

Petrel-3 and Petrel-4 Monitoring and Decommissioning Environment Plan

dr *[Signature]* *Reffers*

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ABBREVIATIONS AND ACRONYMS

AEP	Australian Energy Producers
ACHIS	Aboriginal Cultural Heritage Inquiry System
AHO	Australasian Hydrographic Office
AIMS	Australian Institute of Marine Science
ALARP	As low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environmental Conservation Council
ANZG DGV	Australian New Zealand Guidelines for Fresh and Marine Water Quality Default Guidelines Values
API	American Petroleum Institute
APPEA	Australian Petroleum Production and Exploration Association
ARC	AMSA Rescue Centre
AQIS	Australian Quarantine Inspection Service
BAC	Balanggarra Aboriginal Corporation
BAT	Best Available Techniques
BEP	Best Environmental Practices
BIA	Biologically Important Areas
BTEX	<i>Benzene, toluene, ethylbenzene, and xylenes</i>
CCS	Carbon Capture and Storage
CM	Control Measure
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cth	Commonwealth
DAFF	Department of Agriculture, Fisheries and Forestry
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEE	Department of Environment and Energy
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
DEWHA	Department of Environment, Water, Heritage and the Arts
DITT	Department of Industry, Tourism and Trade
DNP	Director of National Parks
DO	Dissolved Oxygen
DoE	Department of the Environment
DoT	Department of Transport (WA)
DSEWPac	Department of Sustainability, Environment, Water, Population and Communities (Cth)

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EKCCI	East Kimberley Chamber of Commerce
EMBA	Environment that May Be Affected
EP	Environment Plan
EPBC	Environment Protection and Biodiversity Conservation (Act)
EPO	Environmental Performance Outcome
EPS	Environmental Performance Standards
ESD	Ecologically Sustainable Development
GHG	Global greenhouse gas
GVI	General video inspections
HSE	Health, Safety and Environment
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organisation
IMS	Invasive marine species
IMT	Incident Management Team
IOGP	International Association of Oil and Gas Producers
IPA	Indigenous Protected Areas
ISO	International Organisation for Standardisation
ITOPF	International Tank Owners Pollution Federation
IUCN	International Union for the Conservation of Nature
KEF	Key Ecological Features
LDC	Larrakia Development Corporation
LN	Larrakia Nation
LOR	Limit of reporting
LOWC	Loss of Well Control
MARPOL	International Convention for the Prevention of Pollution from Ships
MC	Measurement Criteria
MDO	Marine Diesel Oil
MG	Miriwung and Gajerrong
MNES	Matters of National Environmental Significance
MO	Marine Orders
MOC	Management of Change
MODU	Mobile offshore Drilling Unit
MSL	Mean Sea Level
NAILSMA	North Australian Land and Sea Management Alliance
NEBA	Net Environmental Benefit Analysis
NIAA	National Indigenous Australians Agency
NLC	Northern Land Council

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NMFS	National Marine Fisheries Service
NGOs	Non-government organisations
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Authority
NORMs	Naturally occurring radioactive materials
NT	Northern Territory
NTSC	Northern Territory Seafood Council
NWSA	Northern Wildcatch Seafood Australia
OPEP	Oil Pollution Emergency Plan
OPGGS	Offshore Petroleum and Greenhouse Gas Storage (Act)
OPGGS(E) Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations
OSMP	Operational and Scientific Monitoring Plan
OSPAR	Oil Spill Prevention, Administration and Response Fund
OWR	Oiled Wildlife Response
PAH	Polyaromatic hydrocarbons
PBCs	Prescribed Bodies Corporate
P&A	Plug and Abandonment
PGB	Permanent Guide Base
PMS	Planned Maintenance System
PMST	Protect Matters Search Tool
PNEC	Predicted no effect concentration
POB	Persons on Board
PTS	Permanent Threshold Shift
RAMSAR	Convention on Wetlands of International Importance especially as Waterfowl Habitat
RKB	Rotary kelly bushing
RNTBC	Registered Native Title Body Corporate
ROV	Remotely Operated Vehicle
SCRIP	Source Control Response Planning
SIMAP	Spill Impact Mapping Analysis Program
SOPEP	Ship Oil Pollution Emergency Plan
SPL	Sound Pressure Level
SSS	Side Scan Sonar
STP	Sewage treatment plant
TEC	Threatened ecological communities
TDC	Thamarrurr Development Corporation Ltd
TGB	Temporary Guide Base
TKN	Total Kjeldahl Nitrogen

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TLC	Tiwi Land Council
TOC	Total organic carbon
TP	Total phosphorous
TPH	Total Petroleum Hydrocarbons
TSS	Total suspended solids
TSSC	Threatened Species Scientific Committee
UK	United Kingdom
UMEC	Unguu Monitoring and Evaluation Committee
WA	Western Australia
WCCS	Worst Case Credible Scenario
WOMP	Well Operations Management Plan
WIWA	Working with Indigenous Australia

UNITS

dB	Decibel
cuft	Cubic feet
g/m ²	Grams per metres squared
km	Kilometres
L	Litres
m	Metres
m ²	Metres squared
m ³	Cubic metres
Sm ³	Standard cubic metres
MT	Metric Tons
Scf	Standard cubic feet
µm	Micrometre
nm	Nautical mile
"	Inch

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1 INTRODUCTION

1.1 Activity Overview

Eni Energy Bonaparte Pty Ltd is the titleholder of the Petrel gas field in the Bonaparte Basin in northern Western Australia. The Petrel field is located in permits NT/RL1 and WA-6-R, in water depths of ~95m; and the location is shown in Figure 1-1.

This Environment Plan (EP) applies to two wells (both within NT/RL1) which were suspended in the 1980s:

- Petrel-3; and
- Petrel-4.

This EP has been prepared to meet the requirements of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGGS Act) for decommissioning. The defined petroleum activity for the Petrel-3 and Petrel-4 Monitoring and Decommissioning EP (the petroleum activities) will be limited to:

- Annual general visual inspections (GVI) as part of the in-force Well Operations Management Plan (WOMP) until permanent Petrel-3 and Petrel-4 plug and abandonment (P&A). The current in-force WOMP will be updated in 2025 to include P&A activities, following the pre-decommissioning inspection;
- Geophysical and geotechnical survey campaign;
- Pre-decommissioning inspection to prepare the wells for decommissioning and inform wellhead removal methodology;
- Decommissioning campaign, to permanently seal and abandon the Petrel-3 and Petrel-4 wells and retrieve subsea equipment at or below the mudline;
- In the event that all reasonable attempts to remove and recover the wellheads and associated equipment are unsuccessful, a contingency activity to leave the wellheads and equipment in-situ has been included in this EP; and
- Post-decommissioning seabed survey.

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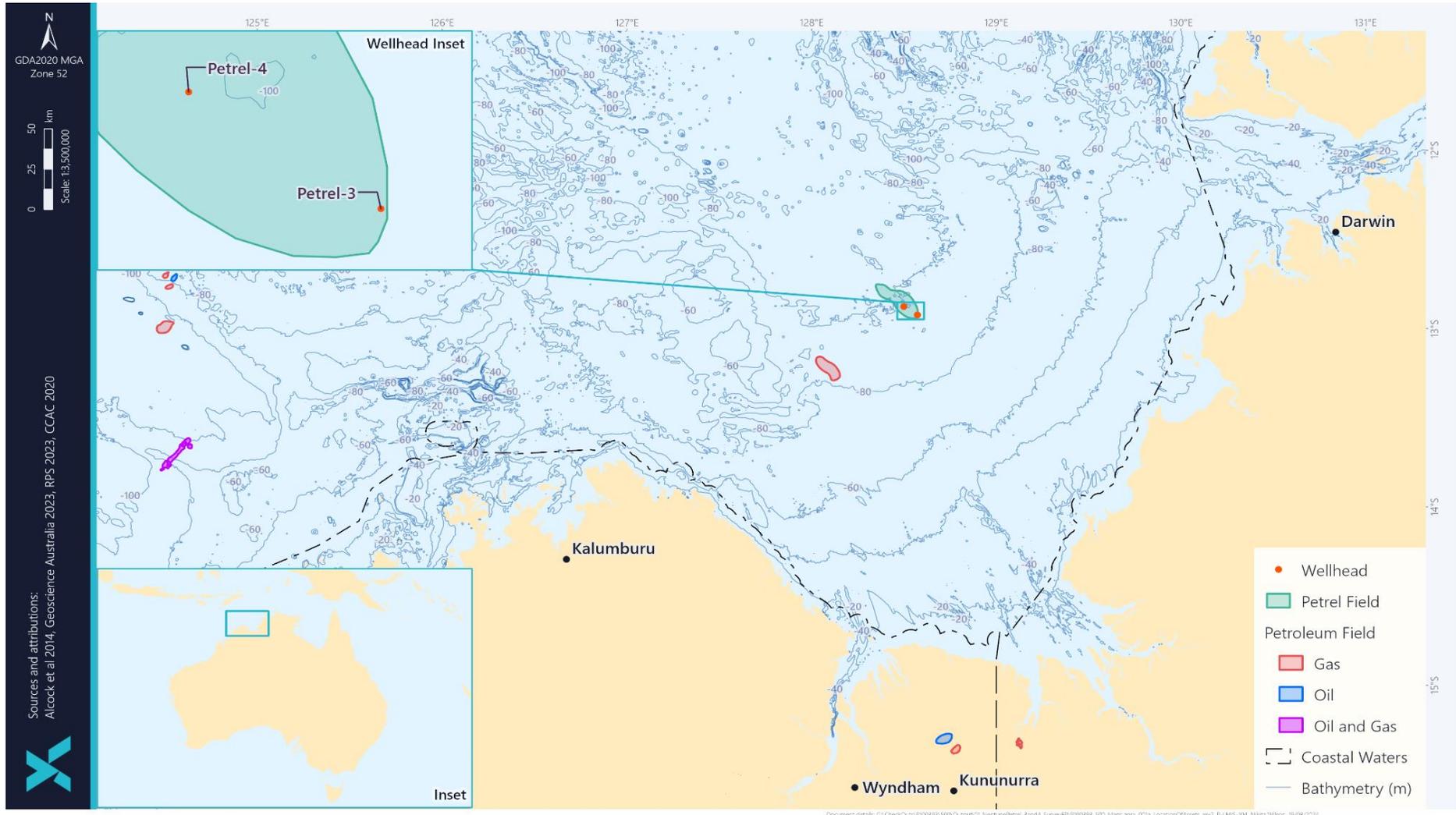


Figure 1-1: Petrel Field Locality

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The Petrel field has undergone extensive exploration and appraisal phases – starting in 1969 with the discovery well Petrel-1. Appraisal drilling was ongoing from the 1980’s through to the last well drilled in 2010 (Petrel-7). At present the field is considered to be in the pre-development phase (Figure 1-2).



Figure 1-2: Phases of Field Development

1.2 Purpose of this Document

This EP has been prepared to demonstrate that appropriate management controls are in place to reduce to as low as reasonably practicable (ALARP) and an acceptable level, the potential for environmental impacts to occur as a result of the monitoring and decommissioning of the suspended wells.

It has been prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (OPGGS(E) Regulations) for acceptance by, the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). This EP details the environmental impacts and risks associated with the Activity and demonstrates how these are reduced to As Low As Reasonably Practicable (ALARP) and to an acceptable level.

1.3 Scope of the Environment Plan

This EP applies to a defined ‘petroleum activity’, as defined in the OPGGS(E) Regulations. For this EP, the planned petroleum activity is defined as:

‘Any other petroleum related operations or works carried out under an instrument, authority or consent granted or issued under the OPGGS Act.’

Specifically, the activities (petroleum activities) covered under this plan include the:

- Ongoing suspension period of the wells and annual GVI surveillance of the seabed equipment on these wells via a non-intrusive visual inspection using a remotely operated vehicle (ROV);
- Geotechnical and geophysical investigation of the seabed conditions;
- Pre-decommissioning activities such as high-pressure cleaning of the wellhead, removal of the corrosion cap and wells external 3D scan;
- Permanent P&A of the Petrel-3 and Petrel-4 wells and retrieval of subsea equipment at or below the mudline;
- In the event that all reasonable attempts to remove and recover the wellheads and associated equipment are unsuccessful, a contingency activity to leave the wellheads and equipment in-situ has been included in this EP; and
- Post-decommissioning inspection to ensure the successful removal of all infrastructures related to Petrel-3 and Petrel-4.

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Activities excluded from the scope of this EP are:

- Future development of the Petrel field; and
- Vessels transiting to or from the Operational Area. These vessels are deemed to be operating under the Commonwealth *Navigation Act 2012* and not performing a petroleum activity.

Eni will permanently abandon both wells and make compliant with Section 270(3)(c) and (d) of the OPGGS Act; however, Eni do not intend to surrender the title under this EP. Title relinquishment will be sought under a separate EP.

1.4 Titleholder Details

Titleholder details for the permit areas are provided in Table 1-1.

Table 1-1: Titleholder Details

Permit Area	Operator	Titleholder Details
NT/RL1 and WA-6-R (Petrel)	Eni Energy Bonaparte Pty Ltd, an affiliate of Eni Australia Ltd, owned and controlled by Eni SpA	Eni Energy Bonaparte Pty Ltd (57%), Santos Limited (24%), Bonaparte Gas and Oil Pty Ltd (19%)

The Operator details are:

Eni Energy Bonaparte Pty Ltd

Level 5, 226 Adelaide Terrace

Perth WA 6000

Telephone: (08) 9320 1111

1.4.1 Details of the Liaison Person

The nominated liaison person for this EP is:

Joe Covic

Health, Safety, Environment and Quality Manager

Eni Australia Ltd

Tel: (08) 9320 1111

Email: info@eniaustralia.com.au

Eni Energy Bonaparte's Australian Business Number is 13 138 853 728 and Australian Company Number is 092 812 023. Eni Energy Bonaparte Pty Ltd is an affiliate of Eni Australia Ltd, owned and controlled by Eni SpA.

1.4.2 Notifying of Change

In the event of a change of titleholder, nominated liaison person or contact details, Eni will provide written notification to NOPSEMA providing details of the change

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2 ENVIRONMENTAL LEGISLATION

The OPGGS(E) Regulations require Eni to describe in this EP the relevant requirements that apply to the petroleum activities, along with how they will be met. Relevant legislation, standards and guidelines are summarised in the next subsections and include:

- Commonwealth legislation (Section 2.1);
- Commonwealth guidelines and policies (Section 2.2); and
- International Agreements (Section 2.3).

While this EP applies to petroleum activities in Commonwealth waters, Section 2.4 summarises key State and Northern Territory requirements relevant to aspects of the petroleum activities outside of NOPSEMA's jurisdiction.

2.1 Commonwealth Legislation

The petroleum activities will be conducted in Commonwealth waters and is therefore subject to Commonwealth legislation, specifically:

- *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act, Section 2.1.1);
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act, Section 2.1.2); and
- *Environmental Protection (Sea Dumping) Act 1981* (Section 2.1.3).

Other Commonwealth legislation is also applicable to environmental management of the petroleum activities; these have been considered in Section 2.1.4.

2.1.1 OPGGS Act 2006 and OPGGS (Environment) Regulations 2023

The *Offshore Petroleum Greenhouse Gas Storage Act 2006* (OPGGS Act) is the principal legislation managing petroleum activities in Australian Commonwealth waters. The OPGGS Act and supporting regulations address all licencing, health, safety environmental and royalty issues for offshore petroleum and gas exploration and production operations in Commonwealth waters. Regulations created under the Act include:

- Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009;
- Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011; and
- Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (OPGGS (E) Regulations).

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 acceptance before activities commence. The object of the OPGGS (E) Regulations is to ensure petroleum activities in Commonwealth waters are performed in a manner:

- consistent with the principles of environmentally sustainable development set out in section 3A of the EPBC Act;

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

The OPGGS (E) Regulations also include requirements for considering matters of national environmental significance (MNES), as defined in Part 3 of the EPBC Act.

Section 572 of the OPGGS Act requires complete removal of all infrastructure above the mudline and plug and abandonment (P&A) of wells as the base case. This requirement has been discussed further in Section 3.3.9.

Section 569 of the OPGGS Act requires good work practices by the titleholder, including the control of flow and preventing the escape of petroleum or water. Section 569 of the OPGGS Act places obligations on petroleum titleholders to control the flow and prevent the escape of petroleum within their title area. Section 572C of the OPGGS Act places duties on petroleum titleholders in the event of an escape of petroleum as a result of, or in connection with their activities (NOPSEMA, 2020b). These requirements are met by the control measures and implementation strategy described in this EP (Section 10), and by the OPEP (Appendix E).

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

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

Section	Requirement	Relevant section in the EP
Consultation with relevant authorities, persons and organisations, etc		
25(1)	<p>In the course of preparing an environment plan, or a revision of an environment plan, a titleholder must consult each of the following (a <i>relevant person</i>):</p> <ul style="list-style-type: none"> 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 NT 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 NT 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. 	Section 5 Relevant Person Consultation
25(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 Relevant Person Consultation
25(3)	The titleholder must allow a relevant person a reasonable period for the consultation.	Section 5 Relevant Person Consultation
25(4)	<p>The titleholder must tell each relevant person the titleholder consults that:</p> <p>(a) the relevant person may request that particular information the relevant person provides in the consultation not be published; and</p> <p>(b) information subject to such a request is not to be published under this Part.</p>	Section 5 Relevant Person Consultation
Environmental assessment		
21(1)	<p><i>Description of the activity</i></p> <p>The environment plan must contain a comprehensive description of the activity, including:</p> <ul style="list-style-type: none"> the location or locations of the activity general details of the construction and layout of any facility or other structure an outline of the operational details of the activity (for example, seismic surveys, exploration drilling or production) and proposed timetables any additional information relevant to consideration of environmental impacts and risks of the activity. 	Section 3.1.2 Operational Area Section 3 Description of the Activity
21(2)	<p><i>Description of the environment</i></p> <p>The environment plan must:</p> <ul style="list-style-type: none"> describe the existing environment that may be affected by the activity include details of the particular relevant values and sensitivities (if any) of that environment. 	Section 4 Description of the Environment

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Section	Requirement	Relevant section in the EP
21(4)	<p><i>Requirements</i></p> <p>The environment plan must:</p> <ul style="list-style-type: none"> describe the requirements, including legislative requirements, that apply to the activity and are relevant to the environmental management of the activity demonstrate how those requirements will be met. 	Section 2 Environmental Legislation
21(5)	<p><i>Evaluation of environmental impacts and risks</i></p> <p>The environment plan must include:</p> <ul style="list-style-type: none"> details of the environmental impacts and risks for the activity an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk 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. 	Section 6 Environmental Risk Assessment Methodology
21(6)	<p>To avoid doubt, the evaluation mentioned in paragraph (5)(b) must evaluate all the significant impacts and risks arising directly or indirectly from:</p> <ul style="list-style-type: none"> all operations of the activity potential emergency conditions, whether resulting from accident or any other reason. 	Section 6 Environmental Risk Assessment Methodology
21(7)	<p><i>Environmental performance outcomes and standards</i></p> <p>The environment plan must:</p> <ul style="list-style-type: none"> set environmental performance standards for the control measures identified under paragraph (5) set out the environmental performance outcomes against which the performance of the titleholder in protecting the environment is to be measured include measurement criteria that the titleholder will use to determine whether each environmental performance outcome and environmental performance standard is being met. 	Section 9 Environment Outcomes, Standards and Measurement Criteria
Implementation strategy for the environment plan		
22(1)	The environment plan must contain an implementation strategy for the activity in accordance with this section.	Section 10 Implementation Strategy
22(2)	<p>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:</p> <ul style="list-style-type: none"> the environmental impacts and risks of the activity continue to be identified and reduced to a level that is as low as reasonably practicable 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 environmental performance outcomes and standards set out in the environment plan are being met. 	Section 10.6 Auditing and Inspection

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Section	Requirement	Relevant section in the EP
22(3)	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
22(4)	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
22(5)	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 10.6 Auditing and Inspection Section 10.7 Non-Conformance, Corrective and Preventative Actions Section 10.8 External Reporting Section 10.9 Internal Reporting
22(6)	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 OPEP (000694_DV_ES.HSE.0285.000)
22(7)	The implementation strategy must: <ul style="list-style-type: none"> state when the titleholder will report to the Regulator in relation to the titleholder's environmental performance for the activity provide that the interval between reports will not be more than one year. 	Section 10.8 External Reporting
22(8)	The implementation strategy must contain an oil pollution emergency plan and provide for the updating of the plan.	OPEP (000694_DV_ES.HSE.0285.000)
22(9)	The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following: <ul style="list-style-type: none"> the control measures necessary for timely response to an emergency that results or may result in oil pollution 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 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 the arrangements and capability in place for monitoring oil pollution to inform response activities. 	OPEP (000694_DV_ES.HSE.0285.000)
22(10)	The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that: <ul style="list-style-type: none"> is appropriate to the nature and scale of the risk of environmental impacts of the activity is sufficient to inform any remediation activities. 	OPEP (000694_DV_ES.HSE.0285.000)

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Section	Requirement	Relevant section in the EP
22(11)	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.	OPEP (000694_DV_ES.HSE.0285.000)
22(12)	The implementation strategy must include arrangements for testing the response arrangements in the oil pollution emergency plan. The testing arrangements must be appropriate to the response arrangements and to the nature and scale of the risk of oil pollution for the activity	OPEP (000694_DV_ES.HSE.0285.000)
22(13)	The arrangements for testing the response arrangements must include: <ul style="list-style-type: none"> statement of the objectives of testing a proposed schedule of tests mechanisms to examine the effectiveness of response arrangements against the objectives of testing mechanisms to address recommendations arising from tests. 	OPEP (000694_DV_ES.HSE.0285.000)
22(14)	The proposed schedule of tests must provide for: <ul style="list-style-type: none"> testing the response arrangements when they are introduced testing the response arrangements when they are significantly amended testing the response arrangements not later than 12 months after the most recent test 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 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. 	OPEP (000694_DV_ES.HSE.0285.000)
22(15)	The implementation strategy must provide for appropriate consultation with: <ul style="list-style-type: none"> relevant authorities of the Commonwealth, a State or a Territory other relevant interested persons or organisations. 	Section 5.6 Ongoing Consultation
22(16)	The implementation strategy must comply with the Act, this instrument, any other regulations made under the Act, and any other environmental legislation applying to the activity.	Section 2 Environmental Legislation

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Section	Requirement	Relevant section in the EP
Details of titleholder and liaison person		
23(1)	The environment plan must include the following details for the titleholder: <ul style="list-style-type: none"> • name • business address • telephone number (if any) • fax number (if any) • email address (if any) • if the titleholder is a body corporate that has an Australian Company Number (within the meaning of the Corporations Act 2001) – Australian Company Number. 	Section 1.4 Titleholder Details
23(2)	The environment plan must also include the following details for the titleholder’s nominated liaison person: <ul style="list-style-type: none"> • name • business address • telephone number (if any) • fax number (if any) • email address (if any). 	Section 1.4.1 Details of Liaison Person
23(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 Implementation Strategy
Other information in the environment plan		
24	The environment plan must contain: <ul style="list-style-type: none"> • a statement of the titleholder’s corporate environmental policy • a report on all consultations under section 25 of any relevant person by the titleholder, that contain: <ul style="list-style-type: none"> - a summary of each response made by a relevant person - an assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates - a statement of the titleholder’s response, or proposed response, if any, to each objection or claim - a copy of the full text of any response by a relevant person. • details of all reportable incidents in relation to the proposed activity. 	Eni Health, Safety and Environment (HSE) Statement (Appendix A: HSE Statement) Section 5 Relevant Person Consultation

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Section	Requirement	Relevant section in the EP
Revision of an environment plan		
38	<p>A titleholder may submit a revised environment plan under section 26 to include a new activity under the title (rather than submit a separate plan for the new activity).</p> <p><i>Note 1: This is subject to NOPSEMA's approval (see subsection 26(7)) and, if the new activity is, or is part of, an offshore project, the requirements of subsections 26(3) to (5).</i></p> <p><i>Note 2: It is an offence to undertake an activity under a title without an environment plan being in force for the activity (see section 17).</i></p>	Section 10.12 Management of Change and Reviews of this EP
39(1)	A titleholder must submit to the Regulator a proposed revision of the environment plan for the activity before the commencement of any significant modification or new stage of the activity that is not provided for in the environment plan that is currently in force.	Section 10.12 Management of Change and Reviews of this EP
39(2)	<p>A titleholder must submit a revised environment plan under section 26 for an activity under the title before, or as soon as practicable after, the occurrence of:</p> <p>a) any significant new environmental impact or risk, or significant increase in an existing environmental impact or risk, of the activity that is not provided for in the environment plan in force for the activity; or</p> <p>(b) a series of new environmental impacts or risks, or a series of increases in existing environmental impacts or risks, which, taken together, amount to the occurrence of:</p> <p>(i) a significant new environmental impact or risk of the activity; or</p> <p>(ii) a significant increase in an existing environmental impact or risk of the activity;</p> <p>that is not provided for in the environment plan in force for the activity.</p>	Section 10.12 Management of Change and Reviews of this EP
39(3)	<p>If:</p> <p>(a) there is a change in the titleholder of a title; and</p> <p>(b) the change will result in a change in the manner in which the environmental impacts and risks of an activity under the title are managed;</p> <p>the new titleholder must submit a revised environment plan for the activity under section 26 as soon as practicable after becoming the new titleholder.</p>	Section 10.12 Management of Change and Reviews of this EP
Revision of an environment plan		
40	A titleholder must submit to the Regulator a proposed revision of the environment plan for an activity if the Regulator requests the titleholder to do so.	Section 10.12 Management of Change and Reviews of this EP

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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 (MNES).

NOPSEMA are the sole designated assessor of petroleum and greenhouse gas (GHG) 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. The objectives of the process include ensuring activities undertaken in the offshore area are conducted in a manner consistent with the principles of ecologically sustainable development (Section 2.1.2.1) and will not result in unacceptable impacts to MNES protected under Part 3 of the EPBC Act.

This has included making specific reference in Section 4 to the values of matters protected under Part 3 of the EPBC Act using references and relevant guidance documents to be considered, such as EPBC Act significance guidance documents, relevant policy statements, plans of management, recovery plans and on-line databases.

Where there is the potential for MNES to be impacted by petroleum activities, an assessment of impacts must be presented in the EP. MNES identified as relevant to the petroleum activities are:

- listed threatened species and ecological communities;
- listed migratory species (protected under international agreements);
- Commonwealth marine environment;
- world heritage properties;
- national heritage places; and
- Ramsar wetlands.

Environmental values and sensitivities, including MNES, are described in Section 4. These descriptions inform the assessment of environmental impacts and risks in Sections 7 and 8.

With regards to section 21(3)(f) of the OPGGS(E) Regulations, more detail has been provided for:

- Key Ecological Features (KEFs) as they are considered a conservation value under a Commonwealth Marine Area; and
- Australian Marine Parks (AMPs) as they are established under the EPBC Act.

More detail has been provided where threatened or migratory species have a spatially defined Biologically Important Area (BIA), as they have been designed to support decision making under the EPBC Act. They are spatially defined areas where aggregations of individuals of a species are known to display biologically important behaviour such as breeding, foraging, resting or migration. BIAs have been referenced in Section 4.

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Important habitat for migratory species is defined within the Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DoE, 2013) as:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
- habitat that is of critical importance to the species at particular life-cycle stages; and/or
- habitat utilised by a migratory species which is at the limit of the species range; and/or
- habitat within an area where the species is declining.

2.1.2.1 Principles of Ecologically Sustainable Development

NOPSEMA also considers whether the petroleum activities are consistent with the principles of ecologically sustainable development (ESD), as defined in the EPBC Act. The principles of ESD include:

- Decision-making processes should effectively integrate both long-term and short term economic, environmental, social and equitable considerations; the 'integration principle';
- If there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation; the 'precautionary principle';
- 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';
- The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making; the 'biodiversity principle'; and
- Improved valuation, pricing and incentive mechanisms should be promoted; the 'valuation principle'.

Eni has considered these principles when assessing environmental impacts and risks in Sections 7 and 8.

2.1.2.2 Management Plans

Under the EPBC Act, listed threatened species are managed through management plans, recovery plans and conservation advice. The purpose of these is summarised in Table 2-2.

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

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

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In relation to offshore petroleum activities in Commonwealth waters, these requirements are now administered by NOPSEMA in accordance with commitments set out in the plans. Recovery plans or threat abatement plans relevant to the scope of this EP have been identified as described in Table 2-3 and assessed in Sections 7 and 8.

Table 2-2: Summary of the purpose of management plans, recovery plans and conservation advice

Plan/Advice	Summary
Recovery plans	Recovery plans are intended to ensure the recovery of threatened species by setting recovery objectives. These objectives are informed by: <ul style="list-style-type: none"> descriptions of the state of the threatened species in Australia and globally identification of threats to the species identification of actions by which these threats may be mitigated, and the recovery objectives achieved.
Conservation advice	Conservation advice provide advice about relevant impacts and threats and set requirements for management and protection. This advice is developed in consultation with the Threatened Species Scientific Committee. Conservation advice: <ul style="list-style-type: none"> describes the threatened species, including its distribution, habitat and conservation status describes threats to the recovery of the species outlines research priorities and conservation actions to prevent further decline of the threatened species.
Wildlife conservation plans	Wildlife conservation plans may be made under the EPBC Act for the protection, conservation and management of species protected under the Act.
Threat abatement plans	Threat abatement plans may be made under the EPBC Act for threatening processes on native species and ecological communities. The plans describe objectives for the mitigation of threatening processes and the actions intended to achieve the objectives.

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Table 2-3: Summary of additional environment protection and biodiversity conservation management and recovery plans and conservation advice relevant to the petroleum activities

Species	Plan or Advice	Protection under EPBC Act	Relevant key threats identified	Relevant objectives	Relevant conservation actions
Vertebrates					
All vertebrate fauna	Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (Commonwealth of Australia, 2018)	N/A	Marine debris	Objectives: <ul style="list-style-type: none"> Contribute to long-term prevention of the incidence of marine debris. Understand the scale of impacts from marine plastic and microplastic on key species, ecological communities and locations. Remove existing marine debris. 	No explicit management actions for non-fisheries-related industries; note that management actions in the plan relate largely to management of fishing waste (e.g., 'ghost' gear), and State and Commonwealth management through regulation.
Marine Mammals					
Blue whale (includes pygmy blue whale)	Conservation Management Plan for the Blue Whale 2015-2025 (DoE, 2015)	Endangered	Noise interference	The long-term recovery objective is to minimise anthropogenic threats to allow the conservation status of the blue whale to improve so that it can be removed from the threatened species list under the EPBC Act.	A.2: Assessing and addressing anthropogenic noise: Assess the effect of anthropogenic noise on blue whale behaviour.
			Vessel disturbance		Action Area A.3: Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury.
					A.4: Minimising vessel collisions: <ul style="list-style-type: none"> Ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented.

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Species	Plan or Advice	Protection under EPBC Act	Relevant key threats identified	Relevant objectives	Relevant conservation actions
			Climate variability and change		Understanding impacts of climate variability and change: <ul style="list-style-type: none"> Continue to meet Australia's international commitments to reduce GHG emissions and regulate the krill fishery in Antarctica.
			Habitat modification (infrastructure/ coastal developments, marine debris, acute and chronic chemical discharge)		No explicit relevant management actions. Habitat modification identified as a threat.
Sei whale	Conservation Advice for <i>Balaenoptera borealis</i> (Sei Whale) (TSSC, 2015)	Vulnerable	Noise interference	No explicit relevant objectives.	Once the spatial and temporal distribution (including biologically important areas) of sei whales is further defined an assessment of the impacts of increasing anthropogenic noise (including from seismic surveys, port expansion, and coastal development) should be undertaken on this species.
			Vessel disturbance		Minimising vessel collisions: <ul style="list-style-type: none"> Develop a national vessel strike strategy that investigates the risk of vessel strikes on sei whales and also identifies potential mitigation measures. Ensure all vessel strike incidents are reported in the National Vessel Strike Database.
			Climate and oceanographic variability and change		Understanding impacts of climate variability and change: <ul style="list-style-type: none"> Continue to meet Australia's international commitments to reduce GHG emissions and regulate the krill fishery in Antarctica.
			Pollution (persistent toxic pollutants)		No explicit relevant management actions. Pollution identified as a threat.

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Species	Plan or Advice	Protection under EPBC Act	Relevant key threats identified	Relevant objectives	Relevant conservation actions
Fin whale	Conservation Advice for <i>Balaenoptera physalus</i> (Fin Whale) (TSSC, 2015a)	Vulnerable	Noise interference	No explicit relevant objectives.	Once the spatial and temporal distribution (including BIAs) of fin whales is further defined, assess the impacts of increasing anthropogenic noise (including seismic surveys, port expansion and coastal development).
			Vessel disturbance		Minimising vessel collisions: <ul style="list-style-type: none"> Develop a national vessel strike strategy that investigates the risk of vessel strikes on fin whales and also identifies potential mitigation measures. Ensure all vessel strike incidents are reported in the National Vessel Strike Database.
			Climate and oceanographic variability and change		Understanding impacts of climate variability and change: <ul style="list-style-type: none"> Continue to meet Australia's international commitments to reduce GHG emissions and regulate the krill fishery in Antarctica.
			Pollution (persistent toxic pollutants)		No explicit relevant management actions. Pollution identified as a threat.
Marine Reptiles					
Loggerhead, hawksbill, green, Olive Ridley, flatback and leatherback turtles	Recovery plan for Marine Turtles in Australia [Department of the Environment and Energy (DEE), 2017]	Endangered (loggerhead, leatherback, Olive Ridley turtles) Vulnerable (green, hawksbill, flatback turtles)	Marine debris	Long-term recovery objective: Minimise anthropogenic threats to allow for the conservation status of marine turtles to improve so they can be removed from the EPBC Act threatened species list. Interim objective 3:	Action Area A3: Reduce the impacts from marine debris: <ul style="list-style-type: none"> Understand the threat posed by marine debris. Determine the extent to which marine debris is impacting turtles.
			Chemical and terrestrial discharge		Action Area A4: Minimise chemical and terrestrial discharge: <ul style="list-style-type: none"> Ensure spill risk strategies and response programs adequately include management for marine turtles and their habitats, particularly in reference to 'slow to recover habitats', such as nesting habitat, seagrass meadows or coral reefs.

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Species	Plan or Advice	Protection under EPBC Act	Relevant key threats identified	Relevant objectives	Relevant conservation actions
			Light pollution	Anthropogenic threats are demonstrably minimised.	Action Area A8: Minimise light pollution: <ul style="list-style-type: none"> Artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats.
			Vessel disturbance		Vessel interactions identified as a threat; no specific management actions in relation to vessels prescribed in the plan.
			Noise interference		No explicit relevant management actions; noise interference identified as a threat.
Leatherback turtle	Approved Conservation Advice for <i>Dermochelys coriacea</i> (Leatherback Turtle) (DEWHA, 2008a)	Endangered	Vessel disturbance	No explicit relevant objectives.	No explicit relevant management actions; only vessel strikes identified as a threat.
			Marine debris		No explicit relevant management actions; marine debris identified as a threat.
			Climate change		No explicit relevant management actions; only climate change identified as a threat.
Leaf-scaled sea snake	Approved Conservation Advice on <i>Aipysurus foliosquama</i> (Leaf-Scaled Sea Snake) (DSEWPaC, 2011a)	Critically Endangered	Habitat degradation or modification	No explicit relevant objectives.	Ensure there is no disturbance in areas where the leaf-scaled sea snake occurs, excluding necessary actions to manage the conservation of the species.
Fish, sharks, and rays					
All sawfish and river sharks	Sawfish and River Shark Multispecies Recovery Plan (Commonwealth of Australia, 2015)	NA	Habitat degradation or modification	The primary objective of this recovery plan is to assist the recovery of sawfish and river sharks in Australian waters with a view to:	Objective 5: Reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species. Identify risks to important sawfish and river shark habitat and measures needed to reduce those risks.

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Species	Plan or Advice	Protection under EPBC Act	Relevant key threats identified	Relevant objectives	Relevant conservation actions
			Marine debris	<ul style="list-style-type: none"> improving the population status, leading to the removal of the sawfish and river shark species from the threatened species list of the EPBC Act ensuring anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future. <p>The specific objectives of the recovery plan (relevant to industry) are:</p> <p>Objective 5: Reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species.</p> <p>Objective 6: Reduce and, where possible, eliminate any adverse impacts of marine debris on sawfish and river shark species noting the linkages with the Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life.</p>	Objective 6: Reduce and, where possible, eliminate any adverse impacts of marine debris on sawfish and river shark species.
Dwarf sawfish	Approved Conservation Advice for <i>Pristis clavata</i> (Dwarf Sawfish) (DEWHA, 2009)	Vulnerable	Habitat degradation or modification		No explicit relevant management actions. Habitat loss, disturbance and modification identified as threats.
Green sawfish	Approved Conservation Advice for Green Sawfish (DEWHA, 2008b)	Vulnerable	Habitat degradation or modification		No explicit relevant management actions. Habitat loss, disturbance and modification identified as threats.
Freshwater sawfish	Approved Conservation Advice for <i>Pristis pristis</i> (largetooth sawfish) (DoE, 2014c)	Vulnerable	Habitat degradation or modification		No explicit relevant management actions. Habitat loss, disturbance and modification identified as threats.
Northern river shark	Approved Conservation Advice for <i>Glyphis garricki</i> (Northern River Shark) (DoE, 2014)	Endangered	Habitat degradation or modification		No explicit relevant management actions. Habitat loss, disturbance and modification identified as threats.

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Species	Plan or Advice	Protection under EPBC Act	Relevant key threats identified	Relevant objectives	Relevant conservation actions
Great white shark	Recovery Plan for the White Shark (<i>Carcharodon carcharias</i>) (DSEWPaC, 2013)	Vulnerable	Habitat modification Climate change	<p>The primary objective of this recovery plan is to assist the recovery of the great white shark in Australian waters with a view to:</p> <p>improving the population status leading to the removal of the great white shark species from the threatened species list of the EPBC Act</p> <p>ensuring anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future.</p>	<p>Ensure anthropogenic activities do not hinder recovery of the species in the near future or impact on the conservation status of the species in the future.</p> <p>No explicit relevant management actions. Ecosystem effects as a result of habitat modification and climate change identified as threats.</p>
Grey nurse shark	Recovery Plan for the Grey Nurse Shark (<i>Carcharias taurus</i>) (DoE, 2014a)	Vulnerable	Pollution and disease	<p>The primary objective of this recovery plan is to assist the recovery of the grey nurse shark in Australian waters with a view to:</p> <p>improving the population status leading to the removal of the grey nurse shark species from the threatened species list of the EPBC Act</p> <p>ensuring anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future.</p>	<p>No explicit relevant management actions. Pollution and disease and ecosystem effects as a result of habitat modification and climate change identified as threats.</p>

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Species	Plan or Advice	Protection under EPBC Act	Relevant key threats identified	Relevant objectives	Relevant conservation actions
Speartooth shark	Approved Conservation Advice for <i>Glyphis glyphis</i> (Speartooth Shark) (DoE, 2014b)	Critically Endangered	Habitat degradation or modification	No explicit relevant objectives.	Implement measures to reduce adverse impacts of habitat degradation or modification.
Whale shark	Approved Conservation Advice for <i>Rhincodon typus</i> (Whale Shark) (TSSC, 2015b)	Vulnerable	Vessel disturbance	To maintain existing levels of protection for the whale shark in Australia while working to increase the level of protection afforded to the whale shark within the Indian Ocean and Southeast Asia region to enable population growth so that the species can be removed from the threatened species list of the EPBC Act.	Minimise offshore developments and transit time of large vessels in areas close to marine features likely to correlate with whale shark aggregations along the northward migration route that follows the northern Western Australian coastline along the 200m isobath (as set out in the Conservation Values Atlas, DoE, 2014).
			Habitat degradation or modification		Implement measures to reduce adverse impacts of habitat degradation or modification.
			Marine debris		No explicit relevant management actions. Marine debris identified as a threat.
			Climate change		No explicit relevant management actions. Climate change identified as a threat.
Seabirds and shorebirds					
Seabirds	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia, 2020)	NA	Habitat loss or modification	Seabirds and their habitats are protected and managed in Australia.	No explicit relevant management actions. Habitat loss or modification identified as a threat.
			Anthropogenic disturbance		2d. Ensure all areas of important habitat for seabirds are considered in the development assessment process. 2e. Manage the effects of anthropogenic disturbance to seabird breeding and roosting areas.
			Climate change		No explicit relevant management actions. Climate change identified as a threat.

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Species	Plan or Advice	Protection under EPBC Act	Relevant key threats identified	Relevant objectives	Relevant conservation actions
			Invasive species Pollution (marine debris, light, water) Resource extraction		2f. Ensure seabirds are protected from the adverse effects of invasive species. 2h. Enhance contingency plans to prevent and respond to environmental emergencies that have an impact on seabirds and their habitats. No explicit relevant management actions. Resource extraction identified as a threat. Noted that seabirds are known to aggregate around oil and gas platforms in above-average numbers due to night lighting and other visual cues.
Migratory shorebirds	Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2015a)	NA	Habitat loss or modification	Anthropogenic threats to migratory shorebirds in Australia are minimised or, where possible, eliminated.	No explicit relevant management actions. Habitat loss or modification identified as a threat.
			Anthropogenic disturbance		3c. Investigate the significance of cumulative impacts on Migratory shorebird habitat and populations in Australia. 3f. Ensure all areas important to Migratory shorebirds in Australia continue to be considered in development assessment processes, specifically for coastal developments.
			Climate change		3b: Investigate the impacts of climate change on Migratory shorebird habitat and populations in Australia.
Curlew sandpiper	Approved Conservation Advice for <i>Calidris ferruginea</i> (Curlew Sandpiper) (DCCEEW, 2023b)	Critically Endangered	Chronic and acute pollution	Minimise further loss of habitat critical to the survival of curlew sandpiper throughout Australia (including habitat predicted to become habitat critical in the future because of climate change).	No explicit relevant management actions for pollution or climate change.
			Climate change		Ensure that functional connectivity of sites is maintained throughout the species' migration network, including inland wetlands and coastal sites.

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Species	Plan or Advice	Protection under EPBC Act	Relevant key threats identified	Relevant objectives	Relevant conservation actions
Eastern curlew	Conservation Advice for <i>Numenius madagascariensis</i> (far eastern curlew) (DCCEEW, 2023c)	Critically Endangered	Chronic and acute pollution Climate change	Minimise further loss of habitat critical to the survival of far eastern curlew throughout Australia (including habitat predicted to become habitat critical in the future because of climate change).	No explicit relevant management actions for pollution or climate change. Ensure that functional connectivity of sites is maintained throughout the species' migration network.
Red knot	Approved Conservation Advice for <i>Calidris canutus</i> (Red Knot) (DCCEEW, 2024a)	Vulnerable	Chronic and acute pollution Climate change	Minimise further loss of habitat critical to the survival of red knot throughout Australia (including habitat predicted to become habitat critical in the future because of climate change).	No explicit relevant management actions for pollution or climate change. Ensure that functional connectivity of sites is maintained throughout the species' migration network
Sharp-tailed sandpiper	Conservation Advice for <i>Calidris acuminata</i> (sharp-tailed sandpiper) (DCCEEW, 2024b)	Vulnerable	Climate change Chronic and acute pollution	Minimise further loss of habitat critical to the survival of sharp-tailed sandpiper throughout Australia (including habitat predicted to become habitat critical to survival in the future because of climate change).	No explicit relevant management actions for pollution or climate change. Ensure that functional connectivity of sites is maintained throughout the species' migration network.
Red-tailed Tropicbird (Indian Ocean)	Conservation Advice for <i>Phaethon rubricauda westralis</i> (Indian Ocean red-tailed tropicbird) (DCCEEW, 2023f)	Endangered	Climate change	Primary conservation objective: A stable or increasing population trend within Australian territory is maintained to the extent that the subspecies is no longer eligible to be listed under the EPBC Act.	No explicit relevant management actions. Climate driven change in resource availability and extreme natural events identified as threats.

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2.1.2.3 Australian Marine Parks

Under the EPBC Act, Australian Marine Parks (AMPs) are declared in Commonwealth waters based on the International Union for the Conservation of Nature (IUCN) principles and guidelines for categorising protected areas. These AMPs are declared for the purpose of conserving marine habitats and the species that live and rely on these habitats. AMPs are managed under a series of region-based management plans, which detail the management objectives of the AMP, the environmental values within each of the AMPs, and the activities that are permissible within the zones of the AMP.

The EPBC Act allows AMPs to be divided into zones and a category assigned to each, which may differ from the overall category of the AMP. The EPBC Regulations prescribe the Australian IUCN Reserve Management Principles (Environment Australia, 2002) applicable to each category. All activities undertaken within an AMP must be consistent with the objectives of the zone and the values of the AMP (DNP, 2018a), being:

- Special Purpose Zone (IUCN category VI) – to provide for ecologically sustainable use and the conservation of ecosystems, habitats and native species, while applying special-purpose management arrangements for specific activities
- Multiple Use Zone (IUCN category VI) – to provide for ecologically sustainable use and the conservation of ecosystems, habitats and native species
- Habitat Protection Zone (IUCN category IV) – to provide for the conservation of ecosystems, habitats and native species in as natural a state as possible, while allowing activities that do not harm or cause destruction to seafloor habitats
- National Park Zone (IUCN category II) – to provide for the protection and conservation of ecosystems, habitats and native species in as natural a state as possible.

Zoning takes into account the purposes for which the AMP was declared, the objectives of the region-based management plan, and the requirements of the EPBC Act.

AMPs relevant to the petroleum activities are described in detail in Section 4.5.1.1.

2.1.2.4 Australian Whale Sanctuary

The Australian Whale Sanctuary has been established to protect all whales and dolphins found in Australian waters. The Australian Whale Sanctuary comprises the Commonwealth marine area, beyond the coastal waters of each state and the NT. It includes all of Australia's Exclusive Economic Zone, from 3nm extending 200nm from the coast. Under the EPBC Act, all cetaceans – whales, dolphins and porpoises – are protected in Australian waters: In summary:

- The Australian Whale Sanctuary includes all Commonwealth waters from the 3nm state waters limit out to the boundary of the Exclusive Economic Zone; as in, out to 200nm and further in some places.
- Within the Australian Whale Sanctuary, it is an offence to kill, injure or interfere with a cetacean. Severe penalties apply to anyone convicted of such offences.

2.1.3 Environment Protection (Sea Dumping) Act 1981

The *Environment Protection (Sea Dumping) Act 1981* enacts the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the London Protocol).

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The *Sea Dumping Act 1981* came into operation on 6 March 1984. The Petrel-3 wellhead predates the Act as it was temporarily plugged and abandoned in 1981; and the Act does not apply.

However, the Petrel-4 wellhead was temporarily plugged and abandoned in 1988, after the *Sea Dumping Act 1981* came into force. As a result, the Act mandates a sea dumping permit if the Petrel-4 wellhead and its associated equipment is left in-situ as a contingency activity only, in the event that all reasonable attempts to recover the subsea equipment as per the wellhead decision framework (Figure 3-7) are not successful.

2.1.4 Additional Relevant Commonwealth Legislation

Table 2-4 summarises additional Commonwealth legislation relevant to the petroleum activity. Further information about international agreements is provided in Section 2.4.

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Table 2-4: Summary of Commonwealth legislation relevant to the petroleum activities

Legislation	Scope	Application to Activities	Related International Conventions Relevant to Activity	Administering Authority
<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i>	This Act provides for the preservation and protection from injury or desecration areas and objects that are of significance to Aboriginal people, under which the Minister may make a declaration to protect such areas and objects. The Act also requires the discovery of Aboriginal remains to be reported to the Minister.	No activity being undertaken on land or near shore. There are no known Aboriginal heritage sites or Indigenous Protected Areas within the Operational Area or EMBA. No First Nations cultural heritage sites or values were identified within the Operational Area during consultation with relevant persons.	Not Applicable	Department of Climate Change, Energy, the Environment and Water (DCCEEW)
<i>Air Navigation Act 1920</i>	This Act is responsible for managing navigation within the avian environment.	Helicopter and other aircraft activities operating will comply with the requirements under this Act.	Not Applicable	Department of Infrastructure, Transport, Regional Development, Communications and the Arts
<i>Australian Heritage Council Act 2003</i>	This Act identifies areas of heritage value listed on the Register of the National Estate and sets up the Australian Heritage Council and its functions.	There are no heritage places found on the National Heritage List, within the EMBA that could potentially be impacted by unplanned events.	Not Applicable	Australian Heritage Council
<i>Australian Maritime Safety Authority Act 1990</i>	The Act aims to: <ul style="list-style-type: none"> • promote maritime safety • protect the marine environment from: <ul style="list-style-type: none"> - pollution from ships - other environmental damage caused by shipping, and • provide for a national search and rescue service. AMSA is the authority responsible for the application of the Act.	The Act is applicable to offshore petroleum activities where these have the potential to affect maritime safety and/or result in pollution and other environmental damage associated with the operation of ships. This is in particular relevant to the potential risk of oil spill associated with offshore petroleum activities.	International Convention on Oil Pollution Preparedness, Response and Cooperation 1990 (OPRC 90).	Australian Maritime Safety Authority (AMSA)

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Legislation	Scope	Application to Activities	Related International Conventions Relevant to Activity	Administering Authority
		Impacts and risks associated with vessel and MODU movements as part of the proposed activities are discussed in Sections 7 and 8.		
<i>Biosecurity Act 2015</i>	<p>The <i>Biosecurity Act 2015</i> replaced the <i>Quarantine Act 1908</i> in June 2016.</p> <p>Provides a definition of 'quarantine' and establishes the Australian Quarantine Inspection Service (AQIS). For the petroleum industry, it regulates the condition of vessels and drill rigs entering Australian waters with regards to ballast water and hull fouling.</p> <p>The regulations stipulate that all information regarding the voyage of the vessel and the ballast water is declared correctly to the quarantine officers.</p>	<p>For the petroleum industry, it regulates the condition of vessels and drill rigs entering Australian waters with regards to ballast water and hull fouling.</p> <p>Management measures related to biosecurity risk associated with the program are presented in Section 8.3.</p>	International Convention for the Control and Management of Ships Ballast Water and Sediment 2004	AQIS and Department of Agriculture, Fisheries and Forestry (DAFF)
<i>Climate Change Act 2022</i>	This Act sets out Australia's greenhouse gas emissions reduction targets in a manner consistent with the Paris Agreement and Australia's Nationally Determined Contribution (NDC).	The emissions targets established by this Act are inclusive of offshore petroleum activities.	The Paris Agreement	The Commonwealth Government
<i>Environment Protection and Biodiversity Conservation Regulations 2000: Division 8.1</i>	These regulations provide guidelines for operating aircraft and vessels in the vicinity of cetaceans.	All vessels and aircraft undertaking the activities will comply with the requirements of the Regulations. The requirements are detailed in the Australian National guidelines for Whale and Dolphin Watching.	Not applicable	DCCEEW
<i>Hazardous Waste (Regulation of Exports and Imports) Act 1989</i>	Implements Australia's obligations under the Basel Convention on the Control or Transboundary Movements of Hazardous Wastes and their Disposal.	<p>All ships involved in offshore petroleum activities in Australian waters are required to abide to the requirements under this Act.</p> <p>The management of waste is discussed in Sections 7 and 8.</p>	Not applicable	DCCEEW

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Legislation	Scope	Application to Activities	Related International Conventions Relevant to Activity	Administering Authority
National Environment Protection (National Pollutant Inventory) Measure 1998 (established under the <i>National Environment Protection Council Act 1994</i>)	<p>This Act aims to implement national environment protection matters to enhance, restore and protect the Australian environment.</p> <p>The Measure provides the framework for developing and establishing the National Pollutant Inventory, which is an internet database designed to provide publicly available information about the types, and amount of certain substances being emitted to the air, land and water.</p>	Reporting requirements for the petroleum activity will comply with the National Environment Protection Measure through routine reporting of the relevant National Pollutant Inventory Substances.	Not applicable	DCCEEW
<i>National Greenhouse and Energy Reporting Act 2007</i> (NGER Act)	<p>The first objective of this Act is to introduce a single national reporting framework for the reporting and dissemination of information related to greenhouse gas emissions, greenhouse gas projects, energy consumption and energy production of corporations to:</p> <ul style="list-style-type: none"> inform government policy formulation and the Australian public; and meet Australia's international reporting obligations; and assist Commonwealth, State and Territory government programs and activities; and avoid the duplication of similar reporting requirements in the States and Territories. <p>The second object of this Act is to ensure that net covered emissions of greenhouse gases from the operation of a designated large facility do not exceed the baseline applicable to the facility.</p>	<p>Reporting requirements for GHG emissions associated with Petrel-3 and Petrel-4 Monitoring and Decommissioning will comply with the reporting requirements of the Act, including the NGER requirements.</p> <p>The management of atmospheric emissions is discussed in Section 7.4.</p>	United Nations Framework Convention on Climate Change (UNFCCC) 1992	Clean Energy Regulator DCCEEW
<i>Navigation Act 2012</i>	The Act regulates international ship and seafarer safety as well as the protection of the marine environment from shipping and the actions of seafarers in Australian waters. The Navigation Act also gives effect to international conventions for maritime issues where Australia is a	All vessels involved in petroleum activities in Australian waters will comply with the requirements under this Act.	Certain sections of MARPOL.	AMSA

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Legislation	Scope	Application to Activities	Related International Conventions Relevant to Activity	Administering Authority
	signatory, including the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). The Act regulates: <ul style="list-style-type: none"> • Vessel survey and certification • Vessel construction standards • Vessel crew • Personnel qualifications and welfare • Occupational health and safety • Handling of cargoes • Passengers • Marine pollution prevention • Monitoring and enforcement activities. 	Several Marine Orders (MO) are enacted under this Act which relate to offshore petroleum activities, including: <ul style="list-style-type: none"> • MO Part 21: Safety of navigation and emergency procedures • MO Part 30: Prevention of collisions • MO Part 59: Offshore industry vessel operations Management measures related to shipping safety during the program are presented in Section 7 and 8.		
<i>Ozone Protection and Synthetic Greenhouse Gas Management Act 1989</i> (and associated regulations)	Regulates the manufacture, importation and use of ozone depleting substances (ODS) (typically used in fire-fighting equipment and refrigerants). Applicable to the handling of any ODS.	The activity does not include import, export or manufacture activities of ODS. This Act applies where ODS is found on vessel refrigeration systems, however, this is a rare occurrence.	Montreal Protocol on Substances that Deplete the Ozone Layer. Vienna Convention for the Protection of the Ozone Layer 1985 and the Montreal Protocol on Substances that Deplete the Ozone Layer 1987	DCCEEW
<i>Protection of the Sea (Harmful Antifouling Systems) Act 2006</i>	The Act aims to protect the marine environment from the effects of harmful anti fouling systems.	All ships involved in offshore petroleum activities in Australian waters will comply with the requirements under this Act. The marine order that relates to petroleum activities is:	International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001.	AMSA

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Legislation	Scope	Application to Activities	Related International Conventions Relevant to Activity	Administering Authority
		<ul style="list-style-type: none"> MO Part 98: Marine Pollution Prevention – Anti-fouling Systems. <p>The management of biofouling risk is discussed in Section 8.3.</p>		
<i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i>	<p>The Act aims to protect the marine environment from pollution by oil and other harmful substances discharged from ships in Australian waters. It also invokes certain requirements of the MARPOL Convention such as those relating to discharge of noxious liquid substances, sewage, garbage and air pollution.</p> <p>This Act requires ships greater than 400 gross tonnes to have pollution emergency plans in place, and also provides for emergency discharges from ships.</p>	<p>All vessels involved in petroleum activities in Australian waters will comply with the requirements under this Act.</p> <p>Several MOs are enacted under this Act relating to offshore petroleum activities, including:</p> <ul style="list-style-type: none"> MO Part 91: Marine Pollution Prevention – Oil MO Part 93: Marine Pollution Prevention – Noxious Liquid Substances MO Part 94: Marine Pollution Prevention – Harmful Substances in Packaged Forms MO Part 95: Marine Pollution Prevention – Garbage MO Part 96: Marine Pollution Prevention – Sewage MO Part 97: Marine Pollution Prevention – Air Pollution. <p>Management measures related to pollution from oil or other hazardous substances are presented in Section 8.</p>	Various parts of MARPOL.	AMSA
<i>Protection of the Sea (Civil Liability of Bunker</i>	This Act implements the requirements for the International Convention on Civil Liability for Bunker Oil Pollution Damage.	This Act applies to diesel refuelling which will occur during the decommissioning campaign.	International Convention on Civil	AMSA

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Legislation	Scope	Application to Activities	Related International Conventions Relevant to Activity	Administering Authority
<i>Oil Pollution Damage) Act 2008</i>			Liability for Oil Pollution Damage	
<i>Sea Installations Act 1987</i>	<p>The Sea Installations Act regulates the placement, use and maintenance of seabed installations in Australian waters. A sea installation refers to any manmade structure that is in contact with the seabed and used for an environment-related activity, for example:</p> <ul style="list-style-type: none"> • Tourism or recreation • Carrying on of a business • Exploring, exploiting or using the living resources of the sea, seabed or sub-soil of the seabed whether by way of fishing, pearling, oyster farming, fish farming or otherwise • Marine archaeology • Other activities including scientific activity or transport activity. 	<p>Yes – the London Protocol is implemented through Section 5 of the Sea Dumping Act; Article 1.4.1.4 of the London Protocol covers the abandonment of manmade structures.</p>	<p>Article 1.4.1.4 of the London Protocol is implemented through Section 5 of the Sea Dumping Act</p>	DCCEEW
<i>Underwater Cultural Heritage Act 2019</i>	<p>Protects the heritage values of shipwrecks, sunken aircraft and relics (older than 75 years) in Australian Territorial waters from the low water mark to the outer edge of the continental shelf (excluding the State’s internal waterways). The Act allows for protection through the designation of protection zones. Activities / conduct prohibited within each zone will be specified.</p>	<p>The Act is applicable to any activities that have the potential to result in damage, interference, removal or destruction of cultural heritage properties protected under the Act.</p> <p>Heritage values of the area of the proposed activities are described in Section 4.6.8 and management measures regarding heritage values discussed in Sections 7 and 8.</p>	<p>Convention on Protection of the Underwater Cultural Heritage 2001.</p>	DCCEEW

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2.2 Commonwealth Guidelines and Policies

While guidelines do not typically have force under legislation, they are often considered to be consistent with good practice. Table 2-5 summarises the Commonwealth policies and guidelines that are relevant to the petroleum activities.

Table 2-5: Summary of Commonwealth guidelines and policies relevant to the decommissioning activities

Policies and guidelines	Summary	Relevance to the Petrel-3 and Petrel-4 Activities
Assessing and Managing Impacts to Underwater Cultural Heritage in Australian Waters – Guidelines on the application of the Underwater Cultural Heritage Act 2018 (DCCEEW, 2024g)	Provides guidance on addressing legislative obligations for proponents of near and offshore developments, and promotes best practice for identifying, assessing, and protecting underwater cultural heritage in Australian waters.	Relevant for assessing impact to cultural heritage values.
Draft Australian Government guidance for removal of oil and gas property and sea dumping of infrastructure in Commonwealth waters (Commonwealth of Australia, 2022)	The draft guidance outlines the types of property and infrastructure that can't be left in the sea. It also includes the types that may be permitted to be left in the sea, in limited circumstances. It clarifies: <ul style="list-style-type: none"> • how Australia's offshore decommissioning and sea dumping frameworks connect. • the application and assessment considerations when an oil and gas titleholder is seeking permission to leave property or infrastructure in place. 	Although in draft form, is relevant for wellhead removal options.
Australian and New Zealand guidelines for fresh and marine water quality (Commonwealth of Australia and New Zealand Government, 2018)	Provides guidelines and a comprehensive set of tools for assessing and managing ambient water and sediment quality.	Where relevant, changes to water and sediment quality will be assessed using the methods and guideline concentrations for toxicants in the guideline.
Australian Ballast Water Management Requirements (DAWE, 2020).	Provides requirements for management measures to reduce the risk of introducing harmful aquatic organisms into Australia's marine environment through ships ballast water.	All vessels undertaking petroleum activities will be required to comply with the requirements.
Australian Biofouling Management Requirements (DAFF, 2023)	Provides requirements for the management of biofouling when operating vessels under biosecurity control within Australian territorial seas.	Where relevant, vessels will comply with the requirements including pre-arrival reporting.

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Policies and guidelines	Summary	Relevance to the Petrel-3 and Petrel-4 Activities
International Maritime Organization (IMO) Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (Biofouling Guidelines) (IMO, 2023)	Guidelines for controlling and managing ships' biofouling to minimise the transfer of invasive aquatic species.	Specific requirements are that vessels have a biofouling management plan and biofouling record book.
Matters of National Environmental Significance – Significant Impact Guidelines 1.1 (DoE, 2013)	Guidelines to assist in determining whether an action is likely to have a significant impact on a matter of national environmental significance.	The guidelines inform the impact assessment detailed in this EP.
National biofouling management guidelines for the petroleum production and exploration industry (Marine Pest Sectoral Committee, 2018).	A voluntary biofouling management guidance document developed under the National System for the Prevention and Management of Marine Pest Incursions. Its purpose is to provide tools to operators to minimise the amount of biofouling accumulating on their vessels, infrastructure and submersible equipment, thereby minimising the risk of spreading marine pests.	All vessels undertaking petroleum activities will implement effective biofouling controls as a best practice.
National Light Pollution Guidelines for Wildlife (DCCEEW, 2023)	The guidelines provide best-practice industry standard for managing potential impacts of light pollution on marine fauna.	National Light Pollution Guidelines for Wildlife are used when assessing the relevant mitigation controls to apply to the petroleum activities light emissions.
NOPSEMA Bulletins – Oil Spill Modelling (NOPSEMA, 2019)	Provides advice relating to applying oil spill modelling to support risk evaluations.	The spill modelling and associated outputs have been developed in accordance with the guidance note.
NOPSEMA Policy – Section 572 Maintenance and removal of property (NOPSEMA, 2022)	Outlines NOPSEMA's expectations on maintaining and removing property.	Decommissioning and removal of the Petrel-3 and Petrel-4 infrastructure have been designed and selected to meet the regulatory base case for full removal.
NOPSEMA Information paper – Reducing marine pest biosecurity risks through good practice biofouling management (NOPSEMA, 2020a)	Provides advice that is consistent with the expectations of all jurisdictions responsible for regulating biofouling management within the Australian marine environment. Also clarifies biosecurity requirements relevant to offshore activities.	The petroleum activities will comply with the relevant biosecurity requirements, including adopting requirements that may apply to the movement of vessels into and between Commonwealth and State jurisdiction.
NOPSEMA Guidance Note: Petroleum activities and Australian Marine Parks (NOPSEMA, 2024b)	Provides guidance on managing petroleum activities risks and impacts to Australian Marine Parks and to support consultation with the Director of National Parks (DNP).	The EMBA overlaps with the Oceanic Shoals Marine Park (Section 4.5.1.1). The guidance has been used when consulting the relevant persons (Section 5).

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Policies and guidelines	Summary	Relevance to the Petrel-3 and Petrel-4 Activities
NOPSEMA Guideline: Consultation in the course of preparing an environment plan (NOPSEMA, 2023)	Provides guidance on consultation for EPs. This guideline is used to develop processes for implementing consultation. The guideline focuses on the instructive reasons given by the Full Federal Court of Australia, in its appeal decision Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 (appeal decision) on 2 December 2022.	The guidance has been used when consulting the relevant persons (Section 5).
NOPSEMA Guideline: Consultation with Commonwealth agencies with responsibilities in the marine area (NOPSEMA, 2024c)	Provides guidance on consultation for EPs, specifically Australian Government agencies with responsibilities in the Commonwealth marine area.	The guidance has been used when consulting the relevant persons (Section 5).
NOPSEMA Guidance Note: Responding to public comment on environment plans (NOPSEMA, 2024a)	Provides guidance on consultation for EPs. The guidance reflects NOPSEMA's interpretation of the requirements of the OPGGS Regulations.	The guidance has been used when consulting the relevant persons (Section 5).
NOPSEMA Guidance note: When to submit a proposal revision of an EP (NOPSEMA, 2024d)	Provides guidance on NOPSEMA's interpretation of the requirements to revise an EP under Part 4 Division 5 of the <i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023</i> .	The guidance has been used when consulting the relevant persons (Section 5).
NOPSEMA Guidance note: Environment plan content requirement (NOPSEMA, 2024e)	Assists stakeholders in understanding the requirements for preparing and submitting an EP for assessment.	The guidance has been used when consulting the relevant persons (Section 5).
Offshore Installations – Biosecurity Guide (DAFF, 2023a)	Provides the offshore petroleum industry with guidance about Australian biosecurity requirements.	All decommissioning activity vessels implement effective biosecurity controls, in accordance with the requirements of this biosecurity guideline.
NOPSEMA Policy: Regulatory compliance monitoring, enforcement and intervention for offshore oil pollution incidents (NOPSEMA, 2020b)	Describes the duties of petroleum titleholders in relation to oil pollution, the suite of compliance monitoring, enforcement and intervention powers available to NOPSEMA during an oil pollution incident, and the extension of those powers in the event of a declared oil pollution emergency that originates in Commonwealth waters	Titleholder duties to control the flow and prevent the escape of petroleum within their title area; and duties in the event of an escape (i.e. OPEP).

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Policies and guidelines	Summary	Relevance to the Petrel-3 and Petrel-4 Activities
Offshore Petroleum Decommissioning Guideline (Department of Industry, Science and Resources, 2022)	Provides a decommissioning guideline and confirms the Australian Government's policy expectation that removing property is the 'base case' or default decommissioning requirement. Assists the offshore petroleum industry in planning and seeking the regulatory approvals necessary to undertake a decommissioning project, and to understand the expectations of relevant decision-makers.	Decommissioning and removal of the Petrel-3 and Petrel-4 infrastructure have been designed and selected to meet the regulatory base case for full removal.

2.3 International Agreements

International agreements and conventions that are relevant to the proposed activity are summarised in Table 2-6.

Table 2-6: Applicable international agreement and conventions

International Agreements and Conventions	Summary
Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment 1974, commonly referred to as JAMBA	These agreements recognise international concern for protecting migratory birds and birds in danger of extinction. The EPBC Act gives effect to the agreement by listing migratory birds recognised by it. Migratory species are MNES.
Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment 1986, commonly referred to as CAMBA	These agreements recognise international concern for protecting migratory birds and birds in danger of extinction. The EPBC Act gives effect to the agreement by listing migratory birds recognised by it. Migratory species are MNES.
Convention on Biological Diversity 1992	This convention aims to conserve biological diversity, sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.
Convention on the Conservation of Migratory Species of Wild Animals 1979 (Bonn Convention)	This convention aims to improve the status of all migratory species by national action and international agreements between range states. The EPBC Act gives effect to the Bonn Convention through listing species as Migratory under Part 3 of the Act. Migratory species are MNES.
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, seaports and oil handling. The convention recognises that in the event of a pollution incident, prompt and effective action is essential.

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International Agreements and Conventions	Summary
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (known as the London Convention and more recently, the London Protocol)	The London Convention contributes to the international control and prevention of marine pollution by prohibiting the dumping of certain hazardous materials. The <i>Environment Protection (Sea Dumping) Act 1981</i> gives effect to the London Protocol.
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. 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 the Protection of the Underwater Cultural Heritage	The 2001 Convention provides a framework on how to better identify, research and protect underwater heritage.
Convention on Wetlands of International Importance (Ramsar Convention)	The Ramsar Convention provides for conserving and sustainably using wetlands. The EPBC Act gives effect to the Ramsar Convention by providing specific protection for wetlands recognised by the Convention under Part 3 of the EPBC Act.
International Convention for the Control and Management of Ships Ballast Water and Sediment 2004	This convention aims to prevent the spread of harmful aquatic organisms from one region to another via ballast water and sediment. The <i>Biosecurity Act 2015</i> gives effect to the convention.
International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978	This convention sets out minimum standards for masters, officers and watch personnel on merchant vessels. The <i>Navigation Act 2012</i> and subsidiary Marine Orders give effect to the convention.
International Convention for the Safety of Life at Sea 1974	This convention sets out minimum standards for constructing, equipping and operating merchant ships. The convention requires signatory flag states to ensure the ships flagged by them comply with these standards as a minimum. The <i>Navigation Act 2012</i> and subsidiary Marine Orders give effect to the convention.
International Regulations for Preventing Collisions at Sea 1972	These regulations outline internationally recognised navigation rules to be used by vessels at sea to avoid collisions. The regulations are published by the International Maritime Organization (IMO). The <i>Navigation Act 2012</i> and subsidiary Marine Orders give effect to the regulations.
International Convention on Civil Liability for Oil Pollution Damage 1969	The Civil Liability Convention ensures 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 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.
Kyoto Protocol	This is an international treaty that extends the 1992 United Nations Framework Convention on Climate Change, which commits state parties to reducing GHG emissions.
The Paris Agreement	The Paris Agreement aims to limit global temperature rise this century to well below 2°C above preindustrial levels and to pursue efforts to limit the temperature increase even further to 1.5°C.

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International Agreements and Conventions	Summary
Vienna Convention for the Protection of the Ozone Layer 1985 and the Montreal Protocol on Substances that Deplete the Ozone Layer 1987	The convention is a multilateral environmental agreement that acts as a framework for international efforts to protect the ozone layer. The accompanying Montreal Protocol specifies goals for reducing the uses of chlorofluorocarbons, the main chemical agents causing ozone depletion.
Minamata Convention on Mercury 2013	The convention is an international treaty that seeks to protect human health and the environment from anthropogenic (caused by humans) emissions and releases of mercury and mercury compounds. The convention covers all aspects of the lifecycle of mercury, controlling and reducing mercury across a range of products, processes and industries. Department of Climate Change, Energy, the Environment and Water (DCCEEW) leads Australia's involvement in the Minamata Convention. It was ratified in Australia in 2021.
United Nations Framework Convention on Climate Change 1992	The convention is an international environmental treaty with the objective of stabilising GHG concentrations at a level that would prevent dangerous anthropogenic interference with the climate system.

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2.4 Western Australian and Northern Territory Legislation

The Petrel field is located in Australian Commonwealth waters adjacent to the Western Australian (WA) coast. The EMBA does not enter WA or NT waters.

Vessels supporting the petroleum activities will pass through either WA or NT waters while transiting to and from a port and will have to comply with a variety of WA legislation. Table 2-7 summarises legislation relevant to the petroleum activities.

Table 2-7: Summary of WA and NT legislation relevant to the petroleum activities

Legislation	Summary
WA	
<i>Biodiversity Conservation Act 2016</i>	The <i>Biodiversity Conservation Act 2016</i> came into effect on 3 December 2016 and replaced the <i>Wildlife Conservation Act 1950</i> . Relating to potential impacts to listed species: this Act provides for conserving and protecting Western Australian wildlife.
<i>Dangerous Goods Safety Act 2004</i>	Relating to general vessel operations: this Act provides for safely storing, handling, and transporting certain dangerous goods, including explosives, gases and flammable or combustible liquids. Licencing may be required, depending on the substances involved and the quantities stored or transported. These laws are administered by the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS).
<i>Environmental Protection Act 1986</i>	Relating to non-routine operations (potential oil spills) in areas under State jurisdiction: this Act provides for preventing, controlling, and abating pollution and environmental harm and for conserving, preserving, protecting, enhancing, and managing the environment.
Fish Resources Management Regulations 1995	Under Regulation 176 of the Fish Resources Management Regulations 1995, it is an offence to translocate live non-endemic fish to WA without permission. Under section 105 of the <i>Fish Resources Management Act 1994</i> , it is an offence to bring noxious fish into WA. Also, under Part 16A of the <i>Fish Resources Management Act 1994</i> , the Department has emergency powers to deal with incursions of invasive marine species (IMS), which include directing a person to perform necessary activities to prevent or control the spread of IMS, or to eradicate them in WA waters. If these activities are not undertaken, Eni may perform the activities and recover any costs incurred from the person initially directed to do so.
Marine (Certificates of Competency and Safety Manning) Regulations 1983	Marine Safety is responsible for administering national and internationally agreed competency standards; and for examining candidates for commercial Certificates of Competency as master, mate or engineer in WA vessels.
<i>Pollution of Waters by Oil and Noxious Substances Act 1987</i>	Relating to non-routine operations (potential oil spills) in State waters: this Act relates to protecting the sea and certain waters from pollution by oil and other noxious substances discharged from ships and places on land.
Prevention of Collisions at Sea Regulations 1983	Regulations largely comprise the Rules set out in the International Regulations for Preventing Collisions at Sea 1972 applicable in state and international waters.
<i>Western Australia Marine Act 1982</i>	Relating to vessel movements: an Act to regulate navigation and shipping.
<i>Western Australian Marine (Sea Dumping) Act 1981</i>	Relating to general vessel operations: an Act to provide for protecting 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.

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NT	
<i>Dangerous Goods Act 1998</i>	This Act provides for safely storing, handling and transporting certain dangerous goods (such as flammable, combustible liquids) in order to promote public safety and protect property and the environment.
<i>Environment Protection Act 2019</i>	This Act establishes the framework for assessing potential or anticipated environmental impacts of development. The object of the Act is to ensure matters affecting the environment to a significant extent are fully examined and taken into account in decisions by the NT Government.
Environment Protection (National Pollutant Inventory) Objective 2004	This is an objective under the Waste Management and Pollution Control Act that provides for compulsory reporting of air emissions by certain facilities, in accordance with the Commonwealth National Environment Protection (National Pollutant Inventory) Measure.
<i>Heritage Act 2011</i>	This Act established the NT Heritage Council and governs the protection of both natural and cultural heritage places within the NT jurisdiction.
<i>Northern Territory Aboriginal Sacred Sites Act 1989</i>	This Act facilitates the protection and registration of sacred sites, through procedures for avoiding sacred sites when developing and using land and through establishing an Authority for the purposes of the Act.
<i>Waste Management and Pollution Control Act 1998</i>	This Act provides for protecting the environment through encouraging effective waste management and pollution prevention measures, including licencing for certain levels of pollution discharges to air and water. The Act does not apply to wastes that are confined to the site on which they are generated but requires licencing and registration for wastes that are discharged offsite.

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3 DESCRIPTION OF THE ACTIVITY

Within the NT/RL1 permit, two wells (Petrel-3 and Petrel-4) have been identified as suspended since the 1980's, with wellheads remaining in-situ. The wells were suspended in accordance with the regulations at the time with barriers across and above the reservoir including the testing of the barriers. The reservoir is isolated in both wells and will not flow in their current condition [i.e. there is no risk of a loss of well control (LOWC)].

Eni proposes the following activities as part of the Petrel-3 and Petrel-4 decommissioning strategy:

- Annual general visual inspections (GVI) as part of the in-force Well Operations Management Plan (WOMP), until Petrel-3 and Petrel-4 are permanently plugged and abandoned (P&A). The inspections will be performed within the five-year WOMP period using a suitable ROV deployed from contracted vessels. Marine growth removal may also be undertaken on the wellhead equipment to facilitate the inspection and prepare for the decommissioning campaign;
- Geophysical and geotechnical survey campaigns;
- Pre-decommissioning vessel campaign to prepare the wells for decommissioning. High-pressure cleaning of the wellheads to allow detailed inspection and preparation for decommissioning. Removal of the corrosion caps, wellhead 3D scan by camera or laser to ensure integrity, potential open water wireline log, and corrosion cap replacement;
- Decommissioning campaign, to permanently seal and abandon the Petrel-3 and Petrel-4 wells pursuant to an accepted Petrel-3 and Petrel-4 WOMP (planned to be updated to include P&A following the pre-decommissioning inspection); and retrieve subsea equipment at or below the mudline;
- Following all reasonable attempts to remove and recover the wellheads and associated equipment, a contingency activity to leave the wellheads and associated equipment in-situ has been included in this EP; and
- Post-decommissioning as-left survey.

Since the actual timing of these activities will depend on a number of factors, including wellhead integrity investigations, site specific surveys, vessel and MODU feasibility checks, vessel and rig availability and scheduling, weather conditions and consideration of neap tides and seasonal metocean operability, stakeholder consultation and regulatory approvals these activities will potentially occur in any season between 2025 and 2028.

This EP allows for the activities to occur any time within 5 years of EP acceptance, pursuant to the NOPSEMA-accepted WOMP.

3.1 Overview

3.1.1 Wells information

The closest wellhead to the shore is Petrel-3, which lies approximately 250km WSW of Darwin (NT) and 280km N from Wyndham, on the northern coast of WA, in water depths of approximately 95m. Table 3-1 and Table 3-2 outline the locations and other well information for the wells proposed for decommissioning. The petroleum activity inventory subject to this EP is limited to the two wells and their respective immediate wellheads.

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The suspended wellheads protrude above the seafloor approximately 2-3m. Both of the suspended wells have four guideposts around the well. Figure 3-1 and Figure 3-2 show subsea images of Petrel-3 and Petrel-4 suspended wells, respectively.

Figure 3-3 and Figure 3-4 show the well suspension diagrams and the barriers in place for Petrel-3 and Petrel-4 wells respectively.

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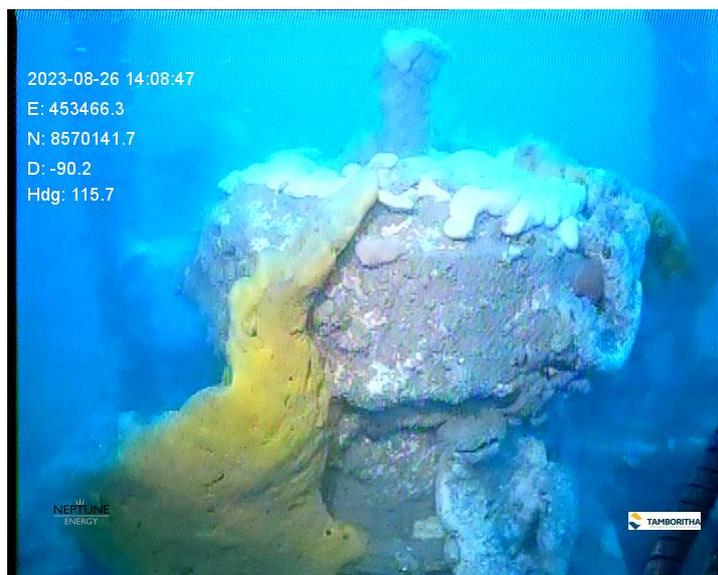


Figure 3-1: Petrel-3 suspended well

Table 3-1: Petrel-3 well information

Well Name	Petrel-3
Well Designation	Step-out Well
Permit	NT/RL1
Spud Date	28 th October 1981
Original Operator	Australian Aquitaine Petroleum Pty Ltd
Current Interest Holders	Eni Energy Bonaparte Pty Ltd, an affiliate of Eni Australia Ltd and owned by Eni International BV (57%), Santos Limited (24%), Bonaparte Gas and Oil Pty Ltd (19%)
Lat-MSL	-2.37m (Fugro 2010)
Weight	20,000kg
Tidal Range	0.00m to 4.21m (RPS Metocean 2010)
Water Depth	95m [Mean Sea Level (MSL)]
Geographic Surface Location	Datum: GDA94
	Lat: 12° 56' 2.071" S
	Long: 128° 34' 14.671" E
	Projection: MGA 94 UTM Zone 52
	Easting: 453,438 m E Northing: 8,570,134 m N
Well Depth (TD)	3970mMDRT (RKB Elevation on original well 30.48m)
Max BHT (°C)	Not reported
Max BHP	5524psi at 3907mMDRT (DST-1)
Well Status	Suspended gas producer
Other features aside from the wellhead	Drilling template or temporary guide base (TGB): made of a steel frame (1.5m high, weighing 5.3 tons) Permanent guide base (PGB), with 4 guideposts: made of a steel frame (~3m high, weighing 6.8 tons) Cement patio

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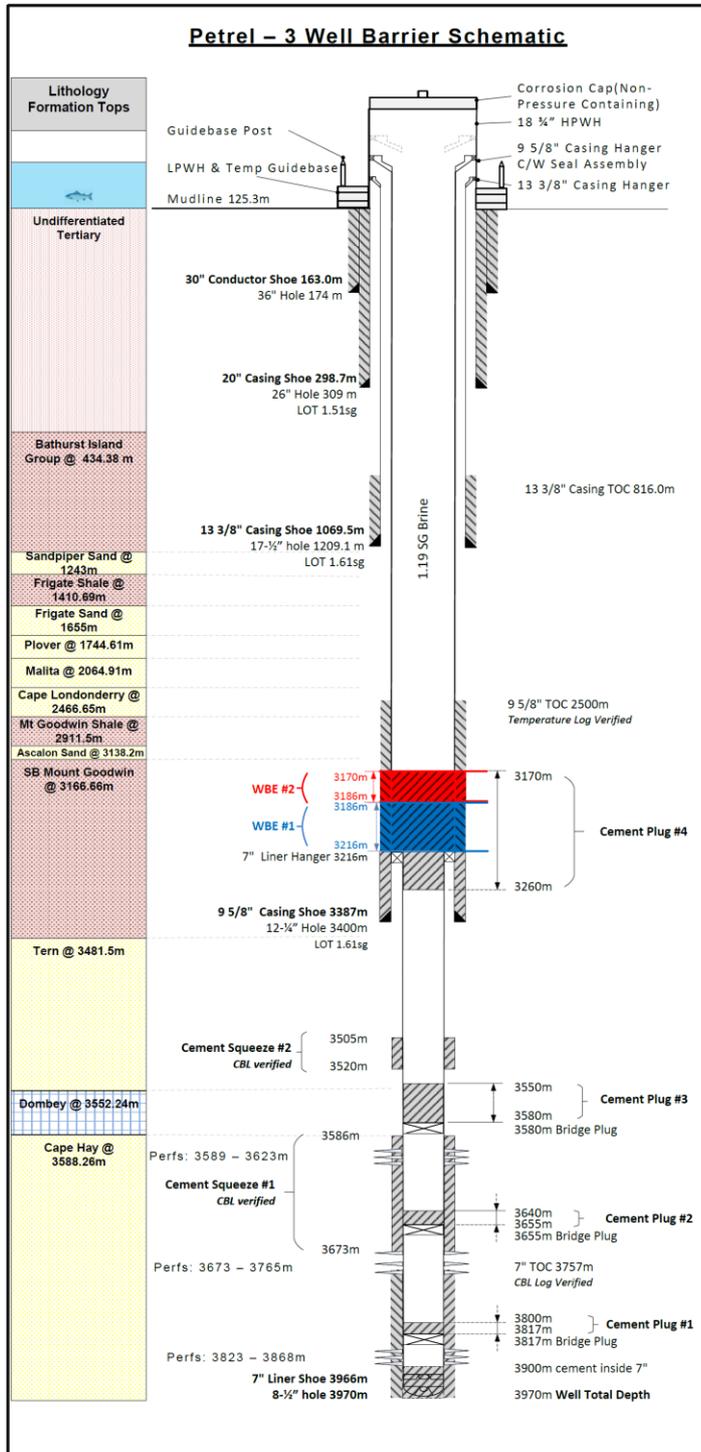
Figure 3-2: Petrel-4 suspended well

Table 3-2: Petrel-4 well information

Well Name	Petrel-4
Well Designation	Step-out Well
Permit	NT/RL1
Spud Date	20 th April 1988
Original Operator	Elf Aquitaine Exploration Australia Pty Ltd.
Current Interest Holders	Eni Energy Bonaparte Pty Ltd, an affiliate of Eni Australia Ltd and owned by Eni International BV (57%), Santos Limited (24%), Bonaparte Gas and Oil Pty Ltd (19%)
Lat-MSL	-2.37m (Fugro 2010)
Weight	20,000kg
Tidal Range	0.00m to 4.21m (RPS Metocean 2010)
Water Depth	95m (MSL)
Geographic Surface Location	Datum: GDA94
	Lat: 12° 53' 13.194" S
	Long: 128° 29' 45.557" E
	Projection: MGA 94 UTM Zone 52
	Easting: 445,319 m E Northing: 8,575,307 m N
Well Depth (TD)	3975m MDRT (RKB Elevation on original well 25m)
Max BHT (°C)	139° reported as maximum temperature in DST.
Max BHP	5125 psi at 3570m
Well Status	Suspended gas producer
Other features aside from the wellhead	Temporary guide base (TGB): made of a steel frame (1.5m high, weighing 5.3 tons) Permanent guide base (PGB), with 4 guideposts: made of a steel frame (~3m high, weighing 6.8 tons) Cement patio



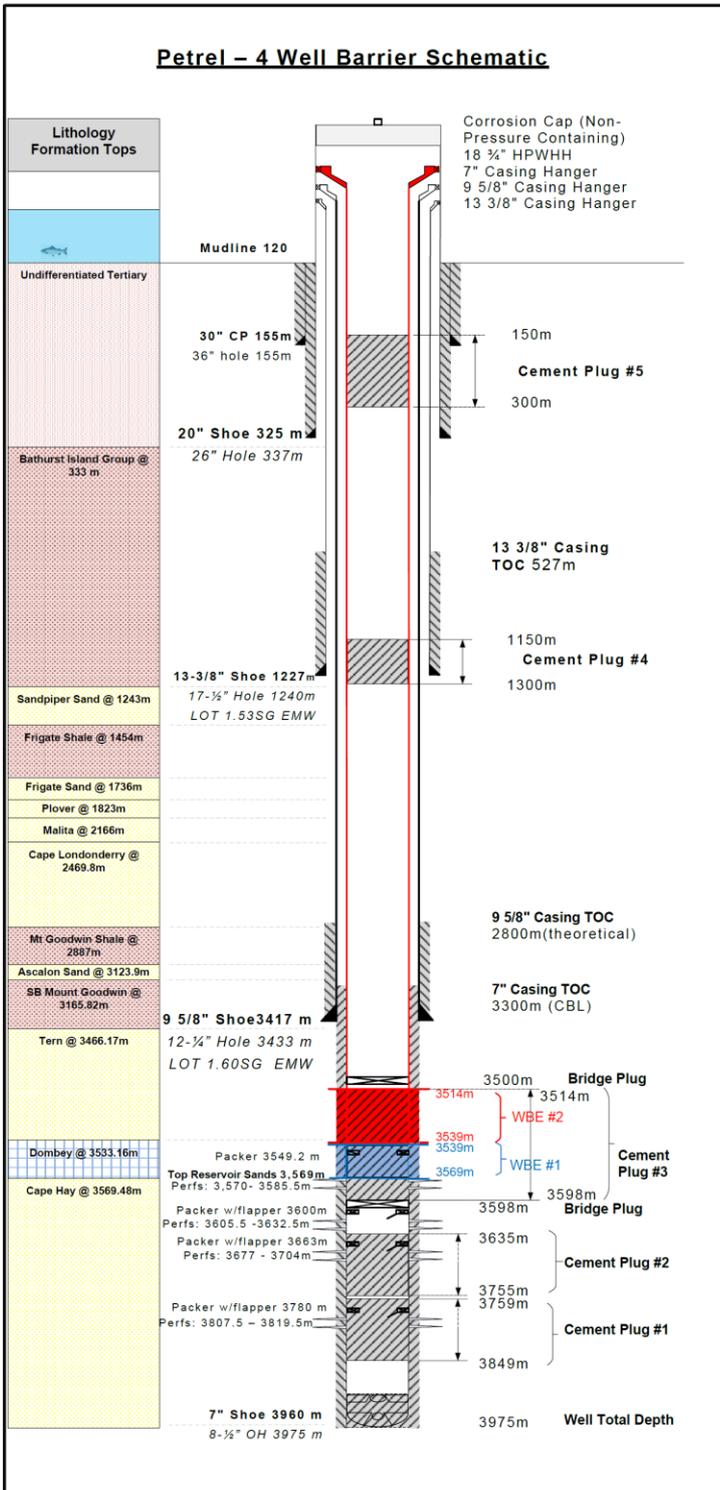
Well Information					
Well Name	Petrel-3	Spud Date	28/10/1981	RT Elevation	30.5m
Well Type	Gas Appraisal	Completion Date	3/03/1982	Water Depth	94.8
Well Status	Suspended	Datum / Projection	GDA94 / MGA 94 UTM Zone 52	TD (MD/TVD)	3970m / 3970m
Basin / Permit	Bonaparte / NT/RL-1	Latitude / Longitude	12° 56' 2.071" S / 128° 34' 14.671" E	Max Deviation	1.5°



PRIMARY BARRIER ENVELOPE (From 3216mMD to 3186mMD)	
BARRIER ELEMENT	VERIFICATION
Cement Plug #4 inside 9 5/8" Casing above the 7" Liner Hanger	Tagged with 8T of weight and Pressure Tested to 2,500 psi on installation.
9 5/8" Casing above TOL	Pressure tested on installation to 3,000psi and 3,500psi as part of the liner test
9 5/8" Annulus Cement	Temperature Log Identified TOC at 2,500m. Cement operation report indicated no issues
In Situ Formation	Leak off test performed to 1.61 SG EMW and the PPGF Graph
SECONDARY BARRIER ENVELOPE (From 3186mMD to 3170mMD)	
BARRIER ELEMENT	VERIFICATION
Cement Plug #4 inside 9 5/8" Casing above the 7" Liner Hanger	Tagged with 8T of weight and Pressure Tested to 2,500 psi on installation.
9 5/8" Casing above TOL	Pressure tested on installation to 3,000psi and 3,500psi as part of the liner test
9 5/8" Annulus Cement	Temperature Log Identified TOC at 2,500m. Cement operation report indicated no issues
In Situ Formation	Leak off test performed to 1.61 SG EMW and the PPGF Graph
NOTES	
<p>Plug#4 is shorter than the minimum required combined WBE Estimated Gas Gradient 0.0736psi/ft Formation Pressure: 5158psi @ 3570m TVDSS Maximum Pressure (9 5/8" Casing Shoe) 5099psi @ 3356.5m TVDSS Cement to Seabed (30" & 20" Conductor)</p>	

Figure 3-3: Petrel-3 Well Barrier Schematic

Well Information					
Well Name	Petrel-4	Spud Date	20/04/1988	RT Elevation	25.0m
Well Type	Gas Appraisal	Completion Date	26/08/1988	Water Depth	95.0m
Well Status	Suspended	Datum	GDA 94 M GA Zone 52	TD (MD/TVD)	3975m / 3975m
Basin / Permit	Bonaparte / NT/RL-1	Latitude / Longitude	12° 53' 13.194" S / 128° 29' 15.557" E	Max Deviation	1.5°



Primary Barrier Envelope	
Barrier Element	Verification
Cement Plug #3	Tagged with 15T of weight and Pressure Tested to 3,000 psi on installation.
7" Casing	Pressure tested on installation to 3,500psi
7" & 9 5/8" Casing Annuli Cement	7" CBL TOC at 3,300m 9 5/8" TOC at 2,800mMD
In Situ Formation	Leak off test to 1.60 SG EMW and the PPFG Graph
Secondary Barrier Envelope	
Barrier Element	Verification
Cement Plug #3	Tagged with 15T of weight and Pressure Tested to 3,000 psi on installation.
7" Casing	Pressure tested on installation to 3,500psi
7" Casing Seal Assembly	
7" & 9 5/8" Casing Annuli Cement	7" CBL TOC at 3,300m 9 5/8" TOC at 2,800mMD
In Situ Formation	Leak off test to 1.60 SG EMW and the PPFG Graph
Notes	
<p>Plug#3 is shorter than the minimum required combined WBE Formation Pressure: 5158psi @ 3570m TVDSS Estimated Gas Gradient 0.075psi/ft 9 5/8" Casing Shoe (3417m TVDSS): Max Anticipated Pressure 5115psi Vs An Estimated Formation Strength of 7712psi</p>	

Figure 3-4: Petrel-4 Well Barrier Schematic

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3.1.2 Operational Area

The Operational Area is a defined area within which all petroleum activities associated within this EP occur, and which allows impact assessment of those activities. It includes the extent of all planned activities within the EP and is defined as a 3km radius around the two wells and a 3km wide corridor between them (Figure 3-5).

The general transit of the MODU and vessels to and from the Operational Area is not considered a petroleum activity and is excluded from the scope of this EP. These activities will be undertaken in accordance with the *Navigation Act 2012* (Cth).

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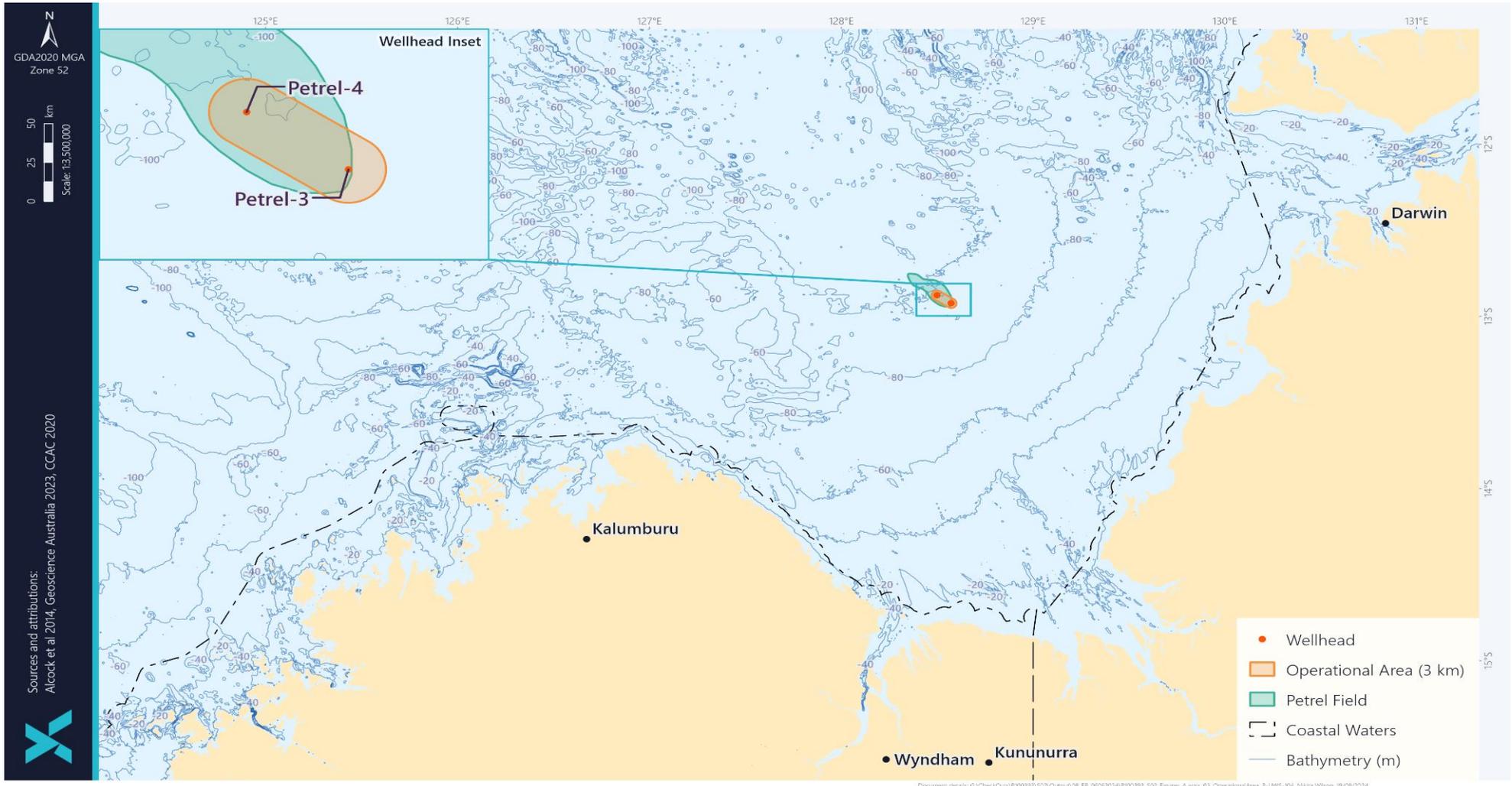


Figure 3-5: Petrel-3 and Petrel-4 Operational Area

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3.1.3 Timing and duration

Since the actual timing of these activities will depend on a number of factors, including wellhead integrity investigations, site specific surveys, vessel and MODU feasibility checks, vessel and rig availability and scheduling, weather conditions and consideration of neap tides and seasonal metocean operability, stakeholder consultation, and regulatory approvals, these activities will potentially occur in any season between 2025 and 2028.

The petroleum activities covered under this EP are grouped into:

- Monitoring and pre-decommissioning activities;
- Decommissioning activities; and
- Post-decommissioning activities.

Table 3-3 provides a summary of these activities and the expected timeframe for these campaigns. The following sections will detail the activities proposed.

Table 3-3: Summary of the activities covered in this EP and duration

Activity	Activities summary	Duration (both wellheads)	Timing
Monitoring and pre-decommissioning activities			
General Visual Inspection (GVI) survey campaign(s)	Annual GVI survey of the two suspended wells, including potential high-pressure cleaning of the well equipment to allow detailed inspection, as per in-force WOMP.	Up to 2 weeks.	During the validity of this EP, until well P&A is performed. Frequency will be annual, with no more than 24 months between surveys. Preference is during neap tides.
Geotechnical and Geophysical survey campaign	Geophysical investigation to evaluate the sub-seabed conditions. Geotechnical survey to support a jack-up MODU.	Geophysical survey: up to 40 days. Geotechnical survey: up to 20 days.	Between Q3 2025 – Q2 2026, subject to vessel scheduling.
Pre-decommissioning inspection	High-pressure cleaning of the wellhead. Removal of the corrosion cap. 3D external scan by camera or laser to ensure integrity. Corrosion cap replacement. Potential wireline run in Petrel-3.	Up to 20 days.	Between Q3 2025 – Q2 2026, subject to vessel scheduling.
Decommissioning activities			
Decommissioning campaign	Permanent P&A of the Petrel-3 and Petrel-4 wells. Wellhead removal during well P&A or subsequent vessel campaign.	Up to 60 days total (~30 days per well). This duration allows for a single campaign with the MODU, or a MODU campaign for P&A followed by a vessel campaign for	P&A will occur between Q3 2026 – Q4 2027, subject to approvals, procurement processes, rig scheduling and feasibility. In the event of vessel-based wellhead recovery,

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		wellhead removal (if required). Intent is to do both wells in a single campaign but allow for a second campaign as an alternate scenario.	this may occur up to the end of 2028, subject to planning, procurement and approvals.
Post-decommissioning activities			
As-left survey	GVI survey to demonstrate that the petroleum activities proposed have been completed and requirements have been met.	2 days per well. May be undertaken during the decommissioning campaign, following P&A.	Following well P&A (Q3 2026 - Q4 2027). May be undertaken during decommissioning campaign. This may occur up to the end of 2028 in the event of vessel-based wellhead recovery.

At the time of writing, the WOMP is currently being progressed and updated and the site survey activity is being planned. Figure 3-6 provides a high-level overview of the Petrel-3 and Petrel-4 decommissioning workflow and scheduling. This roadmap is not exhaustive and doesn't show all activities, however, provides a wider perspective on the forward plan and how it fits into Eni's integrated business planning.

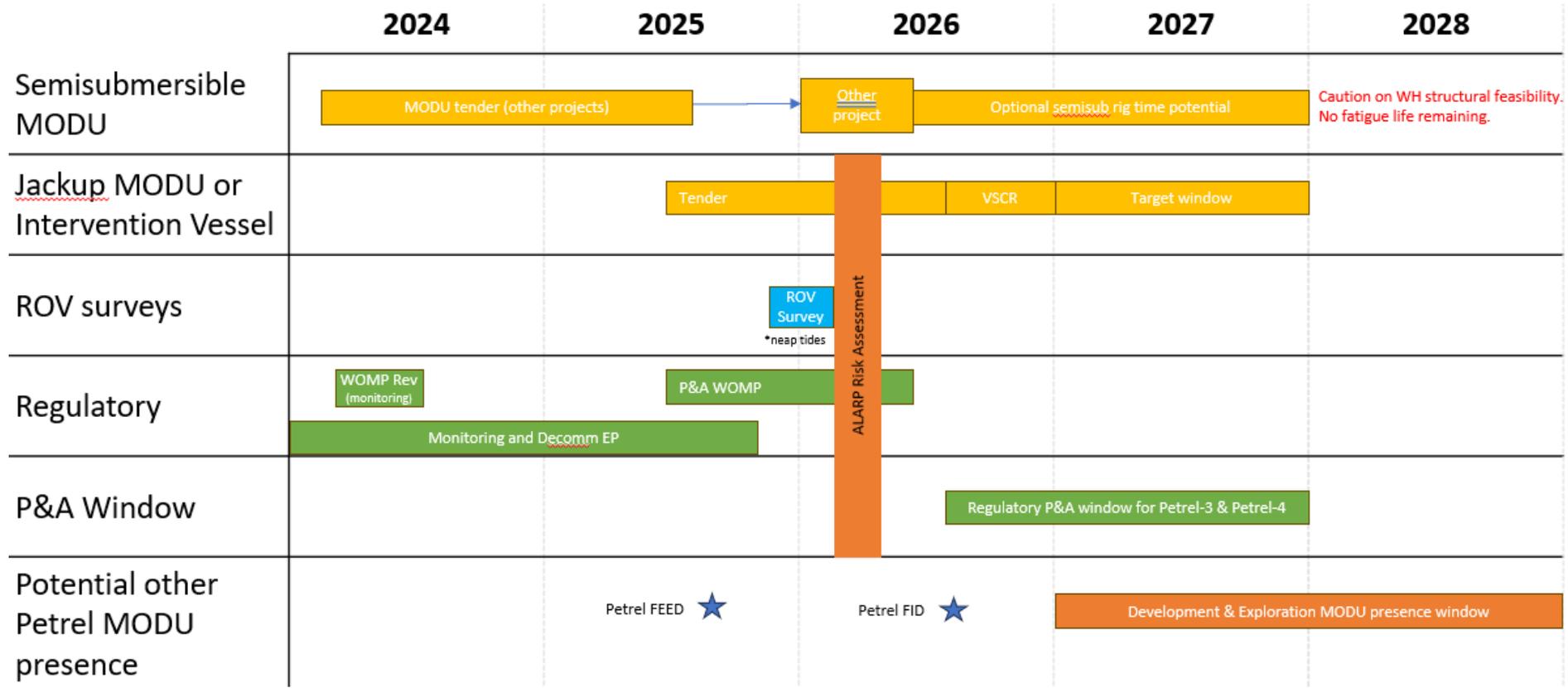


Figure 3-6: Petrel P&A workflow roadmap

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3.2 Monitoring and pre-decommissioning activities

3.2.1 GVI Survey Campaign

Eni will undertake a GVI survey of the two suspended wells in accordance with the in-force WOMP. The current in-force WOMP will be updated in 2025 to include P&A activities, following the pre-decommissioning inspection.

The visual monitoring is required to check the condition of seabed equipment left on the wells and confirm no loss of integrity. The monitoring will be undertaken using an ROV deployed from a support vessel. The survey will take up to 2 weeks.

Marine growth removal from the wellheads may be undertaken during the GVI survey. This involves high-pressure cleaning of the well equipment to allow detailed inspection in preparation for future decommissioning. The cleaning will use in-situ saltwater using a high-pressure hose attachment on the ROV to remove marine growth. The water jetting will be limited to what is necessary to perform an effective inspection. Cleaning chemicals may also be used to remove marine growth (such as sulfamic acid, calcium wash and fluorescent dye).

3.2.2 Geophysical and Geotechnical survey campaign

A geophysical and geotechnical survey campaign will be required to identify sub-seabed features and hazards that may impact the exact positioning of the MODU. A geotechnical investigation is only required if a jack-up MODU will be utilised.

The geophysical elements of the surveys will be undertaken using a multi-purpose, survey vessel and are expected to last for approximately 20 days at each well location.

The geotechnical scopes may be undertaken by the same survey vessel (with reconfigured equipment) or potentially a separate survey vessel may be required in a separate campaign. The geotechnical scope is expected to take approximately 20 days to complete (10 days at each well location).

The GVI scope (Section 3.2.1) may be undertaken by the same geophysical and/or geotechnical survey vessels, capturing synergies and reduced overall vessel presence.

3.2.2.1 Geotechnical survey

Geotechnical data and soil samples will be acquired and sent to the laboratory to be analysed.

The proposed techniques for this investigation will include:

- Core hole sampling to acquire high quality soils for laboratory testing to inform the detailed engineering design in the field; and
- Piezo cone penetrometer testing (PCPT) to determine seabed strength and general ground stratigraphy.

A core hole is a type of borehole that is drilled to extract a cylindrical sample of rock or soil, known as a core. The process of core drilling involves using a diamond-tipped drill bit to cut a cylindrical section of rock or soil from the surrounding material. The core is then extracted from the hole and analysed in a laboratory to determine its physical and

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chemical properties. Up to 6 samples are typically collected at each well location, giving a total disturbance area of 2.4m² per well.

PCPT involves the in-situ measurement of the resistance of ground to continuous penetration. This process involves lowering a frame to the seabed and pushing the PCPT unit into the sediment at a steady penetration rate. When the required penetration depth (6-30m) is reached, all equipment is withdrawn from the seabed. The PCPT frame is ~5m².

A small hole will remain in the seabed (~10cm diameter), which will eventually collapse and infill with the movement of seabed sediments.

3.2.2.2 Geophysical survey

The geophysical survey scope comprising of:

- Multibeam echo sounder (MBES);
- Side scan sonar (SSS);
- Sub-bottom profiling;
- Magnetometer; and
- Ultra-short Baseline (USBL) Positioning System

MBES

Echo sounder surveys will enable the collection of bathymetry data and the correlation of depth information. This type of survey uses a sonar system to transmit short pulses of sound energy, analysing the return signal from the seafloor or other objects.

A multibeam echo sounder transmits at frequencies between 200kHz and 400kHz with pulse lengths from 10 to 500µs. Indicative sound output at the source is equipment dependent and may range from 163 to 190dB re 1µPa@1m.

Side-scan sonar

Use of side-scan sonar methods will enable Eni to identify seabed obstructions or features. This type of survey is a hydro-acoustic technique, comprising a set of transducers mounted on either side of a towed vehicle. The transducers produce high frequency pulses (either 120kHz or 410kHz) which reflect seabed features. Indicative sound output at source may range from 137 to 200dB re 1µPa@1m.

Sub-bottom profiler

Acoustic sub-bottom profiling systems are based on 'ping and chirp' type equipment, used to determine the physical properties of the sea floor and to image and characterize the geological formations below the sea floor.

This equipment is low frequency (1–16kHz) with an indicative sound output at source ranging from 142 to 200dB re 1µPa@1m.

Magnetometer

To check for the presence of any metal objects on or buried underneath the seabed, a magnetometer will be attached to either a hull mounted or towed on a cable behind the vessel. The magnetometer measures the earth's magnetic field and does not emit any sound pulses, therefore not presenting an environmental hazard or threat.

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USBL

A complete USBL system consists of a transceiver, which is mounted on a pole under a vessel, and a transponder or responder on a towfish. A computer, or "topside unit", is used to calculate a position from the ranges and bearings measured by the transceiver.

An acoustic pulse is transmitted by the transceiver and detected by the subsea transponder, which replies with its own acoustic pulse. This return pulse is detected by the shipboard transceiver. The time from the transmission of the initial acoustic pulse until the reply is detected is measured by the USBL system and is converted into a range.

3.2.3 Pre-decommissioning inspection

A thorough inspection and assessment of the functional capability of the wellheads is needed to determine their ability to accept a MODU/vessel interface to enable safe well entry to assess and improve the downhole status.

The pre-decommissioning inspection will clean the wellheads and record various observations and measurements to assess the integrity status of the wellheads and inform MODU/vessel and tooling selection feasibility.

To remove the corrosion cap to evaluate and measure the internal profile of the wellhead prior to P&A, an ROV will first be deployed to clean the corrosion cap and wellhead of marine growth.

An ROV inspection survey conducted in 2021 identified significant marine growth on both wells' surface areas; therefore, high-pressure water jetting cleaning will be employed to clean the marine growth and allow detailed inspection and preparation for decommissioning. Mechanical cleaning may also be used (e.g., brushes, mechanical scraper). Cleaning chemicals may also be used to remove marine growth (such as sulfamic acid). The corrosion cap will be removed with the ROV and hydraulic system. Depending on the hydraulic system, some water-based hydraulic fluids may be discharged subsea (expected to be <1m³).

Once the corrosion cap is removed, seawater and biocide that were trapped underneath the corrosion cap will be released into the marine environment (expected to be <1m³).

After removing the corrosion cap, a 3D external scan of the wellheads will be undertaken by camera or laser. This activity will take up to 2 hours per well using an inspection-class ROV.

Prior to replacing the old corrosion cap, the company may conduct an open-water wireline run to evaluate the annular cement quality in Petrel-3 Well. This operation involves running a wireline tool in open water, which will be guided into the wellhead using an ROV to log the section from the top of the cement to the surface. The procedure is expected to take between 18 to 24 hours and will have no environmental impact. No chemicals will be released into the environment during this operation, and due to the small size and volume of the tool, the fluid displacement inside the well is anticipated to be negligible.

Once the 3D scan is completed, the ROV and hydraulic system will install a new corrosion cap. Biocide sticks and oxygen scavenger will be placed under the new corrosion cap. Depending on the hydraulic system, some water-based hydraulic fluid may be discharged subsea (<1m³).

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3.3 Decommissioning activities

Following completion of the monitoring and pre-decommissioning activities, the following decommissioning activities may be carried out. The activities are presented in operational sequence.

3.3.1 MODU mobilisation and positioning

The MODU for the decommissioning campaign will either be a semisubmersible on dynamic positioning (DP), a DP-assisted moored semisubmersible, a conventionally moored semisubmersible without DP, a jack-up rig or a light well intervention vessel (LWIV).

Semisubmersibles are a type of floating vessel that is supported primarily on large pontoon-like structures submerged below the sea surface. This type of MODU is positioned either by mooring using drag anchors (the moored option); or kept on location with DP using thrusters. A DP assisted moored semisubmersible only uses the DP to reduce strain on the mooring system during a poor weather event.

If a semisubmersible moored MODU is used, anchors may need to be pre-laid prior to the campaign. In this case, the anchors and associated mooring wires/chains are deployed to the seabed by two Anchor Handling Supply Vessels (AHSVs). For this option, 8-12 anchors will be launched, and mooring lines may drag along the seabed resulting in seabed disturbance. Mooring lines will extend from 1500m to 1800m from the well centre, with about 1000-1200m laying on the seabed. The anchor itself has a footprint of approximately 42m². The total direct seabed disturbance area from the MODU mooring system is estimated to be 1,944m² (assuming 12 mooring lines).

To accurately determine anchor positioning, transponders may be used if required. These devices provide GPS position and anchor orientation when interrogated acoustically. As they are attached directly to the anchor, their deployment and recovery coincide with the anchor installation process.

DP is used to help the MODU position in the correct location and will help the MODU to position in the exact location.

A jack-up rig is a type of mobile platform fitted with legs that are towed in the 'up' position. Once on location, the legs are extended down onto the seafloor, and the hull is then 'jacked-up' above the sea surface.

If the MODU is a jack-up, the 3 spud cans (on the bottom of the legs) will be lowered. These are expected to partially penetrate into the seabed (3-25m deep depending on soil properties). This creates a depression ~18m in diameter around each spud can, resulting in total area of ~750m² of temporary seabed disturbance at each well location.

3.3.2 Remove corrosion cap

Once the rig is positioned over the well, the corrosion cap running tool will be run down to the well and the corrosion cap will be engaged (with visuals and some guidance provided by the ROV). The corrosion cap will then be pulled from the wellhead.

Once the corrosion cap is removed, seawater and biocide that were trapped underneath the corrosion cap will be released into the marine environment (expected to be <1m³).

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3.3.3 Establish secondary well control (if required)

Secondary well control is the backup system that activates when primary well control fails or is insufficient. It involves the use of mechanical barriers to seal off the wellbore and prevent the flow of formation fluids or gas..

The main equipment for riser-based secondary well control is the blowout preventer (BOP). A BOP consists of several components, such as annular preventers, pipe rams, blind rams, and shear rams.

For the BOP installation from a semi-submersible, ROV-operated winches will be lowered with a crane and placed on the seabed. The winches are gravity-based and will be set out ~50m from the wellhead. Four winches will be used per well, and each winch is ~20.6m², giving a total footprint of ~83m² per well location.

If the clump weight style tether winch anchoring was not suitable for the seabed, pre-installed suction piles will be fixed by the Construction Support Vessel (CSV) prior to the beginning of the decommissioning activities. This system is comprised by four suction cans, each one approximately 6m in diameter.

The use of the pre-installed suction piles will be determined by the geotechnical survey. To latch the semi-submersible BOP, 2.5m³ of control fluid per well will be discharged to sea.

The current assessment of well status concludes that secondary well control is not required on either well. Use of secondary well control equipment will be further informed by the pre-decommissioning inspection and will be determined by the WOMP. The use of a BOP has been assumed for the purposes of impact assessment.

3.3.4 Drill out non-reservoir cement plugs (Petrel-4 only)

Petrel-4 has two non-reservoir cement plugs that may need to be drilled out to access the lower wellbore for well abandonment. The drill pipe and drill bit will be run from the MODU, following standard procedures for equipment setup and lowering the drill string into the wellbore.

Next, the well will be displaced with a viscous Water Based Mud (WBM) drilling fluid. This is a closed-circuit system with no planned discharges expected. No Synthetic Based Mud (SBM) will be used.

Non-reservoir cement plugs will be drilled out and the fluids and cement fragments (cement debris) will undergo treatment onboard the MODU using shale shakers. The treated fluids and cement debris will be discharged to the sea surface, with an estimated volume of 6m³. No hydrocarbons are expected in this discharge.

According to the in-force WOMP, the wells were displaced with an inhibited water-based drilling brine solution (WBM) after setting the final suspension plug in the 1980's. This brine solution will be treated over shale shakers onboard the MODU. The treated fluid will then be discharged to the sea surface, expected to be ~200m³ of fluid for both wells (100m³ per well).

Where the well re-entry is performed riserless with an open circulating system, the abovementioned fluids and cement discharges will occur at the seabed rather than at the sea surface.

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There is potential that a small volume of gas may have migrated through the cement matrix over the lifetime of the wellhead (~37 years at time of writing), and accumulated beneath the shallow plug. When the plug is drilled out, this trapped gas could be released at the seabed (riserless mode) or at surface (riser-based mode).

3.3.5 Well integrity evaluation

The next step involves running a wireline logging tool from the MODU into the well to assess the quality of the cement behind the casing. After completion of the logging process, the obtained results will be analysed, and further actions will be decided.

If the condition of the annulus cement is inadequate, the next step will be remediating the well integrity to the standard required by the WOMP. To achieve this, additional cement will be pumped into the annulus via perforations or following section milling (milling a circumferential hole in the casing).

Milling is typically performed at a controlled rate to enable metal swarf (metal chips) to be removed effectively from the milling site to minimise the risk of 'birds nesting' of metal swarf, which may block fluid returns and jam equipment. Milling tools may become worn during milling operations and could require tripping for new/redressing about every 30 to 50m. As a result, the rate of milling is slower than normal drilling operations.

As the metal swarf within the milling fluids is hard and sharp, the fluids from the well will be passed through specific swarf handling equipment, which generally include magnets, that liberate metal from the fluid before being processed on the shale shakers. The milling fluids, including up to an additional 1.5m³ of swarf, 3m³ of drilled cement and 3.5m³ of formation rock, will be discharged overboard (riser-based mode) or at the seabed (riserless mode) per 100m interval, if milling is required. As a result of restricted milling speeds, the rate of swarf and cement will be generated over several days.

3.3.6 Set cement plug and permanent isolation of the reservoir

If the assessment of the annulus cement is considered satisfactory, the subsequent step involves setting new barriers inside the casing to secure the wellbore, as per the methodology that will be submitted to NOPSEMA in the WOMP which will be updated to include abandonment.

Prior to commencing any cementing operations, the cementing unit undergoes thorough testing to ensure its functionality and reliability. This testing process typically results in a discharge of ~2.4 to 8m³ of cement slurry to the sea, per well.

Upon completion of each cementing activity, the cementing head and blending tanks are cleaned, resulting in the release of less than 1m³ of cement washings to the sea, per cement job. Additionally, as part of the process, less than 160m³ WBM will be displaced from the well and subsequently discharged to the sea surface (riser-based mode) or seabed (riserless mode).

Towards the conclusion of the decommissioning operations, any excess of WBM, estimated at 500m³ per well, will be discharged at the sea surface. Furthermore, any excess of inhibited seawater (containing additives such as brines, seawater, hi-vis pills, water-based hydraulic fluid, biocide, oxygen scavenger and corrosion inhibitor) will also be discharged, typically around 25m³ per well.

There is potential for ~82m³ of brine to be released at the end of the activity (either at the seabed or below the sea surface).

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3.3.7 Cut and recover casing

To facilitate setting a cement plug above permeable shallow sands the innermost casing(s) in the well may need to be removed. This is performed by cutting the casing with a casing cutting tool. The tool will perform the cut inside the well and no additional noise is expected from this operation. The casing cutting will take approximately 10 minutes to be completed. During the casing retrieval, the casing hanger seal is broken, and a small volume of gas might be released, approximately 1m³, that will be controlled through the rig's BOP and choke manifold.

This procedure may be executed once for Petrel-3 and twice for Petrel-4, as the latter has an additional casing that requires removal. Each instance will follow the same controlled release process through the choke manifold to manage any gas emissions.

The subsequent step involves displacing the WBM from the well by introducing inhibited seawater through the MODU, as described in Section 3.3.4 and setting new cement plugs, as described in Section 3.3.6.

3.3.8 Recovery of secondary well control (if required)

After the P&A completion, if a riser-based methodology with a subsea BOP is used, the next step will be the recovery of the secondary well control system by unlatching the BOP and bringing it to the surface. During this process, approximately 2.5m³ of control fluid per well will be released to the sea.

Following the release of the control fluid, the BOP will be retrieved to the MODU.

Lifting equipment will be attached to the 4 winches, and they will be retrieved to the MODU. It is anticipated that there will be minor seabed disturbance as the winches are lifted, however, dredging or the use of Mass Flow Excavation is not expected.

If riserless methodology is used, there is no equipment to recover from the seabed.

3.3.9 Wellhead, PGB and TGB recovery

Eni will undertake the pre-decommissioning inspection (Section 3.2.3) to clean the wellheads and record various observations and measurements to assess the integrity status of the wellheads and inform MODU/vessel and tooling selection feasibility.

Once the wells have been adequately plugged and abandoned as per the accepted WOMP (Section 3.3.6), recovery of the wellhead, PGB and TGB can commence. This may occur either in direct continuance of the well P&A with the MODU (pending NOPSEMA well integrity permissioning), or by a subsequent vessel campaign.

3.3.9.1 Decision framework

All reasonable attempts will be made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits. Eni commits to ensuring the wellhead cutting and recovery tools selected are of suitable and proven capability for Petrel-3 and Petrel-4.

Eni has recent experience with subsea wellhead removal in the Woollybutt Field where 9 wellheads were removed by abrasive jet cutting technology from a multipurpose supply vessel. Several other titleholders have and are currently performing legacy subsea

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wellhead removal within decommissioning campaigns in Australia and the activity is well understood.

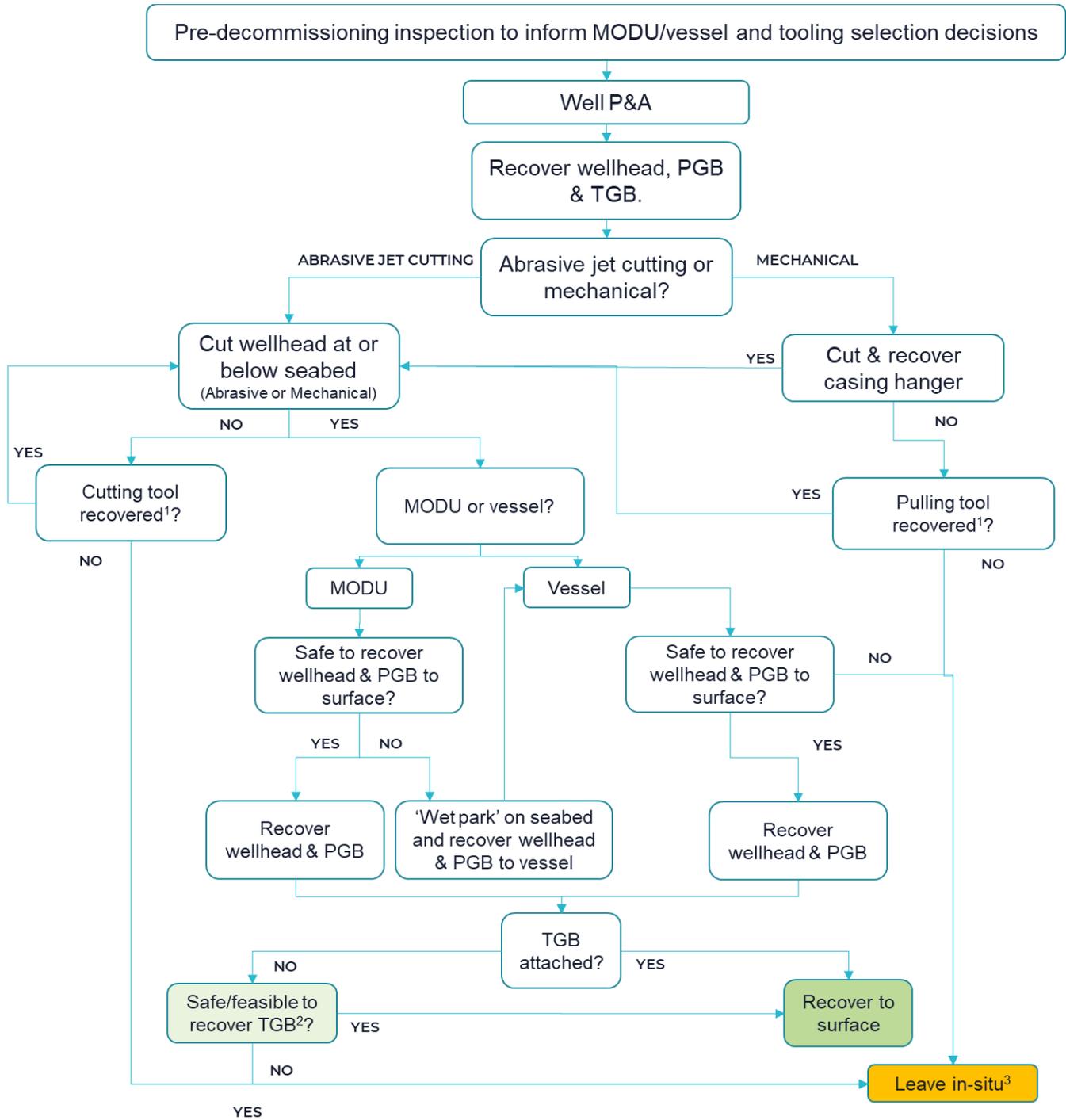
However, there can be unforeseen operational challenges that may prevent the successful full removal of subsea equipment. An example of this is the Corkybark-1 wellhead in the Woollybutt field, which had no internal or external access to perform wellhead removal, due to tooling failure.

Examples of operational risks that may prevent successful retrieval include the following:

- Mechanical cutting tool twisting off and blocking internal access;
- Unable to grip and pull tension while mechanical cutting;
- TGB / PGB latch mechanism is corroded and presents a drops risk (both subsea and at surface);
- TGB may not be attached to the wellhead and PGB; and therefore needs to be retrieved separately. The TGB may be partially buried which could restrict lifting point access or pose structural integrity issues (e.g. corrosion), which could result in it separating during lift recovery;
- Vessel / DP failure;
- Prolonged excessive weather for operations;
- Unable to recover internal strings, to gain access for larger tubular cuts; and
- Unable to safely recover and handle debris through the MODU moon pool.

Although unlikely, in the event that all reasonable attempts at retrieval are unsuccessful, the wellhead or associated equipment (for example the TGB) may be left in-situ.

To show all reasonable attempts will be made to remove and recover the wellheads and associated equipment, a decision framework (Figure 3-7) has been developed and will be implemented. The decision framework describes the approach to wellhead removal and recovery options following well P&A, either with a MODU, or by a subsequent vessel. A vessel provides greater handling ability through the use of the vessel crane, which can perform lifts over the deck from the side or rear; and offers less restrictions on equipment dimensions and angle recovery than a MODU via the moon pool.



^{1,2,3} Refer to notes below.

Figure 3-7: Wellhead removal decision framework

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The following scenarios/factors (as referenced in Figure 3-7) have been considered during the development of the decision framework:

¹Should the pulling tool or cutting tool become stuck in the well, internal well access will become blocked or restricted, preventing successful cutting of the wellhead and recovery of the tool. If this occurs, the wellhead, PGB and TGB will be left in-situ.

²The TGB may be partially buried which could restrict lifting point access or pose structural integrity issues (e.g., corroded) which could result in it separating during lift recovery; even to lift into a basket. In these circumstances where it is not deemed safe/operationally feasible to recover the TGB and all reasonable attempts have been made, the TGB will be left in-situ.

³Following the steps outlined in the decision framework, should operational challenges persist in preventing successful wellhead removal and safe recovery; the wellhead, PGB and TGB will be left in-situ. Where it is not safe/operationally feasible to recover the TGB, the TGB will be left in-situ. Eni will liaise closely with the NOPSEMA well integrity team throughout well abandonment activities prior to wellhead removal. If the wellhead, PGB and TGB or the TGB itself is left in-situ, the wellhead guideposts will be cut and recovered prior to equipment left in-situ in an attempt to reduce the height profile of the guideposts.

The worse-case scenario (i.e., all subsea equipment left in-situ) has been used for the purpose of impact assessment in Sections 7.3 and 8.1.

Section 572(3) of the OPGGS Act allows for deviations to the base case should the alternative decommissioning approach deliver equal or better environmental and safety outcomes compared to complete removal. In the event it becomes necessary to leave the wellhead, PGB or TGB in-situ, the residual risk to the environment and other marine users is evaluated in Sections 7.3 and 8.1, and is considered low risk, ALARP and acceptable.

3.3.9.2 Wellhead, PGB and TGB recovery

An ROV survey in 2021 found the Petrel-3 TGB to be on an angle of ~40° (Figure 3-8). Typically, insufficient ROV access below the PGB can make an external cut difficult without the requirement for excessive dredging. In this case, with the added presence of the TGB, particularly where Petrel-3 is positioned in such an angle, an external cut is not deemed a feasible methodology to be pursued.

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Figure 3-8: 2021 ROV footage of Petrel-3 TGB

The retrieval of the wellheads can be performed using internal cutting options, as described below.

Mechanical Cutting

The cutting tool is deployed into the well to cut the casing, using an ROV to guide and power the tool. During this process, it's anticipated that some fluid trapped in the annulus will be discharged below or at the seabed surface. The content is expected to be the old water and biocide, likely the same as below the corrosion cap (see Section 3.3.2). No discharge of swarf is expected with mechanical cutting.

Abrasive Jet Cutting

The internal cut will be made at or below the mudline, with cutting material discharged at the cut point below the seabed. A plume of debris, aerated water and sediment will surround the wellhead as it is cut and retrieved. No external discharge of swarf is expected. However, an abrasive media (e.g., garnet) is typically added to the jet stream to increase cutting performance and therefore there is the potential for minimal fallout on the seabed during cutting.

Some noise from the mechanical cutting tool and abrasive jet cutting is expected during this process, and both options are estimated to take 10 to 14 hours per well.

The PGB and guideposts are attached to the wellhead and will be retrieved together directly to MODU; or temporarily wet parked until recovered to a vessel. If required, the vessel will be a CSV and the infrastructure will be wet parked within a 20m radius of the wellhead locations.

If the wellhead and PGB cannot be successfully recovered due to a stuck tool or other reasons identified in Section 3.3.9.1, following implementation of the decision framework

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(Figure 3-7), they will be left in-situ. The 4 guideposts will be cut by ROV, using a hydraulic cutter, grinder or saw blade, to reduce the height profile of the equipment. Swarf debris is expected to settle on the seabed near the wellhead.

TGB

The TGB may not be attached to the wellhead and PGB. It may be corroded, with a risk that it could separate during the lift. If this occurs, and if it is safe/feasible to recover the TGB, it will be picked up with slings, placed in a basket and retrieved to the surface. The basket will be placed on the seabed, with a footprint of 30m². If the TGB has advanced corrosion, there is potential the slings could cut through it. In this case, or if the TGB is partially buried and requires excavation, it will be left in-situ.

The basket will be used for any other items or debris required to achieve ALARP safety practices during the activity.

Removing the cement patio is not proposed under the activities performed in this EP. According to previous wellhead surveys, this item is buried, and the removal would create additional seabed disturbance (Figure 3-9).

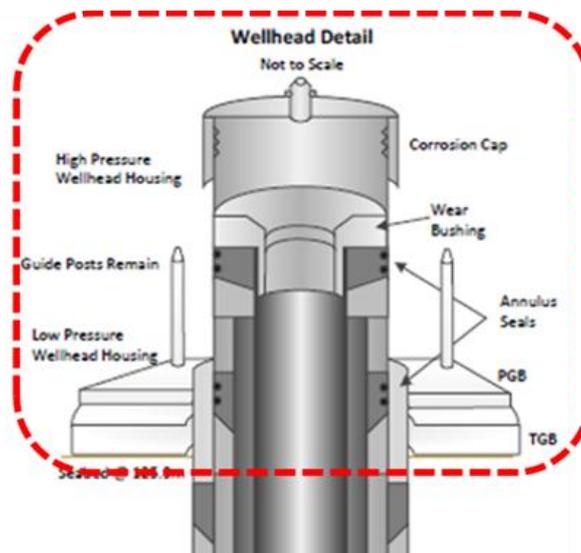


Figure 3-9: Full removal option - all items highlighted in red will be removed (pending decision framework outcome)

3.3.10 Demobilisation of MODU

Upon completion of the decommissioning scope at each well, the support vessels will commence the recovery of the anchors from the seabed and back to the MODU. Anchor recovery is covered in a mooring and demobilisation plan and considers the risk of collision with any subsea infrastructure remaining.

Pre-laid anchors may have been placed on the seabed prior to MODU arrival, and where used, these pre-laid anchors would be released and recovered by the support vessels at the end of the decommissioning campaign.

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3.4 Post-decommissioning activities

3.4.1 As-left survey

An 'as left' ROV survey will be conducted following the decommissioning activities. This could be undertaken in a separate campaign after the decommissioning campaign, or could be undertaken at the end of the decommissioning campaign, following P&A. The as-left survey will take ~2 days per well.

The purpose of the as-left survey is to capture and record the general condition of the seabed. The survey will:

- Confirm that equipment removal has been completed as planned;
- Confirm no missed objects or debris;
- Confirm the seabed around the sites is clear of potential hazards to other marine users;
- Identify and confirm the extent of any seabed disturbance around the sites; and
- Identify and confirm any damage to benthic communities or habitat.

A visual survey of the seabed near the MODU will be completed by an ROV to document seabed state. This will be a General Video Inspection (GVI) undertaken by camera, similar to the wellhead inspection survey described in Section 3.2.1.

The as-left survey may be used to demonstrate compliance with Section 270(3)(c), (d), (e) and (f) during subsequent title relinquishment, as per Section 270 Consent to surrender title – NOPSEMA advice (NOPSEMA, 2022a), noting that title relinquishment is not proposed following these decommissioning activities, as Eni propose future development of the Petrel field.

3.5 Support Operations

3.5.1 MODU Operations

Eni will employ a MODU for the decommissioning activities. For the purposes of this EP, MODU may refer to any of the options listed here. As these options have different impacts and risks, for each aspect, the option with the greatest potential for environmental impact has been assessed (Sections 7 and 8). Where there is no difference between the options in terms of impact or risk for a particular aspect, the assessment does not specify which type of MODU. The MODU options considered are described below:

- Moored MODU (or DP-assisted moored MODU): The MODU is towed into position by AHSVs and moored to the seabed with anchors. Approximately 8-12 anchors are required, which are tethered to the MODU with mooring lines. The total estimated footprint is ~1,944m² per well location (assuming 12 mooring lines);
- DP MODU: The MODU uses dynamic positioning (DP) to hold itself in position. This option may not be feasible due to the Petrel field water depth, as the operating depth of DP MODUs is generally limited to deeper waters;
- Jack-up MODU: The MODU is towed into position and legs are lowered to the seabed, jacking up the MODU hull above sea level. Typically, 3 legs are used, each with an estimated footprint of ~750m² per well location; and

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- LWIV: The LWIV uses DP to hold itself in position.

The MODU option selected depends on the outcomes of the pre-decommissioning survey and availability. All potential MODU types are referred to as a 'MODU'. Non-decommissioning activities occurring on the MODU will include:

- Bunkering and bulk transfer of fuel, chemicals and supplies
- Transferring equipment and waste to supply vessels
- Discharges of:
 - sewage, greywater and food waste;
 - cooling water and reverse osmosis brine;
 - deck drainage and bilge;
 - atmospheric emissions; and
- Helicopter operations.

An estimated maximum of 140 personnel on board (POB) is expected on the MODU, depending on which MODU option is selected.

There is no formal Petroleum Safety Zone around the MODU, however exclusion and cautionary zones will be in place during activities.

3.5.2 Vessel Operations

Different vessel capabilities are required for the different campaigns if performed separately, including:

- CSV;
- Multipurpose survey vessel (geophysical and geotechnical survey);
- Small utility vessel (GVI inspection; as-left survey); and
- AHSV.

If an alternate vessel campaign is required as part of the wellhead removal scope, it will likely be a CSV, and is expected to take up to 7 days per well. This duration is included in the decommissioning campaign (60 days total; as outlined in Table 3-3) as the MODU would therefore not be required for the whole duration.

Where vessel synergies are realised, lighter scopes may be performed with larger vessels (e.g., GVI during the G&G survey).

The activities prior to the decommissioning campaign require only one vessel to be mobilised at a time to undertake the campaigns. Vessels are likely to mobilise out of Darwin Harbour.

All vessels will be fuelled by marine diesel oil (MDO). Vessels may be refuelled in the Operational Area or within the nearest suitable harbour (likely Darwin). The largest single fuel tank for the types of support vessels identified for the campaigns is expected to have a volume of $\sim 206\text{m}^3$.

During the decommissioning campaign, support vessels will bunker to the MODU.

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Vessels transiting to and from the operational area are not included in the scope of this EP; and will operate under the Commonwealth *Navigation Act 2012* and are subject to existing Australian Maritime Law.

Table 3-4 presents a summary of type of vessel, campaign, and Persons on Board (POB).

Table 3-4: Vessel type, campaign, and POB

Vessel	Purpose/Campaign	Approx POB
Small utility vessel	GVI survey campaign - wellhead inspection As-left survey campaign	15
Multipurpose survey vessel	Geophysical and Geotechnical survey campaign - samples collection	30
CSV	Pre-decommissioning vessel campaign – corrosion cap removal and wellhead inspection Potential wellhead removal campaign	30 - 50
AHSV	Decommissioning campaign – support operations Total of 3 AHSVs. Two will be used to tow and position the MODU and act as guard vessels. The third vessel is to re-supply.	42

Activities associated with these vessels include:

- Supporting MODU positioning;
- Transfer of equipment and supplies to and from the MODU;
- Bunkering and bulk transfer of fuel, chemicals and supplies to the MODU;
- Collecting and potentially treating waste from the MODU;
- Discharges of:
 - sewage, greywater and food waste
 - cooling water and brine
 - deck drainage and bilge water
 - atmospheric emissions
- Assisting in emergency response situations; and
- Monitoring the 500m safety exclusion zone, if applicable.

Support vessels will not anchor in the Operational Area.

Vessels transiting to and from the operational area are not included in the scope of this EP; and will operate under the Commonwealth *Navigation Act 2012* and are subject to existing Australian Maritime Law.

3.5.3 ROV Operations

ROV operations are proposed to support the monitoring and pre-decommissioning campaigns and the decommissioning campaign. ROVs are unoccupied, underwater vehicles that are tethered to a support vessel. ROVs may be fitted with various equipment, including a video camera, lights, a manipulator or cutting arm, instruments and high-pressure cleaning equipment to undertake marine growth removal.

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The ROV will be deployed and operated from support vessels and are not expected to 'wet park' on the seabed.

ROVs will be used for a variety of activities, including:

- Wellhead inspections (GVI);
- Wellhead and corrosion cap cleaning;
- Installation, functioning and retrieval of decommissioning and well evaluation equipment (e.g. guiding tooling into the wellhead);
- Monitoring of decommissioning operations (e.g. cutting of the wellhead); and
- Recovery of equipment.

3.5.4 Helicopter Operations

Helicopters will be used for crew change from the MODU during the decommissioning campaign only. The frequency of flights may be once per day, likely from Darwin. Refuelling helicopters offshore is not planned.

Helicopter operations are not required for the pre-decommissioning vessel campaigns.

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4 DESCRIPTION OF THE ENVIRONMENT

This section summarises the key physical, biological, socio-economic and cultural characteristics of the existing environment that may be affected (EMBA) by the activity, both from planned and unplanned events associated with the Petrel-3 and Petrel-4 petroleum activities. The EMBA by the petroleum activity within the scope of this EP has been defined as an area where a change to environmental receptors may potentially occur as a result of planned activities or unplanned events (Section 4.1).

The purpose of this section is to address the requirements of OPGGS(E) Sections 21(2) and 21(3) by describing the existing environment, including values and sensitivities that may be affected by both planned activities and unplanned events.

The description of the environment applies to two spatial areas:

1. the Operational Area (as defined in Section 3.1.2); and
2. the Environment that May Be Affected (EMBA) or low exposure zone (as defined in Section 4.1).

A third area is referenced in this EP. The zone of potential impact (ZPI) or moderate exposure zone (as defined below) is smaller than the EMBA and may be representative of an area of biological impact from hydrocarbons (refer Section 8.6 for more information).

The DCCEEW Protected Matters Search Tool (PMST) was used to identify MNES listed under the EPBC Act in the Operational Area and EMBA (Appendix B: Environmental Values and Sensitivities). This section is informed by this search.

4.1 Determination of the Environment that May be Affected

Stochastic hydrocarbon dispersion and fate modelling has been performed on the worst-case credible hydrocarbon releases from the petroleum activities (MDO spill of 300m³). There is no risk of LOWC from Petrel-3 or Petrel-4, because there are significant, verified cement plugs above the reservoir zone (i.e. well barriers), which will not be disturbed during the abandonment activities in this EP. It has been established that the reservoir is normally-pressured, from pore and fracture gradients developed and refined during the drilling of the eight wells in the Petrel field; and a series of comprehensive Geomechanics studies.

The EMBA (Figure 4-1) encompasses the outermost boundary of the worst-case spatial extent of the credible hydrocarbon release scenarios, based on the hydrocarbon low exposure values presented in Table 4-1 (NOPSEMA, 2019).

Table 4-1: Summary of environmental hydrocarbon thresholds applied to the environment that may be affected and zone of potential impact

Zone	Surface hydrocarbon (g/m ²)	Entrained hydrocarbon (ppb)	Dissolved aromatic hydrocarbon (ppb)	Shoreline contact hydrocarbon (g/m ²)
EMBA (low exposure)	1	10	6	10
ZPI (moderate exposure)	10	100	50	10
High exposure area	50	-	400	1000

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Stochastic modelling compensates for the uncertainty associated with any single hydrocarbon spill event, such that risk assessment and spill response planning are more robust and conservative by covering a wide range of possible scenarios. The footprint of an actual spill event is more accurately represented by only one of the simulations from the stochastic modelling, resulting in a much smaller spatial footprint.

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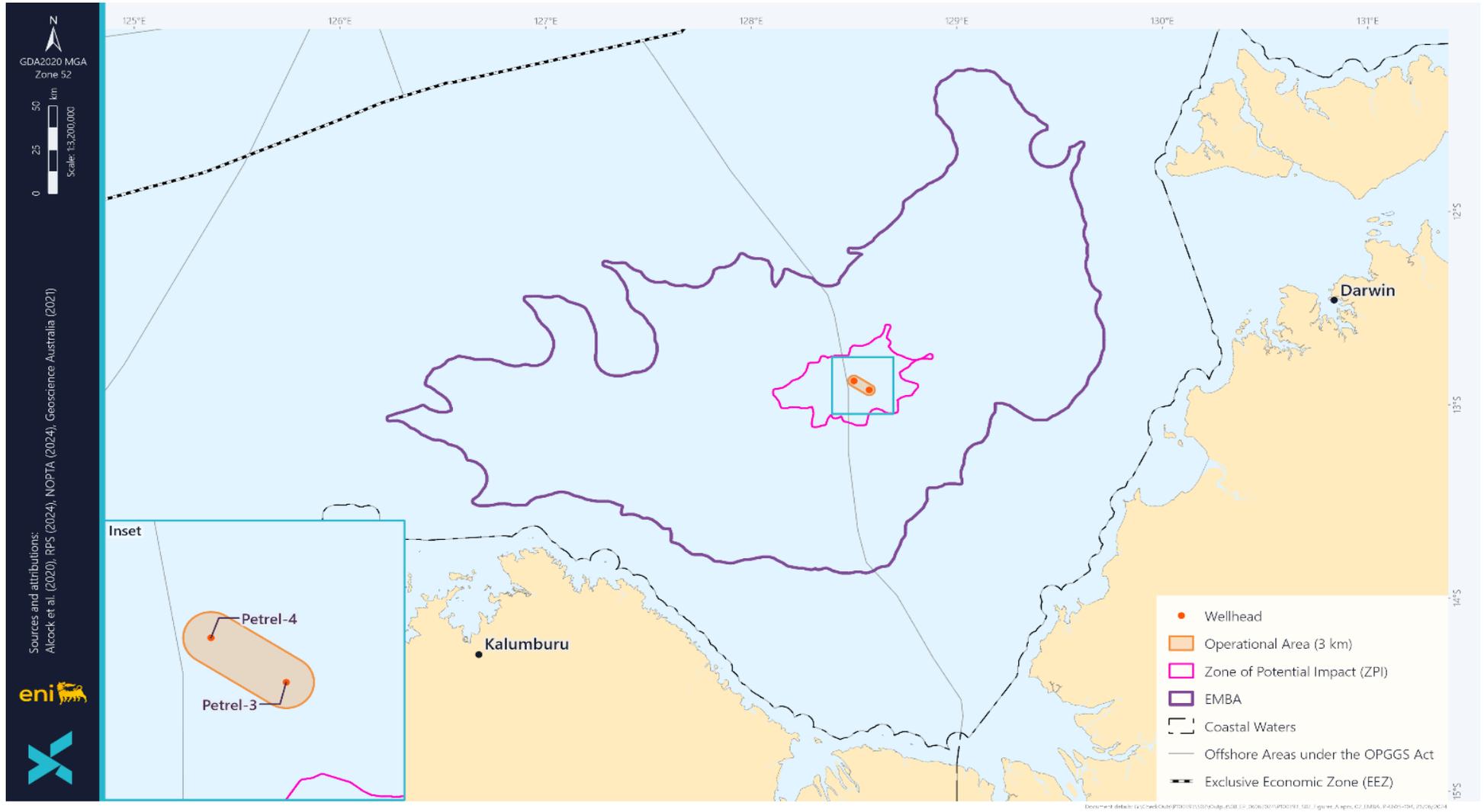


Figure 4-1: The environment that may be affected (EMBA) and the zone of potential impact (ZPI)

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4.2 Particularly Relevant Values and Sensitivities of the Environment

This section summarises environmental values and sensitivities, including physical, biological, social, economic and cultural features within the marine and coastal environment that is relevant to the Operational Area and EMBA.

Table 4-2 and Table 4-3 summarise the MNES (EPBC Act) identified as potentially occurring within the Operational Area and EMBA, respectively, as determined by the PMST results (Appendix B: Environmental Values and Sensitivities).

Additional information about identified MNES is provided throughout this section and in Appendix B: Environmental Values and Sensitivities.

Table 4-2: Summary of matters of national environmental significance within the Operational Area

MNES	Number	Relevant section
World Heritage Properties	0	N/A
National Heritage Places	0	N/A
Wetlands of International Importance (Ramsar)	0	N/A
Commonwealth Marine Areas	1	Section 4.5
Listed Threatened Ecological Communities	0	N/A
Listed Threatened Species	20	Section 4.4.3
Listed Migratory Species ¹	35	Section 4.4.3

Note 1: The EPBC Act categorise migratory and threatened species independently; therefore, migratory species can also be threatened.

Table 4-3: Summary of matters of national environmental significance within the environment that may be affected

MNES	Number	Relevant section
World Heritage Properties	0	N/A
National Heritage Places	0	N/A
Wetlands of International Importance (Ramsar)	0	N/A
Commonwealth Marine Areas	1	Section 4.5
Listed Threatened Ecological Communities	0	N/A
Listed Threatened Species ¹	23	Section 4.4.3
Listed Migratory Species ^{1 2}	40	Section 4.4.3

Note 1: Terrestrial species (such as terrestrial mammals, reptiles, and bird species) that appear in the PMST results of the EMBA and do not have habitats along shorelines are not relevant to the Petrel-3 and Petrel-4 petroleum activities impacts and risks and have, therefore, not been included in these numbers.

Note 2: The EPBC Act categorise migratory and threatened species independently; therefore, migratory species can also be threatened.

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4.3 Physical Environment

4.3.1 Bioregions

The Petrel-3 and Petrel-4 Operational Area is within the Joseph Bonaparte Gulf (JBG), which lies over the Sahul Shelf in the Timor Sea from west of Bathurst Island to the eastern boundary of the North-west Marine Region. The JBG is characterised by complex geomorphology, including:

- coastal, shelf and basin features in the JBG;
- dissected banks, shoals, valleys, and terraces on the Van Diemen Rise; and
- deeper areas on the shelf slope to the north of the Van Diemen Rise.

The JBG is an area of soft substrate expanses with localised rocky outcrops, gravel deposits and raised features. Some areas contain high densities of pockmarks and sand waves, and calcarenite subcrops occur in the far northwest in an 11km wide palaeo channel. Benthic communities are exposed to strong tidal currents, high turbidity, and substantial sediment mobility, with disturbance decreasing offshore. The Operational Area is located in the upper (outer) reaches of the JBG, in an area of relatively flat, featureless seabed. Sediments are predominantly very soft, grey-green, gravelly sand clays (Woodside, 2004).

The Bonaparte Basin, which dominates the western portion of the JBG system, was formed between 15,000 to 13,000 years ago after rapid sea level rise inundated most of the Sahul Shelf, creating fully open marine conditions within the area known as the Bonaparte Depression. During the late quaternary, the environment of the Bonaparte Depression varied with fluctuating sea levels and climatic conditions, from an estuarine embayment to a shallow, freshwater lake. Extensive palaeo-river channels, some up to 150km long, 5km wide and 240m deep, connect the present-day basin to the old shoreline at the edge of the shelf (Heyward et al., 1997).

The JBG has been included in several continent-scale habitat classifications. The most recent being the Commonwealth bioregionalisation (IMCRA 4.0) which places most of the JBG into a single provincial bioregion the Northwest Shelf Transition. IMCRA further classifies Australia's marine regions into smaller meso scale bioregions, five of which overlap the JBG.

Northwest Shelf Transition

The Northwest Shelf Transition, which crosses both the NWMR and NMR, is characterised by the following biophysical features (DSEWPaC, 2012d):

- Located mostly on the continental shelf, with some small areas extending onto the continental slope;
- Water depths range between 0-330m, with the majority of the bioregion occurring in depths of 10-100m;
- The Indonesian Throughflow (ITF) is the dominant oceanographic feature and dominates the majority of the water column;
- The strength of the ITF and its influence in the bioregion varies seasonally in association with the North-west Monsoon;
- Contains a variety of geomorphic features, including terraces, plateaus, sand banks, canyons and reefs; and

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- The biological communities of the North-west Shelf Transition are typical of Indo-west Pacific tropical flora and fauna and occur across a range of soft-bottom and harder substrate habitats.

Northern Shelf Province

The Northern Shelf Province contains submerged patch or barrier reefs in areas with approximately 30-50 m depth of water, these mainly occur around the margin of the Gulf of Carpentaria (which lies outside the combined EMBA) (DSEWPaC, 2012e). The majority of the province is relatively featureless with sandy and muddy sediments and this is expected to be the case for the small portion of the EMBA that overlaps the Northern Shelf Province.

The seabed and benthic habitats relevant to the Operational Area and EMBA are further described in Section 4.3.6.

4.3.2 Hydrography and oceanography

The oceanographic environment of the Joseph Bonaparte Gulf region is dominated by diurnal and semi-diurnal tides featuring some of the largest tidal energies observed anywhere in the world, with tidal sea level ranges exceeding 8 m along the western side of the Gulf during the spring tide (CSIRO, 2005). There is a well-defined spring-neap lunar cycle, with spring tides occurring two days after the new and full moon. A metocean study carried out in 2012 reported a mean high water neap tide level of 2.40 m and mean low water neap tide level of 2.11 m for the Petrel region. The dominance of semi-diurnal tides persists even at neap tides (RPS, 2012).

The average and maximum current speeds were 0.34 m/s and 1.26 m/s, respectively. During all seasons the dominant current directions were along the northwest-southeast axis as a result of the influence of the ebb and flood tide dynamics in the region (RPS, 2023). Cyclone events generate the strongest currents in the JBG, with current speeds in some areas expected to reach 1.4 m/s (Przeslawski et al., 2011).

Mean monthly surface temperatures in the Joseph Bonaparte Gulf region vary between about 26°C between July and August and 30°C during December (RPS, 2023).

The water column is well mixed all year round with respect to temperature, due to the large tidal range and strength of currents.

Baseline surveys carried out in 2010 and 2011 showed that seawater temperature was consistent across the area. Temperature gradients throughout the water column did not display a thermocline, instead a vertical gradient in seawater temperature was observed across in which temperature decreased progressively from the surface to the bottom ranging from 32.08°C to 25.3°C. Temperature was around 2°C greater in the second survey, attributed by the warmer and calmer conditions at the end of summer, when survey two was completed (ERM, 2011).

4.3.3 Bathymetry and seabed morphology

The majority of the Northwest Shelf Transition is located on the continental shelf, with only a small area extending onto the continental slope. This bioregion is characterised by complex geomorphology, including:

- Shelves, such as the Sahul Shelf and Arafura Shelf;
- Shoals, such as Flinders–Evans Shoals;

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- Banks, such as Van Diemen Rise;
- Terraces;
- Basins, such as the Bonaparte Basin; and
- Valleys, such as the Bonaparte Depression and Malita Shelf Valley, which provides a significant connection between the Joseph Bonaparte Gulf and the Timor Trough.

Areas of patch, fringing and rocky reefs are found closer to the coast (DEWHA, 2008). The bioregion contains 90% of the Region's carbonate banks/shoals (Baker et al., 2008). Carbonate banks and shoals occur predominantly in the Joseph Bonaparte Gulf, and consist of a hard substrate with flat tops and steep sides that rise from water depths of 150–300m (Baker et al., 2008).

The Petrel field is located on one of the prominent geomorphic features of the bioregion, the Sahul Shelf (Baker et al., 2008).

The seabed across the Petrel field is generally smooth, with numerous isolated pockmarks up to 25m diameter and 0.5m deep, and several clusters of smaller, shallow pockmarks scattered across the site. A network of shallow channels meanders through the site. In the south-east there is a prominent central channel approximately 400m wide and 3m deep. This channel divides into a network of narrower channels between 100m and 300m wide and up to 1m deep (Fugro 2010).

The distribution of seabed sediments in the Joseph Bonaparte Gulf and contained within the Sahul Shelf reflect the present-day oceanographic condition and display a distinct seaward fining pattern (Baker et al., 2008). Seabed sediments are predominantly carbonate sands mostly transported by strong tidal currents and seasonal cyclones (van Andel and Veever 1967). Terrigenous sediments reach the Sahul Shelf from large river systems (e.g., Victoria River System) (Baker et al., 2008).

4.3.4 Water quality

Surface seawater salinities in the tropics are generally 34–35ppt and vary little between seasons (Middleton, 1995 in Shell 2009). Modelled seawater salinity profiles indicated that there is little variation in salinity through the water column, ranging between 33.7ppt (August) and 35.4ppt (March) (RPS, 2023). This is supported by field data showing that salinity and specific conductivity were similar across the Petrel field and along the pipeline route, and found to slightly increase with depth (ERM, 2011). There is a small variation in salinity and specific conductivity between seasonal surveys with a slight increase in both parameters in the dry season (ERM, 2011).

Dissolved oxygen (DO) concentration ranged from a minimum of 3.64mg/L (49.8%) near the seabed to 7.80mg/L (117.2%) at the sea surface. DO was found to decrease with depth consistently across all fields. Such variation is often linked to higher photosynthetic activity at the seawater surface and wave and wind generated mixing. These values are typical of unpolluted seawater (ERM, 2011).

Total suspended solids (TSS) were largely not detected across the area during the time of sampling. The samples that did report detections, had concentrations marginally above the laboratory LOR of 5mg/L with no differences observed between surface and bottom measurements. These data represent relatively low suspended solid values as would be expected for offshore waters in the region (ERM, 2011).

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Surveys completed in 2010 and 2011 showed that water quality in the Petrel field is relatively pristine with results typical of nutrient poor (oligotrophic) offshore northern Australian waters (ERM, 2011):

- Total petroleum hydrocarbons, BTEX (benzene, toluene, ethylbenzene, and xylenes) and polyaromatic hydrocarbons (PAH) were not detected in any samples from across all fields;
- There was no major spatial variation evident among fields, or difference in metal concentration between the surface and bottom measurements. Concentration of the metals analysed were all below their respective trigger values as defined by the Australian and New Zealand Environment Conservation Council (ANZECC, 2000);
- The concentration of radionuclides (radium 226 and 228) was relatively uniform and low across all fields and depths with concentrations either below or marginally above the limit of reporting (LOR) of 0.03 Bq/L;
- The concentration of nutrients (nitrogen and phosphorous) were similar and low across all fields and depths with mean nitrate + nitrite as N, TKN, and phosphorous concentrations either being below or only slightly above the laboratory LOR;
- Chlorophyll was not detected in any samples from across all fields with all samples reporting concentrations below the laboratory LOR; and
- Dissolved oxygen decreases very steadily with increasing water depth through the water column.

4.3.5 Air quality

There is currently no air quality data recorded within the vicinity of the Operational Area. However, given the distance from land, air quality is expected to be relatively high. Potential sources of air pollution associated with anthropogenic influences are expected to be emissions generated by shipping, and oil and gas activities, and therefore considered to be localised in relation to the regional setting.

4.3.6 Benthic habitats and communities

Sediments of the Bonaparte Gulf are dominated by biogenic gravels and sands, grading to muds offshore (Galaiduk et al 2018).

Previous benthic habitat surveys indicated that the soft sediment seabed is comprised primarily of sand, coarse shell fragment and silt. Sediments in the Petrel field were dominated by sand with similar gravel, silt and clay proportions (ERM, 2011). Benthic habitats are defined as subtidal habitats that occur below the lowest astronomical tide and are driven by light availability. Unvegetated soft sediments are a widespread habitat in both intertidal and subtidal areas, particularly in areas beyond the photic zone. The biodiversity and productivity can vary depending upon depth, light, temperature and the type of sediment present (Brewer et al. 2007).

Concentrations of analytes including metals, nutrients, TOC, and radionuclides co-varied with the particle size distribution data (ERM, 2011). The results from sediment quality sampling are summarised below:

- Low concentrations of metals were generally reported across the Petrel field. The mean concentration of all metals exhibited concentrations below the trigger values defined in

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the ANZECC guidelines (ANZECC, 2000). The mean concentration of metals at Petrel was relatively uniform.

- The mean concentration of nitrate and nitrite as nitrogen was similar across the fields. A high level of variability was evident within each field for TKN and TP as expressed by the high standard deviations.
- Petrel had similar TOC concentrations with mean concentrations of 0.25% wt ± 0.07 and 0.23% ± 0.05.
- TPH, BTEX, PAH and tributyltin were not detected in any sample across the fields with all records below the laboratory LOR.

4.3.7 Existing Infrastructure

A full field site survey was undertaken in 2010 when the Petrel field was under the operatorship of Santos. This site survey was undertaken to confirm the bathymetry, shallow geological profiles, confirm the location of existing wells and the location of any debris within the field location (Fugro Survey, 2013; Tamboritha Survey, 2021).

The existing Petrel-1, 1A, 2, 5 and 6 abandoned wells and the suspended wells Petrel-3 and Petrel-4 were all identified inside the survey area.

This survey identified a debris field in the vicinity of the wells (concentrated around Petrel-1 and 1A). It was not clear what this debris was but it was not considered to possess any threat to the surrounding wells (Fugro Survey, 2013). Proximity of the debris found during the 2010 survey to the wells under this EP is shown in Table 4-4, and proximity to the shipwreck (the Sedco Helen).

Table 4-4: Debris Field Summary (Fugro Survey, 2013; Tamboritha Survey, 2021)

Item	Distance from Petrel-3 (km)	Distance from Petrel-4 (km)
Debris (riser at Petrel-1)	15.9	7.3
Debris (riser at Petrel-1)	15.9	7.3
Debris (small item)	17.1	8.3
Debris (near Petrel-3) *	0.1	9.6
Debris (metal pad-eye)	0.1	9.6
Debris (near Petrel-6)	19.3	10.5
Debris (wire rope or similar)	15.0	6.2
Debris (near <i>Sedco Helen</i>)	15.0	6.4
Wreck of the <i>Sedco Helen</i>	15.1	6.4

*Bulk transfer hose or similar

4.4 Ecological Environment

4.4.1 Plankton

Plankton species, including both phytoplankton and zooplankton, are a key component in oceanic food chains. Scientists classify plankton in several ways, including by size, type, and how long they spend drifting. But the most basic categories divide plankton into two groups: phytoplankton (plants) and zooplankton (animals).

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Phytoplankton are autotrophic planktonic organisms living within the photic zone; and are the start of the food chain in the ocean (McClatchie et al., 2006). Phytoplankton are dependent on oceanographic processes (e.g. currents and vertical mixing), that supply nutrients needed for photosynthesis. Thus, phytoplankton biomass is typically variable (spatially and temporally), but greatest in areas of upwelling, or in shallow waters where nutrient levels are high.

Phytoplankton assemblages recorded across the Petrel field was characteristic of offshore tropical waters. Phytoplankton assemblages were dominated by the cyanobacteria during the 2010 wet season survey, which comprised 99.7% of identified algal cells. During 2011 dry season survey, the phytoplankton assemblage was largely dominated by the diatoms (Bacillariophyceae) (ERM, 2011).

Zooplankton is the faunal component of plankton, comprised of small protozoa, crustaceans (e.g. krill) and the eggs and larvae from larger animals. Zooplankton includes species that drift with the currents and also those that are motile.

Sampling indicated that larval fishes during both seasons were found to be dominated by the Serranidae (Cods) and Lutjanidae (Snappers), both of which are species of interest targeted by commercial fisheries in the region. Larval fish density also varied seasonally with the 2011 dry season recording highest densities of larval fishes in the zooplankton. This seasonal effect is consistent with the notion of an extended spawning season (and possibly planktonic larval duration) of the reef species dominating the larval fish assemblage in the study area at this time.

Zooplankton sampling indicated that copepods represented the most dominant group within the macro-zooplankton assemblage in both the 2010 wet season and 2011 dry season. The density of these macro-zooplankton varied significantly among seasons, with an overall greater density of these animals recorded during 2010 wet season. The greater density of macro-zooplankton may be indicative of higher primary productivity in the summer months fuelling population increases of the zooplankton (secondary productivity) at this time. Overall zooplankton density varied at the level of the assemblage with statistically distinct assemblages found within both the 2010 wet season and 2011 dry season.

4.4.2 Marine invertebrates

Marine invertebrates comprise a variety of different organisms that can live in either the benthic or pelagic zone (Brewer et al. 2007). The most common marine invertebrates include:

- Sponges;
- Cnidarians (e.g. hydroids, anemones, jellyfish);
- Marine worms;
- Arthropods (e.g. krill, prawn, crabs, lobster);
- Molluscs (e.g. nudibranch, sea slugs, mussels, oysters, squid, octopus);
- Echinoderms (e.g. sea stars, sea urchins, sea cucumbers);
- Hemichordates (e.g. acorn worms); and
- Lophophorates (e.g. bryozoans).

Commercially important invertebrates for fisheries include prawn species (see Section 4.6.1).

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The benthic habitat within the EMBA is soft sediment comprised primarily of sand, coarse shell fragment and silt. It is covered by featureless, sandy seabed which is sparsely covered by sessile organisms dominated by filter-feeding gorgonians, sponges, echinoderms and molluscs (ERM, 2011). Carbonate bank substrates associated with the carbonate bank and terrace system of the Sahul Shelf KEF, carbonate bank and terrace system of the Van Diemen Rise KEF, and pinnacles of the Bonaparte basin KEF support more diverse sessile benthos such as hard and soft corals, encrusting sponges, macroalgae and gorgonians (Brewer et al. 2007). A benthic habitat survey conducted in November 2011 recorded benthic infauna assemblages across the Petrel field similar to the results of other studies in the bio-region in terms of the species, diversity and biomass (ERM, 2011; Jones and Morgan, 1994). Infauna is documented to occur in coastal waters to depths of approximately 200m, and are widely distributed through subtropical and tropical waters of Western Australia (ERM, 2011; Jones and Morgan 1994).

A total of 18 benthic habitat sites were sampled in November 2011 with depths ranging from 85-99m. Benthic habitat mapping found that generally the seabed composition was similar to other studies conducted within the Bonaparte Gulf, with sparse sessile benthos except for an unidentified white colonial organism (presently recorded as a hydrozoa) across all sampled fields (ERM, 2011). Estimated percentage cover was low for octocorals and sponges (~2% for each) while the unidentified hydroid comprised between 11-30% at all sites. In soft sediment benthic habitats, infauna represented the predominant seabed biota as there was limited hard substrates available for sessile epibenthic fauna to attach to. Polychaete worms occurring within the top centimetres of the soft substrate were the dominant infauna communities and are an important component of the benthic community serving as a food source for demersal fish (ERM, 2011).

There are no protected invertebrates listed in the PMST search.

4.4.3 Threatened and Migratory Fauna

A search of the EPBC PMST was undertaken using areas that covered the full extent of the Operational Area and EMBA, respectively, to identify MNES under the EPBC Act (DCCEEW, 2025). Full PMST Reports for the Operational Area and EMBA are included in Appendix B: Environmental Values and Sensitivities. The PMST results identified 20 marine fauna species listed as 'threatened', 35 marine fauna species listed as 'migratory', and 57 listed as 'marine' within the Operational Area. In the ZPI, there were 20 marine fauna species listed as 'threatened', 36 marine fauna species listed as 'migratory', and 64 listed as 'marine'. In the EMBA, there were 23 marine fauna species listed as 'threatened', 40 marine fauna species listed as 'migratory', and 74 listed as 'marine' (Table 4-5). All species listed as 'threatened' under the EPBC Act are also 'Protected' under State legislation under the *Biodiversity Conservation Act 2016*.

An examination of the species profile and threats database (DCCEEW, 2025) showed some threatened species were not expected to occur in significant numbers in the marine and coastal environments (within the EMBA) due to their terrestrial distributions. Terrestrial species (such as terrestrial mammals, reptiles and bird species) that appear in the PMST of the EMBA and do not have habitats along shorelines are not relevant to the petroleum activities and have been excluded from Table 4-5.

Species with designated BIAs and Habitat Critical to their Survival (Habitat Critical) overlapping the EMBA and Operational Area have been identified in Section 4.4.4 and Section 4.4.4.1, respectively.

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Table 4-5: Commonwealth listed threatened and migratory species within the Operational Area, ZPI and EMBA

Scientific Name	Common Name	Threatened Status	Migratory Category	Listed Marine Species	Presence in OA	Presence in ZPI	Presence in EMBA
Birds							
<i>Anous stolidus</i>	Common noddy	N/A	Migratory Marine Birds	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Actitis hypoleucos</i>	Common sandpiper	N/A	Migratory Wetlands Species	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Calidris ferruginea</i>	Curlew sandpiper	Critically Endangered	Migratory Wetlands Species	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Numenius madagascariensis</i>	Eastern curlew, far eastern curlew	Critically Endangered	Migratory Wetlands Species	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Fregata minor</i>	Great frigatebird, greater frigatebird	N/A	Migratory Marine Birds	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat likely to occur within area
<i>Thalasseus bengalensis</i>	Lesser crested tern	N/A	N/A	Listed	N/A	N/A	Breeding known to occur within area
<i>Fregata ariel</i>	Lesser frigatebird, least frigatebird	N/A	Migratory Marine Birds	Listed	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
<i>Calidris melanotos</i>	Pectoral sandpiper	N/A	Migratory Wetlands Species	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Calidris canutus</i>	Red knot, knot	Vulnerable	Migratory Wetlands Species	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

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Scientific Name	Common Name	Threatened Status	Migratory Category	Listed Marine Species	Presence in OA	Presence in ZPI	Presence in EMBA
<i>Phaethon rubricauda westralis</i>	Red-tailed tropicbird (Indian Ocean), Indian Ocean red-tailed tropicbird	Endangered	N/A	N/A	Species or species habitat may occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
<i>Calidris acuminata</i>	Sharp-tailed sandpiper	Vulnerable	Migratory Wetlands Species	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Calonectris leucomelas</i>	Streaked shearwater	N/A	Migratory Marine Birds	Listed	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
<i>Phaethon lepturus</i>	White-tailed tropicbird	N/A	Migratory Marine Birds	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat likely to occur within area
Fish, Sharks and Rays							
<i>Corythoichthys intestinalis</i>	Australian messmate pipefish, banded pipefish	N/A	N/A	Listed	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Doryrhamphus dactyliophorus</i>	Banded pipefish, ringed pipefish	N/A	N/A	Listed	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hippichthys penicillus</i>	Beady pipefish, steep-nosed pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Trachyrhamphus bicoarctatus</i>	Bentstick pipefish, bend stick pipefish, short-tailed pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

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Scientific Name	Common Name	Threatened Status	Migratory Category	Listed Marine Species	Presence in OA	Presence in ZPI	Presence in EMBA
<i>Hippichthys cyanospilos</i>	Blue-speckled pipefish, blue-spotted pipefish	N/A	N/A	Listed	N/A	N/A	Species or species habitat may occur within area
<i>Doryrhamphus excisus</i>	Bluestripe pipefish, Indian blue-stripe pipefish, Pacific blue-stripe Pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Halicampus brocki</i>	Brock's pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Doryrhamphus janssi</i>	Cleaner pipefish, Janss' pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Bhanotia fasciolata</i>	Corrugated pipefish, barbed pipefish	N/A	N/A	Listed	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Syngnathoides biaculeatus</i>	Double-end pipehorse, double-ended pipehorse, alligator pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Pristis clavata</i>	Dwarf sawfish, Queensland sawfish	Vulnerable	Migratory Marine Species	N/A	N/A	N/A	Species or species habitat known to occur within area
<i>Corythoichthys amplexus</i>	Fijian banded pipefish, brown-banded pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hippocampus planifrons</i>	Flat-face seahorse	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

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Scientific Name	Common Name	Threatened Status	Migratory Category	Listed Marine Species	Presence in OA	Presence in ZPI	Presence in EMBA
<i>Pristis pristis</i>	Freshwater sawfish, largetooth sawfish, river sawfish, Leichhardt's sawfish, northern sawfish	Vulnerable	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Mobula birostris</i>	Giant manta ray	N/A	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat likely to occur within area
<i>Festucalex cinctus</i>	Girdled pipefish	N/A	N/A	Listed	N/A	N/A	Species or species habitat may occur within area
<i>Pristis zijsron</i>	Green sawfish, dindagubba, narrowsnout sawfish	Vulnerable	Migratory Marine Species	N/A	Species or species habitat known to occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
<i>Carcharias taurus</i>	Grey Nurse Shark	N/A	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Solegnathus lettiensis</i>	Gunther's pipehorse, Indonesian pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hippocampus spinosissimus</i>	Hedgehog seahorse	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Isurus paucus</i>	Longfin mako	N/A	Migratory Marine Species	N/A	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area

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Scientific Name	Common Name	Threatened Status	Migratory Category	Listed Marine Species	Presence in OA	Presence in ZPI	Presence in EMBA
<i>Halicampus grayi</i>	Mud pipefish, Gray's pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Anoxypristis cuspidata</i>	Narrow sawfish, knifetooth sawfish	N/A	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat likely to occur within area
<i>Glyphis garricki</i>	Northern river shark, New Guinea river shark	Endangered	N/A	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Carcharhinus longimanus</i>	Oceanic whitetip shark	N/A	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Choeroichthys brachysoma</i>	Pacific short- bodied pipefish, short-bodied pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Solegnathus hardwickii</i>	Pallid pipehorse, Hardwick's pipehorse	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Choeroichthys suillus</i>	Pig-snouted pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Halicampus dunckeri</i>	Red-hair pipefish, Duncker's pipefish	N/A	N/A	Listed	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Mobula alfredi</i>	Reef manta ray, coastal manta ray	N/A	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat likely to occur within area

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<i>Corythoichthys haematopterus</i>	Reef-top pipefish	N/A	N/A	Listed	N/A	N/A	Species or species habitat may occur within area
<i>Corythoichthys flavofasciatus</i>	Reticulate pipefish, yellow-banded pipefish, network pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Haliichthys taeniophorus</i>	Ribboned pipehorse, ribboned seadragon	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Solenostomus cyanopterus</i>	Robust ghostpipefish, blue-finned ghost Pipefish,	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Cosmocampus banneri</i>	Roughridge pipefish	N/A	N/A	Listed	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Sphyrna lewini</i>	Scalloped hammerhead	Conservation Dependent	N/A	N/A	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
<i>Corythoichthys schultzi</i>	Schultz's pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Isurus oxyrinchus</i>	Shortfin mako, mako shark	N/A	Migratory Marine Species	N/A	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
<i>Hippichthys parvicarinatus</i>	Short-keel pipefish, short-keeled pipefish	N/A	N/A	Listed	N/A	N/A	Species or species habitat may occur within area

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<i>Glyphis glyphis</i>	Speartooth shark	Critically Endangered	N/A	N/A	N/A	N/A	Species or species habitat may occur within area
<i>Hippocampus histrix</i>	Spiny seahorse, thorny seahorse	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Halicampus spinirostris</i>	Spiny-snout pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hippocampus kuda</i>	Spotted seahorse, yellow seahorse	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Trachyrhamphus longirostris</i>	Straightstick pipefish, long-nosed pipefish, straight stick pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Campichthys tricarinatus</i>	Three-keel pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Micrognathus micronotopterus</i>	Tidepool pipefish	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Filicampus tigris</i>	Tiger pipefish	N/A	N/A	Listed	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Rhincodon typus</i>	Whale shark	Vulnerable	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Carcharodon carcharias</i>	White shark, great white Shark	Vulnerable	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

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Scientific Name	Common Name	Threatened Status	Migratory Category	Listed Marine Species	Presence in OA	Presence in ZPI	Presence in EMBA
Marine Mammals							
<i>Sousa sahalensis</i>	Australian humpback dolphin	N/A	Migratory Marine Species	N/A	N/A	N/A	Species or species habitat may occur within area
<i>Orcaella heinsohni</i>	Australian snubfin dolphin	N/A	Migratory Marine Species	N/A	N/A	N/A	Species or species habitat likely to occur within area
<i>Balaenoptera musculus</i>	Blue whale	Endangered	Migratory Marine Species	N/A	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
<i>Tursiops truncatus s. str.</i>	Bottlenose dolphin	N/A	N/A	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Balaenoptera edeni</i>	Bryde's whale	N/A	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Delphinus delphis</i>	Common dolphin, short-beaked common dolphin	N/A	N/A	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Dugong dugon</i>	Dugong	N/A	Migratory Marine Species	Listed	N/A	N/A	Species or species habitat may occur within area
<i>Pseudorca crassidens</i>	False killer whale	N/A	N/A	N/A	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
<i>Balaenoptera physalus</i>	Fin whale	Vulnerable	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

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Scientific Name	Common Name	Threatened Status	Migratory Category	Listed Marine Species	Presence in OA	Presence in ZPI	Presence in EMBA
<i>Megaptera novaeangliae</i>	Humpback whale	N/A	Migratory Marine Species	N/A	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
<i>Tursiops aduncus</i>	Indian Ocean bottlenose dolphin, spotted bottlenose dolphin	N/A	N/A	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Orcinus orca</i>	Killer whale, orca	N/A	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Grampus griseus</i>	Risso's dolphin, grampus	N/A	N/A	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Balaenoptera borealis</i>	Sei whale	Vulnerable	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Tursiops aduncus (Arafura/Timor Sea populations)</i>	Spotted bottlenose dolphin (Arafura/Timor Sea populations)	N/A	Migratory Marine Species	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat known to occur within area
<i>Stenella attenuata</i>	Spotted dolphin, pantropical spotted dolphin	N/A	N/A	N/A	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Reptiles							
<i>Parahydrophis mertoni</i>	Arafura smooth sea snake, northern mangrove sea snake	N/A	N/A	Listed	N/A	N/A	Species or species habitat may occur within area

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Scientific Name	Common Name	Threatened Status	Migratory Category	Listed Marine Species	Presence in OA	Presence in ZPI	Presence in EMBA
<i>Hydrophis zweiffei</i>	Australian beaked sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hydrophis atriceps</i>	Black-headed sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hydrophis coggeri</i>	Cogger's sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Aipysurus duboisii</i>	Dubois' sea snake, Dubois' seasnake, reef shallows sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hydrophis elegans</i>	Elegant sea snake, bar-bellied sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Natator depressus</i>	Flatback turtle	Vulnerable	Migratory Marine Species	Listed	Species or species habitat known to occur within area	Species or species habitat known to occur within area	Foraging, feeding or related behaviour known to occur within area
<i>Chelonia mydas</i>	Green turtle	Vulnerable	Migratory Marine Species	Listed	Species or species habitat may occur within area	Species or species habitat known to occur within area	Foraging, feeding or related behaviour known to occur within area
<i>Eretmochelys imbricata</i>	Hawksbill turtle	Vulnerable	Migratory Marine Species	Listed	Species or species habitat may occur within area	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
<i>Hydrophis peronii</i>	Horned sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

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Scientific Name	Common Name	Threatened Status	Migratory Category	Listed Marine Species	Presence in OA	Presence in ZPI	Presence in EMBA
<i>Aipysurus foliosquama</i>	Leaf-scaled sea snake, leaf-scaled seasnake	Critically Endangered	N/A	Listed	N/A	N/A	Species or species habitat may occur within area
<i>Dermochelys coriacea</i>	Leatherback turtle, leathery turtle, luth	Endangered	Migratory Marine Species	Listed	Species or species habitat may occur within area	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
<i>Caretta caretta</i>	Loggerhead turtle	Endangered	Migratory Marine Species	Listed	Species or species habitat may occur within area	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour known to occur within area
<i>Hydrophis macdowellii</i>	MacDowell's sea snake, small-headed sea snake,	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Aipysurus mosaicus</i>	Mosaic sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Lepidochelys olivacea</i>	Olive Ridley turtle, Pacific Ridley turtle	Endangered	Migratory Marine Species	Listed	Species or species habitat may occur within area	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour known to occur within area
<i>Aipysurus laevis</i>	Olive sea snake, olive-brown sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hydrophis major</i>	Olive-headed sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hydrophis pacificus</i>	Pacific sea snake, large-headed sea snake	N/A	N/A	Listed	N/A	N/A	Species or species habitat may occur within area

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Scientific Name	Common Name	Threatened Status	Migratory Category	Listed Marine Species	Presence in OA	Presence in ZPI	Presence in EMBA
<i>Hydrophis inornatus</i>	Plain sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hydrelaps darwiniensis</i>	Port Darwin sea snake, black-ringed mangrove sea snake	N/A	N/A	Listed	N/A	N/A	Species or species habitat may occur within area
<i>Crocodylus porosus</i>	Salt-water crocodile, estuarine crocodile	N/A	Migratory Marine Species	Listed	N/A	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
<i>Hydrophis kingii</i>	Spectacled sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hydrophis hardwickii</i>	Spine-bellied sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hydrophis ornatus</i>	Spotted sea snake, ornate reef sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hydrophis stokesii</i>	Stokes' sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
<i>Hydrophis platura</i>	Yellow-bellied sea snake	N/A	N/A	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

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4.4.4 Biologically Important Areas and Habitat Critical

BIAs are areas and times used by protected marine species for carrying out critical life functions, such as reproduction, feeding, migration and resting (DCCEEW, 2024c). BIAs are designated for marine species protection under the EPBC Act (DCCEEW, 2024c). BIAs have been under review by DCCEEW and are presented on the Australian Marine Spatial Information system (AMSIS). Shapefiles for the data presented on AMSIS are not available at the time of writing, hence the most recent available data is used to inform presence of BIAs and figures for BIAs within this EP (DCCEEW, 2024d).

BIAs identified within the Operational Area, ZPI and EMBA are presented in Table 4-6, and Figure 4-2, Figure 4-3 and Figure 4-4. The PMST reports on broad search grids of up to 32 x 32km in offshore areas. Therefore, PMST reports may identify environmental values and sensitivities to be within defined spatial extents even if they are only within close proximity. To ensure the most accurate data is assessed within this EP Eni has utilised the Australian Marine Spatial Information System (AMSIS) which provides data at a more granular level. Although PMST results (Appendix B: Environmental Values and Sensitivities) identified a foraging BIA for the loggerhead and flatback turtle that intersects with the Operational Area, the foraging BIAs for both species are located approximately 15 km west of the Operational Area (see Figure 4-2 and Figure 4-3).

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Table 4-6: Biologically important areas within the Operational Area, ZPI and EMBA

Species	Overlaps Operational Area	Overlaps ZPI	Overlaps EMBA	Distance from Operational Area (km)	Figure reference
Marine Reptiles					
Flatback turtle	-	Foraging	Foraging Internesting Internesting Buffer	15km north-east	Figure 4-2
Green turtle	Foraging	Foraging	Foraging	-	Figure 4-3
Loggerhead turtle	-	Foraging	Foraging	15km north-east	Figure 4-3
Olive Ridley turtle	Foraging	Foraging	Foraging	-	Figure 4-2
Seabirds					
Lesser crested tern	-	-	Breeding	197km south-west	Figure 4-4
Lesser frigatebird	-	-	Breeding	164km south-west	Figure 4-4

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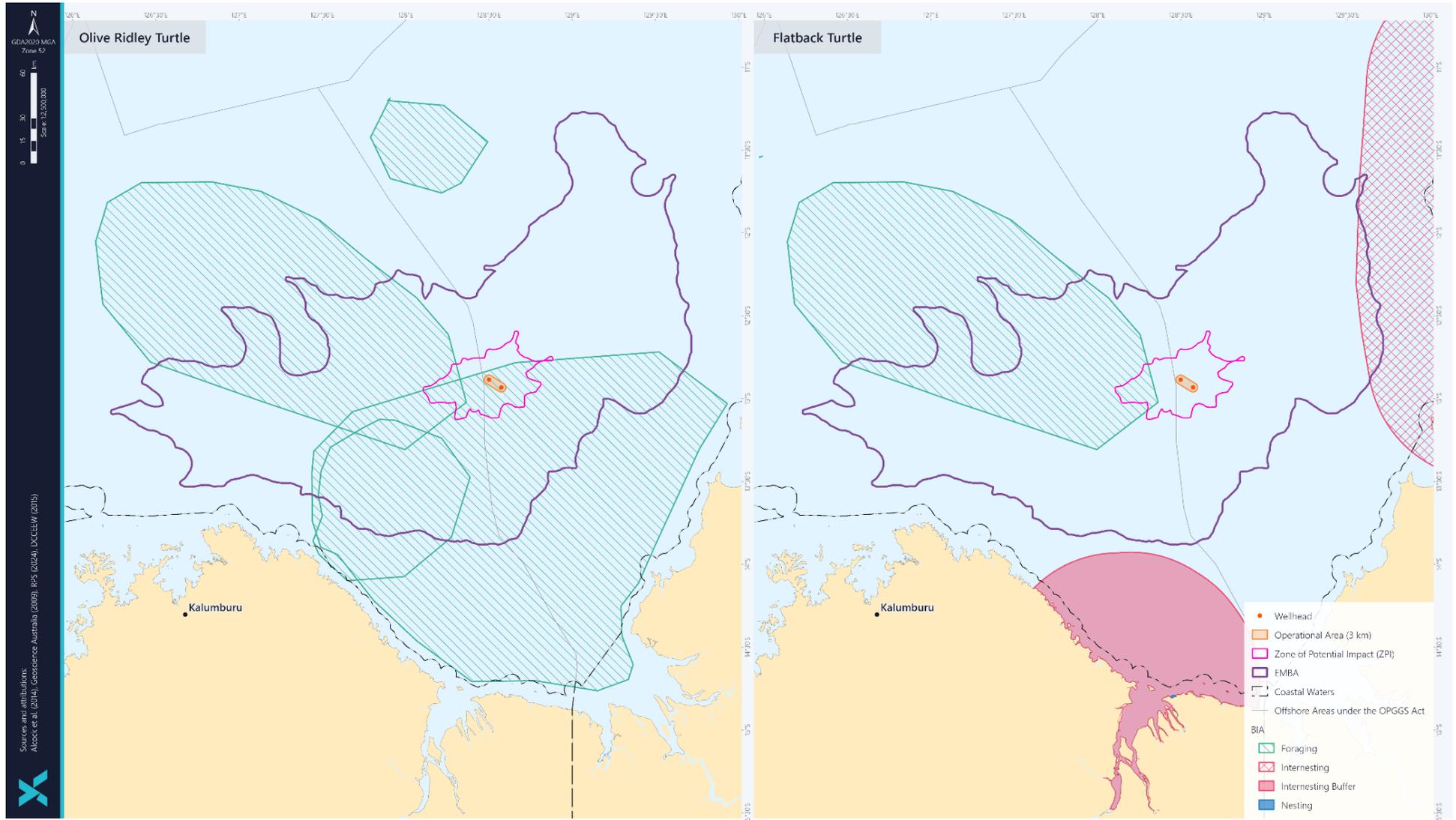


Figure 4-2: Biologically Important Areas for Olive Ridley Turtle and Flatback Turtles

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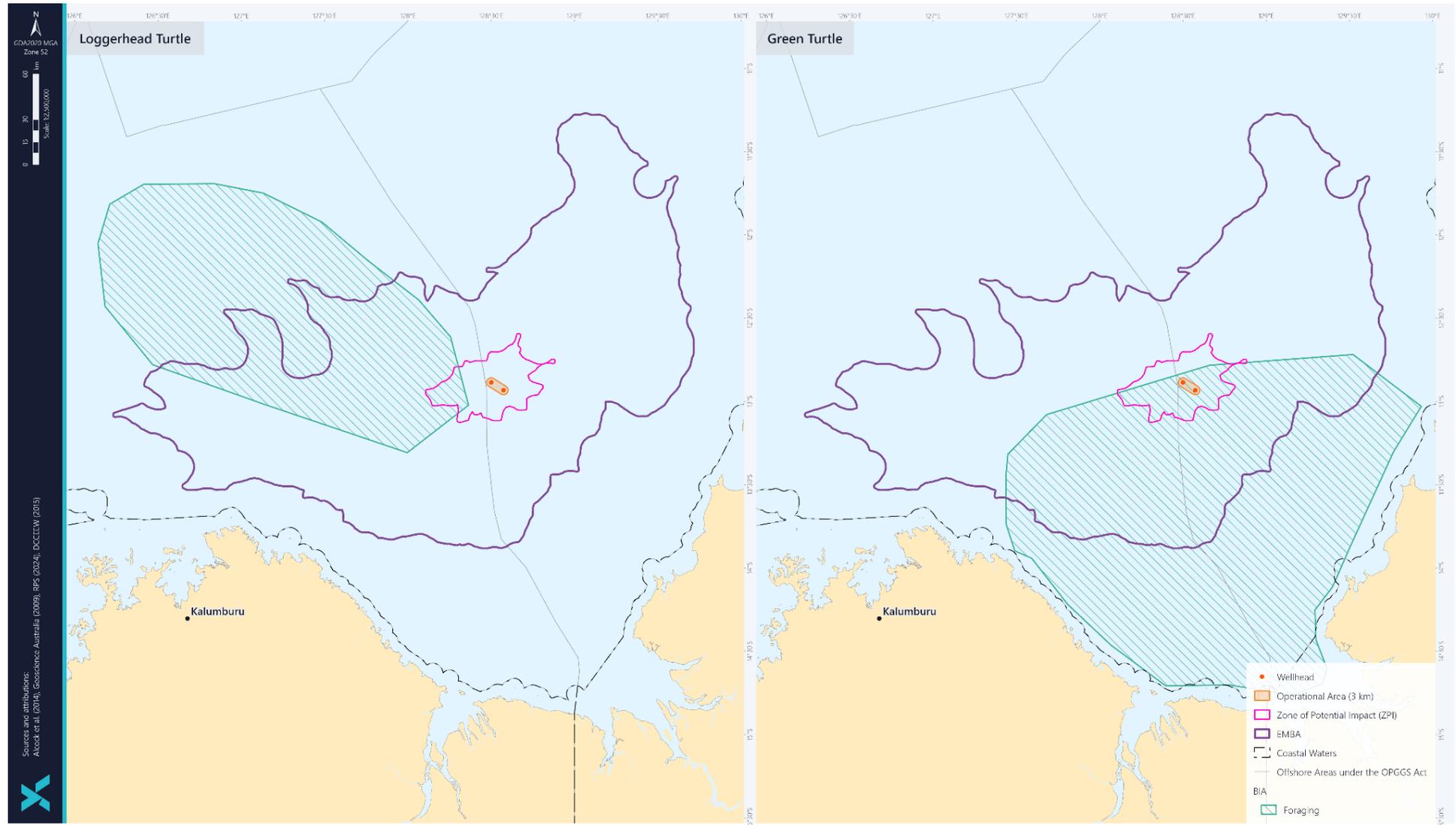


Figure 4-3: Biologically Important Areas for Loggerhead and Green Turtles

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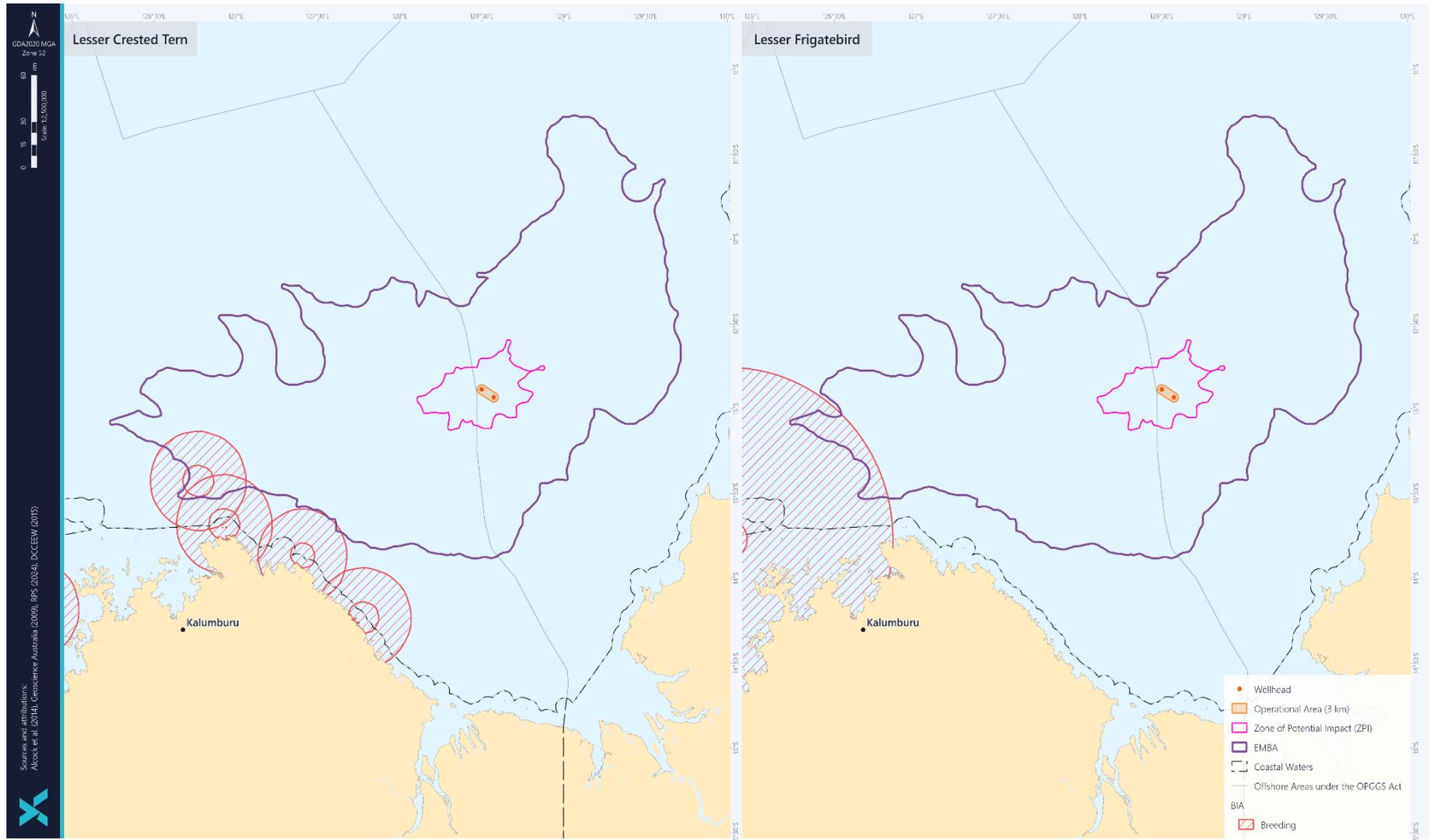


Figure 4-4: Biologically Important Areas for the Lesser Crested Tern and Lesser Frigatebird

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4.4.4.1 Habitat Critical to the Survival of Marine Turtles

No habitat critical to the survival of marine turtles is present in the Operational Area or ZPI; those identified in the EMBA are listed in Table 4-7 and shown in Figure 4-2.

Table 4-7: Habitat critical to the survival of marine turtles within the EMBA

Species	Habitat Type	Overlaps Operational Area	Overlaps ZPI	Overlaps EMBA	Distance from Operational Area (km)
Marine Reptiles					
Flatback turtle	Nesting	-	-	Yes	105km east

4.4.5 Seabirds and shorebirds

There are 13 seabird and shorebird species (or species habitat) classified as threatened and/or migratory with an identified presence within the EMBA (Table 4-5, Appendix B: Environmental Values and Sensitivities). A list of the relevant conservation advice and/or recovery plans is also provided in Table 2-3. The type of presence varies, however the majority of species or species habitat may occur within the EMBA. BIAs for seabird or shorebird species, lesser crested tern and the lesser frigatebird, intersect the EMBA (Table 4-6). These species are discussed in the relevant sections below.

4.4.5.1 Lesser crested tern

The lesser crested tern is a marine listed species that is known to occur within the EMBA (Table 4-5). The species has a wide global range and can be found on islands and coastlines of tropical and subtropical areas, including Australia. Foraging occurs in the surf and over the open ocean where they prey predominantly on small pelagic fish (Commonwealth of Australia, 2020). PMST reports identified that breeding behaviours are known to occur within the EMBA. The nest is a shallow scrape on sand beaches, rock, coral flats, offshore islands, etc. A BIA for breeding for the lesser crested tern is located at Seagull Island and along the Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef to the north-east and north-west, respectively, of the Operational Area, within the EMBA (Table 4-6).

Given their distribution and breeding preference, any occurrence is likely to be of a transient nature due to the absence of shoreline contact and offshore islands within the EMBA; however, it is possible that the species may use the area for mating or foraging.

4.4.5.2 Lesser frigatebird

The lesser frigatebird is a migratory marine species that is likely to occur within the EMBA (Table 4-5). They are a pelagic species, often found far offshore, but have also been observed over shelf waters, inshore areas, and inland over continental coastlines (DSEWPaC, 2012d). The species forages for fish and cephalopods, typically captured via surface-seizing. The lesser frigatebird forages in Australia, on small, remote tropical and sub-tropical islands, in mangroves or bushes, and even on bare ground (Commonwealth of Australia, 2020). A BIA for breeding for the lesser frigatebird has been identified along the Kimberley and Pilbara coasts and associated islands including Ashmore Reef, which is located to the south-west of the Operational Area within the EMBA (Table 4-6). Although a breeding BIA overlaps the EMBA, the species nests on islands and there are no islands within the EMBA. Hence, there are no expected breeding sites within the EMBA.

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Given their distribution and breeding preference occurs outside of the EMBA, any occurrence within the EMBA is likely to be of a transient nature due to the lack of offshore islands in the western EMBA; however, it is possible that the species may use the area for foraging.

4.4.6 Fish, sharks and rays

There are 15 fish, shark and ray species (or species habitat) classified as threatened or migratory and 34 syngnathid species (or species habitat) with an identified presence within the EMBA (Table 4-5, Appendix B: Environmental Values and Sensitivities). A list of the relevant conservation advice and/or recovery plans and relevant management actions is provided in Table 2-3. The type of presence varies, however the majority of species or species habitat may occur within the EMBA. No Biologically Important Areas (BIAs) for fish, sharks or rays were found to intersect the EMBA.

4.4.7 Marine mammals

There are 5 whale, 10 dolphin and one dugong species (or species habitat) classified as threatened, migratory or a listed marine species with an identified presence within the EMBA (Table 4-5, Appendix B: Environmental Values and Sensitivities). A list of the relevant conservation advice and/or recovery plans and relevant management actions are also provided in Table 2-3. The type of presence varies, however the majority of species or species habitat may occur. No BIAs for marine mammal species have been found that intersect the EMBA.

No marine mammals were sighted during two last marine surveys in 2022 and 2023 in the Operational Area.

4.4.8 Marine reptiles

There are 6 marine turtles, 20 sea snakes, and one crocodile species (or species habitat) classified as threatened, migratory or listed marine with an identified presence within the EMBA (Table 4-5, Appendix B: Environmental Values and Sensitivities). A list of the relevant conservation advice and/or recovery plans and relevant management actions is also provided in Table 2-3.

Foraging, Internesting and Internesting Buffer BIAs for 4 marine turtle species intersect with the EMBA (Figure 4-2, Figure 4-3). These 4 species, flatback turtle, green turtle, loggerhead turtle and Olive Ridley turtle, are detailed in the sections below. Further, the EMBA intersects with habitat critical to the survival for the flatback turtle.

No marine turtles were sighted during two last marine surveys undertaken by Neptune Energy in the Operational Area, in 2022 and 2023. No BIAs or habitat critical to the survival of sea snakes were identified (Appendix B: Environmental Values and Sensitivities).

4.4.8.1 Flatback turtle

The flatback turtle is a vulnerable, migratory species that is known to occur within the EMBA (Table 4-5). The flatback turtle is found in tropical waters of northern Australia and is one of only two species of sea turtle without a global distribution (DEE, 2017). Flatback turtles are primarily carnivorous, feeding on soft-bodied invertebrates; juveniles eat gastropod molluscs, squid, siphonophores (DEE, 2017). Limited data also indicate that cuttlefish, hydroids, soft corals, crinoids, molluscs and jellyfish may also form part of their diet (DEE, 2017). Flatback turtles have been observed foraging on the carbonate banks of the Joseph Bonaparte Gulf and around the Pinnacles of the Bonaparte Depression (DCCEEW, 2023e). A BIA for foraging, Western Joseph Bonaparte Gulf, has been identified within the ZPI and EMBA. Further, two BIAs for internesting have been identified within the EMBA. One to the

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south (Cape Domett) and one to the north-east (Melville Island, Cobourg Island) of the Operational Area (Table 4-6, Figure 4-2). Habitat critical to the survival of the species has also been identified within the EMBA, all with a 60km internesting buffer:

- Cape Domett and Lacrosse Island in the Cambridge Gulf;
- Waigait Beach to south of Point Blaze, including all offshore islands;
- Brace Point to One Tree Point, including all offshore islands;
- Waters between Melville Island and Vernon Islands; and
- Soldier Point to Pirlangimpi including Seagull Island.

4.4.8.2 Green turtle

The green turtle is a vulnerable, migratory species that is known to occur within the EMBA (Table 4-5). Green turtles are found in tropical and subtropical waters throughout the world; usually occurring within the 20°C isotherms, although individuals can stray into temperate waters (DEE, 2017). Within Australia, green turtles typically nest, forage and migrate across tropical northern Australia (DEE, 2017). Adult green turtles consume mainly seagrass and algae, although they will occasionally eat mangroves, fish-egg cases, jellyfish, and sponges; juvenile green turtles are typically more carnivorous and will also consume plankton during their pelagic stage (DEE, 2017). A BIA for foraging, Joseph Bonaparte Gulf, has been identified within the Operational Area, ZPI and EMBA (Table 4-6, Figure 4-3). No habitat critical to the survival of the species is known to occur in the vicinity of the EMBA.

4.4.8.3 Loggerhead turtle

The loggerhead turtle is an endangered, migratory species that is known to occur within the EMBA (Table 4-5). The loggerhead turtle has a global distribution throughout tropical, subtropical and temperate waters; and in Australia typically occurs in the waters of coral and rocky reefs, seagrass beds, or muddy bays throughout eastern, northern and western Australia (DEE, 2017). A BIA for foraging, Western Joseph Bonaparte Depression, has been identified within the ZPI and EMBA (Table 4-6, Figure 4-3). Loggerhead turtles are carnivorous, feeding primarily on benthic invertebrates (DEE, 2017). No nesting or habitat critical to the survival of the species is known to occur within the vicinity of the EMBA.

4.4.8.4 Olive Ridley turtle

The Olive Ridley turtle is an endangered, migratory species that is known to occur within the EMBA (Table 4-5). The Olive Ridley turtle is found in waters across northern Australia and to the southern Queensland border. Olive Ridley turtles are primarily carnivorous, feeding on soft-bodied invertebrates such as sea pens, soft corals, sea cucumbers, and jellyfish (DEE, 2017). Both juveniles and adults have been observed foraging over shallow benthic habitats from northern Western Australia to south-east Queensland, although occurrences in pelagic foraging habitats also occur (DEE, 2017). Multiple BIAs for foraging have been identified within the Operational Area, ZPI and EMBA (Table 4-6) and are associated with the Pinnacles of the Bonaparte Basin (see Section 4.5.2) (DCCEEW, 2023d):

- Joseph Bonaparte Depression;
- Western Joseph Bonaparte Gulf; and
- Western Joseph Bonaparte Gulf – banks.

No habitat critical to the survival of the species is known to occur within the vicinity of the EMBA.

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4.5 Protected and Significant Areas

The PMST results (Appendix B: Environmental Values and Sensitivities) identified that the Operational Area, ZPI and EMBA intersect with the Commonwealth Marine Area.

There are protected areas and key ecological features (KEFs) within the EMBA. These are summarised in Table 4-8 and further described in the next subsections.

As shown in Figure 4-5, the Operational Area, ZPI and EMBA do not intersect with any State marine protected areas, wetlands of international or national importance, World, National or Commonwealth heritage properties or places. The EMBA overlaps 3 Key Ecological Features (KEFs) and one Australian Marine Park as outlined below.

The PMST reports on broad search grids of up to 32 x 32km in offshore areas. Therefore, PMST reports may identify environmental values and sensitivities to be within defined spatial extents even if they are only within close proximity. To ensure the most accurate data is assessed within this EP Eni has utilised the Australian Marine Spatial Information System (AMSIS) which provides data at a more granular level. Although the PMST search identifies one AMP (Oceanic Shoals AMP) and one KEF (Pinnacles of the Bonaparte Basin) to be intersected by the ZPI these areas are located 21.7km and 11km from the ZPI, respectively. Further, an additional two AMPs (Kimberly AMP and Joseph Bonaparte Gulf AMP) are identified by the PMST to be intersected by the EMBA, however these parks are located approximately 4km and 17km from the EMBA, respectively.

Table 4-8: Protected areas and key ecological features within the Operational Area, ZPI and EMBA

Key sensitive area	IUCN category	Overlaps Operational Area	Overlaps Zone of Potential Impact	Overlaps EMBA	Distance from Operational Area (km)
Australian Marine Parks					
Oceanic Shoals Marine Park	IV and VI	-	-	Yes	44 km north-west
Key Ecological Features					
Carbonate bank and terrace system of the Sahul Shelf	Not applicable	-	-	Yes	81 km west
Carbonate bank and terrace system of the Van Diemen Rise	Not applicable	-	-	Yes	104 km north
Pinnacles of the Bonaparte Basin	Not applicable	-	-	Yes	27 km north-west

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4.5.1 State, Territory and Australian Marine Parks

The Operational Area and ZPI do not intersect any Australian or State Marine Parks. The EMBA overlaps one Australian Marine Park, the Oceanic Shoals Marine Park (Table 4-8).

The WA North Kimberley Marine Park is within close proximity to the EMBA and has significance to First Nations heritage. The values are discussed in Section 4.6.8 and in Appendix B: Environmental Values and Sensitivities.

4.5.1.1 Australian Marine Parks

The Australian Marine Park (AMP) Network has been established around Australia as part of the National Representative System of Marine Protected Areas (NRSMPA). The primary goal of the NRSMPA is to establish and effectively manage a comprehensive, adequate and representative system of marine parks to contribute to the long-term conservation of marine ecosystems and protect marine biodiversity.

The EMBA overlaps the Oceanic Shoals AMP and is in close proximity to Joseph Bonaparte Gulf AMP and the Kimberley AMP (Figure 4-5). At the closest points, the EMBA lies 17km north west of the Joseph Bonaparte Gulf AMP and 4km north east of the Kimberley AMP. These AMPs hold cultural significance for First Nations people. The values of the Oceanic Shoals AMP are described in Table 4-9.

The Oceanic Shoals AMP is located west of the Tiwi Islands, approximately 155km north-west of Darwin, NT and 305km north of Wyndham, WA. It extends to the limit of Australia's Exclusive Economic Zone (EEZ). The Oceanic Shoals AMP covers an area of 71,743km² and water depths from less than 15m to 500m and is the largest marine park in the North Marine Parks Network.

Table 4-9: Values of the Oceanic Shoals AMP

Value	Summary
Natural values	<p>The Oceanic Shoals AMP provides examples of ecosystems representative of the Northwest Shelf Transition as the pinnacles, carbonate banks and shoals within the AMP are sites of enhanced biological productivity.</p> <p>The AMP also comprises 4 KEFs (Section 4.5.2), the first 3 overlapped by the EMBA namely: Carbonate bank and terrace systems of the Van Diemen Rise; Carbonate bank and terrace system of the Sahul Shelf; Pinnacles of the Bonaparte Basin; and Shelf break and slope of the Arafura Shelf.</p> <p>The EMBA overlaps the Oceanic Shoals AMP in 4 different classified areas: the Multiple Use Zone (IUCN VI), the Special Purpose Zone (Trawl – IUCN VI), the Habitat Protection Zone (IUCN IV) and the National Park Zone (IUCN II) by the IUCN.</p> <p>The Oceanic Shoals AMP is a foraging and internesting Biologically Important Area (BIA) for marine turtles (Section 4.4.4.1).</p>
Cultural values	The Sea Country within the marine park is valued for Indigenous cultural identity, health and wellbeing (Parks Australia, 2024c.).
Socioeconomic values	Commercial fishing and mining are important activities in the Marine Park (DNP, 2018a).

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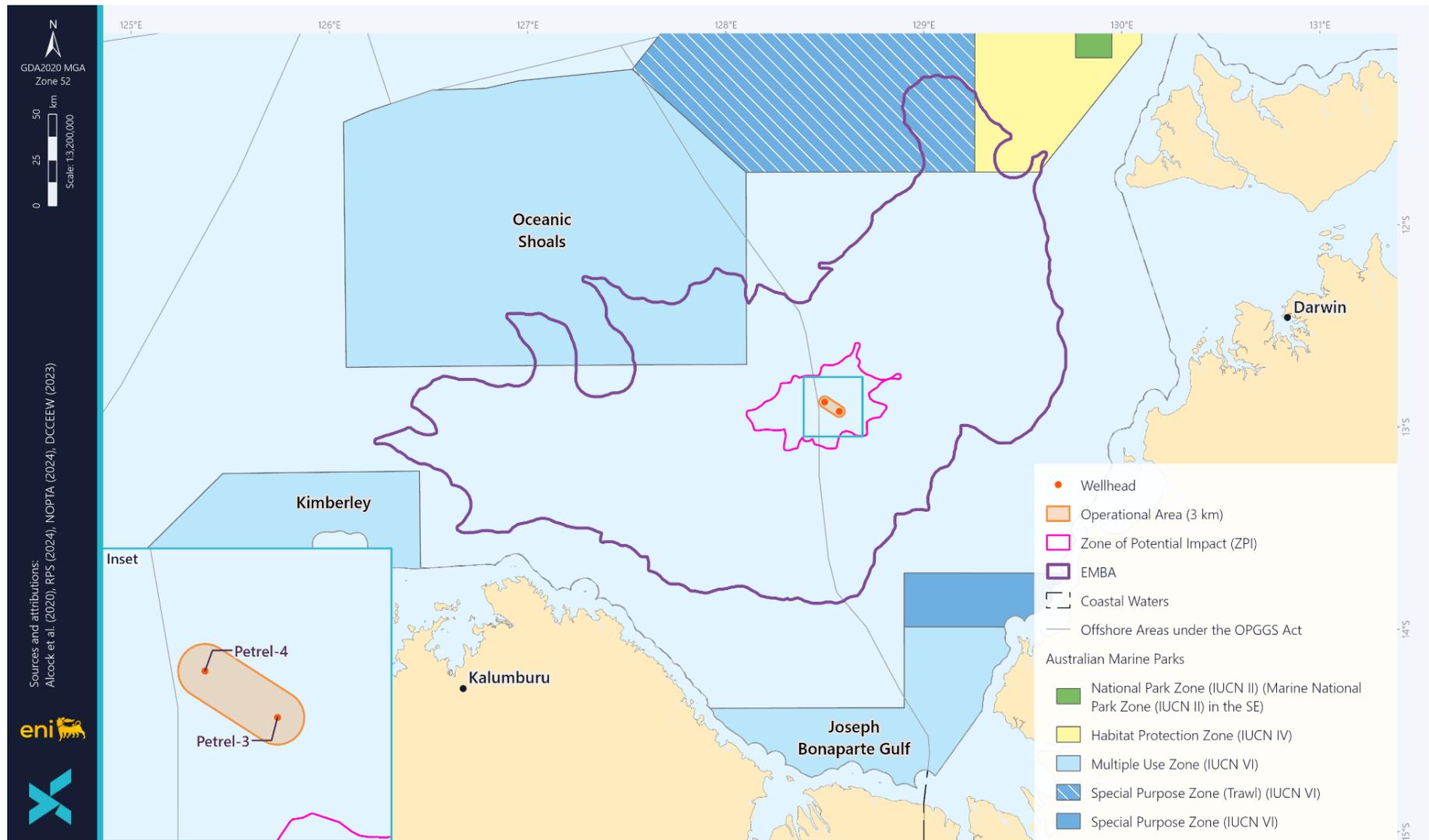


Figure 4-5: Australian Marine Parks in Northern Australia

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4.5.2 Key Ecological Features

KEFs are those components of the marine ecosystem that are important for biodiversity or the ecosystem function and integrity of a Commonwealth marine area. The Operational Area and ZPI do not overlap any KEFs. The EMBA overlaps three KEFs:

- Carbonate bank and terrace system of the Sahul Shelf;
- Carbonate bank and terrace system of the Van Diemen Rise;
- Pinnacles of the Bonaparte Basin.

All KEFs within the EMBA are shown in Figure 4-6 and described in Table 4-10.

Table 4-10: Key Ecological Features within the EMBA

KEF	Values and Description
Carbonate bank and terrace system of the Sahul Shelf	<p>The Sahul banks are the single most extensive banks and shoals in the Australian EEZ with unique seafloor feature with ecological properties of regional significance. The area is significant because of its role in enhancing biodiversity and local productivity in the region. The banks provide hard substrate in an otherwise soft substrate environment which provides a habitat for sessile species. The banks rise steeply from depths of approximately 80m and emerge to within 30m of the surface allowing for light dependant organisms to thrive. Communities comprise of hard and soft corals, sponges, whips, fans and bryozoans.</p> <p>The banks form part of a larger complex of banks and terraces that occurs on the Van Diemen Rise. The area supports a diverse range of species including 11 shark species, black marlin, barracuda, sea turtles, sea snakes and orca. Humpback whales and green and freshwater sawfish are known to occur within the area.</p> <p>(DSEWPAC, 2012a).</p>
Carbonate bank and terrace system of the Van Diemen Rise	<p>The Carbonate banks and terrace system of the Sahul Shelf are located in the western Joseph Bonaparte Gulf and to the north of Cape Bougainville and Cape Londonderry. The carbonate banks and terraces are part of a larger complex of banks and terraces that occurs on the Van Diemen Rise in the adjacent NMR.</p> <p>The bank and terrace system of the Van Diemen Rise covers approximately 31,278km² and forms part of the larger system associated with the Sahul Banks to the north and Londonderry Rise to the east. The feature is characterised by terrace, banks, channels and valleys (DSEWPAC, 2012b). The banks, ridges and terraces of the Van Diemen Rise are raised geomorphic features with relatively high proportions of hard substrate that support sponge and octocoral gardens. These, in turn, provide habitat to other epifauna, by providing structure in an otherwise flat environment. Plains and valleys are characterised by scattered epifauna and infauna that include polychaetes and ascidians. These epibenthic communities support higher order species such as olive ridley turtles, sea snakes and sharks (DSEWPAC, 2012b).</p>
Pinnacles of the Bonaparte Basin	<p>The Pinnacles of the Bonaparte Basin are defined as a KEF due to the unique seafloor that features ecological properties of regional significance.</p> <p>The Pinnacles of the Bonaparte Basin provide areas of hard substrate in an otherwise relatively featureless environment, the pinnacles are likely to support a high number of species, although a better understanding of the species richness and diversity associated with these structures is required. Covering >520km² within the Bonaparte Basin, this feature contains the largest concentration of pinnacles along the Australian margin. The Pinnacles of the Bonaparte Basin are thought to be the eroded remnants of underlying strata; it is likely that the vertical walls generate local upwelling of nutrient-rich water, leading to phytoplankton productivity that attracts aggregations of planktivorous and predatory fish, seabirds, and foraging turtles (DSEWPAC, 2012c).</p>

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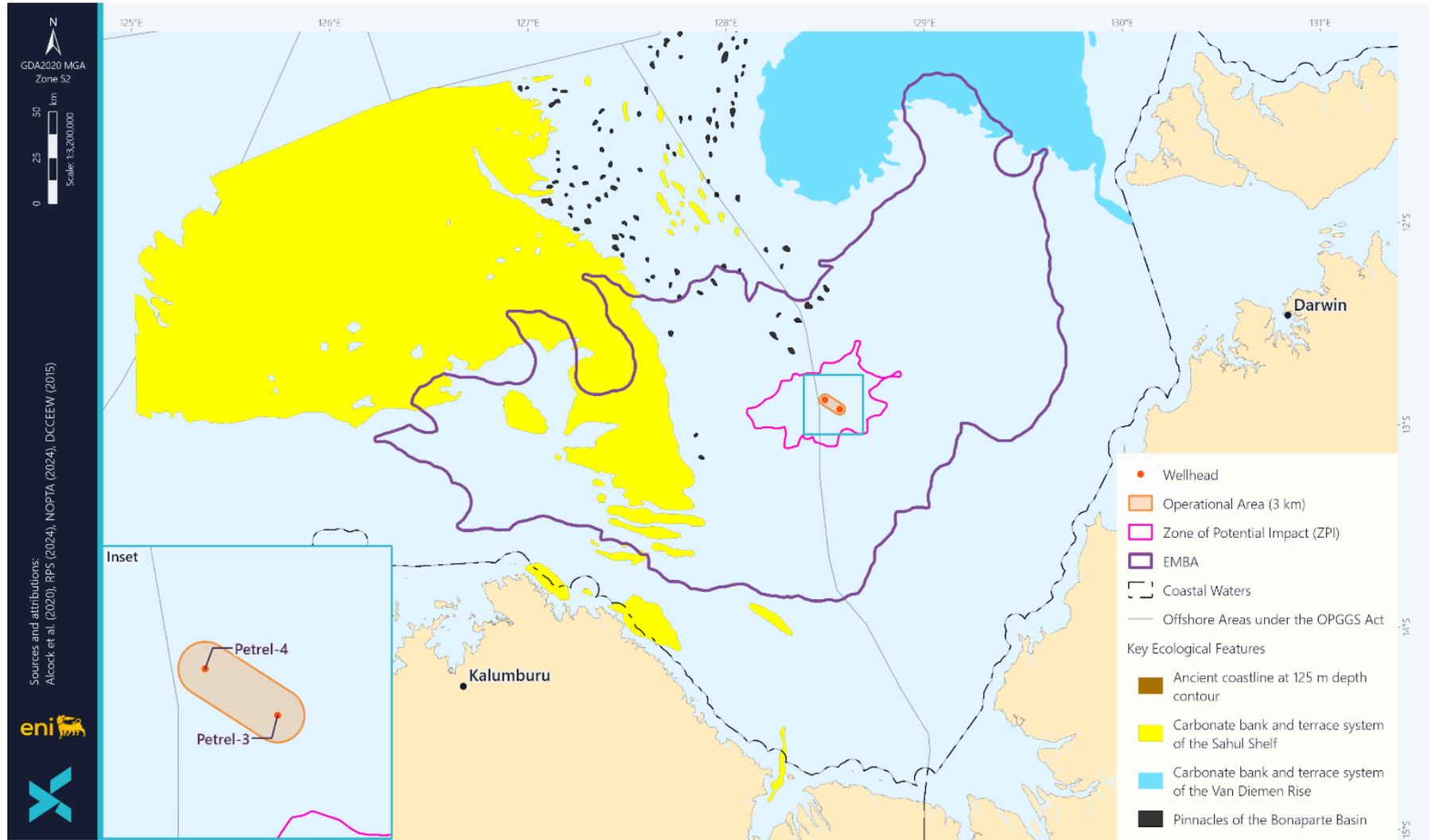


Figure 4-6: Key Ecological Features in Northern Australia

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4.5.3 National Heritage Places

There are no National Heritage Places that intersect the Operational Area, ZPI or EMBA.

4.5.4 Ramsar Wetlands

There are no Ramsar Wetlands that intersect the Operational Area, ZPI or EMBA.

4.6 Cultural and Socioeconomic Environment

4.6.1 Commercial Fisheries

To identify fisheries with the potential for interaction with the activity, a historical catch-effort and detailed fishery management assessment along with consultation was completed. The historical catch-effort assessment was completed using the following datasets and date-ranges:

- Commonwealth-managed fisheries – fishing intensity data from 2010 to 2022. Sourced from Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES; Summerson, 2024);
- State-managed fisheries – averaged over 10 years from 2013 to 2023. Sourced from fishery status reports (Butler, et al., 2023) and the most recent FishCube data catch and effort records, from the West Australian Department of Primary Industry and Regional Development (DPIRD, 2023a); and
- Territory-managed fisheries – number of active licences data from 2017 to 2021. Sourced from Department of Industry, Tourism and Trade (DITT) (NT GOV, 2021).

Table 4-11 identifies the Commonwealth and State/Territory commercial fisheries overlapping the Operational Area, ZPI, and EMBA. Some fisheries have designated management areas, which are specifically defined geographic zones within their respective jurisdiction, each with unique sets of rules and regulations tailored to the specific ecological and socio-economic characteristics of the region. Fisheries that do not have designated management areas are managed via other non-spatial means. Further consideration has been undertaken to determine the potential for interaction with these fisheries, including any spatial management and specific catch-methodology to determine the potential for interaction with petroleum activities.

Table 4-11 also provides an assessment of the potential interaction based on the catch-methodology, relevant spatial closures or management conditions of the fisheries, and historic catch-effort data, to determine whether the fishery is considered 'active'; or has the potential for future fishing effort in the Operational Area. While it is recognised that catch data referenced in Table 4-11 does not preclude the possibility for future catch, it is highly unlikely the catch effort of these fisheries will significantly increase in the vicinity of the Operational Area over the life of this EP.

Based on the assessment in Table 4-11, the following is a summary of fisheries that overlap with the Operational Area, ZPI and EMBA; and those considered active in the Operational Area (within the data range):

- Commonwealth-managed fisheries: 4 fisheries overlap with the Operational Area (Northern Prawn Fishery, Southern Bluefin Tuna Fishery, Western Skipjack Fishery and Western Tuna and Billfish Fishery). Based on the catch-effort assessment, none of these fisheries are considered active within the Operational Area. There are 4 fisheries that

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overlap the ZPI and EMBA. Of these, the only active fishery is in the EMBA, which is the Northern Prawn Fishery.

- Western Australian-managed fisheries: 2 fisheries overlap the Operational Area. The Joint Authority Northern Shark Fishery has been closed since 2009, and therefore is not considered 'active'; therefore only 1 fishery is considered active within the Operational Area (Open Access in the North Coast, Gascoyne Coast and Bioregions Fishery). There are 9 fisheries that overlap the ZPI; and 14 that overlap the EMBA.
- Northern Territory-managed fisheries: 5 fisheries overlap the Operational Area (Aquarium Fisher, Demersal Fishery, Offshore Net and Line Fishery, Spanish Mackerel Fishery and NT Tour Operators). Based on the catch-effort assessment, all 5 of these fisheries are considered active within the Operational Area. There are 5 fisheries that overlap the ZPI; and 13 that overlap the EMBA.

Fisheries with maximum fishing effort recorded over the data period that overlaps the EMBA are shown in Figure 4-7 to Figure 4-24. Note that some fisheries do not have management areas to display, and that the datasets and the way fishing effort is recorded differs between Commonwealth, State and Territory commercial fisheries (i.e. intensity, number of active licences or number of active vessels).

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Table 4-11: Commonwealth and State fisheries within the Operational Area, ZPI and EMBA

Fishery	Spatial overlap with fishery				Description
	Operational Area	Active in Operational Area*	ZPI	EMBA	
Commonwealth Fisheries					
Northern Prawn Fishery	✓	✗	✓	✓	<p>The Northern Prawn Fishery (NPF) management area overlaps the Operational Area, ZPI, and the EMBA. The fishery extends from Joseph Bonaparte Gulf across the Top End to the Gulf of Carpentaria (Butler et al., 2023). The NPF uses otter trawl gear to target a variety of tropical prawn species and has fishing effort overlapping with the EMBA (Summerson, 2024). In the management area, fishing effort peaked in 1981 of more than 250 active vessels and has decreased to 54 active vessels in the 2022-2023 fishing season (Butler et al., 2023).</p> <p>The Operational Area does not fall within a fishing intensity area, as indicated through the Commonwealth Fishery Status Reports (Figure 4-7; Butler et al., 2023). Engagement with the NPF confirmed there is no NPF fishing effort in the immediate vicinity of the wellheads, and that the JBG fishery is closed from 1st December to 1st August each year (Section 5). Therefore, Eni does not consider it a possibility that interaction with the fishery may occur within the Operational Area or ZPI, but may do within the EMBA.</p>
Southern Bluefin Tuna Fishery	✓	✗	✓	✓	<p>The Southern Bluefin Tuna Fishery management area overlaps the Operational Area, ZPI, and the EMBA. The fishery spans the Australian Fishing Zone, both on the high seas and within the Exclusive Economic Zones (EEZs) of Australia and other nations. Since 1992, most of the Australian catch has been taken by purse seine in the Great Australian Bight (Patterson and Dylewski, 2023a).</p> <p>There has been no fishing activity recorded within the Operational Area, ZPI, or the EMBA (Summerson, 2024). The fishery targets tuna species that can be found in deeper waters to 500m (AFMA, 2021). Accordingly, given the depth of the Operational Area (~95m), Eni considers there to be no potential for interaction within the Operational Area, ZPI or EMBA, and unlikely to interact in the future.</p>
Western Skipjack Fishery	✓	✗	✓	✓	<p>The Western Skipjack Tuna Fishery management area overlaps the Operational Area, ZPI, and the EMBA. The Western Skipjack Tuna Fishery spans the Australian Fishing Zone west of Victoria and the Torres Strait. The fishery is currently not active, with no fishing effort present since 2009 (Patterson and Dylewski, 2023b).</p>

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Fishery	Spatial overlap with fishery				Description
	Operational Area	Active in Operational Area*	ZPI	EMBA	
					Therefore, Eni considers there to be no potential for interaction with this fishery within the Operational Area, ZPI, and the EMBA, and unlikely to interact in the future.
Western Tuna and Billfish Fishery	✓	×	✓	✓	<p>The Western Tuna and Billfish Fishery management area overlaps the Operational Area, ZPI, and the EMBA. However, most of the Australian catch has been concentrated off south-west Western Australia with occasional activity off South Australia (Butler et al., 2023). There has been no fishing activity recorded within the EMBA, with the nearest fishing effort (~348km west of the EMBA), which was last recorded in 2012 (Summerson, 2024).</p> <p>Accordingly, Eni considers there to be no potential for interaction with this fishery within the Operational Area, ZPI, and EMBA, and unlikely to interact in the future.</p>
Western Australian State Managed Fisheries					
Abalone Managed Fishery	×	×	✓	✓	<p>The Abalone Managed Fishery management area overlaps the ZPI and the EMBA. The fishery includes the Greenlip/Brownlip Fishery (Area four) and Roe's Abalone Fishery (Area eight). However, no abalone fishing, recreational or commercial, is permitted north of Moore River until further notice to allow for the Roe's abalone population to rebuild (DPIRD, 2023). Accordingly, Eni considers there to be no potential for interaction with this fishery within the Operational Area, ZPI and the EMBA; but there may be interaction in the ZPI and EMBA in the future if the fishery reopens.</p>
Joint Authority Northern Shark Fishery	✓	×	✓	✓	<p>Joint Authority of Northern Shark Fishery operated in the eastern Kimberley and this fishery has been closed since 2008/09 to protect key habitat and recovery of commercially targeted shark species in WA (DPIRD, 2023).</p> <p>Accordingly, Eni considers there to be no potential for interaction within the Operational Area, ZPI and EMBA, and unlikely to interact in the future.</p>
Kimberley Crab Managed Fishery	×	×	✓	✓	<p>The Kimberley Crab Fishery management area overlaps the ZPI and the EMBA. The fishery allows for 1,200 units (600 traps) to license holders and an additional 600 traps allocated to Traditional Owner groups (Johnston et al., 2023). No fishing effort has been recorded within the ZPI and the EMBA. Accordingly, Eni considers there to be no potential for interaction with the fishery within the Operational Area, ZPI and EMBA, and unlikely to interact in the future.</p>

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Fishery	Spatial overlap with fishery				Description
	Operational Area	Active in Operational Area*	ZPI	EMBA	
Kimberley Prawn Fishery	x	x	x	✓	The Kimberley Prawn Fishery management area overlaps the EMBA. The fishery is active within the EMBA, with five 60NM CAES blocks reporting less than three vessels across the 2017-2022 seasons (DPIRD, 2023). Accordingly, Eni considers it a possibility that interaction with the fishery may occur within the EMBA only.
Mackerel Managed Fishery	x	x	✓	✓	The Mackerel Managed Fishery management area overlaps the ZPI and the EMBA. The fishery extends from the West Coast Bioregion to the WA/NT border and is active within the ZPI and the EMBA, reporting up to seven vessels active, across the 2017-2022 seasons within the EMBA. Accordingly, Eni considers it a possibility that interaction with the fishery may occur within the ZPI and the EMBA.
Marine Aquarium Managed Fishery	x	x	✓	✓	The Marine Aquarium Managed Fishery management area overlaps the ZPI and the EMBA. The fishery is active within the EMBA. There are three 60NM CAES blocks reporting less than three active licences between 2017-2022 seasons within the EMBA (DPIRD, 2023). The Marine Aquarium Managed fishery is a diver-based fishery and restricted to relatively shallow waters. Accordingly, Eni considers it a possibility that interaction with the fishery may occur within the EMBA.
Northern Demersal Scalefish Fishery	x	x	✓	✓	The Northern Demersal Scalefish Fishery management area overlaps the ZPI and the EMBA. The fishery is active within the ZPI and the EMBA and is managed in accordance with the North Coast Demersal Resource. The fishery is active within the ZPI and EMBA, with seven active vessels reporting catch over the 2017-2022 seasons (DPIRD, 2023). Accordingly, Eni considers it a possibility that interaction with the fishery may only occur within the ZPI and the EMBA.
Open Access in the North Coast, Gascoyne Coast and Bioregions*	✓	✓	✓	✓	The Open Access in the North Coast Fishery has fishing effort that intersects with the Operational Area and the EMBA. Note this fishery does not have management areas. The fishery is active within the Operational Area and EMBA, with 60NM CAES block reporting six vessels in the Operational Area and between up to 37 active vessels in the EMBA across the 2017-2022 seasons (DPIRD, 2023). Therefore, Eni considers it a possibility that interactions with the fishery may occur in the Operational Area, ZPI and EMBA.
Pearl Oyster Managed Fishery*	x	x	x	✓	The Pearl Oyster Managed Fishery has fishing effort that intersects with the EMBA. Note this fishery does not have a management area. The fishery is active within the EMBA, with 60NM CAES block reporting less than three active vessels across the 2017-2022 seasons (DPIRD, 2023). The Pearl Oyster Managed Fishery fishing

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Fishery	Spatial overlap with fishery				Description
	Operational Area	Active in Operational Area*	ZPI	EMBA	
					effort is mostly focused in shallow, coastal waters (10-15 m depth) with a maximum depth of 35 m (Lulofs and Sumner, 2002). Accordingly, Eni considers it a possibility that interactions with the fishery may occur within the EMBA only.
South West Coast Salmon Managed Fishery	x	x	✓	✓	The South West Coast Salmon Managed Fishery management area overlaps the ZPI and the EMBA. Historically, no fishing has occurred north of the Perth Metropolitan Area (Duffy et al., 2023) and there is no fishing effort recorded within the ZPI and the EMBA. Accordingly, Eni considers there to be no potential for interaction with this fishery within the EMBA and unlikely to interact in the future.
Specimen Shell Managed Fishery	x	x	✓	✓	The Specimen Shell Managed Fishery overlaps the ZPI and the EMBA. The fishery is largely diver-based, targeting specimen shells in water depths < 30 m. There has been no fishing effort recorded within the ZPI and the EMBA. Accordingly, Eni considers there to be no potential for interaction with the fishery within the ZPI and the EMBA, and unlikely to interact in the future.
West Australian Sea cucumber Fishery*	x	x	x	✓	The West Australian Sea Cucumber Fishery has fishing effort that intersects with the EMBA. Note this fishery does not have a management area. The fishery is active in the EMBA, with 60NM CAES block reporting up to seven vessels active across the 2017-2022 seasons (DPIRD, 2023). Accordingly, Eni considers it a possibility that interaction with the fishery may occur with the EMBA only.
West Coast Deep Sea Crustacean Managed Fishery	x	x	✓	✓	The West Coast Deep Sea Crustacean Managed Fishery management area overlaps the ZPI and the EMBA. However, the ZPI and the EMBA are within the closed waters of the fishery and no fishing effort recorded. Accordingly, Eni considers there to be no potential for interaction with the fishery within the ZPI and the EMBA, and unlikely to interact in the future.
Western Australia Charter based fisheries					
Tour Operators*	x	x	✓	✓	Fishing Tour Operators are permitted to operate across WA state waters and are required to report monthly logbook records of client fish catches. This fishery does not have a management area but are permitted to fish anywhere in WA state waters. The fishery is active within the ZPI and the EMBA. There is one 60NM within the ZPI, and three 60NM and one 10NM CAES blocks within the EMBA reporting less than three active licences in the ZPI and up to 42 active licences in

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Fishery	Spatial overlap with fishery				Description
	Operational Area	Active in Operational Area*	ZPI	EMBA	
					the EMBA. Accordingly, Eni considers it a possibility that interaction with the fishery may occur within the ZPI and the EMBA.
Northern Territory Managed Fisheries					
Aquarium Fishery	✓	✓	✓	✓	<p>The Northern Territory Aquarium Fishery overlaps with the Operational Area and EMBA. The Aquarium Fishery is a small-scale, multi-species fishery and includes freshwater, estuarine and marine habitats to the outer boundary of the Australian EEZ. Freshwater and estuarine species are generally collected between the Adelaide and Daly rivers, while most marine species are collected within 100km of Nhulunbuy and Darwin (NT Government 2024a). The fishery implements barrier, cast, scoop, drag and skimmer nets, hand pumps, freshwater pots and hand-held equipment to collect species, hard rock and corals.</p> <p>Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence operating in the Operational Area and EMBA (NT GOV, 2021). Eni considers there may be potential for interaction with the fishery in the Operational Area, ZPI and EMBA.</p>
Barramundi*	x	x	x	✓	<p>The Barramundi Fishery has fishing effort that intersects with the EMBA. Note this fishery does not have a management area. The fishing area is restricted to waters seaward from the coast, river mouths and legislated closed lines from the high-water mark to 3nm seaward of the low water mark (NT Government 2024b). Commercial operators fish over tidal mud flats and inside a restricted number of rivers using monofilament gill nets. Historical fishing effort demonstrates, fishing has concentrated in the eastern Joseph Bonaparte Gulf and Van Diemen Gulf region of coastal NT waters. Analysis of five years of NT fishing effort data (2017-2021) shows up to 4 licences operated in the vicinity of the EMBA during this period (NT GOV, 2024). Accordingly, Eni considers it a possibility that interaction with the fishery may occur only in the EMBA.</p>
Coastal Line Fishery	x	x	x	✓	<p>The Coastal Line Fishery has fishing effort that intersects with the EMBA. The fishery is permitted to fish between the high-water mark to 15nm (from the low water mark). The western zone of the fishery extends from the WA border to Vashon Head on Cobourg Peninsula. Previous fishing effort has been concentrated in the coastal waters of the Tiwi Islands and Daly River inlet. Analysis of five years</p>

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Fishery	Spatial overlap with fishery				Description
	Operational Area	Active in Operational Area*	ZPI	EMBA	
					of NT fishing effort data (2017-2021) shows up to 2 licences operated in the vicinity of the EMBA during this period (NT GOV, 2024). Therefore, Eni considers it a possibility that interaction with the fishery may occur only in the EMBA.
Demersal Fishery	✓	✓	✓	✓	The Demersal Fishery overlaps with the Operational Area, ZPI and EMBA. Demersal fishing is allowed from 15 nm from the low water mark to the outer boundary of the Australian EEZ, excluding the area of the Timor Reef fishery. Analysis of five years of NT fishing effort data (2017-2021) shows 3 licences operating in the Operational Area, ZPI and EMBA (NT GOV, 2024). Eni considers there may be potential for interaction with the fishery in the Operational Area, ZPI and EMBA.
Development Fishery (Small Pelagic)	x	x	x	✓	The Development Fishery overlaps with the EMBA. Development Fishery Licences are issued to existing fisheries intending to trial new fishing gear, fishing methods and/or catch new target species. Fishers who wish to conduct development trials are required to lodge written applications providing detailed information about their proposed activities. Performance criteria are assigned to each permit so that the feasibility of the trials may be assessed. Development licences may be issued to approved applicants for up to one licensing year and may be renewed a maximum of four times. Where licence holders meet all performance criteria and remain able to demonstrate that the fishery and/or gear is both ecologically and economically sustainable, the fishery and/or gear in question may progress to a managed fishery. Analysis of five years of NT fishing effort data (2017-2021) shows two licences operated in the vicinity of the EMBA during this period (NT GOV, 2024). Therefore, Eni considers it a possibility that interaction with the fishery may occur only in the EMBA.
Jigging Fishery*	x	x	x	✓	The Jigging Fishery has fishing effort that intersects with the EMBA. Note this fishery does not have a designated management area. Analysis of five years of NT fishing effort data (2017-2021) shows one licence operated in the vicinity of the EMBA during this period (NT GOV, 2024), concentrated in the eastern Joseph Bonaparte Gulf and Daly River inlet. Commercial fishers may use bait nets, cast nets, or scoop nets. Eni considers it a possibility that interaction with this fishery may occur within the EMBA only.
Mud Crab Fishery*	x	x	x	✓	The Mud Crab Fishery has fishing effort that intersects with the EMBA. Note this fishery does not have a management area. Crabbing is generally confined to

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Fishery	Spatial overlap with fishery				Description
	Operational Area	Active in Operational Area*	ZPI	EMBA	
					coastal mudflats and estuaries and commercial activity is concentrated in the Gulf of Carpentaria. Analysis of five years of NT fishing effort data (2017-2021) shows up to 3 licences operating in the vicinity of the EMBA during this period (NT GOV, 2024). Therefore, Eni considers it a possibility that interactions with the fishery may occur only in the EMBA.
Offshore Net and Line Fishery	✓	✓	✓	✓	The Offshore Net and Line Fishery overlaps with the Operational Area, ZPI and EMBA. This fishery operates in all NT waters from the low water mark to the boundary of the Australian EEZ. The fishery operates using demersal and pelagic long-lines, gaffs, and pelagic nets. Analysis of five years of NT fishing effort data (2017-2021) shows up to 6 licences operated in the vicinity of the EMBA and 1 licence within the vicinity of the Operational Area during this period (NT GOV, 2024). Therefore, Eni considers it a possibility that interactions with the fishery may occur within the Operational Area, ZPI and EMBA.
Pearl Oyster Fishery*	x	x	x	✓	The Pearl Oyster Fishery has fishing effort that intersects with the EMBA. Note this fishery does not have a management area. The Pearly Oyster Fishery operates from the high-water mark to the outer boundary of the Australian EEZ. There are currently a total of 5 licences in the fishery. Pearl oysters must be caught by hand. Analysis of five years of NT fishing effort data (2017-2021) shows one licence operated in the vicinity of the EMBA during this period (NT GOV, 2024). Therefore, Eni considers it a possibility that interactions with the fishery may occur only in the EMBA.
Spanish Mackerel	✓	✓	✓	✓	The Spanish Mackerel overlaps with the Operational Area, ZPI and EMBA. Commercial fishing for Spanish mackerel is allowed from the high-water mark to the outer boundary of the Australian EEZ. Fishing generally takes place around reefs, headlands and shoals. The fishery is restricted to 15 licences, which are fully allocated. The fishery operates via troll lines, floating hand lines and rods. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence and up to 8 licences operated in the vicinity of the Operational Area and EMBA, respectively (NT GOV, 2024). Therefore, Eni considers it a possibility that interactions with the fishery may occur within the Operational Area, ZPI and EMBA.
Special Permits*	x	x	x	✓	The Special Permits Area has fishing effort that intersects with the EMBA. Note this fishery does not have a management area. This permit is for education activities,

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Fishery	Spatial overlap with fishery				Description
	Operational Area	Active in Operational Area*	ZPI	EMBA	
					research or carrying out trials and experiments with fishing vessels or gear. It may also be issued for sport or recreation for a person who would otherwise be unable to fish due to disability. Analysis of five years of NT fishing effort data (2017-2021) shows one licence operated in the vicinity of the EMBA during this period (NT GOV, 2024). Therefore, Eni considers it a possibility that interactions with the fishery may occur only in the EMBA.
Timor Reef Fishery	x	x	x	✓	The Timor Reef Fishery overlaps with the EMBA. Commercial fishing is allowed north-west of Darwin to the WA/NT border and to the outer boundary of the Australian EEZ. Analysis of five years of NT fishing effort data (2017-2021) shows up to 2 licences operated in the vicinity of the EMBA during this period (NT GOV, 2024). Therefore, Eni considers it a possibility that interactions with the fishery may occur only in the EMBA.
Northern Territory Charter based fisheries					
Tour operators*	✓	✓	✓	✓	Fishing tour operators in the NT are required a licence to run commercial guided fishing tours and authorisation with an approved operator card (Northern Territory Government, 2024). This fishery does not have a management area but has fishing effort that intersects with the Operational Area, ZPI, and EMBA. Analysis of five years of NT fishing effort data (2017-2021) shows only one active licence within the Operational Area and ZPI, and up to 17 active licences within the EMBA. Therefore, Eni considers it a possibility that interactions with the fishery may occur within the Operational Area, ZPI, and the EMBA.

**Note that some fisheries do not have management areas but do have licences or active effort; and are identified as 'active within the Operational Area'.*

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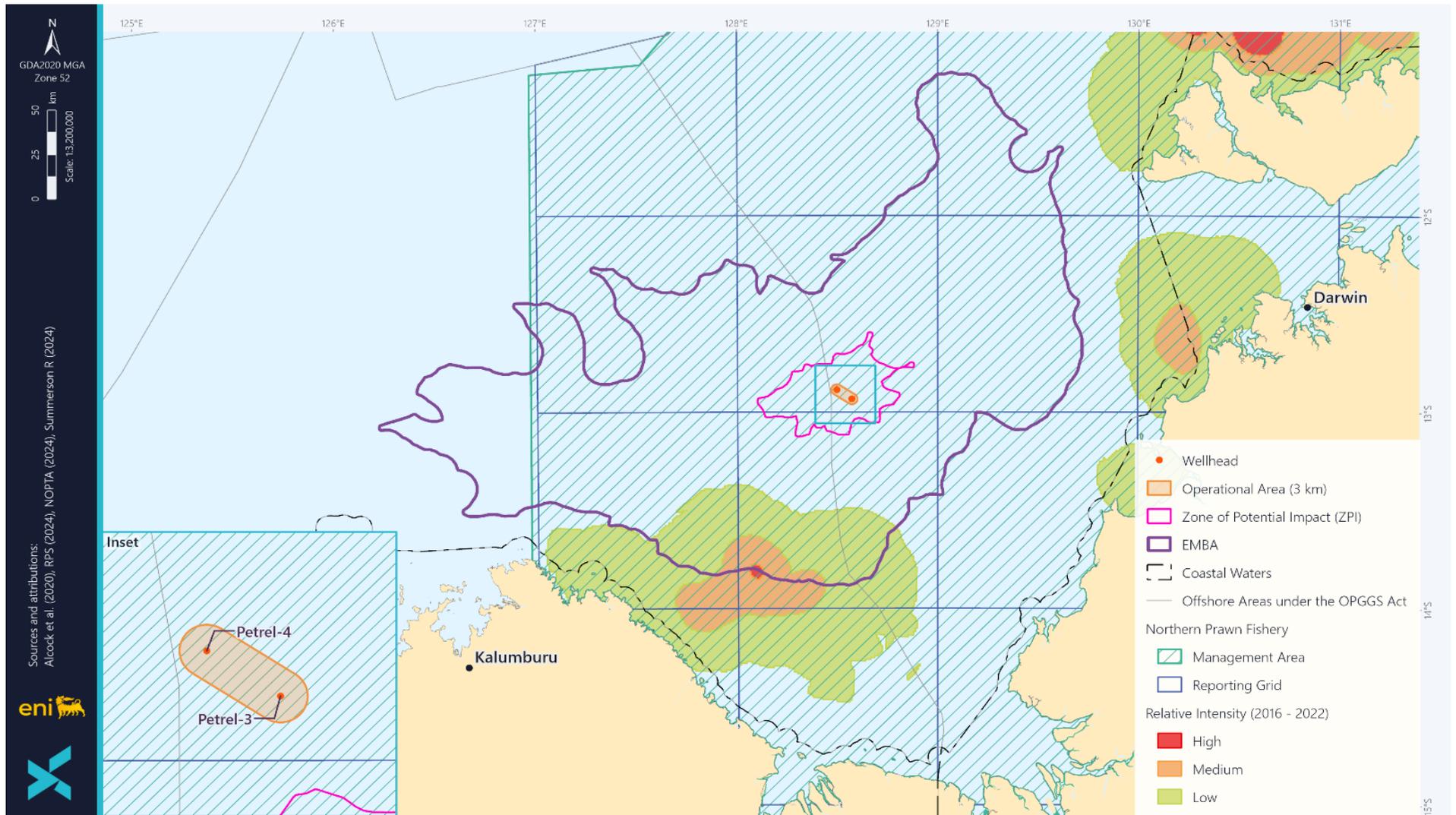


Figure 4-7: Northern Prawn Fishery Fishing Intensity (2016-2022)

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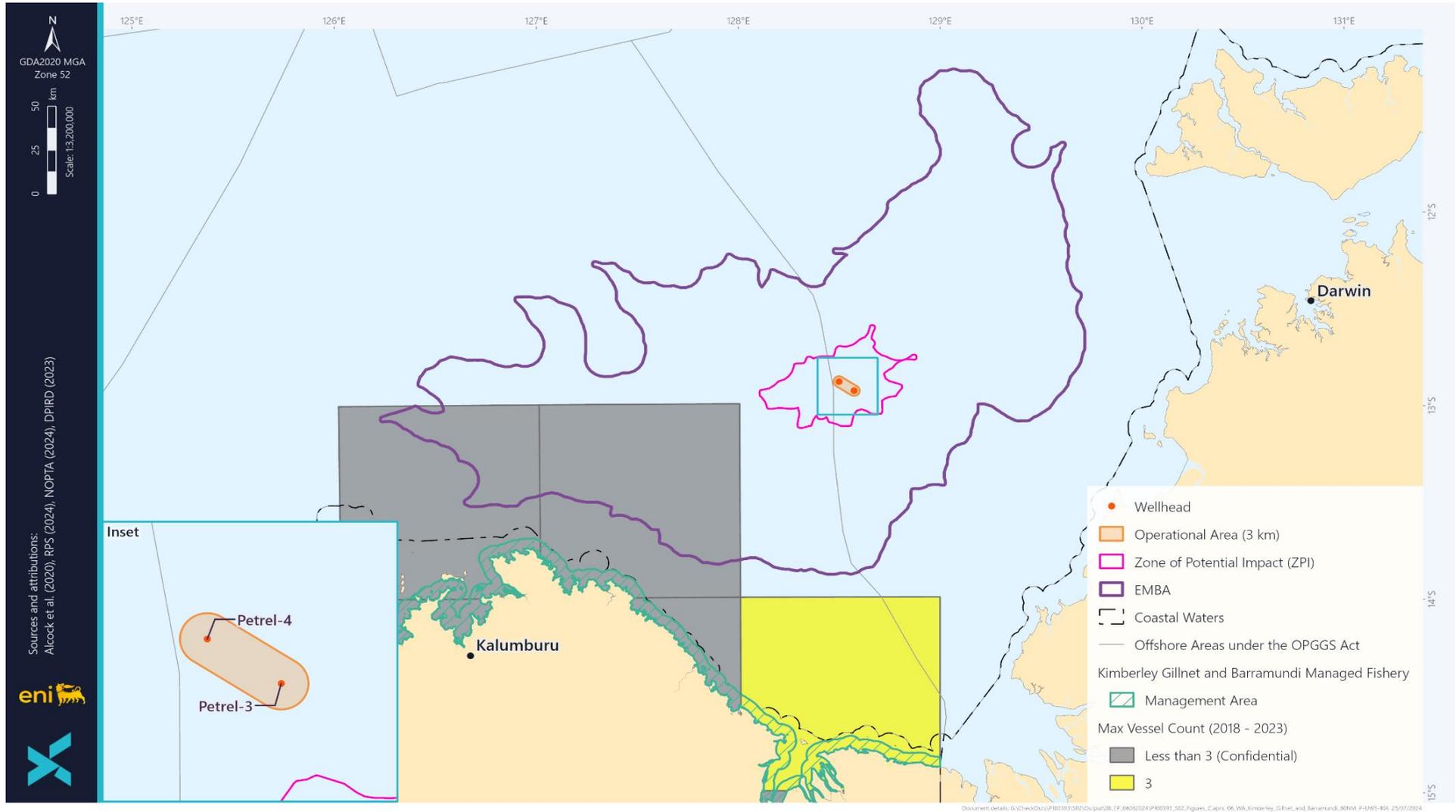


Figure 4-8: WA Kimberley Gillnet and Barramundi activity within the EMBA (2018-2023)

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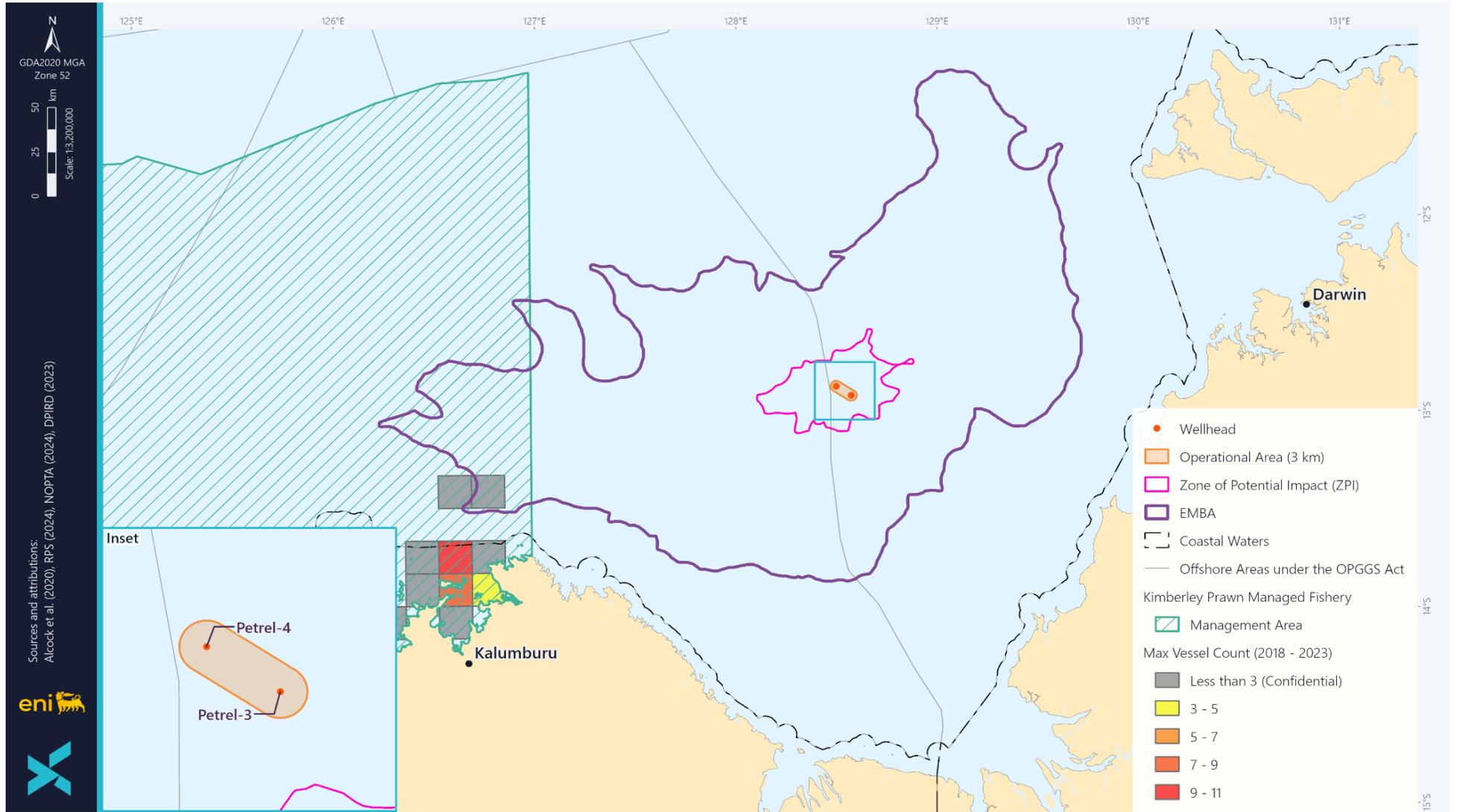


Figure 4-9: WA Kimberley Prawn Managed Fishery activity within the EMBA (2018-2023)

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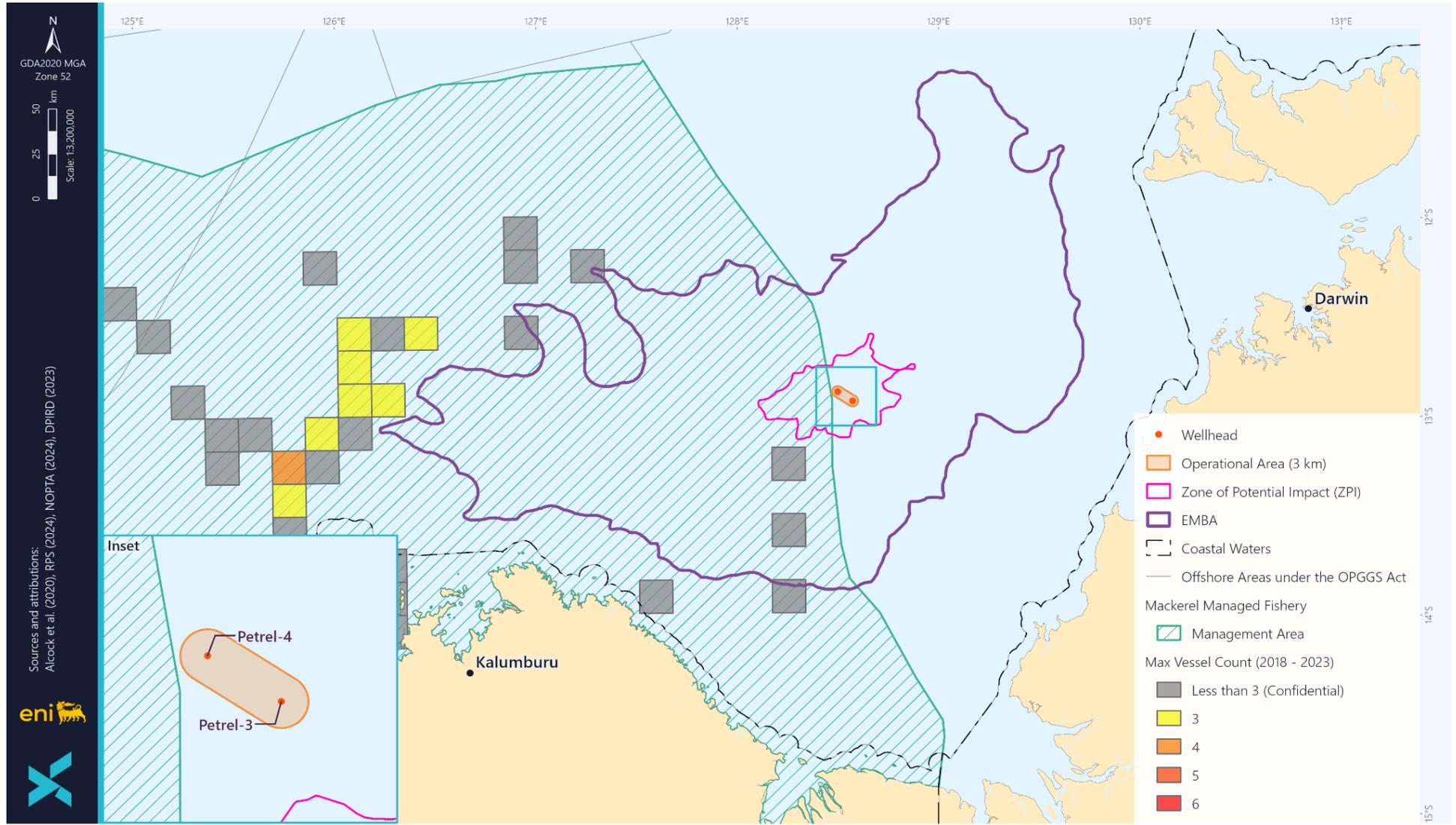


Figure 4-10: WA Mackerel Managed Fishery activity within the EMBA (2018-2023)

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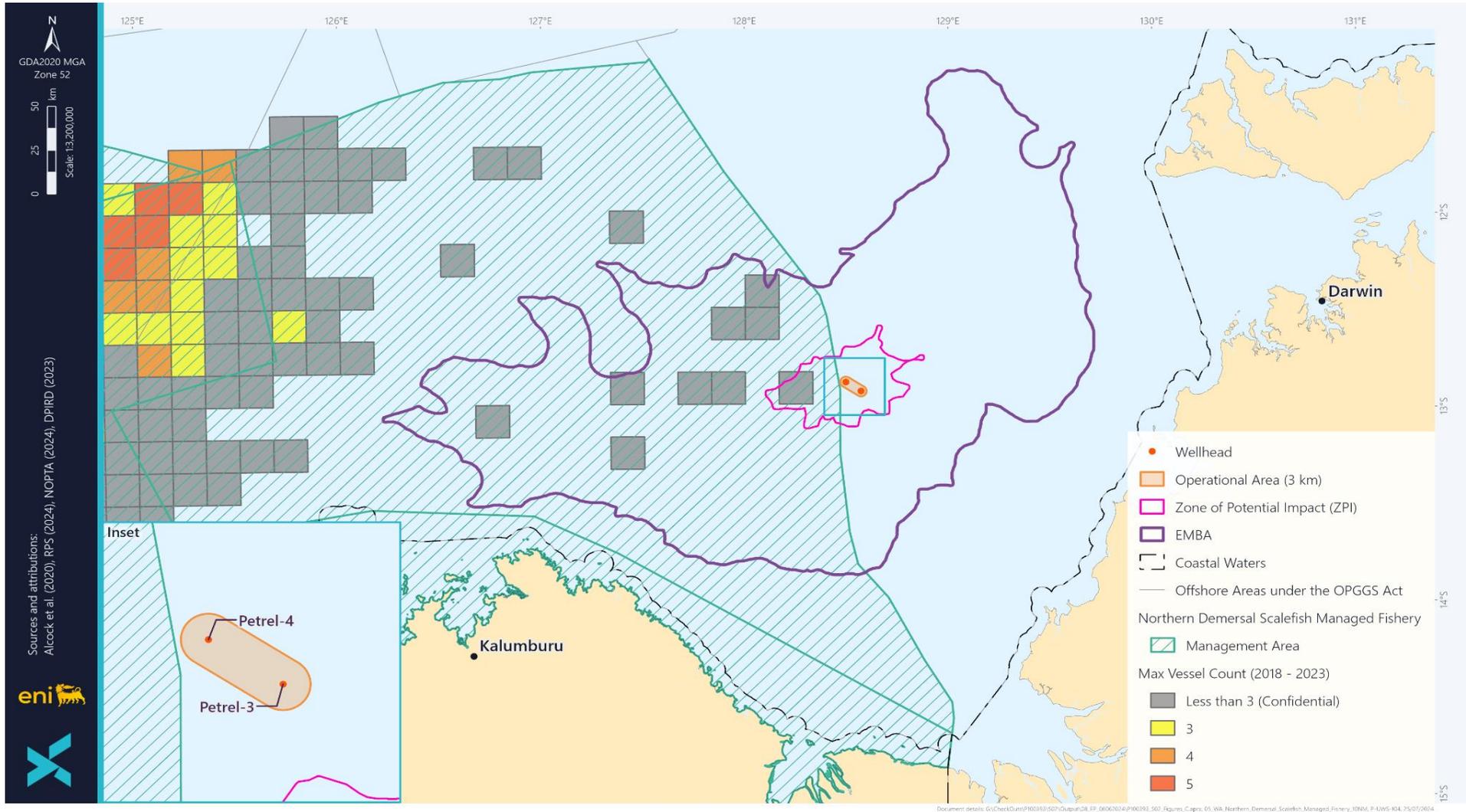


Figure 4-11: WA Northern Demersal Scalefish Managed Fishery activity within the EMBA (2018-2023)

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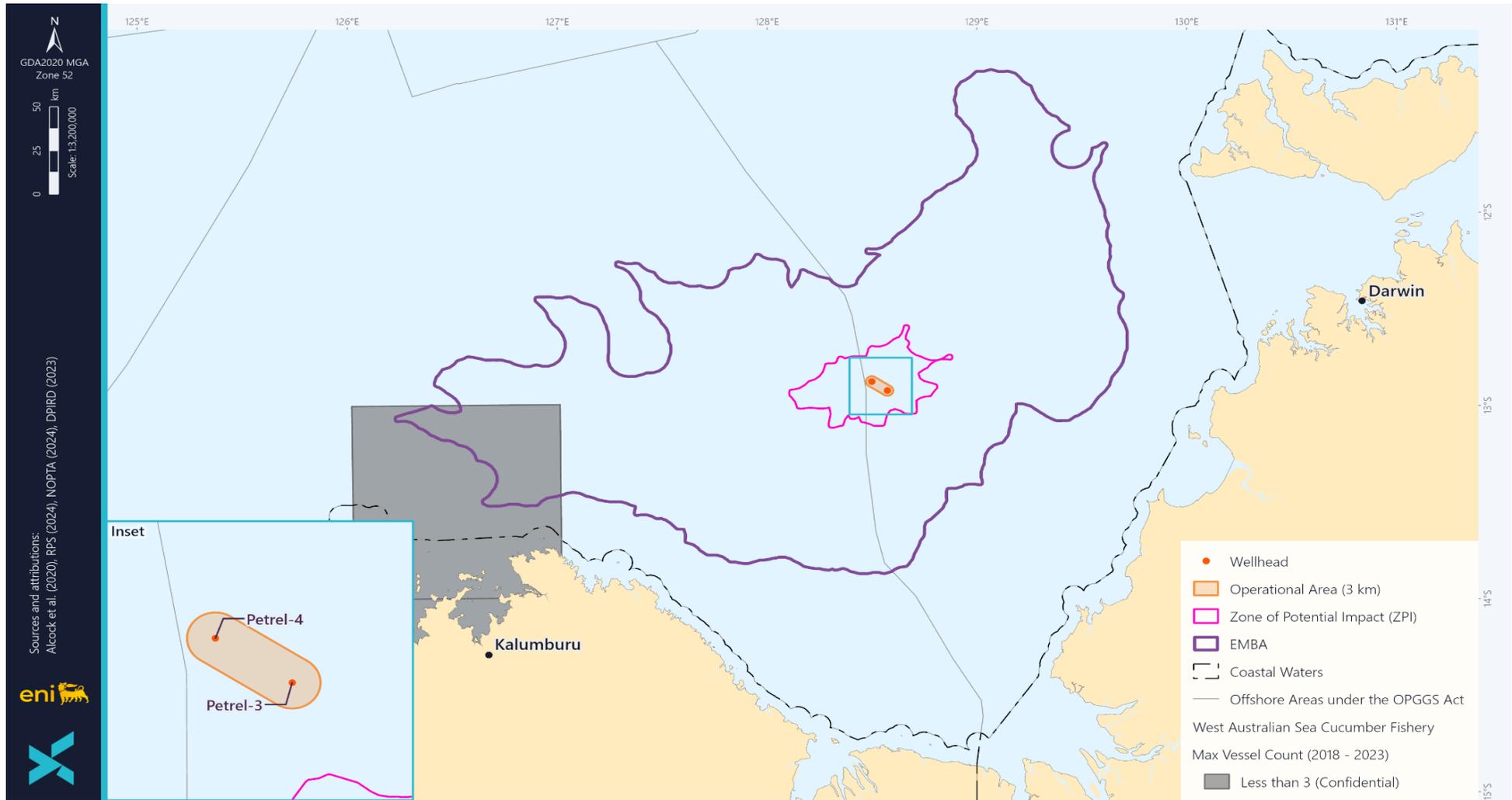


Figure 4-12: WA Sea Cucumber Fishery activity within the EMBA (2018-2023)

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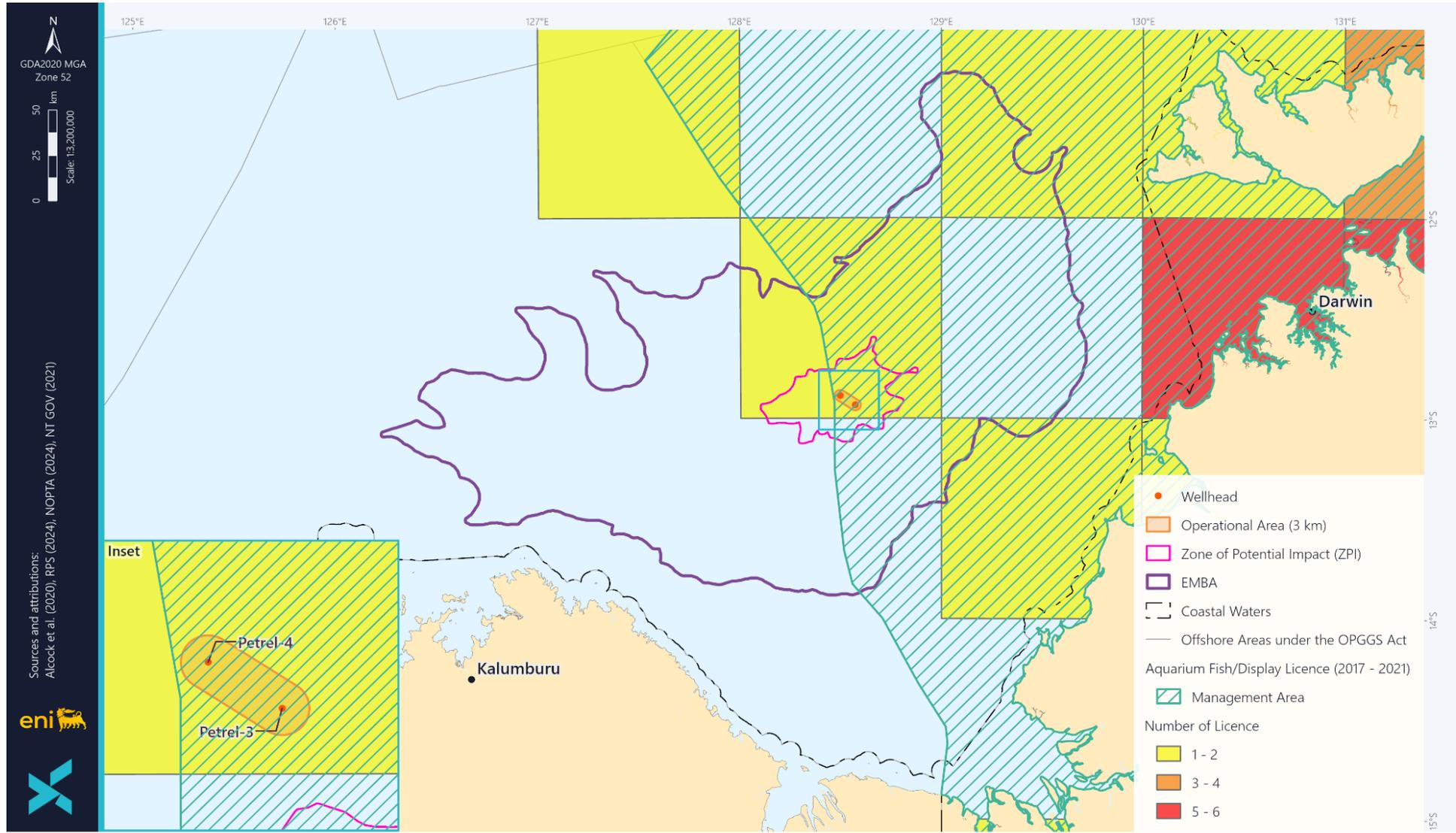


Figure 4-13: NT Aquarium Fishery (Display Licences) activity within the EMBA

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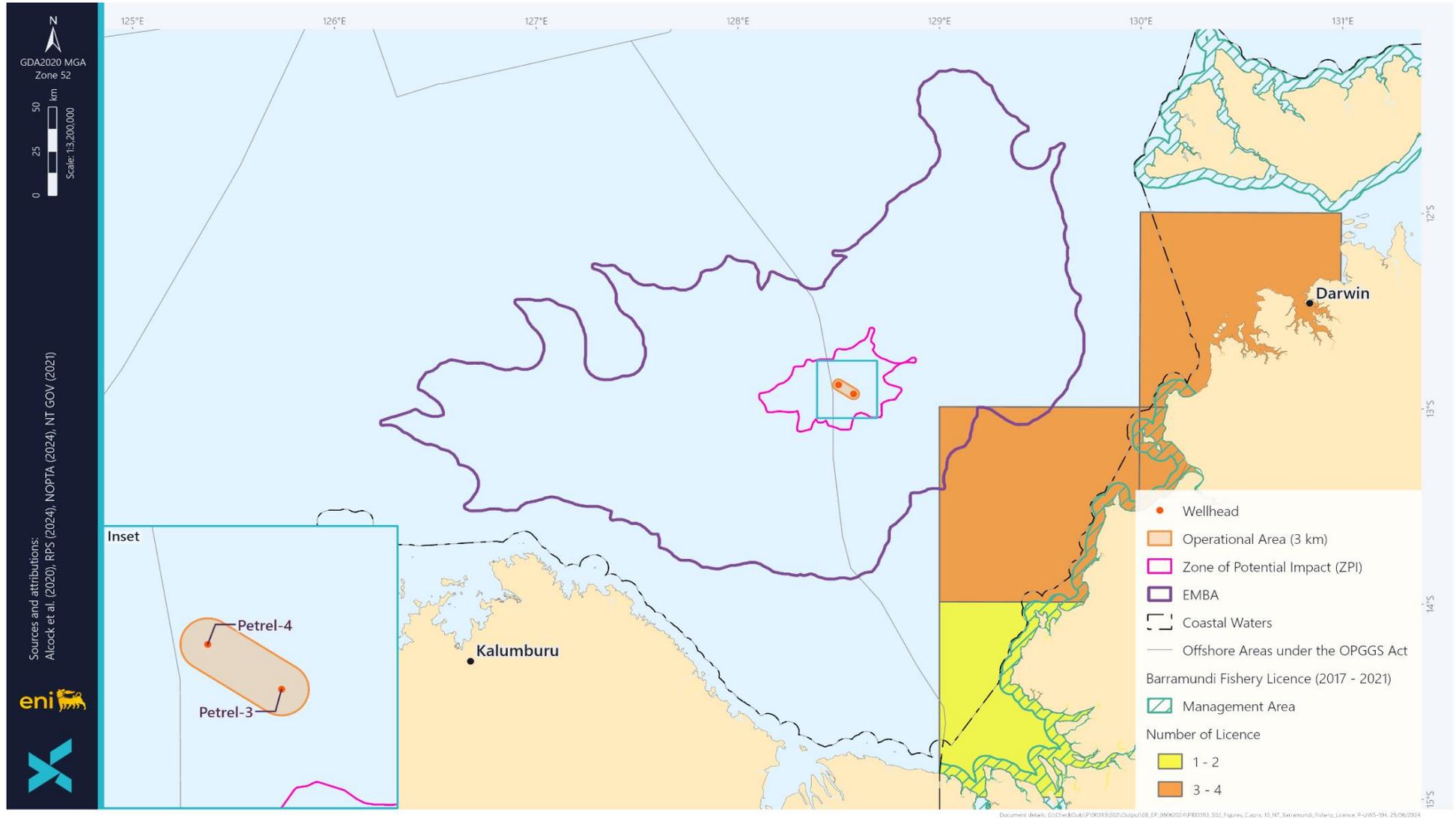


Figure 4-14: NT Barramundi Fishery activity within the EMBA

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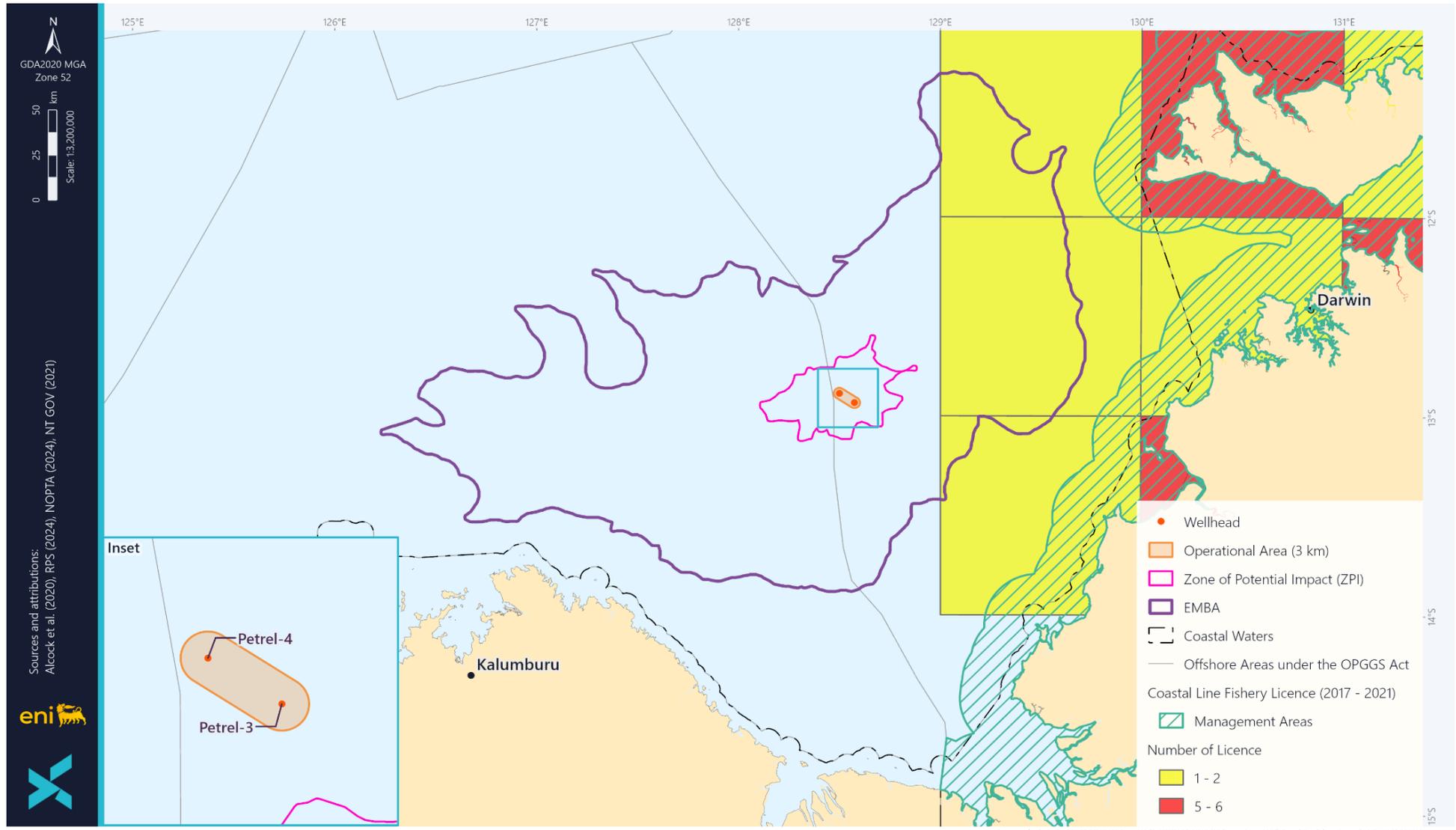


Figure 4-15: NT Coastal Line Fishery activity within the EMBA

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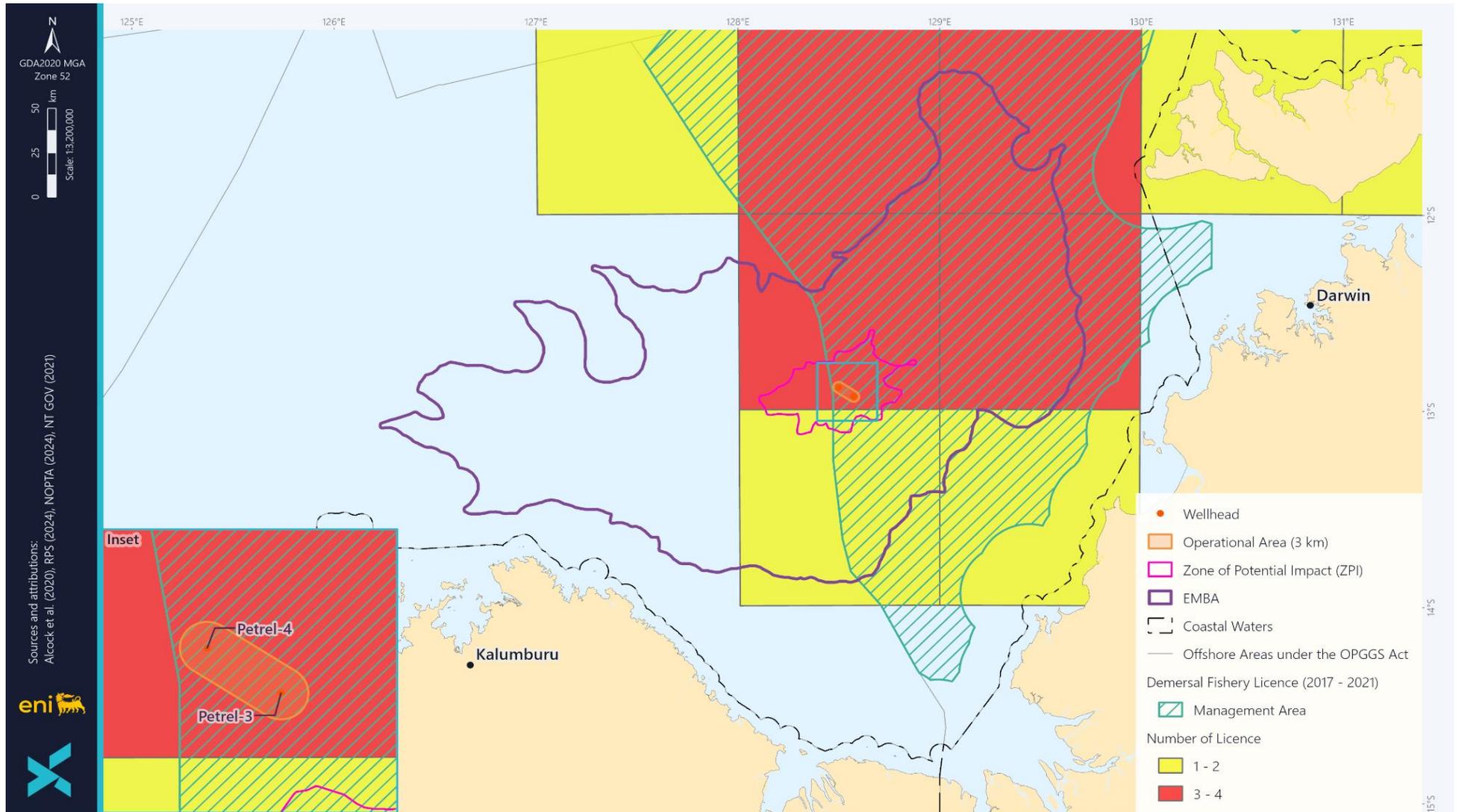


Figure 4-16: NT Demersal Fishery activity within the EMBA

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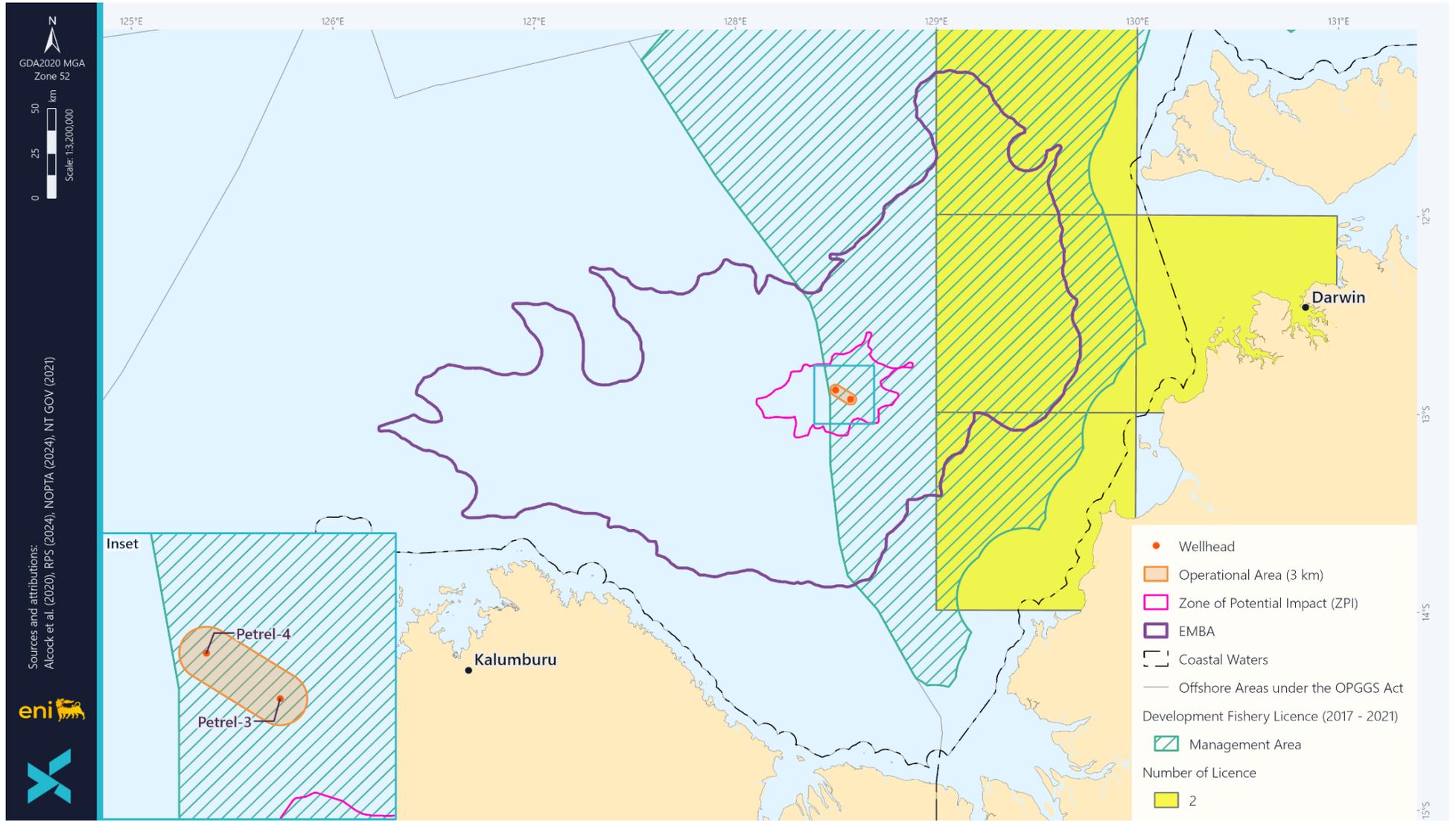


Figure 4-17: NT Development Fishery activity within the EMBA

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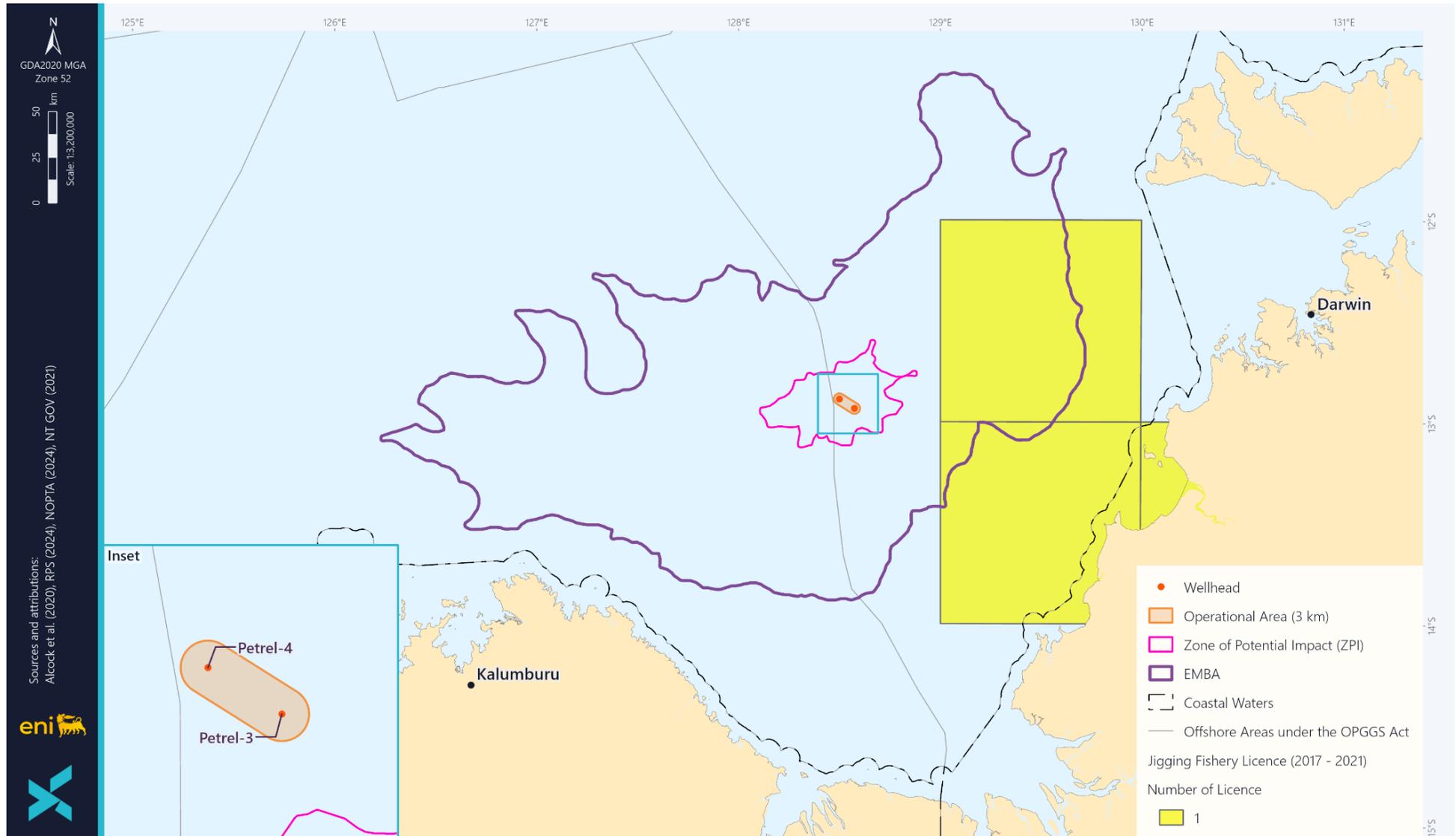


Figure 4-18: NT Jigging Fishery activity within the EMBA

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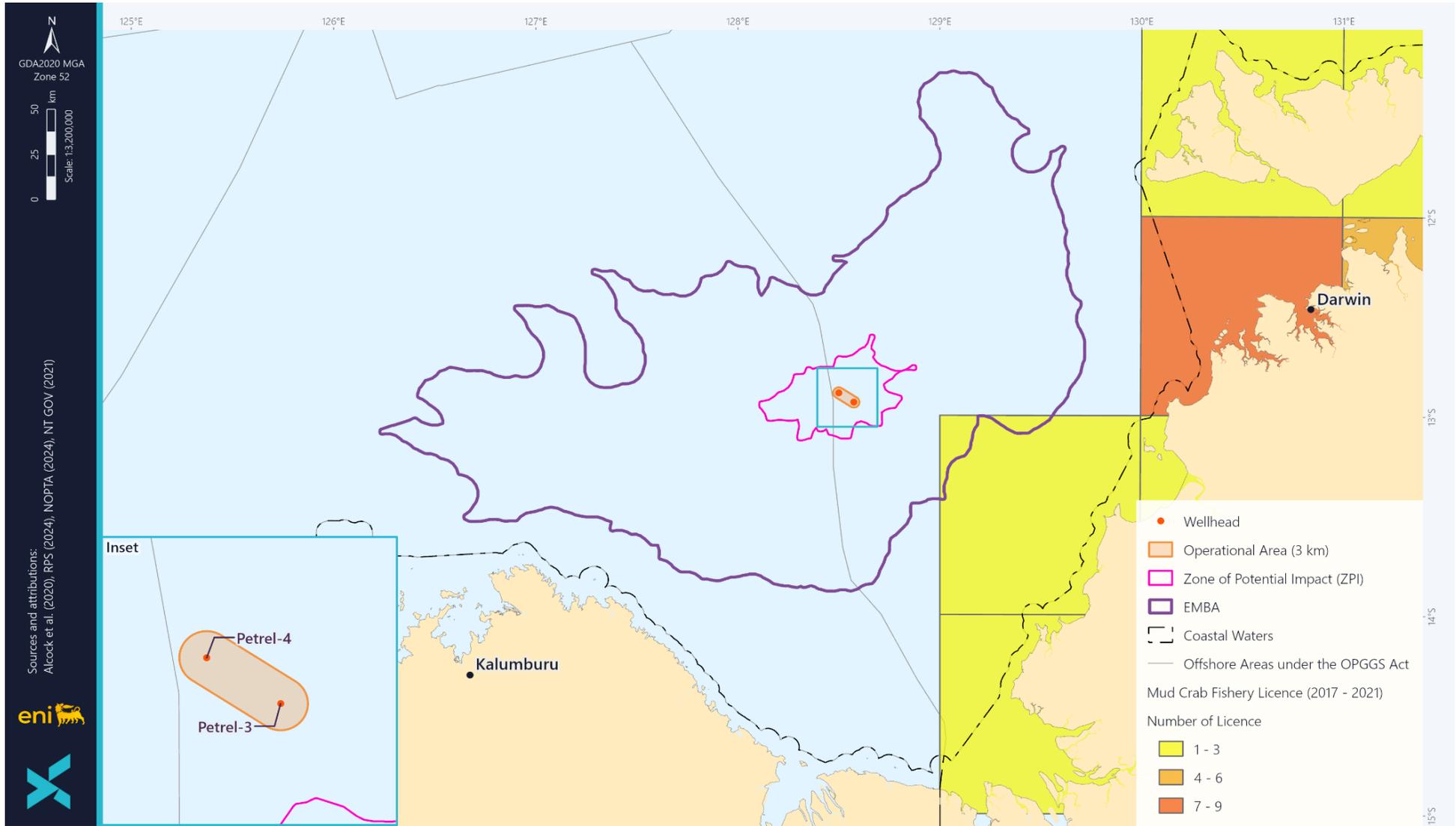


Figure 4-19:NT Mud Crab Fishery activity within the EMBA

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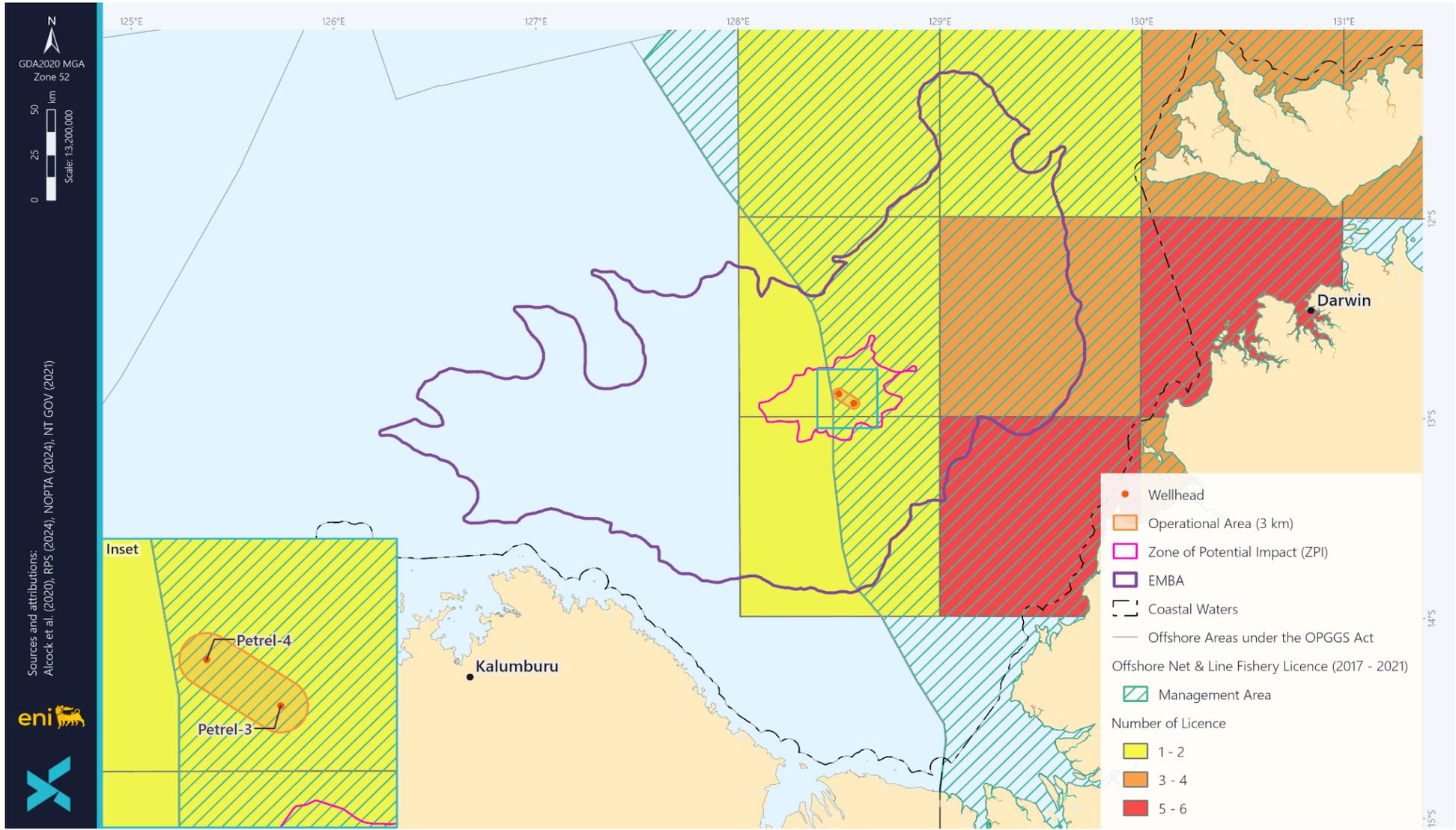


Figure 4-20: NT Net and Line Fishery activity within the EMBA

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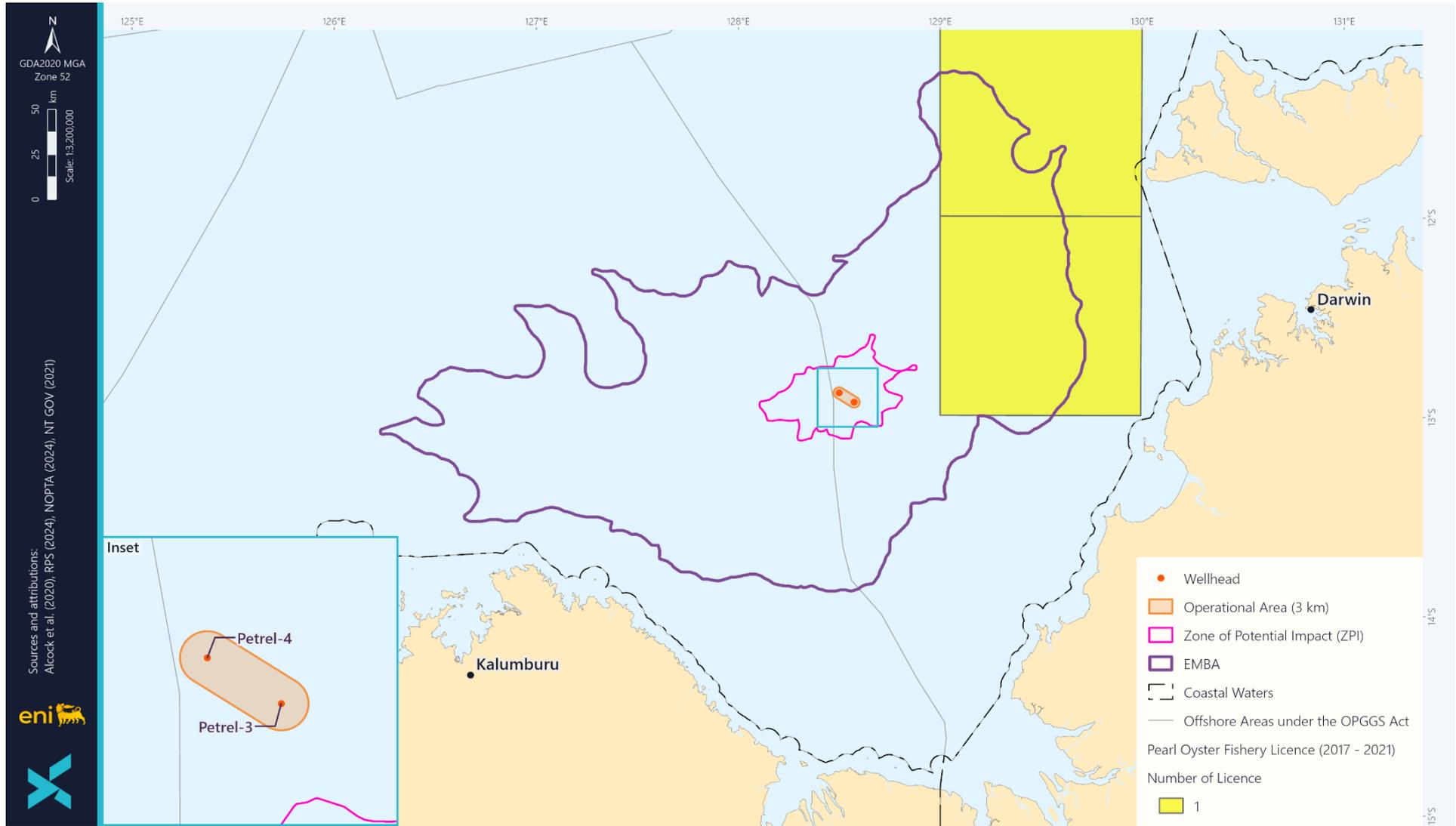


Figure 4-21: NT Pearl Oyster Fishery activity within the EMBA

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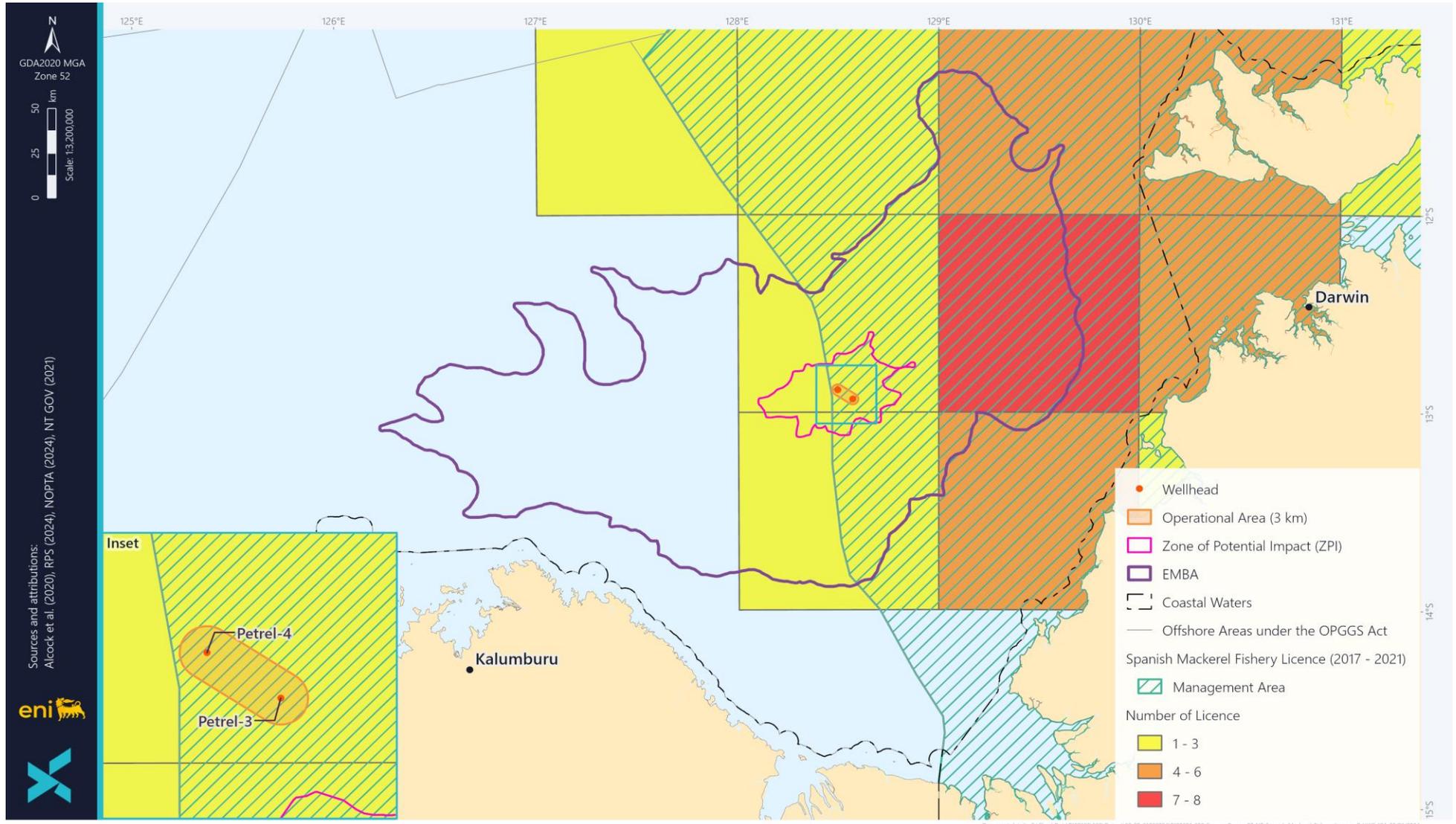


Figure 4-22: NT Spanish Mackerel Fishery activity within the EMBA

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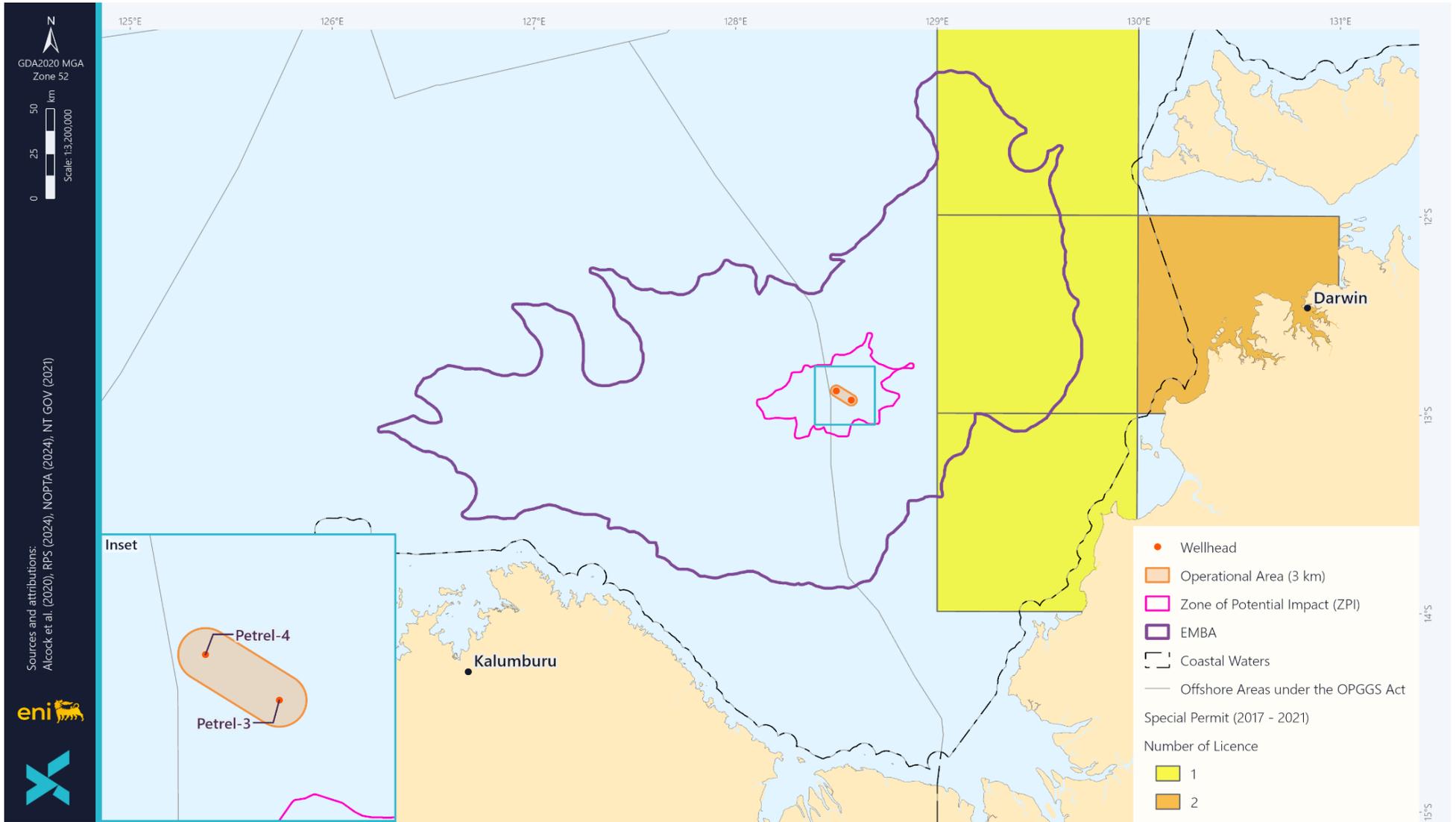


Figure 4-23:NT Special Permit activity within the EMBA

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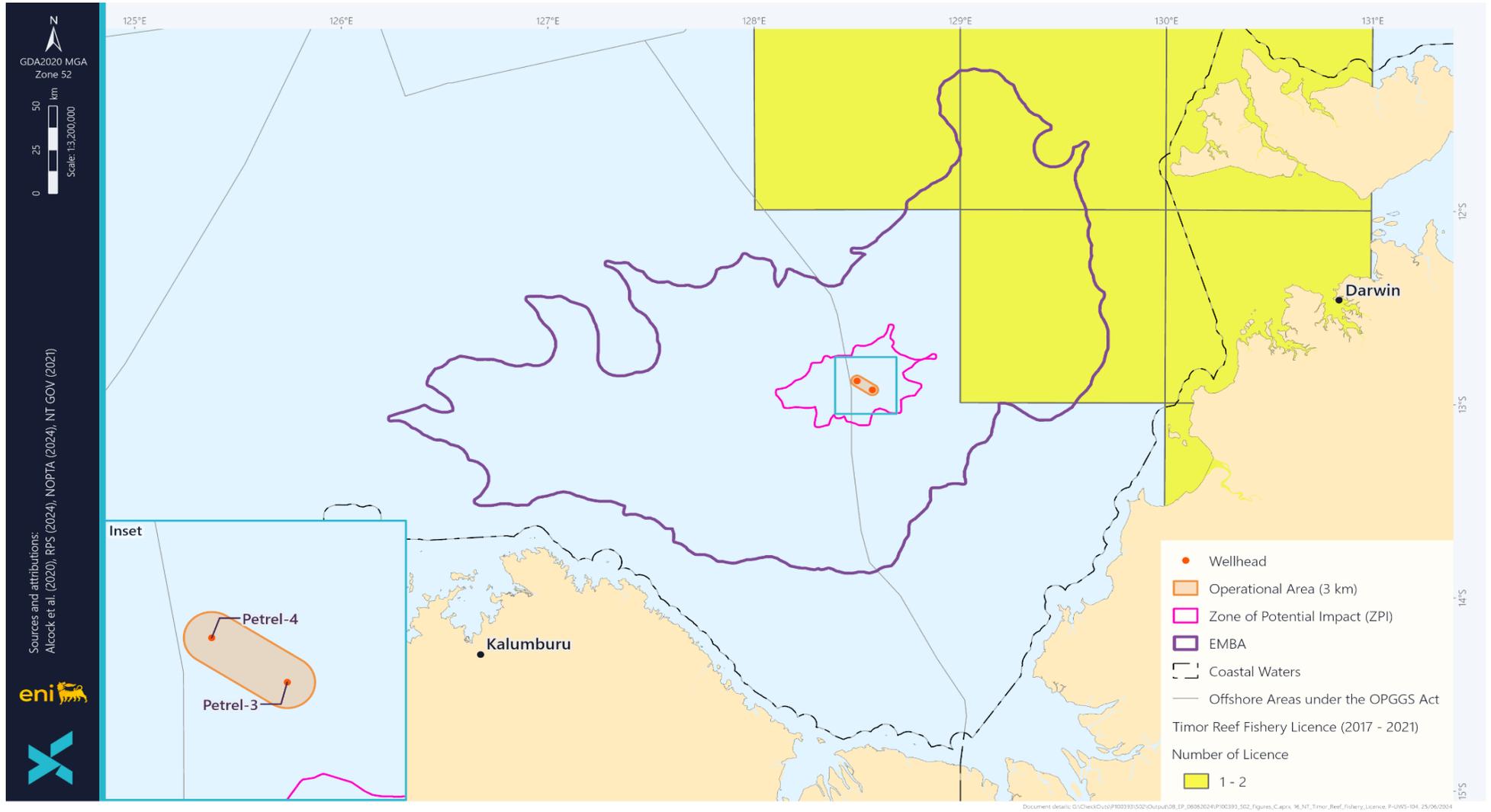


Figure 4-24: NT Timor Reef Fishery activity within the EMBA

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4.6.2 Tourism and Recreational Fishing

Charter fishing and tourism operate out of Darwin and the Kimberley (more than 240km from the Operational Area) and generally target areas of high scenic value or offshore coral reef areas. As these attributes are generally sparse in the offshore area of the JBG, the level of charter fishing and tourism is expected to be very low.

Expedition cruise boats operate between Broome and Wyndham and Darwin in the dry months (April to October). The boats remain in proximity to the coastline and are not likely to be present within the Operational Area for any significant periods.

Any recreational and charter fishing from vessels is largely undertaken using lines. Given the distance from boating facilities and slipways and lack of natural attractions in the Operational Area, very little recreational or charter fishing is expected to occur.

4.6.3 Commercial Shipping

Under the *Commonwealth Navigation Act 2012*, all vessels operating in Australian waters are required to report their location daily to the AMSA Rescue Centre (ARC) in Canberra. This Australian Ship Reporting System is an integral part of the Australian Maritime Search and Rescue system and is operated by AMSA through the ARC.

Coastal shipping traffic is common to offshore areas; the largest port in coastal waters adjacent to the activity location is the Port of Darwin. The Port of Darwin is important for trading vessels, fishing vessels, navy ships and cruise ships; and also, services activity associated with the operation of the AustralAsia Railway and the Timor Sea oil and gas developments.

There are no known recognised major shipping routes through the permit areas, however vessels may pass through the Operational Area (Figure 4-25). The suspended wellheads have been in-situ since the 1980's and appear on navigation charts.

AMSA was consulted about the petroleum activities and its coordinate searches in 2023 have indicated there is no major commercial shipping in the vicinity of the Operational Area. The nearest shipping fairway designated by AMSA located more than 80 km away (Figure 4-25). Traffic is limited to infrequent visits by Northern Prawn Fishery (NPF) and other fisheries, whose boats are typically 13 to 25m long.

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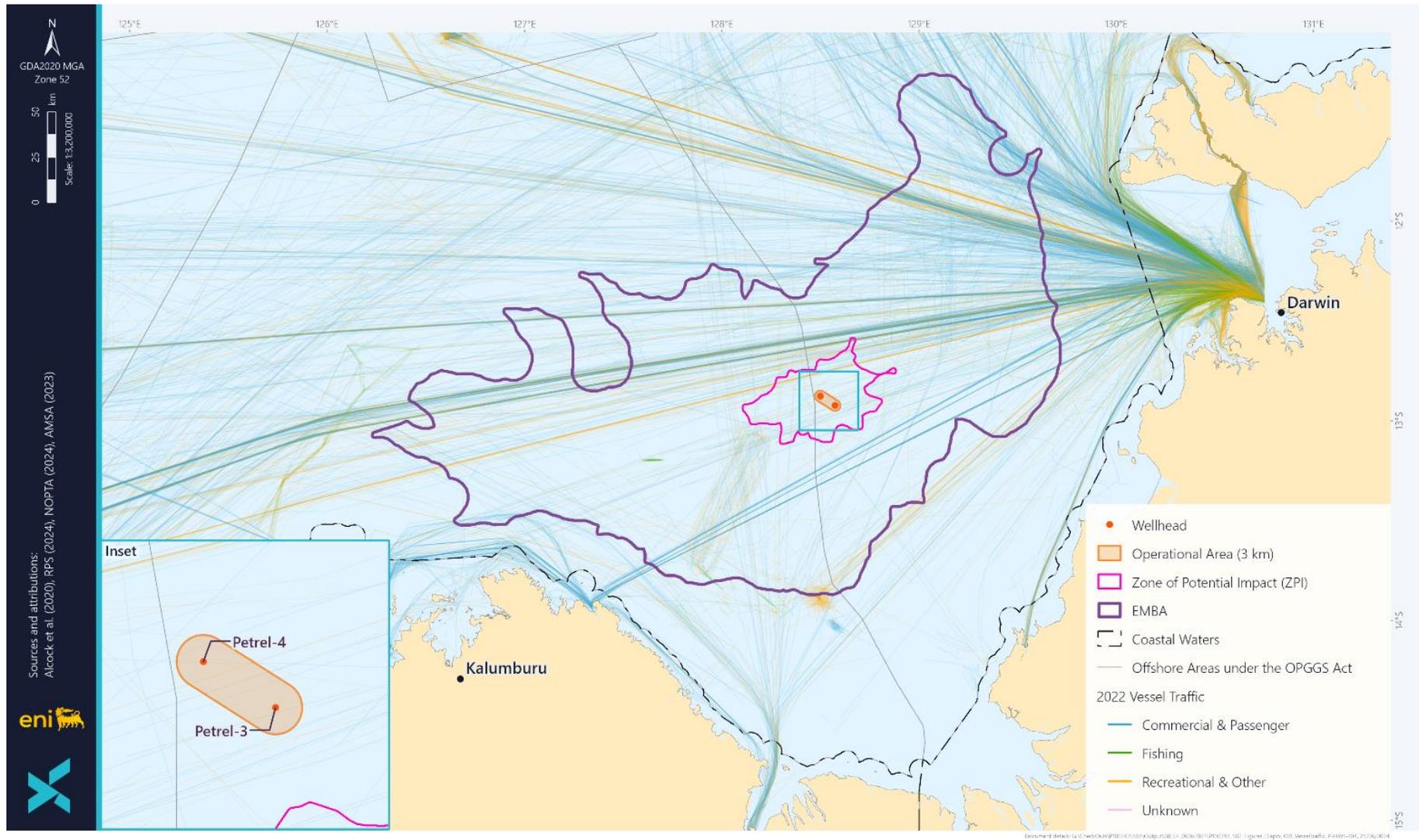


Figure 4-25: Shipping traffic within the EMBA

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4.6.4 Defence Activities

The Operational Area, ZPI and EMBA is located within the Northern Australia Exercise Area (Figure 4-26). This zone incorporates the majority of the Northern Territories portion of the Bonaparte Basin. This zone is mainly utilised for activities associated with border protection including surveillance, illegal immigration and illegal fishing. This area is occasionally used for live firing military exercises.

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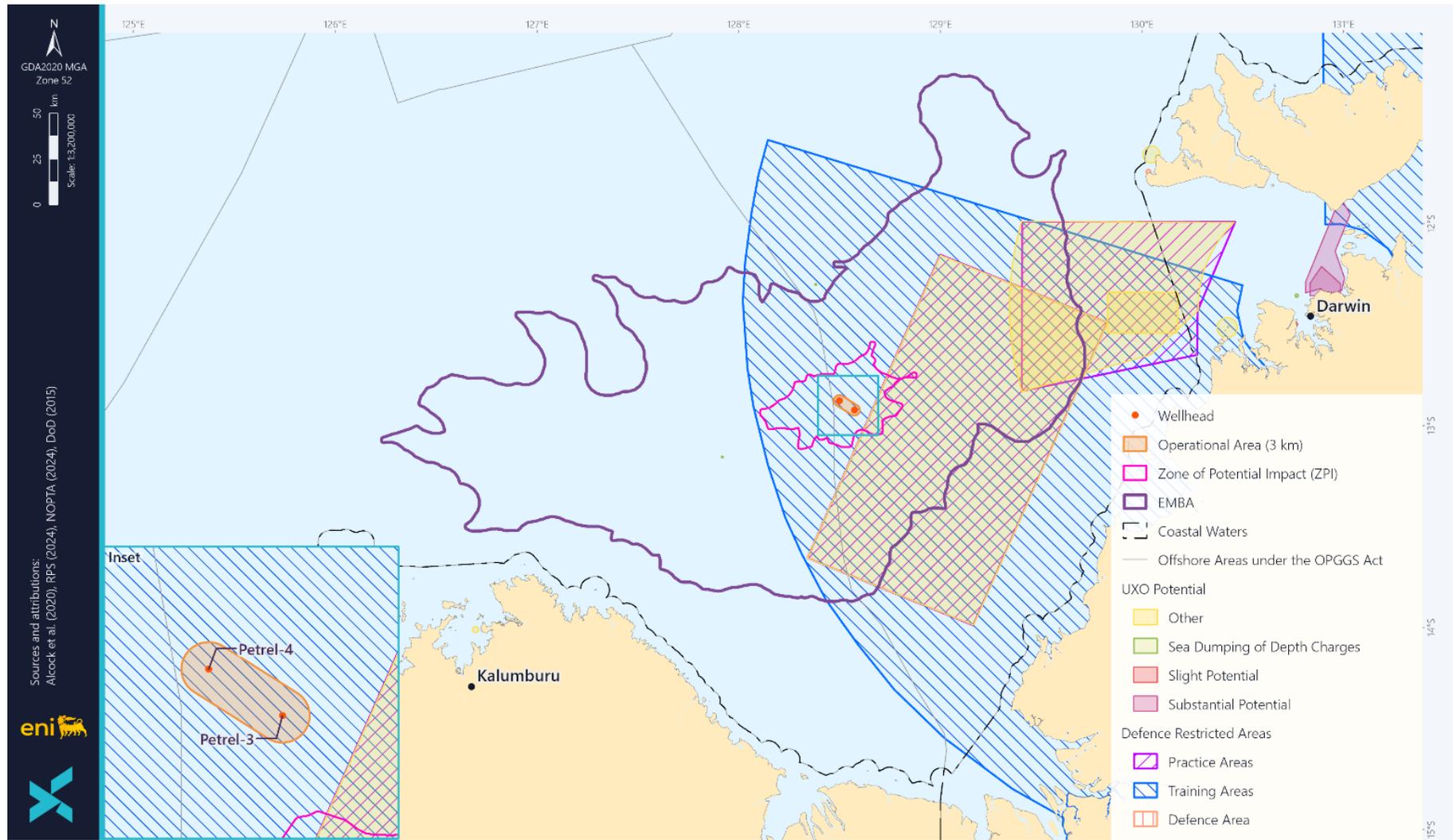


Figure 4-26: Defence Training Areas within the EMBA

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4.6.5 Offshore Industry

Offshore industry, in particular petroleum exploration, has been present in the Bonaparte Basin since the late 1940s.

Gas in the Bonaparte Basin is currently produced from the Bayu-Undan and Blacktip fields. Oil was produced from the Laminaria-Corallina and Buffalo fields and is currently produced from the greater Montara fields (DISR, 2024).

There are five yet to be developed gas fields in the region – Sunrise/Sunset/Troubadour, Barossa/Caldita, Petrel/Tern/Frigate, Cash/Maple, and Evans Shoals (NOPSEMA, 2024).

No Carbon Capture and Storage (CCS) permits overlap with the NT/RL1 and WA-6-R permits. However, there are two CCS permits on the edge of NT/RL1 and WA-6-R. The permits G-7-AP and G-11-AP are held by INPEX and Santos, respectively, and there is a potential for future development in the surroundings of Petrel-3 and Petrel-4. At the time of writing, the only publicly available, accepted EP on the NOPSEMA website is the Bonaparte Basin Exploration Drilling, which commenced in February 2024 and will not overlap with the Operational Area. In March 2025, Inpex submitted an EP for geophysical and geotechnical survey activities within G-7-AP to NOPSEMA, which is under assessment at time of writing. The surveys may be completed over several multi-week campaigns and are described as taking place between 2025 and 2027. The Inpex survey area overlaps the ZPI and the EMBA.

Table 4-12 provides the EPs that were accepted and under assessment at time of writing; according to NOPSEMA’s website. Figure 4-27 shows petroleum and CCS infrastructure and permit areas within the EMBA.

Table 4-12: Petroleum activities within the Operational Area, ZPI and the EMBA

Status	Project Name	Titleholder	Timing	Presence		
				Operational Area	ZPI	EMBA
Approved	Beehive Pre-Drill Geotechnical Assessment WA-488-P EP	EOG	Pending notification	x	x	✓
	Beehive-1 Exploration Drilling WA-488-P	EOG	Pending notification	x	x	✓
	Bonaparte Basin Exploration Drilling EP (CCS)	INPEX	Start date Feb 2024	x	x	✓
	Bayu-Undan to Darwin Gas Export Pipeline EP	Santos	Ongoing	x	x	✓
	Blacktip Drilling EP	Eni	Start date est. 2024-2027	x	x	✓
	Beehive Multi-Well Exploration Drilling EP	EOG	Pending notification	x	x	✓
	Blacktip Operations EP	Eni	Ongoing	x	x	✓

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Under assessment	Tern-2 Plug & Abandonment EP	Santos	Est. late 2024	*	*	✓
	G-7-AP Geophysical and Geotechnical Survey EP	Inpex	Est. date 2025-2027	*	✓	✓

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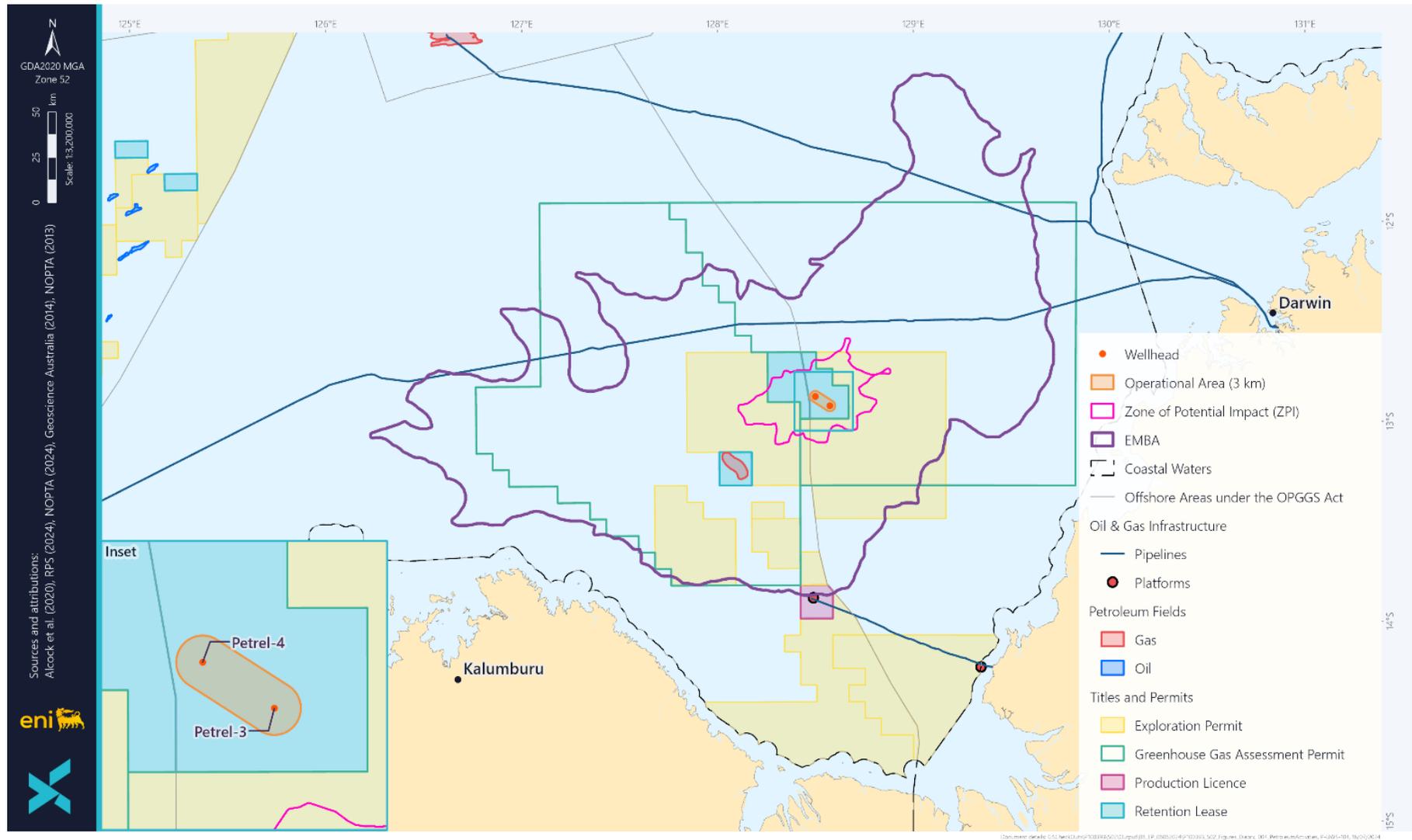


Figure 4-27: Offshore industry infrastructure within the EMBA

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4.6.6 Subsea Cables

Submarine cables are underwater infrastructure which transfer communications or electricity, linking one area of Australia to another, or Australia to other countries. A network of submarine cables extends from Darwin through the Timor Sea and offshore waters of the Kimberley, linking Northern Australia with South-East Asia. The North West Cable System intersects the EMBA (indicative routes shown in Figure 4-28). No subsea cables intersect with the Operational Area or ZPI.

The North West Cable System, which heads north-west out of Darwin Harbour, passes north of the Joseph Bonaparte Gulf (JBG) and travels west around the Kimberly to Port Headland, WA, and the Asia Connect Cable-1 and Hawaiki Nui Cable, which head northwest out of Darwin Harbour towards Timor Leste.

Subcom have proposed a new subsea cable which will also cross the EMBA (Figure 4-28).

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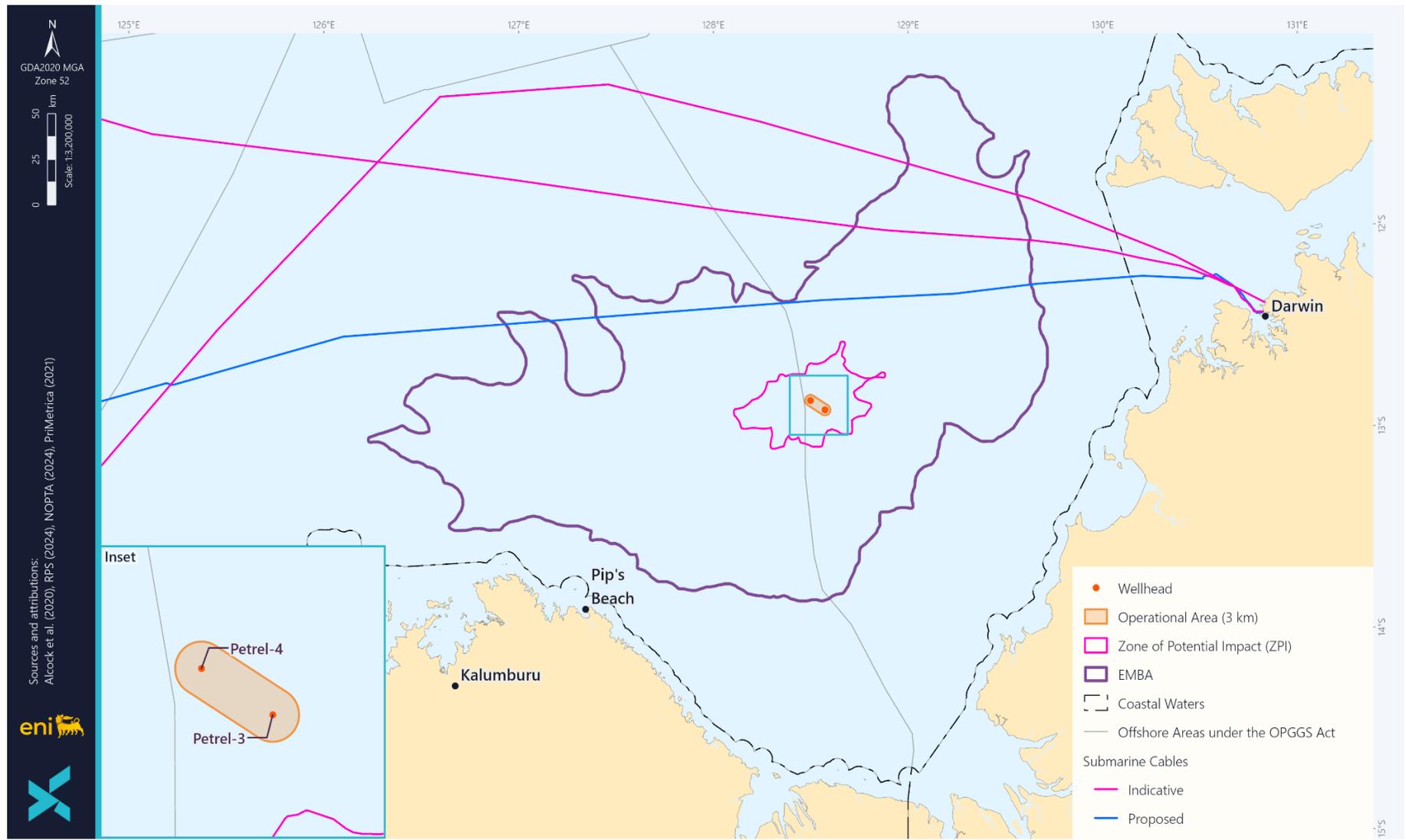


Figure 4-28: Existing and proposed subsea cables within the EMBA

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4.6.7 Shipwrecks

Australia protects its archaeological remains of vessels and aircraft associated relics, including Aboriginal and Torres Strait Islander traditional watercraft that have been wholly or partially submerged for more than 75 years through the Commonwealth *Underwater Cultural Heritage Act 2018*.

Some historic shipwrecks also have an associated protected or no-entry zones; these zones cover an area around a wreck site and ensures that a fragile or sensitive historic shipwreck is actively managed. No historic wrecks with protected zones exist within the EMBA, the closest wrecks with protected zones are the I-124 (Japanese Submarine) (1942) and the SS Florence (1942) which are located approximately 52km and 96km east of the EMBA, respectively.

One shipwreck site does occur within the EMBA (Figure 4-29). The Sedco Helen was wrecked in 1970 and is located approximately 4km north-northwest of the Petrel-4 well in approximately 100m of water depth.

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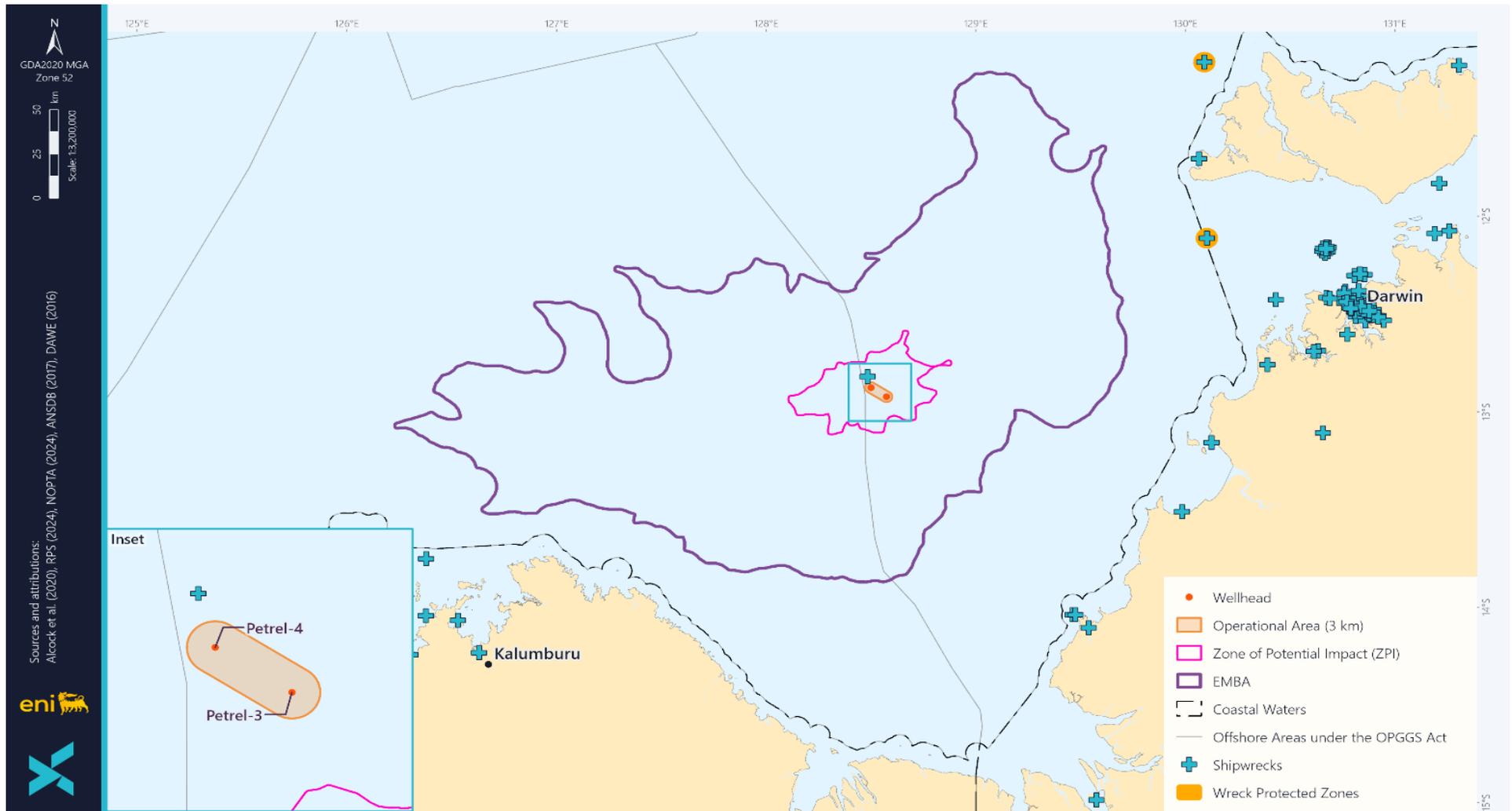


Figure 4-29: Shipwrecks within the EMBA

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4.6.8 First Nations

Australian First Nations culture is the oldest continuing culture in the world and is central to Australia’s national heritage. First Nations peoples continuing connection to country is recognised in Australia under several acts. At a national level, the *Native Title Act 1993* establishes Native title, which recognises, under Australian common law, pre-existing Indigenous rights and interests according to traditional laws and customs (DCCEEW, 2024e).

Australia has a range of laws to protect First Nations’ heritage. Aboriginal land in the NT is governed by the *NT Aboriginal Land Rights Act 1976* (NT), which affords Traditional Owners sovereign rights to country. In WA, recognition of Aboriginal rights is afforded by the *Native Title Act 1993* (Cth) and *Land Administration Act 1997* (WA), which give rights to access, live upon, forage, harvest and hunt upon and carry out traditional cultural practises on country.

The First Nations language groups, including Aboriginal corporations and Prescribed Bodies Corporate (PBCs) that are on the shorelines within proximity to the EMBA are identified in Figure 4-30.

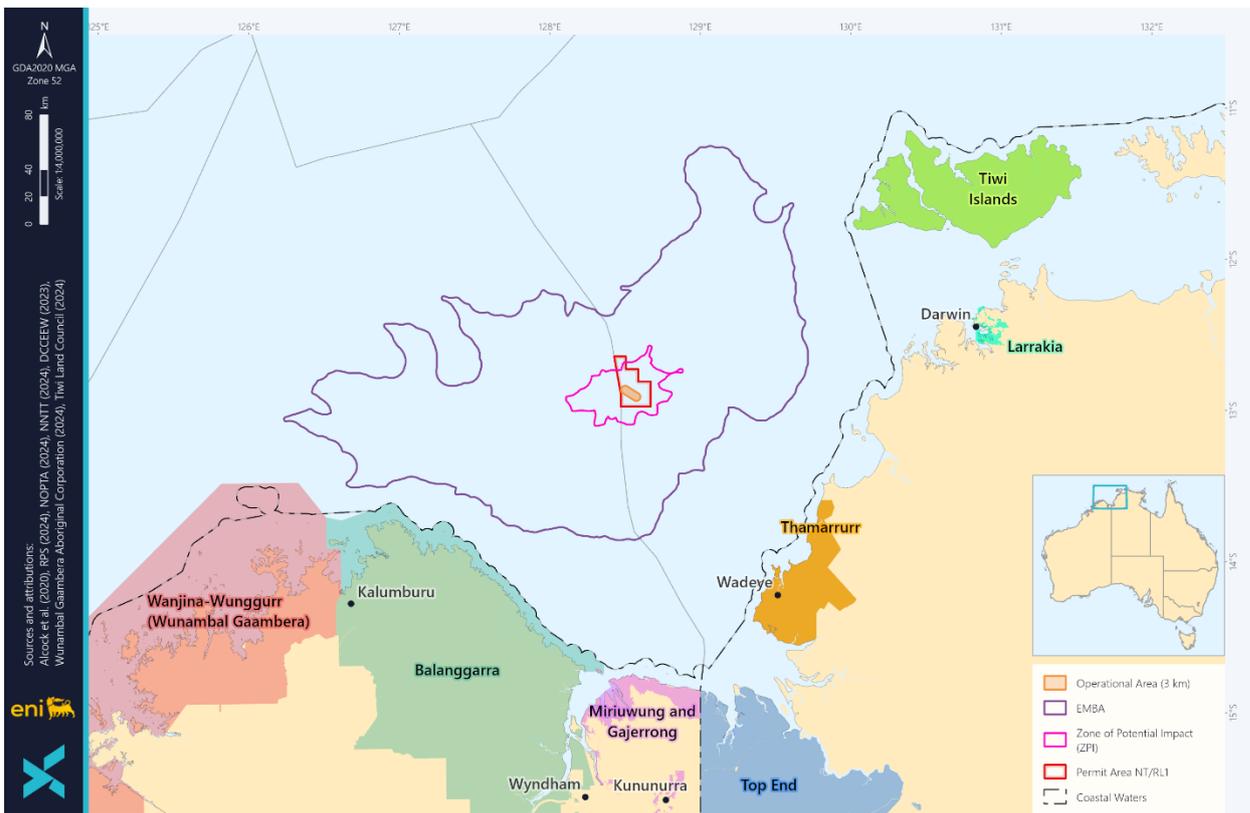


Figure 4-30: First Nations languages groups, including Aboriginal corporations and Registered Native Title PBCs

For the EMBA, three Aboriginal land councils represent the respective Traditional Owners in the regions adjacent to the EMBA: the Kimberly Land Council in WA; and the Northern Land Council and Tiwi Land Council in NT. There are also Prescribed Bodies Corporate and Aboriginal non-government organisations (NGOs) that represent First Nations peoples both across the NT and WA.

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Thamarrurr Country

The land around Wadeye, to the southeast of the Operational Area is the Thamarrurr Region, owned by the Traditional Owner groups of the Daly River Port Keats Aboriginal Land Trust. The land is inalienable freehold land, held under the *Aboriginal Land Rights (Northern Territory) Act 1976*.

Within the Thamarrurr Region, there are seven language groups and more than 20 clan groups, as identified in Figure 4-31 (Streten et al., 2020; Ivory, 2009). The Thamarrurr Development Corporation Ltd (TDC) is a not-for-profit corporate entity owned by members of the four main ceremonial groups – the Wangka, Lirrga, Wulthirri and Tjanpa peoples – and established by the 20 clan groups of the Thamarrurr Region. The TDC represents the interests of these clan groups, which are patrilineal land-owning groups with clear estates and boundaries. Under Thamarrurr, all land-owning groups have traditional rights and responsibilities over their land and are able to work together to resolve issues involving that land (TDC, 2023). Thamarrurr Rangers are an important part of the TDC, employing 20+ local Indigenous staff and four non-Indigenous support staff (TDC, 2023). The Thamarrurr Rangers actively engage with Traditional Owners and community members in natural and cultural resource management as they work across 18,000km² of Country and 240km of coastline (TDC, 2023).



Figure 4-31: Thamarrurr Region and 20 clan regions

Other Northern Territory Country

In coastal areas of the NT that are located within close proximity to the EMBA, Native Title claims and determinations are limited to the pastoral lease areas located south of Wadeye and under the responsibility of the Top End (Default PBC/CLA) Aboriginal Corporation RNTBC (Registered Native Title Body Corporate); and the area in and around Darwin linked to Larrakia Nation peoples. Whilst, as yet, Larrakia people have no legal native title recognition, the Larrakia people have continued connection to country and continue to care for land and water across this region. In addition, the Top End (Default PBC/CLA) Aboriginal Corporation RNTBC, is currently the registered native title body corporate for all determinations of native title in the northern part of the NT.

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Balanggarra Country

Approximately 160km to the south-south-west of the Operational Area, the land comes under the ownership of the Balanggarra Aboriginal Corporation (BAC), who administer the land on behalf of the Balanggarra People. Balanggarra means 'one mob together for Country' and the claim area covers about 2.6 million hectares of land and Sea Country in the north Kimberley. Balanggarra Country has 'blue-water Country' from north of the Forrest River drainage system west to Kalumburu (including Cape Londonderry, the lower Drysdale River as well as the Lyne, Berkeley and King George Rivers), plus 'saltwater Country', the reef, and offshore islands, including Sir Graham Moore and Governor Islands, and 'brown-water Country', the remainder, which is in the southern part and takes in all the land drained by the Forrest River system, and the muddy waters and some offshore islands of the Cambridge Gulf, like Adolphus and Lacrosse Islands (BAC, 2011).

The Balanggarra People live in communities in Kalumburu, Wyndham and Kununurra. A number of people also live at Balanggarra-managed Home Valley Station. Balanggarra Rangers look after Country in both the traditional way (as handed down by their ancestors); and the 'western' way using contemporary natural resource management practices. The Balanggarra Rangers use traditional knowledge when looking for certain animals on Country and to orientate themselves around Country, and western knowledge for flora and fauna surveys, weed eradication, water testing and coastline monitoring (BAC, 2011). Both traditional and western practices are utilised for fire management.

Balanggarra Rangers participate in the North Australian Land and Sea Management Alliance (NAILSMA) Saltwater People Network and work together with Traditional Owners of Saltwater Country along the whole of North Australia to share knowledge and ensure that marine animals are well looked after for future generations (BAC, 2011).

Miriuwung and Gajerrong Country

The land to the east of the Balanggarra Aboriginal Corporation land comes under the MG Corporation (who administer the land on behalf of the Miriuwung and Gajerrong people). The Miriuwung and Gajerrong people have Native Title determination over two adjacent areas of the East Kimberley in WA and crossing into the Northern Territory, totalling approximately 7,500km² of land (MG Corporation, 2024). In addition, the MG Corporation owns agricultural land at Goomig as part of a settlement under the Ord Final Agreement; 50,000 hectares of freehold land at Yardungarrl (located on the WA/NT border, which is home to eight Aboriginal communities) and 107 hectares at Weaber Plains Reserve to the east of the Kununurra townsite (which offers protection of sacred sites and direct employment opportunities for MG people) and 125,000 hectares at Reserve 31165, adjacent to Lake Argyle (MG Corporation, 2024).

MG Corporation land covers mangrove coastal flats and the mouths of river valleys in the north, progressing to grassy plains and savannah forests and woodlands, deep gorges cutting through sandstone and huge limestone outcrops, with the southernmost area home to semi-desert savannah. An agreement is in place between MG Corporation and the Department of Biodiversity, Conservation and Attractions - Parks and Wildlife (DBCA) for the operation of a ranger program at Reserve 31165. The ranger program provides funding for four full-time rangers and a ranger supervisor. Each of the rangers represents one of the four Dawang groups within the reserve (MG Corporation, 2024).

Wunambal Gaambera Country

The land to the west of the Balanggarra Aboriginal Corporation land comes under the Wunambal Gaambera Aboriginal Corporation (who administer the land on behalf of the

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Wunambal Gaambera people). Wunambal Gaambera Country covers approximately 25,000km² of land and wundaagu (sea). Like Wunambal Gaambera their ancestors, the Wunambal Gaambera call their Country their 'Uunguu' – or living home. The Wunambal Gaambera population is approximately 700, who mainly live in Kalumburu, with others scattered through Derby, Broome and Kununurra. One Wunambal Gaambera family group lives at Kandiwal on Ngauwudu (Mitchell Plateau) (Wunambal Gaambera, 2021).

There are fifteen graa winya (15 traditional parts of Wunambal Gaambera Country - or 15 family areas) on Wunambal Gaambera Country, with two skin groups, Woday and Jirrin girn. The Wunambal Gaambera Aboriginal Corporation currently has 7 full-time Uunguu Rangers and many casuals, covering a vast area of Country. All Uunguu Rangers undertake Certificate III in Conservation and Land Management, and ranger stations are located on Country to help rangers access and look after the land (Wunambal Gaambera, 2023). The Wunambal Gaambera Aboriginal Corporation established the Uunguu Monitoring & Evaluation Committee (UMEC) to set standards and benchmarks for keeping their Country strong and to help guide actions and decisions about managing Country. The committee is made up of a combination of Traditional Owners and outside experts, including a senior DBCA scientist.

North Kimberly Marine Park

The North Kimberly Marine Park extends along the north Kimberley coast in State waters and encompasses the Wanjina Wunggur Uunguu, Balangarra and Miriuwung Gajerrong Determinations (Figure 4-32, Department of Parks and Wildlife, 2016). The North Kimberley Marine Park is jointly managed with the Wunambal Gaambera, Balangarra and Miriuwung Gajerrong people respectively through the establishment of joint management arrangements (Department of Parks and Wildlife, 2016).

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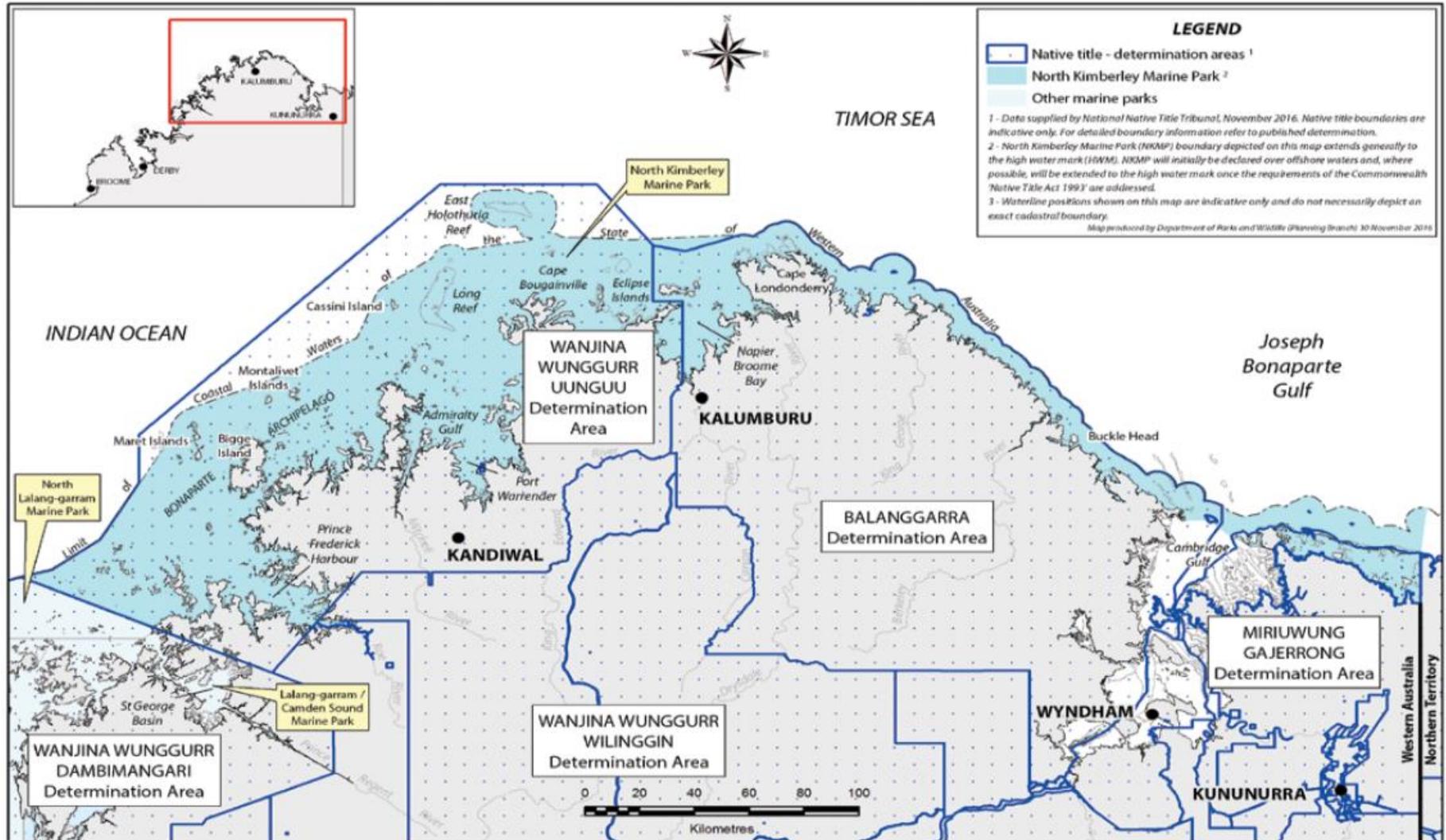


Figure 4-32: Native Titles claim and determination areas within and adjacent to the North Kimberley Marine Park

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Dambimangari Country

The Dambimangari Aboriginal Corporation have native title determination over land (including coastal lands) that is located further south-west of Wunambal Gaambera Country – from Prince Regent National Park to south of Derby. Whilst Dambimangari Country looks to be not in close proximity to the EMBA, there may be connections to sea country heritage and sea life that need to be considered.

4.6.8.1 Culture, Songlines and Connection to Country

First Nations peoples have passed down their culture through generations for the past 65,000 years. This is demonstrated by ongoing cultural connections to Country, as well as by archaeological evidence of human occupation dated to be over 65,000 years old (DCCEEW, 2024e).

Country is the term often used by First Nations people to describe the lands, waterways and seas (and sometimes the sky) to which they are connected. The term contains complex ideas about law, place, custom, language, spiritual belief, cultural practice, material sustenance, family and identity (AIATSIS, 2023). Country can be described as the lands with which First Nations people have a traditional attachment or relationship (Rose, 1992).

Historically, First Nations people lived in small family groups and were semi-nomadic, with each family group living in a defined territory, systematically moving across a defined area following seasonal changes. First Nations people built semi-permanent dwellings; as a nomadic society, emphasis was on relationships to family, group, stories and Country. Membership within each family or language group was based on birthright, shared language, and cultural obligations and responsibilities. Groups had their own distinct history and culture and at certain times, family groups would come together for social, ceremonial and trade purposes (WIWA, 2024).

According to First Nations beliefs, the physical environment of each local area was created and shaped by the actions of spiritual ancestors who travelled across the landscape (WWIA, 2024). Songlines are tied to the Australian landscape and provide important knowledge, cultural values and wisdom. Songlines trace the journeys of ancestral spirits as they created the land, animals and lore, and are integral to spirituality and connectedness to Country.

Unlike elsewhere in Australia, Traditional Owner groups in northern Australia had several centuries of contact with foreign visitors before the arrival of Europeans (National Oceans Office, 2004). Many coastal and island regions in WA and the NT were the scene of complex patterns of interaction, trade and exchange with outsiders including Macassan trepangers from Sulawesi from the late 1600s until early 1900s, European mariners from the mid-1600s, and Japanese pearl divers after European arrival (McCarthy et al, 2022).

As is the case for all of the Australian coast, Songlines exist along the coast of northern WA and the NT. There are often sacred sites interwoven with the Songlines. Natural features within close proximity to the EMBA (e.g., reefs and coastline features) may form core components of Dreaming stories for different First Nations people.

Totems connect First Nations people on a spiritual level, providing a deeper connectivity and understanding to their family groups, their Country, Dreaming and creation events. Marine animals and plants found in Sea Country can hold special cultural significance (including totemic value) to different First Nations people and may be important for subsistence and medicinal purposes. As described in Section 4.4.4, BIAs for marine fauna are located within the EMBA, including those for marine turtles. For the Balanggarra people, two important Dreaming narratives are *Wungkurr* (rainbow serpent) and *Wolara* (the creator). A male and

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female *Wungkurr* travelled from Sir Graham Moore Island in the far west to King George Falls, to become the majestic twin waterfalls. *Wolara* made the saltwater as he 'poled his canoe' in the coastal regions. Some of the islands are where his pole touched the seabed (Department of Parks and Wildlife, 2016).

The Balanggarra people have deep understanding and traditional ecological knowledge of plants, animals, the seasons and landscape features, which can also greatly inform scientific research and conservation programs in Balanggarra Country, as detailed in their Healthy Country Plan (BAC, 2011). In recent years, Balanggarra Traditional Owners and rangers have worked in partnership with a range of organisations to conduct research and field surveys for a number of important marine species such as *abil* (dugong), *mangkuru manya* (turtle) and *yinga* (dolphin) (Department of Parks and Wildlife, 2016).

The Miriuwung Gajerrong have lived for thousands of years by the law, languages and ceremonies established by their ancestral beings who were created by the Ngarranggarni (their Dreaming). In ancient times, Miriuwung Gajerrong land was covered by the waters of an enormous flood which receded, placing some of the Dreamings, and ancestral beings, on the landscape. Other Ngarranggarni roamed their land, creating creeks, billabongs, hills and escarpments on tracks through their cCountry. They created different soils, plants and animals, and all the seasons of the country – *ying-geng* (wet season), *gerloong* (big storm), *barndinyiriny* (dry season) and *wan-gang* (cold weather). The Dreamings became different features of the landscape and are still here present today. Every part of the Miriuwung Gajerrong Country has a song and their Dreaming makes connections between their First Nations people, plants, animals and parts of their Country like waterholes, creeks, hills, mountains and tracks through the Miriuwung Gajerrong Country (Department of Parks and Wildlife, 2016).

As described in the Wunambal Gaambera Healthy Country Plan 2021-2030, Lalai, for Wunambal Gaambera people, is their Dreaming story and belief of the creation of Wunambal Gaambera Country by their *Wanjina* (creator ancestors) and *Wunggurr* (creator snake) when the world was soft and why their lands and sea are the only place in the world Wunambal Gaambera can call Uunguu (home). Their ancestors gave them their Law, customs and culture. Saltwater *Wanjina* like *Ngamali* and *Jagulamarra*, created the sea (wundaagu Saltwater Country) and coast. Some *Wunggurr* (creator snakes) travelled and still live in the wundaagu and can be seen as waves, tides and currents and their heads, tails and backbones are the islands seen today. *Wunggurr* formed stone arrangements throughout the coastal Country. *Wunggurr* also live in waterfalls and waterholes like *Punamii-Unpuu* (Mitchell Falls) (Wunambal Gaambera, 2021).

4.6.8.2 Sea Country and Submerged Historic Landscapes

Over the 65,000+ years of First Nations occupation of Australia, sea levels have fluctuated, rising from a peak low of -120m at around 21,000 years ago relative to present levels, which resulted in the inundation of vast areas the continental shelf (Ward et al, 2022). First Nations peoples have been sustainably using and managing their Sea Country for tens of thousands of years, in some cases since before rising sea levels created these marine environments (DNP, 2018b).

Sea Country or Saltwater Country refers to the areas of the sea that First Nations peoples are particularly affiliated with. It is an estate of sea as well as land, containing sacred sites and inhabited by ancestral beings, existing in both the physical and spiritual world. Sea Country is valued for First Nations cultural identity, health and wellbeing (DNP 2018a, 2018b).

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Sea Country includes all living things, beliefs, creation stories, spirits, and cultural obligations (Streten et al., 2020). Smyth and Isherwood (2016) further describe Sea Country as all estuaries, beaches, bays and marine areas collectively, within a traditional estate. Sea Country contains evidence of the ancient mystical events by which all geographic features, animals, plants and people were created. Sea Country contains sacred sites and contains tracks (or songlines) along which mythological beings travelled during the creation period (Smyth and Isherwood, 2016).

There is a considerable body of literature describing the complexity of the cultural, spiritual, ceremonial, territorial and economic connection between First Nations peoples and the sea.

Although limited baseline surveys of submerged archaeology have been undertaken in Australia to date, submerged archaeological landscapes have recently been identified in WA through combined evidence of terrestrial ecology, coastal and marine geomorphology and sea-level studies (Benjamin et al., 2020; McCarthy et al, 2022). As some of the oldest dated terrestrial sites have been found in the NT, there is a potential for the existence of submerged landscapes with associated First Nations heritage values, due to strong cultural connections between Traditional Owners and the sea (McCarthy et al, 2022). Such relationships and the connections with Sea Country transcend the landscape/seascape divide and the sea is not only a physical and temporal space, but also a mental map of ancestral journeys and rituals to nurture and pass on to future generations (Ward et al, 2022).

Many AMPs (Section 4.5.1.1) are of important cultural significance with fishing, hunting and the maintenance of First Nations heritage through ritual and stories, and are considered to be important uses of nearshore and adjacent areas (DNP, 2018a). Australian and State Marine Park Management Plans offer a source of publicly available information regarding Sea Country within close proximity to the EMBA. Management Plans developed to protect these reserves have been used to inform some of the marine values and sensitivities related to Sea Country in this EP (refer also to Appendix B: Environmental Values and Sensitivities).

Documenting traditional knowledge initiates from conversations with First Nations people about their Sea Country and allows industry to gain further understanding about where the geographic areas of importance are and why they are important for First Nations people.

Sea Country in the Thamarrurr Region

Eni has had a long-standing relationship with the Thamarrurr people since 2009, in the early stages of development of the Blacktip and Yelcherr facilities. A partnership project between Eni, the TDC – Thamarrurr Rangers and the Australian Institute of Marine Science (AIMS) was undertaken in 2019 to map the ecological and cultural values of Sea Country in the Thamarrurr Region. The results of this mapping exercise were published by Streten et al. (2020) in the Australian Energy Producers (AEP) (formerly Australian Petroleum Production and Exploration Association (APPEA)) Journal under the title 'Mapping traditional ecological knowledge of Sea Country to understand biodiversity and areas of cultural importance'. This section summarises the Sea Country mapping process and outcomes.

The conversation regarding a participatory mapping workshop was started through a proposal by AIMS that was provided to the Thamarrurr Rangers through Eni's community and environmental group. The Thamarrurr Rangers sought approval from the TDC, which represents the interests of the Traditional Owners of the Thamarrurr Region.

After receiving consent and agreement from the Traditional Owners, researchers (Eni and AIMS) travelled to Wadeye to hold the participatory mapping workshops in 2020. The first workshop was attended by 30 Traditional Owners and Rangers representing different clan groups of the Thamarrurr Region. Attendance at the workshop by Traditional Owners

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representing many different clan groups in the area allowed the mapping exercise to cover a greater extent of the coastline. Note that Traditional Owners each have custodianship for their specific areas and are restricted to speak only for that part of Country.

The workshop commenced with researchers explaining how the knowledge shared by the Traditional Owners and Rangers would be used to generate a benthic habitat map that could be used by the people of the Thamarrurr Region to communicate with government and industry. The explanation was translated into local language by a member of the TDC.

From a Traditional Ecological Knowledge perspective, 'habitats' in the marine environment could be differentiated based on different ecological processes to those prioritised by scientists, and names will often differ between language, community or dialect. As such, habitats were identified in the local languages first, with English descriptions fitted to the Traditional Ecological Knowledge classifications. The workshop commenced with development of a classification system for marine benthic habitats in three local languages – Murrinhpatha, Mari Amu and Marri Tjevin – and English (Table 4-13). The local language words for each habitat were confirmed by discussing photographs of potential habitats in the region and using local language dictionaries with workshop participants.

Table 4-13: Murrinhpatha, Mari Amu, Marri Tjevin and English words for marine habitat

English	Murrinhpatha	Mari Amu	Marri Tjevin
Oysters	Ku wurldirr	Awu wundirr	Awu wundirr
Sea rocks, coral, rocky reef	Nanthi kalpa	Karrila	Karrila
Seagrass	Nanthi kurrukurruk	Thamurr munmurr	Thamurr munmurr
Sand	Da darrimurn	Munirrhi	Munirrhi
Macroalgae	Nanthi wemat	Thamurr murmur	Thamurr murmur
Mangrove	Da dara	Tha Tjindi (nidin wuri)	Tha Tjindi (nidin wuri)
Mud	Da Paldart	Pilak	Pilua

After the language discussion, Traditional Owners and Rangers separated into five groups based on their specific Country. The smaller groups drew the location of coral, oysters, seagrass, mangroves, mud, rock, rocky reef and sand on topographic maps of their homelands. The mapping exercise was repeated on the second day with Traditional Owners and Rangers, to add information and check the outcomes from the first day of workshops. The information collected at the workshops was digitised in geographic information system software and a draft habitat map was generated. Researchers returned to Wadeye to discuss the draft habitat map of the Thamarrurr Region.

Rangers and Traditional Owners were invited to check the detail on the map to confirm its accuracy and to identify additional information for inclusion. This refinement step ensured the researchers' interpretation of the knowledge shared matches that of the participants. The classification system in local languages was also reviewed during the second visit to Wadeye. The draft map was refined and the final map identified eight different benthic habitats in three local languages plus English, covering a total area of over 1000km² along the Thamarrurr coastline (Figure 4-33). Other cultural information was also mapped, including totem and dreaming sites and other features of cultural and historical importance (Figure 4-34).

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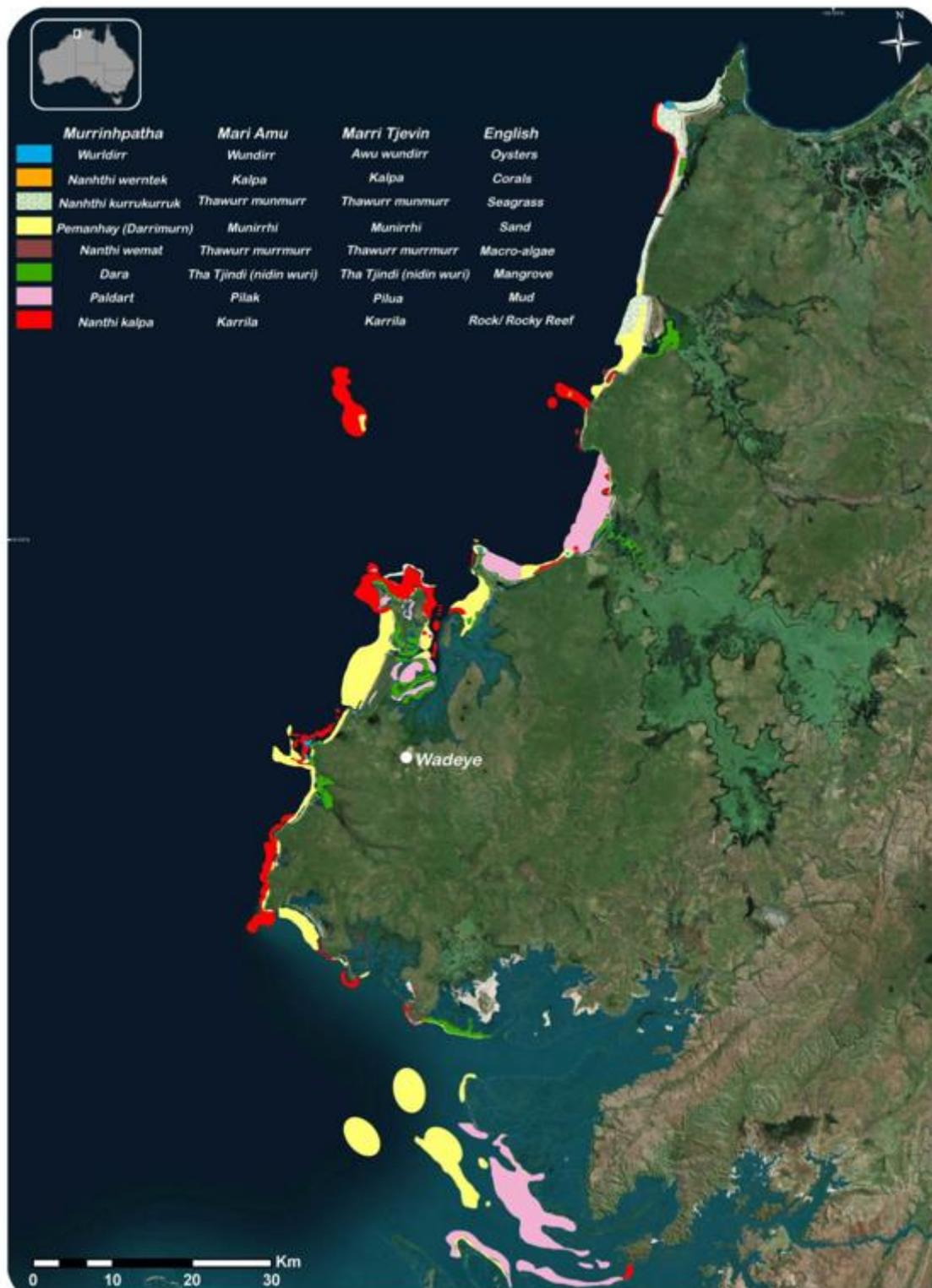


Figure 4-33: Sea Country habitat map for the Thamarrurr Region based on participatory mapping workshop

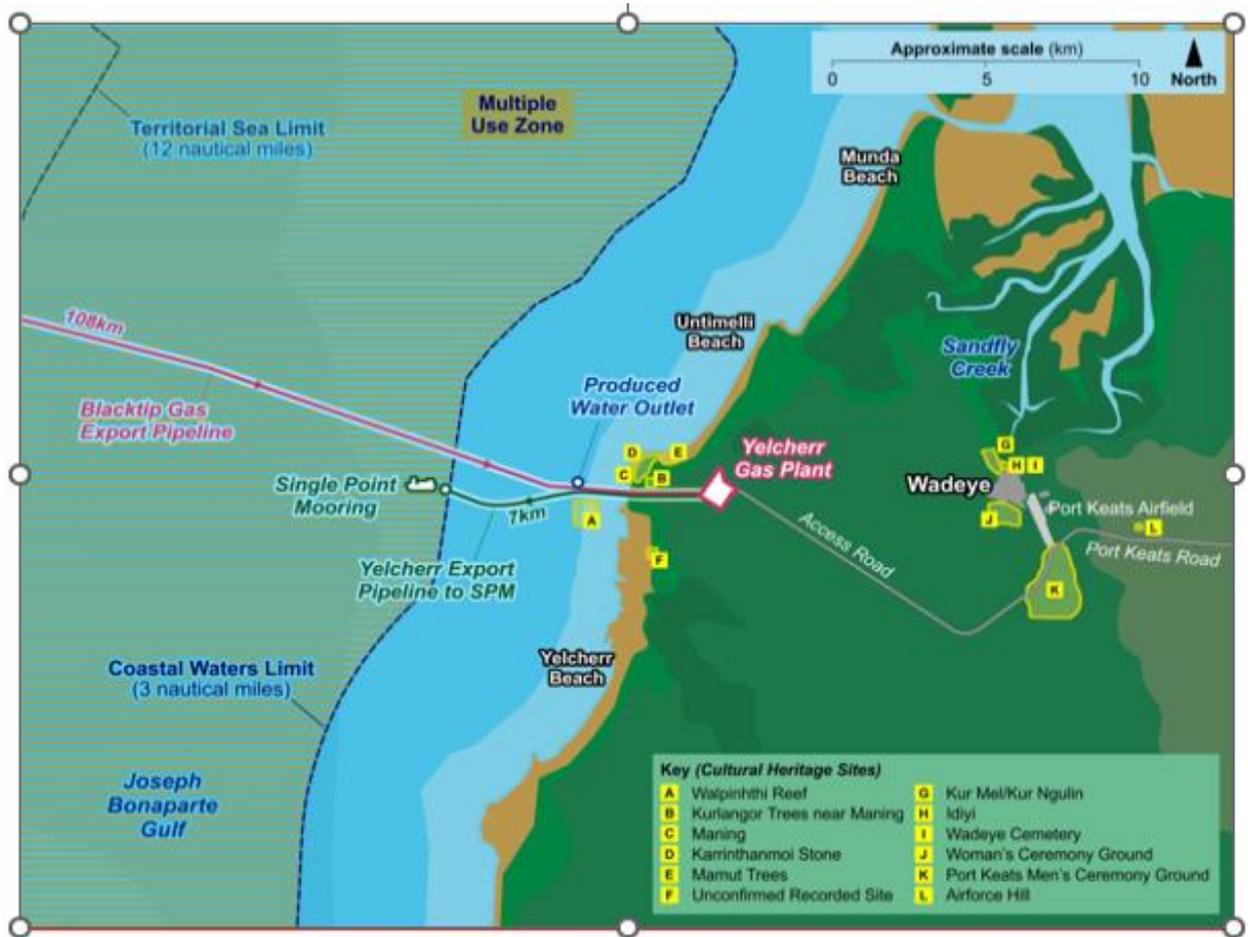


Figure 4-34: Key cultural sites in the vicinity of Yelcherr Gas Plant/Wadeye

Sea Country within Close Proximity to the EMBA

It is understood a fundamental aspect of First Nations peoples' past and ongoing relationship with the sea is that particular groups have a complexity of rights and interests over particular areas of the sea and adjoining coastal land (National Oceans Office, 2004). Such relationships and the connections with Sea Country transcend the landscape/seascape divide; the sea is not only a physical and temporal space, but also a mental map of ancestral journeys and rituals to nurture and pass on to future generations (Ward et al., 2022).

Many of the land along the north Kimberley coastlines has Sea Country components and encompasses small islands near the coast. Given the NT has the oldest dated terrestrial sites, there is a potential for the existence of submerged landscapes with associated Aboriginal heritage values due to strong cultural connections between Traditional Owners and the sea (McCarthy et al., 2022).

Many AMPs (Section 4.5.1.1) are of important cultural significance, with fishing, hunting and the maintenance of First Nations heritage through ritual and stories considered to be important uses of nearshore and adjacent areas (DNP, 2018a).

Balanggarra Sea Country comprises all the saltwater and reef from the offshore islands in the north (including Sir Graham Moore and Governor Islands), down to the offshore islands of the Cambridge Gulf to the south (e.g., Adolphus and Lacrosse Islands) (see Figure 4-32) (Department of Parks and Wildlife, 2016).

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The saltwater of Balangarra Sea Country was created by *Wolara* as he 'poled his canoe' in the coastal regions. Some of the islands are where his pole touched the seabed. Rinjiibarda'bindingei (to the north of Cape Londonderry) is a reef where the Dreaming Star 'fell down' to become the very shiny and highly prized, ritually and socially important pearl shell.

Whilst the Miriuwung Gajerrong people's traditional lands are primarily inland in the Kimberley region of Western Australia (including the Ord River and its associated floodplains, billabongs, and surrounding landforms), the Miriuwung Gajerrong people also have Sea Country associated with their coastal regions. Miriuwung Gajerrong Sea Country extends from Cambridge Gulf into the NT to the east. Their *Dawang* groups are responsible for the upkeep of the land and protection of sites of cultural significance for community according to transitional laws and customs that are handed down. The *Dawang* responsible for the Saltwater Country in the North Kimberley Marine Park is *Wardanybeng* (Department of Parks and Wildlife, 2016).

The Wunambal Gaambera people are *Wundaagu* (Saltwater) people. Their ancestors travelled the waters by raft and canoe right out to the outer islands and reefs (see Figure 4-32). Their ancestral sea wanjinias (creator ancestors) are represented in cave paintings at places like Jalandal and Bigge Island. Wunambal Gaambera Saltwater Country off the Unguu Coast includes both Commonwealth and State waters, *daagu* (deep/subtidal water) and intertidal waters including *warrurru* (reefs), *burrurrga* (beaches), *darrngarla* (mangroves), tidal creeks and mudflats.

The Wunambal Gaambera Aboriginal Corporation has developed the Unguu Wundaagu Saltwater Indigenous Protected Area (IPA) Plan of Management (Wunambal Gaambera, 2023) that compiles aspects relevant to Saltwater Country and elaborates on strategies and actions relating to Saltwater management and is a sub-plan of their Wunambal Gaambera Healthy Country Plan (Wunambal Gaambera, 2021). As detailed in the IPA Plan of Management, the most important values relating to Saltwater Country are (Wunambal Gaambera, 2023):

- The Wunambal Gaambera culture – for example talking to the *wundaagu* (sea) when fishing and only taking what is needed).
- The Wunambal Gaambera people – this includes ensuring livelihoods and opportunities for future generations).
- *Gawi* (fish and other seafood) – Wunambal Gaambera people have strong customary practices for collecting and harvesting fish and other seafoods from different Saltwater Country such as *warrurru* (reefs) and *darrngarla* (mangroves) and these traditions are from their *Lalai* (Dreaming).
- *Mangguru* (marine turtles) and *Balguja* (dugong) – these are important cultural foods especially for cultural gatherings and the Wunambal Gaambera people's customary right to hunt turtle and dugong and to collect turtle eggs is recognised under statutory law.
- Saltwater cultural places – the Wunambal Gaambera people have many important cultural places in the *Wundaagu* (Saltwater); in particular:
 - Wanjina Wunggurr Cultural Tradition: Our Sea Country is associated with our cultural tradition and has many significant sites
 - Wunambal Gaambera log-raft maritime tradition: Wanjina Wunggurr ancestors used rafts and canoes to sail the tides and currents from the mainland to islands and *warrurru* (reefs) far offshore. Travel routes followed the tides and were important in their ancestors' *wunan* (traditional sharing and business trading system) between families

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- Makassan: Wanjina Wunggurr ancestors interacted with Makassan seafarers for hundreds of years. Makassans came for *Bujulum* (sea cucumber) and other resources from the sea and left Tamarind trees and stone hearths on the shores.

4.6.8.3 Sacred Sites and Other Recognised Heritage Places

Culturally important sites and places include a range of ceremonial and mythological sites, camps, quarries, artefacts and manmade structures. Some sites are located inland and therefore have limited potential for interaction with activities (unplanned) associated with this EP. Whereas other sites may be located directly on the coast or on offshore islands that have values associated with plant resources, water sources, hunting places/camps and spiritual and cultural history. Refer to Figure 4-33 where some of these places have been identified in the Joseph Bonaparte Gulf in consultation with different clan groups of the Thamarrurr Region and Section 4.6.8.2 for information on Saltwater cultural places for the Wunambal Gaambera people.

4.6.8.4 Seasonal Calendars

First Nations peoples have developed an understanding of the Australian environment over many thousands of years (BOM, 2023; CSIRO, 2022). Knowledge of the seasons is highly localised and unique to each Aboriginal group. As such, the number of seasons recognised in an annual cycle, the length of each season, and how they are locally defined and understood, differs a lot depending on where the seasonal knowledge of Country has developed (CSIRO, 2022).

Within specific seasons certain activities occur; these include customary activities such as ceremonies and burn offs. Resource availability is also influenced by season such as the flowering of certain plants identifying when eggs are available for collection or specific bird calls which indicate that yams are ready to eat (BOM, 2023).

Some examples of specific traditional activities that may occur within close proximity to the EMBA that are influenced by season include:

- The Wunambal Gaambera seasonal calendar shows that during *Yurrma* (dry season: May to August) turtles and mud crabs are hunted, whereas in *Yuwala* (storm season: September to December) dugong are hunted for food and turtle eggs are collected (Wunambal Gaambera, 2021).
- The Balangarra seasonal calendar shows that stingray hunting for food occurs in *Yuwala* (hot season, no wind: September to November) and turtles are hunted for food in *Yirrma* (winter: June to August) (BAC, 2011).

4.6.8.5 Traditional Use of Resources

Traditional fishing occurs along the majority of the Kimberley and NT coastline. The practice of traditional fishing includes taking turtles, dugong, fish and other marine life, with traditional fishing methods consisting of the use of lines, hand collection, nets and spears (National Oceans Office, 2004). Several IPAs identified in Section 4.6.8.6 are found within proximity to the EMBA where it can be expected that traditional fishing activities will occur. Within the Northern Land Council region, approximately 55% of the NT's coastline is owned by Traditional Owner groups. These areas support a range of economies and livelihoods and contain many iconic fishing areas (NLC, 2021).

A National Recreational and Indigenous Fishing Survey undertaken in 2000, reported that the greatest fishing effort focused on saltwater environments, including estuarine, coastal,

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inshore (less than 5km from the coast) and offshore (greater than 5km from the coast) with line fishing and hand gathering being the two most common fishing methods (National Oceans Office, 2004). Data collected during the survey in 2000, showed that offshore fishing activities represented only 2% of total indigenous fishing effort with inshore (49%), coastal (23%), rivers (16%) and lakes/dams (10%) being more common (National Oceans Office, 2004).

The traditional harvesting of marine resources (e.g. turtles, whale sharks and dugong) adjacent to the North West Marine Region is a pressure of potential concern for the carbonate bank and terrace system of the Sahul Shelf, the pinnacles of the Bonaparte Basin, and the Commonwealth waters surrounding Ashmore Reef and Cartier Island (DSEWPac, 2012d) to the west of the EMBA.

Several Traditional Owner groups have responsibility for managing Sea Country in areas within close proximity to the EMBA where they have deep spiritual connections to offshore landscapes and harvest marine resources for food and cultural purposes. Fish are a staple food source, and fishing a form of cultural expression, connecting people to Country modelled on tradition and based in traditional law (DNP, 2018a).

Balanggarra people have strong traditions to collect and harvest saltwater fish and other seafood from *darkurr* (open sea) and the *warrirr* (reefs). Saltwater fish, *mangkuru manya* (turtles), *abil* (dugong), mud crabs, *marlinji manya* (oysters) and *numbarru manya* (cockle shells) continue to be important food sources for Balanggarra people (Department of Parks and Wildlife, 2016).

In the past, Miriuwung Gajerrong people used tidal saltwater areas, such as mangroves, for hunting, fishing and general bushtucker and wood for spears. The hunting in these places is good for *bundungjiliwurrng* (saltwater turtle), *juinying* (saltwater crocodile) and *marri marri* (pelican). Miriuwung Gajerrong people would also hunt for *galak galak* (dugong) and fish for *ngadagung* and *muwugang* (mullet), *durrngman* (saltwater salmon), *jaliwong* (barramundi), *jajan* (seawater catfish), *kalawung* (sharks) and *birin* (stingrays). Bushtucker such as *marmurrng* (mangrove fruits), *gagolyang* (big saltwater mussels), *woiyimbung* and *jaguli* (oysters), *mulgurrent* (big saltwater mudcrabs), *mulum ngalanggubiny* (saltwater worms from mangrove trunks) and *gurruwiling* (crocodile/turtle eggs) is also collected from these areas (Department of Parks and Wildlife, 2016).

Wunambal Gaambera people have strong customs and traditions for hunting *manggurru* (turtle) and *balguja* (dugong), collecting and harvesting fish and other seafoods from the *wundaagu* (sea) and *warrurru* (reefs) for ceremony, food, medicine and bait. These traditions from their Lalai are in songs, oral traditions and paintings. In the past, Wunambal Gaambera Traditional Owners built stone fish traps to catch fish like *munungiyunga* (barramundi) and also fished from canoes and rafts. Saltwater fish such as *ngarrwan* (mangrove jack), *wunbarlu* (blue-bone groper), *munungiyunga*, *bunjumarru* (mud crabs) and *marlinju* (oysters) continue to be important food sources for Wunambal Gaambera people. Wunambal Gaambera people are working to ensure the continuing health of their Country and the sustainable use of resources (Department of Parks and Wildlife, 2016). Eni's focus on the Thamarrurr Rangers Initiative.

Since 2009, Eni has had a strong focus on the Thamarrurr Rangers initiative. The Thamarrurr Rangers were established in 2001 by the Traditional Owners of the Thamarrurr Region to address land and sea management issues. The Rangers have grown from community development and employment programs to a well-resourced program through the Working on Country program (TDC, 2023).

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The Thamarrurr Rangers actively engage with Traditional Owners and community members in natural and cultural resource management. The rangers patrol more than 18,000km² of land and around 240km of coastline (from the Daly River to the Fitzmaurice River), and do a range of work, including coastguard, pest control, monitoring wild animals, protecting cultural assets, education and managing the Marri Jabin Indigenous Protected Area (IPA) (TDC, 2023) as well as activities for Eni.

Traditional Owners of the Thamarrurr Region hold a close affinity with Sea Country and, together with Thamarrurr Rangers, have recognised the importance of maintaining an active presence on the water. As discussed in previous sections, the 2019 Sea Country mapping workshops provided the opportunity for the Rangers and researchers (Eni and AIMS) to exchange scientific monitoring knowledge that could enhance the local community's management capabilities of Sea Country.

Eni, AIMS and Thamarrurr Rangers have worked together on field-based projects, notably the following:

1. 2020 Ecological Data Collection at Emu Reef in Wadeye, NT

Rocky reefs are important habitats and nursery areas for a diversity of marine species, such as golden snapper and black jewfish. Based on the participatory mapping workshop (discussed in previous sections), rocky reefs are a key ecological feature in the Thamarrurr Region. The rocky reefs in the region include reef fish protection area, Emu Reef, and the sacred site Walpinhthi Reef (refer Figure 4-33). There is limited scientific data available on the nature of these ecologically important areas.

This project was conducted by AIMS, in collaboration with the Thamarrurr Rangers, during two fieldtrips in the fourth quarter of 2020, and provided training to Rangers on how to use baited remote underwater videos and other marine surveying techniques to characterise reef habitats. The target locations included an around Eni produced formation water release point and Emu Reef. The project not only increased the current knowledge of reefs in the area but also provides field data to refine the details for the areas mapped during the initial participatory workshop. In addition, training of the Rangers provided them with the skills to undertake routine monitoring of the reefs in Sea Country.

2. 2023 Water Quality Sampling at the Blacktip Produced Formation Water Release Point

This project trained the Thamarrurr Rangers to undertake monthly produced water outfall sampling following Eni verified sampling protocols. AIMS trained the Thamarrurr Rangers in water sampling and conducted a dummy survey using a fluorometer on the subsequent day. A Go Pro was used to record the training and fieldwork and may be used as reference and future training of new rangers.

Eni and Thamarrurr Rangers arrangements continue in relation to monitoring and data collection. It is expected to continue to grow with ongoing training in marine operations, with Rangers increasing their ability to monitor for research and compliance purposes. The Thamarrurr Rangers will also use water quality sampling skills to assist Eni in the event of an oil spill (refer to the Petrel-3 and Petrel-4 Monitoring and Decommissioning Operational and Scientific Monitoring Plan (OSMP) (000694_DV_ES.HSE.0286.000_00)).

3. 2023 Fluorometer Survey Training in Response to Oil Spill

Following the water quality sampling training (detailed above), AIMS trained the Thamarrurr Rangers in fluorometer use so they can be first responders sampling water in the event of an oil spill. Further details on the use of the Thamarrurr Rangers' skills in operational and scientific monitoring following an oil spill are included in the Petrel-3 and Petrel-4 Monitoring

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and Decommissioning Operational and Scientific Monitoring Plan (OSMP) (000694_DV_ES.HSE.0286.000_00).

4. Annual Sediment and Shellfish Surveys

Sediment and shellfish sampling around the Blacktip produced water outfall and at reference sites offshore of Wadeye region.

Other field-based projects in collaboration with the Thamarrurr Rangers may be completed in the future. These include:

5. Understanding Mangrove Habitat Change in the Thamarrurr Region

Mangroves play an important role in coastal ecosystem health because they limit coastal erosion and are important nursery grounds for demersal fish and sharks. A change in mangrove habitats along the west coast of the Gulf of Carpentaria, NT has been identified.

The Traditional Owners of the Thamarrurr Region have also identified this change along the east coast of the Bonaparte Gulf, NT. While studies are underway to understand the change in the Gulf of Carpentaria, the cause, rate and extent of the changes of mangrove habitat along the coast near Wadeye have not been examined. This project, in collaboration with Rangers and Traditional Owners, would use participatory mapping techniques to document the change identified by Traditional Owners, in combination with analysis of remote sensing satellite imagery, to elucidate the observed patterns and to assess other environmental variables that may have attributed to this change. Understanding the location of mangrove decline within the Thamarrurr Region may facilitate the identification of factors driving the decline and to develop potential strategies for mangrove rehabilitation projects.

6. Interpreting Megafauna Data and Designing Monitoring Program for Rangers

During the mapping exercise, Rangers and Traditional Owner identified foraging locations for turtles and dugongs as well as movement patterns of rays along the coast. This project may collate Traditional Owners' knowledge as well as data to provide information about the status of species in the area. The outcomes from the project would be a monitoring program designed based on priority species and areas.

Eni sees the benefit of the Thamarrurr Rangers program and is keen to understand what other relevant programs are available in the region.

In addition to the Thamarrurr Rangers program, Eni notes that under NT Fisheries, Aboriginal people living in a remote community who want to fish and sell the fish they catch, can apply for an Aboriginal Coastal Fishing Licence. There are currently 5 Aboriginal Coastal Fishing Licences in Wadeye, and these people will be approached for comment regarding this EP, through Eni's relevant person consultation process.

4.6.8.6 Indigenous Protected Areas

An IPA is an area of Indigenous-owned land or sea where Traditional Owners have entered into an agreement with the Australian Government to promote biodiversity and cultural resource conservation. IPAs are managed by First Nations groups in accordance with Traditional Owners' objectives. The boundaries of IPAs may be aligned with Native Title boundaries, or wholly contained within. In 2022, the Australian Government announced a program (the Sea Country IPA Program) to expand the IPA network to include coastal and marine areas.

The IPA program is jointly administered by DCCEEW and NIAA.

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There are no IPAS within the Operational Area or the EMBA.

There are three IPAs within proximity to the EMBA (the Marri-Jabin, Balangarra and Unguu IPAs), which are further described below.

Marri-Jabin IPA

Gazetted in 2009, the Marri-Jabin covers an area of approximately 71,200ha and was dedicated under IUCN category IV (DCCEEW, 2024f) (Figure 4-35). The Thamarrurr Land and Sea Rangers oversee the management of the IPA and carry out a range of critical activities, such as surveying and managing invasive weeds, feral animals, marine invertebrates, and diseases. The rangers also monitor the habitats of threatened species, including sea turtles, while managing fire and documenting and preserving significant cultural sites. Additionally, they are committed to passing on traditional knowledge to the next generation, ensuring the continuation of cultural practices and values for years to come (NIAA, 2024).



Figure 4-35: Marri-Jabin Indigenous Protected Area (Source: NIAA, 2024)

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Balanggarra IPA

The Balanggarra IPA, declared in 2013 has a gazetted area of 1,083,000ha and supports the long-term management of Balanggarra traditional Country (DCCEEW, 2024f) (Figure 4-36). The IPA is dedicated under IUCN Category VI. The IPA is situated in the northern-Kimberley region and intersects with five major river systems, namely the King, Forest, Pentecost, Durack, and Ord Rivers, as well as the Cambridge Gulf and the Timor Sea. The IPA is managed by the Balanggarra Rangers (NIAA, 2024a).

The Balanggarra Rangers look after Country both ways, using traditional knowledge and western scientific methods. Walking in both worlds with this knowledge allows Balanggarra Rangers to do ‘right-way-fire management’, look after cultural sites, undertake wildlife surveys and conduct weed management activities (NIAA, 2024a).

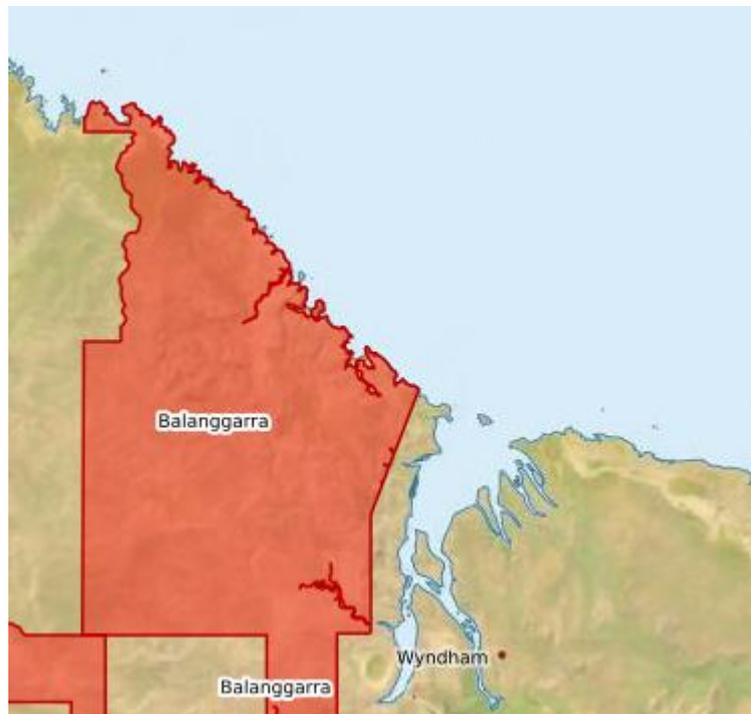


Figure 4-36: Balanggarra Indigenous Protected Area (Source: DCCEEW, 2024f)

Uunguu IPA

The Uunguu IPA, dedicated in 2010, is located in north Kimberley and covers an area of over 760,000ha on the land of the Wunambal Gaambera people (Figure 4-37). The IPA was dedicated under IUCN category VI (DCCEEW, 2024f).

The Uunguu Rangers are responsible for the management of land and sea Country. Key tasks include pest control, cultural heritage conservation, monitoring the health of plants and animals, and implementing Right-way Fire, a method of fire management that involves a mosaic of fires being burnt in the cool season to prevent wildfires in the hot, dry season. The Uunguu Rangers are also responsible for visitor management through the Uunguu Visitor Pass and have established a seasonal base at Garmbemirri on Anjo Peninsula, as well as working out of Kandiwal Community at Ngauwudu (Mitchell Plateau). The Uunguu IPA is a vital area for the Wunambal Gaambera people and requires continued conservation and management efforts (NIAA, 2024b).

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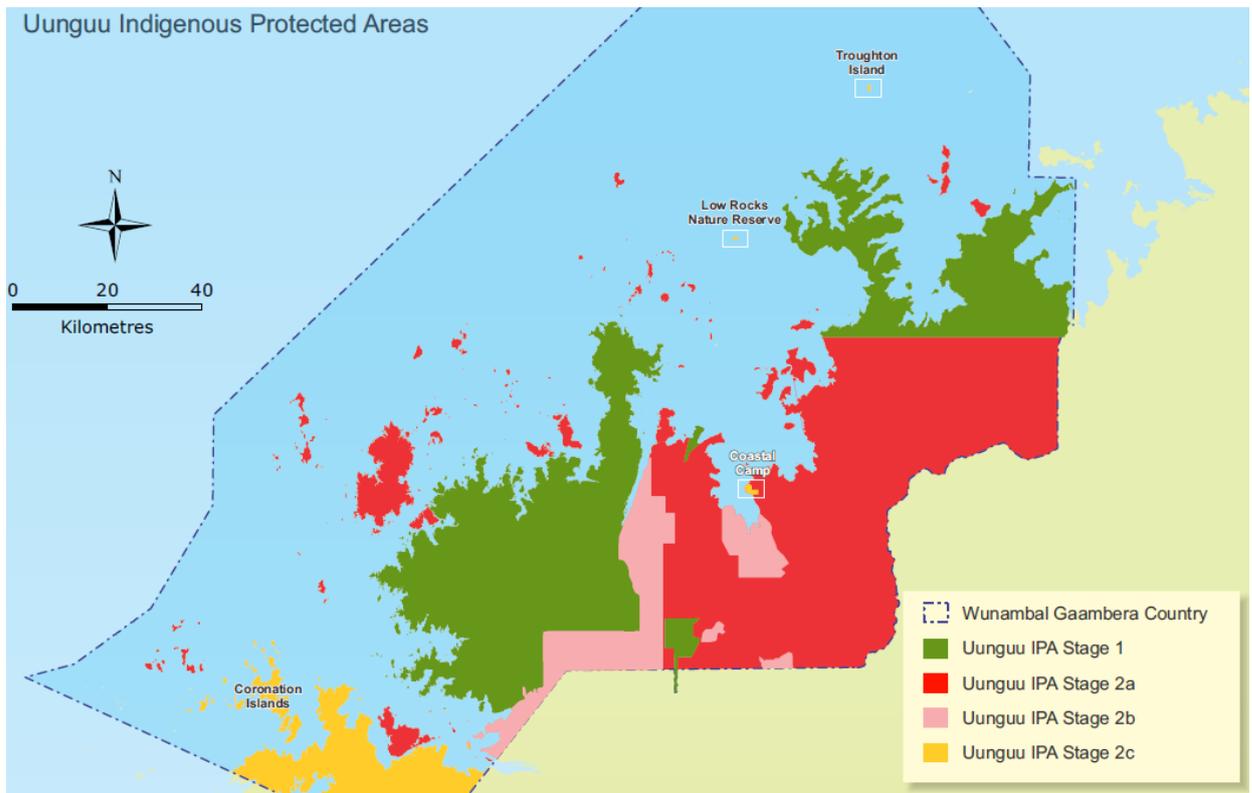


Figure 4-37: Uunguu Indigenous Protected Area (Source: Wunambal Gaambera, 2021)

4.6.8.7 Aboriginal Heritage Sites

There are no Aboriginal heritage sites under applicable Aboriginal heritage legislation within the Operational Area or the EMBA.

There are multiple Aboriginal heritage sites along the northern Kimberley coastline; within close proximity to the EMBA (ACHIS, 2024). These include:

- Cassini Island in the Uunguu IPA, which has two registered Aboriginal Sites, the Cassini Stone Line and Cassini Stone Circles, both human-made structures. Cassini Island itself is a registered Heritage Place;
- Reverley Island within the Balanggarra IPA, which has two middens as registered Aboriginal Sites; and
- Ganggarryu and Lacrosse Island (Burrungu) which are both listed as sites with ritual/ceremonial importance and Dreaming narratives.

4.6.8.8 Australian Marine Parks

The EMBA for this EP overlaps with features of the North Marine Parks Network Management Plan (DNP, 2018a), which identify natural, cultural and spiritual values associated with AMPs in the EMBA (refer Section 4.5.1.1). The Oceanic Shoals AMP is referred to in the North Marine Parks Network Management Plan (DNP, 2018a) and the WA North Kimberley Marine Park is referred to in the North Kimberley Marine Park Joint Management Plan (Department of Parks and Wildlife, 2016).

Eni acknowledges Commonwealth and State Marine Park Management Plans recognise cultural features of Traditional Owner groups. AMPs describe taking 'values into account'

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when making decisions and taking action in relation to AMPs. Furthermore, the WA North Kimberley Marine Park Joint Management Plan describes the opportunity for Parks and Wildlife and Traditional Owners to work together, with the wider community, to achieve cultural, ecological and social management of the marine park. Traditional knowledge and understanding of Saltwater Country will be incorporated into the management of the marine park, and Traditional Owners will be actively involved in managing the area.

Natural, cultural, heritage and socioeconomic values are associated with the Oceanic Shoals AMP and have been detailed in Section 4.5.1.1.

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5 RELEVANT PERSON CONSULTATION

5.1 Overview

This section of the EP, in conjunction with Appendix C: Relevant Person Consultation, describes consultation undertaken by Eni in 2024 for the Petrel-3 and Petrel-4 Monitoring and Decommissioning Environmental Plan.

In accordance with Regulation 24 of the OPGGS Regulations, the EP must contain:

- b) *a report on all consultations between the titleholder and any relevant person, that contains:*
 - i) *a summary of each response made by a relevant person, and*
 - ii) *an assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates, and*
 - iii) *a statement of the titleholder's response, or proposed response, if any, to each objection or claim.*

The Petrel Operational Area is located in the Joseph Bonaparte Gulf, ~100km north of Eni's Northern Territory Blacktip activities. Eni has been operating its Blacktip activities since 2009, and as a result, is quite familiar with local communities and other users of the coastal and marine environment across the region.

As per part 2.3 of Appendix C1: Bridging Document, stakeholders have been previously identified through the associated Blacktip Stakeholder Management Plan (SMP) [0000_DV_PR.DPM.0110.000], where Eni maintains a database of interested persons, being those individuals, groups and/or organisations who may have an interest in current onshore and offshore activities. Eni has an ongoing engagement strategy to monitor and maintain its already strong relationships, and these interested persons (along with other identified stakeholders) have been identified as relevant persons for the Petrel-3 and Petrel-4 Monitoring and Decommissioning EP.

There are 4 key appendices that support this 'Relevant Person Consultation' Section:

- Appendix C1: Bridging Document – the relevant persons consultation methodology that has been developed for this Environment Plan that takes into account both Eni's corporate requirements and requirements under the OPGGS(E) regulations;
- Appendix C2: Relevant Persons Register – a register identifying all relevant persons that have been approached for this Environment Plan;
- Appendix C3: Consultation Materials – All evidence/copies of all materials that were used for consultation such as advertisements, public notices, correspondence, PowerPoint slide sets etc; and
- Appendix C4: Relevant Persons Consultation Evidence – a comprehensive report of all relevant persons' engagement records made up of two documents:
 - Appendix C4a - Relevant Persons Consultations Log: a spreadsheet showing all efforts and methods (email, letter, phone, text) made to seek two-way dialogue with relevant persons;
 - Appendix C4b - Relevant Persons Feedback Assessment: a record of all relevant person claims and objections – with Eni's assessment, response (where required) and action.

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For the consultation described in this section of the EP and further presented throughout Appendices C1 to C4a and C4b, the guidance documents considered were as listed in Table 3-1 of the Petrel Bridging Document (Appendix C1: Bridging Document).

5.2 Identified Relevant Persons

Also outlined in part 2.3 of Appendix C1: Bridging Document, Eni's ongoing strategy for stakeholder engagement is to develop and maintain long-term relationships with stakeholders (including relevant persons) in and around its general areas of operations.

As the Operational Area is located in such close proximity to Eni's Blacktip activities, Eni was able to review its stakeholder database from its Blacktip Stakeholder Management Plan as a source document to identify relevant persons for the Petrel-3 and Petrel-4 Monitoring and Decommissioning EP.

To further identify relevant persons, further desktop work was carried out to ensure that all relevant persons were identified that traverse the petroleum activity's:

- Overall spatial extent, which encompasses the Operational Area, ZPI and EMBA; and
- General zone, which extends beyond the overall spatial extent and involves communities within approximately 250km from the Operational Area (Figure 5-1).

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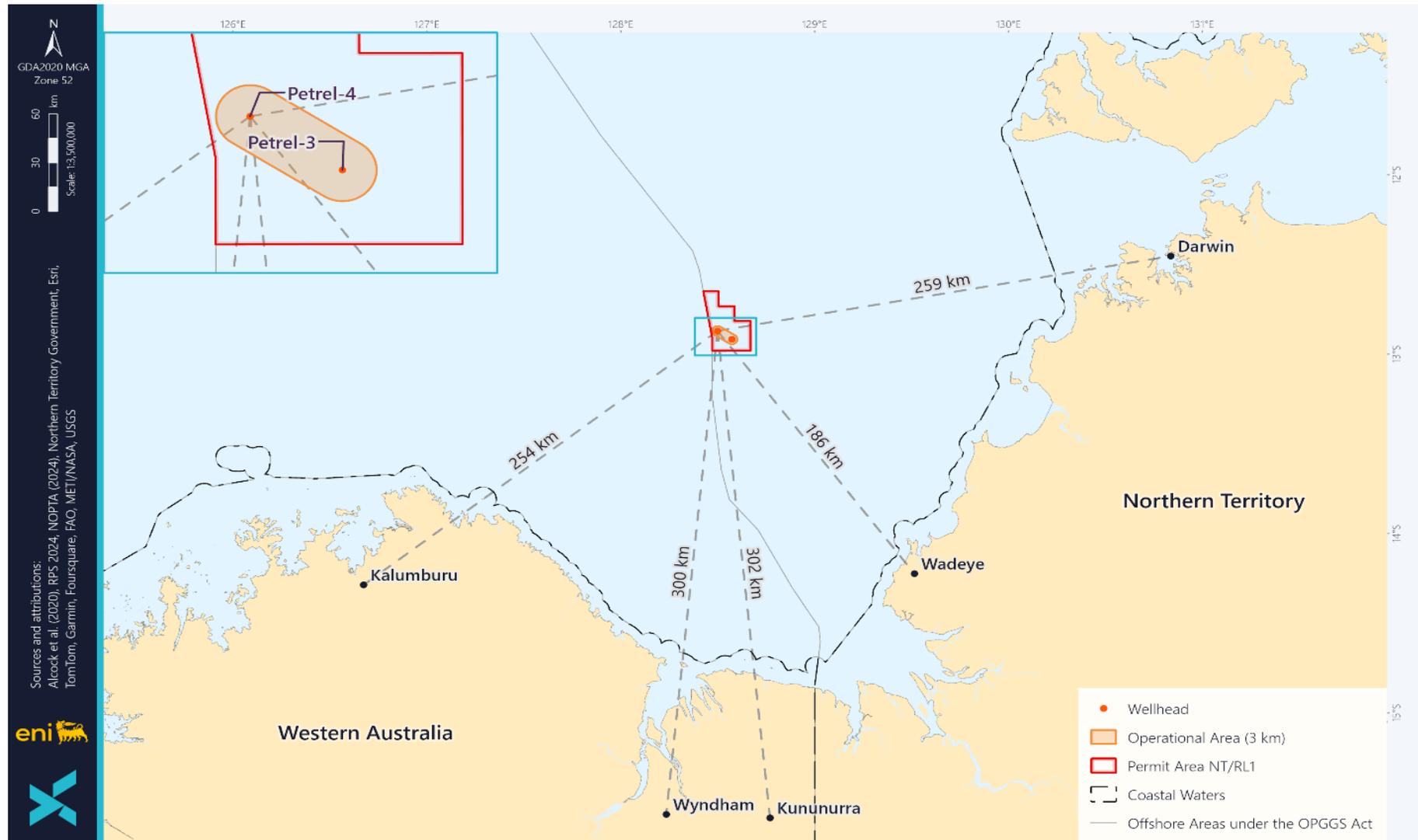


Figure 5-1: Communities within Petrel's General Zone

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5.2.1 Petrel Internal Stakeholder Mapping Workshop

Eni further developed Petrel relevant person identification and analysis through the strategic implementation of an internal Stakeholder Mapping Workshop held on 10 May 2024. This was an important first step to not only identify and profile relevant persons, but also to be able to assess their target groupings as specified in part 5.2.1 of Appendix C1: Bridging Document. The following attendees participated in the Workshop:

- Eni Executive Leadership;
- Eni Petrel Project Team;
- Eni Health, Safety, Environment and Quality Team;
- Eni Stakeholder Engagement and Sustainability Team;
- Third party subject matter experts.

Participants deliberated on a number of matters including a Project overview; confirming roles and responsibilities; professional learning, relevant person identification, analysis, and target group classification; and communications tools.

As result of the workshop, Eni was able to finalise the Petrel Relevant Person Register fully encompassing of all categories as defined by sub-regulation 25(1) (a)-(e) of the OPGGS (E) Regulations. Relevant persons that were identified include (but is not limited to) industry bodies and associations; commonwealth, state/territory and local government departments; commercial operators; marine user groups; Traditional Owner groups; local businesses; and non-government organisations and interest groups.

Further to the process described above, additional opportunities for identifying relevant persons were implemented throughout the consultation period – including being informed of others through local connections, in face-to-face meetings and in relevant person self-identification through the approach outlined in part 6.2 of Appendix C1: Bridging Document.

In summary, a complete list of relevant persons applicable to the Petrel-3 and Petrel-4 Monitoring and Decommissioning EP is presented in Appendix C2: Relevant Person Register.

5.3 Preparing for Consultation

As outlined in part 5 of Appendix C1: Bridging Document, Eni undertook the following strategic planning and preparation to ensure effective and appropriate consultation could take place:

- Collation of all technical information for consultation materials;
- Development of materials for initial consultation information package (e.g., email script, web landing page, activity flyer / fact sheet, NOPSEMA information brochure, and dedicated email/phone contacts);
- Development of relevant person slide-set for scheduled in-person presentations;
- Mapping the prioritisation of relevant persons into target groups (to plan for the tracking of effective consultation); and
- Planning the consultation effort to be applied for each of the target groups.

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5.3.1 Collation of Information for Consultation Materials

Both Eni's project and stakeholder engagement teams collaborated to ensure the provision of all related information. This included information about the specific location of the Operational Area, the ZPI and the EMBA; an overview of the required activities; images of the wells; a schedule of planned timings and duration; a frequently asked questions document; and environmental impacts and associated management measures.

5.3.2 Development of Materials for Initial Consultation Information Package

A scripted email was drafted to include the following general information:

- Company Name and plan for Petrel-3 and Petrel-4 monitoring and decommissioning;
- Summary of activity description, including location, timing and duration, including distances from the Australian coastline and a map with coordinates listed;
- Notification of web landing page (petreleni.com.au);
- Invitation to provide feedback and management of sensitive information; and
- The option to 'opt out'.

An attached activity flyer / fact sheet was developed for distribution with the email. This information flyer had the following information included within it:

- Further detailed information regarding the company, the location, the two wells, planned activities, timing and duration;
- Information regarding the need to consult with information about NOPSEMA and the OPGGS (E) Regulations;
- Contact details for the provision of stakeholder comment and feedback,
- Information about the EMBA;
- Inclusion of QR code and website links;
- A specific project-related email (info@petreleni.com.au) and a dedicated 1300 telephone answering service (to provide a constantly monitored service);
- Summary tables of potential planned and unplanned environmental impacts/risks associated with the activity, including a high-level description of emissions, discharges and wastes and summary of key management controls to be implemented.

The web landing page (petreleni.com.au) was developed and made 'live' with the following inclusions as a part of the data:

- An explanation of what an environment plan is;
- A simple map showing the location;
- A repeat of all information from the activity flyer / fact sheet and a link to it as well;
- A link to frequently asked questions (FAQs);
- High-level descriptions of the Operational Area, Zone of Potential Impact (ZPI) and environment that may be affected (EMBA);
- An explanation box 'Should I be consulted' with a link to the definition of relevant person and further link to NOPSEMA's information brochure, 'Consultation on offshore petroleum environment plans; Information for the community';

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- Contact details with dedicated email and 1300 phone number; and
- A 'register your interest in engagement' section with user fields for completion.

Examples and copies of the above initial consultation materials are presented in Appendix C3: Consultation Materials

5.3.3 Development of Advertisements

As further elaborated on in Section 5.4.3, efforts were made to develop a series of newsletter advertisements, posters, local newspaper advertisements and scripts for radio station advertisements.

These were made up of similar information to that outlined above for the initial scripted email, attached activity flyer / fact sheet, and web landing page. Importantly these contained the information for the specific project-related email (info@petreleni.com.au), dedicated 1300 phone answering service, and for the visual media, the inclusion of the QR code and web landing page (petreleni.com.au).

Examples and copies of all advertising materials are presented in Appendix C3: Consultation Materials.

5.3.4 Development of Relevant Person Slide Set

Prior to consultation, a slide set for in-person presentations was developed with the intention of summarising the content of the EP for monitoring and decommissioning of the Petrel wells in the format most suitable for the public and align with Regulation 25(2), and NOPSEMA's Guideline: Consultation in the course of preparing an environment plan. The slides were collaboratively developed with input from Eni's project team, environment team, well intervention team and stakeholder engagement team.

Whilst this slide set was presented to most relevant persons that Eni met face-to-face, it was adapted slightly in a few cases (language, terminology, relevance) and this was dependent on the specific relevant person that Eni was meeting with.

In any case a copy of the base slide set as well as each and every adapted slide-set that is available in Appendix C3: Consultation Materials.

5.3.5 Mapping Prioritisation of Relevant Persons

As outlined in part 5.2.1 in Appendix C1: Bridging Document, once identified, Eni assessed all relevant persons that were identified in the Stakeholder Mapping Workshop (Section 5.2.1) and arranged them into target groups based on the following criteria:

- Group 1 - Relevant persons with functions, interests or activities that are associated with the Operational Area who may be affected by planned activities. (Of the total 96 RPs, 24% fell into target group 1 - 23)
- Group 2 - Relevant persons with functions, interests or activities that are associated with the ZPI (moderate exposure zone) who may be affected by unplanned activities (i.e. spills) and who require information. (Of the total 96 RPs, 18% fell into target group 2 - 17)
- Group 3 - Relevant persons with functions, interests or activities that are associated with the EMBA (but not the Operational Area or ZPI) who may be affected by unplanned

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activities and who may have an interest and/or expectation to be informed about the unplanned activities. (Of the total 96 RPs, 26% fell into target group 3 - 25)

- Group 4 - Any other relevant persons who may be indirectly impacted or have interests in the unplanned activities. Includes extended enquiry for persons who may not be known to Eni. (Of the total 96 RPs, 32% fell into target group 4 - 31).

5.3.6 Implementing Planned Consultation Effort for Target Groups

In considering target groupings, where those relevant persons interests overlapped the operational area (Group 1), Eni ensured extreme effort to assure two-way dialogue with these relevant persons. Where relevant persons' interests overlapped the ZPI (Group 2), Eni still looked to ensure relatively intensive efforts. For those relevant persons whose interests overlapped the EMBA (Group 3), Eni also made considerable efforts to engage. For relevant persons who may be indirectly impacted or have interests in potential unplanned activities (Group 4), whilst Eni made significant effort to consult, it was expected that these relevant persons would make equal effort to reply to consultation efforts.

For Group 1 relevant persons (extreme effort implemented), Eni ensured direct engagement between all key focal points across disciplines through providing tailored information with scheduled phone/email/meeting follow-up to invite comments. Group 1 relevant persons were focused on first and foremost, in the knowledge that the best outcome was to ensure engagement with relevant persons in two-way dialogue to the fullest extent. As a result, Eni was successful in engaging with 22 of the 23 Group 1 relevant persons.

For Group 2 relevant persons (relatively intensive effort implemented), the Eni consultation focal point/s provided tailored information to relevant persons through targeted emails and phone calls. An initial default response period (inviting comments) of 30 business days was provided, and throughout this period, further scheduled phone/email follow up occurred. As well as this, Eni engaged in regional roadshow visits; meetings and/or presentations; and provision of detailed responsive correspondence upon request, to Group 2 relevant persons. With the understanding that two-way dialogue with Group 2 relevant persons needed to be optimised as much as possible, these relevant persons were also strongly focused on. Primarily due to all the commercial fishers being in this grouping, (to be explained further in Section 5.4.2.2) Eni was only able to engage with 8 of the 17 Group 2 relevant persons.

With Group 3 relevant persons (considerable effort implemented), targeted emails with tailored information were sent and follow-up phone calls also occurred. The same initial default response period of 30 business days inviting comments was also enacted. Multiple follow-up calls and emails again occurred to ensure receipt of information and to invite comments. With a strong commitment to ensure any relevant persons with functions, interests or activities that may overlap with the EMBA had the chance to engage in two-way dialogue, Eni also engaged in regional roadshow visits with meetings and presentations to Group 3 relevant persons. Consequently, Eni was successful in engaging with 24 of the 25 Group 3 relevant persons.

Eni utilised extended enquiry to aim to reach Group 4 relevant persons, with informative radio advertisements providing contact details; and newspaper advertisements and posters with a QR code that linked the audience to the tailored information package. Given significant effort was still a requirement, Eni still made key effort to call and follow up with these relevant persons. Accordingly, Eni was successful in engaging with 24 of the 31 Group 4 relevant persons.

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In total across all relevant persons and regardless of groupings, Eni was successful in engaging in two-way dialogue with 81% of all relevant persons. For those relevant persons that did not respond please see Section 5.5.

5.4 Consultation Approaches and Activities

Eni commenced consultation on 20 June 2024, and invited feedback to be provided by the end of the consultation period - initially set at 2 August 2024. The intention was to ensure at least 30 business days to allow a reasonable opportunity for consultation to occur. As the development of the EP progressed and regional face-to-face consultation continued to play out, Eni extended the consultation period to 15 September. This almost 3-month period encompassed double the amount of business days than was initially planned.

Following identification of relevant persons, and as outlined in part 6.1 of the Petrel Bridging Document (Appendix C1: Bridging Document), Eni's undertook the following:

1. Established a dedicated Petrel web landing page with deep information about the activities (petreleni.com.au); a dedicated email address (info@petreleni.com.au); and a dedicated phone number (1300 155 616) for any relevant persons to either get in contact, or to self-identify as per Section 5.2.1.
2. Issued emails to all identified relevant persons with information packages, and seeking feedback should they wish to provide this (initial response period of 30 business days).
3. Sourced direct postal addresses for selected identified relevant persons who historically, have not responded to emails for other EP consultation campaigns (e.g. Commercial Fishers), and mailed a hard copy of correspondence with information pack.
4. Further follow up emails, text messages (for known mobile contacts) and phone calls to all identified relevant persons who had received the initial email – especially to relevant persons in Target Groups 1, 2 and 3.
5. Repeated mail out correspondence with a second round to those relevant persons who were posted a hard copy of the information pack.
6. Reviewed/tracked the Relevant Persons Consultations Log (Appendix C4: Consultation Efforts Log) to ensure appropriate consultation with relevant person target groups was succeeding as expected and implemented remedial interventions for relevant persons not responding.
7. Held targeted regional roadshow visits to (already emailed) relevant persons in Kimberley and Northern Territory communities within Petrel's general footprint (refer Figure 5-1), with Eni stakeholder engagement and subject matter experts presenting slide-sets with question-and-answer sessions to individuals, groups and associations.
8. Issued materials (e.g., slide sets) in a follow up email to in-person presentations to each relevant person that partook in a face-to-face session.
9. Continued to offer to present slide-sets with question-and-answer sessions (both in person and online) to any relevant person requesting further information (one Group 1 relevant person took advantage of this).
10. Implemented extended enquiry approach as outlined in part 6.2 of Appendix C1: Bridging Document to seek out relevant persons who may wish to self-identify and potentially log an objection of claim (also refer to Section 5.4.3).

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5.4.1 Consultation During Environment Plan Development

On 20 June 2024, Eni commenced the consultation campaign with relevant persons for the proposed planned activities described in this EP. As described above, activity consultation material was sent to each identified relevant person (Appendix C2: Relevant Person Register). The consultation period was initially outlined within the consultation material as closing on 2 August 2024 (approximately 30 business days from commencement).

Print, digital and radio advertising for the activity commenced on 15 July 2024 and then an updated deadline for receiving comments was set to 28 August 2024 (approximately 30 business days from the date of advertising). The advertising transgressed from 15 July 2024 through to 17 August 2024.

In a full effort to ensure appropriate consultation, Eni continued to follow up with relevant persons beyond 28 August to 15 September. Multiple attempts were made to contact each relevant person, and where no response was received, Eni engaged alternative methods of contact (e.g., phone call, personal texts, in-person approaches, alternative contacts). Where still no response or feedback was received, Eni determined that this almost 3-month consultation period was reasonable time for relevant persons to have had opportunity to provide feedback. Note that Eni undertook exhaustive research through already established relationships, further desktop research and third parties to seek alternative contacts.

Over the course of consultation for the EP, some relevant persons requested or may have required a different level of engagement. In these instances, additional information was provided to allow that person to make an informed decision about whether there were any consequences or impacts to their specific functions, interests, or activities with regards to the proposed Petrel monitoring and decommissioning activities. Similarly, other relevant persons may have requested a lower level of engagement, such as indicating a preference for email rather than in-person meetings.

As outlined in the Relevant Persons Consultations Log (Appendix C4: Consultation Efforts Log), there were several relevant persons that communicated they were either under-resourced or were challenged in terms of having available time to consult. Other relevant persons (a relative minority, compared to the successful two-way dialogue that occurred for 81% of the total number of relevant persons) chose not to engage with or provide feedback to Eni.

As per Section 26(8) of the OPGGS (E) Regulations, the full records of all correspondence and interactions with relevant persons are discretely provided in the sensitive information part of this Environmental Plan.

5.4.2 Specific Consultation Approaches for Relevant Persons

As outlined in Sections 5.3.5 and 5.3.6, specific requirements for consultation were carefully considered to ensure each relevant person received information and materials, and the appropriate amount of opportunity to be able to provide feedback. In most circumstances, consultation engagement was through the process outlined in Section 5.3.6.

Eni sent a Petrel consultation team on to travel directly to locations in the Northern Territory, the East Kimberley and Broome in order to hold face-to-face 'regional roadshow' presentations with relevant persons. All relevant persons within the locations as per Figure 5-1 were contacted prior via email, text and phone to pre-organise the visits and to seek an audience.

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5.4.2.1 Approaches to Other Petroleum or Greenhouse Gas Titleholders

Eni approached titleholders who have ongoing interests within proximity (~100 km) of the Operational Area. Noting other titleholders have industry understanding, Eni provided a factsheet via email, and was successful in obtaining feedback.

5.4.2.2 Approaches to Commercial Fishers

As mentioned in part 5.2.2 of Appendix C1: Bridging Document, the designated licenced areas of many of the fisheries are extensive over the Australian coast, including within the EMBA. The EP provides an assessment of the potential interaction of the various fisheries with the petroleum activities, based on the nature of the fishery and historic effort and catch data.

Given the lack of commercial fishing activity identified in the location of the proposed activities, interaction with commercial fishers is not anticipated. Nevertheless, as Eni considers, as a general principle, that the peak bodies representing the commercial fisheries would be the established representatives of the fishing licence holders, Eni approached the peak bodies representing the commercial fisheries for Commonwealth, WA and NT, and provided consultation materials. Where Eni had the opportunity, the support of peak bodies was utilised to share information on their regular newsletter to their members. In addition, and to ensure the widest reach for consultation for commercial fishers as possible, Eni engaged with Commonwealth, State and Territory government bodies responsible for commercial fishers.

Whilst some peak bodies replied on behalf of those fisheries that they represented, Eni went further to seek to ensure direct engagement with individual license holders.

Updated licensee data was sourced in June 2024, and all individual NT and WA license holders whose fishing management or licence area may overlap the EMBA were sent hard copies of information packs by registered mail on two occasions in June and July 2024. Of the 65+ letters that went out (twice), Eni received feedback from only 4 commercial fishers.

Eni was fortunate to gain an in-person meeting with one WA commercial fisher. Whilst his comments cannot be attributed to every other commercial fisher, these comments did provide an on-the-ground perspective as to why license holders may not respond to titleholders:

- license holders are often at sea for extended periods of time;
- license holders are undergoing major consultation fatigue - being inundated with emails and receiving up to 7 mail-outs per quarter from titleholders with many being irrelevant;
- Nevertheless, the hard copies were considered useful and would often be placed with correspondence to be taken offshore to be read at sea. However, consultation feedback, if required, could not be provided until returning;
- Email is not a preferred method of contact for many, who are offshore without wifi, and when they return to shore there are so many emails that they are generally disregarded; and
- print, digital and radio advertising to reach individual licensees were considered appreciated modes of providing information about the activities.

A final target group highlighted by NT Fisheries were the Aboriginal Coastal Licence Holders. A review of the location of those fishers' activity determined they were located well away from the EMBA. Regardless, Eni's intention was to hold a meeting with these individuals in-

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person when visiting Wadeye Community where they all were based. Unfortunately, as outlined below, the visit to Wadeye never eventuated and the opportunity was lost. However as for all commercial fishers, this group of fishers were sent hard copies of information packs by registered mail on two occasions, and in fact one licence holder contacted Eni through the contact channels provided. This person expressed appreciation for the information provided and confirmed his activities were not impacted by the activity.

In summary, Eni certainly implemented its best endeavours to consult with commercial fishers authentically and genuinely. This is evidenced (see Appendix C4: Consultation Efforts Log) by engagement with a large array of Commonwealth, State and Territory government bodies responsible for commercial fishers; some commercial license holders (including an in-person meeting); and a number of cooperative peak bodies.

5.4.2.3 Approaches to First Nations Relevant Persons

As described in Appendix C1: Bridging Document, for the Petrel consultation, Eni made concerted efforts to target coastal land councils, Prescribed Bodies Corporate (PBCs), and other Native Title organisations representing First Nations people that have potential to overlap Petrel's overall spatial extent (- being within the Operational Area, the ZPI and/or the EMBA).

Through other company activities, Eni has been continuously proactive in seeking to develop and build relationships with the land councils, and in addition to an already sound relationship with the administration of the Tiwi Land Council, was excited in this process to gain an audience with the administration of the Northern Land Council. These land councils, although relevant persons in their own right, have indicated the importance of engaging directly with Traditional Owners and Eni has sought to do this through engagement with the relevant PBCs.

Once initial email information packs had been issued directly to CEOs and/or Chairpersons, Eni commenced active engagement through contacting land councils, PBCs and other Native Title organisations directly, offering to hold in-person presentations in its regional roadshows to continue relationship building and to provide opportunities for the PBC's to understand Eni's general activities and specifically in relation to the Petrel consultation.

Subject matter experts provided guidance on culturally appropriate consultation approaches for First Nations people to account for culturally appropriate engagement, and to ensure local traditions, customs and protocols were considered prior to scheduling engagements.

Although consultation for the purposes of compliance with the OPGGS(E) Section 25 has been completed, Eni continues to maintain ongoing communication with both land councils and PBCs to enable any opportunity for feedback during and post acceptance of this EP in accordance with part 9 of Appendix C1: Bridging Document and Section 5.6.

5.4.2.4 Thamarrurr Region Consultation (Northern Territory)

With the community of Wadeye in close proximity and already linked to Eni's other activities, Eni already partners, both contractually and from an engagement perspective, with the Thamarrurr Development Corporation (TDC). Eni is resolute in facilitating an ongoing engagement process in the Thamarrurr Region through attendance to monthly community meetings; investigation of increased Ranger servicing opportunities; and progression towards more regular community interaction.

Eni initially consulted through providing the email/information pack on 20 June, and then on numerous occasions, sought to follow up to coordinate in-person consultation via a targeted

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site visit. Once having confirmed a visit to the community, it was planned to also liaise with West Daly Regional Council's Wadeye Office to also provide information about Eni's activity.

Initially Eni reached out to TDC to inform of a scheduled visit to Wadeye for Tuesday 23 July (whilst on an NT Regional Roadshow). Also proposed was the plan to meet with the Thamarurr Rangers and the five local Aboriginal Coastal Fishers. However, TDC reverted to inform that there was a funeral on this day and so the community could not be available. Although Eni then proposed to visit the TDC Winnellie Office on 23 July, no further discussion eventuated regarding this. On 22 July, TDC reverted inviting Eni to join their Board meeting for 31 July, however at that stage, Eni had already committed to and locked in meetings for a Kimberley Regional Roadshow at this time.

With Eni motivated to present to the Thamarurr community within the consultation period, the concept of providing a presentation over TEAMS was discussed, but it was agreed that in order to have authentic two-way dialogue, this (or other online approaches) was not an appropriate medium for delivery to these relevant persons.

In mid-August, it was then agreed with TDC for Eni to visit Wadeye on 18/19 September. Even though this was after the designated consultation period close date, Eni wanted to ensure the Thamarurr community had every opportunity to participate in the consultation and so extended their process. TDC confirmed the meeting on 27 August and also provided contacts who could assist with ensuring all relevant persons were in attendance. However unfortunately in early September, TDC informed that there were now 3 funerals scheduled the week of the 18/19 of September, and that all relevant traditional owners would now be unavailable during this time.

Eni advised TDC that with a visit to Wadeye now unable to occur until October, that despite all parties committed to trying to make it happen, the opportunity to present in person regarding the Petrel 3 and Petrel 4 Monitoring and Decommissioning Environmental Plan prior to submission had lapsed. Eni reiterated its commitment to maintain strong relationships with the TDC and Rangers and will seek the most opportune time for face-to-face consultation with local peoples regarding Petrel (post-acceptance of this EP) and other associated activities.

Throughout this process of trying to organise a visit, Eni's consultation team has continued to liaise with TDC Administration seeking input on feedback on the petrel information package that was provided.

As a result of being unable to attend Wadeye within the consultation period, Eni was unable to publish a Petrel information advertisement in the monthly TDC Newsletter. The aim of this publication was to facilitate relevant persons to self-identify and/or attend any on-Country consultation meeting. However, in order to publish this, Eni determined that it was important to be able to liaise in-person with TDC so as to prepare them for any reader enquiries.

Eni considers that the Wadeye/TDC consultation has concluded following numerous efforts to consult face-to-face as well as the initial, and follow-up emails and calls to relevant persons. That said, and as outlined in Appendix C1, an ongoing engagement process will occur in the Thamarurr Region through Eni's attendance to monthly community meetings, and Eni will continue to maintain efforts to engage in continued dialogue with TDC and Thamarurr Rangers to allow for relevant interested persons engagement throughout the execution of the planned activities, as per section 22(15) of the OPGGS(E) Regulations.

A complete overview of efforts to engage with TDC can be found in the Relevant Persons Consultations Log (Appendix C4: Consultation Efforts Log).

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5.4.2.5 Kimberley Region Consultation (Western Australia)

With the Kimberley (and specifically East Kimberley) being in proximity to Petrel’s general zone and including the communities of Kununurra, Wyndham and Kalumburu and Broome, Eni initiated a Kimberley Regional Roadshow from 29 July to 9 August 2024.

Initial Kimberley region consultation (as per all relevant person initial consultation) was through the provision of emails and information packs, and Eni then immediately followed up with one-on-one emails, phone calls and text messages to relevant individuals and groups to offer in-person consultation.

Eni’s long-standing engagement with National Indigenous Australians Agency continued to facilitate the fostering of relationships across Traditional Owner groups, and NIAA Kununurra was particularly helpful in offering advice and support and even co-attending some meetings.

With a similar narrative to the process of full commitment and attempts to consult as per Section 5.4.2.4, and whilst already having a strong relationship with MG Corporation, Eni was unfortunately unable to secure a face-to-face consultation meeting in either their first Regional Roadshow visit (29 Jul - 9 Aug) or their later visit on to Kununurra when visiting Wyndham (2 Sept).

At the time of the Roadshow visit, Eni was unable to secure an opportunity to meet with some important traditional custodian groups including the Balangarra people in Wyndham, the Kalumburu community, the Balangarra Guini people in Kalumburu and the Wunambal Gaambera people in Kalumburu. As a result, a special convoy was organised to visit Kalumburu community and hold a joint meeting there on 28 August. Following that Eni was able to secure a Balangarra Community meeting in Wyndham to meet with key people from that area.

Eni utilised its current sound relationships with Broome-based KRED Enterprises (<https://www.kred.org.au/>) as well as NIAA Kununurra, to facilitate engagement with the Kalumburu community, and both entities sent representatives to the Kalumburu meeting to support the process. The presence of these representatives facilitated ease in relating to, and connecting with, the local community. The extensive network of connections that both people had supported the information sharing process greatly. With the presence of these representatives, community leaders and Traditional Owners showed comfort in entering into conversations with Eni’s consultation team.

Whilst Eni was unable to secure a face-to-face meeting with Kimberley Land Council and Dambimangari Aboriginal Corporation, Appendix C4: Consultation Efforts Log will show the persistent efforts implemented to seek consultation feedback.

Kimberley regional consultation was not restricted to Traditional Owner groups alone and included all relevant Kimberley stakeholders that were identified as relevant persons. This included locally based commonwealth, state and local government departments, and all other Kimberley individuals or groups whose functions, interests or activities may be affected by the activities to be carried out under this Environment Plan.

As a member of the East Kimberley Chamber of Commerce (EKCCI), Eni was able to advertise in their newsletter, and also presented a ‘Business After Hours’ event to reach a broad audience of East Kimberley business owners to share information about the activities. An invitation to the event was sent to members and included in the EKCCI newsletter (Appendix C3: Consultation Materials).

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Kimberley Roadshow face-to-face meetings were successfully held with representatives from Shire of Wyndham; East Kimberley CCI; DBCA Broome; DBCA Kununurra; DPIRD Fisheries Kununurra; Wyndham Port; NIAA Kununurra; and a commercial fisher. For each of these meetings, Eni presented the prepared slides and then followed up with tailored emails to each relevant person.

Eni considers that consultation has concluded following the Kimberley engagements and Roadshow meetings, including follow-up emails sent to relevant persons. That said, and as outlined in Appendix C1, Eni will continue to maintain efforts to engage in continued dialogue with all Kimberley stakeholders to allow for relevant and interested persons engagement throughout the execution of the planned activities, as per section 22(15) of the OPGGS(E) Regulations.

A complete overview of efforts to engage with Kimberley Region relevant persons can be found in the Relevant Persons Consultations Log (Appendix C4: Consultation Efforts Log).

5.4.2.6 Broader Northern Territory Consultation (including Tiwi Islands)

Initial NT region consultation (as per all relevant person initial consultation) was through the provision of emails and information packs, and Eni then immediately followed up with one-on-one emails, phone calls and text messages to relevant individuals and groups to offer in-person consultation. Eni then initiated a NT Regional Roadshow from 22 to 27 July 2024.

At the time of the Roadshow visit, Eni was able to secure an opportunity to meet, present to, and conclude consultation efforts with some important traditional custodian representative groups including executives from Northern Land Council (NLC); Tiwi Land Council (TLC); Larrakia Development Corporation (LDC); Larrakia Nation (LN):

- TLC proposed that the activities did not have a direct impact on the Tiwi Islands or community, and chose not to view the presentation or provide any feedback on the EP;
- NLC is in the process of recruiting a new CEO. Given NLC were not in a position to organise meetings with Traditional Owners, they confirmed no further consultation was required, but that any updates for the proposed activities continue to be directed to the CEO email;
- LDC were thankful to be consulted and said they would forward the activity flyer to other potentially interested persons; and
- LN confirmed that given the proximity of Petrel, the face-to-face consultation could be dealt with at a management level and that no further consultation was required.

NT regional consultation was not restricted to Traditional Owner groups alone and included all NT identified relevant persons. This included locally based State government departments, and other NT groups whose functions, interests or activities may be affected by the activities to be carried out under the Environment Plan. As such, further Darwin-based Roadshow face-to-face meetings were successfully held with the N.T. Seafood Council and the NT Fisheries Department. Unfortunately, due to their resource constraints and despite our repeated efforts, we were unable to secure a meeting with the N.T. Guided Fishing Industry Association.

For each of all the above held face-to-face meetings, Eni presented the prepared slides and then followed up with tailored emails to each relevant person.

Eni considers that consultation has concluded following the broader NT engagements and meetings, including follow-up emails sent to relevant persons. That said, and as outlined in

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Appendix C1, Eni will continue to maintain efforts to engage in continued dialogue with the broader NT and Tiwi Islands to allow for relevant interested persons engagement throughout the execution of the planned activities, as per section 22(15) of the OPGGS (E) Regulations.

A complete overview of efforts to engage with the broader NT can be found in the Relevant Persons Consultations Log (Appendix C4: Consultation Efforts Log).

5.4.3 Extended Enquiry – Broader Consultation

In the knowledge that there may be instances where other persons, organisations, departments or agencies may consider themselves relevant and wish to be included in the consultation process, as an additional proactive step, Eni undertook the following:

- Local/regional newspaper advertisement campaigns;
- Local/regional radio advertisement campaigns;
- Newsletter distribution via the East Kimberley Chamber of Commerce (EKCCI);
- Hosting an EKCCI regional roadshow event to business owners in the East Kimberley;
- Newsletter distribution via the NT Seafood Council (NTSC) Weekly Wrap Newsletter; and
- Posting of information posters in the regional Shire Offices and EKCCI public space.

As mentioned previously, due to Eni being unsuccessful in gaining a face-to-face meeting with the Thamarrurr Development Corporation (TDC), we were unable to secure the posting of an information poster in their office or for their newsletter distribution.

The objective of this approach was to help identify any other relevant persons that may not have already been identified. Whilst providing an opportunity to identify new relevant persons, the extended enquiry activities also provided another means of broadcasting information to existing relevant persons, and we were given positive feedback when meeting with relevant persons in-person, that they appreciated this far-reaching approach.

Table 5-1 provides details on the broader enquiry efforts including newspapers, radio and other mediums where the consultation information was broadcasted.

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Table 5-1: Broader Enquiry Efforts

Method	Broadcast Medium	Dates
Print & Digital	NT News (daily edition)	July 2024: 16, 17, 23, 24, 29, 30 August 2024: 5, 8, 12, 15, 17
	The West Australian (daily edition)	July 2024: 15, 20, 22, 27, 29 August 2024: 1, 6, 8, 13, 15
	Kimberly Echo (fortnightly edition)	July 2024: 18, 25 August 2024: 1, 8, 15
	EKCCI Newsletter (3-weekly)	July 2024: 29 August 2024: 9
	NTSC Weekly Wrap Newsletter (weekly)	July 2024: 26
	Shire Wyndham East Kimberley Office Posters	Posted Kununurra from 30 July Posted Wyndham from 31 July
	EKCCI public space posters	Posted from 23 July
	TDC Newsletter (monthly)	Not achieved (refer Section 5.4.2.4)
Radio	Darwin's Mix 104.9	July 2024: 15, 16, 17, 18, 19, 20 - 1 min in length
	First Nations FM 94.5	July 2024: 15, 16, 17, 18, 19, 20 - 1 min in length
	First Nations AR 913 National	July 2024: 15, 16, 17, 18, 19, 20 - 1 min in length
	Palmerston FM 88	July 2024: 15, 16, 17, 18, 19, 20 - 1 min in length
Event	EKCCI Business After Hours	July 2024: 31 (5.00pm-7.30pm) (invites issued via EKCCI social media and via email)

Whilst Eni have undertaken a range of approaches to capture a broad audience and recognise the benefits of this, Eni have made considerable in-person efforts during the consultation process, which arguably outweigh the efforts made through advertisement campaigns.

In terms of Eni reaching out to a broader audience, the EKCCI 'Business After Hours' event was very successful with EKCCI reaching out to potential interested persons via their social media pages and their issuing of an invitation to their membership via email. The event not only attracted already identified relevant persons, but also business owners from industries including professional consultancies; construction and civil engineering; port services; hospitality and tourism; horticulture; careers training; and Aboriginal development.

Other than the EKCCI example above, at the conclusion of the consultation effort on 15 September and notwithstanding the potential for future self-identified relevant persons identified post submission of this EP, no enquiries have been identified as having been received as a result of the extended enquiry efforts.

5.4.4 Requests for Fees and Service Agreements

There have been a number of incidences throughout the consultation period where Relevant persons have responded with a request for fees via a financial consultation agreement.

Eni maintains its clear commitment towards genuine consultation, which includes:

- Relevant persons being issued with a Consultation Information Pack with links to further comprehensive information on its web landing page (petreleni.com.au); and

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- Offering availability to discuss alternative consultation options such as providing information in a different format; providing more time to consider information; and/or providing help to understand the information.

Eni does not consider that on all occasions and in all instances, that a financial consultation agreement is necessary to allow consultation to occur, and also notes that various titleholders have differing levels of activities going on. There is also the issue that providing financial payment to 'facilitate' stakeholders to enter into consultation conflicts with company values.

Eni has communicated with a number of relevant persons, highlighting that they have already been provided with a comprehensive Stakeholder Consultation Information Pack – which is sufficient to allow them to make an assessment.

In the spirit of authentic and genuine consultation, Eni also asserted full availability to discuss alternative options including discussing further how the relevant person can participate; visiting relevant persons face-to-face; providing materials in a different format; providing more time to consider information; having technical staff provide presentations, explanations and clarifications; and/or providing help to understand the information.

5.5 Consultation Outcomes

In accordance with Section 24(b) of the OPGGS (E) Regulations, reports on all consultations from the Petrel consultation campaign are presented as Appendix C4. Appendix C4 has been deconstructed into Appendix C4a and Appendix C4b to clearly reflect the Relevant Persons Consultations Log and Relevant Persons Consultations Feedback Assessment respectively.

Appendix C4b also outlines Eni's statements of responses to objections or claims.

As outlined in part 7.3 of Appendix C1, and in alignment with OPGGS (E) Regulation 24, application, interpretation and responsiveness with regards to all feedback received from relevant persons was undertaken at all times. For relevant persons who provided feedback, and following assessment of the merits of their objection or claim, Eni provided a response to the relevant person advising them of the assessment and invited them to further respond. This is reflected in the Relevant Persons Consultations Feedback Assessment (Appendix C4b). For statements issued by Eni of both acceptance and rejection of objections and/or claims, there were numerous relevant persons that chose not to further respond.

Despite Eni's best efforts, there was a small percentage of relevant persons that chose not to reply or engage with Eni at all, and as described in part 6.4 of Appendix C1, where no response or acknowledgement of receipt of consultation materials was received by Eni, the actions undertaken were:

- Continued follow-up emails post issue of initial consultation materials; and
- Alternative methods of contact where appropriate and available (e.g., phone call, personal texts, in-person approaches, alternative contacts).

Eni consulted with all relevant persons since issuing initial information regarding this EP, and then made subsequent consultation efforts to engage non-responders in accordance with its consultation approach (outlined throughout Appendix C1). Eni ensured provision of sufficient information to allow relevant persons to make an informed assessment of the possible consequences of the activities the subject of this EP on their functions, interests, or activities, and provided a reasonable period for relevant person to provide objections or claims in relation to the EP and for consultation to occur.

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Given multiple attempts were exhausted for this minority of non-responders, and that the consultation period was extended and then closed just prior to EP submission, under these circumstances, Eni deems consultation in the course of the preparation of the EP has been completed in accordance with OPGGS (E) regulations.

There were some instances where Eni attempted to identify relevant persons but were unable to confirm individual contact details (contact details of individual commercial fishers and some associations were an example of this). Eni undertook the following best endeavours to ensure contact with relevant persons:

- Contacting government departments who may have had contact details of individual relevant persons;
- Contacting associated organisations and/or advocacy groups who may have had contact details of individual relevant persons;
- Leveraging off other relevant persons who had contact details of certain individual relevant persons; and
- Comprehensive desktop research to exhaust all public domains of information of potential contact details.

To conclude, the in-total 3-month duration with appropriate follow-up of relevant persons since the consultation period commenced in June 2024, is considered a reasonable time for relevant persons to have had opportunity to make an informed assessment of the possible consequences of the petroleum activities on their functions, interests or activities, in accordance with the requirements of sub-regulation 25(3) of the OPGGS (E) Regulations and provide a response.

5.6 Ongoing Consultation

Relevant and interested person consultation for the Petrel monitoring and decommissioning activities will be ongoing, post-acceptance of this EP in accordance with section 22(15) of the OPGGS (E) Regulations. Eni will continue to work with relevant and interested persons and organisations to develop and maintain a current and comprehensive view of relevant persons' and organisations' functions, interests and activities, and provide opportunity for enquiries, objections or claims in the lead up to and during the conduct of the planned activities. As outlined in part 4.1 of Appendix C1, should any new relevant persons and/or organisations be identified, they will be added to the stakeholder database and included in all future consultation as required, including specific activity notifications.

As outlined in parts 2.3 and 9 of the Petrel Bridging Document (Appendix C1: Bridging Document), outside of regulatory compliance and hence outside of this 'preparation of EP' consultation, Eni's 'best practice' strategy has always been to develop and maintain long-term relationships with stakeholders (which includes relevant persons) in and around its operations, both onshore and offshore. Eni sees that it is good corporate social responsibility to engage with stakeholders within or near our footprint; we look to build partnerships and potential long-term value proposition opportunities; and by continuing to talk to stakeholders, we gain better knowledge of the context, needs and interests of these stakeholders.

So outside of, and well before, the consultation period for this specific 'preparation of EP', Eni has already been conducting 'meet and greets' across the Kimberley and Northern Territory regions. Whilst this may assist in building and maintaining of relationships with prospective relevant persons, it was not considered a part of any Environment Plan consultation process.

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As such, Eni's intention is to now consistently plan multiple visits to NT (including Tiwi Islands) and Kimberley communities. The purpose of this will be to engage in an ongoing way, with interested and relevant persons and organisations. Where the opportunity arises, Eni will seek to consistently engage with the various groups in order to:

- Continue to provide bi-monthly updates about the progress of the activities;
- Respond in person to clarifications raised in collaboratively coordinated meetings across the two regions;
- Respond in person to informal clarifications; and
- Invite and respond to feedback from relevant persons and where necessary adjust the EP through the Management of Change processes.

Eni will continue to accept feedback from all relevant and interested persons and organisations during the assessment of this EP and throughout the duration of the accepted EP. Where any new information is received, that is assessed as a new relevant matter or objection/claim with merit, the EP will be updated in accordance with the Management of Change (MoC) process described in Section 10.12 ensuring risks remain managed to ALARP and acceptable levels.

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

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6 ENVIRONMENTAL RISK ASSESSMENT METHODOLOGY

6.1 Risk Assessment

In accordance with Section 21(5) of the OPGGS Regulations 2023, the EP must contain:

- (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.

To meet this requirement, Eni has implemented its HSE Risk Management and Hazard Identification Procedure (ENI-HSE-PR-001). The purpose of the procedure is to ensure the HSE, asset and reputational hazards are identified, risk-assessed and managed in a systematic and consistent way. In this way, risks associated with projects and operational changes are effectively managed and addressed in compliance with company and legislative requirements.

The procedure is based on Eni's philosophy that 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. Where risks and impacts are unable to be eliminated at the project planning phase, the HSE Risk Management and Hazard Identification Procedure provides a robust framework that must be applied to understand the residual risk and impact from the key project activities covered in this EP.

The procedure is consistent with the Australian Standard for Risk Management: ISO 31000:2018 Risk Management – Principles and Guidelines and ISO 14001:2015 Environmental Management Systems. A general outline of the formal risk management process is provided in Figure 6-1.

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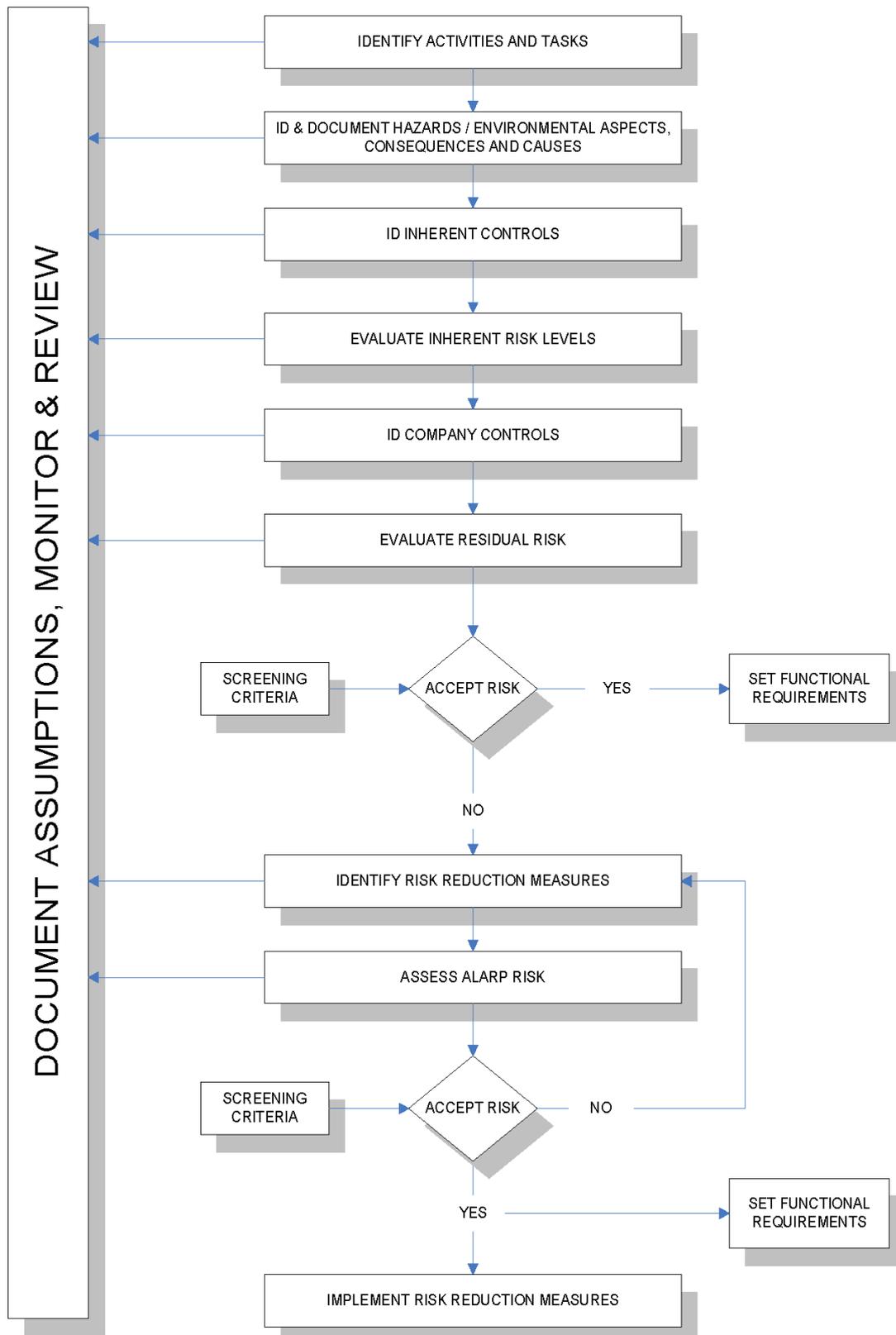


Figure 6-1: Overview of the risk management process

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Before commencing a systematic risk assessment process, it is essential to ensure the context of the risk assessment (why, when, who, what, where) is fully understood. This is achieved by identifying the:

1. Project activities and tasks, the sources of impact and risk, and the associated environmental aspects; and
2. Environmental values and sensitivities within and adjacent to the Zone of Potential Impact, Operational Area and the EMBA.

Using that information, the process continues by:

- Defining the potential environmental effects (impacts and risks) of aspects identified in Step 1 on the values identified in Step 2;
- Identifying the potential environmental consequences and severity of the impact (Table 6-1);
- Identifying the likelihood of occurrence of the consequence, according to a six-level scale (Table 6-2);
- Evaluating overall environmental risk levels using the Eni environmental risk matrix (Figure 6-2); and
- Identifying mitigation measures, assigning management actions and further recommended risk reduction measures according to the hierarchy of controls (Table 6-3), with consideration of the risk management actions (Table 6-4), to reduce the risk to an acceptable level.

Inherent risk levels assume inherent controls are in place. Residual risk levels are based on the inherent controls and the application of additional risk reduction measures.

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Table 6-1: Environmental consequence descriptors

Description	
Descriptor	<p>(1) Slight</p> <p>No stakeholder impact OR temporary impact on the area. Involved area less than 0.1 sq mile. Spill less than 1m³ – no sensitive impact on ground. 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 and use. Negligible financial consequences.</p>
	<p>(2) Minor</p> <p>Some local stakeholder concern or less than one week for clean-up OR one year for natural recovery OR impact on a small number of uncompromised species. Involved area less than 1 sq mile. Spill less than 10m³ – impact on localised ground. 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 number of non-threatened species). Slight impact due to GHG emissions. Adequate materials/energy/water selection and use. Single breach of statutory or prescribed limit, or single complaint.</p>
	<p>(3) Local</p> <p>Regional stakeholder concern OR one to two years for natural recovery OR one week for clean-up OR threatening to some species or impact on protected natural areas. Involved area less than 10 sq miles. Spill less than 100m³. 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 number of non-threatened species). Limited impact due to GHG emissions. Inadequate materials/energy/water selection and use. Repeated breaches of statutory or prescribed limit, or many complaints.</p>
	<p>(4) Major</p> <p>National stakeholder concern OR impact on licences OR 2 to 5 years for natural recovery OR up to 5 months for clean-up OR threatening to biodiversity or impact on interesting areas for science. Involved area less than 100 sq miles. Spill less than 1000m³. 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). Extensive measures (financially significant) required to restore the impacted area. Significant impact due to GHG emissions. Poor materials/energy/water selection and use. Extended breaches of statutory or prescribed limits, or widespread nuisance.</p>
	<p>(5) Extensive</p> <p>International stakeholder concern OR impact on licences/acquisitions OR greater than 5 years for natural recovery OR greater than 5 months for clean-up OR reduction of biodiversity OR impact on special conservation areas. Involved area greater than 100 sq miles. Spill greater than 1000m³. 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). Very poor materials/energy/water selection and use. Extensive impact due to GHG emissions. Major financial consequences for the Company. Ongoing breaches well above statutory or prescribed limits.</p>

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Table 6-2: Likelihood scale

ID	Likelihood	Frequency (occurrence per year)	Description
0	Non-credible	$<10^{-6}$ occ/y	Theoretically possible but not known or reasonably expected to have occurred in the exploration and production industry.
A	Rare	$10^{-6} \leq \text{occ/y} < 10^{-4}$	Known or reasonably expected to have occurred in the exploration and production industry under similar circumstances.
B	Unlikely	$10^{-4} \leq \text{occ/y} < 10^{-3}$	Known or reasonably expected to have occurred in company under similar circumstances.
C	Credible	$10^{-3} \leq \text{occ/y} < 10^{-1}$	Known or reasonably expected to have occurred in the company more than once under similar circumstances.
D	Probable	$10^{-1} \leq \text{occ/y} < 1$	Known or reasonably expected to have occurred in the company more than once a year under similar circumstances.
E	Frequent	≥ 1 occ/y	Known or reasonably expected to have occurred at the considered location, more than once a year under similar circumstances.

Table 6-3: Hierarchy of controls

Control Category	Description
Elimination	The causes of the hazardous event are removed such that it is no longer credible it will occur.
Substitution (alternatives)	Replace with a less hazardous substance or method; for example, use a wet method instead of dry and introduce a non-dusting powder for one that is friable.
Engineering (plant and equipment)	Physical controls; for example, containment, exhaust ventilation, mechanical aids.
Procedural (signage, warnings or administrative)	Human controls; for example, supervision, work methods, housekeeping, personal hygiene, information, instruction and training.
Personal protective equipment	In all cases, use of personal protective equipment should be considered as the only barrier only when control measures within the above categories are not practicable.

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Table 6-4: Risk management actions

Risk Rating	Significance	Risk Management Actions
Low (green)	Continuous improvement	The level of risk is broadly acceptable and generic control measures are required, aimed at avoiding deterioration ¹ .
Medium (yellow)	Risk reduction measure	The level of risk can be tolerable only once a structured review of the risk reduction measures has been performed; where necessary, the relevant guidance from the local authorities should be adopted for application of ALARP. ALARP is a concept that applies well to personnel and environmental risk. Asset risk is often most easily judged on a basis of costs and benefits alone.
Medium-High (orange)	Risk reduction measure	The level of risk can be tolerable only once a structured review of the risk reduction measures has been performed; where necessary, the relevant guidance from the local authorities should be adopted for application of ALARP. ALARP is a concept that applies well to personnel and environmental risk. Asset risk is often most easily judged on a basis of costs and benefits alone ² .
High (red)	Intolerable risk	The level of risk is not acceptable and risk control measures are required to lower the risk to another level of significance.

Note 1: The exception to the appropriate risk management actions for the Low risks are where a low risk to people is identified on the matrix position A3, then risk reduction measures are required.

Note 2: The exception to the appropriate risk management actions for Medium-High risk is the case of a 4B risk where the impact is on third parties onshore and is considered intolerable.

Consequence					Likelihood or Annual Frequency					
Severity	Company Reputation	People (Health & Safety)	Environment	Assets / Project	0	A	B	C	D	E
					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 6-2: Eni environmental risk matrix

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6.1.1 Environmental Risk

An environmental risk identification and assessment workshop for the petroleum activities was undertaken in June 2024. The workshop was attended by a representative cross-section of the Petrel-3 and Petrel-4 workforce, including Eni drilling engineers and HSE personnel.

All the credible risks from the petroleum activities were assessed and Environmental Performance Objectives (EPOs), Environmental Performance Standards (EPSs) and Measurement Criteria (MC) to reduce impacts and risks to ALARP and acceptable levels were developed, as detailed in Sections 7 and 8; and summarised in Section 9.

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; and
- 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 6-4.

6.3 As Low as Reasonably Practicable and Acceptance Criteria

6.3.1 As Low as Reasonably Practicable Criteria

The ALARP principle recognises 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.

Section 34 of the OPGGS Regulations require a demonstration that environmental impacts will be reduced to ALARP. For risks to be considered as reduced to ALARP, one of the following criteria must apply:

- There are no reasonably practicable alternatives to the activity; and
- The cost (in other words, 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;

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- 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; and
- Impact on risks from additional controls or alternative arrangements.

6.3.2 Acceptance Criteria

Section 34 of the OPGGS Regulations requires a demonstration that environmental impacts are of an acceptable level.

Eni considered a range of factors when evaluating the acceptability of environmental impacts associated with its activities. The evaluation criteria are outlined in Table 6-5.

Table 6-5: Eni acceptability factors

Demonstration of acceptability	
Compliance with legal requirements, laws, and standards	Considers the legal aspect, particularly compliance with applicable legislative prescriptions and regulations in force which imply specific procedures to be performed 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 of 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, EPOs and EPSs must be consistent with the nature of the receiving environment.
Environmentally sustainable development (ESD) principles	The overall activity is consistent with principles of ESD1 (as defined in Section 3A of the Commonwealth EPBC Act), as detailed below.
a). 'Integration Principle' Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.	This principle is met through consideration and response to public comments, evaluation of environmental impacts and risk to the socio-economic, cultural and ecological features of the environment that may be affected by the project; and demonstration of how environmental impacts and risks will be acceptable. This principle is inherently met through the EP assessment process. This principle is not considered separately for each acceptability evaluation.
b). 'Precautionary Principle' If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.	This principle is met through evaluation of environmental impacts and risks; reasons and evidence in support of how the impacts and risks will be of an acceptable level; the level of scientific uncertainty associated with predictions of environmental impacts and risks and the effectiveness of management measures in controlling impacts and risks; commitments to apply measures designed to manage residual scientific uncertainty; and the predicted severity, and persistence (including recovery potential) of environmental impacts and risks.

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c). 'Intergenerational Principle' The principle of inter-generational equity: the present generation should ensure the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.	This principle is met through commitment to measures to avoid and minimise environmental impacts and risks such that they will be managed to be an acceptable level for the duration of the environmental impact(s) generated by project; The case made in the EP that environmental impacts and risks of the project will not forego the health, diversity and productivity of the environment for future generations.
d). 'Biodiversity Principle' The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.	This principle is met through evaluation of environmental impacts to the biodiversity and ecological values of the environment affected, including matters of National Environmental Significance; and the levels of performance for management.
e). 'Valuation Principle' Improved valuation, pricing and incentive mechanisms should be promoted.	This principle is met through provision to bear the cost of environmental management for the whole of project life to ensure that the environmental impacts and risks are managed to an acceptable level. This principal is not considered relevant for acceptability evaluation in an EP.
ALARP	There is a consensus among the risk assessment team that risks, or impacts are ALARP.

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7 ENVIRONMENTAL RISK ASSESSMENT - PLANNED OPERATIONS

7.1 Seabed Disturbance

7.1.1 Summary of Environmental Risk Assessment

Hazard	Seabed Disturbance		
	Frequency	Severity	Risk
Inherent Risk	B	1	L
Residual Risk	C	1	L

7.1.2 Description of Hazard

During the petroleum activities, seabed disturbance will occur as a result of:

- Geotechnical survey;
- MODU positioning;
- Marine growth removal;
- Establish secondary well control;
- Cutting of the wellhead; and
- Retrieval of infrastructure from the seabed.

The greatest seabed disturbance footprint is from MODU positioning, for the moored MODU option. Discharges associated with cementing and milling is assessed in Section 7.8.

7.1.2.1 Geotechnical survey

During the geotechnical survey, samples of the seabed are taken and testing is carried out.

Core hole sampling involves removing a sample of rock or soil. The total disturbance area for core hole sampling is 2.4m² per well. PCPT involves placing equipment on the seabed and pushing some of the equipment into the seabed. All equipment is removed, but a hole with a diameter of ~10cm remains on the seabed which will eventually collapse and infill with seabed sediments.

7.1.2.2 MODU positioning

If a moored MODU is used, up to 12 anchors and mooring lines will be used to secure the MODU. The maximum footprint will be up to 1,944m² per well, which assumes up to 12 anchors and associated mooring chains.

If the jack-up option is used, the 3 spud cans (on the bottom of the legs) will be lowered. These are expected to partially penetrate into the seabed, creating a depression ~18m in diameter around each spud can, resulting in total area of ~750m² of temporary seabed disturbance at each well location.

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7.1.2.3 Marine growth removal

Marine growth may be removed using high-pressure water jetting, mechanical cleaning or chemical cleaning. The high-pressure water jetting may disrupt the sediment around the wellheads. The organic matter dislodged during cleaning will fall to the seabed.

7.1.2.4 Establishment and recovery of secondary well control

If the riser-based method of secondary well control is used, for the BOP installation from a semi-submersible, ROV-operated winches will be lowered with a crane and placed on the seabed. The winches are gravity-based and will be set out ~50m from the wellhead. 4 winches will be used per well, and each winch is ~20.6m², giving a total footprint of ~83m² per well location.

When the 4 winches are recovered, lifting equipment will be attached and they will be retrieved to the MODU. It is anticipated that there will be minor seabed disturbance as the winches are lifted, however, dredging or the use of Mass Flow Excavation is not expected.

If riserless methodology is used, there is no associated seabed disturbance as no additional equipment is required to support this methodology.

7.1.2.5 Cutting of wellhead

The cutting of the wellhead will be performed by internal cutting (mechanical or abrasive jet cutting as outlined in Section 3.3.9). Internal cutting will result in the cutting material being discharged below the seabed and no external swarf is expected. There may be minimal fallout of an abrasive media (e.g. garnet) on the seabed if abrasive jet cutting is used.

Following the steps outlined in the decision framework (Figure 3-7), should operational challenges prevent successful wellhead removal and safe recovery, the wellhead, PGB and TGB will be left in-situ. Whereby the wellhead, PGB and TGB or the TGB is left in-situ, the wellhead guideposts (~3m high) will be cut and recovered prior to equipment being left in-situ in an attempt to reduce the height profile of the guideposts. During the cutting of the guideposts, swarf is expected to settle on the seabed near the wellhead.

7.1.2.6 Wellhead, PGB and TGB recovery

The planned activity is full removal of the wellhead and associated equipment at or below the mudline.

The PGB and guideposts are attached to the wellhead, and will be retrieved together. As outlined in Section 3.3.9, in the event that recovery to the MODU is not successful, the wellhead and PGB will be temporarily 'wet parked' on the seabed and recovered by a vessel. In the event that the cutting tool or pulling tool are not able to be recovered, the wellhead cannot be successfully cut due to blocked or restricted internal well access. As a result, the wellhead, PGB and TGB will be left in-situ. Each wellhead has a footprint of ~9m². The footprint of both the PGB and TGB is 30m². Should the wellhead, PGB and TGB be required to be 'wet parked', they will be temporarily laid down within a 20m radius of the wellhead locations prior to vessel recovery.

The TGB may not be attached to the wellhead and PGB, requiring it to be recovered separately. It may be corroded, and therefore there is a risk that it could separate during lifting. Should this be encountered, the TGB will be picked up with slings and placed in a subsea basket to allow for safe retrieval to the surface. The subsea basket is placed temporarily on the seabed and has a footprint of ~30m². If the TGB is partially buried, lift

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point access may be restricted. The TGB may suffer from integrity issues which could result in it separating during lift recovery; even lifting into a basket. Should these scenarios occur, it may not be safe or operationally feasible to recover the TGB. In this instance, the TGB will be left in-situ.

Should the wellhead, PGB and TGB be left in-situ, the guideposts (~3m high) will be cut and recovered to reduce the height profile of the guideposts. It is anticipated that there will be minimal swarf generated during the cutting of the guideposts.

Previous inspections have confirmed the cement patio is buried, and it is not proposed to be removed as this would cause additional seabed disturbance.

Following all reasonable attempts [as outlined in the decision framework (Figure 3-7)] to remove and recover the wellheads and associated equipment, a contingency activity to leave the wellheads and associated equipment in-situ has been included in this EP, as described in Section 3.3.9. Note the impact from this contingency is assessed in Sections 7.3 and 8.1.

7.1.3 Potential Environmental Impact

Seabed disturbance has the potential to result in:

- Change in water quality;
- Change in habitat; and
- Change in cultural heritage.

Potential receptors that may be impacted are:

- Water quality;
- Benthic habitats and communities; and
- Cultural heritage values.

There are no marine protected areas or KEFs within the Operational Area.

7.1.3.1 Water quality

Change in water quality

A change in water quality may result from a temporary increase in turbidity near the seabed when infrastructure is placed on the seabed, samples are taken, or swarf or other materials fall to the seabed.

Past surveys show the seabed within the Operational Area is characterised predominantly by sand, with gravel, silt and clay (Section 4.3.6).

The greatest seabed disturbance footprint is from MODU positioning of the moored MODU option. The maximum footprint will be up to 1,944m² per well, which assumes up to 12 anchors and associated mooring chains. The temporary turbidity associated with the moored MODU is not considered likely to cause environmental impact given the sparseness of benthic cover and the highly localised impact zone. The high settling velocity of sand (and coarser) material would ensure that the particles do not remain in suspension for an extended period of time.

High pressure saltwater jetting may be used to remove marine growth from the wellhead structures. This will result in temporary suspension of organic matter and localised increase

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in turbidity; however, water jetting will be limited to what is necessary to perform an effective inspection.

If the guideposts require cutting, swarf is expected to settle on the seabed. This activity is anticipated to cause suspension of only a small volume of sediment.

The location of the Operational Area within a homogenous seabed area, and lack of sensitive benthic features, means that turbidity resulting from the described activities is expected to result in only temporary and very localised change in water quality.

7.1.3.2 Benthic habitats and communities

Change in habitat

Benthic habitat may be disturbed when infrastructure comes into contact with the seabed. The seabed within the Operational Area is characterised by sand (with gravel, silt and clay) and sparse sessile epibenthic organisms, as shown by past surveys (Section 4.3.6). Unvegetated soft sediments are a widespread habitat in the region.

The greatest seabed disturbance footprint is from MODU positioning of the moored MODU option. The maximum footprint will be up to 1,944m² per well, which assumes up to 12 anchors and associated mooring chains. Any impact will be limited to the immediate vicinity of each of the anchors and chains, and thus the extent of potential impact is considered to be very localised.

Benthic habitat may also be disturbed through high pressure water jetting. The organic matter that will fall to the seabed as a result of these activities is expected to cause only a small volume of suspended material, in close proximity to the activities.

PCPT and jack-up spud cans are likely to leave holes in the seabed sediment. Should the wellhead, PGB and/or the TGB require to be 'wet parked' on the seabed prior to vessel recovery or retrieved using a subsea basket, a small area of the seabed will be impacted by the temporary lay down of equipment. The maximum footprint will be up to 30m² (both the PGB, TGB and subsea basket are 30m²). As the sediments are very soft, any holes/indentations are expected to collapse and fill in with sediment.

Given the lack of sensitive benthic receptors, and that potential damage would only occur within a small area, it is expected that any areas impacted would rapidly recolonise and recover from any disturbance.

7.1.3.3 Cultural heritage values

Change in heritage values

There are no identified shipwrecks within the Operational Area, with the closest being the Sedco Helen, which is ~4km from Petrel-4.

There are no known Traditional Owners artefacts or specific sites of cultural value associated with the seabed within the Operational Area.

No claims or objections were made by Traditional Owner stakeholder groups regarding seabed disturbance within the Operational Area.

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7.1.3.4 Residual risk summary

The worst-case residual severity to water quality, benthic habitat and cultural heritage values from seabed disturbance is evaluated as Slight (1), given the temporary, localised nature of the disturbance, and the lack of sensitive benthic features and sites of cultural heritage value.

The likelihood of impact from seabed disturbance occurring as a result of the activities is considered Credible (C).

Therefore, the residual risk of seabed disturbance due to the petroleum activities is considered Low.

7.1.4 Environmental Performance Outcomes and Control Measures

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

- Seabed disturbance limited to planned activities (EPO-01).

Control measures (CMs) relating to this risk include:

- MODU move and anchoring procedure (including mooring analysis) (CM-01);
- MODU station keeping system (for DP and DP-assisted MODU option) (CM-02);
- Recovery of all deployed equipment (CM-03);
- Post-activity ROV survey (CM-04);
- Lifting Management System Procedure (ENI-LOG-PR-017) (CM-05);
- Wellhead recovery decision framework (Figure 3-7) (CM-44); and
- Well Operations Management Plan (WOMP) (CM-47).

Environmental Performance Standards (EPSs) and Measurement Criteria (MC) relating to the above are presented in Section 9.1.

7.1.5 As Low as Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/ Management	Evaluation	Adoption?
Eliminate	Eliminate use of geotechnical survey	This control would eliminate seabed disturbance from seabed sampling, however, geotechnical survey is required for safe positioning if the jack-up MODU option is used. The footprint of the geotechnical survey is comparatively small.	x
	Eliminate marine growth removal	This control would prevent benthic disturbance resulting from water jetting activities, however the failure to remove marine growth means that visual inspections and work on the wells would be impeded.	x

Demonstration of ALARP			
Type	Control/ Management	Evaluation	Adoption?
	No placing of equipment on the seabed	<p>This would prevent seabed disturbance from this equipment. However, use of a subsea basket may be required in order to safely retrieve subsea equipment.</p> <p>In the event that recovery to the MODU is not successful (due to stuck tooling or other reasons identified in Section 3.3.9.1), the subsea equipment may be temporarily 'wet parked', and retrieved by a vessel, which offers greater handling capabilities. Temporary wet parking on the seabed allows further reasonable attempts to be made to recover subsea equipment.</p>	*
	No removal of wellheads, PGB, or TGB	<p>This would eliminate seabed disturbance caused by the removal of subsea equipment and permanent abandonment.</p> <p>As discussed in Section 3.3.9.1, following the pre-decommissioning inspection and well P&A operations, wellhead, PGB and TGB recovery will be carried out in accordance with the decision framework (Figure 3-7).</p> <p>The wellhead removal decision framework (Figure 3-7) will be implemented to ensure all reasonable attempts are made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits of the MODU; and alternate vessel (if required). Eni commits to ensuring the MODU/vessel and wellhead cutting and recovery tools selected are of suitable and proven capability for Petrel-3 and Petrel-4.</p> <p>However, as discussed in Section 3.3.9 there can be unforeseen operational challenges that may prevent the successful full removal of subsea equipment at or below the mudline. In this case, the wellhead, PGB and TGB (or TGB only) may be left in-situ. Figure 3-7 accounts for mechanical and abrasive jet tooling methodologies and considers MODU/vessel capabilities to ensure all options are explored and applied as appropriate. Internal cutting methods identified minimise seabed disturbance from debris and discharges.</p> <p>If the wellhead and PGB cannot be recovered, the guideposts will be cut to</p>	✓ (CM-44)

Demonstration of ALARP			
Type	Control/ Management	Evaluation	Adoption?
		<p>reduce the height profile. These methods will all generate seabed disturbance from swarf and debris. Not undertaking recovery of subsea equipment means all equipment is left in-situ, meaning long-term physical presence will:</p> <ul style="list-style-type: none"> • Provide a hard substrate resulting in the creation of a new habitat; • Potentially interrupt natural sediment movement in the immediate vicinity of the wellhead remaining in-situ permanently; and • Introduce contaminants to the water column and sediment surrounding the wellhead as it degrades over time. These impacts are assessed in Section 7.3. <p>Section 572(3) of the OPGGS Act allows for deviations to the base case should the alternative decommissioning approach deliver equal or better environmental and safety outcomes compared to complete removal. In the event it becomes necessary to leave the wellhead in-situ, the residual risk to the environment and other marine users is evaluated in Sections 7.3 and 8.1, and is considered low risk, ALARP and acceptable.</p>	
	Jetting/excavating of the TGB	<p>In the event that the TGB is not attached to the wellhead/PGB and is partially buried, as described in Section 3.3.9.1, high pressure jetting or excavating the TGB could potentially restore lifting point access and subsequent recovery. However, these methods will generate additional seabed disturbance from jetting/excavation, increased turbidity and debris.</p> <p>Not undertaking recovery of the TGB and therefore leaving in-situ, means the long-term physical presence will:</p> <ul style="list-style-type: none"> • Provide a hard substrate resulting in the creation of a new habitat; • Potentially interrupt natural sediment movement in the immediate vicinity of the TGB remaining in-situ permanently; • Introduce contaminants to the water column and sediment surrounding 	*

Demonstration of ALARP			
Type	Control/ Management	Evaluation	Adoption?
		<p>the TGB as it degrades over time. These impacts are assessed in Section 7.3.</p> <p>Potential ecotoxicity impact is assessed in Section 7.3.3.</p> <p>The TGB weighs 5,300kg and is only 1.5 m high. Whereas the wellhead and PGB are ~3m and weigh 20,000kg and 6,800kg, respectively. Therefore, the surface area of the TGB for new habitat creation and potential interruption to sediment movement is much smaller than for the entirety of the equipment.</p> <p>The environmental benefit of jetting/excavating the TGB in the attempt to recover, which is not guaranteed, is considered disproportionate to leaving the TGB in-situ. In the event it becomes necessary to leave the TGB in-situ, the residual risk to the environment and other marine users is evaluated in Sections 7.3 and 8.1, and is considered low risk, ALARP and acceptable.</p>	
Substitute	MODU option with no anchoring requirements	<p>The use of a dynamically positioned floating MODU which does not moor instead of a moored MODU or jack-up MODU would remove the impact to seabed from the MODU positioning.</p> <p>The selection of MODU type is determined following the pre-decommissioning inspection, by MODU availability, feasibility of MODU positioning, feasibility of interfacing with the legacy wellheads for which the structural integrity requires further investigation. The in-force WOMP will be updated in 2025 to include P&A methodology, and must be accepted by NOPSEMA.</p> <p>Moored and jack-up MODUs are retained as an option.</p>	*
	Riserless methodology	<p>Current well status assessment does not require the deployment of secondary well control as there are already sufficient barriers in the well. However, well access methodology selection will be further informed by the outcome of the pre-decommissioning inspection and acceptance of the updated WOMP to include well abandonment. For example, the pre-decommissioning inspection may find that the integrity of the</p>	✓ CM-47

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Demonstration of ALARP			
Type	Control/ Management	Evaluation	Adoption?
		<p>wellhead is not sufficient to support the weight of the subsea BOP.</p> <p>If the subsea BOP is used, it requires a small area of seabed disturbance for the winches. However, this is only ~83m² per well location. This is a very small area and negligible difference in potential environmental impact.</p> <p>Both options are included, and will be determined in the WOMP.</p>	
Engineering	Not applicable	N/A	N/A
Isolation	Not applicable	N/A	N/A
Administrative	Lifting operations	This control manages safe lifting operations during retrieval of subsea equipment.	✓ (CM-05)
	MODU move and anchoring procedure (mooring analysis)	If a MODU on DP is selected, this control manages the mooring plan, accidental contact with the seabed and subsea infrastructure and reduces risk to seabed habitat.	✓ (CM-01)
	Recovery of deployed equipment	Prevents ongoing impact to the seabed due to equipment being left in-situ. Minimal additional cost to recover equipment.	✓ (CM-03)
	Post-activity ROV survey	Confirms understanding of physical environment in operational area post activities. Costs resulting from up to 2 days if separate campaign is required.	✓ (CM-04)

7.1.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>The petroleum activities will be undertaken to ensure there is no impact upon cultural heritage properties protected under the <i>Underwater Cultural Heritage Act 2018</i>.</p> <p>There are no known cultural heritage sites of significance or shipwreck sites within the Operational Area.</p>
Policy Compliance	<p>The management of seabed disturbance is aligned with Eni policies and standards. The residual risk is Low, which is acceptable.</p> <p>The EPOs, CMs and EPSs that will be implemented are consistent with Eni internal requirements.</p>
Social Acceptability	<p>Stakeholder consultation has been undertaken (refer Section 5).</p> <p>No claims or objections were made by stakeholders regarding seabed disturbance within the Operational Area.</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>

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Area Sensitivity/ Biodiversity	<p>The benthic environment within the Operational Area is characterised by sand (with gravel, silt and clay) and sparse sessile epibenthic organisms (Section 4.3.6). Impacts to the marine environment from seabed disturbance will be highly localised. There are no KEFs or AMPs overlapping the Operational Area.</p> <p>The evaluation of impacts and risks indicates significant impacts to MNES will not result from seabed disturbance.</p> <p>Seabed disturbance has not been identified as a threat in any recovery plans or conservation advice for threatened and migratory species.</p>
ESD Principles	<p>The activity is consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> • The worst-case impact associated with this aspect is Slight (1); and the residual risk is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage; and there is no scientific uncertainty associated with the potential impact. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

Given the localised seabed disturbance from these activities, and lack of sensitive benthic habitat or features, the potential impacts associated with seabed disturbance are considered to be Slight (1). The residual risk is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Potential impacts associated with seabed disturbance are acceptable and ALARP.

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7.2 Physical Interaction - Other Marine Users

7.2.1 Summary of Environmental Risk Assessment

Hazard	Physical Interaction - Other Marine Users		
	Frequency	Severity	Risk
Inherent Risk	B	1	L
Residual Risk	A	1	L

7.2.2 Description of Hazard

During the petroleum activities, interaction with other marine users may occur as a result of:

- MODU Operations; and
- Vessel Operations.

The presence of the MODU and vessels within the Operational Area during the petroleum activities has the potential to result in interactions with other marine users. The Operational Area is a 3km radius around the 2 wells and the corridor between them. There is no formal Petroleum Safety Zone, however exclusion and cautionary zones will be in place during activities.

Vessel and MODU transit outside of the Operational Area is not within scope of this EP and comes under the *Navigation Act 2012*.

The monitoring and pre-decommissioning vessel-based campaigns have an expected duration of 14 to 40 days. The As-left survey has a duration of 2 days per well, but this campaign is likely to occur at the same time as the decommissioning campaign. The decommissioning campaign using the MODU has an expected duration of up to 60 days (30 days per well). If an alternate vessel campaign is required as part of the wellhead removal scope, it is expected to take up to 7 days per well. This duration is inclusive of the decommissioning campaign (60 days total; as outlined in Table 3-3) as the MODU would therefore not be required for the whole duration.

The closest wellhead to the shore is Petrel-3, which lies approximately 250km WSW of Darwin (NT) and 280km N from Wyndham, on the northern coast of WA.

The planned activity is full removal of the wellhead and associated equipment at or below the mudline. Following all reasonable attempts to remove and recover the wellheads and associated equipment, a contingency activity to leave the wellheads and associated equipment in-situ has been included in this EP, as described in Section 3.3.9. The physical interaction with other marine users as a result of the contingency outcome to leave in-situ is assessed in Section 8.1.

7.2.2.1 MODU Operations

The MODU will be in the Operational Area for up to 60 days undertaking decommissioning activities. Once decommissioning is completed at the first well, it will move to the second well; and then demobilise from the Operational Area once the activities are complete.

During operations, other marine users may be temporarily displaced from the area surrounding the activity by the presence of exclusion zones around the MODU, which includes:

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- A 2km radius cautionary zone around the MODU to allow for anchors, mooring chains and wire to be placed within the Operational Area during decommissioning activities; and
- A safety exclusion zone of 500m around the MODU for each well. The safety exclusion zone will be communicated via a 'Notice to Mariners' outlining the exclusion zone and timeframe for the decommissioning activities.

7.2.2.2 Vessel Operations

Vessels are expected to be present in the Operational Area for all the campaigns covered in this EP. The maximum number of vessels in the Operational Area at a single time is expected to be 3 AHSVs plus the MODU during the decommissioning campaign. Vessel-based operations have an expected duration of 14 to 40 days, depending on the activity (see Section 3.1.3).

As part of the wellhead removal scope, if a vessel-based campaign is required, it is likely to be a CSV and is expected to take up to 7 days per well. This duration is included in the decommissioning campaign (60 days total; as outlined in Table 3-3).

The presence of vessels has the potential to exclude or displace some activities by other marine users.

7.2.3 Potential Environmental Impact

Interaction with other marine users has the potential to result in:

- Change to the functions, interests and activities of other marine users.

Potential receptors that may be impacted are:

- Commercial fisheries;
- Offshore industry; and
- Defence.

Due to the distance from shore, there is not expected to be any recreation or traditional fishing in the Operational Area; nor are there any commercial shipping routes. There are no subsea cables in the Operational Area.

7.2.3.1 Commercial Fisheries

Change to the functions, interests and activities of other marine users

A number of Commonwealth and State (WA and NT) fisheries are located within the Operational Area (Section 4.6.1); and an assessment was undertaken to identify potential interactions based on historic catch data and intensity, sourced from relevant datasets and for data periods.

Based on the assessment in Table 4-11, the following is a summary of fisheries that overlap with the Operational Area; and those considered active in the Operational Area (within the data range):

- Commonwealth-managed fisheries: 4 fisheries overlap with the Operational Area (Northern Prawn Fishery, Southern Bluefin Tuna Fishery, Western Skipjack Fishery and Western Tuna and Billfish Fishery). Based on the catch-effort assessment, none of these fisheries are considered active within the OA.

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- Western Australian-managed fisheries: 2 fisheries overlap the Operational Area. The Joint Authority Northern Shark Fishery has been closed since 2009, and therefore is not considered active or have potential for future interaction. Only 1 fishery is considered active within the Operational Area (Open Access in the North Coast, Gascoyne Coast and Bioregions Fishery).

Northern Territory-managed fisheries: 5 fisheries overlap the Operational Area (Aquarium Fisher, Demersal Fishery, Offshore Net and Line Fishery, Spanish Mackerel Fishery and NT Tour Operators). Based on the catch-effort assessment, all 5 of these fisheries are considered active within the Operational Area. Of the Commonwealth-managed fisheries with designated management areas that overlap the Operational Area, none of these are considered active. Of these fisheries, only the Northern Prawn Fishery (NPF) has historical fishing effort that overlaps the EMBA only (not the Operational Area). Highest intensity fishing efforts during the 2016-2022 seasons took place in the nearshore coastal NT waters (Butler et al., 2023). The Operational Area does not fall within any effort fishing intensity area, as indicated through the Commonwealth Fishery Status Reports (Butler et al., 2023). Engagement with the NPM confirmed there is no NPF fishing effort in the immediate vicinity of the wellheads, and that the JBG fishery is closed from 1st December to 1st August each year (Section 5).

The Southern Bluefin Tuna Fishery management area overlaps the Operational Area, however, has no recorded fishing activity within the region. The fishery operates predominantly in the Great Australian Bight, targeting deeper water depths up to 500m. The Western Skipjack fishery management area overlaps the Operational Area, however, has been closed for fishing since 2009. The Western Tuna and Billfish Fishery management area overlaps the Operational Area, with most of the Australian catch has been concentrated off south-west Western Australia.

The Open Access in the North Coast Fishery is the only 'active' WA-managed fishery overlapping the Operational Area. The 60NM CAES reporting block overlapping the Operational Area, indicated up to six vessels active across the 2017-2022 seasons (DPIRD, 2023). Noting that this fishery does not have a designated management area, management of the fishery refers to specific areas where commercial fishers can operate without needing a particular fishing license or permit.

Five Northern Territory-managed fisheries overlap the Operational Area and are considered active and may interact with activities (Section 4.6.1):

- Northern Territory Aquarium Fishery: Hand-held equipment. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence operating in the Operational Area (NT GOV, 2021);
- Demersal Fishery: Line and fish-trap gear. Analysis of five years of NT fishing effort data (2017-2021) shows 3 licences operating in the Operational Area (NT GOV, 2021);
- Offshore Net and Line Fishery: Demersal/pelagic long-lines. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence within the Operational Area (NT GOV, 2021);
- Spanish Mackerel Fishery: Troll/floating long lines. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence within the Operational Area (NT GOV, 2021); and
- NT Tour Operators: Fishing tour operators are permitted to fish in Territory waters, and do not have management areas. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence within the Operational Area (NT GOV, 2021).

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The petroleum activities are anticipated to only result in a temporary disruption to commercial fishing, as the exclusion and cautionary zones from MODU and vessel operations are small, fishing intensity in the Operational Area is low, and the duration is relatively short (with the longest campaign being 60 days).

7.2.3.2 Defence

Change to the functions, interests and activities of other marine users

The Northern Australia Exercise Area military zone overlaps the Operational Area. This zone is mainly utilised for activities associated with border protection including surveillance, illegal immigration, and illegal fishing. This area is occasionally used for live firing military exercises.

The petroleum activities are anticipated to only result in a temporary disruption to Defence exercise activities, as the exclusion and cautionary zones are small and the duration is relatively short (with the longest campaign being 60 days).

Consequently, it is unlikely that the petroleum activities will pose a challenge to future Defence activities in the Operational Area.

7.2.3.3 Offshore industry

Change to the functions, interests and activities of other marine users

Interaction with other activities from the offshore industry is not expected to occur. There are several petroleum or CCS activities within the Bonaparte Basin, however none of the activities accepted or proposed overlap with the Petrel-3 and Petrel-4 Operational Area (Section 4.6.5).

No CCS permits overlap with the NT/RL1 and WA-6-R permits, therefore direct interference with any future CCS activities is not expected. Eni is the titleholder of NT/RL1 and WA-6-R; and any future development within the title would be evaluated and undertaken by Eni.

The closest platform is the Blacktip Wellhead Platform, which is also operated by Eni, located ~100km southeast of the Operational Area.

EOG Resources Australia and Inpex were engaged during stakeholder consultation (Section 5). Both companies have proposed activities in the area, outside the Operational Area, but within the EMBA (Inpex have now submitted an EP for a geophysical and geotechnical survey scope within the EMBA). They raised the possibility of simultaneous operations and Eni have committed to ongoing communication with both titleholders.

The petroleum activities are anticipated to only result in a temporary disruption to Defence exercise activities, as the exclusion and cautionary zones are small and the duration is relatively short (with the longest campaign being 60 days).

Consequently, it is unlikely that the petroleum activities will pose a challenge to future other offshore industries in the Operational Area.

7.2.3.4 Residual risk summary

The worst-case residual severity to commercial fisheries and offshore industry from the presence of vessels and MODU is evaluated as Slight (1), given the low activity of commercial fishing activity and offshore industry in the Operational Area.

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The likelihood of changing the functions, interests and activities of other marine users from Petrel-3 and Petrel-4 petroleum activities is considered Rare (A) due to:

- Low intensity of fishing effort in the Operational Area; and
- No offshore industry activities within the Operational Area.

Therefore, the residual risk of interactions with other marine users due to the petroleum activities is considered Low.

7.2.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this risk include:

- Information is provided to relevant persons to manage impacts on their functions, interests, and activities (EPO-02); and
- Activities are managed in accordance with navigational and safety requirements (EPO-03).

CMs relating to this risk include:

- Navigation equipment and procedures (CM-06); and
- Consultation with relevant persons (including notification requirements) (CM-07).

EPSs and MC relating to the above are presented in Section 9.

7.2.5 As Low as Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
Eliminate	Eliminating the use of MODU and support vessels in the Operational Area	Not considered feasible as a MODU and support vessels are the only form of equipment that can undertake the activities.	x
	Timing of activities to avoid NPF JBG fishing season (August to November)	<p>During 2024 consultation, the NPFI confirmed there is no NPF fishing effort in the immediate vicinity of the wellheads, but advises the preference for activities to be scheduled when the NPI JBG fishery is closed, to limit any impacts on fishing operations from Eni vessel transit (Section 5).</p> <p>The timing of the Petrel monitoring and decommissioning activities is subject to vessel and MODU availability in the region as well as weather conditions; and given the nature of the work, it is not feasible to commit to limiting work to specific periods of the year.</p> <p>The petroleum activities will occur at the two wellheads, within the 3km radius identified as the Operational Area. Given the short duration of the longest campaign (up to 60 days) and the relatively small radius of the exclusion and cautionary zones, there are no benefits in</p>	x

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Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
		<p>timing the activities to avoid NPF JGB fishing season.</p> <p>The potential impact to commercial fish species and fisheries from the petroleum activities is assessed in relevant sections in Section 7 and 8; and is considered acceptable and reduced to ALARP.</p>	
Substitute	N/A	N/A	N/A
Engineering	Navigation equipment and procedures	<p>Ensures the MODU and vessels are seen by other marine users.</p> <p>Reduces risk of environmental impact from vessel collisions due to ensuring safety requirements are fulfilled.</p> <p>Negligible costs of operating navigational equipment.</p> <p>A requirement under Marine Orders, requires vessels to have navigational equipment to avoid collisions.</p>	✓ (CM-06)
Isolation	N/A	N/A	N/A
Administrative	Consultation with relevant persons (refer Section 5)	<p>Relevant persons consultation ensures marine users are aware of the drilling activities, reducing the likelihood of unplanned interactions. Provides marine users an opportunity to request practicable interface control measures.</p> <p>Enables identification of potential Sea Country protection or enhancement initiatives, and implementation where practicable.</p> <p>To ensure Eni activities do not conflict with Defence training in the future, Eni will notify Defence a minimum of five weeks before the actual commencement of activities. Notification will need to be provided to offshore.petroleum@defence.gov.au.</p> <p>Minor administrative costs in notifying Defence.</p> <p>Ensures Defence is aware of the activities, reducing likelihood of interactions.</p>	✓ (CM-07)

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7.2.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>Physical presence of petroleum activities is managed in accordance with relevant legislative requirements, including compliance with international maritime conventions and Australian legislation, being:</p> <ul style="list-style-type: none"> • International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 • International Convention for the Safety of Life at Sea 1974 • International Regulations for Preventing Collisions at Sea 1972 • <i>Navigation Act 2012</i>, including, as appropriate to vessel class: <ul style="list-style-type: none"> – Marine Order 21: Safety and emergency arrangements) – Marine Order 30: Prevention of Collisions) – Marine Order 71: Masters and Deck Officers. <p>Eni will not interfere with the rights of other marine users to a greater extent than is necessary for the reasonable exercise of right conferred by the titles granted, as per Section 280 of the OPGGS Act.</p>
Policy Compliance	<p>The management of physical presence of the petroleum activities is aligned with Eni policies and standards. The residual risk is Low, which is acceptable. The EPOs, CMs and EPSs that will be implemented are consistent with Eni internal requirements.</p>
Social Acceptability	<p>Engagement with the NPMI confirmed that NPM operators do not have any objection to the decommissioning of Petrel-3 and Petrel-4; and confirmed there is no NPM fishing effort in the immediate vicinity of the wellheads (Section 5). NPM advised the preference for activities to be scheduled when the NPM JBG fishery is closed, to limit any impacts on fishing operations from Eni vessel transit. However, the timing of the Petrel monitoring and decommissioning activities is subject to vessel and MODU availability in the region as well as weather conditions; and given the nature of the work, it is not feasible to commit to limiting work to specific periods of the year. Given the short duration of activities (with the longest campaign <60 days), the potential impact to the NPM from transiting vessels is considered acceptable.</p> <p>NTSC, AFMA, Northern Wildcatch Seafood Australia (NWSA), RecFishWest, DITT NT Fisheries, the Wilderness Society and EOG Resources and Inpex requested to be notified prior to activities commencing (Section 5); and have been included in routine external notifications (Table 10-3).</p> <p>Eni will notify Defence a minimum of five weeks before the actual commencement of activities.</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
ESD Principles	<p>The petroleum activities are consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> • The worst-case impact associated with this aspect is Slight (1); and the residual risk is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage. The analysis of available fishing data and usage information was supplemented with consultation where knowledge gaps were identified. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.

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Demonstration of acceptability		
Area Biodiversity	Sensitivity/	<p>The following fisheries that overlap the Operational Area; and of those the following are considered active:</p> <ul style="list-style-type: none"> • Commonwealth-managed fisheries: 4 fisheries overlap with the Operational Area; however none are considered active. The Operational Area overlaps the management area of the NPF however, there has not been any historical fishing effort recorded based on data from 2010-2022 (Summerson, 2024). • Western Australian-managed fisheries: 2 fisheries overlap the Operational Area. The Joint Authority Northern Shark Fishery has been closed since 2009, and therefore is not considered active or have potential for future interaction. • Northern Territory-managed fisheries: 5 fisheries overlap the Operational Area and all are considered active within the Operational Area. <p>The Operational Area overlaps with low effort fishing area and/or low number of licences for the following fisheries:</p> <ul style="list-style-type: none"> • WA Open Access in the North Coast Fishery (6 vessels) • NT Aquarium Fishery (1 licence) • NT Demersal Fishery (3 licences) • NT Offshore Net and Line Fishery (1 licence) • NT Spanish Mackerel Fishery (1 licence) • NT Tour operator (1 licence). <p>The fisheries not currently considered active in the Operational Area, given the spatial and catch-method limitations, in place to manage the fishery stocks. These fisheries may have access rights in the future; however, it is not expected these fisheries would be significantly affected given the short duration of the MODU and vessel operations.</p> <p>No CCS permits overlap with the NT/RL1 and WA-6-R permits, therefore direct interference with any future CCS activities is not expected. Eni is the titleholder of NT/RL1 and WA-6-R; and any future development within the title would be evaluated and undertaken by Eni.</p> <p>Physical presence of infrastructure has not been identified as a threat in any recovery plans or conservation advice for threatened and migratory species.</p>
ALARP		The residual risk has been demonstrated to be ALARP.

Given the low volume of other marine users within the Operational Area, the small spatial extent of the Operational Area and short duration of activities, the potential impacts are Slight (1). The residual risk is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Potential impact associated with interactions with other marine users is considered acceptable and ALARP.

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7.3 Physical Presence – Equipment in-situ

7.3.1 Summary of Environmental Risk Assessment

Hazard	Physical Presence – Equipment in-situ		
	Frequency	Severity	Risk
Inherent Risk	A	1	L
Residual Risk	A	1	L

7.3.2 Description of Hazard

The planned activity is full removal of the wellhead and associated equipment at or below the mudline. Following all reasonable attempts (as per the decision framework outlined in Figure 3-7) to remove and recover the wellheads and associated equipment, a contingency activity to leave the wellheads and associated equipment in-situ has been included in this EP, as described in Section 3.3.9.

During the petroleum activities, interaction with equipment may occur as a result of:

- The permanent presence of the wellhead or other equipment, if these are left in-situ as a contingency only.

7.3.2.1 Wellhead, PGB and TGB recovery

As discussed in Section 3.3.9, following the pre-decommissioning inspection and well P&A operations, wellhead, PGB and TGB recovery will be carried out in accordance with the decision framework (Figure 3-7). The wellhead removal decision framework will be implemented to ensure all reasonable attempts are made to remove and recover wellheads, PGB and TGB. Should operational challenges prevent successful removal and recovery of the wellhead, PGB and/or the TGB itself, then subsea infrastructure may be left in-situ (Section 3.3.9.1).

If the wellhead and PGB cannot be successfully recovered, the guideposts will be cut, reducing the height profile of the subsea equipment left in-situ.

Wellhead, PGB and TGB decommissioning status shall be documented in a Wellhead Decommissioning Report.

If the wellheads or other equipment (i.e. the PGB and/or TGB) are left in-situ following decommissioning as a contingency only, the permanent physical presence will continue to:

- Provide a hard substrate resulting in the creation of a new habitat;
- Potentially interrupt natural sediment movement in the immediate vicinity of the wellhead, PGB and/or TGB remaining in-situ permanently; and
- Introduce contaminants to the water column and sediment surrounding the wellhead, PGB and/or TGB as they degrade over time.

To account for the worst-case scenario, the following impact assessment is based on the assumption that all subsea infrastructure (i.e., wellhead, PGB and TGB) are left in-situ.

The wellheads have been in place since the 1980s, and protrude ~3m above the seabed. The wellheads, guideposts, TGB and PGB are constructed of steel. There are no records for material composition of the Petrel-3 and Petrel-4 wellheads (both installed in the 1980's), therefore the exact composition is unknown. However, wellheads and associated

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infrastructure (guide base, guideposts and drilling template) of this era are known to be made of carbon steel and are not expected to comprise of any other material components, such as plastic coatings. For example, parts such as gasket rings are expected to be a metal-to-metal design. Examples of nearby wells of a similar era include the Tern-1 (1971) and Frigate-1 (1978) wellheads, approximately 35km and 70km from the Petrel-4 wellhead respectively.

The wellheads, TGB, and PGB are comprised of low-alloy steel (Table 7-1) – of which the main component is iron (typically 95-98%). The remaining components making up the approximate combined percentage by weight are chromium, molybdenum, manganese, nitrogen and <1% of trace alloys including carbon, silicon, sulphur and phosphorous.

As discussed in Section 3.1.1, the wellheads protrude ~3m from the seabed and are a total of 12m in height. Therefore, approximately 75% of the mass of the wellhead is buried. Consequently, a portion of the degradation products will be buried and unlikely to be available to fauna. Fauna such as demersal fishes, epifauna and infauna will only be exposed to degraded material within the water column, in the seabed or within the layer of sediment that may be reworked through bioturbation which is typically concentrated in the upper 30cm of the seabed (Kristensen et al., 2012). Therefore, when considering only the exposed portion of the wellhead and the depth of sediment reworking, degradation products from the upper 3.3m of the wellhead, constituting approximately 28% of the wellheads mass (i.e., 5,600kg), PGB (6,800kg) and TGB (5,300kg) will credibly come into contact with fauna.

Table 7-1 provides the typical composition of low-alloy steel, based on the range of minimum and maximum percentage compositions across three commonly used wellhead material specifications and the portion of the wellhead materials that may be exposed to the marine environment.

Table 7-1 Typical composition of low-alloy steel subsea infrastructure

Material	Typical low-alloy steel composition ranges		Maximum exposed portion of wellhead material (kg)*
	Minimum (%)	Maximum (%)	
Iron	95.04	98.22	5,498.32
Carbon	0.05	0.33	18.48
Chromium	0.4	2.5	140
Molybdenum	0.15	1.13	63.28
Manganese	0.3	0.95	53.2
Nitrogen	0	0.75	42
Silicon	0	0.5	28
Sulphur	0	0.04	2.24
Phosphorous	0	0.04	2.24

*Calculations are based on 28% of a wellheads mass (i.e., 5,600kg)

Source: AISI 8630, AISI 4130, ASTM A182 F22

Removal of the cement patio is not proposed under the activities performed in this EP. According to previous wellhead surveys, this item is buried, and the removal would create additional seabed disturbance. The unplanned interaction with other marine users due to the presence of the wellheads if left in-situ as a contingency outcome is assessed in Section 8.1.

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7.3.3 Potential Environmental Impact

The physical presence of equipment left in-situ has the potential to result in:

- Change in water and sediment quality;
- Change in habitat; and
- Injury / mortality to marine fauna.

Potential receptors that may be impacted are:

- Water quality;
- Sediment quality;
- Benthic habitats and communities; and
- Threatened and migratory fauna.

There are no marine protected areas or KEFs within the Operational Area. No Traditional Owner heritage sites were identified within the Operational Area during consultation with stakeholders.

7.3.3.1 Water quality

Change in water quality

If the wellheads, PGB and/or the TGB are left in-situ as a contingency in the event that operational challenges prevent them from being removed (as outlined in Section 3.3.9.1), they will continue to degrade slowly over a long period of time, gradually releasing corrosion materials into the receiving marine environment.

During the corrosion process, subsea infrastructure will lose wall thickness at a variable rate that is primarily influenced by oxygen availability. Generally, as water depths decrease so do corrosion rates due to lower levels of dissolved oxygen. Therefore, considering both subsea wells and associated infrastructure are located in water depths of ~95m corrosion rates are expected to be low.

Of the materials typically found within low-alloy steel, 2 have established guideline values for toxicity in marine ecosystems, while an additional one with established guideline values for toxicity in freshwater ecosystems (Table 7-2) (ANZG, 2018):

- Chromium occurs in trace amounts as alloying material (~2.5% of low alloy steel composition).
- Molybdenum occurs in trace amounts as alloying material (~1.13% of low alloy steel composition).
- Manganese occurs in trace amounts as alloying material (~0.95% of low alloy steel composition).

Table 7-2 provides an overview of the indicative material composition of low-alloy steel within subsea infrastructure and their associated default guideline values for water quality based on the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018). Where there is an absence of a default guideline value it does not indicate they have no potential for toxicity. However, the evidence-based approach used to develop the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) indicates that these materials will pose negligible environmental risk at the concentrations found in the low-alloy steel.

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Table 7-2: Indicative low alloy steel materials and associated guideline values for water quality in marine ecosystems

Material	Level of species protection	Guideline value^ (mg/L)
Iron	No guideline	No guideline
Carbon	No guideline	No guideline
Chromium	99%	7.7
	95%	27
Molybdenum	Unknown	34*
Manganese	Unknown	80
Nitrogen	No guideline	No guideline
Silicon	No guideline	No guideline
Sulphur	No guideline	No guideline
Phosphorous	No guideline	No guideline

*Value based on freshwater ecosystem due to insufficient data to derive a marine trigger value

^Source: ANZG, 2018

Considering the typical corrosion rate for steel in seawater, which ranges from 0.1 to 0.3 mm per year (Valdez et al., 2016), it is anticipated that corrosion particulates will be deposited on the seabed at a slow and steady rate. While a minimal fraction of these particulates may dissolve into the water column, leading to a slight increase in heavy metal concentrations, the overall impact will be negligible. Given the gradual release of contaminants from the wellhead, coupled with the substantial water depth and continuous exposure to open ocean conditions (i.e., tides and currents (Section 4.3.2)), these contaminants will be rapidly dispersed and diluted throughout the water column. Consequently, the concentration of toxicants is expected to remain well below the established guideline levels as outlined in Table 7-2.

As the wellheads degrade over time, they will eventually release their contents, which is anticipated to be <1m³ of fluid trapped in the annulus from previous suspension activities. The content is expected to be aged inhibited water remnants (i.e. seawater and biocide). Given this small quantity, it will rapidly disperse into the water column and have a negligible impact on water quality. The area around the wellheads which will receive the corrosion materials and wellhead contents will also be the site of some discharges during decommissioning activities. The impact of these decommissioning discharges (Table 7-14) on water quality is assessed in Section 7.8.3.1. The worst-case impact of these materials on water quality has been evaluated to be minor and temporary, given the small quantities, low toxicity and dispersive nature of the open ocean environment. Recovery of water quality is expected within hours of the decommissioning activities being completed. If equipment is left in-situ there is potential for a cumulative impact to water quality from discharges and corrosion materials. However, given the minor and temporary impacts expected from decommissioning discharges, cumulative impacts to water quality are unlikely.

7.3.3.2 Sediment quality

Change in sediment quality

As corrosion materials are gradually released over time, corrosive particulates will gradually fall onto the surrounding sediments. Given water depth and open ocean location, it is expected corrosion particulates will rapidly disperse. Studies of erosion and accretion around subsea structures (e.g. shipwrecks, artificial reefs) indicate indirect impacts may be limited to within 20m of the structure (Smiley 2006; Lewis and Pagano 2015). The Petrel-3 and Petrel-4 wellheads and associated equipment are ~3m tall and 3x3m wide. The wellheads weigh approximately 20,000kg each. Each TGB weighs 5.3 tons and each PGB, 6.8 tons.

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They are relatively small structures; and therefore, the 20m potentially affected area identified in these studies is considered conservative.

Of the materials typically found within low-alloy steel, only one, chromium, has established guideline values for toxicity in marine sediments in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Table 7-2) (ANZG, 2018):

- Chromium occurs in trace amounts as alloying material (~2.5% of low-alloy steel composition).

Table 7-3 provides an overview of the indicative material composition of low-alloy steel within subsea infrastructure and their associated default guideline values for sediment quality based on the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018). Where there is an absence of a default value it does not indicate they have no potential for toxicity. However, the evidence-based approach used to develop the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) indicates that these materials will pose negligible environmental risk at the concentrations found in the low-alloy steel.

Table 7-3: Indicative low alloy steel materials and associated guideline values for sediment quality in marine ecosystems

Material	Default Guideline Value (DGV)* (mg/kg)	High Guideline Value (GV-High)* (mg/kg)
Iron	No guideline	No guideline
Carbon	No guideline	No guideline
Chromium	80	370
Molybdenum	No guideline	No guideline
Manganese	No guideline	No guideline
Nitrogen	No guideline	No guideline
Silicon	No guideline	No guideline
Sulphur	No guideline	No guideline
Phosphorous	No guideline	No guideline

*Source: ANZG, 2018

It is estimated that the ANZG (2018) DGV (80mg/kg) sediment quality value for chromium will not be exceeded for 99 years within 10m of the wellhead; and associated equipment and 347 years within 20m of the wellhead and associated equipment. This is based on the assumption of no dispersion of corrosion particulates from currents, and the following parameters:

- the mass of the wellhead (5,600kg), PGB (6,800kg) and TGB (5,300kg);
- dimensions of the section above the seabed (3 x 3 x 3.3m);
- composition of alloying materials (Table 7-1);
- rate of corrosion (0.3mm per year); and
- density of marine sediment (1,700kg/m³; Cayeux (2022)).

However, given the gradual release of contaminants from the wellhead, coupled with the substantial water depth and continuous exposure to open ocean conditions, these contaminants will be rapidly dispersed across the seabed or buried through seabed accretion. Consequently, the concentration of toxicants is expected to remain well below the

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established guideline levels as outlined in Table 7-3. Other alloy materials are expected to be subject to the same corrosion process and dispersion effects resulting in comparable environmental outcomes.

7.3.3.3 Benthic habitats and communities

Change in habitat

Benthic habitat surveys indicated that the soft sediment seabed is comprised primarily of sand, coarse shell fragment and silt. Sediments in the Petrel field were dominated by sand with similar gravel, silt and clay proportions (ERM, 2011). Unvegetated soft sediments are a widespread habitat in both intertidal and subtidal areas, particularly in areas beyond the photic zone.

Following all reasonable attempts, as outlined in Figure 3-7, to remove and recover the wellheads and associated equipment, a contingency activity to leave the wellheads and associated equipment in-situ has been included in this EP, as described in Section 3.3.9.1. In this case, they will degrade slowly over a long period of time, gradually releasing corrosion materials. The wellheads, TGB, and PGB are comprised of low-alloy steel (Table 7-1) – of which the main component is iron (typically 95-98%). The toxicity of iron is only acute to marine organisms at extremely high concentrations, which are not expected to be reached due to the open ocean conditions. Section 7.3.3.2 assessed the potential impact to sediment quality by analysing the wellhead mass and dimensions of the section above the seabed, the percentage composition of alloying materials, the rate of corrosion and the assumption of no dispersion of corrosion particulates from currents. Given the water depth and open ocean location, it is expected that corrosion products will rapidly disperse. The trace elements of metals released by gradual degradation are not expected to cause toxicity to benthic or infauna species as the concentration of toxicants (i.e. chromium) is expected to remain well below the established guideline levels (ANZG, 2018) as outlined in Table 7-3.

Over time as the wellhead integrity reduces, sections of the wellheads, TGB, and/or PGB may break off and fall to the seabed, causing a small area of seabed disturbance and smothering in direct proximity to the wellhead. Relevant studies of erosion and accretion around subsea structure indicate impacts may be limited to within 20m of the structure.

Corrosion products diffused in the water column are expected to disperse rapidly from strong ocean currents in the area. Metals diffused in the seabed are expected to be limited to the immediate surrounds of the wellhead location, and within 20m of the structure. Under certain oceanic conditions, metals diffused in the seabed may resuspend into the water column and deposit further from the well head, preventing the build-up of high concentrations immediately around the wellhead. Given the widespread nature of the benthic environment and the limited scale of the impact to the seabed and water column, no significant long-term effects on habitat or ecosystem function are anticipated.

The area around the wellheads which will receive the corrosion materials and wellhead contents will also be the site of some discharges during decommissioning activities. The impact of these decommissioning discharges (Table 7-14) on benthic habitats and communities is assessed in Section 7.8.3.3. The worst-case impact of these materials on habitat has been evaluated to be minimal, temporary and restricted to a small area, given the small quantities of discharges, sparsely colonised seabed, rapid biodegradation and dispersive nature of the open ocean environment. No significant habitats, significant biota or sensitive receptors are present in the Operational Area. If equipment is left in-situ there is potential for a cumulative impact to benthic habitat and communities from discharges and corrosion materials. However, given the minor impacts expected from decommissioning discharges, cumulative impacts to benthic habitats are unlikely.

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7.3.3.4 Marine fauna

Injury / mortality to marine fauna

The main constituents of the wellheads, TGB, and PGB (Table 7-1) are only toxic to marine organisms at high concentrations (ANZG, 2018). These concentrations are not expected to be reached in this situation (i.e. the gradual decay of solid metal structures in deep water).

Iron, carbon, nitrogen, silicon, sulfur, and phosphorus are abundant in the marine environment and generally poses minimal risk to marine life (Grimwood and Dixon 1997). While molybdenum, and manganese is essential for living organisms, it is also present in seawater (ANZECC, 2000). The concentrations of these constituents from the degradation of the wellheads, TGB, and PGB are unlikely to reach the high in-water or sediment concentrations required to harm marine ecosystems given strong ocean currents diluting potential suspended metals and in-water metal concentrations surrounding the wellhead. Section 7.3.3.1 assessed the potential impact to water quality by analysing the percentage composition of alloying materials, the rate of corrosion and the assumption of no dispersion of corrosion particulates from currents. Given the water depth and open ocean location, it is expected that corroded and trace metals will rapidly disperse. The potential build-up of corroded metals in the sediments around the wellhead from deposition would be counteracted by gradual dissipation because of local sediment movements (Morelli and Gasparon, 2019). The disturbance of sediments from storms, waves and strong ocean currents is likely to redistribute the build-up of deposited corroded metals. As a result, corroded metals and trace heavy metals will be quickly dispersed, preventing the on-going presence of metals at concentrations needed to cause injury or mortality to marine fauna.

Marine fauna in the Operational Area, such as marine mammals, marine reptiles, fish, sharks and rays, are generally mobile and unlikely to have prolonged contact to in-water concentrations of any corroded wellhead constituents. The rapid dispersal of well constituents with the transient nature of marine animals means that exposure times are expected to be minimal and unlikely to cause harm. Impacts to benthic fauna is likely to be temporary and localised (within 20 m of the wellhead). While a decrease in local population size may occur to benthic fauna, rapid recolonisation is expected and therefore, no loss or disruption of habitat critical to the survival of a species or disruption to the breeding cycle of any marine fauna is expected.

Surveys on the Petrel-3 and Petrel-4 wellheads shows they have significant marine growth (Section 3.1.1). Several studies undertaken on wellheads in the NWS have observed a diverse range of reef dependant and transient pelagic species associating with structures including commercially fished species (Pradella et al. 2013). Wellheads in the NWS at depths between 82 and 135m were found to sustain full populations of *Prubrizonatus* from juveniles through to adults (Fowler and Booth 2012). The physical presence of the wellhead is likely to have a localised increase in the abundance of some fish species; thereby providing the potential for fish assemblages (Stephens 1998 cited in Frumkes 2002).

There are no marine protected areas or KEFs in the Operational Area.

The area around the wellheads which will receive the corrosion materials and wellhead contents will also be the site of some discharges during decommissioning activities. The impact of these decommissioning discharges (Table 7-14) on marine fauna is assessed in Section 7.8.3.4. Impacts to fauna from increased suspended sediments are not predicted given the small release volumes and metocean conditions. Any toxic effects are likely to be limited to small organisms such as plankton, but are not anticipated to impact species at a population level due to small volumes and the dispersive offshore environment. If equipment is left in-situ there is potential for a cumulative impact to marine fauna from discharges and

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corrosion materials. However, given the minor impacts expected from decommissioning discharges, cumulative impacts to marine fauna are unlikely.

7.3.3.5 Residual risk summary

The worst-case residual severity from the physical presence of equipment left in-situ is evaluated as Slight (1), given the low toxicity of the main constituents of the wellheads and equipment, small size and slow degradation. Any cumulative impact is unlikely given the worst-case residual severity from planned decommissioning discharges has been evaluated as slight (Section 7.8.3.5).

The likelihood of impact as a result of the activities is considered Rare (A).

Therefore, the residual risk of physical presence of equipment left in-situ due to the petroleum activities is considered Low.

7.3.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this risk include:

- Make all reasonable attempts, as detailed in the decision framework (Figure 3-7), to recover the wellheads, PGB and TGB at or below the mudline (EPO-16).

CMs relating to this risk include:

- Wellhead removal decision framework (CM-44).

EPSs and MC relating to the above are presented in Section 9.1.

7.3.5 As Low as Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
Eliminate	Full recovery of wellhead, PGB and TGB	<p>The planned activity is full removal of the wellheads, PGB and TGB at or below the mudline.</p> <p>As discussed in Section 3.3.9.1, following the pre-decommissioning inspection and well P&A operations, wellhead, PGB and TGB recovery will be carried out in accordance with the decision framework (Figure 3-7).</p> <p>The wellhead decision framework (Figure 3-7) will be implemented to ensure all reasonable attempts will be made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits of the MODU; and alternate vessel (if required). Eni commits to ensuring the MODU/vessel and wellhead cutting and recovery tools selected are of suitable and proven capability for Petrel-3 and Petrel-4.</p> <p>However, as discussed in Section 3.3.9 there can be unforeseen operational challenges that may prevent the successful full removal of subsea equipment at or below the mudline. In</p>	✓ (CM-44)

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Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
		<p>this case, the wellhead, PGB and/or TGB may be left in-situ. Figure 3-7 accounts for mechanical and abrasive jet tooling methodologies and considers MODU/vessel capabilities to ensure all options are explored and applied as appropriate. An alternate vessel scenario has been included in the event that equipment cannot be successfully recovered to the MODU. Based on the worst-case scenario of leaving all the subsea equipment in-situ, the sediment quality value for chromium (ANZG, 2018) will not be exceeded for 314 years within 10m of the wellhead, based on conservative assumptions. Considering the metocean conditions, it is expected that the toxicants concentration will remain well below the DGV and the ecotoxicology potential is therefore considered very low.</p> <p>Section 572(3) of the OPGGS Act allows for deviations to the base case should the alternative decommissioning approach deliver equal or better environmental and safety outcomes compared to complete removal. In the event it becomes necessary to leave the wellhead in-situ, the residual risk to the environment from physical presence is evaluated in Section 7.3.6 , and is considered Low risk, ALARP and acceptable.</p>	

Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
	Jetting/ excavation of the TGB	<p>In the event that the TGB is not attached to the wellhead/PGB and is partially buried, as described in Section 3.3.9.1, high pressure jetting or excavating the TGB could potentially restore lifting point access and subsequent recovery. However, these methods will generate additional seabed disturbance from jetting/excavation, increased turbidity and debris.</p> <p>Not undertaking recovery of the TGB and therefore leaving in-situ, means the long-term physical presence will:</p> <ul style="list-style-type: none"> • Provide a hard substrate resulting in the creation of a new habitat; • Potentially interrupt natural sediment movement in the immediate vicinity of the TGB remaining in-situ permanently; • Introduce contaminants to the water column and sediment surrounding the TGB as it degrades over time. These impacts are assessed in Section 7.3. <p>However, the potential impact of leaving the entirety of the subsea infrastructure in-situ (i.e., wellhead, PGB and TGB) has been used as the conservative basis for impact assessment in Section 7.3.3.</p> <p>The TGB weighs 5,300kg and is only 1.5 m high. Whereas the wellhead and PGB are ~3m and weigh 20,000kg and 6,800kg, respectively. Therefore, the surface area of the TGB for new habitat creation and potential interruption to sediment movement is much smaller than for the entirety of the equipment. The TGB is also made of low alloy steel; and is much smaller than the mass assessed for corrosion in Section 7.3.3.2; and the concentration of toxicants is expected to remain well below the established guideline levels as outlined in Table 7-3.</p> <p>Section 572(3) of the OPGGS Act allows for deviations to the base case should the alternative decommissioning approach deliver equal or better environmental and safety outcomes compared to complete removal.</p> <p>The environmental benefit of jetting/excavating the TGB in the attempt to recover, which is not guaranteed, is considered disproportionate to leaving the TGB in-situ.</p>	*
Substitute	N/A	N/A	N/A

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Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
Engineering	Wellheads monitoring	<p>The wellhead decision framework (Figure 3-7) will be implemented to ensure all reasonable attempts will be made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits of the MODU; and alternate vessel (if required). If the wellheads are left in-situ as a contingency in the event that operational challenges prevent them from being successfully removed, there is no compelling reason for wellhead monitoring given the environmental assessment is predicting negligible impacts. There is a low level of uncertainty associated with the prediction of impacts.</p> <p>A monitoring campaign is estimated to cost approximately AUD \$200,000. Numerous monitoring campaigns would be required to collect meaningful data. Impacts are unlikely to be detectable beyond the immediate area surrounding the wellhead; or be detectable for decades, given the slow rate of decay (Melchers, 2005).</p> <p>The environmental impacts and risks associated with additional vessel campaigns, and health and safety risks associated with an offshore monitoring program are considered disproportionately high to the low environmental benefits that a monitoring program would possibly provide.</p>	*

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Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
	Wellheads maintenance	<p>The wellhead decision framework (Figure 3-7) will be implemented to ensure all reasonable attempts will be made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits of the MODU; and alternate vessel (if required). If the wellheads are left in-situ as a contingency in the event that operational challenges prevent them from being successfully removed, there is no justification for maintaining the wellheads (if left in-situ), following permanent abandonment; as there is no credible risk of LOWC. There are significant, verified cement plugs above the reservoir zone (i.e. well barriers), which will not be disturbed during the abandonment activities in this EP. It has been established that the reservoir is normally-pressured, from pore and fracture gradients developed and refined during the drilling of the eight wells in the Petrel field; and a series of comprehensive Geomechanics studies (Section 8.6.2.1).</p> <p>The wells will be permanently plugged and abandoned.</p> <p>The wellheads will slowly degrade, lose their structural integrity and eventually break apart. This is inevitable, and the desired outcome.</p>	*

Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
	TGB monitoring	<p>The wellhead decision framework (Figure 3-7) will be implemented to ensure all reasonable attempts will be made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits of the MODU; and alternate vessel (if required). In the event that the TGB are partially buried, high pressure jetting or excavating the TGB could potentially restore lifting point access and subsequent recovery. However, as discussed in Section 7.1.5, the environmental benefit of jetting/excavating the TGB in the attempt to recover, which is not guaranteed, is considered disproportionate to leaving the TGB in-situ.</p> <p>If the TGB are left in-situ as a contingency in the event that operational challenges prevent them from being successfully removed, there is no compelling reason for TGB monitoring given the environmental assessment is predicting negligible impacts. There is a low level of uncertainty associated with the prediction of impacts.</p> <p>The environmental impacts and risks associated with additional vessel campaigns, and health and safety risks associated with an offshore monitoring program are considered disproportionately high to the low environmental benefits that a monitoring program would possibly provide.</p>	*
Isolation	N/A	N/A	N/A
Administrative	N/A	N/A	N/A

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7.3.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>The planned activity is full removal of the wellhead and associated equipment at or below the mudline. Following all reasonable attempts, as detailed in the decision framework (Figure 3-7), to remove and recover the wellheads and associated equipment, a contingency activity to leave the wellheads, PGB and/or TGB in-situ has been included in this EP, as described in Section 3.3.9.</p> <p>All reasonable attempts will be made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits of the MODU; and alternate vessel (if required). Eni commits to ensuring the MODU/vessel and wellhead cutting and recovery tools selected are of suitable and proven capability for Petrel-3 and Petrel-4.</p> <p>Section 572(3) of the OPGGS Act allows for deviations to the base case should the alternative decommissioning approach deliver equal or better environmental and safety outcomes compared to complete removal. In the event it becomes necessary to leave the wellheads or equipment in-situ, the residual risk from the physical presence of equipment in-situ are assessed as Low and demonstrated to be acceptable.</p> <p>The physical presence of equipment in-situ is managed in accordance with the <i>Sea Dumping Act 1981</i>. Eni has reviewed the <i>Sea Dumping Act 1981</i> and engaged with DCCEEW (Section 5), and determined the temporary P&A activities for Petrel-3 predates the Act and therefore Petrel-3 equipment abandonment does not require a permit.</p> <p>However, temporary P&A activities for Petrel-4 were conducted after the Act was in place. If any equipment is left in-situ as a result Petrel-4 abandonment, a Sea Dumping permit will be required (Section 2.1.3).</p>
Policy Compliance	No controls are proposed for the management of physical presence of the wellheads and equipment which is aligned with Eni policies and standards, given the residual risk is Low, which is acceptable.
Area Sensitivity/ Biodiversity	<p>The Operational Area does not intersect with any State or Territory marine protected areas, AMPs, wetlands of international or national importance, World, National or Commonwealth heritage properties or places, or KEFs.</p> <p>The Operational Area overlaps foraging BIAs for green turtle and Olive Ridley turtle. Physical presence of equipment in-situ has not been identified as a threat in any recovery plans or conservation advice for threatened and migratory species.</p>
ESD Principles	<p>The petroleum activities are consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> • The worst-case impact associated with this aspect is Slight (1); and the residual risk is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservatism was incorporated in assumptions and analysis of the expected components of the wellheads, mass, and decay rates. The activity of leaving equipment in-situ is contingency only. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.

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Demonstration of acceptability	
Social Acceptability	<p>Following initial consultation (as described in Section 5), Eni has re-considered the wellhead removal options. The planned activity is now full removal of wellheads and associated equipment at or below the mudline. Following all reasonable attempts, as detailed in the decision framework (Figure 3-7), to remove and recover the wellheads and associated equipment, a contingency activity to leave the wellheads and associated equipment in-situ has been included in this EP, as described in Section 3.3.9.</p> <p>During initial consultation with the NPFI and WAFIC (as described in Section 5), and no concerns were raised regarding the physical presence of the wellheads or potential snag risk, if the wellheads are left in-situ. The NPFI confirmed that NPF operators do not have any objection to the decommissioning of Petrel-3 and Petrel-4, and confirmed there is no NPF fishing effort in the immediate vicinity of the wellheads.</p> <p>During initial consultation, the Wilderness Society advised that they object to anything other than complete removal of the wellheads (Section 5). Eni confirmed that a pre-decommissioning inspection needs to be conducted to assess the integrity of the structures and come to a final decision on the end state of the infrastructure; and that the options will be evaluated considering impacts to the environment, cultural heritage and other marine users; and as per regulatory requirements.</p> <p>During initial consultation, DPIRD advised that given the uncertainty of the overall integrity of the structures drilled in the 1980s, they requested Eni considers risks associated with any partial removal options carefully, including in relation to the future risk of any structures or equipment left behind in the environment (Section 5). As described above, Eni confirms that the pre-decommissioning inspection will assess well integrity, status of cleaning and modification, and inform final selection of the wellhead removal option. The original options assessment undertaken by Eni considered all impacts and risks against environmental, technical, health and safety, social and economic criteria. This assessment identified leave in-situ as the most preferred decommissioning option. Given ongoing risks from the leave in-situ option from the physical presence of equipment in-situ was assessed as Low and demonstrated to be acceptable, in the event this option is selected following the pre-decommissioning inspection.</p> <p>Following this, Eni have re-considered the wellhead removal options and have committed to full removal of wellheads and associated equipment at or below the mudline. All reasonable attempts will be made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits of the MODU and alternate vessel (if required). Eni commits to ensuring the MODU/vessel and wellhead cutting and recovery tools selected are of suitable and proven capability for Petrel-3 and Petrel-4.</p> <p>Section 572(3) of the OPGGS Act allows for deviations to the base case should the alternative decommissioning approach deliver equal or better environmental and safety outcomes compared to complete removal. In the event it becomes necessary to leave the wellheads or equipment in-situ, the residual risk from the physical presence of equipment in-situ are assessed as Low and demonstrated to be acceptable.</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
ALARP	The residual risk has been demonstrated to be ALARP.

Given the localised impacts to water and sediment quality, benthic habitats and communities and marine fauna, potential impacts associated with physical presence if equipment is left in-situ as a contingency only are considered to be Slight (1). The residual risk is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5: Eni acceptability factors). Potential impact associated with physical presence of equipment in-situ is considered acceptable and ALARP.

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7.4 Atmospheric Emissions and Greenhouse Gas

7.4.1 Summary of Environmental Risk Assessment

Hazard	Atmospheric Emissions and Greenhouse Gas		
	Frequency	Severity	Risk
Inherent Risk	B	1	L
Residual Risk	C	1	L

7.4.2 Description of Hazard

7.4.2.1 Scoping

During the petroleum activities, atmospheric and greenhouse gas (GHG) emissions will be generated from:

- MODU operations;
- Vessel operations;
- Helicopter operations;
- Cut and recover casing;
- Material use; and
- Waste retrieval and end-of-life treatment.

GHG emissions are described as Scope 1, 2 or 3, which relate to who has operational control of those emissions (Clean Energy Regulator, 2021). Scope 1 is defined as direct emissions created as a result of the activities, for example, emissions released as a result of burning fuel during offshore campaigns. Scope 2 is related to GHG emissions when electricity is purchased from the grid. Scope 3 emissions occur as a consequence of the activities of a facility, but from sources not owned or controlled by that facility's business, for example, material use and waste disposal.

7.4.2.2 Boundary of Assessment

Non-GHG emissions include sulphur oxides (SO_x), volatile organic compounds (VOC) and nitrous oxides (NO_x), and may be released to the atmosphere during fuel combustion and vessel operations. Vessels may utilise ozone-depleting substances (ODS) in closed-system rechargeable refrigeration systems. There is no planned release of ODS to the atmosphere.

The vessels and MODU will not use an incinerator to dispose of waste.

The boundary of assessment for the GHG emissions estimation is outlined in Table 7-4. As there is no planned flaring or venting, the direct Scope 1 emissions cover fugitive emissions resulted from the activities, including the emissions from the casing retrieval.

During the retrieval of the casing, when the seal is broken, a small volume of gas might be released (~1m³). This procedure may be executed once for Petrel-3 and twice for Petrel-4, as the latter has an additional casing that requires removal. Each instance will follow the same controlled release process through the choke manifold to manage any gas emissions.

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There are no Scope 2 emissions. Scope 3 emissions sources include MODU and vessel operations, helicopter travels, material use (only the major items are included) and waste generated.

The use of fuel (specifically marine-grade diesel) to power MODU and vessel engines, generators, and mobile and fixed plant (e.g., ROV, back-deck crane, generator), will result in GHG emissions of greenhouse gases such as carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). These gases are recognised to also contribute to the GHG emissions loading globally, which could in turn contribute to climate change.

Table 7-4: Boundary of assessment for GHG emissions estimation

Scope / Project Activities	Monitoring and Pre-decommissioning Activities	Decommissioning Activities	Post-decommissioning Activities
Scope 1	N/A	• Fugitives	N/A
Scope 2	N/A	N/A	N/A
Scope 3	• Vessels ¹	• MODU ¹ • Vessels ¹ • Helicopter • Materials ² • Waste ³	• Vessel ¹

¹ The general transit to and from the Operational Area is excluded from the scope of the EP.

² Assumed major items only - cement, casing and drilling fluid.

³ Assumed 100% retrieval of wellhead, TGB, PGB and guideposts.

7.4.2.3 GHG Modelling

GHG emissions were estimated by multiplying the activities with the emissions factors in accordance with the methods in NGER Determination 2008. Diesel oil for transportation and kerosene emissions factors from NGER Determination were used for estimating the emissions from vessel operations and helicopter, respectively. The embodied carbon emissions factors of the major materials used were taken from the ICE database. It was assumed that all the retrieved materials will be landfilled as industrial waste, with the emissions factor taken from UK GHG Conversion Factors.

Table 7-5 shows the GHG emissions for the project activities. Scope 1 emissions were calculated to be immaterial (less than 1% of the total emissions). The total Scope 3 emissions were estimated to be approximately 29.5 kt CO₂-e, less than ~0.0015% of the Australian carbon budgets for the duration 2025 to 2030.

Figure 7-1 shows the breakdown of the GHG emissions by source. Vessel operations, MODU operations and material use generated most of the GHG emissions, contributing ~66%, 17% and 15% of the total emissions respectively, with helicopter and waste emissions less than ~1% of the total emissions.

Table 7-5: GHG emissions estimation for the project activities

Emissions Scope	Monitoring and Pre-decommissioning Activities	Decommissioning Activities	Post-decommissioning Activities	Total Emissions (t CO ₂ -e)
Scope 1 (t CO ₂ -e)	0	< 0.1	0	< 0.1
Scope 2 (t CO ₂ -e)	0	0	0	0

Emissions Scope	Monitoring and Pre-decommissioning Activities	Decommissioning Activities	Post-decommissioning Activities	Total Emissions (t CO ₂ -e)
Scope 3 (t CO₂-e)				
Vessels ¹	6,760	12,630	210	19,600
MODU ²	0	4,950	0	4,950
Materials ³	0	4,480	0	4,480
Helicopter ⁴	0	260	0	260
Waste ⁵	0	200	0	200
Total (t CO₂-e)	6,760	22,520	210	29,490

¹ Assumed contingencies included in the durations/timing, transit speed of 4 knots within the OA.

² Based off a semisubmersible MODU on DP for conservatism.

³ Assumed 400 t cement/well, 300 t casing/well and 300 t WBM/well.

⁴ Assumed fuel consumption 550 L/h, travel speed 140 knots, 20% of travel time taxiing.

⁵ Assumed retrieved materials weigh 200 t /well, 100% retrieval from field and landfilled (for conservatism).

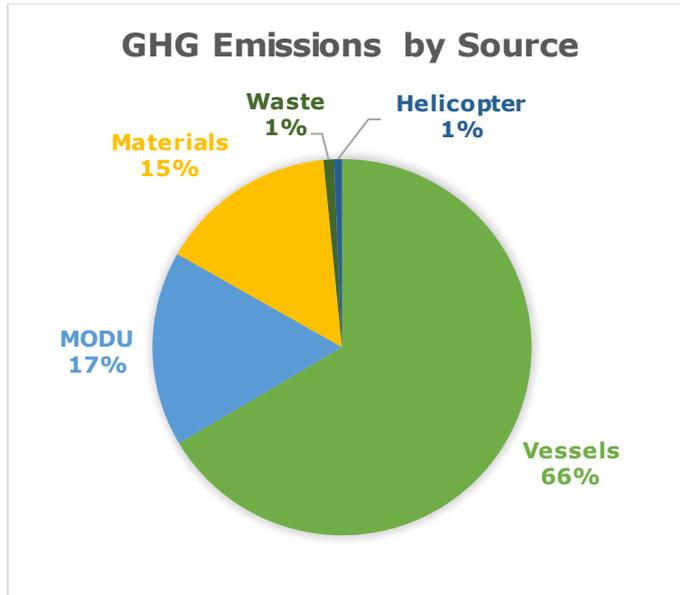


Figure 7-1: Total GHG emissions (Scopes 1, 2 and 3) by source

7.4.3 Potential Environmental Impact

Atmospheric and GHG emissions have the potential to result in:

- Change in air quality.

Potential receptors that may be impacted are:

- Air quality.

Given the relatively short duration of the campaigns and therefore minimal fuel usage, the contribution of GHG emissions to the global carbon budget is expected to be insignificant and is not evaluated further.

There are no marine protected areas or KEFs within the Operational Area.

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7.4.3.1 Air quality

Change in air quality

Hydrocarbon combustion may result in a temporary, localised reduction of air quality in the environment immediately surrounding the emission source.

The quantities of gaseous emissions are small and will quickly dissipate into the surrounding atmosphere. Atmospheric emissions will be similar to other vessels operating in the region for both petroleum and non-petroleum activities.

Local impacts typically associated with the atmospheric 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 (i.e., within a 500m radius).

As the activity will occur in open-ocean offshore waters, the combustion of fuels in such remote location will not impact on air quality in coastal towns, considering that the nearest township is Wadeye, located ~180km southeast of the Operational Area. The quantities of CO₂ emissions are relatively small (29,490t CO₂-e for all of the monitoring and decommissioning campaigns) and will quickly dissipate into the surrounding atmosphere.

Accidental release and fugitive emissions of Ozone Depleting Substances (ODS) has the potential to contribute to ozone layer depletion. Maintenance of refrigeration systems containing ODS is on a routine, but infrequent basis, and with controls implemented, the likelihood of an accidental ODS release of material volume is considered rare.

Potential impacts are expected to be short-term, localised air quality changes, limited to the air shed local to the Operational Area. Atmospheric emission impacts are not expected to have direct or cumulative impacts on sensitive environmental receptors, or above National Environmental Protection (Ambient Air Quality) measures. Given the low sensitivity of the receiving environment – open offshore location away from coastal communities – the impact on air quality is anticipated to be slight.

Emissions will be small in quantity and will dissipate quickly into the surrounding atmosphere, therefore any reduction in air quality is not expected to result in any measurable effect.

7.4.3.2 Residual risk summary

The worst-case residual severity to air quality from atmospheric emissions is evaluated as Slight (1), given the low volume of emissions from the activity. The likelihood of atmospheric and GHG emissions occurring as a result of the activities is considered Likely (D). Therefore, the residual risk of atmospheric and GHG emissions due to the petroleum activities is considered Low.

7.4.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this risk include:

- No significant decrease in air quality (EPO-04).

CMs relating to this risk include:

- Drilling contractor bulk solids transfer procedure (CM-08);
- Waste Incineration (CM-09);

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- Vessel fuel quality (CM-10);
- International Air pollution prevention certification (CM-11);
- Ozone-depleting substance handling procedures (CM-12);
- Eni E&P Marine Manual (Marine assurance standard) (CM-13); and
- Planned Maintenance System (PMS) (CM-14).

EPSs and MC relating to the above are presented in Section 9.

Monitoring and reporting of emissions are presented in Section 10.8.

7.4.5 As Low as Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
Eliminate	Eliminate the use of the MODU or vessels in the Operational Area	Vessels are required to perform equipment removal activities and vessel use cannot be eliminated.	*
	No incineration of waste on MODU or vessels	Eliminates the potential for emissions due to waste incineration impacting air quality. However, increase in health risk from storage of wastes and transport to land.	✓ (CM-09)
Substitute	Use green energy sources on the MODU and vessels	Alternatives such as renewable energy generators (wind and sun) are not viable options as they are weather-dependent and do not supply continuous base load power. Vessels powered by renewables is not currently accepted technology, are not widely available and engaging them would have significant cost and schedule impacts. For the short duration of the campaigns, the benefit is considered grossly disproportionate. The vessels and MODU will use MDO, which is low in sulphur dioxide, in accordance with Marine Order 97.	*
	Vessel fuel quality (in compliance Marine Order 97)	Reduces emissions through use of low-sulphur fuel in accordance with Marine Order 97. Minimal cost as vessels are required to comply with Marine Orders.	✓ (CM-10)
Engineering	N/A	N/A	N/A
Isolation	N/A	N/A	N/A
Administrative	Vessel air pollution prevention certificate (in compliance Marine Order 97)	Reduces the probability of potential impacts to air quality. Minimal cost, as vessels are required to comply with Marine Orders.	✓ (CM-11)
	ODS procedures	Where present, ensure vessel's ODS are managed in a way that is responsible and as per international standards.	✓ (CM-12)

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Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
	Planned Maintenance System	Ensures vessels and MODU is running efficiently and are as per manufacture specifications. Routine maintenance endeavours to ensure emissions are minimal. No additional costs, is industry best practice.	✓ (CM-14)

7.4.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	Atmospheric emissions will be managed in accordance with relevant legislative requirements, including compliance with international maritime conventions and Australian legislation, specifically: <ul style="list-style-type: none"> • MARPOL 73/78: Annex VI: Regulations for the prevention of air pollution from ships • Marine Order 97: Marine Pollution Prevention – Air Pollution • relevant requirements of the National Pollutant Inventory National Environmental Protection Measure.
Policy Compliance	The management of atmospheric emissions from the petroleum activities are aligned with Eni policies and standards. The residual risk is Low, which is acceptable. The EPO, CM and EPS that will be implemented are consistent with Eni internal requirements.
Social Acceptability	To date, no relevant person concerns have been raised regarding atmospheric emission impacts (refer Section 5). The Clean Energy Regulator advised that NGER requirements and potentially Safeguard Mechanism requirements need to be considered in the EP. Emissions reporting requirements are captured in Table 10-3. An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.
Area Sensitivity/ Biodiversity	Offshore location means winds will disperse and dilute emissions rapidly. The estimated volume of total CO ₂ emissions (29,490t CO ₂ -e for all of the monitoring and decommissioning campaigns) is relatively low. No human settlements nearby. Atmospheric emissions have not been identified as a threat in any recovery plans or conservation advice for EPBC Act listed threatened and migratory species.
ESD Principles	The activity is consistent with the principles of ESD because: <ul style="list-style-type: none"> • The worst-case impact associated with this aspect is Slight (1); and the residual risk is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage; and there is no scientific uncertainty associated with the potential impact. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

Potential impacts associated with atmospheric emissions are Slight (1) due to the relatively low total volume of emissions. The residual risk is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Potential impact associated with atmospheric emissions is considered acceptable and ALARP.

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7.5 Noise Emissions

7.5.1 Summary of Environmental Risk Assessment

Hazard	Noise Emissions - Continuous		
	Frequency	Severity	Risk
Inherent Risk	B	1	L
Residual Risk	C	1	L

7.5.2 Description of Hazard

During the petroleum activities, noise emissions will be generated from:

- Geophysical survey;
- MODU mobilisation and positioning;
- Cutting of the wellheads/casing;
- MODU operations;
- Vessel operations;
- Helicopter operations; and
- ROV operations.

7.5.2.1 Geophysical survey

Geophysical survey instrumentation specifically MBES, SSS, and sub-bottom profiling (SBP), are designed to characterise the seabed topography, bathymetry, potential geohazards, and other seafloor features using impulsive sound sources. Impulsive noise can be defined as a series of pulsed sound events that are brief, broadband, atonal and transient. The geophysical surveys will be undertaken using a multi-purpose survey vessel and are expected to last for approximately 20 days at each well location.

Impulsive sound sources generated by relevant geophysical survey equipment are detailed in Table 7-6.

MBES and SSS operate at high frequencies (10-900kHz) producing narrow sound beams primarily directed at the seabed (Seiche, 2020). This results in limited horizontal sound spread and rapid sound energy dissipation. The high frequency pulses of sound are produced in a highly directional and narrow beams, which rapidly attenuate outside of the beam (JASCO, 2013).

SBP use lower frequencies (2-16kHz) within the hearing range of most marine fauna. SBP also focuses sound energy towards the seabed, minimizing horizontal sound propagation. SBPs produce directional beams of sound towards the seabed and therefore sound propagation tends to be downwards in the water column with limited horizontal propagation.

Noise modelling studies conducted by McPherson and Wood (2017), Wood and McPherson (2019), prepared for the Beach Energy Geophysical and geotechnical seabed survey EP modelled impulsive noise sources of a geophysical surveys. Predictions for these studies found limited impulsive effect criteria to be reached within metres of an SBP sound source, including:

- Fish (swim bladder) mortality/potential mortal injury – 0.3m;

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- Fish (swim bladder) recoverable injury – 0.1m;
- Fish (no swim bladder) mortality/potential mortal injury – 0.1m;
- Fish (no swim bladder) recoverable injury – 0.1m;
- Turtle mortality/potential mortal injury – 0.3m;
- Marine mammals behavioural – 2.0m;
- Low-frequency cetaceans PTS – not reached.
- Low-frequency cetaceans TTS – 10m;
- High-frequency cetaceans TS and TTS – not reached.
- Very-high frequency cetaceans PTS – 0.6m; and
- Very-high frequency cetaceans TTS – 1.2m.

It is noted that effect criteria for invertebrates and lobster were not reached. Consequently, no potential impact is expected for invertebrates and crustaceans from geophysical surveys. Sound propagation from geophysical surveys is unlikely to exceed effect criteria range of two metres from the sound source. This distance is significantly lower than the range predicted for exceedance of effect criteria from vessel operations, where the maximum distance to effect criteria for vessel operations was predicted to be 11.8km (Table 7-11). It is expected that the underwater noise generated by geophysical surveys will be largely indistinguishable from background survey vessel noise at lower frequencies. Consequently, the noise produced by geophysical surveys will be considered as part of the noise generated by vessel operations (Section 7.5.2.5).

Table 7-6: Summary of noise emissions source levels of geophysical activities

Noise Source	Source levels	Literature source
MBES	SPL: 210-247dB re 1µPa @ 1m	(Seiche, 2020)
Side-Scan Sonar (SSS)	SPL: 200 – 234dB re 1µPa @ 1m	(Seiche, 2020)

7.5.2.2 MODU mobilisation and positioning

Long baseline or ultra-short baseline (USBL) transponder arrays may be installed on the seabed for metrology and MODU positioning. These arrays, consisting of transponders within a 1500-1800 metre radius of the wellheads, will emit short, intermittent acoustic pulses (impulsive sound). Transponder transmissions, typically between 21 and 31kHz, last 3 to 40 milliseconds and occur in bursts of up to six hours per well. For general positioning, a pulse is emitted every five seconds for approximately four hours, while precise positioning requires a pulse every second for about two hours.

Estimated sound pressure levels (SPL) from transponders are 180 to 206dB re 1µPa at 1 metre (Jimenez-Arranz et al., 2020).

Based on sound propagation study by Warner and McCrodan, (2011), transponder noise is unlikely to exceed the behavioural response criteria for cetaceans (160dB re 1µPa) beyond 42 metres. This distance is significantly smaller than range predicted for cetacean behavioural response from vessel operations. Such that the maximum distance to the continuous noise effect criteria was predicted by underwater sound modelling for MODU operations was 11.8km for behavioural response to marine mammals (Table 7-11).

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It is expected that the underwater noise generated by transponder arrays will be largely indistinguishable from background survey vessel noise at lower frequencies. Consequently, the noise produced by transponders for MODU mobilisation and positioning will be considered as part of the noise generated by MODU operations (Section 7.5.2.4).

7.5.2.3 Cutting of casing/wellhead

A casing cutting tool will be used to cut the well casing. The tool performs the cut inside the well and will take approximately 10 minutes. This is likely to be performed once for Petrel-3 and twice for Petrel-4 (see Section 3.3.7 for further details).

Removal of the wellhead will be performed by internal cutting (mechanical or abrasive jet cutting). The wellhead removal decision framework (Figure 3-7) outlines both internal cutting options considered for cutting the wellheads at or below the mudline. For internal cutting, the process will take an estimated 10 to 14 hours per well and some continuous noise will be produced.

As detailed in Section 3.3.9, should operational challenges prevent successful removal and recovery of the wellhead, PGB and TGB, or the TGB itself, the wellhead guideposts will be cut to reduce the height profile of the guideposts left in-situ. The guideposts will be cut with an ROV equipped cutting tool and it is estimated that each guidepost will take 1 to 2 hours to cut with some continuous noise produced.

Pangerc et al., (2016) found that the continuous noise generated during diamond wire cutting of a 32-inch conductor in approximately 80 meters of water was largely indistinguishable from background vessel noise at lower frequencies. Whilst the wellheads won't be cut using diamond wire, it is assumed that the wellhead internal cutting methods and guidepost cutting methods (hydraulic cutter, grinder or saw blade) will generate less continuous noise. This finding aligns with acoustic modelling by JASCO (Koessler and McPherson, 2021) which showed minimal increase in noise levels when comparing a cutting operation to standard drilling activities. Consequently, the noise produced by wellhead cutting or guidepost cutting will be considered negligible in comparison to the noise generated by MODU operations (Section 7.5.2.4).

7.5.2.4 MODU Operations

The decommissioning campaign is currently maintaining the flexibility to use either a moored MODU, a DP-assisted moored MODU, a MODU on DP, a jack-up MODU, or LWIV (see Section 3.5.1). Therefore, the MODU will generate continuous sound from onboard equipment vibrations (e.g., pumps, generators, and machinery) and from the thrusters if a MODU on DP or DP-assisted is considered. The decommissioning campaign using the MODU is expected to take up to 60 days (30 days per well) (see Section 3.1.3). If an alternate vessel campaign is required for wellhead removal, it will shorten the duration of the MODU in the field (60 days total; as outlined in Table 3-3). The noise generated from the MODU operations has been used as a worst-case scenario for the impact assessment

Review of sound source levels for each potential drill rig option found a MODU under DP is considered the noisiest scenario of all the options identified above (Austin et al., 2023; Austin et al., 2018; McPherson et al., 2021). Whilst there are no direct studies or data for underwater noise relating to a LWIV operating on DP, the LWIV is considered likely to have similar DP thruster power to a MODU.

The underwater sound measurements obtained for the West Aquarius semisubmersible whilst on DP identified within Austin et al., (2023) has been used for this assessment. The

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modelling report identified broadband frequency levels of 10Hz to 25kHz with a mean monopole source level of 183–187dB re 1µPa m for a MODU on DP.

7.5.2.5 Vessel Operations

Vessel operations generate continuous noise from propellor cavitation, thrusters, hydrodynamic flow around the hull, and the operations of machinery and equipment.

The vessel-based monitoring and pre-decommissioning campaigns have an expected duration of 14 to 40 days; with the decommissioning campaign is expected to take up to 60 days (30 days per well) Should the alternate vessel campaign be required for wellhead removal, it will likely be undertaken by a CSV (up to 7 days per well) (see Section 3.1.3). The vessel-based post-decommissioning survey has a duration of 2 days per well, this campaign has the potential to occur at the same time as the decommissioning campaign. For all the activities, there will be a maximum of three vessels within the Operational Area at any one time.

Vessels typically produce sound levels around 160-180dB re 1µPa at 1 m, generally dominated by low frequencies during transit and drop with reduced speed. The sound produced usually increases with increasing vessel size; varying from 160 to 175dB (re 1µPa) for small vessel (<50m), to 165 to 180dB (re 1µPa) for vessels in the 50 to 100m size class, and up to 190dB re 1µPa SPL for large ships (Gotz et al., 2009). Noise levels are the highest when vessels are holding position, with the use of thrusters to maintain position (under DP). A vessel using DP produces noise of low frequency, less than 1kHz, with broadband values from 177dB re 1µPa at 1m (Simmonds et al., 2004). More recently, Welch et al., (2023), modelled underwater sound levels from a support vessel as 173.0dB re 1µPa whilst slowly transiting, up to 190.0dB re 1µPa whilst under DP. Similar noise levels are expected to be generated by the vessels used for the decommissioning activity.

7.5.2.6 Helicopter operations

The presence of the helicopter and its associated sound field will be highly transient during take-off and landing on the MODU. On approach to the drill rig the helicopter will descend to the helideck where there is greatest potential to ensonify the water column with continuous sound. Sound pressure will be greatest at the sea surface and rapidly diminish with increasing depth. Helicopters will be used for crew changes during the decommissioning campaign with flights potentially occurring up to once per day during this time. Helicopters will only be required for the abandonment campaign, therefore, for a maximum of 60 days.

Helicopter engine sound is emitted at a range of frequencies generally, below 500Hz (Richardson et al., 1995). Richardson et al., (1995) reported helicopter sound (for Bell 214 type) being audible in air for four minutes before it passed over receivers, but only detectable underwater for 38 seconds at 3m depth and for 11 seconds at 18m depth for the same flight path. Thus, the predicted extent of impact is between 3 to 18m for a period of 11 – 38 seconds twice a day (landing and take-off). It is expected that the upper water column ensonified by helicopter operations will be largely indistinguishable from background MODU noise at lower frequencies. Consequently, the noise produced by helicopter operations will be considered as part of noise generated by MODU and vessel operations.

7.5.2.7 ROV operations

ROV operations will be undertaken during the petroleum activities, notably cleaning of the wellhead and during support operations and in the event of dropped objects. The ROV will be deployed from the MODU, and the continuous noise generated will typically be of considerably lower intensity than the DP vessel noise. It is expected that the underwater

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noise generated by ROV operations will be largely indistinguishable from background MODU noise at lower frequencies. Consequently, the noise produced by ROV operations will be considered as part of noise generated by MODU and vessel operations.

Table 7-7 provides a summary of the continuous sound sources relevant to this activity and the relevant literature sources for each.

Table 7-7: Summary of noise emissions source levels from decommissioning activities

Noise Source	Source levels	Literature source
Sub-Bottom Profiler (SBP)	SPL: 191.7dB re 1µPa @ 1m Per-pulse SEL: 171.4dB re 1µPa2.s	(Martin et al., 2012)
Cutting operations	Broadband SPL: 161.4dB re 1µPa	(Koessler and McPherson, 2021)
MODU under DP	183–187dB re 1µPa m	(Austin et al., 2023)
LWIV under DP	183–187dB re 1µPa m	N/A
Support Vessel under DP	Broadband SPL: 190.0dB re 1µPa	(Welch et al., 2023)
Support Vessel in slow transit	Broadband SPL: 173.0dB re 1µPa	(Welch et al., 2023)
Helicopter	SPL: 162dB re 1µPa m	(Richardson et al., 1995)

Broadband SPL calculated over 10 Hz to 25 kHz range.

7.5.2.8 Noise Criteria Thresholds

This assessment focuses solely on continuous noise criteria thresholds. This approach is based on the description of hazards which identified that continuous noise sources generate the largest areas of underwater noise exposure.

Different species groups perceive and respond to sound differently, and so a variety of exposure criteria for the different types of impacts and species groups are considered. The following noise effect thresholds were used in the impact and risk assessment:

- Frequency-weighted accumulated sound exposure levels (SEL24h) from the NOAA Technical Guidance (NMFS, 2018) and Southall et al., (2019) for the onset of PTS and TTS in marine mammals;
- Un-weighted SPL for behavioural threshold for marine mammals based on NOAA, (2024);
- Frequency-weighted accumulated sound exposure levels (SEL24h) from Finneran et al., (2017) for the onset of PTS and TTS in marine turtles;
- Sound exposure guidelines for fish, fish eggs, and larvae (Popper et al., 2014);
- Current available literature on the sound exposure impacts to marine invertebrates for continuous noise is limited. Information is only available to define threshold levels for assessment for impulsive sources. Consequently, impacts to invertebrates have not been discussed further in this section; and
- There are no thresholds for underwater sound impacts to birds.

Recent Commonwealth guidance has defined “injury to blue whales” as both PTS and TTS hearing impairment, as well as any other form of physical harm arising from anthropogenic sources of underwater sound (DAWE, 2021).

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The NOAA (2024) behavioural threshold for marine mammals of a SPL at 120dB re 1µPa is current best available science. This is based on Southall et al. (2007) and Southall et al. (2021) literature reviews and studies in relation to marine mammal behavioural response to continuous sound emissions.

Accomando et al. (2024) have updated the underwater sound exposure thresholds for marine turtles. The proxy model does not use these thresholds. In the absence of predictions against Accomando et al. (2024) exposure thresholds for marine turtles, Eni have chosen to use the PTS and TTS thresholds for low frequency cetaceans (Table 7-10) as a proxy for potential PTS and TTS for marine turtles. This is considered a highly conservative and precautionary approach, given:

- The PTS and TTS thresholds for low frequency cetaceans are numerically lower than the PTS and TTS thresholds criteria for marine turtles:
 - PTS turtles 220db, PTS LF cetaceans 199db (Table 7-9)
 - TTS turtles 200db, TTS LF cetaceans 179db (Table 7-10)
- The weighting function applied is based on the more sensitive broader hearing frequency range of low frequency cetaceans. Generalised hearing ranges are:
 - LF cetacean 7 Hz to 35 kHz
 - Marine turtles below 2 kHz (NOAA, 2024a).

This application of low-frequency cetacean threshold criteria, due to the lower thresholds values and wider frequency weighting range, effectively provides a highly conservative and protective framework for marine turtles in the absence of using Accomando et al. (2024).

Table 7-8 to Table 7-10 provide a summary of the continuous noise criteria thresholds identified within the relevant literature that has been used for the assessment of fish, marine turtles, and marine mammals, respectively.

Table 7-8: Continuous noise: criteria for noise exposure for fish

Receptor	Behaviour	Mortality and Potential mortal injury	Impairment		
			Recoverable injury	TTS	Masking
Fish: No swim bladder (particle motion detection)	(N) Moderate (I) Moderate (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate
Fish: Swim bladder not involved in hearing (particle motion detection)	(N) Moderate (I) Moderate (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate
Fish: Swim bladder involved in hearing (primarily pressure detection)	(N) High (I) Moderate (F) Low	(N) Low (I) Low (F) Low	170 dB SPL for 48 h	158 dB SPL for 12 h	(N) High (I) High (F) High

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Fish eggs and fish larvae	(N) Moderate (I) Moderate (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low
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Source: Popper et al., 2014.

Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N), intermediate (I), and far (F).

Table 7-9: Continuous noise: criteria for noise exposure for marine turtles

Receptor	Masking	Behaviour	PTS	TTS
			Weighted SEL _{24h} (LE _{24h} ; dB re 1µPa ² ·s)	
Marine turtle	(N) High (I) High (F) Moderate	(N) High (I) Moderate (F) Low	220	200

Note: Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N) – tens of meters, intermediate (I) – hundreds of meters, and far (F) – thousands of meters.

Source: Popper et al., 2014; Finneran et al. 2017.

Table 7-10: Continuous noise: criteria for noise exposure for mammal mammals

Hearing group	Behavioural	PTS	TTS
	SPL (L _p ; dB re 1µPa)	Weighted SEL _{24h} (LE _{24h} ; dB re 1µPa ² ·s)	
Low-frequency (LF) cetaceans	120	199	179
Mid-frequency (MF) cetaceans		198	178
High-frequency (HF) cetaceans		173	153
Very High-frequency (VHF) cetaceans		219	199

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

L_p denotes sound pressure level period and has a reference value of 1 µPa.

LE denotes cumulative sound exposure over a 24 h period and has a reference value of 1 µPa²·s.

7.5.2.9 Modelling

The use of DP systems for maintaining a stationary vessel during certain activities was identified as likely to be the noisiest activity associated with the decommissioning activity. The activity of MODU mobilisation and positioning identified the requirement of up to potentially three support vessels under DP, whilst manoeuvring the MODU, on idle, into position.

The noise assessment approach taken was to contrast the noise associated with the decommissioning campaign to relevant existing information as site-specific modelling was not conducted. The approach utilised a conservative approach, primarily using available literature and relevant modelling. Table 7-7 summarises the sound sources relevant to the planned petroleum activity and the associated sound frequencies, levels and literature references.

An assessment conducted by Welch et al., (2023) prepared for the ConocoPhillips Otway Drilling Program modelled a scenario for the positioning of the MODU for the drilling

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campaign; with three vessels under DP in the presence of the MODU on idle. The modelling results for this scenario presented in Welch et al., (2023) have been used for the assessment below as they represent the scenario anticipated to produce the highest levels of continuous noise emissions for the petroleum activities for this EP.

While acknowledging the distinct characteristics of the Otway and Bonaparte basins, employing underwater sound modelling from the ConocoPhillips Otway Drilling Program can provide valuable insights. The fundamental principles of sound propagation in marine environments are consistent across regions, and the Otway Basin, with its established modelling framework for multiple vessel operations, offers a conservative foundation for initial predictions which considers high sound source levels representative of this activity and multiple vessels operating at the same time.

See Section 7.5.2.8 for further details on the applicable noise criteria thresholds that have been used for the assessment below. The maximum effect distances of the behavioural disturbance to marine mammals and fish, and to PTS and TTS thresholds for marine mammals and turtles are presented in Table 7-11 from the representative modelled MODU mooring scenario from Welch et al., (2023).

Table 7-11: Maximum distance (km) from the continuous sound source to each the noise effect criteria during mooring (source: Welch et al., 2023)

Hearing Group	Threshold	Behavioural	Impairment			Injury	
			Masking	TTS	Recoverable injury	PTS	Mortality or potential mortal injuries
<i>SPL (Lp; dB re 1µPa)</i>		<i>km</i>					
Fish (swim bladder involved in hearing)	158 / 170	N/A	N/A	0.13	0.02	N/A	N/A
LF cetaceans	120	11.8	N/A	N/A	N/A	N/A	N/A
<i>SEL24h threshold (LE,24h; dB re 1µPa²·s)</i>		<i>km</i>					
LF cetaceans	179 / 199	N/A	N/A	3.11	N/A	0.29	N/A
HF cetaceans	178 / 198	N/A	N/A	0.09	N/A	-	N/A
VHF cetaceans	153 / 173	N/A	N/A	1.43	N/A	0.12	N/A
Otariid Seals	199 / 219	N/A	N/A	0.08	N/A	-	N/A
Marine Turtles	200 / 220	N/A	N/A	0.22	N/A	-	N/A

Note: A dash indicates the level was not reached within the limits of the modelled resolution.

7.5.3 Potential Environmental Impact

Continuous noise emissions have the potential to result in:

- Change in fauna behaviour; and
- Auditory impairment [masking, recoverable injury, Temporary Threshold Shift (TTS)] or auditory injuries [mortality or potential mortal injuries, Permanent Threshold Shift (PTS)] to marine fauna.

Potential receptors that may be impacted are:

- Fish;
- Marine reptiles; and

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- Marine mammals.

Studies have identified marine mammals, fish and sharks and marine reptiles to be susceptible to behavioural change from vessel noise, with documented observations of behavioural and acoustic responses, auditory masking, and avoidance (Erbe et al., 2019, Chapius et al., 2019, Popper et al., 2014).

Auditory impairment may be in the form of a temporary threshold shift (TTS) from which an animal recovers within minutes or hours, or a permanent threshold shift (PTS) from which the animal does not recover. Marine fauna exposed to continuous underwater sound generated by the petroleum activities are not expected to experience auditory impairment or loss of hearing sensitivity, either temporarily or permanently.

The onset of auditory impairment, TTS and PTS to marine mammals, fish and sharks and marine reptiles requires either chronic exposure (over 24 hours) or sudden intense sound exposure (Southall et al., 2019, Popper et al., 2014).

7.5.3.1 Fish

Fish and sharks in the Operational Area and surrounds are expected to be transient individuals, based on the absence of BIAs and critical habitat (see Section 4.4.6).

Change in behaviour

Behavioural impacts to fish, including and sharks, from the petroleum activities, such as avoidance behaviour of continuous sound sources, may potentially occur (Popper et al., 2014). However, all of the EPBC listed fish species identified to potentially occur in the area (Table 4-5, Appendix B: Environmental Values and Sensitivities), are highly mobile species, and therefore are expected to be transitory in nature. Mobile species are expected to actively move away from the sound source. Based on the absence of suitable habitat for site-attached fish, only transient individuals are expected to be within the Operational Area and subject to temporary behavioural changes close to the source of continuous noise emissions. Potential localised and temporary behavioural changes to individual fish in the Operational Area is not expected to impact fish populations.

Auditory impairment to marine fauna

Fish were modelled to reach the criteria for 48-hour recoverable injury within 20m, and the criteria for 12-hour TTS within 130m of the MODU mooring scenario for the petroleum activity (see Table 7-11). No habitats likely to support site-attached fish have been identified within the Operational Areas. Therefore, it is unlikely that fish species would be present within 20m for a period of 48 hours, or 80m for 12 hours whilst MODU positioning is occurring. Given the transient nature of fish and their ability to move away from noise sources, the potential of individuals experiencing TTS due to continuous underwater noise within the Operational Area is not considered credible.

7.5.3.2 Marine reptiles

The EMBA overlaps BIAs for four species of marine reptiles that are sensitive to changes in underwater noise emissions as identified by the EPBC Act Protected Matters Search:

- Green turtle – foraging;
- Olive Ridley turtle – foraging;
- Flatback turtle – foraging and internesting; and

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- Loggerhead turtle – foraging.

The Operational Area overlaps foraging BIAs for the green turtle and Olive Ridley turtle.

The only species which has habitat critical to the survival of the species identified within the EMBA was the flatback turtle (see Section 4.4.8.1 for further details).

Importantly, no marine turtles were sighted during two last marine surveys in 2022 and 2023 in the Operational Area.

Change in Behaviour

The Recovery Plan for Marine Turtles in Australia (DEE, 2017) highlights noise interference from anthropogenic activities as a threat to marine turtles. The plan refers to vessel noise as a source of chronic (continuous) noise in the marine environment, of which exposure may lead to avoidance of important turtle habitat. Specific data on behavioural response thresholds, such as avoidance or masking, of marine turtles to sound emissions does not exist (Popper et al., 2014).

Marine turtles have been shown to respond to low frequency sound, indicating they have the highest hearing sensitivity in the frequency range 100 to 700Hz (Bartol and Musick, 2003). Marine turtles use sounds for navigation, to avoid predators and to find prey (Dow Piniack, 2012). The Operational Area overlaps a small portion of green turtle and Olive Ridley turtle foraging BIAs in water depths of 95m (MSL). Olive Ridley and green turtles in the Joseph Bonaparte Gulf are known to forage in depths less than 14m (Galaiduk et al., 2018). The Operational Area is in water depths outside of Olive Ridley and green turtle foraging depths. Loggerhead and flatback turtles are known to feed in reef habitats and around the pinnacles on the mid-shelf of the gulf (Galaiduk et al., 2018). The Pinnacles of the Bonaparte Basin are located ~30km from the Operational Area. The Operational Area does not contain reef or pinnacle habitats suitable for loggerhead, or flatback turtles foraging.

Based on the absence of suitable foraging habitat for marine turtles, only transient individuals are expected to be within the Operational Area and subject to temporary behavioural changes close to the source of continuous noise emissions. Potential localised and temporary behavioural changes to individual marine turtles in the Operational Area is not expected to impact turtle populations (DEE, 2017).

Auditory impairment to marine fauna

Based on the strategy of using low-frequency cetacean threshold criteria (Section 7.5.2.8), PTS is conservatively predicted to be reached within 290m and TTS within 3.11km of the MODU positioning and mooring operations. These activities are expected to take approximately 24-36 hours; therefore, it is possible for PTS and TTS impacts to occur. However, it is unlikely that individual marine turtles will remain within 3.11km for 24 hours whilst MODU positioning activities are occurring. Given the transient nature of marine reptiles and their ability to move away from noise sources, the potential of individuals experiencing PTS or TTS due to continuous underwater noise within the Operational Area is not considered credible.

7.5.3.3 Marine mammals

Marine mammals that may occur within the vicinity of the petroleum activities include low frequency (such as baleen whales), high frequency (odontocetes such as orca), and very high frequency (such as dolphins) cetaceans and sirenians (dugongs) (Appendix B: Environmental Values and Sensitivities). Marine mammals in the Operational Area and

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surrounds are expected to be transient individuals based on the absence of BIAs and critical habitat.

Change in behaviour

Continuous sound levels greater than 120dB re 1µPa (SPL) is currently accepted as the behavioural threshold for marine mammals including otariid seals, low-frequency cetaceans, high-frequency cetaceans and very high-frequency cetaceans (NOAA, 2024). The maximum distance to the behavioural response threshold for marine mammals predicted by the underwater sound modelling was 11.8km (Table 7-11). Underwater sound generated by the petroleum activities has the potential to cause a wide range of behavioural changes to transient marine mammal individuals including area avoidance, increase or decrease in vocalisations, dive duration, travel speed and number of breaches (Erbe et al., 2019). Vessel noise has also been shown to reduce foraging efficiency for specific species, such as sperm whales (Erbe et al., 2019).

Auditory masking impacts may occur when there is a reduction in audibility for one sound (signal) caused by the presence of another sound (noise). For this to occur the noise must be loud enough and have a similar frequency to the signal and both signal and noise must occur at the same time. Therefore, the closer the marine mammal is to the sound source, and the more overlap there is with their vocalisation frequencies, the higher the probability of masking. The potential for masking and communication impacts is therefore more likely to occur near the source (tens of meters), with decreasing impacts, further from the source (Clark et al., 2009). Given the short duration (i.e., approximately 60 days for decommissioning), and localised extent of potential behavioural changes (e.g., a maximum distance of ~11.8km during MODU positioning), the lack of BIAs or habitat critical to the survival of the species, the consequence has been evaluated to potentially result in localised short-term impacts to individuals of conservation value, however not affecting local ecosystem function or impact populations.

Auditory impairment to marine fauna

Marine mammals that may occur within the Operational Area are outlined in Section 4.4.7. There are no known aggregation, resting, breeding or feeding BIAs identified for marine mammals in proximity to the Operational Area.

Literature provides weighted sound exposure levels (SELs) as the primary metric for assessing auditory impairment in marine mammals (Table 7-10). SEL integrates noise exposure over time, and a 24-hour period is used to estimate this value for TTS and PTS. Given the transient nature of marine mammals and their ability to move away from noise sources, the potential of individuals experiencing TTS or PTS due to continuous underwater noise within the Operational Area is not considered credible.

7.5.3.4 Residual risk summary

The worst-case residual severity to marine fauna from continuous noise emissions is evaluated as Slight (1), given the temporary, localised nature of the disturbance, and the lack of known aggregation, resting, breeding or feeding areas for marine fauna within the area exposed to continuous noise emissions. The likelihood of a change in behaviour from continuous noise emissions occurring as a result of the activities is considered Credible (C) given:

- Mobile species, such as fish, marine turtles, and marine mammals are expected to actively move away from the sound source;

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- The absence of suitable foraging habitat for marine turtles indicating that any potential behavioural changes to individual marine turtles found within the Operational Area are not expected to impact marine turtle populations; and
- Auditory masking impacts to marine mammals may occur, however, due to the short duration, and the lack of BIAs or habitat critical to the survival of the species, the consequence has been evaluated to potentially result in localised short-term impacts to species of conservation value, however not affecting local ecosystem function or impacting populations.

Auditory impairment from noise emissions is not considered credible given that marine fauna are expected to actively avoid the sound source, preventing prolonged exposure for the onset of auditory impairment or injury to occur.

Therefore, the residual risk of noise emissions due to the petroleum activities is considered Low.

7.5.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this risk include:

- No injury or mortality to EPBC Act listed fauna during operational activities (EPO-05).

CMs relating to this risk include:

- Planned Maintenance System (PMS) (CM-14); and
- Regulations and measures for interacting with fauna (CM-15).

EPSs and MC relating to the above are presented in Section 9.1.

7.5.5 As Low as Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?

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Eliminate	Eliminating the helicopters, vessels and MODU use	The noise associated with the use of helicopters, vessels and MODU/LWIV cannot be eliminated. Elimination of helicopters, vessels and MODU would mean the activities cannot be completed.	*
Substitute	Substitute vessels	The vessels will be contracted to meet the specifications of the scheduled work and cannot be substituted. They are required to support the MODU operations.	N/A
Engineering	N/A	N/A	N/A
Isolation	N/A	N/A	N/A
Administrative	PMS	Ensures equipment which generates noise on the MODU and vessels is operating optimally and sound sources levels are appropriately verified and within desired operating range. PMS is routine and there are no additional costs.	✓ (CM-14)
	Regulations and measures for interacting with marine fauna (e.g., EPBC Regulations 8 (Part 8))	Minor cost in complying. Reduces risk of physical and behavioural impacts to marine fauna. EPBC Regulations include restrictions such as vessel speed and direction when in proximity to marine fauna and are based on legislated requirements.	✓ (CM-15)
	Scheduling activity outside of sensitive period for marine fauna	The timing of the petroleum activities will be subject to vessel and MODU availability and weather conditions. Given the low risk to marine fauna in the region, rescheduling the activity will not result in significant environmental benefit.	*
	Dedicated marine fauna observer on vessels to spot marine fauna	May improve ability to spot and identify marine fauna at risk of impact from noise. However, the high cost of contracting marine fauna observers is grossly disproportionate to the low risk (refer to 7.5.3.3) of vessel and MODU noise sources on marine fauna.	*
	Update noise modelling and impact assessment using Accomando et al. (2024) marine turtle thresholds, once weightings have been published.	Jasco anticipates that distances to thresholds will increase once the weightings have been published. A conservative estimate has already been applied to the impact assessment by using the criteria thresholds for LF cetaceans (Table 7-10). The closest critical habitat to the Operational Area is 105km away. If the new thresholds were used to remodel, it is unlikely the range to thresholds would overlap a new turtle habitat. Overlap with existing BIA would change but the overlap would still be a small fraction of the area. Therefore, the risk level would not change if noise modelling was updated. Considerable time and cost will be required for updating modelling and will not result in significant environmental benefit.	*

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7.5.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws, and Standards	<p>Noise from the petroleum activities is managed in accordance with relevant legislative requirements, including:</p> <ul style="list-style-type: none"> Vessels will comply with EPBC Regulations 2000 – Part 8 Division 8.1 (Interacting with cetaceans). Helicopters will comply with EPBC Regulations 2000 – Part 8 Division 8.3 (Reg 8.07).
Policy Compliance	<p>The management of physical presence of the petroleum activities are aligned with Eni policies and standards. The residual risk is Low, which is acceptable.</p> <p>The EPOs, CMs and EPSs that will be implemented are consistent with Eni internal requirements.</p>
Social Acceptability	<p>To date, no relevant person concerns have been raised regarding noise impacts (refer Section 5).</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
Area Sensitivity/ Biodiversity	<p>The Operational Area does not intersect with any State or Territory marine protected areas, AMPs, wetlands of international or national importance, World, National or Commonwealth heritage properties or places, or KEFs.</p> <p>The Operational Area does not contain any BIAs for marine mammal species. The Operational Area overlaps foraging BIAs for green turtles and Olive Ridley turtles.</p> <p>Eni has considered information contained in relevant Recovery plans and approved conservation advice that identify noise emissions as a threat (as listed in Table 2-3). This includes:</p> <p>Conservation Advice</p> <ul style="list-style-type: none"> Conservation Advice for Balaenoptera borealis (Sei Whale) (TSSC, 2015) Conservation Advice for Balaenoptera physalus (Fin Whale) (TSSC, 2015a) <p>Recovery/Management Plans</p> <p>The petroleum activity is consistent with the objectives and actions of the plans identified below through adoption of EPO-04 and the control measures outlined in Section 7.5.4:</p> <ul style="list-style-type: none"> Recovery Plan for Marine Turtles in Australia (DEE, 2017) identifies noise interference as a threat to marine turtles. There are no explicit relevant management actions. The long-term recovery objective of minimising anthropogenic threats will be managed through the adoption of the EPO. Conservation Management Plan for the Blue Whale 2015–2025 (DoE, 2015) identifies noise interference as a threat to blue whales. Action Area A.2 from the plan: assessing and addressing anthropogenic noise, will be managed through the adoption of the EPO and CMs. <p>Recovery Plans/ Conservation Advice for other EPBC Act listed threatened and migratory species that may occur in the Operational Area do not identify noise emissions as a key threat or have explicit relevant objectives or management actions related to noise emissions.</p> <p>The control measures outlined in Section 7.5.4 are consistent with the objectives and actions in these publications. The petroleum activities are not inconsistent with the objectives and actions in the relevant recovery plans/conservation advice.</p>
ESD Principles	<p>The activity is consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> The worst-case impact associated with this aspect is Slight (1); and the residual risk is Low. Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservative assumptions have been applied to the impact assessment. Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

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Given the relatively short duration of the petroleum activities, and sensitivity of marine fauna to the vessels and MODU noise emissions, potential impacts are Slight (1). Controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3). The residual risk is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Potential impacts are therefore acceptable and ALARP.

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7.6 Light Emissions

7.6.1 Summary of Environmental Risk Assessment

Hazard	Light Emissions		
	Frequency	Severity	Risk
Inherent Risk	A	1	L
Residual Risk	A	1	L

7.6.2 Description of Hazard

Lighting is used to allow safe operations during night hours, as well as to communicate the presence of support vessels to other marine users (i.e. navigation lights). Lighting is required for safe operation and cannot be reasonably eliminated.

During the petroleum activities, light emissions will be generated from support operations including:

- MODU operations; and
- Vessel operations.

7.6.2.1 MODU and Vessel Operations

Lights on the MODU and vessels will be required on a 24-hour basis during the activities for safety and navigational purposes, in accordance with requirements of the Navigation Act 2012 (Marine Order Part 30 – Prevention of collisions). External lighting on the MODU and vessels is located on the decks, with most external lighting directed towards working areas. However, the external lights on the MODU and vessels will generate light glow and direct illumination of surrounding surface waters.

The distance at which direct light and sky glow may be visible from sources within the Operational Area depend on the characteristics of the lighting and environmental conditions.

Vessel-based campaigns have an expected duration of 14 to 40 days; and the decommissioning campaign using the MODU has an expected duration of up to 60 days (30 days per well). If an alternate vessel campaign is required as part of the wellhead removal scope, it is expected to take up to 7 days per well. This duration is inclusive of the decommissioning campaign (60 days total; as outlined in Table 3 3) as the MODU would therefore not be required for the whole duration.

7.6.3 Potential Environmental Impact

Artificial light can be received by the environment in three ways, being:

- Directly visible light;
- Skyglow, the diffuse scattering of light in the atmosphere above the horizon; and
- Light spill, the trespass of light outside the area intended, such as the sea surface.

Potential receptors that may be impacted by light emissions are:

- Seabirds; and
- Marine reptiles.

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The characteristics of light emissions associated with sources from petroleum will differ depending upon the number, intensity, spectral output, and type of light.

To inform the impact assessment, Eni is able to draw upon artificial light modelling it has previously commissioned for vessel activities in Australia (Pendoley Environmental, 2022). While this modelling is for a large construction vessel (pipelay vessel), it does provide a useful conservative proxy for light emissions from the MODU and support vessels. In particular as the Petrel-3 and Petrel-4 decommissioning activities do not require any flaring.

The modelling study (Pendoley Environmental, 2022) applied the ILLUMINA model (Aube et al., 2005), which represents light across large areas and distances and across the entire visible spectrum and generates quantitative outputs relevant to the assessment of the impacts of light on wildlife and the night sky.

In the absence of published or generally accepted impact thresholds for evaluating the impact of artificial light on sensitive receptors, an approach based on presenting the light modelling outputs to the visibility of the full moon was used in the modelling.

As the full moon is the brightest natural light source visible within the region of the horizon, presenting modelling outputs as a proportion of full moon equivalent (FME) gives the model outputs some biological relevance for informing impact assessments for marine turtles. Impacts are assessed on a scale of the FME, with different FME ranges assigned an impact level and impact potential criteria that have been developed based on expert opinion (refer Table 7-12). Although the potential effects of artificial light on other marine fauna, such as seabirds or migratory shorebirds, is gaining more recognition, the vulnerability of individuals to negative impacts is highly species specific and can vary depending on the life stage or behaviour being undertaken at the time (DCCEEW, 2023). Accordingly, while presenting radiance as a measure relative to that of a full moon is biologically relevant to other marine taxa, potential impact criteria could not be defined (Pendoley Environmental, 2022).

Furthermore, the sensitivity of a hatchling turtle to directional light can be described by a specific 'cone of acceptance', which indicates a hatchling's field of view. This is defined by Lohmann et al. (1997) as 180° horizontally and 30° vertically. To understand potential impacts of modelled light emissions on hatchling behaviour, radiance was averaged over the brightest light source with this field of view (orientation field of view) and converted to FME.

The exposure area for light emissions is based on the extent of visible light that has been estimated to occur from the vessel associated with the activity. The visibility of an artificial light does not necessarily imply a measurable change in ambient light (or any subsequent potential impact). The light assessment boundary of 20km from the source will be used as the extent of light exposure, in accordance with National Light Pollution Guidelines for Wildlife (DCCEEW, 2023). Localised light glow may act as an attractant to light-sensitive species.

Table 7-12: Artificial light impact potential for marine turtles (Pendoley Environmental, 2022)

Impact level	FME ranges*	Impact potential criteria for marine turtles
4	10 to 100	Light or light glow visible and impact likely. Represents a very bright light, equivalence of up to 100 times the radiance of one moon. This light radiance will greatly override the moderating influence of the ambient full moon at the time of exposure.
3	1 to 10	Light or light glow visible and impact likely. Represents a bright light, equivalence of up to ten times the radiance of one moon. This light radiance

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Impact level	FME ranges*	Impact potential criteria for marine turtles
		will override the moderating influence of the ambient full moon at the time of exposure.
2	0.1 to 1	Light or light glow visible and behavioural impact possible, depending on ambient moon phase at the time of exposure, which will influence the visibility of the artificial light sources, equivalent to the light output. Artificial lights will be more visible to marine turtles under a first quarter moon than under a full moon.
1	0.01 to 0.1	Light or light glow visible but behavioural impact unlikely; as in, not biologically relevant. Equivalent to the light output from the first quarter moon to new moon.
NA	<0.01	Light or light glow is considered ambient and no impact expected. Equivalent to the light output from a new moon.

* Proportion of radiance of a full moon within orientation field of view, where 100 equals the radiance of one hundred full moons and 0.01 equals 100th the radiance of one full moon.

The distances at which the orientation field of view FME value is predicted to fall below 0.01 (ambient levels) is 16.2km. Light is expected to be visible, but behavioural impacts to marine turtles unlikely, at distances beyond 5.2km. Behavioural impacts to marine turtles are possible within 1.7km of the source (Table 7-13) (Pendoley Environmental, 2022).

Table 7-13: Summary of available artificial light modelling results for a pipelay vessel

Impact level	FME	Distance (m)
4	10 to 100	<540
3	1 to 10	540
2	0.1 to 1	1680
1	0.01 to 0.1	5210
NA	<0.01	>16,150

As a conservative measure, impacts to light-sensitive species have been considered by reviewing the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023), which recommends applying a 20km buffer around the light source. A 20km buffer provides a precautionary limit based on observed effects of sky glow on marine turtle hatchlings, demonstrated to occur at 15 to 18km, and fledgling seabirds grounded in response to artificial light 15km away (DCCEEW 2023). The exact details of the MODU, and support vessels are unknown for the petroleum activities. Given this uncertainty, it is assumed light could be visible on the horizon at distances up to approximately 20km during vessel use, based on review of the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023).

7.6.3.1 Seabirds

Change in fauna behaviour

No BIAs for seabirds occur within the Operational Area. The nearest breeding BIAs for the lesser crested tern and lesser frigatebird are 197km and 164km south-west of the Operational Area, respectively (Table 4-6).

Artificial light can have a variety of effects on seabirds, depending upon the species and the life stage or behaviours being undertaken at the time. Negative responses of birds to artificial light may include collision, entrapment, stranding, grounding, disorientation, or interference

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with navigation – being drawn off course from their usual migration route – potentially resulting in reduced fitness, in injury or death (DCCEEW, 2023).

Species with a nocturnal component of their life history, such as procellariiforms (shearwaters, petrels and storm petrels), are at greater risk of negative impacts. The most significant impacts recorded, in terms of numbers of individuals impacted, have been associated with the synchronised mass exodus of procellariiform fledglings from nesting sites at night (Deppe et al., 2017; Raine et al., 2007; Rodriguez et al., 2015a; Rodriguez et al., 2015b; Le Corre et al., 2002; Reed et al., 1985).

No important nesting sites for procellariiform species are located within 500km of the Operational Area; therefore, impacts to breeding adults or fledgling procellariiforms are not expected.

Nocturnal foraging at sea is known to occur across the procellariiform order, with preferences for bioluminescent prey (Imber, 1975). This is likely linked to the vertical migration of prey in the water column; the greater abundance of prey closer to the sea surface under darkness enables more efficient foraging by birds compared to during daylight. While no foraging BIAs for procellariiforms overlap with or occur within 500km of the Operational Area, nocturnal seabirds, such as the streaked shearwater, may traverse the area and forage in low numbers.

Reports of procellariiforms being attracted to vessels and oil and gas facilities exist (Black, 2005; Merkel & Johansen, 2011; Montevecchi, 2006); however, interaction events are usually associated with weather conditions providing poor visibility. These conditions are not common within the region, suggesting any interaction between procellariiforms and the MODU or vessels would be limited to individuals rather than populations.

Diurnal seabird species, such as terns, noddies, frigatebirds and tropicbirds, in contrast to procellariiforms, are less vulnerable to impacts of artificial light, given the absence of nocturnal behaviours. However, the presence of facilities can alter foraging behaviours, potentially in response to aggregation of increased prey density around platforms – as described for fish above – or due to light sources artificially extending day length and foraging activities. Although such attraction increases the risk of collision with facilities, incidents of collision of these species, or similar taxonomic groups, are few (Ronconi et al., 2015).

7.6.3.2 Marine reptiles

Change to marine fauna behaviour

Wavelength particularly has been shown to significantly affect the vulnerability of individuals to artificial light. In general, artificial light rich in short wavelength blue and green light are most disruptive (Fritsches, 2012; Pendoley, 2005; Witherington, 1991). Although longer wavelengths of light are less attractive than shorter wavelengths, long wavelength light can still disrupt sea-finding of hatchlings (Robertson et al., 2016; Pendoley, 2005; Pendoley & Kamrowski, 2015), and if bright enough, can elicit a similar response to shorter wavelength light (Mrosovsky, 1972; Mrosovsky & Shettleworth, 1968; Pendoley & Kamrowski, 2015; Cruz et al., 2018).

The Operational Area overlaps foraging BIAs for the green turtle and the Olive Ridley turtle. The EMBA overlap a foraging BIA for the loggerhead turtle and foraging, internesting and internesting buffer BIAs for the flatback turtle (Section 4.4.4). The EMBA also intersects nesting habitat critical to the survival of the flatback turtle at Brace Point to One Tree Point

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in the Northern Territory. However, the Operational Area is located more than 200 km from the shoreline of these locations (Section 4.4.4.1).

The behavioural response of marine turtles to artificial light depends upon the life stage or behaviours being undertaken at the time and the characteristics of the light sources themselves. The main implication of artificial lighting for marine turtles is the disruption of hatchling sea-finding behaviour.

Turtles transiting or foraging in the surroundings of the Operational Area may be disturbed by the lights from the vessel, however, given the large distances typically covered by foraging individuals, lighting from the support vessels should not impact foraging behaviour. Light cues are not thought to guide migration and no evidence to date suggests artificial light disrupts migration or leads to disorientation in adult marine turtles. Foraging adult turtles have been observed feeding on prey presumed to be attracted by lights of oil production platforms in the Gulf of Mexico (Kebodeaux, 1994). However, illumination of fishing gear has been implemented as a measure to reduce by-catch, as the light sources allow individuals to avoid the net (Ortiz et al., 2016). This suggests marine turtles are most likely attracted to increased prey abundance around offshore facilities, rather than the light sources itself.

Although the Operational Area and 20km buffer overlaps the BIAs for the green turtles (foraging), Olive Ridley turtles (foraging) (Table 4-6), the number of individuals likely to be present is expected to be low. Suitable internesting habitat for flatback turtles is typically defined as water depths shallower than 16 m (Whitlock et al., 2016). Internesting Olive Ridley turtles remain relatively close to nesting beaches during the nesting period (in comparison to post-nesting movements); tagged turtles remained within 48km of the nesting beach in waters typically <30 m water depth (Hamel et al., 2008). Water depth in the vicinity of the Operational Area is approximately 95m and the nearest marine turtle nesting sites are located more than 200km east. It is therefore reasonable to assume the Operational Area and 20km buffer are not used as a significant foraging or internesting location.

If individual adult turtles are present, light emissions are unlikely to be of concern. There is no evidence, published or anecdotal, to suggest internesting turtles are impacted by light from offshore vessels, and nothing in their biology would indicate this as a plausible threat (Witherington & Martin, 2003). Potential impacts to foraging turtles are limited to local attraction to prey species attracted to light (Kebodeaux, 1994). As such, the impact to adult marine turtles from light is anticipated to be slight and temporary.

The effects of artificial light on female nesting and hatchling emergence behaviour have been well documented, and include:

- disrupted nest site selection and orientation of females on the beach (Witherington & Martin, 2003);
- lower nesting density on beaches with significant light spill; for example, from urban development adjacent to nesting beaches (Salmon, 2003; Hu et al., 2018);
- disrupted hatchling sea-finding behaviour (Withington & Martin, 2003; Pendoley & Kamrowski, 2015; Kamrowski et al., 2014); and
- hatchlings disoriented or misoriented by artificial lighting, such that they may take longer, or fail, to reach the sea. This may result in increased mortality through dehydration, predation, or exhaustion (Salmon & Witherington, 1995).

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Given the Operational Area and a 20km buffer is located more than 200km east from the nearest marine turtle nesting sites (flatback) at Brace Point to One Tree Point in the Northern Territory, light emissions are not expected to affect the sea finding behaviour of hatchling turtles or hatchling dispersal.

7.6.3.3 Residual risk summary

The worst-case residual severity to seabirds and marine reptiles from light emissions is evaluated as Slight (1), given the distance from breeding and nesting areas respectively, the relatively short duration of activities and no flaring operations. The likelihood of a change in behaviour from light emissions occurring as a result of the activities is considered Rare (A).

Therefore, the residual risk of light emissions due to the petroleum activities is considered Low.

7.6.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this risk include:

- No significant impacts to marine fauna from lighting emissions (EPO-06).

CMs relating to this risk include:

- Lighting will be used as required for safe work conditions and navigational purposes. (CM-16).

EPSs and MC relating to the above are presented in Section 9.

7.6.5 As Low as Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
Eliminate	Eliminate light sources on the MODU and vessels	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	Eliminating 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. Additionally, if the activity was to take twice as long to complete, emissions would be doubled and the risk of accidents would increase due to more movements to and from shore.	×
Substitute	Adopt measures on the vessels/MODU designed to minimise impacts to marine turtles as per National Light Pollution Guidelines for Wildlife	Substituting external lighting for lights/design such as those identified in the National Light Pollution Guidelines for Wildlife would result in significant cost sacrifice and time expenditure. Given the distance of the Operational Area, from the nearest nesting sites and the already slight impacts of lighting from the petroleum activities on marine fauna, cost of adopting measures	×

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Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
	(management actions) (DCCEEW, 2023): <ul style="list-style-type: none"> Use non-reflective, dark-coloured surfaces (best practice design principle 5) Replace some or all lights with reduced or filtered blue, violet, and ultraviolet wavelengths (best practice design principle 6) 	(management actions) within the National Light Pollution Guidelines for Wildlife outweighs the environmental benefit. Lighting is already applied to levels required for safe work conditions and navigational purposes on the vessel.	
Engineering	N/A	N/A	N/A
Isolation	N/A	N/A	N/A
Administrative	Lighting will be used as required for safe work conditions and navigational purposes	Lighting is assessed to only provide necessary lighting for safety and navigation during the activity. Reducing the potential for additional light pollution to the environment, thus reducing the potential impacts to fauna.	✓ (CM-16)

7.6.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>Light emissions from petroleum activities are managed in accordance with relevant legislative requirements, including compliance with international maritime conventions and Australian legislation.</p> <p>Light emissions from petroleum activities are managed in accordance with EPBC Act Policy Statement 3.21 Industry guidelines for avoiding, assessing, and mitigating impacts on EPBC Act listed Migratory shorebird species (Commonwealth of Australia, 2015a).</p>
Policy Compliance	<p>The management of lighting from the petroleum activities is aligned with Eni policies and standards. The residual risk is Low, which is acceptable.</p> <p>The EPOs, CMs and EPSs that will be implemented are consistent with Eni internal requirements.</p>
Social Acceptability	<p>To date, no relevant person concerns have been raised regarding light (refer Section 5).</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
Area Sensitivity/ Biodiversity	<p>The Operational Area and 20km light buffer do not intersect with any State or Territory marine protected areas, AMPs, wetlands of international or national importance, World, National or Commonwealth heritage properties or places, or KEFs.</p> <p>Foraging BIAs for the green turtle and Olive Ridley turtle overlap the Operational Area and 20km light buffer. No BIAs for migratory shorebirds or seabirds overlap these areas. Light emissions may have temporary and localised behavioural disturbance to individual marine turtles, however, is not anticipated to displace marine turtles from critical habitats or impact nesting adults and emerging and dispersing hatchlings.</p> <p>Eni has considered information contained in relevant recovery plans and approved conservation advice for EPBC Act listed species that identify light pollution as a threat (as listed in Table 2-3). This includes:</p> <p>Conservation Advice</p> <ul style="list-style-type: none"> Approved Conservation Advice for <i>Calidris ferruginea</i> (Curlew Sandpiper) states actions that have indirect impacts on habitat critical to the survival (such as light pollution) should be minimised.

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Demonstration of acceptability	
	<ul style="list-style-type: none"> Conservation Advice for <i>Numenius madagascariensis</i> (Far Eastern Curlew) states actions that have indirect impacts on habitat critical to the survival (such as light pollution) should be minimised. Approved Conservation Advice for <i>Calidris canutus</i> (Red Knot) (DCCEEW, 2024a) states actions that have indirect impacts on habitat critical to the survival (such as light pollution) should be minimised. Conservation Advice for <i>Calidris acuminata</i> (sharp-tailed sandpiper) states actions that have indirect impacts on habitat critical to the survival (such as light pollution) should be minimised. <p>Recovery/Management Plans</p> <p>The petroleum activity is consistent with the objectives and actions of the plans identified below through adoption of EPO-05 and CM-16 outlined in Section 7.6.4:</p> <ul style="list-style-type: none"> National Light Pollution Guidelines for Wildlife including Marine Turtles, Seabirds and Migratory Shorebirds (DCCEEW, 2023). The management of artificial light emissions are aligned with the objectives of this plan through the adoption of the EPO and CM-16. Recovery Plan for Marine Turtles in Australia 2017–2027 (DEE, 2017) identifies light pollution as a threat to marine turtles. The Operational Area and 20km light buffer do not overlap nesting or internesting BIAs or habitat critical to the survival of the species, however does overlap foraging BIAs for the green turtle and Olive Ridley turtle. The petroleum activities are consistent with Action Area A8 of the plan (minimise light pollution) through the adoption of the EPO and CM-16. Wildlife Conservation Plan for Seabirds (Commonwealth of Australia, 2020) identifies light pollution as a threat to seabirds. The petroleum activities are consistent with Objective 2 of this plan (to identify and protect seabirds and their habitats) through the adoption of the EPO and CM-16. The Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2015a) identifies artificial lighting as part of anthropogenic disturbance and a threat to migratory shorebirds. The petroleum activities are consistent with the objective of this plan 'anthropogenic threats to migratory shorebirds in Australia are minimised or, where possible, eliminated', through the adoption of EPO-05 and CM-16. <p>Recovery Plans/Conservation Advice for other EPBC Act listed threatened and migratory species that may occur in the Operational Area do not identify light pollution as a threat or have explicit objectives or management actions related to light pollution.</p> <p>The control measures outlined in Section 7.6.4 are consistent with the objectives and actions in these publications. The petroleum activities are not inconsistent with the objectives and actions in the relevant recovery plans/conservation advice.</p>
ESD Principles	<p>The activity is consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> The worst-case impact associated with this aspect is Slight (1); and the residual risk is Low. Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservative assumptions have been applied to the impact assessment. Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

Given the relatively short duration of the petroleum activities, and light source of navigational and operational lighting only (with no flaring activities), and the distance of the Operational Area from the nearest turtle nesting beaches, the potential impacts are considered Slight (1). Controls have been evaluated in accordance with the ALARP criteria (Section 6.3). The residual risk associated with light emissions is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5: Eni acceptability

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factors). Potential impacts associated with light emissions are therefore acceptable and ALARP.

7.7 Planned Discharges - Routine

7.7.1 Summary of Environmental Risk Assessment

Hazard	Planned Discharges - Routine		
	Frequency	Severity	Risk
Inherent Risk	C	1	L
Residual Risk	C	1	L

7.7.2 Description of Hazard

During the petroleum activities, routine discharges will be generated from:

- MODU operations; and
- Vessel operations.

7.7.2.1 MODU and Vessel Operations

During the petroleum activities, the MODU and vessels will generate the following routine planned discharges:

- Sewage;
- Grey water;
- Food/putrescible waste;
- Brine (from water treatment plant);
- Cooling water; and
- Deck drainage and bilge water.

Grey water and sewage as well as food wastes will be generated on-board the MODU and support vessels, with volumes being directly proportional to the persons on board (POB). This will range from approximately 15 POB for small support vessels (small utility vessels), to 50 for a larger support vessel (construction support vessel), and up to 140 for the MODU (see Section 3.5 for further details). Based on information presented by National Energy Resources Australia (2017), it is estimated 0.04 to 0.45m³ of sewage and greywater, per person per day, will be released to the marine environment during petroleum activities.

The generation of food waste from feeding personnel will result in the discharge of food waste. The scraps are macerated and discharged within the operational area as permitted under the Marine Order requirements. The volume of putrescible wastes varies depending on persons on board; however, it is predicted approximately 1 to 2kg of wastes per day per person.

Concentrated brine is a waste stream created through the vessel desalination equipment for potable water generation. Brine generated from the water supply systems on-board the vessel will be discharged to the ocean at a salinity of approximately 10% higher than seawater. The volume of the discharge is dependent on the requirement for fresh (or potable) water and would vary between vessels and the number of people on-board.

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Cooling water is used as a heat exchange medium for the cooling of machinery engines on the MODU and support vessels. Seawater is drawn from the ocean and flows counter-current through closed-circuit heat exchangers, transferring heat from engines and machinery to the seawater. The seawater is then discharged to the ocean. Cooling water temperatures vary depending upon the vessel engine's workload and activity; however, may be in the vicinity of 32°C.

Bilge water is generated on the MODU and support vessels and consists of deck drainage and machinery space water that has been directed to a bilge water tank. Sources of contamination include chemical spills on deck. Bilge water shall be diverted to a holding tank either for onshore disposal at an appropriately licenced facility, or for discharge with an oil content of less than 15 parts per million (ppm) in accordance with Marine Order 91.

Vessel-based operations have an expected duration of 14 to 40 days, depending on the activity (see Section 3.1.3). The MODU operations have an expected duration of 30 to 60 days, depending on success of the first campaign. If an alternate vessel campaign is required as part of the wellhead removal scope, it is expected to take up to 7 days per well. This duration is inclusive of the decommissioning campaign (60 days total) as the MODU would therefore not be required for the whole duration (see Section 3.1.3).

7.7.3 Potential Environmental Impact

Routine discharges have the potential to result in various environmental impacts to receptors, including:

- Change in water quality;
- Change in fauna behaviour; and
- Injury or mortality of marine fauna (plankton).

Potential receptors that may be impacted are:

- Water quality; and
- Marine fauna (plankton, marine invertebrates, marine mammals, marine reptiles, fish, sharks and rays).

There are no marine protected areas or KEFs within the Operational Area.

7.7.3.1 Water quality

Change in water quality

Routine vessel and MODU discharges will result in localised impact on water quality from increased temperature, salinity, nutrients, and chemical toxicity. The planned liquid discharges from the petroleum activity will be small and intermittent, with quantities determined by the specific activity.

Temperature

The release of cooling water into the marine environment will increase the ambient temperature of the surrounding water. Modelling produced for Woodside found that discharged water temperature decreases quickly as it mixes with the receiving waters, with the discharge water temperature being <1°C above ambient within 100m (horizontally) of the discharge point, and 10m vertically (Woodside 2014). As such, given the nature of discharge and the open ocean metocean conditions, a highly localised increase in temperature is expected to be negligible and within the immediate are of the discharge.

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Salinity

Concentrated brine is a waste stream created through the vessel desalination equipment for potable water generation. Due to its greater density compared to seawater, brine will sink and subsequently disperse into the water column from ocean currents. Studies indicate that most marine species are able to tolerate short-term fluctuations in salinity (20–30%) (Walker and McComb 1990), and it is expected that most pelagic species would be able to tolerate short-term exposure to the slight increase in salinity caused by the discharged brine. Given the relatively low volume and intermittent nature of brine discharge and the open ocean metocean conditions, a localised increase in salinity is expected to be negligible and within the immediate area of the discharge.

Nutrients

Contaminants found in routine discharges may result in localised increase in nutrients in the marine environment, which can increase nutrient availability, algal growth and subsequently eutrophication (NERA, 2017). Sewage is typically composed of more than 99% fresh water, with small amounts of contaminants and nutrients such as organic carbon, nitrogen, and phosphorus. However, elevated nutrient levels from sewage, putrescible waste, and grey water discharges, are anticipated to either dilute in the receiving waters, settle out of the water column, chemically break down or be consumed by bacteria (NERA, 2017).

Chemical Toxicity

The release of chemical contaminants found in bilge water, such as oily fluids, lubricants, and cleaning fluids, and in the scale inhibitors and biocides, used in heat exchange and desalination process, and treatment of bilge and deck drainage, have the potential to increase the toxicity of the surrounding water.

Modelling by Shell (2009) indicates that upon discharge, hydrocarbon and other chemical concentrations are rapidly diluted and expected to be below Predicted No Effect Concentration (PNEC) within less than 100m of the discharge point, within a relatively short period of time. The biocides typically used in the industry are highly reactive and degrade rapidly (Black et al., 1994). Standard marine vessel discharges typically use these chemicals in low concentrations, which upon discharge, rapidly dilute to below PNEC. Any chemicals are selected in accordance with the Eni Chemical Assessment Process to ensure ecotoxicity profiles are of an acceptable level.

The offshore open ocean metocean conditions will rapidly dilute the discharge due to the mixing of the surface and near surface waters driven by current and tidal action. Therefore, any changes to the water quality from routine discharges are anticipated to be temporary and localised.

7.7.3.2 Marine fauna

Change in fauna behaviour

The release of routine discharges may result in a change to the behaviour of marine fauna. The discharge of sewage and food wastes will create a localised and temporary food source and may attract marine fauna to the source. As discussed above, the discharge extent for all planned discharges is anticipated to be localised and rapidly dilute within the open ocean environment. This is likely to limit the impacts of putrescible waste discharges to within the vicinity of the discharge and to be temporary in nature. Furthermore, marine fauna found within the Operational Area are likely to be transient.

Therefore, any changes to marine fauna behaviour are anticipated to be short-term due to the rapid dispersion of the plume and the transient fauna movement.

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Given the nature of discharged chemicals, the small volumes that could be released to the marine environment and the nature of the marine environment within the vicinity of the Operational Area, the operational planned discharges are not predicted to have ecologically significant effects.

Injury or mortality to marine fauna

The potential increase of chemical toxicity within the marine environment from routine discharges has the potential to cause injury, or mortality, to plankton. A change in water quality as a result of routine discharges is unlikely to lead to injury or mortality of plankton at a measurable level given the small discharge quantities and rapid dilution anticipation following the release. Plankton are known to accumulate rapidly, due to their small size and high surface area to volume ratio, therefore populations are typically not sensitive to the impacts of contaminants in the water column (Hook et al. 2016). The ability of plankton to rapidly reproduce and their inherent population dynamics means they can quickly recover from temporary disturbances. The Operational Area does not overlap any areas known for upwelling, known for high productivity. Therefore, the consequence of any impacts to plankton from planned discharges from the petroleum activity are expected to be negligible and not cause impacts at an ecosystem or population level.

7.7.3.3 Residual risk summary

The worst-case residual severity to water quality and marine fauna from routine discharges is evaluated as Slight (1), given the quantities of the discharges, the low toxicity of the contaminants, and the open ocean metocean conditions causing the discharges to rapidly disperse and dilute in the marine environment.

The likelihood of a change to water quality from routine discharges occurring as a result of the activities is considered Credible (C).

Therefore, the residual risk of changes to water quality and marine fauna behaviour due to the petroleum activities is considered Low.

7.7.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this risk include:

- No unplanned discharges to sea of untreated sewage, greywater, putrescible wastes, bilge, and deck drainage (EPO-07); and
- No unplanned discharge of oily water or chemicals (EPO-08).

CMs relating to this risk include:

- Planned Maintenance System (PMS) (CM-14);
- Eni E&P Marine Manual (Marine assurance standard) (CM-13);
- Vessels and MODU comply with Marine Order 96 (Marine pollution prevention – sewage) (CM-17);
- Vessels and MODU comply with Marine Order 95 (Marine pollution prevention – garbage) (CM-18);
- Vessels and MODU comply with Marine Order 91 (Marine pollution prevention – oil) (CM-19); and
- Hazardous and non-hazardous waste management processes (CM-20).

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- Chemical risk assessment process (CM-21).

EPSs and MC relating to the above are presented in Section 9.

7.7.5 As Low as Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
Eliminate	Eliminating discharge on vessels and MODU	<p>The generation of sewage, greywater, putrescible waste, bilge and deck drainage by personnel cannot be eliminated on the vessels or MODU, as storing the waste would present a safety issue.</p> <p>Storage space required for containment and an increase in transfers to shore for disposal would be required.</p> <p>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 and 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.</p> <p>This discharge is permitted under Marine Orders and is not anticipated to present significant environmental impact.</p>	*
Substitute	N/A	N/A	N/A
Engineering	Equip vessels and MODU 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)
	Continually plug the deck drains on vessels and MODU to prevent deck drainage	<p>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/MODU deck can also cause stability issues.</p> <p>Storage space required for containment of drained liquids and increase in transfers to vessels, resulting in increased potential impacts and risks.</p>	*
	Sewage treatment system	Reduces potential impacts of inappropriate discharge of sewage at sea or additional emissions associated with ship to shore of waste.	✓ (Through compliance with Marine Order 96)
Isolation	Capture contaminated waters/bilge water	Fixed equipment, such as engines and generators, are contained and captured in the bilge water tank for treatment via the oil	✓ (Through compliance)

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Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
		in water (OIW) separator (on vessels and MODU) in compliance with Marine Order 91.	with Marine Order 91)
Administrative	Implementation of measures in Marine Order 95 (Marine pollution prevention – garbage)	Marine Order 95 reduces potential impacts of inappropriate discharge of sewage. Stipulates putrescible (food) waste disposal conditions and limitations. Environmental benefit outweighs the minor administrative costs in implementing the Marine Order.	✓ (CM-18)
	Implementation of measures in Marine Order 96 (Prevention of pollution – sewage)	Marine Order 96 reduces probability of garbage being discharged to sea. Environmental benefit outweighs the minor administrative costs in implementing the Marine Order.	✓ (CM-17)
	Vessels and MODU comply with Marine Order 91: Marine pollution prevention – oil	Marine Order 91 stipulates the oily water prevention system and treatment requirements for oil in water discharge from vessels and MODU. Environmental benefit outweighs the minor administrative costs in implementing the Marine Order.	✓ (CM-19)
	Chemical risk assessment process	Ensures that planned discharges to sea meet the criteria for not being harmful to the marine environment according to MARPOL Annex V; or Gold/Silver/D or E rated through OCNS; or have a completed chemical risk assessment so that only environmentally acceptable products are used.	✓ (CM-21)

7.7.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	Discharges comply with the requirements of the <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> , which in Australian waters reflects MARPOL, and is enacted by: <ul style="list-style-type: none"> • Marine Order 91: Marine pollution prevention – oil • Marine Order 95: Marine pollution prevention – garbage • Marine Order 96: Marine pollution prevention – sewage.
Policy Compliance	The management of the discharge is aligned with Eni policies and standards. The residual risk is Low, which is acceptable. The EPO and the controls that will be implemented are consistent with Eni internal requirements.
Social Acceptability	DPIRD requested confirmation that all chemicals and fluids used in the activity are selected on the criterion that they are lowest impact, which Eni confirmed is managed by its chemical risk assessment process (CM-21, described in Section 10.14) (refer Section 5). An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.
Area Sensitivity/ Biodiversity	The Operational Area does not intersect with any State or Territory marine protected areas, AMPs, wetlands of international or national importance, World, National or Commonwealth heritage properties or places, or KEFs.

Demonstration of acceptability

Foraging BIAs for the green turtle and Olive Ridley turtle overlap the Operational Area. Other marine fauna are likely to be transient in the Operational Area. The discharge extent for all routine planned discharges is anticipated to be localised and rapidly dilute within the open ocean environment.

Eni has considered information contained in relevant recovery plans and approved conservation advice for EPBC Act listed species that identify chemical discharges, pollution and habitat degradation or modification as a threat (as listed in Table 2-3). This includes:

Conservation Advice

- Approved Conservation Advice for Balaenoptera borealis (Sei Whale) identifies pollution (persistent toxic pollutants) as a threat.
- Approved Conservation Advice for Balaenoptera physalus (Fin Whale) identifies pollution (persistent toxic pollutants) as a threat.
- Approved Conservation Advice for Green Sawfish lists habitat degradation or modification as a threat.
- Approved Conservation Advice for Pristis pristis (Large Tooth Sawfish) lists habitat degradation or modification as a threat.
- Approved Conservation Advice for Glyphis garricki (Northern River Shark) lists habitat degradation or modification as a threat.
- Approved Conservation Advice for Rhincodon typus (Whale Shark) lists habitat degradation or modification as a threat.

Recovery/ Management Plans

The petroleum activity is consistent with the objectives and actions of the plans identified below through adoption of EPO-06 and EPO-07 and the control measures outlined in Section 7.7.4:

- Conservation Management Plan for the Blue Whale 2015–2025 (DoE, 2015) identifies habitat modification, including acute and chronic chemical discharge, as a threat. There are no BIAs for the blue whale overlapping the Operational Area. There are no explicit relevant management actions in this plan. The petroleum activity is consistent with the long-term recovery objective to 'minimise anthropogenic threats to allow the conservation status of the blue whale to improve so that it can be removed from the threatened species list under the EPBC Act' through the adoption of the EPOs.
- Recovery plan for Marine Turtles in Australia (DEE, 2017) identifies acute chemical and terrestrial discharge as a threat. Foraging BIAs for the green turtle and Olive Ridley turtle overlap the Operational Area. Action Area A4 to minimise chemical and terrestrial discharge is met through the adoption of the EPOs.
- Sawfish and River Shark Multispecies Recovery Plan (Commonwealth of Australia, 2015) lists habitat degradation or modification as a threat. No habitat critical or BIAs have been identified for sawfish or river sharks within the operational area. The petroleum activity is consistent with Objective 5 of this plan to 'reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species', through adoption of the EPOs.
- Recovery Plan for the White Shark (Carcharodon carcharias) (2013) identifies habitat modification as a threat. No habitat critical or BIAs have been identified for white sharks within the operational area. The petroleum activity is consistent with the objective of this plan to ensure anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future through adoption of the EPOs.
- Recovery Plan for the Grey Nurse Shark (Carcharias taurus) (DoE, 2014a) identifies pollution as a threat. No habitat critical or BIAs for the grey nurse shark have been identified in the Operational Area. The petroleum activity is consistent with the objective of this plan to ensure anthropogenic activities do not hinder recovery in

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Demonstration of acceptability	
	<p>the near future, or impact on the conservation status of the species in the future, through the adoption of the EPOs.</p> <p>Recovery Plans/Conservation Advice for other EPBC Act listed threatened and migratory species that may occur in the Operational Area do not identify chemical discharges, pollution and habitat degradation or modification as a key threat or have explicit relevant objectives or management actions related to these threats.</p> <p>The control measures outlined in Section 7.7.4 are consistent with the objectives and actions in these publications. The petroleum activities are not inconsistent with the objectives and actions in the relevant recovery plans/ conservation advice.</p>
ESD Principles	<p>The petroleum activities are consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> • The worst-case impact associated with this aspect is Slight (1); and the residual risk is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage; and there is no scientific uncertainty associated with the potential impact. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

Given the short duration of the petroleum activities, with the longest campaign being 30 days at each well, the potential impacts associated with discharge of sewage, greywater and putrescible wastes are considered to be Slight (1). Controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3). The residual risk is considered to be Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Therefore, the potential impacts associated with routine discharges are acceptable and ALARP.

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7.8 Planned Discharges - Decommissioning

7.8.1 Summary of Environmental Risk Assessment

Hazard	Planned Discharges - Decommissioning		
	Frequency	Severity	Risk
Inherent Risk	B	1	L
Residual Risk	B	1	L

7.8.2 Description of Hazard

During the petroleum activities, decommissioning discharges will occur as a result of the following MODU and vessel operations:

- Pre-decommissioning activities (GVI survey campaign);
- Removal of corrosion cap;
- Secondary well control (BOP activities);
- Drill out of cement plugs;
- Well integrity evaluation;
- Setting of cement plug and permanent isolation of the reservoir; and
- Wellhead removal.

7.8.2.1 GVI Survey Campaign

Cleaning chemicals may be released during the removal of marine growth that may occur in the GVI Survey Campaign, as discussed in Section 3.2.1. The cleaning chemicals are typically calcium wash, fluorescent dye, and sulfamic acid. See Table 7-14 for the predicted volume of each.

7.8.2.2 Removal of corrosion cap

The removal of the corrosion cap from the wellhead, as discussed in Section 3.3.2, will release < 1m³ of the inhibited seawater, seawater and biocide, trapped underneath the cap.

7.8.2.3 Secondary well control installation

If riser-based secondary well control is used, the process of latching and unlatching the BOP, as discussed in Section 3.3.3 and 3.3.8, and will release ~2.5m³ of control fluid (hydraulic fluid) into the marine environment each time per well.

7.8.2.4 If riserless well access methodology is used, there is no additional equipment or associated planned discharge of hydraulic control fluid to sea. Drill out of non-reservoir cement plugs

During the process of drilling out the two non-reservoir cement plugs at Petrel-4, as discussed in Section 3.3.4, ~6m³ of treated cement debris, and ~100m³ of an inhibited water-based drilling brine solution (WBM) will be discharged to the marine environment. This may be either at seabed or overboard at surface depending on whether a riser is used.

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There is potential that a small volume of gas may have migrated through the cement matrix over the lifetime of the wellhead (37 years at time of writing), and accumulated beneath the shallow plug. The unplanned release of this trapped gas is assessed in Section 8.6.

7.8.2.5 Well integrity evaluation

The process of milling may be required during the well integrity evaluation. If required, approximately 3.5m³ of swarf, 3m³ of drilled cement and 3.5m³ of formation rock will be discharged overboard at the sea surface (riser-based mode) or at the seabed (riserless mode) at intervals of 100m (see Section 3.3.5 for further details).

7.8.2.6 Setting of cement plug and permanent isolation of the reservoir

As discussed in Section 3.3.6, a discharge of ~2.4 to 8m³ of cement slurry may be released, per well, during the testing of the cement unit. Upon completion of each cementing activity, less than 1m³ of cement washings will be discharged to the sea, due to cleaning of the unit. Additionally, as part of the process, less than 160m³ WBM will be displaced from the well to the MODU and subsequently discharged to the sea surface. Any excess of WBM, estimated at 500m³ per well, will be discharged at the sea surface. Furthermore, any excess of inhibited seawater will also be discharged, typically around 25m³ per well.

There is potential for ~82m³ of brine to be released at the end of the activity (either at the seabed or below the sea surface).

7.8.2.7 Wellhead removal

During the internal cutting of the wellhead, as discussed in Section 3.3.9, inhibited seawater, trapped within the annulus will be discharged below or at the seabed. The content is likely to be old water and biocide and similar to the corrosion cap release (<1m³). No external swarf is expected from internal cutting of the wellhead. However, if abrasive jet cutting (Figure 3-7) uses an abrasive media, typically garnet, there is the potential for a small amount of abrasive to be released within the well during internal cutting.

In the event that the guideposts are required to be cut (contingency activity of leaving of wellhead, PGB and TGB, or the TGB itself in-situ), there is the potential for a small amount of swarf that could be displaced from the guideposts that could settle on the seabed.

7.8.2.8 Summary

Table 7-14 summarises the anticipated discharges and the associated volume that will occur for each decommissioning activity.

The use of secondary well control will be determined in the WOMP, following the pre-decommissioning inspection. If the well re-entry is performed riserless with an open circulating system, the associated fluids and cement discharges will occur at the seabed rather than at the sea surface. Table 7-14: Summary of the type and predicted volume of planned decommissioning discharges for each activity

Discharge Type	Decommissioning Activity	Discharge Volume per well	Discharge location
Inhibited water	Removal of corrosion cap	<1m ³	Seabed
	Setting cement plug & isolation of the reservoir	25m ³ per well	Surface
	Wellhead removal (fluid within annulus – internal cutting only)	<1m ³ per well	Seabed

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Discharge Type		Decommissioning Activity	Discharge Volume per well	Discharge location
Control Fluid		Secondary well control (if riser-based methodology is used – i.e. subsea BOP) (Establishment and Recovery)	2.5m ³ each time	Seabed
Cement	Cement	Well integrity evaluation	3m ³ each well (if milling is required)	Surface or seabed*
	Cement Debris	Drill out of cement plugs	6m ³	Surface or seabed*
	Cement Slurry	Setting cement plug & isolation of the reservoir	~2.4 to 8m ³ per well	Surface
	Cement Washing		<1m ³ per well	Surface
Water Based Mud (WBM)		Setting cement plug & isolation of the reservoir (displaced fluid)	<160m ³	Surface or seabed*
		Setting cement plug & isolation of the reservoir (excess fluid)	500m ³	Surface
		Drill out of cement plugs	100m ³	Surface or seabed*
Bulk powder		Disposal of excess bulk products (following process in Figure 7-2)	100MT barite, 60MT cement, 30MT bentonite, 75MT calcium carbonate	Surface
Brine		Setting cement plug & isolation of the reservoir	~82m ³	Surface or seabed*
Cleaning chemicals	Calcium wash	GVI Survey Campaign	40-80L	Seabed
	Fluorescent dye		1L	Seabed
	Sulfamic acid		20L	Seabed

**Discharged to surface if riser-based subsea BOP; discharged to seabed if riserless.*

Unused excess dry bulk product will be, where reasonably practicable, provided to another nearby MODU at the end of decommissioning. Figure 7-2 presents the decision framework for managing volumes of unused excess bulk product remaining on the MODU. Eni's preference is that excess cement, bentonite or barite are not discharged as a bulk product at the end of drilling; the products should either be passed to the next operator or sent back to shore via vessel. If the unused bulk product cannot be transferred to another nearby MODU, a risk assessment will be undertaken to identify onshore disposal options, technical feasibility and safety risks and ALARP and acceptability of onshore disposal compared to discharge overboard.

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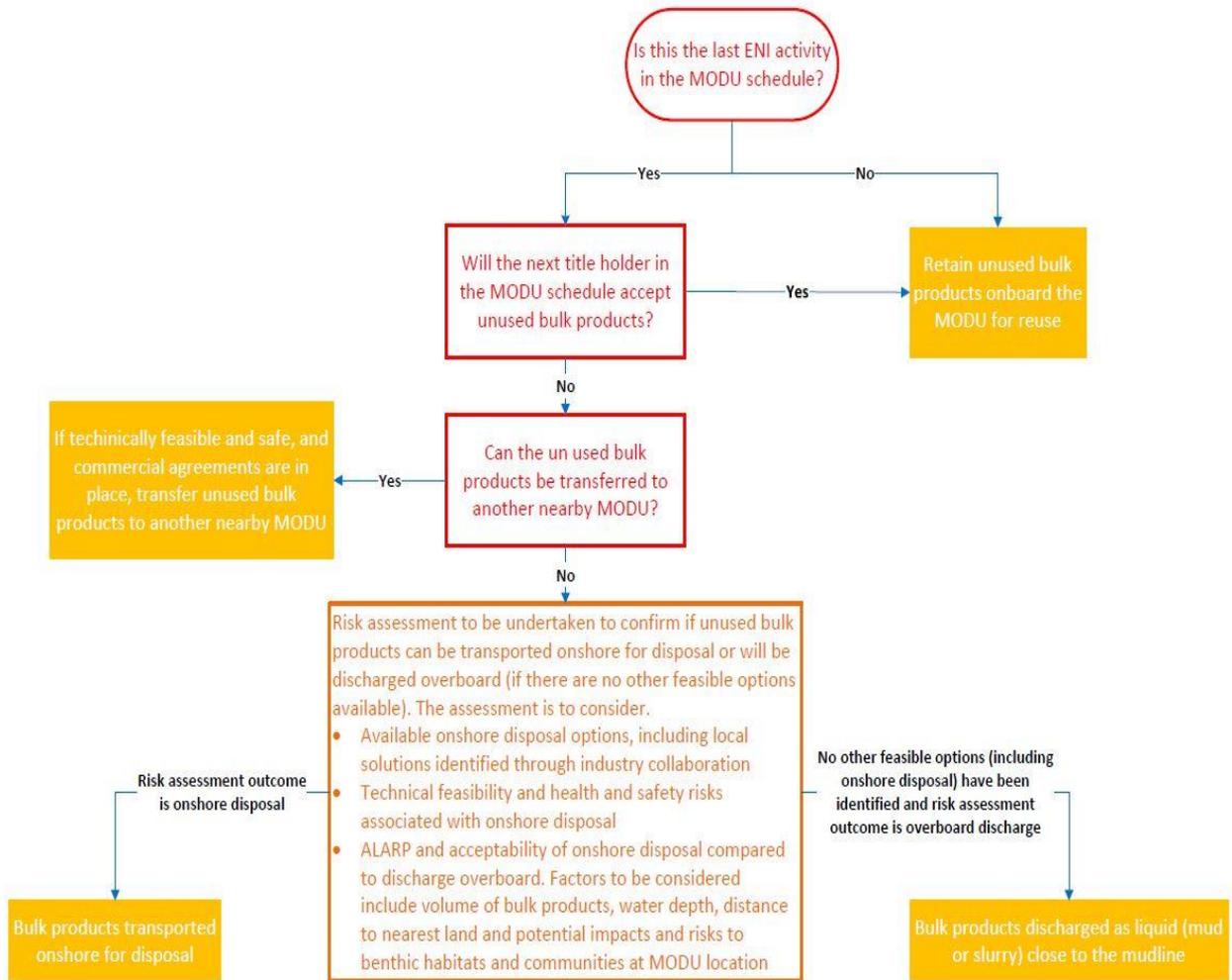


Figure 7-2: Decision framework for managing unused bulk product at the end of decommissioning

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7.8.3 Potential Environmental Impact

The release of discharges from decommissioning activities has the potential result in various environmental impacts to receptors, including:

- Change in water quality;
- Change in habitat; and
- Injury or mortality of marine fauna.

Potential receptors that may be impacted are:

- Water quality;
- Sediment quality;
- Benthic habitats and communities; and
- Marine fauna.

There are no marine protected areas or KEFs within the Operational Area.

7.8.3.1 Water quality

Change in water quality

Planned discharges released into the marine environment during decommissioning activities have the potential to change the water quality in the vicinity of the release site (Table 7-14). The discharge of fluids into the marine environment during decommissioning activities will result in a reduction in water quality and an increase in turbidity and TSS levels in the water column. The release of certain fluids has the potential to increase the toxicity levels within the marine environment.

The brine that may be released at the end of the activity is likely to have a negligible impact due to the small volumes, similarity in salinity and temperature of the receiving environment and rapid dilution.

WBM is a drilling fluid in which water or brine is the major liquid phase as well as the wetting (external) phase. Apart from water or brine, this WBM is made up of fluid additives that are typically completely inert in the marine environment. The additives are often naturally occurring, benign minerals or organic polymers, which are readily biodegradable in the marine environment and typically include barite, bentonite and guar gum. These additives will generally have low concentrations of products that can cause environmental impact. Synthetic based muds (SBM) will not be used for the decommissioning activities; and no drill cuttings are generated by the P&A activities. Bentonite sweeps or barite, typically used as weighting agents in the WBM, also have very low toxicities. Similarly, cement is also considered to be an inert substance, and both WBM and cement are considered by OSPAR to pose little or no risk to the environment (OSPAR, 2021) and are listed as an "E" Category fluid under the Offshore Chemical Notification Scheme (OCNS).

Most of the metals detected in drilling fluids are primarily trace impurities in barite, bentonite clay, or the formation rock penetrated by the drill bit (i.e. the drill cuttings), which is not relevant for the decommissioning of Petrel-3 and Petrel-4. A study recorded the solubility of barite and "other trace metals" and observed that 1% of mercury and 15% of the cadmium dissolved from the barite after one week of exposure to the marine environment (Crecelius et al. 2007). Barite has very low ("trace") concentrations of these components to begin with (Sadiq et al. 2003) and it is referred to as practically inert from a toxicological perspective

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(Smit et al. 2008). Considering the low concentrations of heavy metals within stock barite, and low proportion of barite within a drilling fluid, the discharge of WBM is not expected to have a significant adverse impact on water quality via the dissolution of metals.

Given their inert nature, impacts to marine species from increased toxicity are not anticipated.

Increased turbidity and TSS in the water column from the discharge of fluids, such as WBM, cement slurry, and cement washings, will result in a temporary change in water quality. Modelling conducted by BP (2013) detailed that particulate concentrations within a discharge of a cement plume was between 5-50mg/L 2 hours after the discharge and was less than 5mg/l 4 hours after the discharge, indicating that the plume will rapidly disperse when released into the marine environment. In well-mixed ocean waters, fluids, such as WBM, have been shown to dilute by 100-fold within 10 m of the release site and by 1000-fold after a transport time of about 10 minutes at a distance of about 100m from the platform (Neff et al., 2005). Given the volumes released and open ocean environment the WBM and cement particles are expected to disperse under the action of metocean conditions and eventually settle out of the water column. Impacts to marine fauna from increased turbidity and TSS are not predicted.

The release of certain fluids has the potential to increase the toxicity levels within the marine environment, such as control fluid, cleaning agents and inhibited seawater. Inhibited seawater (including the annulus fluid) consists of chemical additives such as biocide, oxygen scavenger, dyes, corrosion inhibitor (see Section 3.3.2 and 3.3.6). Cleaning chemicals may also be used to remove marine growth (such as sulfamic acid, calcium wash and fluorescent dye) (see Section 3.2.1). Control fluid released when latching and unlatching the BOP is typically hydraulic fluid (see Section 3.3.3 and 3.3.8). However, given the relatively small quantities of each (see Table 7-14), to the open ocean environment, and the short period of discharge, the release of these discharges is expected to rapidly disperse into the water column. The discharge has the potential to cause a very highly localised change to the water quality in the immediate proximity to the release, however, is anticipated to return to base levels quickly after the release.

Given the quantities of decommissioning discharges, the low toxicity of WBM and cement and high dispersion in the open, offshore environment, any impact to water quality is anticipated to be minor and temporary. Recovery of water quality conditions is expected within hours after the cessation of the decommissioning activities. For impact to sediment quality, refer to Section 7.1.

7.8.3.2 Sediment quality

Change in sediment quality

In the event that bulk barite is discharged overboard at the end of decommissioning (Section 7.8.2.7), there is potential for a change in sediment quality in the vicinity of the discharge site. The release of barite has the potential to increase levels of heavy metals within the seabed sediment.

Given water depth and the open ocean environment, it is expected that bulk material will disperse widely. However, for the purposes of impact assessment, it has been assumed that the entire volume of bulk barite will settle into the sediment. To understand the potential concentration of heavy metals in the seabed sediment, an estimate has been calculated based on the model used in the NOPSEMA-accepted Athena Supply Project EP (Cooper Energy, 2025). The parameters used in the Athena Supply Project estimation are considered conservative when applied here because the seabed at the Operational Area is deeper than

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at the Athena Supply Project location. The timing of the activities in the Athena Supply Project EP are similar to the timings for this project; with Athena Supply Project activities occurring up until the end of 2027.

The estimate is based on a release of 100MT of barite with a concentration of 1mg/kg of mercury and 3mg/kg of cadmium (equating to 0.1kg of mercury and 0.3kg of cadmium), and assumed the bulk materials settle on the seabed within 200m of the discharge point and are distributed in the top 5cm of seabed sediment. The resulting concentration of mercury in the sediment is 0.009mg/kg, which is well below the ANZG DGV of 0.15mg/kg (ANZG, 2018). The estimate for cadmium is 0.030mg/kg, which is also well below the ANZG DGV of 1.5mg/kg (ANZG, 2018).

The estimates indicate residual concentrations of mercury and cadmium originating from bulk materials, once dispersed within a 200m radius of shallow sediment around the discharge location, would be well below the applicable ANZG DGVs for sediment, and therefore would cause no discernible ongoing impacts.

Inhibited water and small volumes of cleaning chemicals will also be discharged at the seabed. Dependant on the use of secondary well control methodology determined in the WOMP, WBM, brine, cement and cement debris may also be discharged at the seabed (if riserless). Similarly to Section 7.8.3.1, given the quantities of decommissioning discharges, the low toxicity of WBM and cement and high dispersion in the open, offshore environment, any impact to sediment quality is anticipated to be minor and temporary.

7.8.3.3 Benthic habitats and communities

Change in habitat

Benthic habitat may be disturbed when decommissioning activities result in discharges being released on the seabed.

During well integrity evaluation, should milling be required, approximately 3m³ of cement will be discharged to the seabed per well (see Table 7-14). The discharged cement is not anticipated to disperse or release any chemicals from the cement, as cement is designed to set, is inert and considered to pose little or no risk to the environment (OSPAR, 2021). Therefore, the impact from discharged cement is limited to the potential for it to smother the benthic habitats and associated communities. A study conducted by BP modelled the discharge of ~83m³ of cement discharged at the seabed and identified that changes to the benthic environment was limited to maximum of ~10m radius from the cement release (BP, 2013). The seabed within the Operational Area is characterised by sand (with gravel, silt and clay) and sparse sessile epibenthic organisms (see Section 4.3.6). Therefore, the impact from cement is anticipated to be minimal, and restricted to the small area around the release site.

The discharge of WBM onto the seabed during the decommissioning activities can potentially cause physical damage to benthic organisms by abrasion or clogging, or through changes in sediment texture that can inhibit the settlement of planktonic polychaete and mollusc larvae (Hinwood et al., 1994; Neff et al., 2005). Impacts are not expected to be significant due to the rapid biodegradation and dispersion of WBM, as discussed above. Barite contains relatively low concentrations of mercury and cadmium (less than 1mg/kg and 3mg/kg, respectively) – noting these concentrations are considered within the high guideline value for sediments in ANZG (2018) (refer to Section 7.8.3.2 for assessment of impact on sediment quality). However, barite is mixed with WBM and diluted before being used in the marine environment; so the concentrations are substantially lower. Barite is referred to as practically inert from a toxicological perspective (Smit et al. 2008). Discharges are not

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expected to contribute to sediment toxicity due to the low bioavailability of mercury and cadmium (Schaanning et al. 2002).

During the cutting of the wellheads, there is the potential for abrasive media (i.e., garnet) to be discharged within the well as it is cut internally. Almandine is the most common type of garnet and is usually found in metamorphic rocks or as heavy mineral sand from weathered hard rocks (Perec, 2018). Impacts to benthic organisms are not expected as this naturally occurring mineral is considered to be inert and non-toxic to the environment. No swarf is expected to settle external of the wellheads, as the wellheads will be cut internally and there is substantial clearance between the mudline and top of cement (Figure 3-3 and Figure 3-4).

In the event that the guideposts are required to be cut, there is the potential for swarf to be discharged and released on the seabed. The impact from swarf is anticipated to be minimal, and localised to the area immediately surrounding the guideposts.

Recovery of benthic communities following physical damage has been shown to occur by recruitment of new colonists from planktonic larvae and immigration from adjacent undisturbed sediments. Ecological recovery usually begins shortly after completion of the activity and often is well advanced within a year (Neff et al., 2005). Furthermore, the lack of significant habitats and biota or sensitive receptors present in the Operational Area over the area contacted by decommissioning discharges, indicate that impacts to sensitive benthic habitats and communities are not anticipated to occur (see Section 4.3.6).

See Section 7.1 for further details on seabed disturbance to benthic habitats and communities.

7.8.3.4 Marine fauna

Injury / mortality to marine fauna

The release of certain fluids into the marine environment during the decommissioning activities has the potential to cause injury, or mortality, to marine fauna.

Cement and WBM are both inert products and are both considered to pose little or no risk to the environment (OSPAR, 2021) and are listed as an "E" Category fluid under the Offshore Chemical Notification Scheme (OCNS). Barite has relatively low concentrations of mercury and cadmium and it is referred to as practically inert from a toxicological perspective (Smit et al. 2008). The concentration of mercury and cadmium in fluids released to the marine environment is even lower, as barite is a small constituent of drilling fluids. SBM will not be used during the decommissioning activities; and no drill cuttings are generated by the P&A activities.

Therefore, toxicity impacts to marine fauna such as plankton, fish, turtles, and marine mammals are not predicted. Very high concentrations of suspended sediments have been shown to result in mortality of marine fauna. A study by Jenkins and McKinnon (2006) indicated that levels of suspended sediments greater than 500mg/l are likely to produce a measurable impact upon larvae of most fish species and levels of 100mg/l where exposure occurs for greater than 96 hours may also affect the larvae of some species. The study further indicated that levels of 100mg/l may affect the larvae of several marine invertebrate species. Given the release volumes, metocean conditions and the limited time of exposure in the water column such concentrations are not expected to occur as a result of the decommissioning activities. Previous modelling has indicated that a cement plume will disperse rapidly once in the marine environment (BP, 2013). Therefore, impacts to marine fauna, including fish eggs and larva are not predicted.

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Potential contamination or toxicity effects can occur through the release of inhibited water (including the annulus fluid), control fluid, and cleaning chemicals into the marine environment. During the removal of the corrosion cap, there is potential for 1m^3 of annulus fluid to be released into the marine environment. Control fluids (i.e. hydraulic fluid) will be discharged into the marine environment during the establishment and recovery of the secondary well control if a subsea BOP is used, releasing 2.5m^3 each time per well (Table 7-14). Cleaning chemicals, such as sulfamic acid, calcium wash and fluorescent dye, may also be used to remove marine growth, similarly, to inhibited water, these will be in small volumes.

Diluted hydraulic control fluids are water-based, readily biodegradable and exhibit low levels of toxicity. Studies indicate that in well-mixed oceanic waters, such as that within the offshore environment of the Joseph Bonaparte Gulf (see Section 4.3.2), the control fluids will dilute by over 100-fold within 10m of the discharge release point (Neff, 2005). Neff (2010) indicate that control fluid from the BOP will disperse within 100m of the well location.

Any toxic effects that might potentially occur would likely be restricted to small organisms, such as plankton, larvae and potentially small fish, that become entrained in discharged water in the immediate vicinity of the release. Toxic effects to planktonic organisms are predicted to be limited given the short period of discharge, the small volumes, and the dispersive offshore marine environment. Toxicity impacts are therefore anticipated to not impact species at a population level.

See Section 8.5 and 8.6 for a further evaluation of a minor loss of containment.

7.8.3.5 Residual risk summary

The worst-case residual severity from planned decommissioning discharges is evaluated as Slight (1), given the relatively low volume of infrequent discharges, and the dispersive offshore marine environment.

The likelihood of injury or mortality of marine fauna from planned discharges during decommissioning activities is considered Rare (A) as any toxicity impacts are predicted to be short-term and not impacts species at a population level due to the short discharge duration, small discharge volumes, and highly dispersive offshore environment.

Therefore, the residual risk of planned decommissioning discharges due to the petroleum activities is considered Low.

7.8.4 Environmental Performance Outcomes and Control

EPOs relating to this risk include:

- Impacts to water quality and/or marine biota from decommissioning discharges will be temporary and localised within the immediate vicinity of the discharge location (EPO-09)

CMs relating to this risk include:

- Chemical risk assessment process (CM-21);
- Cuttings management system (CM-22);
- Unused excess bulk product managed as per Figure 7-2 at end of decommissioning program (CM-23);
- Quality control for barite (CM-24);
- Monitoring use of barite and cement (CM-25);

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- Industry collaboration on management of unused bulk products (CM-26); and
- Well Operations Management Plan (WOMP) (CM-47).

EPSs and MC relating to the above are presented in Section 9.1.

7.8.5 As Low as Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
Eliminate	Eliminate the use of decommissioning fluids and muds	Decommissioning fluids and muds are technically required to decommission the well and cannot be eliminated. The chemical risk assessment process will ensure any new chemicals are assessed before use in accordance with the procedure to reduce impact to ALARP and acceptable.	*
	Eliminate discharge of unused bulks to sea	<p>The environmental benefits of eliminating discharge of bulks to the sea is limited due to classification of the materials as inert or PLONOR and in the case of barite, it's low solubility in the marine environment. Bulks disperse effectively in the offshore environment. In addition barite is subject to a control to ensure the concentration of mercury is limited (CM-24).</p> <p>To ensure compliance with Article 9 of the Minamata Convention, best available techniques (BAT) and best environmental practices (BEP) will be identified to control releases of mercury from relevant sources. BAT are those that are most effective in preventing, and where that is not practicable, reducing releases of mercury to water, the impact of such releases and the impact of releases on the environment as a whole, taking into account technical and economic considerations. Using BEP means application of the most appropriate combination of environmental control measures and strategies. Eni have done this by developing the following control measures:</p> <ul style="list-style-type: none"> • Monitoring use of barite and cement (CM-25) to reduce the amount of excess bulk products • Quality control of barite (CM-24) to limit the concentration of mercury in stock barite. • Unused bulk product management (CM-23) to pass on excess materials to other operators. <p>The decision framework employed for management of unused bulks (CM-23) ensures bulks are released (once diluted into a slurry at a similar dilution to WBM), only when no other safe and practicable option has been found.</p> <p>Transport and transfers of bulks onshore requires a significant increase in time and cost,</p>	*

Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
		and increases HSE risk due to more lifts and transfers. Once brought onshore, re-use is unlikely due to the nature of the material, and onshore disposal options have limited capacity. Cleaning of storage tanks that have held cement for an extended period is a costly and complex task, which can also increase risk to personnel.	
	Unused bulk product managed as per Figure 7-2 at end of decommissioning program	Eni is committed to investigating available solutions for management of excess bulk products. Passing unused bulk product to the next operator is not always an option (e.g. where bulk barite does not meet the next operators acceptance criteria or there is no contract for the MODU at the end of the campaign). Transport and transfers of bulk products introduce costly technical requirements and additional HSE risks. Barite may contain some trace levels of heavy metals, including mercury. However, these metals are present primarily as inorganic, insoluble sulphide minerals and have limited environmental mobility and low bioavailability. While restricting overboard discharge would reduce the overall volume of discharge to the marine environment, with controls in place that limit the mercury concentrations in stock barite to $\leq 1\text{mg/kg}$ dry weight, the low solubility and inert behaviour of barite in seawater, and the predominantly bare soft substrate habitats, the implementation of the no overboard discharge on unused bulk product management control is considered to be of limited environmental benefit and would not result in a reduction of residual risk of toxicity effects to benthic habitats and communities or marine fauna.	✓ (CM-23)
Substitute	Substitute out high-toxicity chemicals where possible	The chemical risk assessment process will ensure any impact from chemical discharge is ALARP and acceptable. See Section 10.14.	✓ (CM-21)
	Riserless methodology	The use of secondary well control methodology is dependant on the outcome of the pre-decommissioning inspection and acceptance of the updated WOMP to include well abandonment. For example, the pre-decommissioning inspection may find that the integrity of the wellhead is not sufficient to support the weight of the subsea BOP. The use of a riser or not will determine whether the location of discharge is at the surface or seabed. If riserless, then WBM, brine, cement and cement debris will be discharged at the seabed, instead of at the surface. However, the discharge volumes are the same. The only unique planned discharge between the two	✓ CM-47

Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
		<p>methods is an additional 2.5m³ discharge of hydraulic control fluid per time from the riser-based subsea BOP. The surface discharges may disperse more rapidly compared to at the seabed; however, all discharges are of low volumes, and of low toxicity.</p> <p>There is considered to be negligible difference in potential environmental impact (to water or sediment quality) between the two methods.</p> <p>Both options are included, and will be determined in the WOMP.</p>	
Engineering	N/A	N/A	N/A
Isolation	N/A	N/A	N/A
Administrative	Selection of chemicals to reduce impact to ALARP and acceptable	The chemical risk assessment process will ensure any new chemicals are assessed before use in accordance with the procedure to reduce impact to ALARP and acceptable. See Section 10.14.	✓ (CM-21)
	Procedures for cement plug drilling operations	Procedures detailed in the abandonment program include controlled drilling out rates and use of seawater as the primary circulating fluid. Reduces the risk of operational issues during drilling out of cement plugs. Ensures the activity is conducted in a planned and controlled manner. Minimal cost to implement.	✓ (CM-48)
	Quality control for barite	<p>The following contaminant limits have been identified as good international industry practice:</p> <ul style="list-style-type: none"> Mercury (Hg) – 1mg/kg dry weight in stock barite Cadmium (Cd) – 3mg/kg dry weight in stock barite. <p>Adopting these limits reduces releases of mercury to the environment as required by the Minamata Convention.</p> <p>Minimal administrative costs.</p>	✓ (CM-24)
	Monitoring use of barite and cement	Monitoring the use of barite and cement will help to identify and reduce excess bulk products at the end of the exploration drilling activity. The barite bulk volume to be maintained on the MODU through to the end of the drilling operations (and supply of additional barite from onshore) will be managed and minimised to enable maintenance of the planned drilling fluid density and allow for a contingency drilling fluid density increase of 1ppg for well control purposes. Cement bulk volume on the MODU will be managed and minimised to enable all cement plugs to be installed, and will account for potential contingency cementing operations.	✓ (CM-25)
	Industry collaboration on management of	The Australian petroleum industry is currently working to establish an aligned position on management and disposal opportunities for	✓ (CM-26)

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Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
	unused bulk products	unused bulk products. This includes an assessment of feasible onshore disposal solutions. Participating in industry efforts may help in the identification of feasible improvements to the management of unused bulk products at a regional level and reduce potential impacts and risks associated with disposal. Eni is committed to investigating onshore disposal solutions for excess bulk products, and any improvements identified through industry collaboration will be implemented, if deemed ALARP, following the process outlined in Figure 7-2.	

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7.8.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>Planned decommissioning discharges from petroleum activities are managed in accordance with relevant legislative requirements, including compliance with international maritime conventions and Australian legislation.</p> <p>Mercury concentrations in barite will be limited in line with industry practice, to ensure compliance with article 9 of the Minamata Convention.</p>
Policy Compliance	<p>The management of the discharge is aligned with Eni policies and standards. The residual risk is Low, which is acceptable.</p> <p>The EPO and the controls that will be implemented are consistent with Eni internal requirements.</p>
Social Acceptability	<p>DPIRD requested confirmation that all chemicals and fluids used in the activity are selected on the criterion that they are lowest impact, which Eni confirmed is managed by its chemical risk assessment process (CM-21, described in Section 10.14) (refer Section 5).</p> <p>The Australian petroleum industry is currently working to establish an aligned position on management and disposal opportunities for unused bulk products, including onshore disposal solutions. Eni is involved in this industry collaboration to help in the identification of feasible improvements to the management of unused bulk products at a regional level and reduce potential impacts and risks associated with disposal.</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
Area Sensitivity/ Biodiversity	<p>The Operational Area does not intersect with any State or Territory marine protected areas, AMPs, wetlands of international or national importance, World, National or Commonwealth heritage properties or places, or KEFs.</p> <p>Foraging BIAs for the green turtle and Olive Ridley turtle overlap the Operational Area. Other marine fauna are likely to be transient in the Operational Area. Any toxicity impacts are predicted to be short-term and not impact species at a population level due to the short discharge duration, small discharge volumes, and highly dispersive offshore environment.</p> <p>Eni has considered information contained in relevant recovery plans and approved conservation advice for EPBC Act listed species that identify chemical discharges, pollution and habitat degradation or modification as a threat (as listed in Table 2-3). This includes:</p> <p>Conservation Advice</p> <ul style="list-style-type: none"> • Approved Conservation Advice for <i>Balaenoptera borealis</i> (Sei Whale) identifies pollution (persistent toxic pollutants) as a threat. • Approved Conservation Advice for <i>Balaenoptera physalus</i> (Fin Whale) identifies pollution (persistent toxic pollutants) as a threat. • Approved Conservation Advice for Green Sawfish lists habitat degradation or modification as a threat. • Approved Conservation Advice for <i>Pristis pristis</i> (Large Tooth Sawfish) lists habitat degradation or modification as a threat. • Approved Conservation Advice for <i>Glyphis garricki</i> (Northern River Shark) lists habitat degradation or modification as a threat. • Approved Conservation Advice for <i>Rhincodon typus</i> (Whale Shark) lists habitat degradation or modification as a threat. <p>Recovery/Management Plans</p> <p>The petroleum activity is consistent with the objectives and actions of the plans identified below through adoption of EPO-08 and the control measures outlined in Section 7.8.4:</p> <ul style="list-style-type: none"> • Conservation Management Plan for the Blue Whale 2015–2025 (DoE, 2015) identifies habitat modification, including acute and chronic chemical discharge, as

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	<p>a threat. There are no BIAs for the blue whale overlapping the Operational Area. There are no explicit relevant management actions in this plan. The petroleum activity is consistent with the long-term recovery objective to 'minimise anthropogenic threats to allow the conservation status of the blue whale to improve so that it can be removed from the threatened species list under the EPBC Act' through the adoption of the EPO.</p> <ul style="list-style-type: none"> • Recovery plan for Marine Turtles in Australia (DEE, 2017) identifies acute chemical and terrestrial discharge as a threat. Foraging BIAs for the green turtle and Olive Ridley turtle overlap the Operational Area. Action Area A4 to minimise chemical and terrestrial discharge through the adoption of the EPO. • Sawfish and River Shark Multispecies Recovery Plan (Commonwealth of Australia, 2015) lists habitat degradation or modification as a threat. No habitat critical or BIAs have been identified for sawfish or river sharks within the operational area. The petroleum activity is consistent with Objective 5 of this plan to 'reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species', through adoption of the EPO. • Recovery Plan for the White Shark (<i>Carcharodon carcharias</i>) (2013) identifies habitat modification as a threat. No habitat critical or BIAs have been identified for white sharks within the operational area. The petroleum activity is consistent with the objective of this plan to ensure anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future through adoption of the EPO. • Recovery Plan for the Grey Nurse Shark (<i>Carcharias taurus</i>) (DoE, 2014a) identifies pollution as a threat. No habitat critical or BIAs for the grey nurse shark have been identified in the Operational Area. The petroleum activity is consistent with the objective of this plan to ensure anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future, through the adoption of the EPO. <p>Recovery Plans/Conservation Advice for other EPBC Act listed threatened and migratory species that may occur in the Operational Area do not identify chemical discharges, pollution and habitat degradation or modification as a key threat or have explicit relevant objectives or management actions related to these threats.</p> <p>The control measures outlined in Section 7.8.4 are consistent with the objectives and actions in these publications. The petroleum activities are not inconsistent with the objectives and actions in the relevant recovery plans/conservation advice.</p>
ESD Principles	<p>The petroleum activities are consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> • The worst-case impact associated with this aspect is Slight (1); and the residual risk is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage; and there is no scientific uncertainty associated with the potential impact. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

Given the short duration of the petroleum activities, the relatively small volumes of planned decommissioning discharges and dispersive offshore marine environment in the Operational Area, the potential impacts associated with decommissioning discharges are considered to be Slight. Controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3).

The residual risk is considered to be Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Therefore, the potential impacts associated with planned decommissioning discharges are acceptable and ALARP.

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8 ENVIRONMENTAL RISK ASSESMENT - UNPLANNED EVENTS

8.1 Interaction with Other Marine Users – Equipment in-situ

8.1.1 Summary of Environmental Impact

Hazard	Interaction with Other Marine Users – Equipment in-situ		
	Frequency	Severity	Risk
Inherent Risk	B	1	L
Residual Risk	B	2	L

8.1.2 Description of Hazard

The planned activity is full removal of the wellhead and associated equipment at or below the mudline. Following all reasonable attempts to remove and recover the wellheads and associated equipment, a contingency activity to leave the wellheads and associated equipment in-situ has been included in this EP, as described in Section 3.3.9.

Unplanned interactions with other marine users may occur as a result of:

- permanent presence of the wellheads, PGB and/or TGB, if these are left in-situ as a contingency only.

8.1.2.1 Wellhead, PGB and TGB recovery

Once the wells have been adequately plugged and abandoned as per the WOMP (Section 3.3.6), wellhead recovery can commence. This may occur either in direct continuance of the well P&A with the MODU (pending NOPSEMA well integrity permissioning), or by a subsequent vessel campaign.

The decision framework shown in Figure 3-7 describes the approach to wellhead removal and recovery options following well P&A, either with a MODU, or a vessel if the MODU cannot successfully recover the equipment to surface. The wellhead removal decision framework will be implemented to ensure all reasonable attempts are made to remove and recover the wellheads, PGB and TGB. Should operational challenges and contingency operations prove unsuccessful, preventing safe removal and recovery of the wellhead, PGB and TGB (or the TGB only), then subsea infrastructure may be left in-situ (Section 3.3.9.1).

If the wellhead and PGB cannot be successfully recovered, the guideposts will be cut, reducing the height profile of the subsea equipment.

If the TGB is not attached to the wellhead and PGB; it may be too corroded to successfully lift with slings, or partially buried. In this case, the TGB would be left in-situ.

Wellhead, PGB and TGB decommissioning shall be documented in a Wellhead Decommissioning Report.

To account for the worst-case scenario, the following impact assessment is based on the assumption that all subsea infrastructure (i.e., wellhead complete with PGB and TGB) are left in-situ.

If the wellheads or other associated equipment are left in-situ following decommissioning as a contingency only, the presence of the wellheads in-situ will last for many decades until

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the material is completely degraded. The ongoing presence of the wellheads in-situ may interfere with third-party activities, such as commercial fishing, commercial shipping and offshore industry activities.

The wellheads protrude approximately 3m above the seabed, so are ~92m below the sea surface. Demersal trawling consists of towing a net across the seabed to catch fish that are generally within 2-3m of the seabed (Baker, 2003). Protruding wellheads or other structures may potentially snag fishing nets.

The Petrel-3 and Petrel-4 wellheads have been in place since 1982 and 1988, respectively. Since then, no impacts to any stakeholder were reported.

8.1.3 Potential Environmental Impact

The continuous presence of the wellheads and other associated equipment such as TGB, PGB, guideposts and cement patio may result in:

- Change to the functions, interests or activities of other marine users.

Potential receptors that may be impacted are:

- Commercial fisheries;
- Defence; and
- Offshore industry.

Due to the distance from shore, there is not expected to be any recreational or traditional fishing in the Operational Area; nor are there any commercial shipping routes. There are no subsea cables in the Operational Area.

8.1.3.1 Commercial fisheries

Change to the functions, interests or activities of other marine users

The planned activity is full removal of the wellhead and associated equipment at or below the mudline. If the wellheads, PGB and TGB (or the TGB only), are left in-situ as a contingency in the event that operational challenges prevent them from being successfully removed (as per the decision framework in Section 3.3.9.1), they will be present on the seabed for many decades as they degrade slowly over a long period of time.

Based on the assessment in Table 4-11, the following is a summary of fisheries that overlap with the Operational Area; and those considered active in the Operational Area (within the data range):

- Commonwealth-managed fisheries: 4 fisheries overlap with the Operational Area (Northern Prawn Fishery, Southern Bluefin Tuna Fishery, Western Skipjack Fishery and Western Tuna and Billfish Fishery). Based on the catch-effort assessment, none of these fisheries are considered active within the Operational Area.
- Western Australian-managed fisheries: 2 fisheries overlap the Operational Area. The Joint Authority Northern Shark Fishery has been closed since 2009, and therefore is not considered active or have potential for future interaction. Only 1 fishery is considered active within the Operational Area (Open Access in the North Coast, Gascoyne Coast and Bioregions Fishery).

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- Northern Territory-managed fisheries: 5 fisheries overlap the Operational Area (Aquarium Fisher, Demersal Fishery, Offshore Net and Line Fishery, Spanish Mackerel Fishery and NT Tour Operators). Based on the catch-effort assessment, all 5 of these fisheries are considered active within the Operational Area.

The Open Access in the North Coast Fishery is the only WA-managed fishery active that is considered active within the Operational Area. The 60NM CAES reporting block overlapping the Operational Area, indicated up to six vessels active across the 2017-2022 seasons (DPIRD, 2023). The Joint Authority Northern Shark Fishery overlaps the Operational Area, however the fishery has been closed since 2009 and is not considered to have potential for future interaction if the wellheads and associated equipment are left in-situ as a contingency.

Five Northern Territory-managed fisheries are overlap the Operational Area and are considered active and have the potential to interact with equipment if left in-situ (Section 4.6.1):

- Northern Territory Aquarium Fishery: Hand-held equipment. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence operating in the Operational Area (NT GOV, 2021);
- Demersal Fishery: Line and fish-trap gear. Analysis of five years of NT fishing effort data (2017-2021) shows 3 licences operating in the Operational Area (NT GOV, 2021);
- Offshore Net and Line Fishery: Demersal/pelagic long-lines. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence within the Operational Area (NT GOV, 2021);
- Spanish Mackerel Fishery: Troll/floating long lines. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence within the Operational Area (NT GOV, 2021); and
- NT Tour Operators: Licence holders are permitted to fish in Territory waters, and do not have management areas. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence within the Operational Area (NT GOV, 2021). As identified in Section 8.1.2.1, if left in-situ the wellhead may present a snag risk to demersal trawl nets.

The NT Demersal Fishery includes areas designated for semi-demersal trawling, of which Zone B is in the JBG. The wellheads are not located in the area designated for trawling in the demersal fishery. Given that trawl fishing within the fishery is prohibited in the vicinity of the wellheads and that wellheads will be marked on nautical charts, the potential for snag risk with semi-demersal trawlers within the demersal fishery is not considered likely. Given the methodology of the other identified NT fisheries; if left in-situ, the wellhead is not likely to present a snag hazard to these fisheries.

Of the Commonwealth-managed fisheries with designated management areas that overlap the Operational Area, none of these are considered active. However, these fisheries have access rights to the Operational Area, and could potentially have fishing effort in the proximity of the wellheads in future.

The Southern Bluefin Tuna Fishery management area operates predominantly in the Great Australian Bight, targeting deeper waters <500m. The Western Skipjack fishery management area overlaps the Operational Area, however, has been closed for fishing since 2009. The Western Tuna and Billfish Fishery management area overlaps the Operational Area, however most of the Australian catch has been concentrated off south-

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west Western Australia. These 3 fisheries do not trawl; therefore, the potential for snag risk if wellheads are left in-situ is not considered credible.

Of these fisheries, only the Northern Prawn Fishery (NPF) has historical fishing effort that overlaps the EMBA only (not the Operational Area). The NPF is a trawl fishery; therefore, the wellheads may represent a trawl net snag hazard. Historically, the Operational Area does not fall within any effort fishing intensity area, as indicated through the Commonwealth Fishery Status Reports (Butler et al., 2023).

The NPF within the JBG primarily targets the redleg banana prawn (*Penaeus indicus*), accounting for 95% of species catch. The NPF fishing effort within the JBG, occurs away from other NPF catch effort, which occurs in the nearshore waters surrounding Darwin and the Gulf of Carpentaria (targeting other species). The fishing effort for the redleg banana prawn is targeted to the waters adjacent to Cape Londonderry, with highest catches of banana prawns taken offshore from mangrove forests, which serve as the juvenile nursery areas (Butler et al., 2024). The targeted redleg banana prawn fishery is managed via a single stock assessment for the JBG region. In 2021, following significant management strategy evaluation of the stock within the fishery, seasonal closures have resulted in the catch of redleg banana prawn now tending to be concentrated in July - August (Plagányi et al. 2023). Other species caught within the fishery include the tiger (*Penaeus esculentus* and *P. semisulcatus*) and endeavour (*Metapenaeus endeavouri* and *M. ensis*). Most catches of tiger prawns come from the southern and western Gulf of Carpentaria, and along the Arnhem Land coast, with the highest catches coming from areas near coastal seagrass beds, the nursery habitat for tiger prawns. Endeavour prawns are mainly caught as a byproduct species (Butler et al., 2024).

Given the significant distance from mangrove forests (~150kms) or coastal seagrass beds (~100kms) that serve as essential nursery habitats for targeted NPF species, the Operational Area is highly unlikely to support suitable habitats required for substantial fishing effort. Consequently, the waters within the Operational Area are not conducive to sustaining the necessary prawn populations for any concentrated future fishing activities for the NPF.

Eni consulted with the NPMI and WAFIC (as described in Section 5), and no concerns were raised regarding the physical presence of the wellhead or potential snag risk. The NPMI confirmed that NPF operators do not have any objection to the decommissioning of Petrel-3 and Petrel-4, and have no specific comments on the environmental plan, and confirmed there is no NPF fishing effort in the immediate vicinity of the wellheads. The NPMI's key concern was around scheduling of activities to avoid vessel transit impacting fishing season, which is not relevant for the physical presence of the equipment in-situ.

For the Tern-1 Wellhead Abandonment EP (accepted by NOPSEMA in September 2021), Santos engaged with the Australian Marine College to undertake an assessment of the potential impacts of Tern-1 wellhead on the NPF in the region. Given the report is from 2021, Tern-1 is approximately 55 and 60 km from the Petrel-3 and Petrel-4 respectively, and they are of a similar vintage, the same report has been used to inform potential concerns of the NPF.

The study indicates that most trawling and harvesting occurs in the Gulf of Carpentaria, particularly during the tiger prawn season. Conversely, the westernmost part of the fishery, including the Joseph Bonaparte Gulf near the Operational Area, experiences significantly less fishing activity. This aligns with the 2023 Australian Fisheries Zone data, illustrated in Table 4-11. Due to strong ocean currents, remoteness, and considerable water depth, the study deems the Tern-1 wellhead location, representative of the Petrel-3 and Petrel-4 Operational Area, unsuitable for prawn trawling. Existing NPF prawn trawl equipment is

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limited to depths of less than 75m (AMC, 2021), rendering the Operational Area inaccessible for this fishing method.

The Joseph Bonaparte Gulf is primarily a banana prawn (consisting of (white – *Penaeus merguensis*, and redleg – *P. indicus*) fishing ground, typically inhabit shallower waters. The common variety thrives in depths less than 45m, while the Indian white prawn is found between 45 - 85m (NPF25, 1994). Moreover, the Northern Prawn Fishery has experienced a significant decline in vessel numbers over the past four decades, from a peak of 292 licenced vessels in the 1980s to just 52 today. This reduction has curtailed exploratory fishing activities, leading to less frequent fishing in remote areas like the Joseph Bonaparte Gulf. This trend is projected to continue, with the potential for further decline as larger fishing companies consolidate the industry. Consequently, fishing efforts in the Gulf of Carpentaria may increase, while those in the Operational Area are likely to decrease (AMC, 2021). Although the wellhead is located within a trawlable area, based on this information, fishing effort in the vicinity of the Operational Area is likely to be low.

Regarding snagging risk, NPF vessels utilize echosounders and GPS plotters for navigation, enabling them to detect seabed obstacles like wellheads and plan routes accordingly (AMC, 2021). While the Operational Area is deep, the trawl gear is positioned far enough behind the vessel to allow for manoeuvrability in case of obstacles. Historical data indicates a low incidence of fishing vessel incidents involving offshore oil and gas infrastructure globally, with wellheads posing a significantly lower risk than other structures (Rouse et al., 2020).

While snagging incidents are rare, they can result in financial losses for commercial fishers due to lost fishing time or damage to and loss of equipment (Rouse et al., 2020). Historical data from the UK indicates that vessel damage or loss due to snagging occurred in less than 0.5% of cases between 1989 and 2016. Fatalities or injuries were even rarer, with only one such incident reported during this period (Rouse et al., 2020), representing 0.06% of all incidents.

Of the potential future interaction with commercial fisheries; only 2 of the fisheries have the potential to trawl in the Operational Area (NPF and NT Demersal Fishery). Given the low fishing activity in the area, advanced vessel equipment, and the potential for future technological improvements, the risk of trawl net snagging is considered minimal. It is noted that the wells have been suspended since the 1980s (with locations shown on existing navigation charts), and as such the continued presence of the wellheads is not a new aspect for marine users. Therefore, the proposed activities are not expected to result in an impact to commercial operations (via loss of catches or damage to fishing equipment) from presence of wellheads on the seabed given the long-term presence of the wellheads.

8.1.3.2 Defence

Change to the functions, interests and activities of other marine users

If the wellheads, PGB and TGB (or the TGB only) are left in-situ as a contingency in the event that operational challenges prevent them from being successfully removed as per the decision framework (Section 3.3.9.1), they will be present on the seabed for many decades as they degrade slowly over a long period of time.

The Northern Australia Exercise Area military zone overlaps the Operational Area. This zone is mainly utilised for activities associated with border protection including surveillance, illegal immigration, and illegal fishing. This area is occasionally used for live firing military exercises.

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The likelihood of disruption of military exercises due to the presence of the wellheads, PGB and TGB (or the TGB itself), if left in-situ is minimal. The wellheads have a small profile of ~3m in height, and approximately 1 meter in diameter, and their precise location is documented on nautical charts. The Petrel-3 and Petrel-4 wellheads have been in place since 1982 and 1988, respectively; and no impacts or concerns have been reported by any other marine user.

Consequently, it is unlikely that the presence of the wellheads will pose a challenge to future Defence activities in the region.

8.1.3.3 Offshore Industry

Change to the functions, interests or activities of other marine users

The presence of Petrel-3 and Petrel-4 wellheads or associated equipment on the seabed could potentially interfere with future offshore operations, such as the placement of a MODU or future infrastructure.

No CCS permits overlap with the NT/RL1 and WA-6-R permits, therefore direct interference with any future CCS activities is not expected. Eni is the titleholder of NT/RL1 and WA-6-R; and any future development within the title would be evaluated and undertaken by Eni.

The likelihood of disruption due to the presence of the wellheads, PGB and TGB (or the TGB only) if left in-situ as a contingency only is minimal. The wellheads have a small profile of ~3m in height, and approximately 1 meter in diameter, and their precise location is documented on nautical charts. The Petrel-3 and Petrel-4 wellheads have been in place since 1982 and 1988, respectively; and no impacts or concerns have been reported by any other marine user.

Consequently, it is unlikely that the presence of the wellheads will pose a challenge to future offshore activities in the region.

8.1.3.4 Residual risk summary

The worst-case residual severity to other marine users from leaving the wellheads in-situ is evaluated as Minor (2), given the low profile of the equipment, low fishing activity in the area, lack of bottom trawling, and no offshore industry activities permitted in the title areas except by Eni.

The likelihood of interaction with other marine users from leaving the wellhead in-situ occurring as a result of the activities is considered Unlikely (B) due to the small footprint of the wellheads.

Therefore, the residual risk of the wellheads interacting with other marine users due to the petroleum activities is considered Low.

8.1.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

- Reduce impacts on other marine users through the provision of information to relevant stakeholders such that they are able to plan for their activities and avoid unexpected interference (EPO-10)
- Make all reasonable attempts, as detailed in the decision framework (Figure 3-7), to recover the wellheads, PGB and TGB at or below the mudline (EPO-16).

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CMs relating to this risk include:

- Consultation with relevant persons (including notification requirements) (CM-07);
- AHO Nautical Charts (CM-27); and
- Wellhead removal decision framework (CM-44).

EPSs and MC relating to the above are presented in Section 9.1.

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8.1.5 As Low As Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/ managem ent	Evaluation	Adoption?
Eliminate	N/A	N/A	N/A
Substitute	N/A	N/A	N/A
Engineering	Full removal of wellhead, PGB and TGB	<p>The planned activity is full removal of the wellheads, PGB and TGB at or below the mudline. As discussed in Section 3.3.9.1, following the pre-decommissioning inspection and well P&A operations, wellhead, PGB and TGB recovery will be carried out in accordance with the decision framework (Figure 3-7).</p> <p>The wellhead decision framework (Figure 3-7) will be implemented to ensure all reasonable attempts will be made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits of the MODU; and alternate vessel (if required). Eni commits to ensuring the MODU/vessel and wellhead cutting and recovery tools selected are of suitable and proven capability for Petrel-3 and Petrel-4.</p> <p>However, as discussed in Section 3.3.9, there can be unforeseen operational challenges that may prevent the successful full removal of subsea equipment at or below the mudline. In this case, the wellhead, PGB and/or TGB may be left in-situ. Figure 3-7 accounts for mechanical and abrasive jet tooling methodologies and considers MODU/vessel capabilities to ensure all options are explored and applied as appropriate. An alternate vessel scenario has been included in the event that equipment cannot be successfully recovered to the MODU. This provides additional handling ability during lifts.</p> <p>If the wellhead and PGB cannot be successfully recovered, the guideposts will be cut, reducing the height profile of the subsea equipment to minimise interaction with other marine users such as snagging. The Petrel-3 and Petrel-4 wellheads have been in place since 1982 and 1988, respectively. Since then, no impacts to any stakeholder were reported.</p> <p>Section 572(3) of the OPGGS Act allows for deviations to the base case should the alternative decommissioning approach deliver equal or better environmental and safety outcomes compared to complete removal. In the event it becomes necessary to leave the wellhead in-situ, the residual risk to the environment from physical presence is evaluated in Section 7.3.6, and is considered Low risk, ALARP and acceptable.</p>	✓ (CM-44)

Demonstration of ALARP			
Type	Control/ managem ent	Evaluation	Adoption?
	Jetting/ excavation of the TGB	<p>In the event that the TGB is not attached to the wellhead/PGB and is partially buried, as described in Section 3.3.9.1, high pressure jetting or excavating the TGB could potentially restore lifting point access and subsequent recovery. However, these methods will generate additional seabed disturbance from jetting/excavation, increased turbidity and debris.</p> <p>Not undertaking recovery of the TGB and therefore leaving in-situ, means the long-term physical presence of the TGB structure.</p> <p>The TGB is only 1.5m high; whereas the wellhead is ~3m high. Therefore, the height profile of the TGB; especially if partially buried, is much less than the wellhead itself. It is not expected to cause interference with other marine users. The Petrel-3 and Petrel-4 wellheads have been in place since 1982 and 1988, respectively. Since then, no impacts to any stakeholder were reported.</p> <p>The environmental benefit of jetting/excavating the TGB in the attempt to recover, which is not guaranteed, is considered disproportionate to leaving the TGB in-situ. In the event it becomes necessary to leave the TGB in-situ, the residual risk to other marine users is considered low risk, ALARP and acceptable.</p>	*
Isolation	N/A	N/A	N/A
Administrative	AHO Nautical Charts	<p>Both wellheads are charted on AHO nautical charts so that marine users are aware of its location, they can therefore avoid the wellhead if required thus reducing snag risk</p> <p>Marine users will not be excluded from the area.</p>	✓ (CM-27)
	Consultation with relevant persons (refer Section 5)	<p>Relevant persons consultation ensures marine users are aware of the wellheads potentially remaining in-situ. They have been in place since the 1980s without any reported issues.</p> <p>Enables identification of potential Sea Country protection or enhancement initiatives, and implementation where practicable.</p>	✓ (CM-07)

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8.1.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>N/A.</p> <p>Eni will not interfere with the rights of other marine users to a greater extent than is necessary for the reasonable exercise of right conferred by the titles granted, as per Section 280 of the OPGGS Act.</p> <p>The planned activity is full removal of the wellhead and associated equipment at or below the mudline. Following all reasonable attempts to remove and recover the wellheads and associated equipment, a contingency activity to leave the wellheads and associated equipment in-situ has been included in this EP , as described in Section 3.3.9.</p> <p>All reasonable attempts will be made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits of the MODU and alternate vessel (if required). Eni commits to ensuring the MODU/vessel and wellhead cutting and recovery tools selected are of suitable and proven capability for Petrel-3 and Petrel-4.</p> <p>Section 572(3) of the OPGGS Act allows for deviations to the base case should the alternative decommissioning approach deliver equal or better environmental and safety outcomes compared to complete removal. In the event it becomes necessary to leave the wellheads or equipment in-situ, the residual risk from the physical presence of equipment in-situ are assessed as Low and demonstrated to be acceptable.</p> <p>The physical presence of equipment in-situ is managed in accordance with the <i>Sea Dumping Act 1981</i>. Eni has reviewed the <i>Sea Dumping Act 1981</i> and engaged with DCCEEW and determined the temporary P&A activities for Petrel-3 predates the Act and therefore Petrel-3 equipment abandonment does not require a permit.</p> <p>However, temporary P&A activities for Petrel-4 were conducted after the Act was in place. If any equipment is left in-situ as a result of the Petrel-4 abandonment, a Sea Dumping permit will be required (Section 2.1.3).</p>
Policy Compliance	<p>The management of physical presence of the petroleum activities is aligned with Eni policies and standards. The residual risk is Low, which is acceptable.</p> <p>The EPOs, CMs and EPSs that will be implemented are consistent with Eni internal requirements.</p>
Social Acceptability	<p>Following initial consultation (as described in Section 5), Eni has re-considered the wellhead removal options. The planned activity is now full removal of wellheads and associated equipment at or below the mudline. The contingency outcome to leave the wellhead in-situ would only be actioned under ALARP principles should the removal activity encounter operational challenges, as described in Section 3.3.9, that prevent it from being successfully severed and retrieved to the MODU/vessel.</p> <p>During initial consultation with the NPMI and WAFIC (as described in Section 5), no concerns were raised regarding the physical presence of the wellhead or potential snag risk, if the wellheads are left in-situ. The NPMI confirmed that NPF operators do not have any objection to the decommissioning of Petrel-3 and Petrel-4, and confirmed there is no NPF fishing effort in the immediate vicinity of the wellheads.</p> <p>During initial consultation, the Wilderness Society advised that they object to anything other than complete removal of the wellheads (Section 5). Eni confirmed that a pre-decommissioning inspection needs to be conducted to assess the integrity of the structures and come to a final decision on the end state of the infrastructure; and that the options will be evaluated considering impacts to the environment, cultural heritage and other marine users; and as per regulatory requirements.</p> <p>During initial consultation, DPIRD advised that given the uncertainty of the overall integrity of the structures drilled in the 1980s, they request Eni considers risks associated with any partial removal options carefully, including in relation to the future risk of any structures or equipment left behind in the environment (Section 5). As described above, Eni confirms that the pre-decommissioning inspection will assess well integrity, status of cleaning and modification, and inform final selection of the wellhead removal option. The original options assessment undertaken by Eni considered all</p>

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	<p>impacts and risks against environmental, technical, health and safety, social and economic criteria. This assessment identified leave in-situ as the most preferred decommissioning option. Given ongoing risks from the leave in-situ option from the physical presence of equipment in-situ was assessed as Low and demonstrated to be acceptable, in the event this option is selected following the pre-decommissioning inspection.</p> <p>Following this, Eni have re-considered the wellhead removal options and have committed to full removal of wellheads and associated equipment at or below the mudline. All reasonable attempts will be made to complete the proposed wellhead removal activity outlined in this EP as best as practical within acceptable cost, time and HSE exposure limits of the MODU and alternate vessel (if required). Eni commits to ensuring the MODU/vessel and wellhead cutting and recovery tools selected are of suitable and proven capability for Petrel-3 and Petrel-4.</p> <p>Section 572(3) of the OPGGS Act allows for deviations to the base case should the alternative decommissioning approach deliver equal or better environmental and safety outcomes compared to complete removal. In the event it becomes necessary to leave the wellheads or equipment in-situ, the residual risk from the physical presence of equipment in-situ are assessed as Low and demonstrated to be acceptable.</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
ESD Principles	<p>The petroleum activities are consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> • The worst-case impact residual risk associated with this aspect is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservative assumptions have been applied to the impact assessment. The analysis of available fishing data and usage information was supplemented with consultation where knowledge gaps were identified, and potential future fishing effort considered. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.

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Area Sensitivity/ Biodiversity	<p>The following fisheries that overlap the Operational Area; and of those the following are considered active:</p> <ul style="list-style-type: none"> Commonwealth-managed fisheries: 4 fisheries overlap with the Operational Area; however none are considered active. The Operational Area overlaps the management area of the NPF, however there has not been any historical fishing effort recorded based on data from 2010-2022 (Summerson, 2024). Western Australian-managed fisheries: 2 fisheries overlap the Operational Area. The Joint Authority Northern Shark Fishery has been closed since 2009, and therefore is not considered active or have potential for future interaction. <p>Northern Territory-managed fisheries: 5 fisheries overlap the Operational Area and all are considered active within the Operational Area. The Operational Area overlaps low effort fishing area and/or low number of licences with the following active fisheries:</p> <ul style="list-style-type: none"> WA Open Access in the North Coast Fishery (six vessels) NT Aquarium Fishery (1 licence) NT Demersal Fishery (3 licences) NT Offshore Net and Line Fishery (1 licence) NT Spanish Mackerel Fishery (1 licence) NT Tour operator (1 licence). <p>Of the potential future interaction with commercial fisheries; only 2 of the fisheries have the potential to trawl in the Operational Area (NPF and NT Demersal Fishery).</p> <p>The NPF is a trawl fishery, therefore, the wellheads may represent a trawl net snag hazard However the Operational Area does not fall within any effort fishing intensity area (Butler et al., 2023). Given the significant distance from essential nursery habitat for targeted NPF species, the Operational Area is highly unlikely to support suitable habitats required for substantial fishing effort; and the Operational Area is not conducive to sustaining the necessary prawn populations for any concentrated future fishing activities for the NPF.</p> <p>The NT Demersal Fishery includes areas designated for semi-demersal trawling, however the wellheads are not located in the area designated for trawling.</p> <p>None of the other Commonwealth, WA or Northern-Territory-managed fisheries that overlap the Operational Area that could potentially have fishing effort in future use bottom trawling as fishing method, which excludes the snagging risk.</p> <p>No CCS permits overlap with the NT/RL1 and WA-6-R permits, therefore direct interference with any future CCS activities is not expected. Eni is the titleholder of NT/RL1 and WA-6-R; and any future development within the title would be evaluated and undertaken by Eni.</p> <p>Physical presence of infrastructure has not been identified as a threat in any recovery plans or conservation advice for threatened and migratory species.</p>
ALARP	The residual risk has been demonstrated to be ALARP.

Given the low volume of other marine users within the Operational Area, unlikely future use by trawling fisheries, the small physical profile of wellheads and equipment if left in-situ as contingency only, and no concerns raised by commercial fisheries regarding snagging, the potential impacts are Slight (1). The residual risk is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Potential impact associated with interactions with other marine users is considered acceptable and ALARP.

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8.2 Marine Fauna Interaction

8.2.1 Summary of Environmental Impact

Hazard	Marine Fauna Interaction		
	Frequency	Severity	Risk
Inherent Risk	B	1	L
Residual Risk	B	1	L

8.2.2 Description of Hazard

Marine fauna interaction may occur as a result of:

- MODU operations;
- Vessel operations; and
- Helicopter operations.

There is the potential for the MODU, vessels, ROVs or helicopters to interact with marine fauna, via strike or collision.

The monitoring and pre-decommissioning vessel-based campaigns have an expected duration of 14 to 40 days. The As-left survey has a duration of 2 days per well, but this campaign is likely to occur at the same time as the decommissioning campaign. The decommissioning campaign using the MODU has an expected duration of up to 60 days (30 days per well).

8.2.2.1 MODU operations

Within the Operational Area, the MODU will move into position above the first wellhead; and then move to the second wellhead (depending on whether there are one or 2 campaigns). It will then de-mobilise from the Operational Area once the activities are complete. The movement of the MODU will be very slow.

While the MODU is stationary, it is not considered a collision risk.

8.2.2.2 Vessel operations

During the monitoring and pre-decommissioning activities, only one vessel will be present at any one time.

During the decommissioning activities, up to 3 support vessels will be present in the Operational Area. Support vessels will be operating in the immediate vicinity of the MODU and as a result will be moving slowly.

8.2.2.3 Helicopter operations

Helicopters will be employed during the decommissioning campaign with an estimated frequency of once per day.

During landing and take-off there is potential for helicopter blades to strike birds.

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8.2.3 Potential Environmental Impact

Interaction with marine fauna has the potential to result in:

- Injury/mortality of marine fauna.

Potential receptors that may be impacted are:

- Fish;
- Marine reptiles;
- Marine mammals; and
- Seabirds and shorebirds.

8.2.3.1 Fish, marine reptiles and marine mammals

Injury / mortality of marine fauna

Megafauna comprising marine mammals, turtles and whale sharks are the species most at risk from this potential impact. As identified in Section 4, several marine mammals (whales and dolphins), turtle species and whale sharks listed as threatened and/or migratory and/or a listed marine species under the EPBC Act have the potential to occur within the Operational Area. Most of these species are expected to transit through, rather than aggregate within the Operational Area. There were no sightings of marine fauna in the Operational Area during the 2022 and 2023 survey campaigns. The Operational Area is located within a foraging BIA for green and Olive Ridley turtles, but the Operational Area is in water deeper than foraging depths for these species.

There is limited data regarding strikes to fauna such as turtles and whale sharks, possibly due to lack of collisions being noticed and lack of reporting. However, marks observed on animals show that strikes have occurred (Peel et al., 2016). Cetaceans provide a representative case to enable an evaluation of consequence to be undertaken.

Cetaceans are naturally inquisitive marine mammals that are often attracted to offshore vessels and facilities. The reaction of whales to the approach of a vessel is quite variable. Some species remain motionless when in the vicinity of a vessel, while others are curious and often approach ships that have stopped or are slow moving (Richardson et al., 1995). They generally do not approach, and sometimes avoid, faster-moving ships (Richardson et al., 1995).

Collisions between larger vessels with reduced manoeuvrability and large, slow-moving cetaceans occur more frequently where high vessel traffic and cetacean habitat occurs. Larger vessels with reduced manoeuvrability moving in excess of 10 knots may cause fatal or severe injuries to cetaceans, with the most severe injuries caused by vessels travelling faster than 14 knots (Laist et al., 2001). Vessels typically used to undertake petroleum activities do not have the same limitations on manoeuvrability and would not be moving at these speeds when conducting activities inside the Operational Area. While the MODU has reduced manoeuvrability, it will be moving at speeds well below 10 knots.

The probability and consequence of a vessel strike between a vessel and cetacean is proportionate to the speed at which the vessel is travelling. The chance of a vessel strike causing a lethal injury to a large whale will increase from 20% at 8.6 knots to 80% at 15 knots (Vanderlaan and Taggart, 2007). Similarly, an increase in vessel numbers increases the likelihood of strike (Silber and Bettridge, 2012).

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Peel et al., (2016) reviewed vessel strike data (1997-2015) for marine species in Australian waters and identified the following:

- Whales including the humpback, pygmy blue, Antarctic blue, southern right, dwarf minke, Antarctic minke, fin, bryde's, pygmy right, sperm, pygmy sperm and pilot species were identified as having interacted with vessels. The humpback whale exhibited the highest incidence of interaction followed by the southern right whale. A number of these species may migrate through the waters of the Operational Area; and
- Dolphins including the Australian humpback, common bottlenose, indo-pacific bottlenose and Risso's dolphin species were also identified as interacting with vessels. The common bottlenose dolphin exhibited the highest incidence of interaction. A number of these species may reside in or pass through the waters of the Operational Area.

The decommissioning activities represent the longest duration of fauna exposure to MODU, vessel and ROV collision. This campaign may be up to 60 days, during which time, the MODU and up to 3 vessels will be present.

If a fauna strike occurred and resulted in death, it is not expected that it would have a detrimental effect on the overall population of the species or ecosystem function.

8.2.3.2 Seabirds and Shorebirds

The movement and operation of helicopters, has the potential to disturb, and potentially cause injury or death to birds due to collision. However, due to the location of the activity offshore and the lack of BIAs or habitats critical to the survival of species overlapping with the Operational Area, large numbers of birds are not expected.

It is considered unlikely that a collision between a helicopter and seabird will occur.

8.2.3.3 Residual risk summary

The worst-case residual severity to marine fauna from interaction with the MODU and vessels is evaluated as Slight (1), given a lethal interaction will not impact species population or ecosystem function.

The likelihood of injury or mortality of marine fauna from interaction with the MODU and vessels occurring as a result of the activities is considered Unlikely (B) due to the slow speeds of vessels in the Operational Area and the low numbers of fauna expected to be present.

Therefore, the residual risk of marine fauna interaction due to the petroleum activities is considered Low.

8.2.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

- No injury or mortality to EPBC Act listed fauna during operational activities (EPO-05).

CMs relating to this risk include:

- Regulations and measures for interacting with marine fauna (CM-15).

EPSs and MC relating to the above are presented in Section 9.1.

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8.2.5 As Low As Reasonably Practicable 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 support the MODU.	*
Substitute	N/A	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 (e.g., EPBC Regulations 8 (Part 8))	Minor cost in complying. Reduces risk of physical and behavioural impacts to marine fauna. EPBC Regulations include restrictions such as vessel speed and direction when in proximity to marine fauna and are based on legislated requirements.	✓ (CM-15)
	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 vessel movements during periods when sensitive marine fauna are not present	May reduce the risk of vessel strikes 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, such as higher probability of inclement weather. In addition, there is a low likelihood of encountering marine mammals in the Operational Area.	*

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8.2.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>Vessels and helicopters will comply with EPBC Regulations 2000 – Part 8 (Interacting with cetaceans) and the Australian National Guidelines for Whale and Dolphin Watching 2017 (DEE, 2017b). Specifically:</p> <ul style="list-style-type: none"> Vessels will comply with EPBC Regulations 2000 – Part 8 Division 8.1 (Interacting with cetaceans) <p>Helicopters will comply with EPBC Regulations 2000 – Part 8 Division 8.3 (Regulation 8.07).</p>
Policy Compliance	<p>The management of marine fauna interaction is aligned with Eni policies and standards. The residual risk is Low, which is acceptable.</p> <p>The EPOs, CMs and EPSs that will be implemented are consistent with Eni internal requirements.</p>
Social Acceptability	<p>To date, no relevant person concerns have been raised regarding marine fauna interaction (refer Section 5).</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
Area Sensitivity/ Biodiversity	<p>The Operational Area does not intersect with any State or Territory marine protected areas, AMPs, wetlands of international or national importance, World, National or Commonwealth heritage properties or places, or KEFs.</p> <p>Megafauna comprising marine mammals, turtles and whale sharks are the species most at risk from strike or collision. There are foraging BIAs for the Olive Ridley turtle and green turtle overlapping the Operational Area. No other BIAs or habitat critical for EPBC listed species overlap the Operational Area.</p> <p>Eni has considered information contained in relevant recovery plans and approved conservation advice for marine fauna that identify collision or strike with MODU, vessels, ROVs or helicopters as a threat (as listed in Table 2-3). The petroleum activities are consistent with the objectives and actions of the plans identified below through adoption of EPO-10 and CM-15 (Section 8.2.4).</p> <p>This includes:</p> <p>Conservation Advice</p> <ul style="list-style-type: none"> Approved Conservation Advice for Dermochelys coriacea (Leatherback Turtle). Conservation Advice for Balaenoptera borealis (sei whale) (TSSC, 2015). Conservation Advice for Balaenoptera physalus (fin whale) (TSSC, 2015a). Approved Conservation Advice for Rhincodon typus (Whale Shark) (TSSC, 2015b). <p>Recovery/Management Plans</p> <p>The petroleum activity is consistent with the objectives and actions of the plans identified below through adoption of EPO-10 and the control measures outlined in Section 8.2.4:</p> <ul style="list-style-type: none"> Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2015a) identifies aircraft disturbance/strike as a threat to seabirds. The petroleum activities are consistent with the objective of this plan to ensure seabirds and their habitat are protected and managed. Wildlife Conservation Plan for Seabirds (Commonwealth of Australia, 2020) identifies aircrafts as a threat under anthropogenic disturbance. The petroleum activities are consistent with the objective of this plan to ensure anthropogenic threats are minimised or where possible, eliminated. Recovery plan for marine turtles in Australia 2017–2027 (DEE, 2017) identifies vessel interaction as a threat to marine turtles. The petroleum activities are consistent with Interim Objective 3 of this plan (anthropogenic threats are demonstrably minimised).

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Demonstration of acceptability	
	<ul style="list-style-type: none"> • Conservation Management Plan for the Blue Whale 2015–2025 (DoE, 2015) identifies vessel collision as a threat. The petroleum activities are consistent with Action Area A4: Minimising vessel collisions. • National Strategy for Mitigating Vessel Strike of Marine Megafauna 2017 (DEE, 2017a). The petroleum activities are consistent with this plan. <p>Recovery Plans/Conservation Advice for other EPBC Act listed threatened and migratory species that may occur in the Operational Area do not identify collision or strike with MODU, vessels, ROVs or helicopters as a key threat or have explicit relevant objectives or management actions.</p> <p>The control measures outlined in Section 8.2.4 are consistent with the objectives and actions in these publications. The petroleum activities are not inconsistent with the objectives and actions in the relevant recovery plans/conservation advice.</p>
ESD Principles	<p>The risks of this unplanned event are consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> • The worst-case residual risk associated with this aspect is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservative assumptions on scale of impact have been applied, including a conservative assumption on marine fauna presence. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

Given the short duration of the activities, low number and speed of vessels and MODU and lack of marine fauna aggregation areas in the Operational Area, the residual risk is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Potential impacts are acceptable and ALARP.

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8.3 Introduction of Marine Pest Species

8.3.1 Summary of Environmental Impact

Hazard	Introduction of Marine Pest Species		
	Frequency	Severity	Risk
Inherent Risk	C	3	MH
Residual Risk	A	3	L

8.3.2 Description of Hazard

Marine pest species or invasive marine species (IMS) are marine plants, animals and algae that have been introduced into a region that is beyond their natural range but that have the ability to survive and possibly thrive (DAFF, 2021).

Introduction of marine pest species may occur as a result of:

- MODU operations; and
- Vessel operations.

The movement of vessels and mobile facilities into, out of, and within Commonwealth waters is a potential mechanism for the transfer of IMS into new areas. The establishment of IMS in Commonwealth waters may result in significant impacts to the marine environment, potentially compromising the viability of socio-economic commodities such as aquaculture, fishing and tourism as well as potentially widespread ecological impacts (NOPSEMA, 2020a). Historically, once IMS are established, they are very difficult to control and fully eradicate (NOPSEMA, 2020a).

In order for an IMS to be successfully introduced, it must colonise and establish on a vector (e.g. vessel,) in a donor region (e.g. port); then survive on the vector during transit; then colonise the receiving environment (e.g. by reproduction or dislodgement) and then successfully establish a viable new local population.

To become established within the Operational Area, IMS need suitable habitat and conditions, which includes water temperature, water depth and presence of predators. Hard substrates such as rocks or subsea infrastructure in shallow waters (where photosynthesis can occur) are suitable habitats. The Operational Area is ~95m deep, has strong currents and soft sediment on the sea floor, which are not conditions considered suitable for the establishment of IMS.

8.3.2.1 Vessel and MODU operations

There are two main vector pathways for the introduction of IMS into an area, which are:

- Biofouling on MODU or vessel hulls; and
- Discharge of vessel ballast water.

Biofouling

Biofouling is the growth of marine organisms found on the hulls and niche areas of vessels and underwater surfaces of offshore facilities, including mobile offshore drilling units (MODUs). Areas with high water movement, such as propellers, tend to have lower levels of biofouling compared to areas subject to low water movement, such as stationary vessels or slow-moving vessels. Biofouling is one of the most common ways that IMS are transferred

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within the marine environment (NOPSEMA, 2020a). Research indicates that biofouling has been responsible for more foreign marine introductions than ballast water (DAFF, 2021). The potential biofouling risk presented by vessels will relate to:

- The length of time that these vessels have already been operating in Australian waters or, if they have been operating outside Australian waters;
- The locations of the operations they have been undertaking;
- The length of time spent at these locations; and
- Whether the vessels have undergone hull inspections, cleaning and application of new anti-foulant coating prior to returning to operate in Australia.

Ballast water

Ballast water is water adjusted on vessels to help manage weight and stability and improve manoeuvrability. During the uptake of ballast water from the surrounding environment in an international or domestic location, it is possible for a vessel to take in water that contains planktonic biota. This biota may then be discharged at the vessel's new location during ballast water exchange.

It is estimated that up to 30% of IMS in Australia have arrived via ballast water (DAWE, 2020). All saltwater from ports or coastal waters outside Australia's territorial seas presents a high risk of introducing foreign marine pests into Australia (AQIS, 2011).

Highly disturbed shallow-water marine ecosystems are more prone to marine pests colonisation, and the establishment of marine pests depends on the distance to shore (Paulay et al., 2002). Modelling of ballast water by the Bureau of Rural Sciences (BRS) has shown that the risk of IMS colonisation decreases with distance to shore with estimates as follows (BRS, 2007):

- 33% chance of colonisation at 3nm;
- 8% chance at 12nm; and
- 2% chance at 24nm.

The Operational Area is 81nm (150km) from the nearest shore.

Since the introduction of mandatory ballast water requirements (DAWE, 2020), where ballast water must be exchanged outside territorial sea (12nm off the Australian coast, including islands), the risk of IMS from international shipping has been greatly reduced. Domestic ships that discharge or exchange water at any Australian port has variable risk ratings depending on where the ballast water was last acquired.

Summary

No ballast water discharge or exchange is expected to occur within the Operational Area. Vessels will not anchor in the Operational Area.

The monitoring and pre-decommissioning vessel-based campaigns have an expected duration of 14 to 40 days. The as-left survey has a duration of 2 days per well, but this campaign is likely to occur at the same time as the decommissioning campaign. The decommissioning campaign using the MODU has an expected duration of up to 60 days (30 days per well).

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8.3.3 Potential Environmental Impact

An introduction of marine pest species has the potential to result in:

- Displacement of native marine species
- Change to the functions, interests and activities of other marine users.

Potential receptors that may be impacted are:

- Benthic habitats and communities
- Commercial fisheries.

There are no marine protected areas or KEFs within the Operational Area.

8.3.3.1 Benthic habitats and communities

Displacement of native marine species

The establishment of IMS may result in direct and indirect impact to benthic habitats, including:

- Competition with native species for food;
- Competition with native species for hard substrate; and
- Predation of native species.

IMS are likely to have little or no natural competition or predators, thus potentially outcompeting native species for food or space, preying on native species, or changing the nature of the environment. It is estimated that Australia has more than 250 established marine pests, and it is estimated that approximately one in six introduced marine species becomes pests (DoE, 2015).

If left unmanaged, IMS can result in irreversible impact to the marine environment. IMS often significantly change the environment in which they are introduced (Bax et al., 2003). This change may include predation pressure on native organisms, smothering habitats or providing new structural habitat (Bax et al., 2003).

The establishment of an IMS can have a variety of effects on the environment that receives it and might possibly affect the ecological dynamics of a region. Because of the complexity of ecosystems and the number of interactions between and among biotic and abiotic components, it is impossible to anticipate how a particular species would interact with a foreign environment.

Marine pests have the potential to alter ecosystem functioning by:

- competing for natural resources;
- reducing natural resource availability;
- predation;
- altering natural cycling processes;
- habitat segregation;
- virus spread;
- changing water quality;

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- generating toxic chemicals;
- disturbing, injuring, or killing important ecosystem organisms (ecosystem engineers and fundamental species);
- changing surrounding ecosystems;
- changing conservation values of protected areas; and
- creating new environments.

IMS are difficult to eliminate once they are established (Hewitt et al., 2002). Eradication may be effective if detected early, but it will most likely be costly, disruptive, and, subject to the method used, damaging to other local marine species. Highly disturbed nearshore settings (such as marinas) have been found to be more vulnerable to colonisation than offshore ecosystems featuring intense dilutions and high degree of dispersal (Paulay et al., 2002).

The benthic habitat within the Operational Area is comprised of sand, coarse shell fragments and silt. Sediments in the Petrel field were dominated by sand with similar gravel, silt and clay proportions (ERM, 2011). No threatened ecological communities or protected areas are present in the Operational Area. Previous surveys have not identified any sensitive seabed habitats. IMS are generally unable to establish in deep-water ecosystems, most likely due to a lack of light or suitable habitat to sustain their growth and survival.

Successful colonisation in the recipient region would be difficult given the nature of the benthic habitats within the Operational Area and lack of light due to deep waters (i.e. >95m). The offshore open waters of the Operational Area are therefore not conducive to the settlement and establishment of IMS. It is unlikely that any marine organisms would become established at the field.

If a marine pest was introduced, and if it did colonise an area, it is expected that any colony would remain fragmented and isolated, and only within the vicinity of the wells. Similarly, it would not be likely to propagate to nearshore environments, and protected marine areas present in the wider region.

8.3.3.2 Commercial fisheries

Change to the functions, interests and activities of other marine users

The establishment of IMS may impact commercial fisheries directly or indirectly. It may cause changes to the abundance of prey for fish species and distribution or behaviour of fish species, subsequently resulting in impacts to the activities of commercial fisheries. Between 10% and 40% of Australia's fishing sector may be at risk from marine pest intrusion, which can reduce fishing areas and aquaculture stock (Dommissie and Hough, 2004).

The establishment of IMS may result in increased abundance of prey for fish species targeted by commercial fisheries, although this is unlikely to result in any detectable change in the abundance of targeted fish or commercial by-catch.

Based on the assessment in Table 4-11, the following is a summary of fisheries that overlap with the Operational Area; and those considered active in the Operational Area (within the data range):

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- Commonwealth-managed fisheries: 4 fisheries overlap with the Operational Area (Northern Prawn Fishery, Southern Bluefin Tuna Fishery, Western Skipjack Fishery and Western Tuna and Billfish Fishery). Based on the catch-effort assessment, none of these fisheries are considered active within the OA.
- Western Australian-managed fisheries: 2 fisheries overlap the Operational Area. The Joint Authority Northern Shark Fishery has been closed since 2009, and therefore is not considered active or have potential for future interaction. Only 1 fishery is considered active within the Operational Area (Open Access in the North Coast, Gascoyne Coast and Bioregions Fishery).
- Northern Territory-managed fisheries: 5 fisheries overlap the Operational Area (Aquarium Fisher, Demersal Fishery, Offshore Net and Line Fishery, Spanish Mackerel Fishery and NT Tour Operators). Based on the catch-effort assessment, all 5 of these fisheries are considered active within the Operational Area.

Of the Commonwealth-managed fisheries with designated management areas that overlap the Operational Area, none of these are considered active. Of these fisheries, only the Northern Prawn Fishery (NPF) has historical fishing effort that overlaps the EMBA only (not the Operational Area). Highest intensity fishing efforts during the 2016-2022 seasons took place in the nearshore coastal NT waters (Butler et al., 2023). The Operational Area does not fall within any effort fishing intensity area, as indicated through the Commonwealth Fishery Status Reports (Butler et al., 2023). Engagement with the NPF confirmed there is no NPF fishing effort in the immediate vicinity of the wellheads, and that the JBG fishery is closed from 1st December to 1st August each year

The Southern Bluefin Tuna Fishery management area overlaps the Operational Area, however, has no recorded fishing activity within the region. The fishery operates predominantly in the Great Australian Bight, targeting deeper water depths up to 500m. The Western Skipjack fishery management area overlaps the Operational Area, however, has been closed for fishing since 2009. The Western Tuna and Billfish Fishery management area overlaps the Operational Area, with most of the Australian catch has been concentrated off south-west Western Australia.

The Open Access in the North Coast Fishery is the only 'active' WA-managed fishery overlapping the Operational Area. The 60NM CAES reporting block overlapping the Operational Area, indicated up to six vessels active across the 2017-2022 seasons (DPIRD, 2023).

Five Northern Territory-managed fisheries overlap the Operational Area and are considered active and have the potential to be affected by an introduction of IMS (Section 4.6.1):

- Northern Territory Aquarium Fishery: Hand-held equipment. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence operating in the Operational Area (NT GOV, 2021);
- Demersal Fishery: Line and fish-trap gear. Analysis of five years of NT fishing effort data (2017-2021) shows 3 licences operating in the Operational Area (NT GOV, 2021);
- Offshore Net and Line Fishery: Demersal/pelagic long-lines. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence within the Operational Area (NT GOV, 2021);
- Spanish Mackerel Fishery: Troll/floating long lines. Analysis of five years of NT fishing effort data (2017-2021) shows 1 licence within the Operational Area (NT GOV, 2021); and

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- NT Tour Operators: Fishing tour operators are permitted to fish in Territory waters, and do not have management areas. Analysis of five years of NT fishing effort data (2017-2021) shows one licence within the Operational Area (NT GOV, 2021).

Most of the IMS identified as being most likely to establish in Australia inhabit shallow waters with hard substrate (Marine Pest Sectoral Committee, 2018). Therefore, it is unlikely that IMS would establish within the Operational Area and impact nearby fisheries.

8.3.3.3 Residual risk summary

The worst-case residual severity to benthic habitats and communities, and commercial fisheries from the introduction of marine pest species is evaluated as Local (3), given the potential for marine pests to disrupt ecosystems.

The likelihood of ecosystem disruption from the introduction of marine pest species occurring as a result of the activities is considered Rare (A) due to the sparse nature of the benthic habitats in the Operational Area, the open ocean environment and the lack of light resulting from the water depth.

Therefore, the residual risk of the introduction of marine pest species due to the petroleum activities is considered Low.

8.3.4 Environmental Performance Outcomes and Control Measures

The EPO relating to this event is:

- No introduction of invasive marine species (EPO-11).

The CMs relating to this risk include:

- Implementation of an IMS risk assessment tool (CM-28);
- Ballast water management (CM-29); and
- Biofouling management (CM-30).

EPSs and MC relating to the above are presented in Section 9.1.

8.3.5 As Low As Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption ?
Eliminate	Do not use a MODU or vessels	The use of a MODU and vessels 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.	×
Substitute	Contract only local MODUs and vessels	Contract MODU only operating in local, State or national waters to reduce potential for IMS; however, may present significant costs and delay in activity schedule.	×

Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption ?
	Alternative ballast system which does not require a discharge	Using 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 scheduling and ballast water exchange is standard practice on many vessels.	*
Engineering	Heat treatment of ballast water to eliminate IMS	Heat treatment will reduce potential for IMS to establish by eliminating individuals present in ballast water itself. However, discharge of water at a much higher temperature than the surrounding marine environment would likely result in impact to local water quality and impact to marine species.	*
Isolation	N/A	N/A	N/A
Administrative	Dry-docking before entering field to clean vessel and 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	Ensures the MODU and vessels are assessed to low IMS risk before mobilising for the activity. Minimal cost involved in demonstrating the MODU and vessels are of 'low risk' of introducing IMS through completion of an IMS risk assessment. IMS management measures will be applied to vessels according to risk to minimise the likelihood of IMS being introduced, such as the treatment of internal systems, IMS inspections or cleaning.	✓ (CM-28)
	Ballast water management	Pursuant to the <i>Biosecurity Act 2015</i> , support vessels and MODU carrying ballast water and engaged in international voyages shall manage ballast water in accordance with a Ballast Water Management Plan. Reduces IMS risk and minimal cost to manage. Vessels should already have a plan in place to meet vessel legislative and Eni vessel contracting requirements.	✓ (CM-29)
	Biofouling management	The likelihood of introducing IMS from vessels and MODU is reduced due to anti foulant systems in accordance with IMO Guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species (IMO, 2023). Includes marine growth prevention systems on the seawater intakes and ballast pumps.	✓ (CM-30)

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8.3.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>The risk of introducing IMS will be managed in accordance with:</p> <ul style="list-style-type: none"> • Australian Ballast Water Requirements (DAWE, 2020) • Offshore Installations – Biosecurity Guide (DAFF, 2023) • IMO’s Guidelines for the Control and Management of Ships’ Biofouling to Minimise the Transfer of Invasive Aquatic Species (IMO, 2023) • Biosecurity Act 2015 • Fish Resources Management Regulations 1995 (WA) • National biofouling management guidelines for the petroleum production and exploration industry (Marine Pest Sectoral Committee, 2018) • Australian Biofouling Management Requirements (DAFF, 2023) • Protection of the Sea (Harmful Antifouling Systems) Act 2006 • WA DPIRD Biofouling and Biosecurity Policy.
Policy Compliance	<p>The management of IMS is aligned with Eni policies and standards. The residual risk is Low, which is acceptable.</p> <p>The EPOs, CMs and EPSs that will be implemented are consistent with Eni internal requirements.</p>
Social Acceptability	<p>DPIRD raised concerns about marine pests or diseases entering WA waters as a result of vessel activity (Section 5). Pest management of vessels has been addressed through CM-26, CM-27 and CM-28.</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
Area Sensitivity/ Biodiversity	<p>The Operational Area does not intersect with any State or Territory marine protected areas, AMPs, wetlands of international or national importance, World, National or Commonwealth heritage properties or places, or KEFs.</p> <p>The main risks associated with the introduction of marine pest species are the displacement of native species or interference with ecosystem processes in other ways (such as through predation). Provided the biosecurity controls are implemented during the activities, the risk of introduction of marine pest species is deemed low.</p> <p>IMS has not been identified as a threat in any recovery plans or conservation advice for Threatened and Migratory species. However, Eni has considered information contained in relevant recovery plans and approved conservation advice for habitat modification (which could occur as a result of IMS establishing) (listed in Table 2-2 or Table 2-3). The petroleum activities are not inconsistent with the objectives and actions detailed in the recovery plans and approved conservation advice.</p>
ESD Principles	<p>The residual risk impact from this event is not inconsistent with the principles of ESD because:</p> <ul style="list-style-type: none"> • The worst-case residual risk associated with this aspect is Low. While the nature and scale of impacts have the potential to result in lasting change to benthic community dynamics, the controls that will be implemented reduce the risk to an acceptable level, the environment is not conducive to IMS settlement and vessel/MODU presence will be of short duration. • Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservative assumptions have been applied to the impact assessment, including assuming conditions in the Operational Area are conducive for IMS to establish and that vessels mobilised to the Operational Area are a vector for IMS. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.

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Demonstration of acceptability	
ALARP	The residual risk has been demonstrated to be ALARP.

Given the short duration of the activities, the water depths and the lack of hard substrates in the Operational Area, and distance from shore, the potential impacts associated with the unplanned introduction of IMS are considered to be Local. The residual risk is considered Low, which is acceptable in accordance with Eni’s acceptability criteria (Table 6-5). Potential impacts associated with the unplanned introduction of IMS are acceptable and ALARP.

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8.4 Accidental Release – Waste and Solid Objects

8.4.1 Summary of Environmental Impact

Hazard	Accidental Release – Waste and Solid Objects		
	Frequency	Severity	Risk
Inherent Risk	B	1	L
Residual Risk	A	1	L

8.4.2 Description of Hazard

Accidental release of waste or solid objects to the marine environment may occur as a result of:

- Establishment of secondary well control;
- Wellhead removal;
- MODU operations; and
- Vessel operations.

8.4.2.1 Establishment of secondary well control

To establish secondary well control, 4 gravity-based winches will be lowered to the seabed. The total footprint of each winch is $\sim 20.6\text{m}^2$. In the case where the seabed is not suited to the winches, 4 suction cans will be fixed to the seafloor, each with a footprint of $\sim 28.3\text{m}^2$.

During installation and recovery, there is potential for these items to be dropped to the seabed.

8.4.2.2 Wellhead removal

During retrieval activities, there is potential for the items being lifted from the seabed to be dropped, as a result of equipment failure or due to the structural integrity of subsea equipment. The items that may be lifted are:

- Wellhead, PGB and guideposts; and
- TGB.

The footprint of both the PGB and TGB is 30m^2 .

Retrieval will also likely involve a subsea basket. The basket is lowered to and lifted from the seabed and has a footprint of 30m^2 .

8.4.2.3 MODU and vessel operations

The handling and storage of materials and waste on board the vessels and MODU generates the potential for accidental over-boarding of hazardous/non-hazardous materials and waste.

Solid waste materials with the potential to be accidentally lost to the marine environment include:

- Non-hazardous solid wastes, such as paper, plastics, scrap steel, rope and glass;

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- Hazardous solid wastes, such as paints, hydrocarbon-contaminated materials, batteries, fluorescent tubes, aerosol cans and medical wastes; and
- Equipment and materials, such as hard hats and tools or supplies backloaded to support vessels.

Non-hazardous, hazardous and smaller items may be accidentally lost from vessels, as a result of human error, incorrect or inappropriate waste storage, mechanical failure or breakdown of equipment, or dropped objects. Based on industry experience, the most common solid material accidentally lost includes articles of personal protective equipment, such as hard hats or gloves, and small tools or equipment that may be dropped by vessel personnel.

The monitoring and pre-decommissioning vessel-based campaigns have an expected duration of 14 to 40 days. The As-left survey has a duration of 2 days per well, but this campaign is likely to occur at the same time as the decommissioning campaign. The decommissioning campaign using the MODU has an expected duration of up to 60 days (30 days per well).

8.4.3 Potential Environmental Impact

The accidental release of waste or solid objects may result in:

- Change in habitat;
- Change in water quality; and
- Injury / mortality of marine fauna.

Potential receptors that may be impacted are:

- Benthic habitat and communities;
- Marine fauna (birds, fish, marine mammals and marine turtles).

There are no marine protected areas or KEFs within the Operational Area.

8.4.3.1 Benthic habitats and communities

Change in habitat

Benthic ecosystems may be temporarily and locally disturbed by objects lost overboard during the petroleum activities in the Operational Area. The area of potential seabed disturbance due to release of a heavier solid would be restricted to the Operational Area.

The largest item with potential to drop to the seabed would be one of the items being lifted or lowered during the decommissioning campaign. The largest items are the PGB, TGB and subsea basket, each with a footprint of 30m². The frequency of dropped objects from a crane has been calculated by Eni as 1.6×10^{-5} per lift (Kent, 2023). This equates to 1.6 dropped objects per 100,000 lifts, making it rare.

While soft sediment benthic habitats will not be destroyed, disturbance of the communities on and within the sediment (in other words, the epifauna and infauna) will occur in the event of a dropped object. Depressions may remain on the seabed for some time after removal of the dropped object as they gradually infill over time. The seafloor of this bioregion is strongly affected by cyclonic storms, long-period swells and large internal tides, which can resuspend

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sediments within the water column and move sediment across the seafloor. In this context, any potential sediment movement caused by the event is likely to have minimal impacts.

As described in Section 4.3.6, the benthic habitat within the Petrel field is characterised by primarily sand, coarse shell fragments and silt; with infauna assemblages and sparse coverage of sessile epibenthic organisms. The habitat type in the Operational Area is widely distributed and well represented in the region (the wider Sahul Shelf). Consequently, the potential risk of alteration of benthic habitats and associated communities from accidental release of waste is considered minor given the short duration and limited size of the Operational Area.

8.4.3.2 Marine fauna

Change in water quality

Water quality will temporarily change due to the constituents of accidentally lost hazardous material leaching into the marine environment. The level of impact to water quality depends on the nature of the hazardous materials lost. Typical examples of potential dropped objects are paint cans and oily rags, which are likely to have residual volumes (less than 1m³) of hazardous material (i.e., paint or oil). Due to wave action and metocean currents, minor releases of residual hazardous material will rapidly disperse and dilute close to the release location. This results in temporary and highly localised changes to the water quality. Non-hazardous material is inert; however, may result in impact to marine fauna from ingestion or entanglement, which has been assessed further below.

Impacts from a change in water quality to marine fauna, such as fish, marine mammals, and marine reptiles, are not anticipated, given the localised nature of the water quality change and the transient nature of these species.

Injury or mortality of marine fauna

An accidental loss of solid material may impact marine fauna through ingestion of, and entanglement with, waste. Marine fauna that ingest or become entangled in solid materials – particularly floating, non-biodegradable marine debris such as plastic – may be subject to physical harm that limits or inhibits physiological processes, potentially resulting in fauna fatality. Loss of plastics is of particular concern to seabirds and marine turtles. Wilcox et al., (2015) note foraging seabirds ingesting plastics may be subject to gut obstruction or reduced stomach volume, resulting in a loss of fitness. Turtles have been known to ingest plastics when mistaking it for food sources, such as jellyfish (Mrosovsky et al., 2009). It is recognised that fishing gear (e.g., ropes and nets made from synthetic fibres), balloons and plastic bags are the biggest entanglement threat to marine fauna, and plastic bags and utensils are the biggest ingestion risk for seabirds, turtles and marine mammals (Wilcox et al., 2016, cited in Commonwealth of Australia, 2018).

If plastic waste is accidentally released, it is likely to be buoyant and may therefore move beyond the Operational Area. The most common solid material accidentally lost includes articles of personal protective equipment, such as hard hats or gloves, and small tools or equipment that may be dropped by vessel personnel. Such items would not be a threat to marine fauna in the way that plastic bags and fishing gear are.

The Operational Area does not overlap any BIAs for marine mammals; and no marine mammals were sighted in the Operational Area during two last survey campaigns in 2022 and 2023. While marine mammals may be present within the Operational Area, it is not anticipated that species will be present in significant numbers and, if present, would only be in the vicinity for short periods of time; for example, transiting through the area. Potential

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impacts to marine mammals from either entangling or ingesting lost plastics, will be limited to a small number of individuals. Any impact is anticipated to be minor and will not result in impacts at a population level.

The Operational Area overlaps the foraging BIAs for Green and Olive Ridley turtles; however, no marine turtles were sighted in the Operational Area during two last survey campaigns in 2022 and 2023. However, it is expected that these species will be transiting/foraging for short periods only and are not likely to be resident or occur in the area in significant numbers.

8.4.3.3 Residual risk summary

The worst-case residual severity to benthic habitat and marine fauna from accidental release of waste and solid objects is evaluated as Slight (1), given the localised extent of potential impact, the ability of benthic habitats to recover and the limited number of individuals that would be impacted.

The likelihood of a change in habitat or mortality of marine fauna from accidental release of waste and solid objects occurring as a result of the activities is considered Rare (A) due to the low probability of a dropped object during lifting and the low numbers of marine fauna in the Operational Area.

Therefore, the residual risk of accidental release of waste and solid objects due to the petroleum activities is considered Low.

8.4.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

- No injury or mortality to EPBC Act listed fauna during operational activities (EPO-05); and
- No unplanned objects, emissions or discharges to sea or air (EPO-12).

CMs relating to this risk include:

- Lifting Management System Procedure (ENI-LOG-PR-017) (CM-05);
- Eni NR Marine Manual (CM-13);
- Vessels and MODU comply with Marine Order 95 (Marine pollution prevention – garbage) (CM-18);
- Procedures to reduce the potential for loss of non-hazardous and hazardous waste and dropped objects (CM-31);
- Dropped objects to be retrieved where possible (CM-32)
- Hazardous chemical management procedures (CM-33)
- Review of lifting integrity following pre-decommissioning inspection to inform recovery of subsea equipment (CM-34); and
- Decommissioning Waste Management Plan (CM-35).

EPSs and MC relating to the above are presented in Section 9.1.

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8.4.5 As Low As Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
Eliminate	Eliminate production of non-hazardous and hazardous waste	Eliminates the risk of releasing non-hazardous solids to the marine environment; however, eliminating the use of consumable products is not possible due to operational requirements. Waste will therefore be generated.	*
	Eliminate lifting operations	Lifting operations are required for the decommissioning campaign to retrieve subsea equipment.	*
Substitute	N/A	N/A	N/A
Engineering	Carriage, stowage and securing of cargoes and containers (in accordance with Marine Order 42)	Securing of cargo and containers on vessels and the MODU will reduce the likelihood of items being lost to the marine environment. Minor costs involved.	✓ (CM-13)
	Review of lifting integrity following pre-decommissioning inspection to inform recovery of subsea equipment	The pre-decommissioning survey will provide more certainty on the integrity of subsea equipment, and will be used to inform the methodology to recover equipment. Reducing the risk of dropped object outweighs the personnel cost associated with implementing standard.	✓ (CM-34)
Isolation	Hazardous and non-hazardous processes (waste segregated in accordance with Marine Order 95)	Securely segregating and isolating the hazardous and non-hazardous waste on the MODU and support vessels, in accordance with Marine Order 95, will reduce the likelihood of it being lost to the marine environment. Minor cost involved in segregating the hazardous and non-hazardous waste.	✓ (CM-33)
Administrative	Lifting Management System Procedure (ENI-LOG-PR-017)	Details processes to reduce risk of dropped objects, including: <ul style="list-style-type: none"> • Competency of persons undertaking lift • Planning and preparation process for undertaking lifts. Reducing the risk of dropped object outweighs the personnel cost associated with implementing standard.	✓ (CM-05)
	Dropped objects to be retrieved where possible	Retrieving dropped objects where possible reduces the likelihood of the objects either impacting benthic habitat in the longer-term; or being ingested by marine fauna.	✓ (CM-32)

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Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
	Decommissioning Waste Management Plan	<p>Eni's corporate waste stewardship process for asset removal requires the development and implementation of a Decommissioning Waste Management Plan for the decommissioning of Petrel-3 and Petrel-4 (described in Section 10.15). This Plan identifies the waste inventory, waste hierarchy (re-use and recycling opportunities), appropriate waste management facilities, environmental, health and safety risk management, and an implementation strategy.</p> <p>This reduces the risk of further environmental impact from inappropriate management and disposal of waste from asset removal. It also identifies the various specific legislative requirements for disposal of waste in other jurisdictions (i.e. onshore).</p>	✓ (CM-35)

8.4.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>Waste management complies with the requirements of Marine Order 95 (particularly Regulations 6.1 and 6.4).</p> <p>Securing of cargo complies with the requirements of Marine Order 42.</p>
Policy Compliance	<p>The management of waste and solid objects risks is aligned with Eni policies and standards, including the waste stewardship process for asset removal. The residual risk is Low, which is acceptable.</p> <p>The EPOs, CMs and EPSs that will be implemented are consistent with Eni internal requirements.</p>
Social Acceptability	<p>To date, no relevant person concerns have been raised regarding unplanned loss of solid wastes (refer Section 5).</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
Area Sensitivity/ Biodiversity	<p>The Operational Area does not intersect with any State or Territory marine protected areas, AMPs, wetlands of international or national importance, World, National or Commonwealth heritage properties or places, or KEFs.</p> <p>The Operational Area does not overlap any BIAs for marine mammal species. Foraging BIAs for the green turtle and Olive Ridley turtle overlap the Operational Area. Other marine fauna are likely to be transient in the Operational Area. The discharge extent for all accidental release of waste and solid objects is anticipated to be localised.</p> <p>The benthic environment within the Operational Area is characterised by sand (with gravel, silt and clay) and sparse sessile epibenthic organisms (Section 4.3.6). Impacts to the benthic environment from dropped objects will be highly localised.</p> <p>Eni has considered information contained in relevant recovery plans and approved conservation advice for EPBC Act listed species that identify pollution, marine debris, and habitat degradation or modification as a threat (as listed in Table 2-3). This includes:</p> <p>Conservation Advice:</p> <ul style="list-style-type: none"> Approved Conservation Advice for <i>Balaenoptera borealis</i> (Sei Whale)

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Demonstration of acceptability	
	<ul style="list-style-type: none"> • Approved Conservation Advice for <i>Balaenoptera physalus</i> (Fin Whale) • Approved Conservation Advice for Green Sawfish • Approved Conservation Advice for <i>Pristis pristis</i> (Large Tooth Sawfish) • Approved Conservation Advice for <i>Glyphis garricki</i> (Northern River Shark) • Approved Conservation Advice for <i>Rhincodon typus</i> (Whale Shark). <p>Recovery/Management Plans</p> <p>The petroleum activity is consistent with the objectives and actions of the plans identified below through adoption of EPO-10 and EPO-12 and the control measures outlined in Section 8.4.4:</p> <ul style="list-style-type: none"> • Conservation Management Plan for the Blue Whale 2015–2025 (DoE, 2015) identifies habitat modification, including acute and chronic chemical discharge, as a threat. There are no BIAs for the blue whale overlapping the Operational Area. There are no explicit relevant management actions in this plan. The petroleum activity is consistent with the long-term recovery objective to ‘minimise anthropogenic threats to allow the conservation status of the blue whale to improve so that it can be removed from the threatened species list under the EPBC Act’ through the adoption of the EPOs. • Recovery plan for Marine Turtles in Australia (DEE, 2017) identifies acute chemical and terrestrial discharge as a threat. Foraging BIAs for the green turtle and Olive Ridley turtle overlap the Operational Area. Action Area A4 to minimise chemical and terrestrial discharge is met through the adoption of the EPOs. • Sawfish and River Shark Multispecies Recovery Plan (Commonwealth of Australia, 2015) lists habitat degradation or modification as a threat. No habitat critical or BIAs have been identified for sawfish or river sharks within the Operational Area. The petroleum activity is consistent with Objective 5 of this plan to ‘reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species’, through adoption of the EPOs. • Recovery Plan for the White Shark (<i>Carcharodon carcharias</i>) (2013) identifies habitat modification as a threat. No habitat critical or BIAs have been identified for white sharks within the Operational Area. The petroleum activity is consistent with the objective of this plan to ensure anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future through adoption of the EPOs. • Recovery Plan for the Grey Nurse Shark (<i>Carcharias taurus</i>) (DoE, 2014a) identifies pollution as a threat. No habitat critical or BIAs for the grey nurse shark have been identified in the Operational Area. The petroleum activity is consistent with the objective of this plan to ensure anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future, through the adoption of the EPOs. • Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia’s coasts and oceans (Commonwealth of Australia, 2018). <p>Recovery Plans/Conservation Advice for other EPBC Act listed threatened and migratory species that may occur in the Operational Area do not identify pollution, marine debris, and habitat degradation or modification as a key threat or have explicit relevant objectives or management actions related to these threats.</p> <p>The control measures outlined in Section 8.4.5 are consistent with the objectives and actions in these publications. The petroleum activities are not inconsistent with the objectives and actions in the relevant recovery plans/conservation advice.</p>
ESD Principles	<p>The risks of this unplanned event are consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> • The worst-case residual risk associated with this aspect is Low.

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Demonstration of acceptability	
	<ul style="list-style-type: none"> • Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservative assumptions on scale of impact have been applied. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

Given the short duration of the activities, the minor quantities of material that could be lost to the marine environment and the limited footprint of a potential dropped object (<30m²), residual risk is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Potential impacts are acceptable and ALARP.

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8.5 Accidental Release - Minor Loss of Containment

8.5.1 Summary of Environmental Impact

Hazard	Accidental Release – Minor Loss of Containment		
	Frequency	Severity	Risk
Inherent Risk	B	1	L
Residual Risk	B	1	L

8.5.2 Description of Hazard

Minor loss of containment may occur as a result of:

- MODU operations;
- Vessel operations; and
- ROV operations.

8.5.2.1 Vessel, MODU and ROV operations

Minor volumes of hydrocarbons or other chemicals (e.g. hydraulic fluids, deck spill or MDO) may accidentally be discharged to the environment as a result of:

- ROV failure (including oil seal, hydraulic system hose and quick disconnect system failures);
- Loss of primary containment (drums, tanks, Intermediate Bulk Containers (IBC), etc) due to handling;
- Storage and dropped objects (e.g. swinging load during ROV lifting activities); and
- Vessel pipework failure or rupture, hydraulic hose failure, inadequate bunding and lifting.

The types of fluids stored on the MODU and vessels include fuel, lubricating fluids, hydraulic fluids, and cooling fluids. Leaks could occur due to a failure of a mechanical component, fitting, or hose.

Based on the activities described in this EP, the following potential minor release scenarios were identified:

- Using, handling, and transferring hazardous materials and chemicals on board (1m^3), the maximum credible volume associated with a single-point failure was estimated to be $\sim 1\text{m}^3$ based on the loss of an entire IBC due to rupture while handling; and
- Hydraulic line failure from equipment (1m^3).

Note that a loss of MDO during refuelling is captured in Section 8.6.

The monitoring and pre-decommissioning vessel-based campaigns have an expected duration of 14 to 40 days. The As-left survey has a duration of 2 days per well, but this campaign is likely to occur at the same time as the decommissioning campaign.

The decommissioning campaign using the MODU has an expected duration of up to 60 days (30 days per well).

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8.5.3 Potential Environmental Impact

Minor loss of containment has the potential to result in:

- Change in water quality.

Potential receptors for this impact are:

- Water quality.

There are no marine protected areas or KEFs within the Operational Area.

If individual marine fauna pass through the release plume, any impacts are expected to be highly localised. Given the small volumes, mobility of fauna and short exposure time due to rapid dilution through wave and current activity, chronic impacts to marine fauna are not expected and therefore have not been assessed further.

8.5.3.1 Water quality

Change in water quality

The volume of any hydrocarbons or chemicals accidentally released to the environment would be small, up to 1m³.

The hydraulic fluid typically used during vessel operations is a water-based hydraulic fluid, reported to have a low toxicity to the marine environment (classified under the OCNS as Class D). It has been used widely in marine environments worldwide with no observed environmental effect. All operational chemicals will be selected to reduce environmental impacts to ALARP as per Section 10.14.

Hydraulic fluids are medium oils of light to moderate viscosity and have a relatively rapid spreading rate and, like MDO, will dissipate quickly, particularly in high sea states. More detail on impacts specific to a spill of MDO and its behaviour in the marine environment is presented in Section 8.6.

Water quality will temporarily reduce due to the constituents of chemicals and hydrocarbon releasing into the marine environment, some of which will be toxic. The level of impact to water quality depends on the nature and volume of the chemical lost, which are typically low volumes.

Hydrocarbons and chemicals accidentally released into the marine environment through minor onboard spills and leaks directed through deck drainage or from a release of hydraulic oil from an ROV umbilical would disperse quickly in waters within the vicinity of the Operational Area. Due to wave action and metocean currents and the low volumes potentially lost, minor accidental releases will rapidly disperse and dilute local to the release site, resulting in temporary (hours) and highly localised reduction in water quality. No long-term reduction in water quality is expected.

It is anticipated that the minor volume of hydrocarbons or chemicals would spread and dilute quickly, with a notable decrease in discharge concentrations soon after the release site. Changes in the water quality outside the Operational Area is considered highly unlikely.

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8.5.3.2 Residual risk summary

The worst-case residual severity to water quality from a minor loss of containment is evaluated as Slight (1), as this type of event may result in localised, short-term effects that are expected to recover rapidly.

The likelihood of a minor loss of containment occurring as a result of the activities is considered Unlikely (B). Therefore, the residual risk of a minor loss of containment due to the petroleum activities is considered Low.

8.5.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

- No unplanned objects, emissions or discharges to sea or air (EPO-12).

CMs relating to this risk include:

- PMS (CM-14);
- Chemical risk assessment process (CM-21);
- Procedures to reduce the potential for loss of non-hazardous and hazardous waste and dropped objects (CM-31);
- Hazardous chemical management procedures (CM-33);
- Maritime Dangerous Goods Code (CM-36);
- NOPSEMA-accepted OPEP and OSMP (CM-37);
- Vessel SOPEP/emergency management plan (CM-38);
- Bulk solid transfer procedure (CM-39); and
- ROV inspection and maintenance procedures as per maintenance regime (CM-40)

EPSs and MC relating to the above are presented in Section 9.1.

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8.5.5 As Low As Reasonable Practicable Demonstration

Demonstration of ALARP			
Type	Control/management	Evaluation	Adoption?
Eliminate	Eliminate hydraulic systems and ROVs	Would eliminate the environmental risk associated with minor spill and leaks. 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	N/A	N/A	N/A
Isolation	N/A	N/A	N/A
Administrative	On-board spill response kits on vessels.	Environmental benefit outweighs minor costs in implementing and locating spill response kits in proximity to hydrocarbon storage/bunkering areas on vessels and MODU. Contained within the vessel SOPEP/emergency management plan.	✓ (CM-38)
	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. The SOPEP is a requirement under MARPOL Annex 1 requirements (all vessels over 400 gross tonnages have SOPEP or Shipboard Marine Pollution Emergency Plans outlining options to control the source of a hydrocarbon spill).	✓ (CM-38)
	Maritime Dangerous Goods Code	Dangerous goods managed in accordance with International Maritime Dangerous Goods Code (IMDG Code) to reduce the risk of an environmental incident, such as an accidental release to sea or unintended chemical reaction. Minimal cost to implement.	✓ (CM-36)
	Chemical management procedures	Reduces the risk of spills and leaks to sea by controlling the storage, handling and clean-up of both hazardous and non-hazardous chemicals. Personnel cost associated with implementation of procedures and permanent or temporary storage areas; inspections and training.	✓ (CM-33)
	NOPSEMA-accepted OPEP and OSMP	Implements response plan to deal with an unplanned hydrocarbon spill quickly and efficiently in order to reduce impacts to the marine environment. Costs associated with ongoing spill response preparedness and training of personnel.	✓ (CM-37)
	PMS	Proper maintenance of equipment (e.g. hydraulic hoses, secondary containment) will prevent accidental release. Low cost of maintaining equipment.	✓ (CM-14)

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8.5.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	Chemical management complies with the requirements of the Maritime Dangerous Goods Code, the <i>Navigation Act 2012</i> , and requirements of the NOPSEMA-accepted OPEP and OSMP.
Policy Compliance	The management of accidental/minor spills is aligned with Eni policies and standards. The residual risk is Low, which is acceptable. The EPOs, CMs and EPSs that will be implemented are consistent with Eni internal requirements.
Social Acceptability	To date, no relevant person concerns have been raised regarding accidental/minor spills (refer Section 5). An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.
Area Sensitivity/ Biodiversity	The Operational Area does not intersect with any State or Territory marine protected areas, AMPs, wetlands of international or national importance, World, National or Commonwealth heritage properties or places, or KEFs. Impacts to the marine environment from a minor loss of containment will be highly localised. There are no expected impacts to marine fauna; and there are no relevant recovery plans or approved conservation advices.
ESD Principles	The risk of this unplanned event is consistent with the principles of ESD because: <ul style="list-style-type: none"> • The worst-case residual risk associated with this aspect is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservative assumptions on scale of impact have been applied. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

Given the relatively short duration of the petroleum activities and low volumes of chemical or hydrocarbons that may be accidentally released to the environment, the residual risk is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Potential impacts are acceptable and ALARP.

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8.6 Accidental Release – Trapped Gas

8.6.1 Summary of Environmental Impact

Hazard	Accidental Release – Trapped Gas		
	Frequency	Severity	Risk
Inherent Risk	A	2	L
Residual Risk	A	2	L

8.6.2 Description of Hazard

Accidental release of trapped gas to the marine environment may occur as a result of:

- decommissioning activities (drill out of shallow non-reservoir cement plugs).

8.6.2.1 Drill out non-reservoir cement plugs (Petrel-4 only)

To ensure this EP complies with the current regulatory requirements following consultation with the Regulator, Eni have further evaluated the credibility of a LOC event of trapped gas during decommissioning activities. Eni has considered the porosity and permeability of the cement used and found it unlikely, but conceivable, that over the extended duration of well suspension (~37 years), a small, but limited amount of gas migration may have occurred through the verified reservoir cement plug and bridge plug and accumulated below the shallow cement plug/s in Petrel-4. When the plug is drilled out, this trapped gas could be released at the seabed (riserless mode) or at surface (riser-based mode).

This presents a remote, and highly unlikely risk of a shallow gas release of a small, fixed volume (predominantly methane) residing under a flow impediment during the drill out of the shallow non-reservoir cement plugs in Petrel-4. Based on engineering analysis of cement permeability and formation characteristics, the conservative and worst-case credible volume for this potential scenario is estimated as:

- An instantaneous subsea release of 25sm³ (880scf) of trapped Petrel R1 gas following the drill-out of the shallow, non-reservoir, cement plugs at Petrel-4.

This volume is based on the estimate of a 5m gas cap within the 7" casing, which is 3 cubic feet (~85L) that would be under downhole conditions (100°C and 5200psi). Upon drilling out the shallow cement plug, the gas would be released into the fluid column almost instantaneously. At standard atmospheric conditions the volume has been calculated to expand up to 25sm³ (880scf).

Secondary well control equipment, providing an alternate circulating path, does not reduce the volume of any potential trapped gas released to the atmosphere (relevant to Petrel-4 only).

The Petrel reservoirs are anticipated to contain only trace liquid hydrocarbons, therefore, in the event of a LOC there will be no or negligible liquid component. This means there is no credible hydrocarbon spill scenario in the event of a LOC and as such, quantitative spill modelling has not been undertaken. Note the MDO release remains the worst-case credible scenario for determining the EMBA (Section 8.7).

8.6.2.2 Hydrocarbon Characteristics

Petrel R1 Gas

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The reservoir gas found within the Petrel-4 well will be Petrel R1 gas; which is predominantly made up of Methane (C1; 91.82%), Carbon Dioxide (CO₂; 4.34%), Ethane (C2; 1.87%), Nitrogen (N₂; 0.77%) and small components of other molecules. The composition of Petrel R1 gas has been summarised in Table 8-1.

Gases are typically significantly less persistent in the marine environment compared to conventional hydrocarbons (such as MDO and heavy fuel oil) based on the high level of volatile components and higher rates of biodegradation (ITOPF, 2025).

Table 8-1: Gas composition of the Petrel R1 Gas found at Petrel-4 well

Gas Composition	Molecule (%)
He	-
N ₂	0.77
CO ₂	4.34
C1	91.82
C2	1.87
C3	0.54
IC4	0.08
IC5	0.13
NC5	0.05
C6	0.04
Benzene	-
C7	0.14
Toluene	-
C8	0.06
Xylenes	-
C9	0.05
C10	0.02
C11	0.01
C12+	0.03
C20+	-
Total	100
MW	18.2
LPG, bbl / MMscf	5.1
C5+, bbl / MMscf	4.8
HHV C4+ MU/m ³	36.7

Source: Neptune Energy, 2022

8.6.3 Potential Environmental Impact

The accidental release of trapped gas may result in:

- Change in water quality; and
- Change in air quality.

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A change in either water or air quality is unlikely to result in other environmental impacts to receptors due to the small volumes predicted and the hydrocarbon composition of the gas as a non-persistent hydrocarbon with low density (i.e., positively buoyant in sea water). Any subsea release of trapped gas is expected to rapidly rise and dissipate through the water column to the surface. As such, no impacts to the benthic environment are expected.

Furthermore, in the unlikely event that an individual marine fauna passes through the gas release plume, sublethal or lethal impacts to marine fauna are also not expected due to the restricted exposure time and thus have not been assessed further.

8.6.3.1 Water Quality

Change in water quality

If trapped gas has migrated beneath the shallow non-reservoir cement plugs in Petrel-4 over time, it will be released during drill out of those plugs during decommissioning. An accidental release of 25sm³ gaseous hydrocarbons (Petrel R1 gas) into the marine environment may result in a change in water quality. In the event of a release of trapped gas from the wellhead at ~100m water depth during decommissioning activities, a rapid upward release of small gas bubbles with high momentum into the water column is expected.

The composition of the Petrel reservoir gaseous hydrocarbon is predominantly Methane (approximately 91.75%) and Carbon Dioxide (approximately 4.3%), with minor quantities of components such as Ethane and Nitrogen (Table 8-1). Methane is moderately soluble in seawater, more so under higher pressure and at colder temperatures. As such, majority of the methane potentially released at seabed is expected to dissolve in the water column rather than reaching the surface. Due to the higher level of solubility and biodegradation rates typically associated with gases compared to conventional hydrocarbons the dissolved methane would biodegrade into non-hydrocarbon products (ITOPF, 2025). As such, a significant portion of the dissolved gas will likely be consumed and oxidised by naturally occurring methanotrophic bacteria present in the water column once released into the marine environment.

The upward plume of gas bubbles is expected to rapidly dissolve in the water column rather than entraining within the water column due to the minimal volume of gas expected, the limited heavier hydrocarbon component, the natural biodegradation processes, and the water depth. The gas release will be at pressure and be almost instantaneous, generating rapid mixing and dissolution. Any impact to water quality is anticipated to be minor and temporary. Recovery of water quality conditions is expected within hours after the unplanned gas release.

As such, there is no pathway for impacts to habitats, communities, marine fauna or marine ecosystem functioning from a gaseous hydrocarbon LOC.

Any change in water quality outside the Operational Area is considered highly unlikely and no long-term or widespread reduction in water quality is expected.

8.6.3.2 Air Quality

Change in air quality

If trapped gas has migrated beneath the shallow non-reservoir cement plugs in Petrel-4 over time, it will be released during drill out of those plugs. When the plug is drilled out, this trapped gas could be released at the seabed (riserless mode) or at surface (riser-based mode).

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If this is released subsea, in the unlikely event that a small quantity of the expected 25sm³ of trapped gas reaches the sea surface, there is a potential for a change in air quality to the surrounding atmosphere.

As discussed in Section 0, the small volume released subsea is expected to rapidly dissipate into the water column as it rises, with only a small portion, if any, reaching the surface. If riser-based mode is used, the trapped gas will be released at the surface, to the atmosphere.

The Petrel R1 gas is predominantly Methane (C1; 91.82%), Carbon Dioxide (CO₂; 4.34%), Ethane (C2; 1.87%), Nitrogen (N₂; 0.77%) and small components of other molecules (Table 8-1).

As the activity will occur in open-ocean offshore waters, the release of gas in such remote location will not impact on air quality in coastal towns, considering that the nearest township is Wadeye, located ~180km southeast of the Operational Area.

The quantities of gas release is small and will quickly dissipate into the surrounding atmosphere; and is a once-off, instantaneous occurrence. As such, any change in air quality will be highly localised, temporary and not result in any measurable effect.

8.6.3.3 Residual Risk Summary

The worst-case severity to water quality and air quality from a release of trapped gas is evaluated as Minor (2), given the gas characteristics, volume of release, water depths, transient nature of the marine fauna, and the offshore open water environment of the petroleum activity.

The likelihood of an accidental release of trapped gas occurring as a result of the activities is considered Rare (1) given the trapped gas volume would need to have displaced the fluid in the wellbore, despite the closed volume being pressure tested and the cement plug being on a foundation in cased hole and verified, and the lack of pressure differential across the cement plug due to the normally pressured reservoir. Therefore, the residual risk of a minor loss of containment due to the petroleum activities is considered Low.

8.6.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

- No unplanned objects, emissions or discharges to sea or air (EPO-12).

CMs relating to this risk include:

- NOPSEMA-accepted OPEP and OSMP (CM-37);
- Well barrier requirements to permanently seal and abandon wells (CM-46);
- Well Operations Management Plan (WOMP) (CM-47); and
- Procedures for cement plug drilling (CM-48).

EPSs and MC relating to the above are presented in Section 9.1.

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8.6.5 As Low As Reasonable Practicable Demonstration

Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
Eliminate	Do not drill out the shallow cement plug.	This would eliminate the risk of gas release from this activity. However, drilling out the plug could be required for the permanent P&A of the well in accordance with the accepted future WOMP. This option is not practicable.	*
Substitute	N/A	N/A	N/A
Engineering	Well barrier requirements to permanently seal and abandon wells.	Compliance with the WOMP to ensure barriers are in place and verified, reducing the likelihood of a loss of well integrity occurring.	✓ (CM-46)
Isolation	N/A	N/A	N/A
Administrative	Procedures for cement plug drilling operations	Procedures will be detailed in the well abandonment program and include controlled drilling out rates and use of seawater and bentonite sweeps as the primary circulating fluid. This reduces the risk of operational issues during drilling out of cement plugs. Ensures the activity is conducted in a planned and controlled manner. Minimal cost to implement.	✓ (CM-48)
	NOPSEMA-accepted OPEP and OSMP	Implements response plans to manage an unplanned hydrocarbon release quickly and efficiently to reduce impacts to the marine environment. An accepted OPEP is a legislative requirement under the OPGGS Act.	✓ (CM-37)
	NOPSEMA-accepted MODU Safety Case	The MODU Safety Case includes design control measures for well control that reduce the risk of an unplanned release of hydrocarbons. It is a legislative requirement to have an approved Safety Case in place under the OPGGS Act.	✓ (CM-45)

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Demonstration of ALARP			
Type	Control/ management	Evaluation	Adoption?
	NOPSEMA- accepted WOMP	<p>The WOMP will ensure well barriers are in place and verified, including temporary barriers during MODU activities and permanent abandonment barrier requirements, reducing the likelihood of a loss of containment event occurring.</p> <p>Eni has described and assessed both riser based and riserless well access methods for the purpose of environmental risk assessment under this EP. Based on the current information, riserless well access is elected as ALARP, due to there being no requirement for secondary well control. In addition to the existing well barrier status, there is no reduction in the potential minor volume of trapped gas released if a BOP is used. Also, studies indicate inadequate structural well integrity for accepting the structural loads of a BOP. Finally, prolonging the activity presence for approximately three extra days to run/pull a BOP with all the associated impacts and emissions as described throughout this EP, is an increment not justified.</p> <p>It is a legislative requirement to have an approved WOMP in place under the OPGGS Act.</p>	✓ (CM-47)

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8.6.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	Management of activities which pose a risk of accidental release of trapped gas meet the requirements of the below, as per the OPGGS (E) Regulations and OPGGS Act: <ul style="list-style-type: none"> • NOPSEMA-accepted Safety Case; • NOPSEMA-accepted WOMP; and • NOPSEMA-accepted OPEP.
Policy Compliance	The management of an accidental release of hydrocarbons is aligned with Eni policies and standards. The residual risk is Low, which is acceptable. The EPOs, CMs and EPSs that will be implemented are consistent with internal requirements.
Social Acceptability	To date, no relevant person concerns have been raised regarding the methodology for decommissioning activities (refer Section 5). An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.
Area Sensitivity/ Biodiversity	The Operational Area does not intersect with any State or Territory marine protected areas, AMPs, wetlands of international or national importance, World, National or Commonwealth heritage properties or places, or KEFs. <p>Impacts to the marine environment from accidental release of trapped gas will be highly localised and temporary. There are no expected impacts to marine fauna; and there are no relevant recovery plans or approved conservation advices.</p>
ESD Principles	The risk of this unplanned event is consistent with the principles of ESD because: <ul style="list-style-type: none"> • The worst-case residual risk associated with this aspect is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservative assumptions on the worst-case gas volume have been applied, and that gas may be present beneath the Petrel-4 shallow cement plugs. • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

Given the small potential volume of gas that may be released and the natural processes that limit its environmental impact, the residual risk is considered Low, which is acceptable. Potential impacts are acceptable and ALARP.

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8.7 Accidental Release of Hydrocarbons

8.7.1 Summary of Environmental Risk Assessment

Hazard	Accidental Release of Hydrocarbons - MDO		
	Frequency	Severity	Risk
Inherent Risk	B	1	L
Residual Risk	A	3	L

8.7.2 Description of Hazard

Accidental release of hydrocarbons to the marine environment may occur during:

- MODU operations;
- Vessel operations; and
- Decommissioning activities.

8.7.2.1 Vessel and MODU Operations

Vessel collisions typically occurs as a result of:

- Mechanical failure/loss of Dynamic Positioning (DP) system;
- Navigational error; and/or
- Foundering due to weather.

Vessel operations have an expected duration of 14 to 40 days depending on the activity (see Section 3.1.3).

The MODU operations have an expected duration of 30 to 60 days depending on success of the first campaign (see Section 3.1.3).

A release of MDO during refuelling operations was identified to be up to 50m³ within the Operational Area.

The worst-case release of MDO is due to a vessel collision rupturing a fuel tank. The Technical Guidelines for the Preparation of Marine Pollution Contingency Plans for Marine and Coastal Facilities (AMSA, 2015) identifies the volume of the single largest fuel tank as the worst-case credible scenario for the type of offshore activities covered in this EP (300 m³).

8.7.2.2 Decommissioning Activities

An assessment was undertaken to determine credible LOWC scenarios for the two suspended wells and the decommissioning activity. For a LOWC to occur, multiple levels of control must fail concurrently, such as:

- Primary well control - which is achieved when the hydrostatic pressure exerted by fluids above a hydrocarbon source is greater than the pore pressure at the source.
- Secondary well control - which is provided by the systems of mechanical barriers which form, or are able to form, a pressure-containing envelope around the well to ensure that the well fluids remain under control (see Section 3.3.3).

Further well integrity verification details are documented in the in-force WOMP.

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The likelihood of a LOWC from Petrel-3 or Petrel-4 is considered to have a likelihood of 'non-credible' as per Table 6-2, due to significant, verified cement plugs above the reservoir zone (i.e. well barriers), which will not be disturbed during the decommissioning activities. It has been established that the reservoir is normally-pressured, from pore and fracture gradients developed and refined during the drilling of the eight wells in the Petrel field; and a series of comprehensive Geomechanics studies. The wells were suspended in accordance with the regulations at the time (1980s). The reservoir is isolated in both wells and will not flow in their current condition. As such, natural flow is considered a highly unlikely scenario. An uncontrolled LOWC from Petrel-3 or Petrel-4 to surface scenario is therefore not credible, as assessed within Table 8-2 and the scenario has not been assessed further.

Table 8-2: LOWC spill assessment for suspended wells

Scenario	Credibility of LOWC	Well status
LOWC from Petrel-3 or Petrel-4 during decommissioning	Not credible as worst-case scenario. Activity is incapable of displacing a fluid column as per geological analysis.	Normally pressured reservoir. Deep cement plug above reservoir set in cased hole, on a verified bridge plug, mechanically tagged and pressure tested. Deep cement plugs will not be drilled out upon re-entering the well for decommissioning activities. Wells suspended for >37 years at time of writing without any leaks.

Eni have further evaluated the credibility of a LOC event of trapped gas, which has been assessed previously in Section 8.6.

8.7.3 Spill Modelling

The worst-case credible spill scenario that may occur during vessel and MODU activities comprise:

- An instantaneous release of 300m³ of Marine Diesel Oil (MDO) following a vessel collision.

To understand the potential consequences of a MDO spill, and the response preparedness required, stochastic modelling was undertaken of the identified worst-case credible scenario (RPS, 2024). Model inputs, parameters, and predetermined concentration and exposure assessment thresholds are summarised in Table 8-3.

The spill modelling was carried out using a purpose-developed oil spill trajectory and fates model, SIMAP (Spill Impact Mapping Analysis Program). This model is designed to simulate the transport and weathering processes that affect the outcomes of hydrocarbon spills to the sea, accounting for the specific hydrocarbon type, spill scenario, and prevailing wind and current circulation patterns (RPS, 2024).

SIMAP includes algorithms to account for both physical transport and weathering processes. The latter are important for accounting for the partitioning of the spilled mass over time between the water surface (surface slick), water column (entrained oil and dissolved compounds), atmosphere (evaporated compounds) and land (stranded oil). The model also accounts for the interaction between weathering and transport processes.

The hydrocarbon spill model, the method and analysis applied herein use modelling algorithms which have been peer reviewed and published in international journals.

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Table 8-3: Summary of the Vessel Collision (MDO) Spill Modelling Inputs (RPS, 2024)

Parameter	Details	
Scenario	An instantaneous surface spill of marine diesel oil (MDO) of 300m ³ from a vessel incident	
Location	Petrel-4	
	Latitude:	Longitude:
	12° 53' 13.194" S	128° 29' 45.557" E
Hydrocarbon type	Marine Diesel Oil	
Total spill volume	300m ³	
Number of spill simulations	300 total (100 per season)	
Period of the year (season)	Summer (January, February, December) Transitional (March, September to November) Winter (April to August)	
Release Depth	Surface	
Release Duration	Instantaneous	
Simulation length	30 days	
Surface oil concentration thresholds (g/m ²)*	1 (low); 10 (moderate); 50 (high)	
Shoreline oil accumulation thresholds (g/m ²)*	10 (low); 100 (moderate); 1,000 (high)	
Dissolved hydrocarbon concentrations (ppb)*	10 (low); 50 (moderate); 400 (high)	
Entrained hydrocarbon concentrations (ppb)*	10 (low); 100 (high)	

*Thresholds based on NOPSEMA (2019); see Section 8.7.3.3

8.7.3.1 Hydrocarbon Characteristics

Marine Diesel Oil

Marine Diesel Oil (MDO) is categorised as a group II oil (light-persistent) according to the International Tankers Owners Pollution Federation (ITOPF 2020) and US EPA/USCG classifications. The classification is based on the specific gravity of hydrocarbons in combination with relevant boiling point ranges. It is important to note that some of the heavier components contained in the MDO (i.e. low volatile and persistent portions) will have a strong tendency to physically entrain into the upper water column in the presence of moderate winds (i.e. >12 knots) and breaking waves but can re-float to the surface if these energies abate. The low viscosity (14cP) indicates that this oil will spread quickly when released and will form a thin to low thickness film on the sea surface, increasing the rate of evaporation.

Generally, about 4% of the MDO mass should evaporate within the first 12 hours (Boiling point (BP) < 180°C); a further 32.0% should evaporate within the first 24 hours (180°C < BP < 265°C); and an additional 54.0% should evaporate over several days (265°C < BP < 380°C). Approximately 10% (by mass) of MDO will not evaporate, though will decay slowly over time. Table 8-4 details the physical characteristics and boiling point ranges for the MDO.

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Table 8-4: Physical Properties for the MDO

Properties		Hydrocarbon	
Hydrocarbon Type		Marine Diesel (MDO)	
API		27.0	
Density (kg/m ³)		890.0 (at 25°C)	
Dynamic viscosity (cP)		14.0 (at 25°C)	
Pour point (°C)		-9	
Hydrocarbon property category		Group II	
Hydrocarbon property classification		Light persistent	
Hydrocarbon Component		Boiling point (°C)	% of Total
Volatiles	Non- persistent	<180	4.0
Semi-volatiles		180-265	32.0
Low volatiles		265-380	54.0
Residual	Persistent	>380	10.0

8.7.3.2 Weathering and Fate

Marine Diesel Oil

A series of weathering tests were conducted to illustrate the potential behaviour following a 50m³ instantaneous surface release of MDO. The tests included a model under calm wind conditions (5 knots) and under variable weather conditions (2-24 knots), assuming seasonal water temperature (27°C) and ambient tidal and drift currents. The first case is indicative of the potential weathering rates under calm conditions that would not generate entrainment, while the second case would be more representative of the moderate winds experienced over the region.

The mass balance forecast for the constant wind case (

Figure 8-1) shows that 36.1% of the diesel is predicted to evaporate within 24 hours. The remaining MDO on the water surface will weather at a slower rate and be subject to more gradual decay through biological and photochemical processes.

In the variable wind speeds test (Figure 8-2), characterized by stronger average winds and breaking waves, there is an increased entrainment of MDO into the water column. Approximately 24 hours into the spill, the forecast indicates that 80.5% of the MDO will have entrained, with an additional 15.0% expected to have evaporated. Hence, only a <1% of floating oil remains on the water surface. The low volatile and residual compounds are anticipated to entrain beneath the surface under conditions generating wind waves (winds approximately >6m/s).

While the MDO is entrained, it is forecast to decay at a higher rate of 3% per day or 21% after 7 days, attributed to biological and photochemical degradation. This is in contrast to a rate of 0.14% per day and a total of ~1% after 7 days for the constant-wind case. Given the proportion of entrained MDO and its tendency to remain mixed in the water column, the remaining hydrocarbons are expected to undergo decay over several weeks.

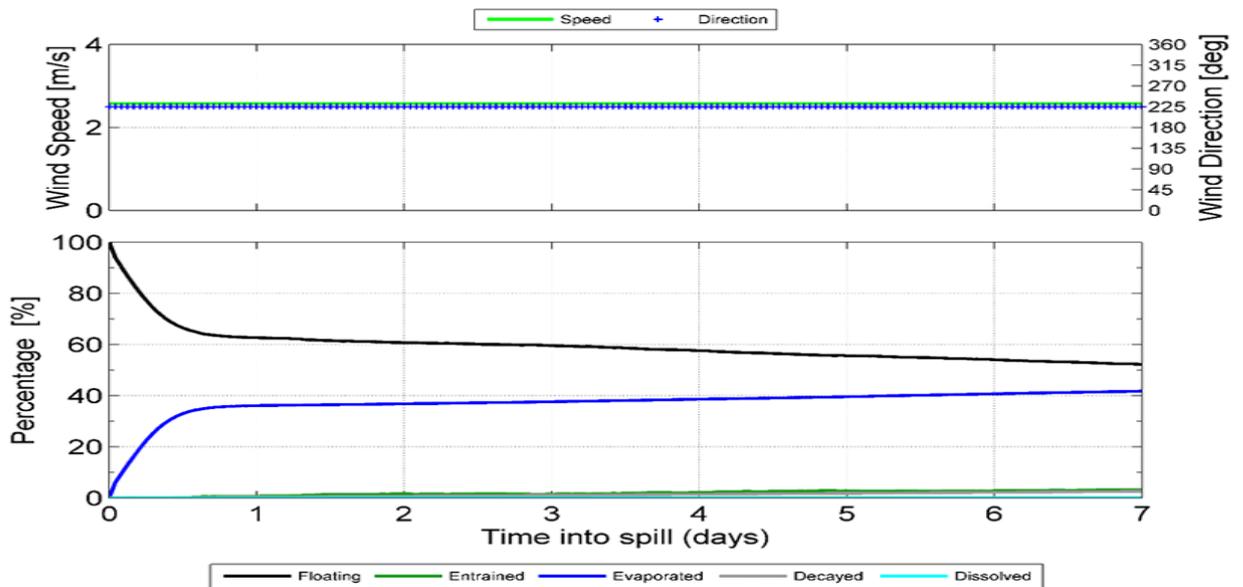


Figure 8-1: Mass balance plot for an instantaneous 50m³ surface release of MDO subjected to a constant 5 knot (2.6m/s) wind, currents and 27°C water temperature (RPS 2024).

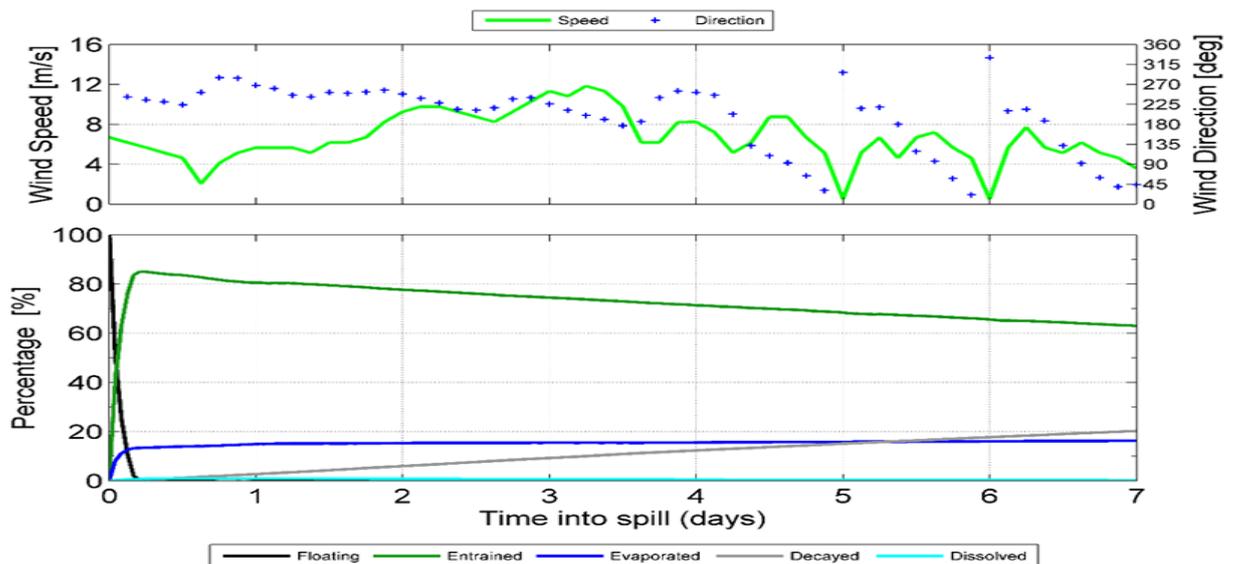


Figure 8-2: Mass balance plot for an instantaneous 50m³ surface release of MDO subjected to variable wind speeds (1 – 12m/s or 2 to 24 knots), currents and 27°C water temperature (RPS 2024).

8.7.3.3 Exposure Thresholds

The SIMAP model tracks oil concentrations to very low levels, therefore it is important to define meaningful threshold concentrations for the recording of contact by oil components and determining the probability of exposure at a location (calculated from the number of replicate simulations in which this contact occurred). The thresholds presented for this EP are based on those outlined by NOPSEMA in the Oil Spill Modelling Bulletin (NOPSEMA, 2019), which are summarised in Table 8-5. Their relationship to exposure for the sea

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surface, shoreline, and water column (entrained and dissolved hydrocarbons) are discussed below.

Table 8-5: Hydrocarbon exposure thresholds (NOPSEMA, 2019)

Exposure level	Threshold	Description
Floating oil		
Low	1g/m ²	Approximates range of socio-economic effects and establishes planning area for scientific monitoring
Moderate	10g/m ²	Approximates lower limit for harmful exposures to birds and marine mammals
High	50g/m ²	Approximates surface oil slick and informs response planning
Shoreline oil accumulation		
Low	10g/m ²	Predicts potential for some socio-economic impact
Moderate	100g/m ²	Loading predicts area likely to require clean-up effort
High	1,000g/m ²	Loading predicts area likely to require intensive clean-up effort
Dissolved in-water oil		
Low	10ppb	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers
Moderate	50ppb	Approximates potential toxic effects, particularly sublethal effects to sensitive species
High	400ppb	Approximates toxic effects including lethal effects to sensitive species
Entrained in-water oil		
Low	10ppb	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers
High	100ppb	As appropriate given oil characteristics for informing risk evaluation

8.7.3.4 Spill Modelling Results

Marine Diesel Oil

Table 8-6 provides a summary of the results from the stochastic modelling report (RPS, 2024; Appendix D: Petrel Oil Spill Modelling) for an accidental release of MDO. The ZPI and EMBA are shown in Figure 4-1.

Table 8-6: Modelling Output Summary of an Accidental Release of MDO (RPS, 2024)

Exposure Values	Summary of worst-case predicted exposure
Surface Exposure	
Low (1g/m ²)	<p>The maximum distance for floating hydrocarbon exposure from the source was predicted to be 99km.</p> <p>The minimum time to floating hydrocarbon exposure at any given receptor(s) was 68 hours (Oceanic Shoals IMCRA).</p> <p>The probability of intersect with the Oceanic Shoals IMCRA is 1%, Pinnacles of the Bonaparte Basin KEF at 1%, and the Carbonate bank and terrace system of the Sahul Shelf KEF at 2%.</p>
Moderate (10g/m ²)	<p>The maximum distance for floating hydrocarbon exposure from the source was predicted to be 43km.</p> <p>No exposure was predicted to any receptor(s) at this threshold.</p>

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Exposure Values	Summary of worst-case predicted exposure
High (50g/m ²)	The maximum distance for floating hydrocarbon exposure from the source was predicted to be 17km. No exposure was predicted to any receptor(s) at this threshold.
Shoreline Exposure	
Low (10g/m ²)	No exposure at this threshold was predicted.
Moderate (100g/m ²)	No exposure at this threshold was predicted.
High (500g/m ²)	No exposure at this threshold was predicted.
In-Water Exposure - Dissolved	
Low (10ppb)	The maximum distance for entrained hydrocarbons at this exposure from the source was predicted to be 107km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 120 hours (Oceanic Shoals IMCRA). The probability of intersect with the Oceanic Shoals IMCRA is 1%.
Moderate (50ppb)	The maximum distance for entrained hydrocarbons at this exposure from the source was predicted to be 42km. No exposure was predicted to any receptor(s) at this threshold.
High (400ppb)	No exposure at this threshold was predicted.
In-Water Exposure - Entrained	
Low (10ppb)	The maximum distance for entrained hydrocarbons at this exposure from the source was predicted to be 248km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 58 hours (Oceanic Shoals IMCRA). The highest probability of intersect was identified at the Pinnacles of the Bonaparte Basin KEF at 24%, Carbonate bank and terrace system of the Sahul Shelf KEF at 20%, and Oceanic Shoals IMCRA at 9%.
High (100ppb)	The maximum distance for entrained hydrocarbons at this exposure from the source was predicted to be 87km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 68 hours (Oceanic Shoals IMCRA). The probability of intersect was only identified at the Oceanic Shoals IMCRA at 1% and Pinnacles of the Bonaparte Basin KEF at 1%.

8.7.4 Potential Environmental Impact

The accidental release of MDO may result in:

- Change in water quality.

A change in water quality can result in various environmental impacts to receptors, including:

- Change in fauna behaviour;
- Injury or mortality of marine fauna;
- Change in ecosystem dynamics and conservation values;
- Changes to the functions, interests, or activities of other marine users; and
- Change in cultural heritage.

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Potential receptors that may be impacted are:

- Marine fauna including:
 - Plankton;
 - Fish (including sharks);
 - Marine Reptiles;
 - Marine Mammals; and
 - Seabirds and Shorebirds
- Socioeconomic receptors, including:
 - Commercial Fisheries;
 - Tourism and Recreational Fishing;
 - Other Marine Users (Commercial shipping, defence, and offshore industry);
 - Shipwrecks;
 - Marine Parks;
 - Key Ecological Features (KEFs); and
 - First Nations Heritage.

The potential impacts to these receptors from exposure to surface and in-water (dissolved and entrained) hydrocarbons has been evaluated in the sections below.

As the spill modelling predicted no exposure to shoreline accumulation (see Section 8.7.3.4); the impacts to shoreline receptors have not been assessed.

8.7.4.1 Water Quality

Change in water quality

An accidental release of MDO into the marine environment will result in a change in water quality. MDO is classified as a light non-persistent hydrocarbon (Group II), containing a high proportion of volatile components and only a small proportion of non-volatile (persistent) components. Based on weathering tests for constant wind conditions, up to approximately 36.1% may evaporate from the water surface within the first 24 hours in calm conditions. Under variable wind speed conditions, MDO has a strong tendency to entrain within the upper water column, with approximately 80.5% that will entrain within 24 hours, leaving a small proportion remaining on the water surface (RPS, 2024).

Entrained MDO will often remain in the upper water column until conditions are calm then will float to the surface and reform as a slick. A change in water quality is expected to be short-term based on the weathering behaviour described above.

Given the nature of the MDO, the weathering predicted (Section 8.7.3), and the offshore metocean conditions, the area of exposure following a spill event is anticipated to be localised and short-term. The water quality of the area exposed to hydrocarbons is expected to return to pre-spill conditions relatively rapidly. Long-term adverse impacts to the water quality are not anticipated.

8.7.4.2 Benthic Habitats and Communities

Benthic habitats have been assessed based on the hydrocarbon exposure thresholds that have the potential to cause harmful impacts (see Section 4.1). Therefore, the extent of the hydrocarbon exposure has been defined by using moderate hydrocarbon exposure thresholds for both surface and in-water (dissolved and entrained) hydrocarbons. This is defined as the Moderate Threshold Area (referred to as the ZPI).

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Table 8-7 evaluates the potential impact that hydrocarbon spills for this activity may have on benthic habitat receptors found within the ZPI.

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Table 8-7: Potential Environmental Impact for MDO Exposure on Benthic Habitats

Benthic Habitats and Communities	
Exposure Evaluation:	
<p>Benthic habitats, such as coral reef formations, and the associated communities present within the ZPI may be exposed to hydrocarbons following an accidental release of MDO. Carbonate banks and shoals occur predominantly in the Joseph Bonaparte Gulf and consist of a hard substrate with flat tops and steep sides that rise from water depths of 150–300m (Baker et al., 2008).</p> <p>However, coral reefs and sponges are not a dominant habitat type identified for the region (see Section 4.3.6).</p>	
Predicted Impact:	
Surface	In-water
<p>Given these receptors are benthic, such as submerged coral reefs, exposure to surface (floating) hydrocarbons is not expected.</p>	<p>Exposure of shallow subtidal corals to entrained hydrocarbons has the potential to result in lethal or sublethal toxic effects, resulting in acute impacts or death at moderate to high exposure thresholds (Shigenaka 2011). 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. Contact with corals may lead to reduced growth rates, tissue decomposition, impaired fertilization and larval settlement, and poor resistance and mortality of sections of reef (NOAA 2010).</p> <p>In-water exposure (dissolved or entrained) at relevant exposure thresholds is only predicted to occur within the upper 0–10m of the water column, therefore, corals found in water depths below 10m are not anticipated to be impacted by in-water hydrocarbon exposure.</p>
Predicted Impact Summary:	
<p>Given the lack of coral reef formations identified within the offshore location of the activity and the associated water depths which they occur in, exposure to hydrocarbons is not expected to occur. Any impacts that may occur are anticipated to be extremely limited and isolated events. Consequently, the potential consequence to submerged coral reefs are expected to result in localised, short-term impacts.</p>	

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8.7.4.3 Marine Fauna

Marine fauna have been assessed based on the hydrocarbon exposure thresholds that have the potential to cause harmful impacts (see Section 4.1). Therefore, the extent of the hydrocarbon exposure has been defined by using moderate hydrocarbon exposure thresholds for both surface and in-water (dissolved and entrained) hydrocarbons. This is defined as the Moderate Threshold Area (referred to as the ZPI).

Table 8-8 evaluates the potential impact that hydrocarbon spills for this activity may have on marine fauna receptors found within the ZPI.

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Table 8-8: Potential Environmental Impact for MDO Exposure on Marine Fauna

Plankton	
Exposure Evaluation:	
<p>Plankton species, phytoplankton and zooplankton, recorded across the Petrel field were characteristic of offshore tropical waters (see Section 4.4.1), therefore, it is possible they may be exposed to surface hydrocarbons and, to a greater extent, hydrocarbons entrained in the water column. However, no specific sites of upwelling were identified within the ZPI.</p> <p>Plankton (phytoplankton and zooplankton) are found in nearshore and open waters beneath the surface and form the basis for the marine food web. Plankton species are known to be sensitive to the toxic effects of oil at low concentrations and large numbers of planktonic organisms may be affected in the event of a spill event (ITOPF 2014). Plankton risk exposure through ingestion, inhalation and dermal contact.</p>	
Predicted Impact:	
Surface	In-water
<p>Plankton migrate vertically through the water column to feed in surface waters at night and, when doing so, may be exposed to surface hydrocarbons (NRDA 2012).</p> <p>Phytoplankton (photosynthetic organisms) can accumulate rapidly, due to their small size and high surface area to volume ratio, therefore populations are typically not sensitive to the impacts of oil (Hook et al. 2016). However, if phytoplankton are exposed to hydrocarbons at the sea surface, their ability to photosynthesise via smothering may be directly affected and would have implications for the next trophic level in the food chain (e.g., small fish) (Hook et al. 2016). In addition, the presence of surface hydrocarbons may result in a reduction of light penetrating the water column, which may again affect the rate of photosynthesis, particularly in instances where there is prolonged presence of surface hydrocarbons over an extensive area. A reduction in the rate of photosynthesis may inhibit growth, depending on the concentration range. For example, photosynthesis is stimulated by low concentrations of oil in the water column (10-30ppb) but becomes progressively inhibited above 50ppb. Conversely, photosynthesis can be stimulated below 100ppb for exposure to weathered oil (Volkman et al. 1994).</p>	<p>Plankton are found in open waters within the water column and are likely to be exposed to hydrocarbons dissolved or entrained in the water column in the event of an oil spill (NRDA 2012).</p> <p>Impacts, including injury and mortality, to planktonic species may occur due to a change in water quality following an unplanned hydrocarbon release. Plankton are widely dispersed throughout the water column, although exposure is predicted to occur within the 0-10m water depth, where plankton are most abundant. Effects will also be greatest in the area close to the spill source where hydrocarbon concentrations are likely to be highest.</p> <p>Relatively low concentrations of hydrocarbons are toxic to both plankton (including zooplankton and ichthyoplankton (fish eggs and larvae)). Plankton risk exposure through ingestion, inhalation and dermal contact with in-water hydrocarbons.</p> <p>Highly volatile hydrocarbons generally have higher toxicity levels when initially released due to the presence of the volatile components (Di Toro et al. 2007), however, with rapid weathering expected, this toxicity decreases. Furthermore, the actual area of exposure is expected to be extremely localised and temporary due to the influence of waves, currents and weathering processes.</p> <p>Studies have shown minimal or transient effects on marine plankton (Volkman et al. 1994). Once background water quality conditions have re-established, the plankton community may take weeks to months to recover due to short generation times (ITOPF 2011), allowing for seasonal influences on the assemblage characteristics.</p>
Predicted Impact Summary:	
<p>Consequently, the potential impacts and risks to plankton from a vessel collision event are expected to result in localised short-term impacts to species for a short duration but not expected to affect species populations or general ecosystem functioning.</p>	

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Marine Invertebrates	
Exposure Evaluation:	
<p>Marine invertebrates identified within the region, including commercially important species, may be impacted by in-water exposure of hydrocarbons. Species such as sponges, cnidarians, molluscs, and echinoderms have been shown to be present within the region. Benthic habitat mapping found that generally the seabed composition was similar, with sparse sessile benthos except for an unidentified white colonial organism (presently recorded as a hydrozoa) across all sampled fields. Estimated percentage cover was low for octocorals and sponges (~2% for each) while the unidentified hydroid comprised between 11-30% at all sites (Jones and Morgan 1994). See Section 4.4.2 for further details.</p> <p>There are no protected invertebrates listed in the EPBA Act PMST search.</p>	
Predicted Impact:	
Surface	In-water
<p>Given invertebrates are only found in benthic habitats, exposure to surface (floating) hydrocarbons is not expected.</p>	<p>The primary modes of exposure for marine invertebrate communities include:</p> <ul style="list-style-type: none"> • Direct exposure to dispersed oil (e.g., physical smothering) from a subsea release of hydrocarbons which remains at the sea floor, • Direct exposure to dispersed and non-dispersed oil (e.g., physical smothering) where oil sinks down from higher depths of the ocean, • Direct exposure to dispersed and non-dispersed oil dissolved in sea water and/or partitioned onto sediment particles, • Indirect exposure to dispersed and non-dispersed oil through the food web (e.g., uptake of oiled plankton, detritus, prey, etc.) (NRDA 2012), and • Acute or chronic exposure through surface contact and/or ingestion can result in toxicological risks. <p>Entrained and dissolved hydrocarbons can have negative impacts on marine invertebrates and associated larval forms. In general, larval invertebrates and invertebrates without an exoskeleton (e.g. sea cucumbers) have been shown to be more sensitive to impacts compared to adult forms, as the presence of an exoskeleton (e.g. crustaceans) reduces the impact of hydrocarbon absorption through the surface membrane.</p> <p>Tissue taint may occur and remain for several months in some species however, this will be localised and low level with recovery expected.</p> <p>Water quality in benthic habitats exposed to entrained hydrocarbons would be expected to return to background conditions within weeks to months of contact. Several studies have indicated that rapid recovery rates may occur even in cases of heavy oiling (National Academies Press 2003).</p>
Predicted Impact Summary:	

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Due to the characteristics of the hydrocarbons, and water depths, coating of benthic assemblages and prolonged exposure to hydrocarbons is considered highly unlikely. Consequently, the potential impacts to invertebrates are expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.

Fish (and Sharks)

Exposure Evaluation:

Several fish species may be present within the ZPI, including seven shark species identified as threatened by the EPBC Act Protect Matter Search Tool. However, no Biologically Important Areas (BIAs) for fish or shark species were found to intersect the ZPI.

Demersal species have been shown to be the most susceptible to oiled sediments, particularly species that are site restricted; however, only pelagic fish and shark species were identified within the area. Any pelagic fish and shark species that occupy the water column, specifically within the upper 0 – 10m of the water column (where in-water hydrocarbon exposure is predicted), are more susceptible to entrained and dissolved hydrocarbons.

Predicted Impact:

Surface

Fish and sharks (including rays) are all pelagic species which rarely break the sea surface, therefore, exposure to surface hydrocarbons may occur only if individuals feed at the sea surface. Studies have shown that near the sea surface, fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al. 1994).

Therefore, there is a low likelihood that these species will be exposed at the surface due to the wide habitat distribution that they have, and the weathering properties of MDO, where the slick will quickly disperse and evaporate, prolonged exposure to surface hydrocarbons by fish, shark and ray species is unlikely.

In-water

Fish and sharks can be exposed to in-water hydrocarbons droplets through a variety of pathways, including:

- Direct dermal contact (e.g. whilst swimming through oil or waters with elevated dissolved hydrocarbon concentrations and other constituents, with diffusion across their gills (Hook et al. 2016),
- Ingestion (e.g. directly or via food base, fish that have recently ingested contaminated prey may themselves be a source of contamination for their predators), and
- Inhalation (e.g. elevated dissolved contaminant concentrations in water passing over the gills).

Exposure to hydrocarbons entrained or dissolved in the water column can be toxic to fish, with their embryonic, larval and juvenile life stages being the most vulnerable. Studies have shown a range of impacts including changes in abundance, decreased size, inhibited swimming ability, changes to oxygen consumption and respiration, changes to reproduction, immune system responses, DNA damage, visible skin and organ lesions and increased parasitism. However, many fish species can metabolise toxic hydrocarbons, which reduces the risk of bioaccumulation of contaminants in the food web (and human exposure to contaminants through the consumption of seafood) (NRDA 2012).

However, generally these species are highly mobile species, and their patterns of movements makes it unlikely for them to remain within the area long enough to be exposed to hydrocarbons to experience sub-lethal impacts (ITOPF 2011). The exception would be in areas such as reefs and other seabed features where species are less likely to move away into open waters (i.e., site-attached species).

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Pelagic species fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al. 1994). As a result, wide-ranging pelagic fish of the open ocean generally are not highly susceptible to impacts from surface hydrocarbons. Adult fish kills reported after oil spills, occur mainly to shallow water, near-shore benthic species (Volkman et al. 1994).	
Predicted Impact Summary:	
As identified in Section 4.4.6, a number of fish and shark species may occur in the Operational Area and over the wider region. Given the wide distribution of fish species in the region and the nature of the potential impacts, which are likely to be temporary and limited to a number of individuals, impacts to an entire population or a population's overall viability is not anticipated. Consequently, the potential impacts and risks to fish and sharks from a vessel collision event are expected to result in localised short-term impacts to species of recognised conservation value for a short duration but not expected to affect species populations or general ecosystem functioning.	
Marine Reptiles	
Exposure Evaluation:	
There may be marine turtles foraging in the area predicted to be exposed to surface hydrocarbons. Foraging BIAs were defined for four species of marine turtles within the ZPI; <ul style="list-style-type: none"> • Loggerhead (EPBC listed as Endangered) • Olive Ridley (EPBC listed as Endangered) • Green (EPBC listed as Vulnerable) • Flatback (EPBC listed as Vulnerable) No habitat critical for the survival of marine turtles was identified within the ZPI (see Section 4.4.8 for further details on these species). The Recovery Plan for Marine Turtles in Australia: 2017–2027 (DEE, 2017) highlights acute chemical discharge as one of several threats to marine turtles. Marine turtles may be exposed to hydrocarbons when transiting through the in-water hydrocarbons, surfacing to breathe within the surface slick, or nesting on oiled shorelines. Marine turtles are vulnerable to the effects of oil at all life stages—eggs, post-hatchlings, juveniles, and adults in nearshore waters. Several aspects of marine turtle biology and behaviour place them at particular risk (NOAA 2010a), including a lack of avoidance behaviour, indiscriminate feeding in convergence zones, and large pre-dive inhalations. There may be sea snakes present in the area predicted to be exposed to surface hydrocarbons; however, their presence is expected to be of a transitory nature only, and most species are not pelagic.	
Predicted Impact:	
Surface	In-water

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Marine turtles make large, rapid inhalations before they dive which may result in inhalation of toxic vapours from hydrocarbons in surface waters (Milton and Lutz, 2003). This can lead to respiratory irritation, inflammation, emphysema or pneumonia (NOAA 2010a).

Ingested oil may cause harm to the internal organs of turtles. Visibly oiled turtles showed higher indicators of polycyclic aromatic hydrocarbons (PAH) in tissues, stomach content, colon content and faeces compared to non-visibly oiled turtles (Ylitalo et al., 2017). This exposure pathway may cause an increase in the production of white blood cells and may affect the functioning of their salt gland (Lutcavage et al. 1995). Oiling has the potential to cause mortality depending on the size of the individual and the extent of oiling (DWH Natural Resource Damage Assessment Trustees 2016).

Sea snakes undertaking foraging behaviours near the water surface may have an increased level of vulnerability to hydrocarbon exposure (Yaghmour et al., 2022).

Oil exposure affects different turtle life stages in different ways. Turtles may be exposed to chemicals in oil in two ways:

- Internally – eating or swallowing oil, consuming prey containing oil-based chemicals, or inhaling of volatile oil related compounds; and
- Externally – swimming in oil or dispersants, or oil or dispersants on skin and body.

Effects of oil on turtles include:

- Increased egg mortality and developmental defects,
- Direct mortality due to oiling in hatchlings, juveniles and adults.

Negative impacts to the skin, blood, digestive and immune systems (elevated susceptibility to infections (NOAA 2010a)) and salt glands resulting from hydrocarbons adhering to body surfaces (Gagnon and Rawson 2010) and entering cavities such as the eyes, nostrils, or mouth.

Records of oiled wildlife during spills rarely include marine turtles, even from areas where they are known to be relatively abundant (Short 2011). An exception to this was the large number of marine turtles collected (613 dead and 536 live) during the Macondo spill in the Gulf of Mexico, although many of these animals did not show any sign of oil exposure (NOAA 2017). Of the dead turtles found, 3.4% were visibly oiled and 85% of the live turtles found were oiled (NOAA 2017). Of the captured animals, 88% were later released, suggesting that oiling does not inevitably lead to mortality.

The four species of marine turtles identified within the ZPI are all widely dispersed across North Australia and the North-West Shelf (NWS); therefore, it is unlikely that an individual will be foraging within the localised area exposed to hydrocarbons at the time of the spill incident. Any potential impact would be limited to individuals, with population impacts not anticipated.

Sea snakes found within the ZPI have the potential to be directly and indirectly impacted by hydrocarbons. In general, there is limited literature on the impacts of oil spills to sea snakes. A recent study by Yaghmour et al., (2022) is the only study to record lethal impacts to sea snakes following a crude oil spill in the Gulf of Oman. The study also identified varying levels of smothering, including over their eyes, snout, mouth, and oesophagus. Due to the hydrocarbon characteristics of the MDO, as a light, non-persistent hydrocarbon, the impact would differ to spills of heavy crude as studied in Yaghmour et al., (2022). Light oils, which are less likely to cause severe external oiling, may expose marine fauna to volatile PAHs during at the surface during inhalations. However, the number of sea snakes that may be exposed is expected to be low due to the offshore location, the lack of BIAs, the extent of

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	exposure above the threshold, and the anticipated rapid weathering of the light-non persistent hydrocarbon. Therefore, potential impacts would be limited to individuals, with population impacts not anticipated.
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Predicted Impact Summary:

The number of marine turtles that may be exposed to hydrocarbons during a spill event is expected to be low due to the localised and temporary presence of surface hydrocarbons at moderate exposure levels and the absence of habitat critical to the survival of the species within this area. The spill modelling predicted no shoreline accumulation at any threshold; therefore, no nesting beaches are anticipated to be contacted. Therefore, any potential impacts would be limited to individual transiting or foraging marine turtles, with no impacts to species populations or general ecosystem functioning anticipated.

Due to the low number of sea snakes anticipated within the EMBA, impacts to sea snakes at both an individual or population level are not anticipated.

Marine Mammals

Exposure Evaluation:

Several cetacean species (whales and dolphins) have the potential to be present within the ZPI, and are threatened, migratory and/or listed as per the EPBC Act Protected Matters Search Tool, including: Blue whale (EPBC listed as Endangered), Fin Whale (EPBC listed as Endangered) and Sei Whale (EPBC listed as Endangered). There are no cetacean BIAs or habitat critical to the survival of the species identified within the ZPI. No pinniped species were identified within the ZPI. Marine mammals, such as cetaceans, can be exposed to the chemicals in oil through: Dermal contact, by swimming in oil and having oil directly on the skin and body (NRDA 2012; Hook et al. 2016), inhaling volatile oil compounds when surfacing to breathe, and internal exposure by consuming oil or contaminated prey.

Predicted Impact:

Surface	In-water
<p>Cetaceans may come into contact with surface hydrocarbons when surfacing. However, direct surface oil contact with hydrocarbons is considered to have little deleterious effect on cetaceans, and any effect is likely to be minor and temporary. This may be due to the skin's effectiveness as a barrier to toxicity (Geraci & St Aubin 1988). Cetaceans have mostly smooth skins with limited areas of pelage (hair covered skin) or rough surfaces such as barnacled skin. Oil tends to adhere to rough surfaces, hair or calluses of animals, so contact with hydrocarbons by cetaceans is expected to cause only minor hydrocarbon adherence.</p> <p>The inhalation of oil droplets, vapours and fumes is a distinct possibility if cetaceans' surface in slicks to breathe. Exposure to hydrocarbons in this way could damage mucous membranes, damage airways, or even cause death. Given the mobility of whales, only a small proportion of a population is anticipated to surface in the affected areas, resulting in short-term and localised consequences, with no long-term population viability effects.</p> <p>The susceptibility to ingested hydrocarbons has also been shown to vary with feeding habits. Baleen whales (such as blue, southern right, and humpback</p>	<p>Cetaceans exposed to entrained hydrocarbons can result in physical coating as well as ingestion (Geraci and St Aubin, 1988). Such impacts are associated with 'fresh' hydrocarbon, the risk of impact declines rapidly as the hydrocarbon weathers.</p> <p>The susceptibility to ingested hydrocarbon has also been shown to vary with feeding habits. Specifically, toothed whales and dolphins may be susceptible to ingestion of dissolved and entrained oil as they gulp feed at depth. There are reports of declines in the health of individual pods of killer whales (a toothed whale species), though not the population as a whole, in Prince William Sound after the Exxon Valdez vessel spill (heavy oil) (Hook et al. 2016).</p> <p>Geraci & St Aubin (1988) found little evidence of cetacean mortality from hydrocarbon spills; however, some behaviour disturbance (including avoidance of the area) may occur. Pelagic species have been said to avoid hydrocarbons, mainly because of its noxious odours, but this has not been proven. In the event that avoidance was to occur, the potential for physiological impacts from contact with hydrocarbons would be reduced, however, active avoidance of an area may disrupt behaviours such as migration, or displace individuals from important habitat, such</p>

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<p>whales) are not particularly susceptible to ingestion of oil in the water column but are susceptible to oil at the sea surface as they feed by skimming the surface. Oil may stick to the baleen while they 'filter feed' near slicks. Sticky, tar-like residues are particularly likely to foul the baleen plates.</p>	<p>as foraging, resting or breeding. Although, the strong attraction to specific areas for breeding or feeding may override any tendency for cetaceans to avoid the noxious presence of hydrocarbons.</p> <p>Dolphin populations from Barataria Bay, Louisiana, USA, which were exposed to prolonged and continuous oiling from the Macondo oil spill in 2010, had higher incidences of lung and kidney disease than those in the other urbanised environments (Hook et al. 2016). The spill may have also contributed to unusually high perinatal mortality in bottlenose dolphins (Hook et al. 2016).</p>
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Predicted Impact Summary:

As highly mobile species, in general it is very unlikely that cetaceans will be constantly exposed to concentrations of hydrocarbons in the water column for continuous durations (e.g., >96 hours) that would lead to chronic toxicity effects. The modelling predicted that hydrocarbons would weather rapidly if released to the environment. Relatively fresh hydrocarbon (closer to the release location) are considered to have the greatest potential for impact. Therefore, the potential for environmental impacts would be limited to a relatively short period following the release and would need to coincide with a migration or aggregation event to result in exposure to a large number of individuals. Regardless, such exposure is not anticipated to result in long-term population viability effects. A proportion of the migrating population of whales could be affected for a single migration event, which could result in temporary and localised consequences. Given the wide distribution of marine mammal species in the region and the nature of the potential impacts, impact to an entire population or the population's overall viability is not anticipated.

Seabirds and Shorebirds

Exposure Evaluation:

Several EPBC threatened, migratory and/or listed marine species have the potential to be rafting, resting, diving and feeding within the area predicted to be contacted by surface hydrocarbons; and diving or foraging within in-water hydrocarbons exposure at moderate thresholds.
No BIAs for any species of seabirds were identified to intersect the ZPI. See Section 4.4.5 for further details on these species.

Predicted Impact:

Surface	In-water
<p>Seabirds rafting, resting, diving or feeding within surface hydrocarbons may be exposed to surface hydrocarbons. Species most at risk include those that readily rest on the sea surface and surface plunging species such as terns.</p> <p>Direct contact with hydrocarbons is likely to foul plumage, which may result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impaired waterproofing (ITOPF 2011a). Increased heat loss as a result of a loss of water-proofing results in an increased metabolism of food reserves in the body, which is not countered by a corresponding increase in food intake and may lead to emaciation (DSEWPaC, 2011).</p> <p>A bird suffering from cold, exhaustion and a loss of buoyancy (resulting from fouling of plumage) may dehydrate, drown or starve (ITOPF 2011; DSEWPaC,</p>	<p>Seabirds could be impacted by in-water hydrocarbon exposure directly (i.e. whilst diving through the water column foraging) or indirectly (i.e. by consuming hydrocarbon-tainted fish, resulting in sub-lethal or toxic impacts).</p> <p>As seabirds are top order predators, any impact on other marine life (e.g., pelagic fish) from hydrocarbon exposure may disrupt and limit food supply both for the maintenance of adults and the provisioning of young.</p> <p>The foraging BIAs are typical over relatively extensive areas, therefore, impacts are not anticipated at a population level due to the localised and temporary exposure of moderate levels of surface hydrocarbons.</p> <p>Furthermore, the time spent within the water column is often time-limited, reducing the amount of exposure experienced whilst diving within the water column</p>

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2011; AMSA, 2013). Physical smothering may also result in impaired navigation and flight performance (Hook et al. 2016). Toxic effects on birds, including internal tissue irritation in their lungs and stomachs, may also result where the oil is ingested as the bird attempts to preen its feathers (ITOPF 2011). The preening process may also spread oil over otherwise clean areas of the body (ITOPF 2011). Whether this toxicity ultimately results in mortality will depend on the amount consumed and other factors relating to the health and sensitivity of the bird.

In a review of 45 marine hydrocarbon spills, there was no correlation between the numbers of bird deaths and the volume of the spill (Burger & Fry, 1993).

Predicted Impact Summary:

Acute or chronic toxicity impacts (death or long-term poor health) to seabirds is possible, however, the presence of birds within areas exposed to moderate threshold levels is expected to be limited, due to the transitory nature of foraging individuals, and given the absence of offshore aggregation areas in the area. The modelling predicted rapid weathering of the hydrocarbons, limiting the area of surface exposure, for seabirds to come into contact with hydrocarbons. Impacts to seabirds in offshore waters are expected to primarily consist of effects such as reduced prey abundance. Consequently, the potential impacts and risks to seabirds from a vessel collision event are expected to result in localised short-term impacts to species of recognised conservation value for a short duration but not expected to affect species populations or general ecosystem functioning.

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8.7.4.4 Protected and Significant Areas

Protected and significant areas have been assessed based on the hydrocarbon exposure thresholds that have the potential to cause harmful impacts (see Section 4.1). Therefore, the extent of the hydrocarbon exposure has been defined by using low hydrocarbon exposure thresholds for both surface and in-water (dissolved and entrained) hydrocarbons. This is defined as the EMBA.

Table 8-9 evaluates the potential impact that hydrocarbon spills for this activity may have on protected and significant areas found within the MDO EMBA.

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Table 8-9: Potential Environmental Impact for MDO Exposure on Protected and Significant Areas

Marine Parks	
Exposure Evaluation:	
<p>Modelling predicted one Australian Marine Park (AMP) to intersect the EMBA (see Section 4.5.1.1):</p> <ul style="list-style-type: none"> The Oceanic Shoals AMP <p>The major conservation values for this AMP have been identified within Section 4.5.1.1 and include pinnacles, carbonate banks and shoals; sites of enhanced biological productivity. The conservation values of these seabed features are recognised in marine bioregional plans through their assignment as Key Ecological Features (KEFs) of regional significance (CoA, 2012). These sites may be impacted by exposure to surface and in-water hydrocarbons.</p>	
Predicted Impact:	
Surface	In-water
<p>The values identified within the Oceanic Shoals AMP have the potential to be exposed to surface hydrocarbons at, or above, the low threshold, in the event of a spill incident.</p> <p>Impact to these receptors from direct or indirect exposure to surface hydrocarbons may cause a subsequent negative impact to the value of the AMPs.</p> <p>However, the values associated with this AMP are predominantly submerged values associated with the unique features, and are therefore, unlikely to be exposed to hydrocarbons at the sea surface.</p> <p>Refer also to:</p> <ul style="list-style-type: none"> Benthic Habitats Seabirds Marine Reptiles. 	<p>The values identified within these AMP have the potential to be exposed to entrained hydrocarbons at, or above, the low threshold in the event of a spill incident.</p> <p>The AMP is associated with unique submerged features, such as carbonate (limestone-like) banks, terraces and isolated pinnacles that provide hard substrates for sponge gardens and associated benthic fauna (Caley et al., 2015).</p> <p>The Oceanic Shoals AMP is identified as an important foraging area for marine turtles. There is a low probability that marine turtles will be exclusively feeding within the area exposed to hydrocarbons given their extensive foraging grounds. Therefore, there is a chance that foraging marine turtles will experience sub-lethal impacts from consuming contaminated prey, however, impacts will be limited to individuals and are not expected to cause impacts at a population-level.</p> <p>The exposure of entrained hydrocarbons will be greatest within the upper 0-10m of the water column and areas close to the spill source. The Oceanic Shoals AMP are located within waters 15m to 500m, respectively, therefore, conservation values within these AMP, such as ecosystems, habitats and sea-floor features are not predicted to be impacted.</p> <p>Studies have suggested that the AMP contributes larvae to the Montebello, Argo-Rowley Terrace, Mermaid Reef, Kimberly, Ashmore Reef, Cartier, Joseph Bonaparte gulf, Arafura and Arnhem AMP (Caley et al., 2015). Therefore, due to this connectivity, hydrocarbon exposure may have indirect negative impacts to these AMPs.</p> <p>Impact to these receptors from direct or indirect exposure to in-water hydrocarbons may cause a subsequent negative impact to the value of the AMPs.</p>

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	Refer also to: Benthic Habitats, Seabirds, Fish and Sharks and Marine Reptiles <ul style="list-style-type: none"> Key Ecological Features.
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Predicted Impact Summary:

The potential consequences to AMPs from exposure to hydrocarbons following a vessel collision has the potential for localized, medium-term impacts to habitats or species of recognised conservation value or to local ecosystem functioning.

Key Ecological Features

Exposure Evaluation:

Modelling predicted 3 Key Ecological Features (KEFs) to intersect the EMBA (see Section 4.5.2), these include:

- Carbonate bank and terrace system of the Sahul Shelf;
- Carbonate bank and terrace system of the Van Diemen Rise; and
- Pinnacles of the Bonaparte Basin.

The major conservation values for KEFs have been identified within Section 4.5.2 and include unique seafloor features with ecological properties of regional significance, such as hard substrates which support diverse species.

The Carbonate bank and terrace system of the Sahul Shelf KEF provides areas of enhanced biological productivity, supporting a high diversity of organisms including reef fish, sponges, soft and hard corals, gorgonians, bryozoans, ascidians and other sessile filter feeders. The banks are known to be foraging areas for loggerhead, Olive Ridley and flatback turtles. Cetaceans and green and freshwater sawfish are likely to occur in the area (CoA, 2012).

The Carbonate bank and terrace system of the Van Diemen Rise is associated with raised geomorphic features, banks, ridges and terraces, with relatively high proportions of hard substrate which support sponge and octocoral gardens.

Both the Carbonate bank and terrace system of the Van Diemen Rise and the Pinnacles of the Bonaparte Basin have been identified as a sponge biodiversity hotspots (Przeslawski et al. 2014; NERP MBH 2014).

The conservation values of these seabed features are recognised in marine bioregional plans through their assignment as Key Ecological Features (KEFs) of regional significance (CoA, 2012). These sites may be impacted by exposure to surface and in-water hydrocarbons.

Predicted Impact:

Surface	In-water
<p>The values associated with these KEFs are identified as unique seafloor features with ecological properties of regional significance, such as hard substrates which support diverse species. As these features are predominantly submerged, they unlikely to be exposed to hydrocarbons at the sea surface. Therefore, only values of the KEFs that may come into contact with surface hydrocarbons, such as marine turtles, have the potential to be impacted by a hydrocarbon release.</p> <p>Refer also to:</p> <ul style="list-style-type: none"> Marine Reptiles 	<p>The values identified within these KEFs have the potential to be exposed to entrained hydrocarbons at, or above, the low threshold.</p> <p>However, the exposure of entrained hydrocarbons will be greatest within the upper 0-10m of the water column and areas close to the spill source. Therefore, the spill is unlikely to intersect with majority of the values of the KEFs which are concentrated within the water column >10m deep or along the seafloor at varying water depths.</p> <p>Hydrocarbon exposure to the key receptors of the KEFs (e.g. marine turtles, sponges, fish species) may cause a subsequent negative impact to the value of the</p>

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	<p>KEFs, however is expected to be limited to a small number of individuals, with no impacts to regional populations.</p> <p>Refer also to:</p> <ul style="list-style-type: none"> • Benthic Habitats • Plankton • Fish and sharks • Marine Reptiles.
Predicted Impact Summary:	
<p>The potential consequence to the KEFs from exposure to hydrocarbons following a vessel collision has the potential for localized, medium-term impacts to habitats or species of recognised conservation value or to local ecosystem functioning.</p>	

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8.7.4.5 Socioeconomic and Cultural

Socioeconomic receptors have been assessed based on the hydrocarbon exposure thresholds that have the potential to cause harmful impacts (see Section 4.1). Therefore, the extent of the hydrocarbon exposure has been defined by using low hydrocarbon exposure thresholds for both surface and in-water (dissolved and entrained) hydrocarbons. This is defined as the EMBA.

Table 8-10 evaluates the potential impact that hydrocarbon spills for this activity may have on socioeconomic and cultural receptors found within the MDO EMBA.

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Table 8-10: Potential Environmental Impact for MDO Exposure on Socioeconomic and Cultural receptors

Commercial Fisheries	
Exposure Evaluation:	
<p>The following fisheries overlap the EMBA (MDO) (Section 4.6.1). These include:</p>	
<p><u>4 Commonwealth-managed fisheries:</u></p> <ul style="list-style-type: none"> • Northern Prawn Fishery (the only Commonwealth fishery that is considered active in the EMBA); • Western Skipjack Fishery; • Southern Bluefin Tuna Fishery; and • Western Tuna and Billfish Fishery. <p><u>13 Northern Territory managed fisheries:</u></p> <ul style="list-style-type: none"> • Aquarium Fishery; • Barramundi Fishery; • Coastal Line Fishery; • Demersal Fishery; • Development Fishery (Small Pelagic); • Jigging Fishery; • Mud Crab Fishery; • Offshore Net and Line Fishery; • Pearl Oyster Fishery; • Spanish Mackerel Fishery; • Special Permits Fishery; • Timor Reef Fishery; and • NT Tour Operators. 	<p><u>14 Western Australian-managed fisheries:</u></p> <ul style="list-style-type: none"> • Abalone Managed Fishery; • Joint Authority Northern Shark Fishery (closed since 2008/09); • Kimberley Crab Fishery; • Kimberley Prawn Fishery; • Mackerel Managed Fishery; • Marine Aquarium Managed Fishery; • Northern Demersal Scalefish Managed Fishery; • Open Access in the North Coast, Gascoyne and Bioregions; • Pearl Oyster Managed Fishery; • South West Coast Salmon Managed Fishery; • Specimen Shell Managed Fishery; • West Australian Sea Cucumber Fishery; • West coast Deep Sea Crustacean Managed Fishery; and • WA Tour Operators.
<p>Refer to Section 4.6.1 for further description of the fisheries located within the EMBA.</p>	
Predicted Impact:	
Surface	In-water

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Physical displacement of commercial fishers may occur due to the establishment of exclusion zones during the spill response.

Visible surface hydrocarbons (i.e. a rainbow sheen) may have the potential to cause impact public perception of the industry, potentially causing a negative economic impact. The commercial fisheries identified within the EMBA predominantly target pelagic or demersal species. As this spill scenario is a surface spill, it is unlikely that demersal species will be impacted as the entrained hydrocarbons are expected to remain within the first 10-20m of the water column. Pelagic species rarely break the sea surface, and studies have shown that fish species are able to detect and avoid contact with surface hydrocarbon slicks (Volkman et al. 1994), therefore there is a low likelihood of exposure to commercially targeted species.

Refer to:

- Fish and sharks.

As discussed in the relevant sections above (i.e. marine invertebrates and fish and sharks) exposure to in-water hydrocarbons has the potential to impact species.

Due to their sensitivity, a small number of juvenile fish, larvae, invertebrates without exoskeletons and planktonic organisms, may be impacted.

In-water hydrocarbon exposure may result in a reduction in commercially targeted marine species (i.e. marine invertebrates and fish and shark species), subsequently resulting in impacts to commercial fishing productivity. Contamination of target species can cause economic impacts to the industry.

In-water exposure is limited to the upper 0 – 10m of the water column, and not within the deeper areas of the water column where several of the commercial species are found.

Furthermore, given the relatively small extent of area potentially impacted by hydrocarbons, highly mobile pelagic species which are present within the EMBA are unlikely to remain in one area for long periods of time, which minimises the risk that they would be exposed to toxic levels of hydrocarbons for the length of time necessary to impart a lethal impact.

Therefore, any acute impacts are expected to be limited to individuals and not expected to cause impacts at a population level. Furthermore, impacts are not expected to affect population viability or recruitment.

Refer to:

- Marine Invertebrates
- Fish and sharks.

Predicted Impact Summary:

Due to the nature of the hydrocarbon, being light, non-persistent with high anticipated evaporation and entrainment rates, any exclusion zones are not expected to be long-term and are unlikely to result in significant impacts.

Tourism and Recreational Fishing

Exposure Evaluation:

The areas identified as potentially being overlapped by the EMBA are areas where very little recreational or charter fishing is expected to occur. This is due to the distance from boating facilities; slipways and the overall lack of natural attractions found within the Operational Area and the ZPI.

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See Section 4.6.2 for further details.

Predicted Impact:

Surface	In-water
<p>Visible surface hydrocarbons (i.e. a rainbow sheen) have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. Recreation is also linked to the presence of marine fauna and direct impacts to marine fauna such as whales, birds, and pinnipeds can result in indirect impacts to recreational values.</p> <p>It is important to note that the impact from a public perception perspective may be even more conservative. This may deter tourists and locals from undertaking recreational activities. If this occurs, the attraction is temporarily closed, economic losses to the business are likely to eventuate. The extent of these losses would be dependent on how long the attraction remains closed.</p> <p>Refer also to:</p> <ul style="list-style-type: none"> • Fish and sharks • Seabirds and Shorebirds • Cetaceans. 	<p>In general, recreational and tourism activities are restricted to shallower coastal waters and shorelines. Given the absence of accumulation of hydrocarbons along shorelines and impacts to coastal waters, any impact tourism and recreational is anticipated to be minimal.</p> <p>Precautionary exclusion from shorelines and coastal areas may be implemented by local governments until water quality monitoring verifies the absence of residual hydrocarbons. This could cause disruption to some recreational and tourism activities within that area.</p> <p>Very limited recreational or charter fishing is expected to occur within the offshore waters of the EMBA (see Section 4.6.2), therefore, impacts are anticipated to be minimal.</p>

Predicted Impact Summary:

Given the nature of the hydrocarbon, being light and non-persistent, and the absence of shoreline impact, any impacts to recreation and tourism are expected to be localised and short-term.

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Other Marine Users

Exposure Evaluation:

Surface hydrocarbons may interact with other marine users, such as commercial shipping, other petroleum exploration and production activities, subsea cables, and defence activities.

There are no known recognised major shipping routes through the permit areas, however vessels may occasionally pass through the EMBA. The nearest shipping fairway, designated by AMSA, is located more than 80km away. Therefore, shipping traffic will likely be limited to infrequent visits by Northern Prawn Fishery (NPF) and other fisheries (see Section 4.6.3 for further details).

Several other offshore industries are located within the area, see Section 4.6.5 for further details.

There is one known historical shipwreck located within the EMBA (Section 4.6.7).

A network of submarine cables extends from Darwin through the Timor Sea and offshore waters of the Kimberley, linking Northern Australia with South-East Asia. No subsea cables intersect with the Operational Area. However, a subsea cable, the North West Cable System, does pass through the top North-East section of the EMBA (see Section 4.6.6). The Petrel field is located within a military exercise zone named the Northern Australia Exercise Area, which incorporates the majority of the Northern Territories portion of the Bonaparte Basin (see Section 4.6.4 for further details).

Predicted Impact:

Surface

Physical displacement of other marine users may occur due to the establishment of exclusion zones during the spill response.

However, due to the comparatively small area of exposure, and the fact that exclusion zones are not expected to be long-term, significant impacts are not anticipated.

In-water

Given these industries are all located in offshore waters which utilise the sea surface vicinity, exposure to in-water hydrocarbons is not expected.

Predicted Impact Summary:

Due to the nature of the hydrocarbon, being light and non-persistent, with high anticipated evaporation and entrainment rates, exclusion zones are not expected to be long-term and are unlikely to result in significant impacts to other marine users.

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First Nation Heritage

Exposure Evaluation:

Sea Country, often known as saltwater country, refers to locations of the sea with which Aboriginal and Torres Strait Islander peoples have a special connection. It is a sea and land estate comprising sacred locations inhabited by ancient creatures who reside in both the physical and spiritual worlds. Aboriginal and Torres Strait Islander cultural identity, health, and wellbeing are valued in Sea Country (DNP 2018a, 2018b).

Relevant First Nations groups were engaged during consultation (Section 5). The Northern Land Council (NLC) raised concerns about the event of an incident impacting the NT coastline or Sea Country. Spill modelling predicts no shoreline exposure. Balangarra Aboriginal Corporation (BAC) requested notification in the event of an activity related incident. Section 8.7.7 details Eni's commitments to notifying these groups in the event of an oil spill.

Sea Country is valued for First Nations cultural identity, health, and wellbeing (Section 4.6.8). Across Australia, First Nations people have been sustainably using and managing their Sea Country for tens of thousands of years. First Nations Heritage consisting of Cultural Heritage Values and Sea Country are considered as socially important receptors. These include coastal and marine Aboriginal heritage sites and places, some of which are registered Aboriginal sites and sacred sites. An unplanned large-scale spill has the potential to impact First Nations Heritage consisting of Cultural Heritage Values including coastal areas and Sea Country.

Maintaining relationships and facilitating ongoing discussions with First Nations people and communities connected to Sea Country allows for opportunities for ongoing improvements to spills preparedness, prevention and mitigation, building resilience and capacity in the community as well as the protection of socially important receptors.

Coastal areas and Sea Country are most likely to be affected in the event of an unplanned large-scale spill such as loss of well containment compared to a small-scale spill of MDO as considered the worst-case credible scenario for the activities within this EP. An unplanned large-scale spill will impact Sea Country for a period, while the spill disperses and weathers. Impacts following a MDO release to the range of species to which First Nation people may have cultural connections to has been discussed throughout this table. Section 4.6.8 provides information on First Nation people's knowledge and First Nations Heritage specific to this region and Section 5 discusses Eni's approach to engaging First Nation people and other relevant persons in such conversation.

It must be noted that the likelihood of a hydrocarbon spill occurring is assessed as highly unlikely and the actual area that may be affected from any single spill event would be considerably smaller than represented by the EMBA.

Combining Traditional Owner knowledge and spill modelling data that considers geographic and metocean data as well as hydrocarbon exposure types, thresholds, concentrations, transport, dispersal, fate, and weathering assists with understanding potential impacts on social receptors in the EMBA or ZPI.

Whilst there are no IPAs intersecting the EMBA, the Marri-Jabin, Balangarra and Uunguu IPAs are within close proximity to the EMBA, and the sea component of these IPAs may be contacted from surface and in-water (dissolved and entrained) hydrocarbon exposure (Section 8.7.3.4). Hydrocarbon exposure (surface and in-water) may have the potential to impact the aesthetic, cultural value, and significance of Sea Country by the presence of physical hydrocarbons or the presence of oil spill responders.

Predicted Impact:

Surface	In-water
Visible surface hydrocarbons have the potential to reduce the visual amenity of known culturally significant values identified within the marine environment, subsequently potentially impacting the value of the site to First Nations people.	First Nations people's connection to Sea Country could potentially be impacted by exposure to hydrocarbons. See Section 4.6.8 for further details of the values.

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First Nation Heritage

In-water exposure at relevant thresholds may impact culturally important species to First Nations peoples, such as cetaceans, which may impact the cultural value of the species.

Hydrocarbon exposure (surface and entrained) may have the potential to impact the aesthetic, cultural value, and significance of Sea Country by the presence of physical hydrocarbons or the presence of oil spill responders.

The Marri-Jabin, Balangarra and Unguu IPAs are within close proximity to the EMBA although do not intersect with the EMBA (Section 4.6.8). Significant impact to First Nations people's sensitivities or values of IPAs are not anticipated given the distance to the spill release sites and the hydrocarbon characteristics of the MDO indicating that high rates of evaporation will occur within the first few days, limiting the exposure to these sensitivities and values (Section 8.7.3.4). The 10ppb low entrained exposure threshold (used to define the extent of the EMBA) represents the very lowest concentration and corresponds generally with the lowest trigger levels for chronic exposure for entrained hydrocarbons in water quality guidelines, no ecological impacts are anticipated at this threshold. It is considered highly unlikely that there will be long-term impacts to First Nations activities from contact at the low entrained threshold.

Furthermore, the spill scenario is expected to be localised and short-term, with the MDO evaporating within the first few days. The spill will likely also be restricted to the first 10-20m of the water column, and not come into contact with the seafloor.

Refer also to:

- Cetaceans
- Australian Marine Parks.

Predicted Impact Summary:

First Nations people's connection to Sea Country could potentially be impacted by exposure to hydrocarbons. However due to the characteristics of the spill scenario, the MDO is expected to evaporate within the first few days. Consequently, the potential impacts and risks to underwater cultural heritage from a vessel collision event are expected to result in localised short-term impacts to socio-economic activities.

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8.7.4.6 Residual risk summary

The worst-case residual severity to benthic habitats and communities, marine fauna, protected and significant areas, and socioeconomic and cultural receptors assessed on the worst-case credible scenario (WCCS) of an accidental release of MDO is evaluated as Local (3), given the hydrocarbon characteristics, water depths, transient nature of the marine fauna, and the offshore open water environment of the petroleum activity.

The likelihood of impacts to these receptors occurring as a result of the activities is considered Rare (A).

Therefore, the residual risk of an accidental release of hydrocarbons due to the petroleum activities is considered Low.

8.7.5 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

- No loss of containment of hydrocarbons to the marine environment (EPO-13).

CMs relating to this risk include:

- Navigation equipment and procedures (CM-06);
- Consultation with relevant persons (including notification requirements) (CM-07);
- Vessel fuel quality (CM-10);
- Eni E&P Marine Manual (Marine assurance standard) (CM-13);
- Vessel SOPEP/emergency management plan (CM-38);
- NOPSEMA-accepted OPEP and OSMP (CM-37);
- Refuelling transfer procedures (CM-41); and
- Refuelling of vessels will be managed to ensure no fuel tank holds more than 300m³ of MDO (CM-42).

EPSs and MC relating to the above are presented in Section 9.1.

8.7.6 As Low as Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control management	Evaluation	Adoption ?
Eliminate	Eliminate the use of vessels in the Operational Area	Vessel use is required to support the MODU operations and cannot be eliminated.	×
	Eliminate bunkering activities during operations	Would remove the spill risk from bunkering. However, the duration of the Petrel activities for the abandonment campaign requires that bunkering of fuel to the MODU occurs in the field, so the activity can be completed.	×

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Demonstration of ALARP			
Type	Control management	Evaluation	Adoption ?
	Eliminate drilling during decommissioning operations	Drilling activities are required to undertake the decommissioning activities and thus, the activities cannot be eliminated.	*
Substitute	No fuel bunkering via hose	Removes spill risk from hose operations. Drums could be used; however, presents cost associated with multiple vessel transits and additional HSE risks during transfer of drums.	*
	Vessel fuel quality (in compliance with Marine Order 97)	MDO is lighter than other types of fuels (e.g., heavy fuel oil) and will evaporate faster and persist less in the marine environment. MDO is already used on the vessels in accordance with Marine Orders. Minimal cost as vessels required to comply with Marine Orders.	✓ (CM-10)
Engineering	Navigation equipment and procedures	Ensures the MODU and vessels are seen by other marine users. Reduces risk of environmental impact from vessel collisions due to ensuring safety requirements are fulfilled. Negligible costs of operating navigational equipment. Marine Orders requires vessels to have navigational equipment to avoid collisions.	✓ (CM-06)
	Contract double-hulled vessels only	Double-hulled vessels only would provide additional protection to the fuel tanks. 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
Administrative	Consultation with relevant persons (refer Section 5)	Relevant persons consultation ensures marine users are aware of the activities, reducing the likelihood of collisions or unplanned interactions. Provides marine users an opportunity to request practicable interface control measures. Enables identification of potential Sea Country protection and enhancement initiatives, and implementation where practicable.	✓ (CM-07)
		In order to ensure Eni activities do not conflict with Defence training in the future, Eni will notify Defence a minimum of five weeks before the actual commencement of activities. Notification will need to be provided to offshore.petroleum@defence.gov.au. Minor administrative costs in notifying Defence. Ensures Defence is aware of the activities, reducing the likelihood of interactions.	
	NOPSEMA-accepted OPEP and OSMP	Implements response plans to manage an unplanned hydrocarbon release quickly and efficiently to reduce impacts to the marine environment. An accepted OPEP is a legislative requirement under the OPGGS Act.	✓ (CM-37)

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Demonstration of ALARP			
Type	Control management	Evaluation	Adoption ?
	Vessel SOPEP / emergency management plan	<p>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.</p> <p>A SOPEP is a requirement under MARPOL Annex 1 (all vessels larger than 400 gross tonnage have a SOPEP or SMPEP outlining options to control the source of a hydrocarbon spill).</p>	✓ (CM-38)
	Eni E&P Marine Manual (Marine assurance standard)	Ensures vessels meet Marine assurance standards to reduce the likelihood of an unplanned spill.	✓ (CM-13)
	Refuelling transfer procedures	Administrative control, such as bunkering/bulk refuelling procedures (applied by the contractors) can reduce the potential for bunkering spills with minimal cost involved.	✓ (CM-41)
	Refuelling of vessels will be managed to ensure no fuel tank holds more than 300m ³ of MDO	A tank limit ensures the modelled MDO spill for vessel collision cannot be exceeded.	✓ (CM-42)

8.7.7 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>Physical presence of Petrel activities is managed to avoid spill risks in accordance with relevant legislative requirements, including compliance with international requirements, maritime conventions, Australian legislation including the OPGGS.</p> <p>For activities which pose a risk of a vessel collision, these include the following:</p> <ul style="list-style-type: none"> • International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978; • International Convention for the Safety of Life at Sea 1974; • International Regulations for Preventing Collisions at Sea 1972; and • <i>Navigation Act 2012</i>, including, as appropriate to vessel class: <ul style="list-style-type: none"> - Marine Order 21: Safety and emergency arrangements); - Marine Order 30: Prevention of collisions); and - Marine Order 71: Masters and deck officers. <p>EPBC approval conditions, under the <i>EPBC Act 1999</i> were considered for this risk. Condition number 3 relates to potential spills. The Petrel-3 and Petrel-4 Monitoring and Decommissioning OPEP (000694_DV_ES.HSE.0285.000) is considered to meet this condition; in addition to being a requirement under the OPGGS (E) Regulations.</p>
Policy Compliance	<p>The management of loss of hydrocarbons is aligned with Eni policies and standards.</p> <p>The EPOs, CMs and EPSs that will be implemented are consistent with Eni internal requirements.</p>

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Demonstration of acceptability	
Social Acceptability	<p>Stakeholders have been consulted.</p> <p>DBCA and the Wunambal Gaambera Aboriginal Corporation raised concerns regarding the potential for a spill to contact shorelines, and Sea Country within WA State waters respectively. Eni confirmed there is no potential for the EMBA (MDO or Condensate) to enter State waters or contact any shorelines.</p> <p>AMSA, WA DoT, DEMIRS, BAC and the Northern Land Council requested to be notified in the event of a spill that could impact their relevant values or responsibilities (refer Section 5); and have been included in routine external notifications (Table 10-3).</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
ESD Principles	<p>The risk of this unplanned event is consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> • The worst-case impact residual risk associated with this aspect is Low. • Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservative assumptions on scale of impact have been applied (see Section 4.1 for further details). • Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. • Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
Area Sensitivity/ Biodiversity	<p>Analysis of the WCCS (MDO spill) has identified the following.</p> <p><i>Note: The entire extent of the EMBA for the LOWC scenario is entirely enclosed within the MDO EMBA, therefore, the assessment of the MDO EMBA is considered appropriate and conservative.</i></p> <p>There are BIAs for 4 marine turtle species; and BIAs for 2 seabird species that overlap the EMBA. There is one marine park (Ocean Shoals AMP), and 3 KEFs that overlap the EMBA. There are no National Heritage Places or Ramsar wetlands within the EMBA. The EMBA does not contact the shoreline.</p> <p>Eni has considered information contained in relevant recovery plans and approved conservation advice for EPBC Act listed species that identify chemical discharges, pollution and habitat degradation or modification as a threat (as listed in Table 2-3). This includes:</p> <p>Conservation Advice:</p> <ul style="list-style-type: none"> • Approved Conservation Advice for <i>Balaenoptera borealis</i> (Sei Whale) • Approved Conservation Advice for <i>Balaenoptera physalus</i> (Fin Whale) • Approved Conservation Advice on <i>Aipysurus apraefrontalis</i> (Short Nosed Sea Snake) • Approved Conservation Advice on <i>Aipysurus foliosquama</i> (Leaf-Scaled Sea Snake) • Approved Conservation Advice for <i>Pristis clavate</i> (Dwarf Sawfish) • Approved Conservation Advice for Green Sawfish • Approved Conservation Advice for <i>Pristis pristis</i> (Large Tooth Sawfish) • Approved Conservation Advice for <i>Glyphis garricki</i> (Northern River Shark) • Approved Conservation Advice for <i>Glyphis glyphis</i> (Speartooth Shark) • Approved Conservation Advice for <i>Rhincodon typus</i> (Whale Shark). <p>Recovery/Management Plans</p> <p>The petroleum activity is consistent with the objectives and actions of the plans identified below through adoption of EPO-13 and the control measures outlined in Section 8.7.57:</p> <ul style="list-style-type: none"> • Conservation Management Plan for the Blue Whale 2015–2025 (DoE, 2015) identifies habitat modification, including acute and chronic chemical discharge, as a threat. There are no BIAs for the blue whale overlapping the EMBA. There are no explicit relevant management actions in this plan. The petroleum activity is consistent with the long-term recovery objective to 'minimise anthropogenic threats to allow the conservation status of the blue whale to improve so that it can be

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Demonstration of acceptability	
	<p>removed from the threatened species list under the EPBC Act' through the adoption of the EPO.</p> <ul style="list-style-type: none"> Recovery plan for Marine Turtles in Australia (DEE, 2017) identifies acute chemical and terrestrial discharge as a threat. Foraging BIAs for the green, flatback, loggerhead and Olive Ridley turtle overlap the EMBA. Action Area A4 to minimise chemical and terrestrial discharge is met through the adoption of the EPO. Sawfish and River Shark Multispecies Recovery Plan (Commonwealth of Australia, 2015) lists habitat degradation or modification as a threat. No habitat critical or BIAs have been identified for sawfish or river sharks within the EMBA. The petroleum activity is consistent with Objective 5 of this plan to 'reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species', through adoption of the EPO. Recovery Plan for the White Shark (<i>Carcharodon carcharias</i>) (2013) identifies habitat modification as a threat. No habitat critical or BIAs have been identified for white sharks within the EMBA. The petroleum activity is consistent with the objective of this plan to ensure anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future through adoption of the EPO. Recovery Plan for the Grey Nurse Shark (<i>Carcharias taurus</i>) (DoE, 2014a) identifies pollution as a threat. No habitat critical or BIAs for the grey nurse shark have been identified in the EMBA. The petroleum activity is consistent with the objective of this plan to ensure anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future, through the adoption of the EPO. <p>Australian Marine Park zoning principles and objectives were also considered:</p> <ul style="list-style-type: none"> North Marine Parks Network Management Plan (2018). <p>Recovery Plans/Conservation Advice for other EPBC Act listed threatened and migratory species that may occur in the ZPI or EMBA do not identify chemical discharges, pollution and habitat degradation or modification as a key threat or have explicit relevant objectives or management actions related to these threats.</p> <p>The control measures outlined in Section 8.7.5 are consistent with the objectives and actions in these publications. The petroleum activities are not inconsistent with the objectives and actions in the relevant recovery plans/conservation advice.</p>
ALARP	The residual risk has been demonstrated to be ALARP.

The worst-case residual severity to benthic habitats and communities, marine fauna, protected and significant areas, socioeconomic and cultural receptors assessed on the WCCS of an accidental release of MDO is evaluated as Local (3), given the hydrocarbon characteristics, water depths, transient nature of the marine fauna, and the offshore open water environment of the petroleum activity. Controls have been evaluated above and adopted in accordance with the ALARP criteria. The residual risk ranking is Low. This is acceptable in accordance with Eni's acceptability criteria (Table 6-5). No additional controls were identified to further reduce risk. Given the low potential risk and the controls that will be implemented, Eni considers the risks are acceptable and managed to ALARP.

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8.8 Oil Spill Response Operations

8.8.1 Summary of Environmental Risk Assessment

Hazard	Oil Spill Response Operations		
	Frequency	Severity	Risk
Inherent Risk	A	1	L
Residual Risk	A	1	L

8.8.2 Description of Hazard

While response strategies are intended to reduce the environmental consequences of a hydrocarbon spill, poorly planned and coordinated response activities can result in further environmental harm whilst undertaking the response strategies. An inadequate level of training and guidance during the implementation of spill response strategies can also result in environmental harm over and above that already caused by the spill.

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 OPEP (Appendix E: OPEP).

NEBA is the process of considering advantages and disadvantages of different spill response options (including no response) to arrive at a spill response decision resulting in the lowest overall environmental and social impacts. This process acknowledges that some response techniques can result in a negative impact to the environment.

A preliminary NEBA is undertaken at a strategic level to identify pre-determined recommended response strategies, and an operational NEBA is undertaken throughout the emergency response. The process requires the identification of sensitive environmental receptors and the prioritisation of those receptors for protection so that the strategic objectives of the response can be established.

The spill response, including the completion of the operational NEBA, will be under the direction of the relevant Control Agency, as defined within the OPEP (Appendix E: OPEP).

Based on the outcomes from the preliminary strategic NEBA, described within the OPEP, the response techniques considered appropriate for this EP include:

- Source control;
- Monitor and Evaluate;
- Oiled Wildlife Response (OWR); and
- Operational and Scientific monitoring.

In general, the greatest potential for impacts additional to those described for routine operations result from the application of shoreline clean-up and oiled wildlife response operations where coastal and shoreline habitat damage and fauna disturbance may occur.

There is no shoreline contact predicted by the spill modelling (Section 8.7.3.4); therefore, shoreline protection and deflection and clean-up strategies are not required, and the associated impacts are not assessed below.

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8.8.2.1 Source Control

Source control arrangements for an accidental release of MDO from a vessel requires the activation of the vessels SOPEP/SMPEP (or equivalent), which will be stored on each vessel as required by AMSA Marine Orders Part 21 and/or 91. Techniques may include:

- Containment;
- Closing watertight doors;
- Checking bulkheads;
- Vessel separation;
- Isolating penetrated tanks; and
- Tank lightening.

8.8.2.2 Monitor and Evaluate

Monitor and evaluate will apply to all marine spills, including an accidental release of trapped gas (Section 8.6). Higher levels of surveillance such as vessel/aerial surveillance, and oil spill trajectory modelling will only be undertaken for Level 2/3 spills given the nature and scale of the spill risk.

It is the responsibility of the Control Agency to undertake operational monitoring during the spill event to inform the operational response. Operational monitoring may include the following:

- Aerial surveillance;
- Vessel surveillance;
- Oil Spill Trajectory Modelling (OSTM);
- Satellite Tracking Buoys; and
- Satellite surveillance.

For vessel-based spills, the responsibility for operational monitoring lies with AMSA (Commonwealth waters) and the relevant control agency (for State/Territory waters). For spills from hydrocarbon infrastructure this is the responsibility of the operator.

8.8.2.3 Oiled Wildlife Response

Due to the characteristics of the MDO being a light, non-persistent hydrocarbon, and the small volume release, large numbers of oiled wildlife are unlikely to occur. The potential impacts that may occur in the unlikely event that an Oiled Wildlife Response (OWR) is required has been assessed below as a cautionary measure. The impacts on wildlife are determined by the types of fauna present, the type of oil spilled and the extent of exposure.

OWR can consists of a number of approaches depending on the response required, including:

- Wildlife reconnaissance - assessment of the wildlife potentially at risk;
- Hazing (deterrence or displacement strategies by auditory, visual, physical deterrents);
- Pre-emptive capture (capture of wildlife at risk prior to oiling and relocation);
- Establishment of any staging centres (if required); and

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- Rehabilitation of any oiled fauna (e.g. capture, field stabilisation, transport, veterinary examination, triage, stabilisation, cleaning, rehabilitation, release).

8.8.2.4 Operational and Scientific Monitoring Program

Eni have developed an Operational and Scientific Monitoring Program (OSMP) to meet the requirements of the OPGGS(E) Regulations (Appendix F: OSMP). The OSMP is the principal tool for determining the extent, severity, and persistence of environmental impacts from an oil spill and allows titleholders to determine whether their environmental protection goals are met.

OSMP techniques vary, depending on the type of spill, location and status of the response. The use of vessels and aircraft may be required to undertake the techniques identified within the OSMP (Appendix F: OSMP).

8.8.3 Potential Environmental Impact

Potential risks that may arise through the implementation of response strategies are summarised in Table 8-11.

Table 8-11: Potential hazards from oil spill response techniques

Potential Hazards	Oil Spill Response Techniques				
	Source control		Monitor and Evaluate	Oiled Wildlife Response	Operational and Scientific Monitoring
Vessel operations	✓		✓	✓	✓
Aircraft operations	×		✓	✓	×
Light emissions	×		✓	✓	✓
Noise emissions	×		✓	✓	✓
Atmospheric emissions	×		✓	✓	✓
Operational discharges	×		✓	✓	✓
Interaction with marine fauna	✓		✓	✓	✓

The potential impacts and risks associated with vessel activities used for the spill response activities, including vessel source control, and any associated light, noise and atmospheric emissions and operational discharges identified within Table 8-11, are similar to those already evaluated for vessel operations within Section 7 and 8 of this EP.

The potential impacts and risks associated with aircraft activities used for the spill response activities, are expected to be similar to those assessed for helicopter operations within Section 7 and 8 of this EP.

As such, due to the nature and scale of these response activities, the evaluation is considered appropriate for any impacts and risks that may occur during source control, monitor and evaluate, and operational and scientific monitoring response activities. Therefore, these have not been considered further.

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The environmental impacts that may arise as a result of OWR will be evaluated within this section as they have not been assessed previously in this EP. These include:

- Change in fauna behaviour; and
- Injury / mortality to fauna.

8.8.3.1 Marine Fauna

Change in fauna behaviour

Hazing of wildlife from impacted areas will result in a change of fauna behaviour. The presence of deliberate noise, such as auditory deterrence devices, may result in disturbance to species feeding, breeding, nesting, or resting. The physical displacement and exclusion of species may have a negative impact to a species if they can no longer access suitable feeding or breeding areas nearby. Exclusion from breeding sites and disrupting the ability for the species to return to a certain site may cause increased stress to be species, particularly species with high site fidelity.

Given the absence of shoreline contact and offshore islands within the EMBA, any OWR required is not anticipated to impact breeding or nesting sites; however, it is possible that impacts to species transiting or using the area for mating or foraging may occur (see Section 4.4 for further details of BIAs present within the WCCS MDO EMBA). Therefore, OWR is expected to result in localised, short-term impacts to individuals and not affect species population or general ecosystem functioning.

Injury / mortality of marine fauna

Incorrect handling of native marine fauna during capture, transportation, cleaning or rehabilitation steps has the potential to result in increased stress, injury, or mortality. To prevent these impacts, only authorised oiled wildlife responders, will approach and handle fauna. This will eliminate any handling impacts to fauna from untrained personnel and reduce the potential for distress, injury or death of a species. Furthermore, only trained response personnel from Eni, AMSA, Australian Marine Oil Spill Centre (AMOSC), the relevant state Control Agencies, and subject matter experts will be used to implement the response strategies to ensure best practice is undertaken and the risks are reduced.

Interactions with marine fauna are only expected to be limited to the duration of the response. Given, the nature and scale of the worst-case spill scenario identified for the activities within this EP, any impacts are not expected to affect species population or general ecosystem functioning.

8.8.3.2 Residual risk summary

The worst-case residual severity to marine fauna from spill response operations is evaluated as Slight (1), given the relatively small scale of response that would be implemented.

The likelihood of an impact to marine fauna occurring as a result of oil spill response operations is considered Rare (A).

Therefore, the residual risk of oil spill operations due to the petroleum activities is considered Low.

8.8.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

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- Activities are managed in accordance with navigational and safety requirements (EPO-03);
- No significant decrease in air quality (EPO-04);
- No injury or mortality to EPBC Act listed fauna during operational activities (EPO-05);
- No unplanned objects, emissions or discharges to sea or air (EPO-12);
- No unplanned discharges to sea of untreated sewage, greywater, putrescible wastes, bilge, and deck drainage (EPO-07);
- No unplanned discharge of oily water or chemicals (EPO-08);
- Reduce impacts from oil spill response operations through incident planning (EPO-14); and
- No unplanned interactions with other users (EPO-15).

CMs relating to this risk include:

- Navigation equipment and procedures (CM-06);
- International air pollution prevention certificate (CM-11);
- Vessel fuel quality (CM-10);
- Regulations and measures for interacting with marine fauna (CM-15);
- Vessels comply with Marine Order 96 (Marine pollution prevention – sewage) (CM-17);
- Vessels comply with Marine Order 95 (Marine pollution prevention – garbage) (CM-18);
- Vessels comply with Marine Order 91 (Marine pollution prevention – oil) (CM-19);
- NOPSEMA-accepted OPEP and OSMP (CM-37); and
- Trained Oiled Wildlife Responders (CM-43).

EPSs and MC relating to the above are presented in Section 9.

For EPOs, EPSs and MCs relating to spill response in the event of a spill during this activity, refer to the Petrel-3 and Petrel-4 Monitoring and Decommissioning OPEP (Appendix E: OPEP) and OSMP (Appendix F: OSMP).

8.8.5 As Low As Reasonably Practicable Demonstration

Demonstration of ALARP			
Type	Control management	Evaluation	Adoption ?
Eliminate	N/A	N/A	N/A
Substitute	Vessel fuel quality (in compliance with Marine Order 97)	Reduces emissions through use of low sulphur fuel in accordance with Marine Order 97. Minimal cost as vessels are required to comply with Marine Orders.	✓ (CM-10)
Engineering	Navigation equipment and procedures	Ensures the vessels are seen by other marine users, thereby reducing the risk of collisions. A requirement under Marine Orders, requires vessels to have navigational equipment to avoid collisions.	✓ (CM-06)

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Demonstration of ALARP			
Type	Control management	Evaluation	Adoption ?
	Vessels 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. In compliance with Marine Order 91.	✓ (CM-19)
Isolation	Capture of contaminated waters/bilge water on vessels	Fixed equipment, such as engines and generators, are contained and captured in the bilge water tank for treatment via the OIW separator (on vessels). In compliance with Marine Order 91.	✓ (CM-19)
Administrative	Vessel air pollution prevention certificate (in compliance with Marine Order 97)	Reduces probability of potential impacts to air quality. Minimal cost as vessels are required to comply with Marine Orders.	✓ (CM-11)
	Regulations and measures for interacting with marine fauna (e.g., EPBC Regulations 8 (Part 8))	Minor cost in complying. Reduces risk of physical and behavioural impacts to marine fauna. While not directly relating to survey noise, EPBC Regulations include restrictions such as vessel speed and direction when in proximity to marine fauna and are based on legislated requirements.	✓ (CM-15)
	Implementation of measures in Marine Order 95 (Marine pollution prevention – garbage)	Marine Order 95 reduces potential impacts of inappropriate discharge of sewage. Stipulates putrescible (food) waste disposal conditions and limitations. Environmental benefit outweighs the minor administrative costs in implementing the Marine Order.	✓ (CM-18)
	Implementation of measures in Marine Order 96 (Marine pollution prevention – sewage)	Marine Order 96 reduces the probability of garbage being discharged to sea. Environmental benefit outweighs the minor administrative costs in implementing the Marine Order.	✓ (CM-17)
	Vessels comply with Marine Order 91 (Marine pollution prevention – oil)	Marine Order 91 stipulates the oily water prevention system and treatment requirements for OIW discharge from vessels. Environmental benefit outweighs the minor administrative costs in implementing the Marine Order.	✓ (CM-19)
	Competent Incident Management Team (IMT) and oil spill responder personnel	Considered a standard spill response control. IMT establishment identified within the OPEP. An accepted OPEP is a legislative requirement under the OPGGS Act.	✓ (CM-37)
	Vessel SOPEP/emergency management plan	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. A SOPEP is a requirement under MARPOL Annex 1 (all vessels larger than 400 gross tonnage have a SOPEP or SMPEP outlining options to control the source of a hydrocarbon spill).	✓ (CM-38)

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Demonstration of ALARP			
Type	Control management	Evaluation	Adoption ?
	NOPSEMA-accepted OPEP and OSMP	Implement spill response preparedness, training, competency and control measures as per NOPSEMA-accepted OPEP and OSMP. Regulatory requirement.	✓ (CM-37)
	Trained Oiled Wildlife Responders.	Only trained responders to undertake oiled wildlife response activities as required under the direction of the Control Agency.	✓ (CM-43)

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8.8.6 Acceptability Demonstration

Demonstration of acceptability	
Compliance with Legal Requirements, Laws and Standards	<p>Response vessels will comply with the EPBC Regulations 2000 Part 8 and the Australian National Guidelines for Whale and Dolphin Watching (DEE, 2017b).</p> <p>Response vessels will comply with relevant MARPOL/Marine Order requirements as detailed throughout Sections 7 and 9.</p> <p>Spill response operations are compliant with the EPBC approval conditions under the <i>EPBC Act 1999</i>.</p>
Policy Compliance	<p>The management of response operations is aligned with Eni policies and standards. The residual risk is Low, which is acceptable.</p> <p>The EPO and the controls that will be implemented are consistent with Eni internal requirements.</p>
Social Acceptability	<p>To date, no relevant person concerns have been raised regarding spill response operations (refer Section 5).</p> <p>An ongoing consultation program will consider statements and claims made by stakeholders when assessing impacts and risks.</p>
Area Sensitivity/ Biodiversity	<p>Analysis of the WCCS (MDO spill) has identified the following.</p> <p><i>Note: The entire extent of the EMBA for the LOWC scenario is entirely enclosed within the MDO EMBA, therefore, the assessment of the MDO EMBA is considered appropriate and conservative.</i></p> <p>There are BIAs for 4 marine turtle species; and BIAs for 2 seabird species that overlap the EMBA. There is one marine park (Ocean Shoals AMP), and 3 KEFs that overlap the EMBA. There are no National Heritage Places or Ramsar wetlands within the EMBA. The EMBA does not contact the shoreline.</p> <p>Eni has considered information contained in relevant recovery plans and approved conservation advice for EPBC Act listed species that identify chemical discharges, pollution and habitat degradation or modification as a threat (as listed in Table 2-3), which may result from spill response operations. This includes:</p> <p>Conservation Advice:</p> <ul style="list-style-type: none"> • Approved Conservation Advice for <i>Balaenoptera borealis</i> (Sei Whale) • Approved Conservation Advice for <i>Balaenoptera physalus</i> (Fin Whale) • Approved Conservation Advice on <i>Aipysurus apraefrontalis</i> (Short Nosed Sea Snake) • Approved Conservation Advice on <i>Aipysurus foliosquama</i> (Leaf-Scaled Sea Snake) • Approved Conservation Advice for <i>Pristis clavate</i> (Dwarf Sawfish) • Approved Conservation Advice for Green Sawfish • Approved Conservation Advice for <i>Pristis pristis</i> (Large Tooth Sawfish) • Approved Conservation Advice for <i>Glyphis garricki</i> (Northern River Shark) • Approved Conservation Advice for <i>Glyphis glyphis</i> (Speartooth Shark) • Approved Conservation Advice for <i>Rhincodon typus</i> (Whale Shark). <p>Recovery/Management Plans</p> <p>The petroleum activity is consistent with the objectives and actions of the plans identified below through adoption of EPO-13 and the control measures outlined in Section 8.8.4:</p> <ul style="list-style-type: none"> • Conservation Management Plan for the Blue Whale 2015–2025 (DoE, 2015) identifies habitat modification, including acute and chronic chemical discharge, as a threat. There are no BIAs for the blue whale overlapping the EMBA. There are no explicit relevant management actions in this plan. The petroleum activity is consistent with the long-term recovery objective to 'minimise anthropogenic threats to allow the conservation status of the blue whale to improve so that it can be removed from the threatened species list under the EPBC Act' through the adoption of the EPO.

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Demonstration of acceptability	
	<ul style="list-style-type: none"> Recovery plan for Marine Turtles in Australia (DEE, 2017) identifies acute chemical and terrestrial discharge as a threat. Foraging BIAs for the green, flatback, loggerhead and Olive Ridley turtle overlap the EMBA. Action Area A4 to minimise chemical and terrestrial discharge is met through the adoption of the EPO. Sawfish and River Shark Multispecies Recovery Plan (Commonwealth of Australia, 2015) lists habitat degradation or modification as a threat. No habitat critical or BIAs have been identified for sawfish or river sharks within the EMBA. The petroleum activity is consistent with Objective 5 of this plan to 'reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species', through adoption of the EPO. Recovery Plan for the White Shark (<i>Carcharodon carcharias</i>) (2013) identifies habitat modification as a threat. No habitat critical or BIAs have been identified for white sharks within the EMBA. The petroleum activity is consistent with the objective of this plan to ensure anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future through adoption of the EPO. Recovery Plan for the Grey Nurse Shark (<i>Carcharias taurus</i>) (DoE, 2014a) identifies pollution as a threat. No habitat critical or BIAs for the grey nurse shark have been identified in the EMBA. The petroleum activity is consistent with the objective of this plan to ensure anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future, through the adoption of the EPO. <p>Australian Marine Park zoning principles and objectives were also considered:</p> <ul style="list-style-type: none"> North Marine Parks Network Management Plan (2018). <p>Recovery Plans/Conservation Advice for other EPBC Act listed threatened and migratory species that may occur in the ZPI or EMBA do not identify chemical discharges, pollution and habitat degradation or modification as a key threat or have explicit relevant objectives or management actions related to these threats.</p> <p>The control measures outlined in Section 8.8.4 are consistent with the objectives and actions in these publications. The petroleum activities are not inconsistent with the objectives and actions in the relevant recovery plans/ conservation advice.</p>
ESD Principles	<p>Petrel response operations are consistent with the principles of ESD because:</p> <ul style="list-style-type: none"> The worst-case residual risk associated with this aspect is Low. Precautionary Principle: There are no threats of serious or irreversible environmental damage. Conservative assumptions on scale of impact have been applied. Intergenerational Principle: Impacts from this aspect will not forego the health, diversity and productivity of the environment for future generations. Biodiversity Principle: Impacts from this aspect are not considered to have the potential to affect biological diversity or ecological integrity.
ALARP	The residual risk has been demonstrated to be ALARP.

Given the controls that will be implemented, the residual risk is considered Low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-5). Potential impacts are acceptable and ALARP.

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9 ENVIRONMENT OUTCOMES, STANDARDS AND MEASUREMENT CRITERIA

Section 21(7) of the OPGGS Regulations requires an EP to include EPOs, EPSs and MC 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
- Include measurement criteria for assessing whether performance outcomes and standards have been met.

The terms used for measuring the environmental performance are defined below:

- EPO – is a statement of the goal that Eni aims to achieve with regard to the management of a given hazard;
- EPS – is 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; and
- MC – defines how the application of the performance standard will be verified. Several measurement criteria may relate to a single performance standard. Measurement criteria are defined in a manner that enables efficient inspection and audit against the performance outcomes and allows for an audit trail.

To ensure environmental risks and impacts will be of an acceptable level, EPOs have been defined and are listed in Table 9-1. These outcomes will be achieved by implementing the identified control measures to the defined EPSs.

Table 9-1: Environmental Performance Outcomes

Reference	Environmental Performance Outcomes
EPO-01	Seabed disturbance is limited to planned activities.
EPO-02	Information is provided to relevant persons to manage impacts on their functions, interests, and activities.
EPO-03	Activities are managed in accordance with navigational and safety requirements.
EPO-04	No significant decrease in air quality.
EPO-05	No injury or mortality to EPBC Act listed fauna during operational activities.
EPO-06	No significant impacts to marine fauna from light emissions.
EPO-07	No unplanned discharges to sea of untreated sewage, greywater, putrescible wastes, bilge, and deck drainage.
EPO-08	No unplanned discharge of oily water or chemicals.
EPO-09	Impacts to water quality and/or marine biota from decommissioning discharges will be temporary and localised within the immediate vicinity of the discharge location.
EPO-10	Reduce impacts on other marine users through the provision of information to relevant stakeholders such that they are able to plan for their activities and avoid unexpected interference.
EPO-11	No introduction of invasive marine species.
EPO-12	No unplanned objects, emissions or discharges to sea or air.
EPO-13	No loss of containment of hydrocarbons to the marine environment.
EPO-14	Reduce impacts from oil spill response operations through incident planning.

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EPO-15	No unplanned interactions with other users.
EPO-16	Make all reasonable attempts, as detailed in the decision framework (Figure 3-7), to recover the wellheads, PGB and TGB at or below the mudline.

9.1 Control Measures and Performance Standards

The CMs that will be used to manage identified environmental impacts and risks, and the associated statements of performance required of the control measure (as in, EPSs) are listed in Table 9-2.

A separate set of performance standards based on the oil spill response operational control measures are included in the Petrel-3 and Petrel-4 Monitoring and Decommissioning OPEP (Appendix E: OPEP).

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Table 9-2: Control measures and environmental performance standards

Control measure	Environmental performance standard	Measurement criteria	EPO Reference (Table 9-1)
CM-01 MODU move and anchoring procedure (for moored MODU option)	EPS-1.1 For each well location, a MODU mooring plan, derived from ISO Standard compliant mooring analysis and seabed surveys, will be developed to ensure the mooring spread and anchor locations are appropriate for the environment, and adequate tensioning of mooring is applied and maintained.	MC-1.1 MODU mooring plan shows that the mooring spread and anchor locations are based on a mooring analysis and seabed surveys.	EPO-01
CM-02 MODU station keeping system (for DP and DP-assisted MODU option)	EPS-2.1 For a dynamically positioned (DP) MODU, DP beacons that have been deployed to sea are detached from their clump weights and recovered prior to MODU departure to mitigate consequences from objects remaining in the marine environment.	MC-2.1 Recovery of DP beacons recorded in an operational report.	EPO-01
CM-03 Recovery of all deployed equipment	EPS-3.1 All equipment deployed during any activity will be recovered.	MC-3.1 Survey records show all deployed equipment was recovered.	EPO-01
CM-04 Post-activity ROV survey	EPS-4.1 An as left survey will be undertaken at each location in the vicinity of the MODU by an ROV. The survey will document the seabed condition at departure and any equipment identified would be recovered by an ROV (if small / light enough).	MC-4.1 Survey records show the seabed condition at MODU departure. Recovery of any additional equipment identified recorded in an operational report.	EPO-01
CM-05 Lifting Management System Procedure (ENI-LOG-PR-017)	EPS-5.1 Lifting operations have been performed in accordance with Lifting Management System Procedure (ENI-LOG-PR-017), including: <ul style="list-style-type: none"> competency of persons undertaking lift planning and preparation process for undertaking lifts. 	MC-5.1 Records show lifting operations were performed in compliance with Lifting Management System Procedure (ENI-LOG-PR-017). Certified Offshore Crane Operator Certified Banksman (API RP2D Banksman)	EPO-01 EPO-05 EPO-12
CM-06 Navigation equipment and procedures	EPS-6.1 Navigation equipment and procedures on vessels and MODU compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 30 (Prevention of Collisions) 2009, including (where applicable): <ul style="list-style-type: none"> adhering to steering and sailing rules including maintaining lookouts (e.g., visual, hearing, radar), proceeding at safe speeds, assessing risk of collision and taking action to avoid collision (monitoring radar) adhering to navigation light display requirements, including visibility, light position/shape appropriate to activity adhering to navigation noise signals as required. EPS-6.2 Navigation equipment and procedures on vessels and MODU compliant (where applicable) with standard maritime safety/navigation procedures, including AMSA Marine Order Part 21 (Safety of Navigation and Emergency Procedure) 2012, including: <ul style="list-style-type: none"> adherence to minimum safe manning levels maintenance of navigation equipment in efficient working order (compass/radar) navigational systems and equipment required are those specified in Safety of Life at Sea (SOLAS) Chapter V (Regulation 19) installation of Automatic Identification System as required by vessel class in accordance with SOLAS Chapter V (Regulation 19). 	MC-6.1 Vessels and MODU have a current (<12 months) International Marine Contractors Association or Offshore Vessel Inspection Database certificate prior to mobilisation and show compliance with the applicable Marine Order requirements.	EPO-03 EPO-13 EPO-14 EPO-15
CM-07 Consultation with relevant persons (including notification requirements)	EPS-7.1 Eni has provided consultation update to relevant persons, and all correspondence has been recorded in the consultation database.	MC-7.1 Consultation records of transmittal and stakeholder database show all correspondence between Eni and relevant persons.	EPO-02 EPO-10 EPO-13
	EPS-7.2 The Australian Hydrographic Office (AHO) is notified four weeks prior to commencing activities so they can then issue a Notice to Mariners.	MC-7.2 Records show a notice to AHO completed 4 weeks prior to commencement.	EPO-02 EPO-10 EPO-13

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Control measure	Environmental performance standard	Measurement criteria	EPO Reference (Table 9-1)
	EPS-7.3 The AMSA ARC (as part of marine safety division) will be notified of the activities four weeks prior to mobilisation to ensure navigation AUSCOAST warnings can be issued and kept up to date.	MC-7.3 Records show a notice to AMSA ARC completed 4 weeks prior to commencement.	EPO-02 EPO-10 EPO-13
CM-08 Drilling contractor bulk solids transfer procedure.	EPS-8.1 Bulk solids transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release to sea and air. The procedure includes standards for: <ul style="list-style-type: none"> • hose integrity: certified hoses • hose flotation: bulk hoses in the water fitted with floatation collars • valve alignment: a MODU supervisor checks that all valves are lined up correctly • communications: constant radio communications between MODU control room and vessel • inventory control: MODU control room monitors tank fill levels or air vents watched to detect tank overfill • emergency shutdown available and tested before each transfer operation. 	MC-8.1 Completed procedural documents, for example work permits, job safety analysis forms, checklists, etc. show bulk transfer procedures were followed.	EPO-04
		MC-8.2 Spill details contained in incident documentation.	EPO-04
CM-09 Waste Incineration	EPS-9.1 No incineration during Petrel-3 and Petrel-4 petroleum activities	MC-9.1 Completed waste record book or recording system that shows no incidents of incineration.	EPO-04
CM-10 Vessel fuel quality	EPS-10.1 Low sulphur fuel is used on vessels, in accordance with Marine Order 97.	MC-10.1 Records of fuel type for vessels show use of low sulphur fuel (in accordance with Marine Order 97).	EPO-04 EPO-13 EPO-14
CM-11 International air pollution prevention certification	EPS-11.1 Vessels and MODU 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: <ul style="list-style-type: none"> • vessels and MODU vessels will have valid international air pollution prevention certificate where required. 	MC-11.1 MODU and vessels records show valid international air pollution prevention certificate where required.	EPO-04 EPO-14
CM-12 Ozone-depleting substance handling procedures	EPS-12.1 Ozone-depleting substances (ODS) managed in accordance with MARPOL Annexe VI to reduce the risk of an accidental release of ODS to air	MC-12.1 Completed ODS record book or recording system show ODS are managed in accordance with MARPOL Annexe VI.	EPO-04
CM-13 Eni E&P Marine Manual (Marine assurance standard)	EPS-13.1 MODU, vessels selected and on-boarded are operated, maintained and manned in accordance with Eni E&P Marine Manual which includes industry standards (Marine Orders) and regulatory requirements.	MC-13.1 MODU and vessels records show they are operated, maintained and manned in accordance with Marine Orders and regulatory requirements.	EPO-04 EPO-05 EPO-07 EPO-08 EPO-13
CM-14 Planned Maintenance System (PMS)	EPS-14.1 Documented maintenance program is in place for equipment on MODU and vessels that provides a status on the maintenance of equipment.	MC-14.1 MODU and vessels daily/weekly records show maintenance program and status of maintenance equipment.	EPO-04 EPO-05 EPO-12
		MC-14.2 Computerized Maintenance Management System (CMMS) records show maintenance program and status of maintenance equipment.	EPO-04 EPO-05 EPO-12
		MC-14.3 MODU contractor written verification demonstrates compliance with PMS.	EPO-04 EPO-05 EPO-12
		MC-14.4 Vessel contractor written verification demonstrates compliance with PMS.	EPO-04 EPO-05 EPO-12
		MC-14.5	EPO-04

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Control measure	Environmental performance standard	Measurement criteria	EPO Reference (Table 9-1)
		IMCA Common Marine Inspection Document (CMID) show maintenance program and status of maintenance equipment.	EPO-05 EPO-12
	EPS-14.2 Engines and associated equipment that require cooling by water will be maintained in accordance with the vessel/ MODU PMS so that they are operating within accepted parameters.	MC-14.6 PMS records verify that the equipment is maintained to schedule.	EPO-04 EPO-05
	EPS-14.3 Processing equipment must be capable of comminuting food waste to a size of <25mm. The macerator will be maintained in accordance with manufacturer specifications.	MC-14.7 Records show routine completion of maintenance in accordance with manufacturer specifications or preventative maintenance system for the macerators.	EPO-07
	EPS-14.4 The Sewage Treatment Plan (STP) will be maintained in accordance with manufacturer specifications.	MC-14.8 Records show routine completion of maintenance in accordance with manufacturer specifications or preventative maintenance system for the STP.	EPO-07 EPO-08
CM-15 Regulations and measures for interacting with fauna	EPS-15.1 EPBC Regulations 2000 – Part 8 for interacting with marine fauna are enforced during the activities, including Part 8 Division 8.1 (Regulation 8.05), which requires that: <ul style="list-style-type: none"> • a vessel will not travel greater than 6 knots within 300m of a whale (caution zone) and not approach closer than 100m from a whale • a vessel will not approach closer than 50m of a dolphin or 100m of a whale (with the exception of animals bow riding). 	MC-15.1 Conformance to EPBC Regulations 2000 – Part 8 is checked on receipt of marine fauna sighting datasheets.	EPO-05
	EPS-15.2 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 that: <ul style="list-style-type: none"> • vessel will not approach closer than 300m to a calf (whale or dolphin) (the exclusion zone) • then the vessel must be immediately stopped and must: <ul style="list-style-type: none"> ○ turn off the vessel’s engines, or ○ disengage the gears, or ○ withdraw the vessel from the caution zone at a constant speed of less than 6 knots. 		EPO-05
	EPS-15.3 Helicopters will comply with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.07), which requires that: <ul style="list-style-type: none"> • helicopters shall not operate lower than 1650 feet or within a horizontal radius of 500m of a cetacean known to be present in the area, except for take-off and landing. 		EPO-05
CM-16 Lighting will be used as required for safe work conditions and navigational purposes.	EPS-16.1 Vessel/MODU navigation lighting and equipment is compliant with COLREGS/Marine Orders 30: Prevention of Collisions, and with Marine Orders 21: Safety of Navigation and Emergency Procedures.	MC-16.1 Vessel/MODU certification confirms compliance with applicable regulations (Marine Orders 21 and 30).	EPO-06
CM-17 Vessels and MODU comply with Marine Order 96 (Marine pollution prevention – sewage)	EPS-17.1 Vessels and MODU comply with Marine Order 96: Marine pollution prevention – sewage (as appropriate to vessel class), which requires: <ul style="list-style-type: none"> • a valid International Sewage Pollution Prevention Certificate, as required by vessel class • an ASMA-approved sewage treatment plant • a sewage comminuting and disinfecting system. • a sewage holding tank sized appropriately to contain all generated waste (black and grey water) • discharge of sewage which is not comminuted or disinfected will only occur at a distance of more than 12 nm from the nearest land • discharge of sewage which is comminuted or disinfected using a certified approved sewage treatment plant and will only occur at a distance of more than 3 nm from the nearest land. • discharge of sewage will occur at a moderate rate while support vessel is proceeding (> 4 knots), to avoid discharges in environmentally sensitive areas. 	MC-17.1 Records demonstrate vessels and MODU are compliant with Marine Order 96: Marine pollution prevention – sewage (as appropriate to vessel).	EPO-07 EPO-08

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Control measure	Environmental performance standard	Measurement criteria	EPO Reference (Table 9-1)
CM-18 Vessels and MODU comply with Marine Order 95 (Marine pollution prevention – garbage)	EPS-18.1 Vessels and MODU comply with Marine Order 95 (Marine pollution prevention – garbage), which requires: <ul style="list-style-type: none"> putrescible waste will only be discharged to sea if comminuted to 25 mm or less and discharged en route when greater than 3 nm from the 'territorial sea baseline' if putrescible waste is not comminuted to 25 mm or less, it will be discharged greater than 12 nm from the territorial sea baseline while en route. 	MC-18.1 Records demonstrate vessels and MODU are compliant with Marine Order 95: Marine pollution prevention – garbage (as appropriate to vessel class).	EPO-07 EPO-08 EPO-05 EPO-12
CM-19 Vessels and MODU comply with Marine Order 91 (Marine pollution prevention – oil)	EPS-19.1 Vessels and MODU comply with Marine Order 91 (Marine pollution prevention – oil) (as relevant to vessel class) requirements, which include mandatory measures for the processing of oily water prior to discharge including: <ul style="list-style-type: none"> Machinery space bilge/oily water shall have IMO approved oil filtering equipment (oil/water separator) with an on-line monitoring device to measure OIW content to be less than 15ppm prior to discharge. IMO-approved oil filtering equipment shall also have an alarm and an automatic stopping device or be capable of recirculating in the event that OIW concentration exceeds 15ppm. A deck drainage system shall be capable of controlling the content of discharges for areas of high risk of fuel, oil and grease or hazardous chemical contamination. There shall be a waste oil storage tank available, to restrict oil discharges. In the event that machinery space bilge and deck drainage discharges cannot meet the oil content standard of <15ppm without dilution or be treated by an IMO approved oil/water separator, they will be contained on-board and disposed of onshore. 	MC-19.1 Records demonstrate vessels are compliant with Marine Order 91: Marine pollution prevention – oil (as appropriate to vessel).	EPO-07 EPO-08
CM-20 Hazardous and non-hazardous waste management processes	EPS-20.1 Vessels and MODU comply with measures outlined in Marine Order 95 (Marine pollution prevention – garbage) as required by vessel class: <ul style="list-style-type: none"> vessel(s) will have a Garbage Management Plan in place which outlines procedures for handling storing, processing and disposing of garbage. 	MC-20.1 Compliant Garbage Management Plan in place for vessels and MODU.	EPO-07 EPO-08
	EPS-20.2 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-20.2 Garbage record book is maintained and available for the vessels and MODU.	EPO-07 EPO-08
	EPS-20.3 All hazardous and non-hazardous wastes generated at sea are retained on vessel/MODU and disposed of onshore by a licenced waste management contractor (excluding putrescible waste and sewage).	MC-20.3 Hazardous and non-hazardous wastes records maintained and available for the vessels and MODU.	EPO-07 EPO-08
	EPS-20.4 All personnel will be notified of the correct waste management procedures through the induction process.	MC-20.4 Waste management procedures included in induction material.	EPO-07 EPO-08
CM-21 Chemical risk assessment process	EPS-21.1 Cement, clean-up fluids and WBM chemicals intended or likely to be discharged into the marine environment are approved before use in accordance with the chemical risk assessment process detailed in Section 10.14.	MC-21.1 ALARP assessment documentation shows chemicals requiring further assessment are ALARP and selected in accordance with the chemical assessment process detailed in Section 10.14.	EPO-09 EPO-12
CM-22 Cuttings management system	EPS-22.1 All well returns to the MODU are diverted to shale shakers, except if drilling with seawater. The recovered drilling fluid is recycled to the mud pits and separated drilled cuttings/solids diverted overboard. If drilling with seawater, cuttings/solids returned to the MODU are diverted overboard.	MC-22.1 Daily Mud Report shows compliance with the cutting management system	EPO-09
	EPS-22.2 The shale shakers are fitted with screens that meet API standards for solids removal particle size cut points.	MC-22.2 Inspection records show shale shakers are fitted with screens that meet API standards.	EPO-09
	EPS-22.3 Centrifuges may be used as required to remove additional finer drilled cuttings/solids that are too small for the shale shakers to remove.	MC-22.1 Daily Mud Report show centrifuges are available for removal of finer drilled cuttings/solids, if required.	EPO-09

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	EPS-22.4 SBM will not be used during the petroleum activities.	MC-22.4 Completed operational reports show that SBM was not used during petroleum activities.	EPO-09
CM-23 Unused bulk product managed as per Figure 7-2 at end of decommissioning program	EPS-23.1 Unused bulk product will be managed as per Figure 7-2 at end of decommissioning program. Upon completion of the activity: <ul style="list-style-type: none"> excess dry bulks will be retained onboard for future activity where acceptable by the next operator cement will be used up via increasing the volume used in the well, if design allows excess bulks will be returned to shore where feasible and considered ALARP after risk assessment during the execution phase, and where permitted by the MODU and vessel operator safe systems of work. In the event that re-use and return-to shore options are not feasible and ALARP then discharges of bulks will be: <ul style="list-style-type: none"> made into a slurry with water prior to release overboard to facilitate dispersion limited to 50m³ of dry bulk per batch of slurry released to facilitate dispersion released no closer to shore, and in water depths no shallower than, the location of the well being constructed, to ensure impacts remain within the parameters assessed within the EP. 	MC-23.1 Records demonstrate that the process outlined in Figure 7-2 was followed for the management of unused bulk product.	EPO-09
CM-24 Quality control for barite	EPS-24.1 Contaminant limit concentrations in barite: <ul style="list-style-type: none"> Mercury (Hg) – 1mg/kg dry weight in stock barite Cadmium (Cd) – 3mg/kg dry weight in stock barite 	MC-24.1 Records show barite used for the drilling meets the below standard: <ul style="list-style-type: none"> Mercury (Hg) – 1mg/kg dry weight in stock barite Cadmium (Cd) – 3mg/kg dry weight in stock barite 	EPO-09
CM-25 Monitoring use of barite and cement	EPS-25.1 Use of barite and cement will be monitored to reduce excess of bulk products remaining at end of decommissioning program.	MC-25.1 Records confirm that the use of barite and cement were monitored, and excess of bulk products were reduced to the minimum required.	EPO-09
CM-26 Industry collaboration on management of unused bulk products	EPS-26.1 Eni will: <ul style="list-style-type: none"> continue to be involved in industry collaboration efforts relating to the management of unused bulk products implement improvements identified through industry-wide collaboration efforts if deemed ALARP following decision framework in Figure 7-2. 	MC-26.1 Records demonstrate Eni is involved in industry collaboration efforts and any improvements are implemented, if deemed ALARP, following the decision framework in Figure 7-2.	EPO-09
CM-27 AHO Nautical charts	EPS-27.1 Wellhead is charted on AHO nautical charts so that marine users are aware of its location, they can therefore avoid the wellhead if required thus reducing snag risk	MC-27.1 Eni correspondence with AHO.	EPO-10
	EPS-27.2 Marine users will not be excluded from the area	MC-27.2 Consultation records	EPO-10
CM-28 Implementation of an IMS risk assessment tool	EPS-28.1 MODU and vessels to be risk assessed (e.g., the DPIRD vessel check tool or similar), demonstrating support vessels they are at 'low risk' of introducing invasive marine species. IMS management measures will be applied to reduce IMS risk to 'low risk'.	MC-28.1 Completed vessel check risk assessment report demonstrating MODU and vessels are 'low risk' of IMS.	EPO-11
	EPS-28.2 Vessel check assessment has been reviewed or completed by a member of the Eni HSE Team.	MC-28.2 Records show vessel check assessment has been reviewed completed by member of the Eni HSE Team	EPO-11
CM-29 Ballast water management	EPS-29.1 Compliance with Australian Ballast Water Management Requirements (as defined under the <i>Biosecurity Act 2015</i> , aligned with the International Convention for the Control and Management of Ships' Ballast Water and Sediments). This includes operators of all vessels answering biofouling questions on a pre-arrival report prior to entering Australia.	MC-29.1 Administrator-approved ballast water management plan on vessels. Completed ballast water record book or log.	EPO-11
CM-30	EPS-30.1	MC-30.1.	EPO-11

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Biofouling management	Vessels and MODU have a Biofouling Management Plan and record book consistent with the International Maritime Organization 2011 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (IMO Biofouling Guidelines).	Records show vessel Biofouling Management Plan and record book in place on MODU and vessels.	
CM-31 Procedures to reduce the potential for loss of non-hazardous and hazardous waste and dropped objects	EPS-31.1 MODU Safety Case includes the following control measures for dropped objects that reduce the risk of objects entering the marine environment: <ul style="list-style-type: none"> Lifting equipment certification and inspection. Lifting crew competencies. Heavy-lift procedures. Preventative maintenance on cranes. 	MC-31.1 NOPSEMA-accepted Safety Case includes control measures for dropped objects. Completed inspection checklist shows compliance with the NOPSEMA-accepted safety case. Details contained in incident documents.	EPO-05 EPO-12
	EPS-31.2. Lifting operations managed in accordance with MODU work instructions or procedures.	MC-31.2 Lifting operations show compliance with MODU work instructions or procedures.	EPO-05 EPO-12
CM-32 Dropped objects to be retrieved where possible	EPS-32.1 Objects dropped overboard are recovered to mitigate the environmental consequences from objects remaining in the marine environment, unless the environmental consequences are negligible, or safety risks are disproportionate to the environmental consequences.	MC-33.1 Fate of dropped objects detailed in incident documents.	EPO-12
CM-33 Hazardous chemical management procedures	EPS-33.1 For hazardous chemicals including hydrocarbons, the following standards apply to reduce the risk of an accidental release to sea: <ul style="list-style-type: none"> Storage containers closed when the product is not being used. Storage containers managed in a manner that provides for secondary containment in the event of a spill or leak. Storage containers labelled with the technical product name as per the safety data sheet (SDS). Spills and leaks to deck, excluding storage bunds and drip trays, immediately cleaned up. Storage bunds and drip trays do not contain free flowing volumes of liquid. Spill response equipment readily available. 	MC-33.1 Completed inspection checklist show hazardous chemical management procedures were followed.	EPO-05 EPO-12
CM-34 Review of lifting integrity following pre-decommissioning inspection to inform recovery of subsea equipment	EPS-34.1 Lifting methodology and plan is developed and implemented based on results of the pre-decommissioning inspection to minimise risk of dropping objects.	MC-34.1 Lifting methodology and plan was developed and implemented prior to lifting operations.	EPO-05 EPO-12
CM-35 Decommissioning Waste Management Plan	EPS-35.1 Develop and implement a Decommissioning Waste Management Plan for Petrel-3 and Petrel-4 asset removal. The Plan includes: <ul style="list-style-type: none"> Identification of legislative requirements Waste inventory Waste hierarchy Appropriate waste management facilities HSE management Implementation strategy. 	MC-35.1 A Decommissioning Waste Management Plan for Petrel-3 and Petrel-4 asset removal was developed and implemented prior to the decommissioning program.	EPO-05 EPO-12
CM-36 Maritime Dangerous Goods Code	EPS-36.1 Dangerous goods managed in accordance with IMDG Code to reduce the risk of an environmental incident, such as an accidental release to sea or unintended chemical reaction.	MC-36.1 Completed Multimodal Dangerous Goods Form for OSV transfers. Completed inspection checklist show dangerous goods were managed in accordance with IMDG Code.	EPO-12
CM-37 NOPSEMA-accepted OPEP and OSMP	EPS-37.1 In the event of an oil spill to sea, the OPEP requirements are implemented to mitigate environmental impacts.	MC-37.1 Completed incident documentation shows OPEP implemented as applicable.	EPO-12 EPO-13 EPO-14
	EPS-37.2	MC-37.2 Completed incident documentation shows OSMP implemented as per initiation criteria.	EPO-12 EPO-13

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Control measure	Environmental performance standard	Measurement criteria	EPO Reference (Table 9-1)
	In the event of an oil spill to sea, the OSMP requirements are implemented to mitigate environmental impacts, as per initiation criteria.		EPO-14
CM-38 Vessel SOPEP/emergency management plan	EPS-38.1 Vessel has and implements a vessel emergency management plan or SOPEP pursuant to MARPOL Annex I.	MC-38.1 Approved vessel emergency management plan or SOPEP.	EPO-12 EPO-13
	EPS-38.2 Vessel emergency management plan or SOPEP spill response exercises conducted at least every three months to ensure personnel are prepared.	MC-38.2 Spill exercise records or evidence of a spill exercise being completed every 3 months.	EPO-12 EPO-13
CM-39 Bulk solid transfer procedure	EPS-39.1 Bulk solids transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release to sea. The procedures includes standards for: <ul style="list-style-type: none"> hose integrity: certified hoses hose flotation: bulk hoses in the water fitted with floatation collars valve alignment: a MODU supervisor checks that all valves are lined up correctly communications: constant radio communications between MODU control room and vessel inventory control: MODU control room monitors tank fill levels or air vents watched to detect tank overfill emergency shutdown available and tested before each transfer operation. 	MC-39.1 Completed procedural documents, for example work permits, job safety analysis forms, checklists, etc. show bulk transfer procedures were followed. Spill details contained in incident documentation.	EPO-12
CM-40 Remotely operated vehicle (ROV) inspection and maintenance procedures as per maintenance regime	EPS-40.1 Preventative maintenance on ROV completed as scheduled to reduce the risk of hydraulic fluid releases to sea.	MC-40.1 ROV maintenance records or evidence of maintenance in operational reports.	EPO-12
	EPS-40.2 ROV pre-deployment inspection completed to reduce the risk of hydraulic fluid releases to sea.	MC-40.2 Completed ROV pre-deployment inspection checklist.	EPO-12
CM-41 Refuelling transfer procedures	EPS-41.1 Vessel/MODU contractor bunkering procedure implemented for all hydrocarbon vessel bunkering and helicopter refuelling activities includes the requirements for: <ul style="list-style-type: none"> a completed Permit to Work or Job Safety Analysis implemented for the hydrocarbon bunkering and refuelling operation visual monitoring of gauges, hoses, fittings and the sea surface during the operation hose checks before commencement. 	MC-41.1 Records demonstrate that refuelling is undertaken in accordance with contractor bunkering procedures.	EPO-13
	EPS-41.2 Bunkering is completed in accordance with the following: <ul style="list-style-type: none"> All hoses that have a potential environmental risk after damage or failure shall be placed on a hose register that is linked to the MODU's preventative maintenance system. There shall be dry-break couplings and flotation on fuel hoses. There shall be an adequate number of appropriately stocked, located and maintained spill kits. All bulk transfer hoses shall be certified for integrity before use (in accordance with OEM recommendations). 	MC-41.2 Records confirm the MODU bunkering equipment complies with the management measures to prevent bunkering spills.	EPO-13
	EPS-41.3 Bunkering is not undertaken in adverse weather conditions and is addressed within a Job Safety Analysis.	MC-41.3 Records demonstrate consideration of daylight and weather conditions before undertaking bunkering and refuelling operations.	EPO-13
CM-42 Refuelling of vessels will be managed to ensure no fuel tank holds more than 300m ³ of MDO	EPS-42.1 Fuel tanks on vessels will be bunkered to a maximum of 300m ³ per tank.	MC-42.1 Fuel bunkering records demonstrate that fuel tanks were filled to a maximum of 300m ³ . Refuelling control included in induction material.	EPO-13
CM-43	EPS-43.1 Oil wildlife responders to be trained and competent to prevent injury to wildlife during response activities.	MC-43.1	EPO-05 EPO-14

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Control measure	Environmental performance standard	Measurement criteria	EPO Reference (Table 9-1)
Trained Oiled Wildlife Responders.		Records of training and/or qualification of oiled wildlife responders to be provided to appropriate Control Agency.	
CM-44 Wellhead removal decision framework	EPS-44.1 Implement wellhead removal decision framework (Figure 3-7) to ensure all reasonable attempts are made to remove and recover wellheads, PGB and TGB.	MC-44.1 Daily reports to document decision framework and actions taken during abandonment. Wellhead Decommissioning Report details the outcomes of the decision framework and as left status.	EPO-16
CM-46 NOPSEMA-accepted MODU Safety Case	EPS-46.1 MODU Safety Case includes control measures for well control that reduce the risk of an unplanned release of hydrocarbons.	MC-46.1 Acceptance letter from NOPSEMA demonstrates the Safety Case is accepted before activity commencement.	EPO-13
CM-47 NOPSEMA-accepted WOMP	EPS-47.1 WOMP in force includes control measures for well integrity that reduce the risk of an unplanned release of hydrocarbons, including: <ul style="list-style-type: none"> at least two isolation barriers are in place between the reservoir and the environment. 	MC-47.1 Acceptance letter from NOPSEMA before the activity commencing.	EPO-13
CM-48 Procedures for cement plug drilling operations	EPS-48.1 Implement procedures for cement plug drilling operations, including: <ul style="list-style-type: none"> controlled drilling out rates; use of seawater as the primary circulating fluid with gel sweeps to lift the cuttings as required; subsea observation by ROV and by personnel at surface for gas bubbles; MODU safety case includes control measures for shallow gas risks; reporting of any observations; pausing of drilling ahead; application of OPEP; and monitoring for safe conditions to resume. 	MC-48.1 Daily Reports evidence that control measures were implemented, observations reported, and actions taken to check for safe conditions before resuming drilling out the rest of the cement plug.	

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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. Section 22(1) of the OPGGS Regulations requires that the EP contain an implementation strategy. To meet this requirement, 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:
 - the environmental impacts and risks of the activity continue to be identified and reduced to a level that is as ALARP
 - 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
 - environmental performance outcomes and standards set out in the environment plan are being met. [Section 22(2)]
- Establishes a clear chain of command and sets out the roles and responsibilities of personnel responsible for implementing, managing and reviewing the EP [Section 22(3)];
- 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 [Section 22(4)];
- Provides sufficient monitoring, recording, audit, management of non-conformance and review of the titleholder's environmental performance and the implementation strategy to ensure the environmental performance outcomes and standards in the environment plan are being met [Section 22(5)];
- 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 [Section 22(6)]; and
- Includes a process for maintaining an OPEP [Section 22(8)].

This section presents the implementation strategy for the Petrel-3 and Petrel-4 monitoring and decommissioning activities (the petroleum activities).

10.1 Systems, Practices and procedures

10.1.1 HSE Management System Overview

Eni's management of HSE matters is arranged hierarchically in three distinct levels, being:

3. Corporate-level Management System (Section 10.1.2)
4. Subsidiary (Eni Australia) level HSE Integrated Management System (HSE IMS) (Section 10.1.3)
5. Facilities Management Systems.

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:

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- The concepts, policies, strategies, HSE goals, processes, procedures and work instructions that comprise the formal content of the HSE IMS
- The organisational structures, communication systems, safety-related data, roles and responsibilities, competencies and training needed by the personnel
- The physical elements that are critical to safety (equipment, structures and engineered systems), including the codes and standards used to design and construct them.

10.1.2 Eni Corporate Management System

Eni Australia's HSE IMS conforms to Eni Natural Resources Policy & HSE Management System Guidelines. Five main Management System elements are shown in Figure 10-1 and incorporated into the Eni Australia HSE IMS.

Elements are largely based on the structure of the ISO 14001 and ISO 45001 series of standards and therefore provide a consistent and recognisable platform for managing HSE, while also ensuring the intent of the principle of continuous improvement is followed.

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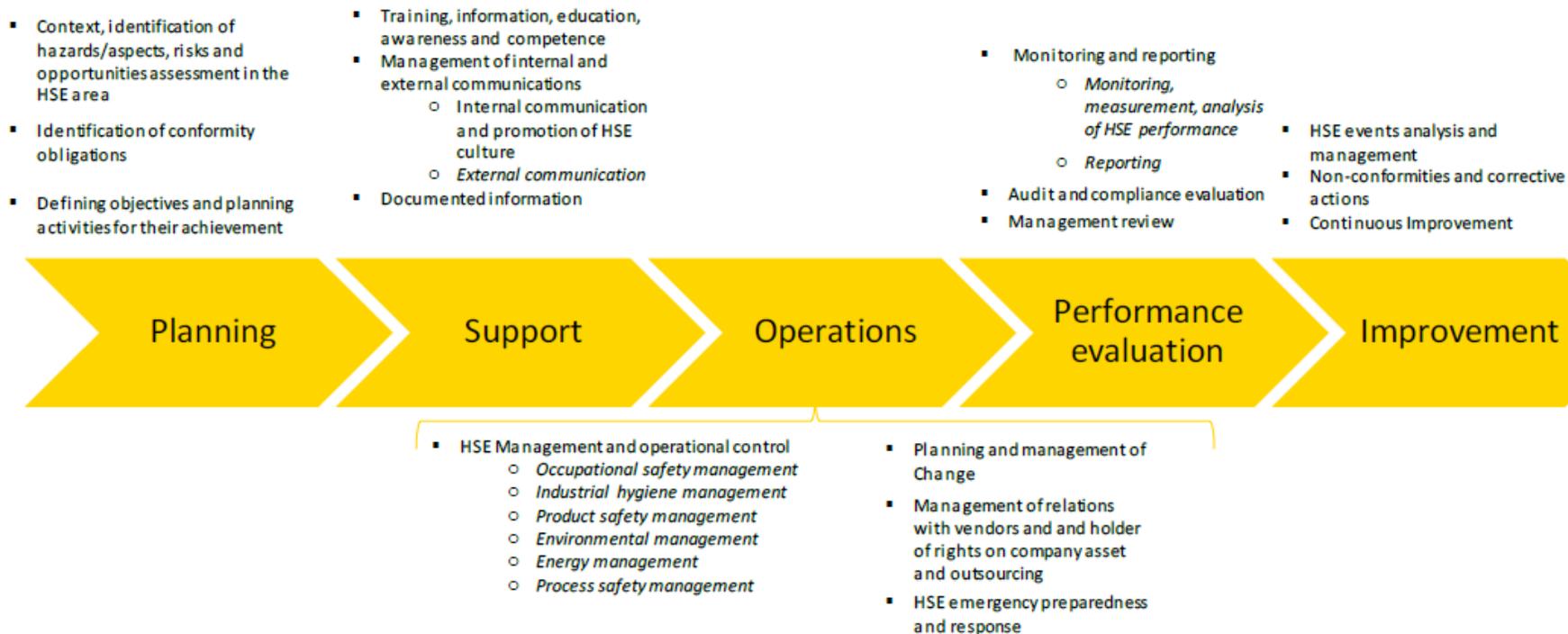


Figure 10-1: The HSE IMS Elements to achieve continual improvement

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10.1.3 Regional Eni Australia HSE Integrated Management System

The Eni Australia HSE IMS, which covers petroleum activities, has been certified against the standards of:

- ISO 14001: Environmental Management System; and
- ISO 45001: Occupational Health and Safety Management.

Audits are performed to verify conformance with these standards and the Eni Natural Resources Corporate Directive.

The HSE Integrated Management System 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 Integrated Management System Framework Document (ENI-HSE-IN-002) 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 Integrated Management System Framework Document (ENI-HSE-IN-002) sets out 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 information, standards, procedures or specification 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 and company best practices.

The HSE standards apply to all personnel working on Eni sites, whether they are an 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.

At the apex of the HSE IMS is Eni's HSE Statement (Appendix A: HSE Statement), which 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

Table 10-1 summarises key roles and responsibilities of Eni personnel and contractors for implementing the petroleum activities.

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Table 10-1: Key roles and responsibilities for health, safety, and environment management for Petrel-3 and Petrel-4 petroleum activities

Role	Responsibilities
Onshore personnel	
Eni Well Operations Manager	<p>Reviewing this EP and confirming all environmental risks have been identified, mitigation strategies are effective and will be undertaken during field management and field management and petroleum activities, including emergencies or potential emergencies. Ensuring:</p> <ul style="list-style-type: none"> • Compliance with all environmental regulations and the EP • The requirements of the EP are communicated to third party contractors • All personnel are inducted and are aware of their environmental responsibilities • Environmental audits are undertaken on project vessels to verify compliance with the EP • All equipment is maintained and in an operable condition • Actions are tracked in an action register, implemented and closed out, including corrective actions identified during audits • Waste is managed on all vessels according to this EP. • Reporting all environmental incidents to the Eni Operations Manager and HSEQ Manager. • Ensuring all notifications are undertaken as per Table 10-3. • Reporting to NOPSEMA any environmental incident (as in, reporting 'reportable incidents' and 'recordable incidents') (Section 10.8.2).
Eni Well Operations Superintendent	<ul style="list-style-type: none"> • Ongoing communications with Offshore Installation Manager (OIM). • Reviewing this EP and confirming all environmental risks have been identified, mitigation strategies are effective and will be undertaken during field management and field management and petroleum activities, including emergencies or potential emergencies. • Ensuring compliance with all environmental regulations and the EP. • Reporting all environmental incidents to the Eni Drilling Manager, HSE Manager and IMT Leader.
HSEQ Manager (office-based)	<ul style="list-style-type: none"> • Reviewing this EP and confirming all environmental risks have been identified, mitigation strategies are effective and will be undertaken during activities, including emergencies or potential emergencies. • Providing and maintaining effective emergency response arrangements for project activities where there is potential environmental risk. • Performing incident investigations. • Submitting annual environmental compliance report to NOPSEMA.
Environmental Advisor (office-based)	<ul style="list-style-type: none"> • Reviewing HSE Management Plans for acceptability and ensuring compliance with this EP. • Reporting all incidents to NOPSEMA in accordance with Section 10.8.2. • Coordinating and reviewing environmental audits to ensure compliance with the agreed EPOs. • Providing advice in the event of an oil spill or other environmental incident.
HSE Assurance Advisor	<ul style="list-style-type: none"> • NOPSEMA monthly environment reporting of 'recordable incidents'.
Eni IMT Leader	<ul style="list-style-type: none"> • Directing the Eni response in the event of an incident. • Notifying NOPSEMA of the details of reportable incidents and providing updates on the status of the incident • Notifying AMSA in the case of vessel incidents. • Communicating with IMT and Crisis Management Team (CMT), government, stakeholders, and media in the event of an incident.

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Role	Responsibilities
Eni IMT Duty Officer	<ul style="list-style-type: none"> Acting as the first point of contact in an incident. Notifying the Eni IMT Leader of the incident.
Offshore personnel	
Eni Offshore Representative	<ul style="list-style-type: none"> Reviewing this EP and confirming all environmental risks have been identified and mitigation strategies are effective and will be undertaken during activities, including emergencies or potential emergencies. Notifying the Eni Operations Manager, HSEQ Manager and Well Operations Manager, should additional environmental risks arise during the activities that have not been identified in this EP. Ensuring all offshore personnel comply with the health, safety and environmental requirements. Ensuring all personnel receive the Eni environmental induction before commencing drilling activities. Providing a daily log of activities and reporting reportable and recordable incidents to the Well Operations Manager. In the event of an emergency, communicating between the support vessel(s) and the Eni IMT in Perth. Implementing and complying with all operational plans, including this EP. Ensuring all required plans, audits and reviews are undertaken in accordance with the regulatory requirements and as required by this EP. Implementing and closing out actions in an action register. Ensuring all monitoring is undertaken in accordance with this EP (Section 10.5) and data is made available to the Well Operations Manager. Ensuring adherence to management and mitigation measures outlined to minimise interaction with cetaceans and other marine fauna. Ensuring all whale interaction reports are submitted to the Environment Advisor. Notifying NOPSEMA of the details of reportable incidents and providing updates about the status of the incident (Section 10.8.2). Investigating hydrocarbon spills, should they occur.
MODU OIM/Vessel Master	<ul style="list-style-type: none"> Ensuring full compliance with all applicable navigational safety standards and regulations. Conducting emergency drills. Supervising MODU/vessel crew to ensure they are fit for duty and undertaking work only within their area of qualification and training. Monitoring, reporting, and taking appropriate action to remedy any MODU/vessel or equipment defects that may impact on safety and environmental performance of the vessel. Maintaining logs with respect to MARPOL 73/78 regulations. Ensuring all crew are appropriately qualified, trained and equipped for their roles on the MODU/vessel. Ensuring MODU/vessel activities comply with the requirements of this EP. Notifying all MODU/vessel-related incidents immediately to the Eni Site Representative.
MODU/vessel operators, technicians and crew	<ul style="list-style-type: none"> Applying operating procedures in letter and in spirit. Following good housekeeping procedures and work practices. Encouraging improvement in environmental performance, wherever possible. Immediately reporting environmental incidents or spillage of hydrocarbons or chemicals to the MODU OIM/Vessel Master.

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10.3 Training

10.3.1 General Arrangements

All staff and contractors working on the petroleum activities must undertake an induction. The induction programs include:

- Company Induction:
 - Eni Golden Rules
 - Eni HSE IMS
 - Substance Abuse.
- Petrel-3 and Petrel-4 monitoring and decommissioning activities inductions:
 - Site Induction
 - Eni Environment Plan Awareness/Legislation:
 - environmental regulatory requirements
 - marine mammal interaction – requirement to record and report sightings of whales and dolphins
 - requirements for waste, segregation, labelling, handling, and storage
 - housekeeping and spill prevention
 - spill preparedness and response
 - environmental incident reporting
 - requirements for recording waste movements and transfers.
 - HSE Standards
 - Job Hazard Analysis
 - Petrel-3 and Petrel-4 Emergency Response arrangements
- Cultural Awareness Induction.

Training is provided to Eni employees and contractors 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 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 uses a number of training matrices which define the competency requirements for the roles relevant for the petroleum activities, specifically:

- Emergency Response Training Matrix
- Induction & HSE Training Matrix
- Technical Training Matrix.

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 individual's Personal Development Plan (which outlines training needs on an annual basis).

The training process has been established to ensure training activities are interactive, effective, competency-based and auditable, in terms of frequency of sessions and attendance of individuals.

HSE training, based on roles and responsibilities, includes:

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- Dangerous goods awareness;
- Management of change;
- Safety Case awareness and legislation;
- Hazard identification and risk management;
- Manual handling;
- HSE Management System and auditing;
- Root cause analysis incident investigation; and
- HSE for supervisors.

OPEP training requirements are outlined in the Petrel-3 and Petrel-4 Monitoring and Decommissioning OPEP (000694_DV_ES.HSE.0285.000).

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 Contractor HSE Management Procedure (ENI HSE-PR-008) and Contractor HSE Specification and Requirements (ENI HSE SP 002).

In addition to this, Eni Australia ensures contractor personnel receive appropriate training on their HSE responsibilities in connection with petroleum 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 in relation to the petroleum activities. All subcontractors and specialist services providers engaged under the maintenance services contract will similarly be approved by Eni.

The Eni contracting process for the contractor vessel selection and management, and the appropriate operators for selected operations associated with the petroleum activities, requires the development of a project-specific vessel scope of work, that is consistent with Logistic Technical Requirements for Supporting Project Activities and corresponding appendix on Vessel Technical Specifications Requirements. These are developed in accordance with Eni Performance Standard P43 Marine Vessels and Eni Marine Transportation Manual, out of which come the requirements informing the vessel on-hire inspection process.

Each vessel must be audited to comply with local and international standards and regulations and Eni Marine Transportation Manual. A complete set of vessel documents will be requested from the operator and once received, Eni's Marine Advisor will review to ensure all documents comply. This may include specific requirements for the vessel scope of work:

- Vessels must have a current (within 12 months of issue) Offshore Vessel Inspection Database (Oil Companies International Marine Forum), Common Marine Inspection Document (International Marine Contractors Association), or Eni marine inspection. If the vessel holds neither of the previous documents, an inspection request will be generated.

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- All information and advice will then be forwarded to Eni Headquarters (LOGIS) for final technical approval. Vessels require technical approval from headquarters if the vessel is going to carry passengers who are Eni employees or direct contractors.

Existing vessels, which Eni has listed as recently engaged, are required to hold a current audit from within the last 12 months and periodically renewed on an annual basis.

10.4.2 Verification of Competence

Personnel qualification and training records will be sampled before and during an activity. Such checks will be performed during the procurement process, inductions, crew change, and operational inspections and audits (refer to Section 10.6).

10.5 Monitoring

For the petroleum activities, information is collected for monitoring compliance to the EPOs, CMs, EPSs and MC in this EP (refer Section 9). At a minimum, evidence identified in the MC in Table 9-2 will be collected and used to demonstrate the EPOs and EPSs are met.

Discharges to the marine environment associated with vessel and MODU activities will be recorded and controlled in accordance with requirements under relevant Marine Orders and MARPOL requirements. Contractors will maintain records so emissions and discharges can be determined or estimated. Such records will be maintained for a period of five years. Contractors are required to make these records available upon request.

To monitor environmental performance during vessel or MODU based activities, Eni and its contractors may use:

- Daily vessel or drilling reports during relevant offshore activities;
- Monthly drilling reports, which include the number of toolboxes and training undertaken, waste, discharges and cetacean sightings;
- Reports from monitoring as detailed in Table 10-2;
- Contractor inspections and audits;
- Review of waste management and recycling records; and
- Audits against the management system, EP requirements or other requirements (Section 10.6).

Table 10-2: Environmental monitoring parameters

Monitoring criteria	Threshold limit	Monitoring method
Marine fauna sightings	N/A	Opportunistic visual observations.
Volume of solid waste	No prescriptive limit but principle of ALARP to be applied.	Calculated based on capacity of storage containers transferred for onshore disposal.
Volume of sewage, greywater, and mass of food scraps discharged overboard	Discharged in accordance with Marine Order requirements.	Estimated based on persons on board, storage capacity and dimensions of discharge point.
OIW concentration of treated wastewater	Discharged in accordance with Marine Order requirements ($\leq 15\text{mg/L}$).	In compliance with vessel Marine Order requirements.

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Monitoring criteria	Threshold limit	Monitoring method
Ballast water	N/A	Ballast water record book or log.

10.5.1 Waste Monitoring

Waste management records shall include:

- Waste manifests for all wastes transferred to shore;
- Waste type and volumes disposed of to landfill;
- Waste type and volumes recycled; and
- Estimate of macerated food and sewage waste discharged offshore.

All waste transported from offshore will be properly manifested. Waste manifests will include information about:

- Manifest identification number;
- Quantity (m³/kg);
- Waste description;
- Waste container(s) number and description;
- Date of shipment;
- Final destination description (such as incineration, landfill);
- Generator data;
- Transporter(s) data and waste acceptance declaration;
- Receiver data and waste acceptance declaration;
- Dangerous goods class and United Nations number (for environmentally hazardous waste);
- Special handling instructions; and
- Any other information required by the waste contractor.

10.6 Auditing and Inspection

Compliance verification and auditing processes for the management of HSE is performed 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 critical HSE processes are in place – for example, the HSE auditing of contractors and subcontractors – and annual audit of the permit to work system.

At a contractor management level, the HSE performance of the 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.

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At an activity level, HSE is monitored as part of the execution of discrete work scopes; for example, pipeline inspection, maintenance and repair. For these activities, a project specific plan is prepared that will identify HSE audits, such as pre-mobilisation and during activity execution.

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 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; and
- Confirm compliance with the EPOs, CMs and EPSs detailed in this EP.

Further details regarding specific audits are outlined in Sections 10.6.1.

10.6.1 Vessel Audits

Before chartering or subcontracting new vessels, 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 Offshore Vehicle Inspection Database or International Marine Contractors Association 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 and assure compliance with EP commitments. Compliance documentation and evidence is collected on an ongoing basis.

Before the decommissioning activities start, the proposed MODU will also be inspected to verify suitability and compliance with Eni requirements.

10.6.2 Environmental Inspections

An environment inspection will be conducted during or before the activities, to ensure the requirements of this EP are being met. Table 9-2 will be used as a basis for the inspection checklist.

The environmental inspection will be conducted by the Offshore HSE Representative or Environmental Advisor and may include verification of:

- Bunkering and transfers between vessels and MODU and offshore supporting vessels;
- Environment containment, including chemical storage, spill response equipment and housekeeping;
- General MODU environment risks, including waste management, drilling fluids oil/water separation and inspection of subsea and moonpool areas; and
- Other relevant EPSs applicable during the activity.

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10.7 Non-conformance, Corrective and Preventative Actions

Non-conformances may be identified from the audits (refer Section 10.6). Close-outs of non-conformances are recorded and tracked in an action tracking database in accordance with the Eni Australia Corrective Action Tracking and Non-conformance Reporting Procedure (ENI-HSE-PR-015). Root cause analysis of incidents is performed to determine the cause and to aid identification of corrective actions, in accordance with the Eni Australia Incident Investigation Procedure (ENI-HSE-PR-025).

Corrective and preventative actions are raised for all identified hazards and incidents according to Eni Australia Procedure Hazard and Incident Reporting (ENI-HSE-PR-003) and are registered and maintained within the Eni SharePoint system.

The Eni HSEQ Manager ensures all corrective and preventative actions are tracked and appropriate reminders are communicated to relevant Department Managers.

Breaches of this EP by Eni's vendors 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. The procedure provides for vendor 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 Reporting and Notifications

Routine regulatory reporting requirements for the Petrel-3 and Petrel-4 activities are summarised in Table 10-3. The requirements include that Eni develops and submits an end-of-activity EP Performance Report to NOPSEMA. The process and details for activation of spill response providers and control agencies in the event of an oil spill is in Section 3 of the OPEP.

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Table 10-3: Routine external reporting requirements

Requirements	Recipient	Timing	Content
Before the Activity			
AHO notification	AHO	Email AHO four weeks before the confirmed activity start date.	Written. Notify AHO (datacentre@hydro.gov.au) of the activity commencement date and duration to enable a Notice to Mariners to be issued.
AMSA Rescue Centre (ARC) notification	AMSA	24 to 48 hours before activities commence.	Written. Through rccaus@amsa.gov.au (Phone: 1800 641 792 or +61 2 6230 6811) for promulgation of radio-navigation warnings.
NOPSEMA: advise about the start date of the activity	NOPSEMA	Email NOPSEMA at least ten days before the activity starting.	Complete NOPSEMA's Regulation 54 Start or end of an activity Form before petroleum activity.
Defence notification	Defence	Minimum of five weeks before the confirmed activity start date.	Notification will be provided to offshore.petroleum@defence.gov.au.
Notification to relevant persons as requested	AFMA, DITT, NT Fisheries, EOG Resources, Inpex, NTSC, NWSA, RecFishWest, Wilderness Society	Prior to activities commencing.	Details on file.
During the Activity			
NOPSEMA: advise about the end date of the activity	NOPSEMA	Email NOPSEMA within ten days of the end of the activity.	Written. In accordance with Section 54 of the OPGGS(E) Regulations (submissions@nopsema.gov.au).
DEMIRS notification	WA DEMIRS	Notify DEMIRS of the end date/cessation of the activities.	Notify DEMIRS of the end-date/cessation of activities (petroleum.environment@dmirs.wa.gov.au).
In the event of an unplanned incident			
AMSA: advise about any oil pollution incidents in Commonwealth waters	AMSA	Within two hours of any oil pollution incidents in Commonwealth waters.	In accordance with the <i>Navigation Act 2012</i> , any oil pollution incidents in Commonwealth waters will be reported by the Vessel Master to AMSA within two hours via the national emergency notification contacts and a written report within 24 hours of the request by AMSA. The national 24-hour emergency notification contact details are: Freecall: 1800 641 792 Fax: (02) 6230 6868 Email: mdo@amsa.gov.au.

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Requirements	Recipient	Timing	Content
Director of National Parks reporting Notification of the event of oil pollution within a marine park or where an oil spill response action must be taken within a marine park; or if there are any changes to intended operations (requested through consultation)	DNP	So far as reasonably practicable before writing response action.	Oral and written. DNP should be made aware of oil and 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 Compliance Duty Officer on 0419 293 465. The notification should include: <ul style="list-style-type: none"> • titleholder details • time and location of the incident (including name of marine park likely to be affected) • proposed response arrangements as per the OPEP (such as dispersant, containment) • confirmation of providing access to relevant monitoring and evaluation reports when available • contact details for the response coordinator. Note DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident.
DPIRD reporting If marine pests or disease are suspected, this must be reported to DPIRD	DPIRD	Within 24 hours.	Notification (written) of any suspected marine pests or diseases, including any organism listed in the Western Australian Prevention List for Introduced Marine Pests and any other non-endemic organism that demonstrates invasive characteristics.
DCCEEW reporting Any harm or mortality to EPBC Act listed threatened marine fauna	DCCEEW	Within seven days to EPBC.permits@environment.gov.au.	Notification (written) of any harm or mortality to an EPBC-listed species of marine fauna, whether attributable to the activity or not.

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Requirements	Recipient	Timing	Content
Department of Transport (WA DoT) reporting <i>All actual or impending marine oil pollution incidents that are in, or may impact, State waters resulting from an offshore petroleum activity</i>	Oil Spill Response Coordination	Within two hours.	Oral. Notification of actual or impending spillage, release or escape of oil or an oily mixture that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment. All oil pollution incidents in WA State waters will be reported by the Vessel Master to the Oil Spill Response Coordination Unit within DoT as soon as practicable (within two hours of spill occurring) via the 24-hour reporting number (08) 9480 9924. The Duty Officer will then advise whether the following forms are required to be submitted: <ul style="list-style-type: none"> Marine Pollution Form (POLREP); http://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-PollutionReport.pdf Marine Pollution Situation Report: http://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-SituationReport.pdf.
DBCA reporting <i>Any harm or mortality to fauna listed as threatened under the WA Biodiversity Conservation Act 2016</i>	DBCA	Fauna report submitted within seven days to fauna@dbca.wa.gov.au.	Notification of any harm or mortality to fauna listed as a threatened species under the WA <i>Biodiversity Conservation Act 2016</i> as a result of activities.
Australian Marine Mammal Centre reporting <i>Any ship strike incident with cetaceans will also be reported to the National Ship Strike Database</i>	DCCEEW	As soon as practicable.	Ship strike report provided to the Australian Marine Mammal Centre: https://data.marinemammals.gov.au/report/shipstrike .
Notification to relevant persons as requested <i>Any spill, incident or hazard that could impact them as requested</i>	BAC DEMIRS (WA) Northern Land Council, WAFIC	Within 24 hours.	Details on file.
NOPSEMA reportable incident	Refer Section 10.8.2.1		
NOPSEMA recordable incident	Refer Section 10.8.2.2.		

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Requirements	Recipient	Timing	Content
After the Activity			
NOPSEMA: end-of-activity notification	NOPSEMA	Within ten days after finishing the activities covered by this EP.	Written. NOPSEMA must be notified that the activity is completed. Complete NOPSEMA's Regulation 54 Start or end of an activity Form.
NOPSEMA: end-of-activity EP Performance Report	NOPSEMA	Submit to NOPSEMA within three months of submission of each Section 54(2) end-of-activity notification to NOPSEMA. For example, three months of activity completion.	This reports compliance against each of the performance outcomes and standards as outlined in Section 9 of this EP and: <ul style="list-style-type: none"> • Reportable and reportable incidents, investigation details, corrective actions determined and actioned • Monitoring records • Inspection and audit outcomes • Summary of the activity operations conducted. The total amount of waste disposed will be included in the environmental performance report (details about waste records are included in Section 10.5.1). EP ends when titleholder notifies completion, and the regulator accepts the notification.
DCCEEW: marine fauna observation data	DCCEEW	Submit to DCCEEW within three months of activity completion.	Provide marine fauna observation data to DCCEEW through its online Cetacean Sightings Application.
National Pollutant Inventory Report	National Pollution Inventory	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	Clean Energy Regulator	Annual, by 31 October each year.	Summary of energy use and GHG emissions, including those from the facility. Reporting period is 1 July to 30 June each year. NGER (Safeguard Mechanism) Rule 2015 is used to measure, report and manage the relevant production operations emissions in compliance with the requirements set by the Clean Energy Regulator.

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10.8.2 Incident Reporting (Reportable and Recordable)

10.8.2.1 Reportable Incidents

Under Sections 24(c), 48 and 49 of the OPGGS(E) Regulations, NOPSEMA must be notified of any reportable incidents. 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 purposes of this activity, in accordance with OPGGS(E) Regulations:

- A recordable incident for an activity means a breach of an EPO or EPS, in the EP that applies to the activity, that is not a reportable incident; and
- A reportable incident for an activity means an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage.

For the Petrel-3 and Petrel-4 petroleum activities, a reportable incident includes:

- An incident that has caused or has the potential to cause environmental damage with a consequence level of moderate or higher in accordance with the Eni risk assessment process (refer Section 6.1). This includes:
 - Introduction of IMS (Section 8.3).

Table 10-4 details the reportable incident requirements.

Table 10-4: Reportable Incident reporting requirements

Requirement/required information	Timing	Type	Recipient
The oral notification must contain: <ul style="list-style-type: none"> • All material facts and circumstances concerning the reportable incident known or that by reasonable search or enquiry could be found out • Any action taken to avoid or mitigate any adverse environmental impacts of the reportable incident • 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 two 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 report must contain: <ul style="list-style-type: none"> • All material facts and circumstances concerning the reportable incident known or that by reasonable search or enquiry could be found out • Any action taken to avoid or mitigate any adverse environmental impacts of the reportable incident • The corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident • The action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future. • Consider reporting using NOPSEMA's Report of an Accident, Dangerous Occurrence or Environmental Incident Form. 	Must be submitted as soon as practicable, and in any case not later than three days after the first occurrence of the reportable incident, unless NOPSEMA specifies otherwise. Same report to be submitted to NOPTA within seven days after giving the written report to NOPSEMA.	Written	NOPSEMA NOPTA

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Requirement/required information	Timing	Type	Recipient
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 NOPTA

10.8.2.2 Recordable Incidents

Under the OPGGS Act, a 'recordable incident' for an operator of an activity is 'a breach of an EPO or EPS 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 (as in, monthly report of recordable incidents sent by the 15th 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 EPOs 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 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); and
- Incorrect disposal of wastes onshore by waste contractors.

10.10 Knowledge-Sharing and HSE Communication

HSE communications include both internal communication to employees and external communication to stakeholders and is managed in accordance with Procedure HSE Communications, Consultation and Participation (ENI-HSE-PR-016). Emergency communications are described in the Petrel Emergency Response Plan (000694_DV_ES.HSE.0223.000_00).

HSE commitments and obligations are established, recorded, maintained, communicated and managed within Eni in accordance with Procedure Maintaining Knowledge of HSE Commitments and Obligations (ENI-HSE-PR-006).

10.10.1 Internal Communication with Eni Natural Resources Division

Regular communications from the Eni Natural Resources Division regarding HSE matters include:

- Guidelines for establishing annual HSE objectives;

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- Requests of monthly, quarterly, and annual reports;
- Documentation relevant to establishing budgetary provisions for HSE activities;
- Highlighting of actions to improve certain objectives;
- Reports about HSE audits that may have occurred;
- Incident reporting and investigation and lessons learned;
- 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; and
- Any other communication specific to a particular HSE event.

Eni Australia regularly communicates HSE performance information to Eni's Natural Resources Division through:

- Monthly, quarterly and annual reports;
- Accident and incident reports and investigation;
- Audit and corrective action close out status; and
- 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 relevant to the Petrel-3 and Petrel-4 petroleum activities are:

- Weekly management meetings;
- Morning call;
- Back-to-back roster handovers;
- HSE meetings;
- Pre-start meetings;
- Safety initiatives and communications; and
- Management safety visits.

10.10.3 Non-verbal Communications

In addition to the meetings described above, there are non-verbal means of communicating HSE issues within Eni, including:

- Eni Intranet websites;
- Emails; and
- HSE noticeboards.

The Eni Intranet site has a HSE page that contains links to:

- HSE IMS;

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- Reporting forms;
- Incident and crisis management documentation;
- Safety Case documentation;
- Environmental Management Plan;
- Emergency Response documentation; and
- Health Risk Assessment.

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 whether to issue a HSE Alert to inform the wider workforce; and
- 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 a 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. The content of the noticeboard is managed by the POS. Regular items which are placed on the HSE noticeboards include:

- HSE Commitment Statement;
- Incident statistics;
- Incident descriptions;
- Audit reports; and
- Hazard cards (for reporting hazards).

10.10.4 External Communications

External communication about HSE matters is typically made to a range of recipients, including governments (including government agencies and regulators), community groups, non-government organisations, customers, industry bodies and the media (Table 10-5).

Table 10-5: External communication summary

External communication	Details on communication level
Government	<p>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 performed through the Eni Operations and HSE Departments. Records of key communications are maintained by the relevant Eni department.</p> <p>The Managing Director may address communications with government bodies in certain circumstances (such as major accident investigation), in which case Eni Natural Resources may also become involved.</p>

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External communication	Details on communication level
Non-Government Organisations and Community Groups	HSE communication and consultation with non-government organisations and community groups will generally be coordinated by the HSE Department. Technical HSE communications to non-government organisations and community groups may be handled via an HSE specialist assigned to the particular project. 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 relate to the supply of products. HSE communication with customers will generally be coordinated by the relevant department(s) with advice from the HSE Department.
Media	Media liaison occurs in relation to crisis and emergency situations and is managed in accordance with the relevant Eni Crisis Management Plan.
Business and Industry Organisations	Eni is a member of the Australian Energy Producers (AEP) 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 AEP conferences and Southeast Asian & Australian Offshore Conference, allow Eni to further communicate HSE aspects. HSE communication with unions is coordinated by the Human Resources Department with advice from the HSE Department.
Public HSE Reporting	Eni Australia, through its corporate head company Eni Natural Resources, communicates externally to the public about Eni's significant HSE aspects through a public Sustainability Report. This report contains information about 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.

10.11 Management Review and Improvement

The HSE IMS is reviewed on a minimum five-yearly cycle in association with risk assessment outcomes 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 (modification to Pipeline Licence conditions);
- Advancement in technology;
- Significant changes arising from hazard and event investigations to prevent recurrence;
- Significant changes due to complaints and changing community expectations;
- Significant changes and 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;

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- Significant changes resulting from monitoring of HSE key performance indicators; and
- Remedial actions from audits.

10.11.1 Health, Safety and Environment 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 typically includes reviews of the:

- Changes in:
 - External and 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 about environmental performance, including trends in:
 - Non-conformances 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, such as current requirements for AMPs; and
- Advances in relevant environmental technology and new scientific information.

Oil spill arrangements and testing are reviewed in accordance with the Petrel-3 and Petrel-4 Monitoring and Decommissioning OPEP (000694_DV_ES.HSE.0285.000; Appendix E).

10.12 Management of Change and Reviews of this Environment Plan

Change is managed in accordance with the Eni Australia Procedure Management of Change (ENI-HSE-PR-002). For this EP, the MoC process considers Section 19 of the OPGGS(E) Regulations and determines if a proposed change can proceed and the manner in which it can proceed.

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, 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.

Potential changes in risk originating from internal and external factors may lead to EP reviews. Changes which may lead to an EP review may include:

- Those concerning the scope of the activity descriptions (Section 3);

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- Advances in technology;
- New scientific information;
- Changes in understanding of the environment, such as advice about species protected under the EPBC Act and current requirements for AMPs; and
- Potential new advice from external stakeholders (Section 5), which will be reviewed in regard to Section 19 of the OPGGS(E) Regulations.

Factors which may lead to an EP review are identified through a number of means, including:

- Internal knowledge sharing and HSE communication (Section 10.10.1);
- Internal communications (Section 10.10.1);
- HSE management review (Section 10.11.1);
- Non-verbal communications (Section 10.10.3); and
- External communications (Section 10.10.4).

If a review of the activity and the environmental risks and impacts does not trigger a requirement for a revision, the change is considered minor. Minor change will be considered a 'minor revision'. Minor administrative changes to this EP, where an assessment of the environmental risks and impacts is not required (such as document references, phone numbers), 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.

Management review (Section 10.11) or further understanding of environment risks through knowledge sharing (Section 10.10) may trigger a review of the EP. 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 (such as protected matters requirements). Reviews may also trigger adoption or reconsideration of once rejected controls within the EP.

This EP will be revised:

- If and when an environmental inspection and audit (see Section 10.6) of the activity finds significant breaches of the EP requirements; and
- 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 Sections 38 and 39 of the OPGGS(E) Regulations.

10.13 Incident Management

10.13.1 Overview

The basic principle of incident and crisis management (ICM) within Eni is to utilise the entire organisation in the most optimal way, to ensure the incident is brought under control, and the organisation is then returned to a normal state. All responses to an emergency or a crisis are based on the priorities of:

- P** protection of **people**
- E** protection of the **environment**

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- A** protection and minimisation of damage to financial and material **assets**
- R** protection of Eni's **reputation**.

The response should be proactive and sufficiently robust to manage all foreseeable events, be prepared for any reasonable variation, be able to flexibly meet an escalation of events and make the best use of the entire organisation.

10.13.2 Incident and Crisis Management Organisational Structure

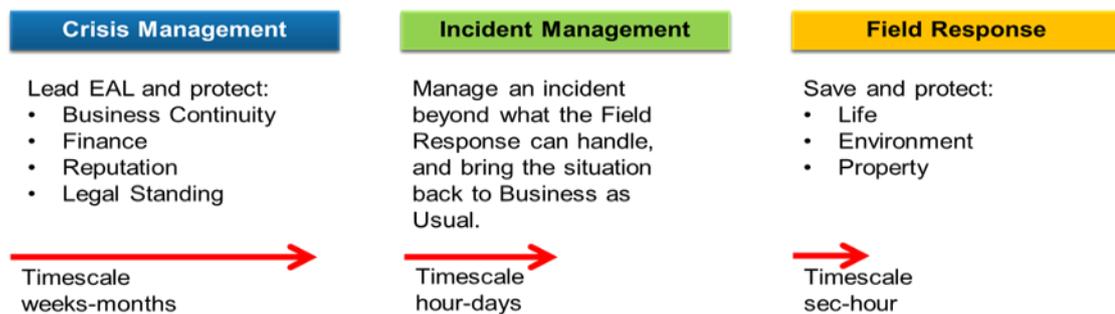
The Eni ICM organisational structure consists of three core levels:

1. Crisis Management
2. Incident Management
3. Field Response.



Figure 10-2: Incident and crisis management core levels

Principal duties of each level and the timescale in which they shall endeavour to operate are illustrated in Figure 10-3.



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Figure 10-3: Incident and crisis management organisation’s principal duties and timescales

10.13.3 Chain of Command

Eni Australia’s ICM Chain of Command is a three-level structure. This is represented below.

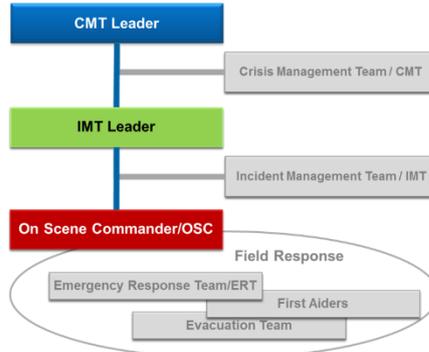


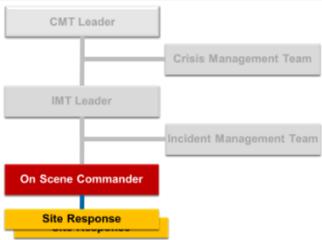
Figure 10-4: Incident and crisis management organisation chain of command

The role holders in the ICM organisation can vary over time. As the responsibility for the response to the incident moves from one organisation to another, a role holder is replaced with a more suitable or more competent individual from the same organisation, or the incident is of such duration that shift changeover is required due to fatigue risk

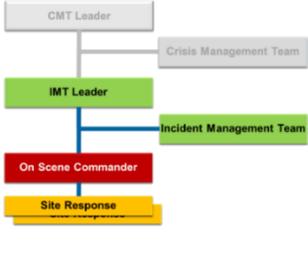
10.13.4 Activation

Activation of the ICM organisation is to be executed in the steps shown in Table 10-6.

Table 10-6: Activation of levels in the incident and crisis management organisation

Severity level	Activation	Illustration (activated parts of the organisation in colour)
Pre-alarm		
Any event, strictly defined as a process safety event or event generated on the equipment/plant by natural risks, which does not lead to an emergency but is visible, audible or in any case noticeable by the population, Institutions, Administrations and Bodies responsible for health, safety and the environment and which may have a significant media impact at local or national level.	Operational response only IMT informed	
Level 1		
An event that can be managed at site level with the personnel and means available there, under the responsibility of the Employer; divided into noticeable from the outside or not.	Planned tactical response only IMT informed	

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Level 2		
<p>An event that can be managed locally under the responsibility of the Employer, with assistance from the Business Unit and Administration at a peripheral level.</p>	<p>Planned tactical response</p> <p>IMT mobilised</p> <p>Eni Australia Managing Director informed</p> <p>CMT mobilised (Managing Director discretion)</p>	
Level 3		
<p>An event that determines a seriously dangerous situation for the site /or the surrounding territory, managed under the responsibility of the Employer, with assistance from the Business Unit and the pertinent HSE unit and with the support of the EMRIL unit. For sites at risk of a major/serious incident, covered by the appropriate national/ international regulations, it may be necessary to implement the external/national emergency plan in coordination with the local or national public Authorities.</p> <p>In the event of third level emergencies with significant impacts, prolonged over time and capable of having serious repercussions on corporate integrity at an international level, Eni supports the management of the emergency through the Crisis Unit in close contact with the Top Management Committee.</p>	<p>Planned tactical response</p> <p>IMT mobilised</p> <p>CMT mobilised</p> <p>Eni Headquarters mobilised</p>	

10.13.5 Petrel Field response

The field response conducts the mitigation work at a facility. A field response can involve, but is not limited to, emergency response teams, first aiders, evacuation team and oil spill response teams.

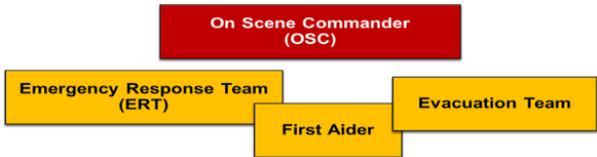


Figure 10-5: On-scene command

For each field response, irrespective of its extent or complexity, there shall always be an On-Scene Commander in direct command of the operation (Figure 10-5: On-scene command).

A Petrel Emergency Response Plan will establish an understanding of the roles and responsibilities for managing, controlling and responding to an emergency associated with the Project. The Plan outlines the:

- Emergency management structure within Eni Limited;
- Emergency management structure for the Petrel Project;
- Procedures for response, control and coordination;

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- Critical internal and external support links and relationships with external response agencies;
- Facilities and response equipment and inventories for facilities; and
- Training and exercises.

The Petrel Emergency Response Plan (000694_DV_ES.HSE.0223.000_00) outlines responses for scenarios at the Petrel Field. In addition, the Plan is supported by or supports the:

- Eni Crisis and Incident Management Plans; and
- Contractors' Emergency Response Plans.

The Petrel Emergency Response Plan addresses a wide range of emergencies involving threats to the health and safety of personnel at or near the Petrel Field. The emergencies associated with the Petrel Field addressed in the plan include but are not limited to:

- Ship collision;
- Helicopter emergency;
- Person overboard; and
- Medevac.

The Petrel Emergency Response Plan details the course of action to be followed for each event to ensure personnel safety is maintained as far as possible during emergency events.

Emergency response documentation is reviewed annually; a review is also undertaken after any incidents. Eni evaluates the effectiveness of the emergency management system via audits and monitoring of exercises.

10.13.6 Coordination with other organization

During an incident, Eni will manage all contacts and coordination with Australian local Public Authorities and Agencies from the IMT and CMT. In some cases, Eni's ICM organisation will operate in parallel or integrated with other organisations; for example, a contractor company, joint venture partner or a company operating in the vicinity of an Eni facility. In these cases, it is important liaison is established on 'equivalent levels' and in accordance with common principles for incident management.

10.13.7 Emergency Response Training

The emergency response training required for each functional role for the petroleum activities are detailed in the Petrel Emergency Response Training Matrix. Eni engages external consultants to provide nationally recognised training for emergency roles.

Members of the ICM organisation have the necessary competence and formal authorisation to efficiently and effectively perform their tasks. Comprehensive training is provided to all personnel in the ICM organisation comprising theoretical training, exercises and drills. A competency assessment system is integral in the ICM system in order to verify the competency of post holders. It is a requirement for all personnel working offshore to undergo the formal Offshore Petroleum Industry Training Organization accredited Tropical Basic Offshore Safety Induction and Emergency Training course. This requirement applies to contractors and visitors.

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10.13.8 Dangerous Weather Response

Tropical cyclones and other storm conditions have the potential to cause damage to personnel, the environment and equipment. Standard Adverse Weather (ENI HSE ST 031) includes detailed procedures for preparing for and responding to cyclone events. The response goal during a cyclone event is to protect personnel, the environment, equipment and the subsea equipment integrity.

Eni uses experienced weather service providers, such as the Bureau of Meteorology and Weatherzone, to provide current, location specific forecasts. Eni uses specifically tailored services for its real-time forecasting and severe weather forecasting capabilities. They advise key Eni personnel of any actual or potential severe weather to support Eni's operations and strategic planning. The POS must ensure he or she receives email notification of cyclones from the provider. This includes:

- Tropical Cyclone seven day outlook; and
- Tropical Cyclone forecast.

The MODU and vessels or any vessels used during the petroleum activities will receive daily forecasts from the Bureau of Meteorology. In the event the cyclone (or severe weather) is forecast and it has the potential to affect the petroleum 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 Chemical Assessment Process

All operational chemicals used in the petroleum activities are considered within the scope of this chemical assessment and selection process. These include production, drilling, cementing, completion, and rig chemicals (pipe dopes and threadlock chemicals). Chemicals required for maintenance activities (such as paints, lubricants, and greases), portable 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 United Kingdom under the Offshore Chemical Regulations 2002 (as Amended 2011).

10.14.1 Centre for Environment, Fisheries and Aquaculture Science Offshore Chemical Notification Scheme Registered Chemicals

All chemicals registered on the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) Offshore Chemical Notification Scheme (OCNS) list with assigned Hazard Quotient (HQ) Bands of Gold or Silver, or OCNS Groups E or D, and have no substitution warnings or product warnings, are determined to not require further assessment as they do not present a significant impact on the environment in standard discharge scenarios. These chemicals are considered approved for use or discharge for the petroleum activities.

CEFAS OCNS registered chemicals which have a substitution warning, product warning or have HQ Bands of White, Blue, Orange, Purple or OCNS Groups of A, B or C require assessment by an appropriate Eni person to understand the environment risk of their use and discharge into the marine environment. Eni may either reject or approve once an ALARP assessment is documented and signed off, showing the environmental risk from the use and discharge is acceptable.

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10.14.2 Chemicals Not Registered by the Centre for Environment, Fisheries and Aquaculture Science Offshore Chemical Notification Scheme

All chemicals proposed for use that are not on the CEFAS OCNS register require assessment by an appropriate Eni person to understand the environment impacts of their use and discharge to the marine environment.

10.14.3 As Low as Reasonably Practicable Chemical Assessment and Justification for Use or Discharge

CEFAS OCNS-registered chemicals which have a substitution 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 an appropriate Eni person in accordance with the principles of ALARP. This assessment includes:

- Assessment of the chemical's application and discharge;
- Assessment of the ecotoxicity, biodegradation and bioaccumulation potential of the chemical in the marine environment and any other applicable environmental information available (see below);
- Investigation of potential alternatives for the chemical, with preference for options that are on the OCNS-Ranked List of Notified Chemicals with OCNS HQ of Gold, Silver, or are Group E or D, with no substitution or product warning and chemicals that have low ecotoxicity risk (Section 10.14.3.1), are readily biodegradable (Section 10.14.3.2) and do not bioaccumulate (Section 10.14.3.3);
- If no more environmentally suitable alternatives are available, further risk reduction measures (such as controls related to use and discharge) considered for the specific context and implemented where relevant to ensure the risk is ALARP and acceptable;
- Justification of the selected chemical in respect to others available;
- Further risk reduction measures; as in, specific controls on its use or future recommendations; and
- Concurrence and sign-off by the relevant Environment Team Lead that the environmental risk associated with the chemical use and discharge is ALARP and acceptable.

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

10.14.3.1 Ecotoxicity Assessment

Table 10-7 and Table 10-8 can act as guidance in assessing a chemical's toxicity. Table 10-7 is used by CEFAS to group chemicals based on ecotoxicity results, 'A' representing highest toxicity and risk to the environment and 'E' lowest. Table 10-8 shows classifications and categories of toxicity against ecotoxicity results.

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

- Ecotoxicity data for analogous products can be referred to where the chemical ingredients and composition are largely identical (for example, 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); and

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- Ecotoxicity data may be referenced for each separate chemical ingredient (if known) within the product.

Table 10-7: Initial Centre for Environment, Fisheries and Aquaculture Science Offshore Chemical Notification Scheme grouping

Initial grouping	A	B	C	D	E
Result for aquatic-toxicity data (ppm)	<1	>1 to 10	>10 to 100	>100 to 1000	>1000
Result for sediment-toxicity data (ppm)	<10	>10 to 100	>100 to 1000	>1000 to 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 10-8: Aquatic species toxicity grouping

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

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

10.14.3.2 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 categories biodegradation into the groups of:

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

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

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10.14.3.3 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 (DMP, 2013). The following guidance is used by CEFAS:

- Non-bio accumulative: LogPow <3, or BCF ≤100 and molecular weight is ≥700; and
- Bio accumulative: LogPow ≥3 or BC>100 and molecular weight is <700.

10.15 Waste Stewardship for Asset Removal

Eni's corporate waste stewardship process for asset removal requires the development and implementation of a Decommissioning Waste Management Plan for the decommissioning of Petrel-3 and Petrel-4. This plan identifies the waste management hierarchy specific to decommissioning which stipulates that reuse is preferred over recycling. The plan addresses reuse and recycling opportunities for components and details of local service providers. Contractor waste management plans will be prepared and will include review and reporting requirements aimed at waste stewardship.

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Appendix A: HSE Statement

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Appendix B: Environmental Values and Sensitivities

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Appendix C: Relevant Person Consultation

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Appendix C1: Bridging Document

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Appendix C2: Relevant Person Register

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Appendix C3: Consultation Materials

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Appendix C4: Consultation Efforts Log

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Appendix D: Petrel Oil Spill Modelling

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Appendix E: OPEP

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Appendix F: OSMP