WOOLLYBUTT ENVIRONMENT PLAN - DECOMMISSIONING

Validity Status	Rev. Number	Date	Description	Prepared by	Checked by	Approved by	Contractor Approval	Company Approval
PR-DE	04	26/04/22	Final Issue	Advisian	JCO	GPA		
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Revision index								

eni australia

Project name

WOOLLYBUTT DECOMMISSIONING

Company identification

000105_DV_PR.HSE.1108.000

Job N. ___

Contractor identification

Contract ___

Advisian

Worley Group

Vendor identification

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Order N.....

Facility Name	Location	Scale	Sheet of Sheets
WOOLLYBUTT		1:1	1 / 444

Document Title

WOOLLYBUTT ENVIRONMENT PLAN - DECOMMISSIONING

Supersedes N.....

Superseded by N.....

Plant Area	Plant Unit

REVISION HISTORY

Rev.	Date	No. of sheets	Description
00	08/04/21	193	Issued for Comment
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ACRONYMS AND DEFINITIONS USED IN THIS DOCUMENT

Acronym	Definition
ACN	Australian Company Number
AHO	Australian Hydrographic Office
AHTB	Anchor Handling Tug Boat
AIMS	Australian Institute of Marine Science
AIS	automatic identification system
ALARP	as low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMOSPlan	Australian Marine Oil Spill Plan
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
ANZACC	Australian and New Zealand Environment Conservation Council
APASA	Asia-Pacific Applied Science Associates
API	American Petroleum Institute
APPEA	Australian Petroleum Production and Exploration Association
ARMCANZ	Agriculture and Resource Council of Australia and New Zealand
BIA	biologically important area
BOD	biological oxygen demand
BoM	Bureau of Meteorology
CAMBA	China-Australia Migratory Bird Agreement
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CFC	chlorofluorocarbon
cm	centimetres
CMID	International Marine Contractors Association
CP	cathodic protection
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
dB	decibels
DEC	Department of Environment and Conservation
DEWHA	Department of Environment, Water, Heritage and the Arts
DISER	Commonwealth Department of Industry, Science, Energy and Resources
DNP	Director of National Parks
DoAWE	Department of Agriculture, Water and the Environment
DoEE	Department of Environment and Energy
DoF	Department of Fisheries
DPaW	Department of Parks and Wildlife

Acronym	Definition
DPIRD	Department of Primary Industries and Regional Development
DSPM	disconnectable single point mooring
Eni	Eni Australia Limited
EP	Environment Plan
EPBC	Environment Protection and Biodiversity Conservation
ESD	ecologically sustainable development
et al.	and others
FPSO	floating production, storage and offloading vessel
GESAMP	Group of Experts on the Scientific Aspects of Marine Environmental Protection
GHG	greenhouse gas
GVI	general visual inspection
HP	high pressure
hr	hour(s)
HSE	health, safety and environment
HSE IMS	Health, Safety and Environment Integrated Management System
HXT	horizontal Xmas tree
Hz	Hertz
IAPP	International Air Pollution Prevention
IMCA	International Marine Contractors Association
IMO	International Maritime Organisation
IMP	Integrity Management Plan
IMS	invasive marine species
IMT	Incident Management Team
IOTC	Indian Ocean Tuna Commission
ISO	International Standards Organisation
IUCN	International Union for Conservation of Nature and Natural Resources
IV	Intervention vessel
JAMBA	Japan-Australia Migratory Bird Agreement
JRCC	Joint Rescue Coordination Centre
JV	Joint Venture
KEF	key ecological feature
Kensington	Kensington West Pty Ltd (in liquidation)
kg	kilograms
km	kilometres
L	litres
LC	lethal concentration

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

Acronym	Definition
PIC	person in charge
PK	peak
PMV	production master valve
PNEC	predicted no effect concentration
POLREP	pollution report
ppb	parts per billion
ppm	parts per million
PWC	perf, wash & cement
PWV	production wing valve
RCC	Rescue Coordination Centre
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
ROV	remote operated vehicle
SBT1	Scalybutt-1
SBT1H	Scalybutt-1 side-track
SB1M	SB1 manifold
Scf	standard cubic feet
SCSSSVs	surface controlled sub surface safety valves
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SITREP	Situation Report
SMFG	Size Management Fish Grounds
SOLAS	International Convention of the Safety of Life at Sea
SPL	sound pressure level
SSSV	sub-surface safety valve
SST	sub-sea test
SUTU	subsea umbilical termination unit
SSWCP	subsea well control package
t	tonnes
Tap Oil	Tap Oil Limited
TSSC	Threatened Species Scientific Committee
UTA	umbilical termination assembly
WA	Western Australia
WAF	water accommodated fraction
WBT1A	Woollybutt-1A
WBT2A	Woollybutt-2A-ST1
WBT4	Woollybutt-4
WCE	well control equipment

Acronym	Definition
WHA	World Heritage Area
WBM	water based mud
WOMP	Well Operations Management Plan
WTBF	Western Tuna and Billfish Fishery
°C	degrees Celsius
µ	micron

HOLD – Ani comments "consider including an executive summary section for EAL Management and NOPSEMA"

1 INTRODUCTION

1.1 Overview

Eni Australia Ltd (Eni), as Titleholder under the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Cth) (referred to as the Environment Regulations), has been the operator of the Woollybutt field within Permit Area WA-25-L (Figure 1.1). Production at the Woollybutt field has now ceased and Eni proposes to decommission all remaining infrastructure within Permit Area WA-25-L.

The scope of this Environment Plan (EP) covers the decommissioning activities within Permit Area WA-25-L.

This EP has been prepared as part of the requirements under the Environment Regulations, as administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

1.2 Background

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

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

During production, the field development consisted of the above-mentioned four subsea wells that produced through subsea wellheads and flexible flowlines to a floating production, storage and offloading (FPSO) facility (Figure 1.2). Production at the field ceased on 16 May 2012 and the FPSO departed from the field on 4 June 2012.

For the period between ceasing production and commencing plug and abandon (P&A) and decommissioning activities, field management activities have been undertaken in accordance with an EP that was accepted by NOPSEMA in 2019. The Woollybutt Environment Plan – Field Management and Plug and Abandonment (Field Management EP) was revised to include P&A activities as well as decommissioning (removal) of the Woollybutt field infrastructure in 2021. This revised Field Management EP (000105_DV_PR.HSE.1011.000) was accepted by NOPSEMA on the 1 July 2021.

This EP has been prepared to address decommissioning of all remaining infrastructure at the Woollybutt field.

The Woollybutt Joint Venture comprises:

- Eni Australia Limited (Eni) (76.47% equity in WA 25-L, permit operator)
- Mobil Australia Resources Company Pty Limited (MARC) (23.53% equity in WA 25-L)

Kensington West Pty Ltd (Kensington) previously held an 15% equity in WA 25-L), the percentage was redistributed as above.

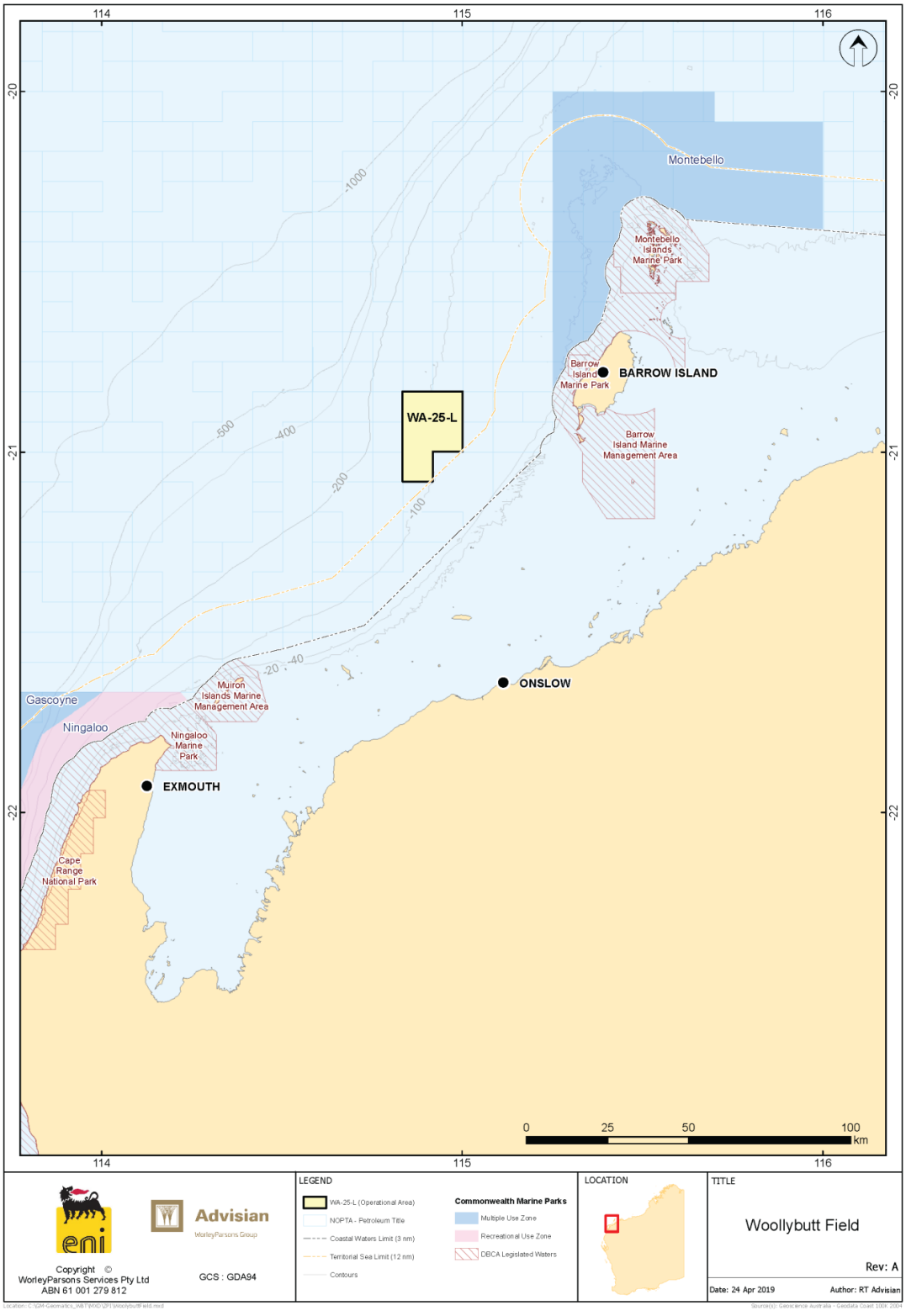


Figure 1.1: Location of the Woollybutt field in WA-25-L and other Petroleum Titles

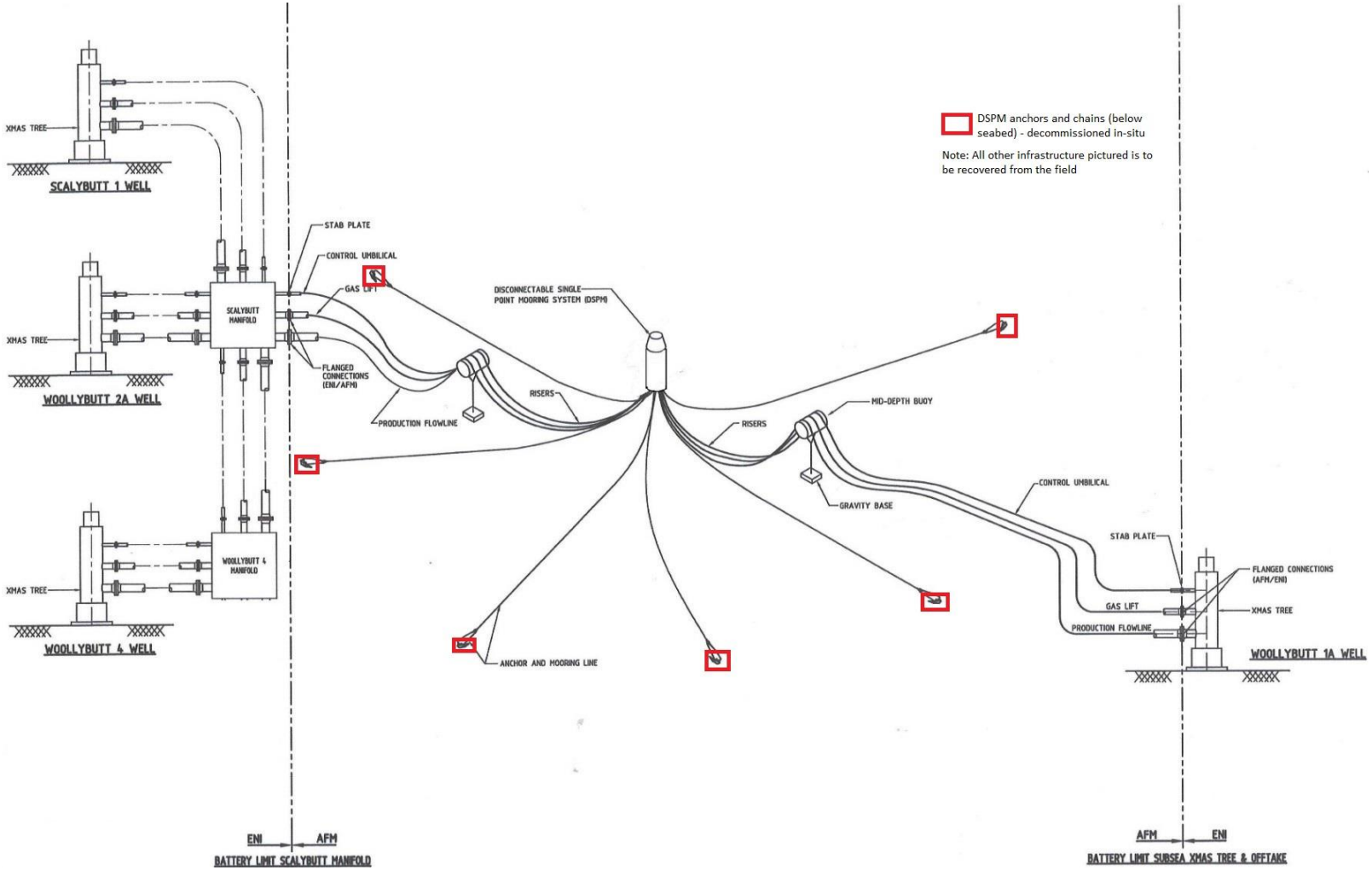


Figure 1.2: FPSO, disconnectable single point mooring and mooring line configuration

1.3 Purpose

The purpose of this EP is to identify the potential environmental risks and impacts that may result from the proposed Petroleum Activities Program (decommissioning of remaining field infrastructure). Management measures have been identified to reduce the environmental risks and impacts to an acceptable level. Activity-specific performance outcomes, standards and measurement criteria have been developed to reduce impacts and risks to 'as low as reasonably practicable' (ALARP).

This EP also provides details of the assessment that has been conducted to identify the preferred decommissioning strategy. This assessment includes demonstration that all feasible decommissioning options were assessed, and the preferred decommissioning strategy provides better or equal environmental outcomes when compared to complete removal of all infrastructure from Permit Area WA-25-L.

The Operational Area for this EP is located within Commonwealth waters, where the Petroleum Activities Program will be undertaken. The extent of the Operational Area is defined in Section 4.3. This EP only addresses the potential environmental impacts from planned petroleum activities within the Operational Area and any potential unplanned events that originate from within the Operational Area.

1.4 Scope

The scope of this EP is the decommissioning of Woollybutt's:

- mooring anchors and chains
- umbilical crossing mattresses and grout bags
- umbilicals and jumpers
- flexible flowlines and jumpers.

The accepted Field Management EP (000105_DV_PR.HSE.1011.000) covers field management activities, P&A activities, recovery of Woollybutt subsea infrastructure, including wellheads, and abandonment of the Corkybark-1 wellhead in-situ.

All wellheads and guide bases (other than the Corkybark wellhead and guide base) will be recovered from the field under the scope of the Field Management EP (000105_DV_PR.HSE.1011.000). Section 3.8 of that EP provides detail of the recovery activities for the following wellheads and guide bases: SB1, WB4, WB2A, WB2, WB1H, WB3A, WB5A, WB5 and WB6H. Section 3.5.1 of that EP includes the details and locations of these wellheads and guide bases.

The Corkybark wellhead and guide base has been the subject of a decommissioning options assessment under the Field Management EP (000105_DV_PR.HSE.1011.000) (refer Section 3.5.1 of that EP) which determined that leaving this wellhead and guide base in-situ delivers equal or better environmental outcomes compared to complete removal option.

1.5 Environment Plan Summary

An EP summary will be prepared based on the material provided in this EP, addressing the items listed in Table 1.1 as required by Regulation 11(4).

Table 1.1: EP summary

EP Summary material requirement	Relevant section of this EP containing EP Summary material
The location of the activity	Section 4
A description of the receiving environment	Section 5
A description of the activity	Section 4
Details of the environmental impacts and risks	Section 8 and 9
The control measures for the activity	Section 8 and 9
The arrangements for ongoing monitoring of the titleholder's environmental performance	Section 11
Response arrangements in the oil pollution emergency plan	Section 11.14
Consultation already undertaken and plans for ongoing consultation	Section 6
Details of the titleholder's nominated liaison person for the activity	Section 1.6.1

1.6 Details of Titleholder

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

Eni's contact details are:

Eni Australia Limited

226 Adelaide Terrace

Perth WA 6000

Telephone: (08) 9320 1111

Eni Australia Ltd ACN is 009475389.

1.6.1 Details of the Liaison Person

The nominated contact person for this EP is:

Joe Covic

Safety, Environment and Quality Manager

Eni Australia Ltd

Tel: (08) 9320 1111

Email: info@eniaustralia.com.au

1.6.2 Notifying of Change

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

2 ENVIRONMENTAL LEGISLATION

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

2.1 Key Commonwealth Legislation

The Petroleum Activities Program will be conducted in Commonwealth waters and are therefore subject to Commonwealth legislation. Key Commonwealth environmental legislation applicable to petroleum operations in Commonwealth waters are detailed in the next subsections. This section does not include Commonwealth legislation relating to oil spill response and preparedness or general vessel operations, as the Petroleum Activities Program does not include a credible spill scenario or any vessel-based activities.

2.1.1 Offshore Petroleum and Greenhouse Gas Storage Act 2006

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

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

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

Table 2.1 includes the pertinent sections of the OPGGS(E) Regulations and details the sections of the EP which ensure compliance with the requirements.

Table 2.1: Requirements of the OPGGS(E) Regulations

Reg.	Requirement	Relevant section in the EP
5G	**Demonstration of financial assurance prior condition for acceptance of environment plan**	
5G(1)	This regulation applies if: • an environmental plan for a petroleum activity is submitted under Regulation 9, and • there is a titleholder in relation to the activity immediately before the Regulator decides whether or not to accept the plan under Regulation 10, or • a proposed revision of an environmental plan for a petroleum activity is submitted under Regulation 17, 18 or 19.	Section 12 – Financial Assurance
11A	**Consultation with relevant authorities, persons and organisations, etc.**	
11A(1)	In the course of preparing an environment plan, or a revision of an environment plan, a titleholder must consult each of the following (a relevant person): • each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant • each Department or agency of a State or the Northern Territory to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant • the Department of the responsible State Minister, or the responsible Northern Territory Minister • a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan, or the revision of the environment plan • any other person or organisation that the titleholder considers relevant.	Section 6– Stakeholder Consultation and Appendix C
11A(2)	For the purpose of the consultation, the titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person.	Section 6 – Stakeholder Consultation and Appendix C
11A(3)	The titleholder must allow a relevant person a reasonable period for the consultation.	Section 6 – Stakeholder Consultation and Appendix C

Reg.	Requirement	Relevant section in the EP
13	**Environmental assessment**	
13(1)	*Description of the activity*	
	The environment plan must contain a comprehensive description of the activity including the following: • the location or locations of the activity • general details of the construction and layout of any facility • 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 4 – Description of Activity
13(2)	*Description of the environment*	
	The environment plan must: • 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 5 – Description of the Environment
	Requirements	
13(4)	The environment plan must: • describe the requirements, including legislative requirements, that apply to the activity and are relevant to the environmental management of the activity, and • demonstrate how those requirements will be met.	Section 2 – Legislation
13(5)	*Evaluation of environmental impacts and risks*	
	The environment plan must include: • 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, and • details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level.	Sections 8 and 9– Environmental Risk Assessments

Reg.	Requirement	Relevant section in the EP
13(6)	To avoid doubt, the evaluation mentioned in paragraph 13(5)(b) must evaluate all the significant impacts and risks arising directly or indirectly from:	
	• all operations of the activity, and	Sections 8 and 9 – Risks from all operations of the activity
	• potential emergency conditions, whether resulting from accident or any other reason.	Section 9.811 – Risks from emergency conditions
13(7)	*Environmental performance outcomes and standards*	
	The environment plan must: • set environmental performance standards for the control measures identified under paragraph (5)(c) • set out the environmental performance outcomes against which the performance of the titleholder in protecting the environment is to be measured, and • include measurement criteria that the titleholder will use to determine whether each environmental performance outcome and environmental performance standard is being met.	Section 10 – Performance outcomes, standards and measurement criteria
14	**Implementation strategy for the environment plan**	
14(1)	The environment plan must contain an implementation strategy for the activity in accordance with this regulation.	Section 11 – Implementation Strategy
14(2)	The implementation strategy must: • state when the titleholder will report to the Regulator in relation to the titleholder's environmental performance for the activity, and • provide that the interval between reports will not be more than 1 year.	

Reg.	Requirement	Relevant section in the EP
14(3)	The implementation strategy must contain a description of the environmental management system for the activity, including specific measures to be used to ensure that, for the duration of the activity: • 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, and • environmental performance outcomes and standards set out in the environment plan are being met.	Section 11 – Implementation Strategy
14(4)	The implementation strategy must establish a clear chain of command, setting out the roles and responsibilities of personnel in relation to the implementation, management and review of the environment plan, including during emergencies or potential emergencies.	Section 11.2 – Roles and Responsibilities
14(5)	The implementation strategy must include measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of his or her responsibilities in relation to the environment plan, including during emergencies or potential emergencies, and has the appropriate competencies and training.	Section 11.2 – Roles and Responsibilities
14(6)	The implementation strategy must provide for sufficient monitoring, recording, audit, management of non-conformance and review of the titleholder's environmental performance and the implementation strategy to ensure that the environmental performance outcomes and standards in the environment plan are being met.	Section 11.8 – Reporting Section 11 – Inspection and Review Section 11.7 – Non-Conformance
14(7)	The implementation strategy must provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met.	Section 11.5 – Monitoring Section 11.14 – Oil Pollution Emergency Plan Woollybutt OPEP (000105_DV_PR.HSE.1045.000).
14(8)	The implementation strategy must contain an oil pollution emergency plan and provide for the updating of the plan.	Section 11.14 – Oil Pollution Emergency Plan Woollybutt OPEP (000105_DV_PR.HSE.1045.000).

Reg.	Requirement	Relevant section in the EP
14(8AA)	The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following: • 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, and • the arrangements and capability in place for monitoring oil pollution to inform response activities.	Section 11.14 – Oil Pollution Emergency Plan Woollybutt OPEP (000105_DV_PR.HSE.1045.000).
14(8A)	The implementation strategy must include arrangements for testing the response arrangements in the oil pollution emergency plan that are appropriate to the response arrangements and to the nature and scale of the risk of oil pollution for the activity.	Section 11.14 – Oil Pollution Emergency Plan Woollybutt OPEP (000105_DV_PR.HSE.1045.000).
14(8B)	The arrangements for testing the response arrangements must include: • statement of the objectives of testing • a proposed schedule of tests • mechanisms to examine the effectiveness of response arrangements against the objectives of testing, and • mechanisms to address recommendations arising from tests.	Section 11.14 – Oil Pollution Emergency Plan Woollybutt OPEP (000105_DV_PR.HSE.1045.000).

Reg.	Requirement	Relevant section in the EP
14(8C)	The proposed schedule of tests must provide for the following: • 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, and • if a facility becomes operational after the response arrangements have been tested and before the next test is conducted—testing the response arrangements in relation to the facility when it becomes operational.	Section 11.14 – Oil Pollution Emergency Plan Woollybutt OPEP (000105_DV_PR.HSE.1045.000).
14(8D)	The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that: • is appropriate to the nature and scale of the risk of environmental impacts for the activity, and • is sufficient to inform any remediation activities.	Section 11.14 – Oil Pollution Emergency Plan Woollybutt OPEP (000105_DV_PR.HSE.1045.000).
14(8E)	The implementation strategy must include information demonstrating that the response arrangements in the oil pollution emergency plan are consistent with the national system for oil pollution preparedness and response.	Section 11.14 – Oil Pollution Emergency Plan Woollybutt OPEP (000105_DV_PR.HSE.1045.000).
14(9)	The implementation strategy must provide for appropriate consultation with: • relevant authorities of the Commonwealth, a State or Territory, and • other relevant interested persons or organisations.	Section 6 – Stakeholder Consultation

Reg.	Requirement	Relevant section in the EP
15	**Details of titleholder and liaison person**	
15(1)	The environment plan must include the following details for the titleholder: • name • business address • telephone number (if any) • fax number (if any) • email address (if any), and • if the titleholder is a body corporate that has an ACN (within the meaning of the *Corporations Act 2001*)—ACN.	Section 1.6 – Details of Titleholder
15(2)	The environment plan must also include the following details for the titleholder's nominated liaison person: • name • business address • telephone number (if any) • fax number (if any), and • email address (if any).	Section 1.6.1 – Details of Liaison Person
15(3)	The environment plan must include arrangements for notifying the Regulator of a change in the titleholder, a change in the titleholder's nominated liaison person or a change in the contact details for either the titleholder or the liaison person.	Section 11.8 – External Reporting

Reg.	Requirement	Relevant section in the EP
16	**Other information in the environment plan**	
16	The environment plan must contain the following: • a statement of the titleholder's corporate environmental policy; • a report on all consultations between the titleholder and any relevant person, for regulation 11A, that contains: ○ a summary of each response made by a relevant person ○ 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, and ○ a copy of the full text of any response by a relevant person. • details of all reportable incidents in relation to the proposed activity.	Appendix A – HSE Statement Appendix C – Stakeholder Consultation Transcripts

2.1.2 General Direction 805 issued under Section 574 of the OPGGS Act

Table 2.2 provides an assessment of the EP against the requirements of the NOPSEMA General Direction 805 issued to Eni under Section 574 of the OPGGS Act on 23 December 2020. This EP is considered the final EP for the Woollybutt field infrastructure, it is considered that this EP, together with the accepted Field Management EP (000105_DV_PR.HSE.1011.000) (as referenced in Table 2.2) fulfill the requirements within General Direction 805.

The End-of-activity EP Performance Report (refer Table 11.4) submitted to NOPSEMA, in accordance with Regulation 26C(c) of the OPGGS(E) will also include details and confirmation that General Direction requirements have been met.

Table 2.2: NOPSEMA General Direction (574) Requirements

Direction number	Relevant sections of this EP
Direction 1 To plug or close off, to the satisfaction of NOPSEMA, all wells made in the title area by any person engaged or concerned in those operations on or before 31 December 2021.	N/A. Plug or close off wells in the title area is complete. The P&A campaign commenced on 26th October 2021 under the scope of the Woollybutt Field Management EP (000105_DV_PR.HSE.1011.000) and was completed on 16th February 2022. Subsea Infrastructure removal scopes remain under the scope of that EP.
Direction 2 Remove, or cause to be removed, from the title area all property brought into that area by any person engaged or concerned in the operations authorised by the permit, lease or licence within 12 months after all the wells referred to in direction 1 are plugged or closed off to the satisfaction of NOPSEMA.	Currently the infrastructure removal scope is under tender process and results from the tender are expected in April 2022. The removal of equipment is planned for Q3 of 2022. All infrastructure will be removed on or before 31 December 2022, unless leave in-situ decommissioning of infrastructure has been accepted by NOPSEMA. As detailed in Section 4.4. Subsea equipment recovery activities under the scope of this EP will be completed by 31st December 2022. This is within 12 months of the completion of the P&A activities covered under the Woollybutt Field Management EP (000105_DV_PR.HSE.1011.000), as required by Direction 2. The Woollybutt Field Management EP (000105_DV_PR.HSE.1011.000) (Section 3.4.3 of that EP) also includes a subsea infrastructure removal scope. The removal scope covered by that EP will be completed on or before 31 December 2022.
Direction 3 To provide, to the satisfaction of NOPSEMA, for the conservation and protection of the natural resources in the title area within 12 months after all the wells referred to in direction 1 are plugged or closed off to the satisfaction of NOPSEMA.	An as-left survey will be undertaken at the Woollybutt field (Section 4.11). The final as-left survey report will be provided to NOPSEMA (refer Section 11.8.1). Section 11.5.4 provides a justification for the scope of the as-left survey and an evaluation of the requirements for future long term monitoring of the infrastructure left in-situ. The 2014 sediment sampling (Jacobs, 2014) (refer Section 5.3) demonstrates that conservation and protection of the natural resources in the title area

Direction number	Relevant sections of this EP
	have not been compromised from the Woollybutt operations (refer Section 11.5.4).
Direction 4 To make good, to the satisfaction of NOPSEMA, any damage to the seabed or subsoil in the title area caused by any person engaged or concerned in those operations within 12 months after all the wells referred to in direction 1 are plugged or closed off to the satisfaction of NOPSEMA.	An as-left survey will be undertaken at the Woollybutt field (Section 4.11). The final as-left survey report will be provided to NOPSEMA (refer Section 11.8.1). Section 11.5.4 provides a justification for the scope of the as-left survey and an evaluation of the requirements for future long term monitoring of the infrastructure left in-situ, which has been determined not required. The as-left survey will determine any damage to the seabed. The 2014 sediment sampling (Jacobs, 2014) (refer Section 5.3) has been determined to show that the sediments in the title area have not been damaged (refer Section 11.5.4). There are no unacceptable impacts and risks to the seabed and subsoil from the anchors and chains remaining in the field and it is considered that the seabed is remediated to enable future unrestricted access, beneficial use and re-release for future use. Impacts and risks have been demonstrated to be reduced to ALARP and acceptable levels (refer Section 8.1)

2.1.3 Environment Protection and Biodiversity Conservation Act 1999

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

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

Prior to the abovementioned change in 2014, the Woollybutt Project environmental approval was provided under the EPBC Act (EPBC 2001/365) in 2001. This approval continues to have effect. Table 2.3 presents the conditions of the EPBC approval and details how they have been met within this EP.

The Australian Government Minister for the Environment may make or adopt and implement recovery and management plans for threatened fauna, threatened flora (other than conservation-dependent species) and threatened ecological communities listed under the EPBC Act. Recovery and management plans relevant to this EP are outlined in Section 5.6.

Table 2.3: Conditions from EPBC 2001/365 approval relevant to the Petroleum Activities Program

Condition Number	Condition	Applicable Section of this EP detailing how condition has been met
1	The person taking the action must implement cetacean interaction procedures for supply vessels consistent with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000.	Refer to Section 9.3
2	The person taking the action must provide the results of pluming studies and analyses of biomarkers on the impacts of discharged produced formation water to the Minister prior to decommissioning.	Outside the scope of this EP.
3	Before the Woollybutt Oil Field Production Facility is commissioned, the person taking the action must prepare and submit for the Minister's approval an Oil Spill Contingency Plan detailing the strategy to mitigate potential oil spills. Within two months of production operations commencing, the person taking the action must submit a revised plan for approval, which must incorporate the results of tests on the Woollybutt crude oil for toxicity, weathering and effectiveness of dispersants. The most recently approved plan must be implemented.	Outside the scope of this EP. Woollybutt OPEP (000105_DV_PR.HSE.1045.000).
4	The person taking the action must not commence decommissioning unless an environment plan that includes measures related to decommissioning is in force under the OPGGS Environment Regulations. The person taking the action must comply with that environment plan.	This EP.
5	A plan required by condition 3 is automatically deemed to have been submitted to, and approved by, the Minister if the measures (as specified in the relevant condition) are included in an environment plan (or environment plans) relating to the taking of the action that: a) was submitted to NOPSEMA after 27 February 2014; and b) either: i) is in force under the OPGGS Environment Regulations; or ii) has ended in accordance with regulation 25A of the OPGGS Environment Regulations.	This EP.

Condition Number	Condition	Applicable Section of this EP detailing how condition has been met
5A	Where a plan required by condition 3 has been approved by the Minister and the measures (as specified in the relevant condition) are included in an environment plan (or environment plans) that: a) was submitted to NOPSEMA after 27 February 2014; and b) either: i) is in force under the OPGGS Environment Regulations; or ii) has ended in accordance with regulation 25A of the OPGGS Environment Regulations, the plan approved by the Minister no longer needs to be implemented.	This EP.
5B	Where an environment plan, which includes measures specified in the conditions referred to in conditions 5 and 5A above, is in force under the OPGGS Environment Regulations that relates to the taking of the action, the person taking the action must comply with those measures as specified in that environment plan.	This EP. Environmental Outcomes, Standards and Measurement Criteria are contained in Section 10.

2.1.4 Underwater Cultural Heritage Act 2018

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

There are no known shipwrecks located within the Operational Area. Shipwrecks occur outside the Operational Area (SEWPaC, 2012a; 2012b) and are further described in Section 5.5.6.

2.1.5 National Greenhouse and Energy Reporting Act 2007

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

2.1.6 Navigation Act 2012

The Act replaces the century old Navigation Act 1912 with a contemporary legislative framework for maritime regulation. The Act reflects changes in the maritime sector and is the primary legislative means for the Australian Government to regulate international ship and seafarer safety, shipping aspects of protecting the marine environment and the actions of seafarers in Australian waters. It also gives effect to the relevant international conventions to which Australia is a signatory, including MARPOL 73/78 (see Section 2.2 and Table 2.6).

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

This Act gives effect to the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) (see Section 2.2 and Table 2.6) and regulates discharges from ships to protect the sea from pollution and establishes requirements for a shipboard waste management plan.

2.1.8 Biosecurity Act 2015

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

2.1.9 Environment Protection (Sea Dumping) Act 1981

The *Environment Protection (Sea Dumping) Act* 1981 (the Sea Dumping Act) is the primary piece of legislation regulating loading and dumping waste at sea in Australia. This Act seeks to minimise pollution threats by:

- prohibiting ocean disposal of waste considered too harmful to be released into the marine environment

- regulating permitted waste disposal to ensure environmental impacts are minimised.

The Sea Dumping Act also fulfils Australia's international obligations under United Nations Convention on the Law of the Sea, the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) and associated Protocol.

In instances where infrastructure is proposed to be left on the seabed, the activity may be considered a dumping activity that is regulated under the Sea Dumping Act. In these instances, permits are required from Department of Agriculture, Water and the Environment (DoAWE) prior to these activities. However, there are circumstances where the abandonment of structures or components associated with oil and gas platforms will not constitute dumping for the purposes of the Sea Dumping Act.

In determining whether the abandonment of such structures or components falls outside of the definition of dumping, the following criteria must be met:

1. The component or structure must be associated with a platform (i.e. a principal or overarching platform facility) or other man-made structure. This criterion is derived from the specific linkage between Articles 1.4.1.4 and 1.4.2.3 of the London Protocol. As neither 'platform' or 'man-made structure' are defined by the London Protocol, DoAWE has considered guidance provided by the International Maritime Organisation (IMO), which:
    a. defines 'platforms' as 'facilities designed and operated for the purpose of producing, processing, storing or supporting the production of mineral resources'
    b. notes that other man-made structures could include 'any man-made structures at sea, such as lighthouses, buoys, offshore transfer facilities and windmills' (see IMO, LC 22/14 'Report of the Twenty-Second Consultative Meeting,' 25 October 2000, Annex 7, para 4.4).

DoAWE confirmed a Sea Dumping Permit is required for the proposed in-situ abandonment of the equipment (anchors and chains) in this EP and Eni has submitted the required application.

2.1.10 Key Commonwealth Legislation Summary

Table 2.4 summarises the key Commonwealth legislation that is relevant to the environmental aspects of the Petroleum Activities Program.

Table 2.4: Summary of key Commonwealth legislation

Legislation	Requirements
OPGGS Act 2006	Licencing requirements. Section 280 interference with other marine rights. Section 569 operations to be performed in accordance with good oilfield practice. Section 574 written directions can be given to titleholders.

Legislation	Requirements
EPBC Act 1999	Relates to significant impacts on matters of national environmental significance. Conditional EPBC decision in place (EPBC 2001/365).
Underwater Cultural Heritage Act 2018	Relates to the protection of shipwrecks of heritage value. There are no historical shipwrecks within or in the vicinity of the field (see Section 5.5.6).
National Greenhouse and Energy Reporting Act 2007	Greenhouse gas (GHG) reporting requirements.
Navigation Act 2012	Requirements for ships transporting oil and chemicals.
Protection of the Sea (Prevention of Pollution from Ships) Act 1983	Discharge requirements from ships.
Protection of the Sea (Harmful Anti-fouling systems) Act 2006	Requirements for the use of anti-fouling substances and prohibits the use of certain types of materials for anti-fouling. Vessels used during the activity will have anti fouling coatings in place and as such are subject to the Act.
Protection of the Sea (Powers of Intervention) Act 1981	This Act provides a range of powers to Australian Maritime Safety Authority (AMSA) that allow it to take measures and issue directions to prevent or respond to pollution of the sea by oil or other substances. As a hydrocarbon spill is identified as credible hazards in relation to the activities in this EP, this Act is applicable.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	Enables the Australian Government to respond to requests to protect traditionally important areas and objects that are under threat, if it appears state or territory laws have not provided effective protection. There are no sites of Aboriginal heritage in the vicinity of the Operational Area (see Section 5.5.6).
Australian Heritage Council Act 2003	Relates to protection of heritage: an Act to establish the Australian Heritage Council, and for related purposes.
Australian Maritime Safety Authority (AMSA) Act 1990	Relates to the protection of the marine environment and maritime and aviation search and rescue services: an Act to establish AMSA.
Hazardous Waste (Regulation on Exports and Imports) Act 1989	Relating to general vessel operations: this Act relates to controls over import and export of hazardous waste material. Permits are required to dispose of waste overseas or to import waste into Australia.
Native Title Act 1993	Recognising by Australian law that some Indigenous people have rights and interests to their land that come from their traditional laws and customs. There are no Native Title claims in the vicinity of the operational area (see Section 5.5.6).
Biosecurity Act 2015	The Biosecurity Act 2015 came into effect on 16 June 2016 and replaced the *Quarantine Act 1908*. Provisions within the Act relating to the management of ballast water and biofouling are of relevance to the petroleum activities.

Legislation	Requirements
Environment Protection (Sea Dumping) Act 1981 (the Sea Dumping Act)	The Sea Dumping Act 1981 requires sea dumping permits to be required for particular activities and gives effect to the United Nations Convention on the Law of the Sea and the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) and associated Protocol.

2.1.11 State Legislation

The Operational Area for this EP is in Permit Area WA 25-L within Commonwealth waters where decommissioning activities will be undertaken. No activities are expected to occur within Western Australian State waters.

Vessels supporting these activities are expected to pass through Western Australia (WA) State waters whilst transiting to and from a port. Whilst in WA State waters the support vessels will have to comply with a variety of WA legislation, including those listed in Table 2.5.

Table 2.5: Applicable State legislation

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

2.2 International Agreements

International agreements and conventions that apply to the Petroleum Activities Program are summarised in Table 2.6.

Table 2.6: Applicable international agreements and conventions

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

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

2.3 Industry Guidelines

The Australian petroleum exploration and production industry operates under various codes of practice, such as the Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice (2008). These provide guidelines for activities that are not subject to prescriptive regulation and have evolved from the collective knowledge and experience of the oil and gas industry, nationally and internationally.

Eni is a member of APPEA and, when undertaking its projects and activities, adheres to the provisions of its Code of Environmental Practice. The APPEA Code of Environmental Practice was a key reference in preparing for the environmental risk assessment and development of performance outcomes in this EP. A summary of applicable industry guidelines is provided in Table 2.7.

Table 2.7: Applicable industry guidelines

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

3 DECOMMISSIONING OPTIONS ASSESSMENT

3.1 Overview

A decommissioning options assessment was undertaken to determine if there were any feasible options to the base case of full removal outlined in Section 572 (3) and, if there were any feasible alternatives, whether they provided better or equal environmental outcomes to the case of complete removal.

The decommissioning options assessment comprised:

- A review of degradation and habitat studies commissioned by Eni to understand the degradation rates of the Woollybutt subsea infrastructure and whether the Woollybutt subsea infrastructure is providing habitat of value to the marine environment.
- A high-level comparative assessment of the decommissioning options to determine the preferred decommissioning option from a technical, safety, environmental, economic and social perspective. The comparative assessment methodology is described in Section 3.4 and is based on best practice, as described in the Oil and Gas United Kingdom Guidelines for Comparative Assessment in Decommissioning Programmes (Oil and Gas UK, 2015). The comparative assessment comprises an initial options screening assessment to determine what decommissioning options would be carried forward for the comparative assessment. It also contained an assessment of the selected options against legislation to ensure options align with legislative requirements.
- An equal or better outcomes assessment to determine whether any alternate option presents equal or better environmental outcomes when compared to the base case of full removal (DIIS, 2018) (Section 3.5). This equal or better outcomes assessment involved a detailed assessment of all the potential environmental risk and benefits of the options and an assessment of the options in accordance with the principles of ecologically sustainable development (ESD).

3.2 Scope of Assessment

The scope of this EP is limited to the infrastructure that is remaining at the Woollybutt field at the completion of plug and abandonment and infrastructure removal activities, which are being undertaken under a separate EP. This infrastructure is listed in Section 1.4. Of this remaining infrastructure it is proposed to completely remove the following:

- Umbilical crossing mattresses and grout bags
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers

As complete removal is the base case, additional assessment is not required, therefore this infrastructure does not form part of the options assessment.

Alternatives to complete removal are considered for the infrastructure listed in Table 3.1.

Table 3.1: Infrastructure within the scope of the options assessment

Infrastructure	Description
Disconnectable single point mooring (DSPM) anchors and chains	Six DSPM anchors weighing approximately 26 T each, and 6 DSPM anchor chains

3.3 Relevant Legislative Requirements

An assessment has been completed to understand how the decommissioning options align with the relevant legislation.

The legislation that was determined to be relevant to this options assessment includes:

- *Offshore Petroleum and Greenhouse Gas Storage Act 2006*
- *Environment Protection (Sea Dumping) Act 1981*.

International conventions/guidelines determined to be relevant:

- IMO Resolution A.672 (16) – Guidelines and standards for the removal of offshore installations and structures on the continental shelf and in the exclusive economic zone, International Maritime Organisation Guidelines and Standards, 1989, International Maritime Organisation.

Table 3.2: Current legislation relevant to the comparative assessment for decommissioning the Woollybutt field

Commonwealth legislation	Details
OPGGS Act 2006	Section 572 requires titleholders to: • maintain all structures, equipment and property in a title area in good condition and repair so that they can be removed, and • remove these when no longer being used in connection with operations authorised by the title. Section 572 (7) of the OPGGS Act provides an exception to duty where titleholders may implement alternatives to complete removal, provided appropriate justification is outlined in an accepted EP. Section 270 of the OPGGS Act states the titleholder can only surrender the title if it has removed all property to the satisfaction of NOPSEMA or made arrangements that are satisfactory to NOPSEMA in relation to that property. To give context to Section 572 and Section 270, the Offshore Petroleum Decommissioning Guideline (DISER, 2018) states the complete removal of infrastructure and the plugging and abandonment of wells is the default decommissioning requirement under the OPGGS Act. Furthermore, the Offshore Petroleum Decommissioning Guideline (DISER, 2018) states that "the titleholder must demonstrate that the alternative decommissioning approach delivers equal or better environmental, safety and well integrity outcomes compared to complete removal".

Commonwealth legislation	**Details**
Environment Protection (Sea Dumping) Act 1981	The Sea Dumping Act requires sea dumping permits for particular activities and gives effect to the United Nations Convention on the Law of the Sea and the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) and associated Protocol. In instances where infrastructure is proposed to be left on the seabed, the activity may be considered a dumping activity that is regulated under the Sea Dumping Act. In these instances, permits are required from DoAWE prior to undertaking these activities. However, there are circumstances where the abandonment of structures or components associated with oil and gas platforms will not constitute dumping for the purposes of the Sea Dumping Act. In determining whether the abandonment of such structures or components falls outside of the definition of dumping, certain criteria must be met. This is detailed in Section 2.1.9
International Guidelines	**Details**
IMO Resolution A.672 (16)	The IMO Resolution A.672 (16) is the approval of the "Guidelines and Standards for the removal of offshore installations and structures on the continental shelf and the exclusive economic zone". The approval is granted by the IMO and is made pursuant to the United Nations Convention on the Law of the Sea, 1982. The guidelines provide for disused installations or structures to be left on any continental shelf or in any exclusive economic zone where non-removal or partial removal is consistent with the guidelines or standards. Particularly, the installations or structures must be located in waters deeper than 75 m and have been installed prior to 1 January 1998. In particular its states *"The decision to allow an offshore installation, structure, or parts thereof, to remain on the sea-bed should be based, in particular, on a case-by-case evaluation, by the coastal State with jurisdiction over the installation or structure, of the following matters:* 1. *any potential effect on the safety of surface or subsurface navigation, or of other uses of the sea;* 2. *the rate of deterioration of the material and its present and possible future effect on the marine environment;* 3. *the potential effect on the marine environment, including living resources;* 4. *the risk that the material will shift from its position at some future time;* 5. *the costs, technical feasibility, and risks of injury to personnel associated with removal of the installation or structure; and* 6. *the determination of a new use or other reasonable justification for allowing the installation or structure or parts thereof to remain on the sea-bed."*

3.4 Comparative Assessment

3.4.1 Options Screening

An options screening assessment was undertaken to determine which alternative options would be carried forward for the comparative assessment. Options that were not technically feasible or that provided little environmental benefit were excluded from the comparative assessment. The screening criteria used for each option were technical limits, required equipment, industry experience and complexity of risks. Table 3.3 summarises the three options considered in the initial screening assessment and summarises the outcomes of the options screening. The options selected from the options screening are summarised in Section 3.4.1.1 to Section 3.4.1.3.

Table 3.3: Options selected for decommissioning options assessment

Option screened	Applicable subsea assets	Comments	Included in options assessment
Base case – complete removal	DSPM anchors and chains	Complete removal of infrastructure is the base case under the OPGGS Act. This option must be included in the options assessment. An overview of the complete removal methodology for the infrastructure components is provided in Section 3.4.1.1.	✓
Leave in-situ	DSPM anchors and chains	Leave in-situ involves leaving the infrastructure in place or intact. Leave in-situ is considered an option for all remaining infrastructure as it has the potential to provide equal or better options than the base case of complete removal. An overview of this option is provided in Section 3.4.1.2.	✓
Partial removal	Removal of: Above seabed components of DPSM anchor chains	This option involves leaving the DSPM anchors and below seabed components of the chains in-situ and removing all remaining infrastructure that has the potential to cause impacts associated with degradation of subsea materials over time. Partial removal is considered an option, as it decreases effort required compared to complete removal of infrastructure, while addressing the risks associated with degrading materials which may cause an impact to the marine environment overtime. Partial removal is a widely accepted method in the United States of America and the Asia Pacific region. This option is further evaluated in the decommissioning options assessment. An	✓

Option screened	Applicable subsea assets	Comments	Included in options assessment
		overview of what this option involves is provided in Section 3.4.1.3.	

3.4.1.1 Removal of DSPM Anchors and Chains

Removal of anchors is likely to require dredging and excavation using ROV(s) to dislodge the anchors, which are embedded in a cemented sand/weak calcarenite layer at 5 to 6 m below the mudline. Once the anchors are dislodged, the chains will be hooked up using ROV(s) to a vessel crane which will pull the chains and anchor at the same time to dislodge them from the seabed. If this attempt does not remove anchors, further exaction will be required prior to another dislodgement attempt. Once anchors and chains are dislodged, they will be recovered to the vessel via the crane.

3.4.1.2 Leave In-situ

DSPM anchors and DSPM anchor chains will be left in-situ.

3.4.1.3 Partial Removal

Partial removal will involve cutting the chains at the seabed (refer to Section 4.8.1) and leaving the anchors and below seabed components of the chains in-situ.

3.4.2 Comparative Assessment Criteria

The decommissioning options selected were assessed against five main criteria and 14 sub-criteria, as outlined Table 3.4.

Table 3.4: Criteria and sub-criteria used in the Woollybutt comparative assessment

Criteria	Sub-Criteria	Hazards Risk-Ranked
Technical	Technical feasibility	The ability to technically achieve the option.
	Industry experience	History of the option and likelihood of failure based on internal and external experience.
Health & Safety	Risk to project personnel offshore	The risk to people offshore during the implementation of the option. Risks may include lifts, cutting, rigging, diving, clean-up and handling of assets and presence of naturally occurring radioactive materials (NORMS).
	Risk to other marine users	The risk to other marine users during the implementation of the option. The combined safety risk to the crews of commercial fishing vessels, the crews of defence vessels and the crew and passengers of commercial shipping vessels.
	Residual risk to other marine users	The combined safety risk to other marine users (the crews and passengers of vessels) posed by the asset after implementation of the option.

Criteria	Sub-Criteria	Hazards Risk-Ranked
Environment	Water quality and sediment impacts	Environmental impacts during and after implementation of the option. This may include impacts to water quality through turbidity or contamination, impacts to seabed sediments from lifts or drops, and impacts to the marine environment from an unplanned spill.
	Ecological services	Potential environmental benefit during or after implementation of the option. This may include environmental benefit from the provision of marine habitat.
	Emissions	Environmental impacts during and after implementation of the option resulting from the combustion of fuels and other processes to generate power onboard vessels, for transportation purposes and the fabrication of structures or other equipment.
	Waste	Environmental impacts during and after implementation of the option resulting from routine discharges to the environment, the disposal of required materials and fabrication by-products.
Economic	Project cost	Comparative cost of implementing the option: **Low cost** – $1 million **Medium cost** – $1-2 million **Medium high cost** – $2-3 million **High cost** – $>3 million
Socio-Economic	Commercial impact on other marine users (commercial, fishers, shipping and defence) during activities.	Commercial impacts on other marine users (commercial fishers, shipping and defence) due to displacement from the project site during activities.
	Residual impact on other marine users following implementation of the options	Extent of impacts to other marine users following implementation of the option.

3.4.3 Method of Assessment

While all assessment criteria are important, certain criteria may be more relevant to specific decommissioning programs and sites. Therefore, the assessment criteria were weighted to determine their relative importance in the context of the Woollybutt field (refer to Section 3.4.4).

Once weightings were assigned to the criteria, the impacts associated with each criterion were ranked in accordance with Eni's risk matrix outlined in Section 7.4, with risks converted to a numerical form (comparative number).

The various decommissioning options for the infrastructure were assessed using the following method:

- A risk rating was given to each hazard using Eni's risk matrix (Section 7.4) (except project cost).

- Project cost risk rankings were assigned for each option as follows: <$1 million = 1, $1-2 million = 2, $2-3 million = 3, >$3 million = 4.
- Sub-criterion ratings were the maximum of their respective risk ratings.
- Mean scores were calculated for each criterion, then multiplied by the pre-decided weighting value.
- A sensitivity analysis was also undertaken where scores were calculated without the weighting value, to eliminate any bias as a result of weighting.
- Risk ratings were summed for each criterion to determine the overall ranking for each option.
- The option with the lowest score (lowest risk) (summed comparative number) was considered most preferred.

3.4.4 Weighting of Assessment Criteria

While all assessment criteria are important, certain criteria may be more relevant to specific decommissioning programs and sites. Therefore, the assessment criteria were weighted to determine their relative importance in the context of as shown in Table 3.5. A sensitivity analysis was also undertaken where scores Woollybutt field were calculated without the weighting value, to eliminate any bias as a result of weighting.

Table 3.5: Weighting of assessment criteria used in the Woollybutt comparative assessment

Criterion	Criterion Weighting	Weighting Justification
Technical	10%	Options considered less technically feasible, or that provided little environmental benefit were screened out during the Options Screening Assessment.
Health & Safety	20%	Offshore and onshore operations are conducted routinely and processes, procedures and controls have been established to ensure the risks involved are reduced to ALARP.
Environment	30%	Water quality and sediment impacts from seabed disturbance are likely to be minimal, as the seabed surrounding the Woollybutt field is of relatively low biodiversity with no species or communities present that are of ecological significance. Metal contamination may accumulate in sediments and become bioavailable. The hard substrate provided by assets may currently enhance marine growth and fish aggregation. Waste generation, NORMS, disposal and emissions are further considerations.
Economic	10%	Decommissioning options involving field activities are unlikely to vary significantly in cost, as all will involve vessel deployment.
Socio-Economic	30%	Socio-economic impacts on other marine users (commercial fishers, shipping and defence) are unlikely to be significant due to the location of the project site. Residual impacts to commercial fishers after decommissioning will vary depending on the type of fishing activities conducted. Hard substrate enhancing fish aggregation may be beneficial to trap fishers. Assets decommissioned in-situ may pose a snagging risk to trawl fishers.

The outcomes of the technical feasibility and economic comparative assessment, health and safety comparative assessment and the environment and socio-economic comparative assessment are outlined in the next sections. The environmental and socio-economic assessment is a summary of the environmental and socio-economic assessment undertaken as part of the comparative assessment. A more detailed assessment of the environmental and social impacts and risks of the decommissioning options is outlined in Section 3.5.1 as part of the equal or better outcomes assessment.

3.4.5 Technical Feasibility and Economic Assessment

Infrastructure/ Options	Sub-criteria	Base case (Complete removal)	Leave in-situ	Partial Removal
DSPM anchors and chains	**Technical feasibility/ industry experience**	Feasible – high complexity. Anchors are embedded in a cemented sand/ weak calcarenite layer at 5 to 6 m below the mudline. Dredging and excavation may be required to aid anchor retrieval. The chains are lying on the seabed and would be recovered to vessel via crane (Section 3.4.1.1). The proposed method has been implemented by industry in the past.	Nil – no field activities	Feasible – moderate complexity. DSPM anchor chains cut at seabed and anchors and below seabed components of chains left in-situ (Section 3.4.1.3). Above seabed components of chains are lying on the seabed and would be recovered to vessel via crane (Section 3.4.1.1). The proposed method has been implemented in the industry in the past.
	Cost	Medium high – $2 to 3 million.	Low - $1 million	Medium - $1 – $2 million

3.4.6 Health and Safety Assessment

Infrastructure/ Options	Sub-Criteria	Base case (Complete removal)	Leave in-situ	Partial Removal
DSPM anchors and chains	Risk to project personnel offshore	Medium – DSPM anchor chains may have become tangled during lowering operations adding complexity to retrieval. Handling on the deck of the dive vessel may be difficult.	Nil – no field activities.	Medium – DSPM anchor chains may have become tangled during lowering operations adding complexity to retrieval. Handling on the deck of the dive vessel may be difficult.
	Risk to other marine users	Low – limited activity duration.	Nil – no field activities.	Low – limited activity duration.

3.4.7 Environment and Socio-Economic

Infrastructure/ Options	Sub-Criteria	Base case (Complete removal)	Leave in-situ	Partial Removal
DSPM anchors and chains	Water quality and sediment impacts	Low – turbidity and water quality impacts from lifting the asset off the seabed. Loss of containment from vessel collision is credible but highly unlikely. Sediment and water quality impacts likely from dredging are short term and localised.	Low – corrosion and degradation of chains over time. Chains are primarily comprised of iron which is non-toxic. Metal corrosion is at a rate of 0.005 to 0.03 mm/year (Atteris, 2021).	Low – turbidity and water quality impacts from lifting the asset off the seabed are very short term and limited to Operational Area. Loss of containment from vessel collision is credible but highly unlikely. Corrosion and degradation of chains over time. Chains primarily comprise iron which is non-toxic. Metal corrosion is at a rate of 0.005 to 0.03 mm/year (Atteris, 2021).
	Ecological services	Low – destruction of marine growth on asset and permanent removal of hard substrate. Marine growth is likely to be limited as assets are small in diameter and partially or fully covered by sediment.	Benefit – fish habitat studies have found the subsea infrastructure provides hard substrate for benthic habitat that supports commercially valuable fish stocks (McLean et al. 2021)	Low – destruction of marine growth on asset and permanent removal of hard substrate. Marine growth is likely to be limited as assets are small in diameter and partially or fully covered by sediment.
	Air emissions	Low – vessel emissions to air during site operations and onshore disposal.	Nil – no field activities.	Low – vessel emissions to air during site operations and onshore disposal.
	Waste	Medium – vessel discharges and disposal of removed infrastructure on shore.	Nil – no field activities.	Medium – vessel discharges and disposal of removed infrastructure on shore.

Infrastructure/ Options	Sub-Criteria	Base case (Complete removal)	Leave in-situ	Partial Removal
	Commercial impact on other marine users during activities	Low – limited activity duration. Vessel presence temporarily excludes other marine users.	Nil – no field activities.	Low – limited activity duration. Vessel presence temporarily excludes other marine users.
	Residual impact on other marine users	Low – removal of infrastructure removes any associated fish attracting habitat. DSPM anchors and chains are unlikely to provide significant habitat benefit as they are lying on the seabed (low relief) and small in size. Complete removal of infrastructure would remove risk of snagging.	Low – Fishing effort is low at the Woollybutt field and the Pilbara Trawl Fishery Zone 1 which overlaps the area is currently closed to trawling. Anchors are embedded in a cemented sand/ weak calcarenite layer at 5 to 6 m below the mudline, therefore the risk of snagging is low. Chains are lying on the seabed. The risk of snagging is considered low, this is discussed is further detail in Section 3.5.1. Risk of snagging is further described in Section 8.1.	Low – removal of above seabed infrastructure removes any associated fish attracting habitat. DSPM anchors and chains are unlikely to provide significant habitat benefit as they are lying below or on the seabed (low relief) and are small in size. The anchors and below seabed components of the chains are embedded in a cemented sand/ weak calcarenite layer at 5 to 6 m below the mudline, therefore the risk of snagging is low.

3.4.8 Comparative Assessment Results

3.4.8.1 DSPM Anchors and Chains

Cutting the DSPM anchor chains at the seabed and leaving the anchors and below seabed components of the chains in-situ is the preferred decommissioning option for the DSPM anchors and chains. The results of the comparative assessment ranked the technical feasibility of completely removing the anchors and chains as presenting a moderate level of complexity. This is because the anchors and a portion of the chains connected to the anchors are embedded in a sand/weak calcarenite layer 5 to 6 m below the mudline, therefore excavation and dredging would be required for removal. Excavation has the potential to cause turbidity and seabed disturbance. Removal of the above seabed components of the DSPM anchor chains may cause localised disturbance to water quality and sediments, no dredging would be required. Cutting DSPM anchor chains at the seabed would remove any potential snagging risk to commercial fishing operators.

The DSPM anchors and chains are comprised of steel with an epoxy coating (refer Section 4.7.1), leaving the below seabed infrastructure in-situ is not expected to cause long-term environmental impacts (Section 8.8.3).

Removal of the anchors would require excavation using ROVs to dislodge the anchors, which are embedded in a sand/weak calcarenite layer 5 to 6 m below the mudline.

3.5 Equal or Better Outcomes Assessment

An equal or better outcomes assessment was undertaken to determine whether any alternate option presents equal or better environmental outcomes when compared to the base case of full removal (DIIS, 2018). Refer to Section 3.4. This equal or better outcomes assessment involved a detailed assessment of all the potential environmental risk and benefits of the options and an assessment of the options in accordance with the principles of ESD.

3.5.1 Environmental Risks and Impacts

The environmental impacts and risks (beneficial and adverse) associated with each decommissioning option are assessed in Table 3.6. The environmental impacts and risks were assessed in accordance with Eni's Risk Assessment process outlined in Section 7.

Potential beneficial impacts have been identified but not ranked because they are not included in Eni's risk assessment process.

The assessment of environmental impacts and risks (Table 3.6) also considers the timeframe of the impact and risk. The following definitions have been used:

- Short-term – impact or risk during decommissioning operations (one to two years).
- Medium-term – impact or risk following decommissioning operations, until the infrastructure degrades (two to 500 years).

- Long-term – impact or risk beyond medium-term at which the infrastructure has reached a steady state, determined to be completely degraded (beyond 500 years).

Table 3.6: Environmental impact and risk assessment of decommissioning options

Impact/risk	Impact risk description	Timeframe	Impact/risk and/or benefit of decommissioning options		
			Complete removal (Base case)	**Leave in-situ**	**Partial removal**
Evaluation of planned activities					
Interaction with other users	Potential for vessels used for decommissioning activities to interact with or displace other users (commercial fisheries, shipping and defence).	Short-term – during decommissioning operations	**Low** Several State and Commonwealth managed fisheries overlap the Operational Area (Section 5.5.1). The presence of a vessel used for decommissioning activities may restrict the use of the area by commercial fishers. However, because the vessel will be in the area for short periods over a defined amount of time, and because the fisheries' areas extend beyond the area, the likelihood of interaction with commercial fisheries is low. No recreational fishing occurs in the area. No shipping fairways intersect the Operational Area. AMSA data also indicates vessel density in the area is low. Based on this and the short duration of the activity, the likelihood of decommissioning vessel interaction with shipping is low. A Department of Defence practice area also intersects the Operational Area. However, due to the temporary nature of the decommissioning activity, the likelihood of interaction is low.	**N/A** No activities would be required and, therefore, there would be no temporary disturbances to other users during the decommissioning phase.	**Low** Partial removal would encounter similar conditions to full removal but likely to occur over a shorter time span.
	Potential economic benefit to commercial fishers associated with opportunity for increased catch.	Medium-term – the period following decommissioning operations until the infrastructure completely degrades	**N/A** Complete removal of infrastructure results in complete removal of associated benthic habitat so no benefit to commercial fishing.	**N/A** Given the amount of infrastructure remaining and burial status there is limited benefit to commercial fisheries. Risk of fishing vessels snagging on remaining anchors is described in Section 8.1.	**N/A** Partial removal would include the removal of all above seabed infrastructure, resulting in the complete removal of associated benthic habitat so no benefit to commercial fishing.
Disturbance to seabed and benthic habitat	Decommissioning activities such as dredging, trenching, recovery and ROV operations have the potential to damage the seabed and benthic habitats.	Short-term - during decommissioning operations	**Low** Excavating buried infrastructure, dredging around infrastructure (such as DSPM anchors) and subsequent removal of the infrastructure from the seabed is likely to result in disturbance to seabed and associated benthic habitat. Seabed disturbance will be localised, limited to the immediate vicinity of the infrastructure.	**N/A** No activities would be required and therefore, there would be no disturbance to the seabed or benthic habitats as a result of removal activities.	**Low** No activities would be required for anchors, and chains which would be cut at the seabed with only below seabed components left in-situ. As such, minimal disturbance would occur in relation to partial removal of this infrastructure

			The excavation and dredging activities have the potential to cause localised, short-term elevated turbidity in the water column, resulting in the clogging of respiratory and feeding parts of filter-feeding organisms. The seabed in the Operational Area predominantly comprises soft sediments with epibenthic flora and fauna. The nearest mangroves and hard coral are found at Barrow Island, 40 km north-east. The seabed and communities found within the Operational Area are common to the broader region. Impacts to the seabed, benthic habitats and water quality as a result of decommissioning activities are expected to be short-term and localised.		
Subsea discharges from corrosion and degradation (concrete and metals)	Corrosion and degradation as a result of infrastructure being left in-situ permanently.	Long-term – the period beyond medium-term at which the infrastructure has reached a steady state	**N/A** All infrastructure removed- no discharge as a result of infrastructure remaining in-situ permanently	**Low** The infrastructure to be left in-situ comprises concrete and steel. The DSPM anchors and chains are comprised of steel, which is mainly comprised of iron (~98%). Iron is not considered a significant contaminant in the marine environment and is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon, 1997). It is also considered to pose little or no risk to the environment.	**Low** Infrastructure (DSPM anchors and below seabed components of chains) left in-situ is comprised wholly of steel which will corrode and degrade over time. Based on the low toxicity of steel and the slow degradation rate, impacts are expected to be localised and slight.
Underwater noise	Generation of underwater noise from vessels and atmospheric noise from helicopter transfers.	Short-term - during decommissioning operations	**Low** Vessel and helicopters will generate noise both in the air and underwater during decommissioning activities. The main source of noise from a dynamically positioned (DP) vessel relates to the use of thrusters. Listed threatened and listed migratory species that could be potentially impacted by noise and vibration which may be present within the Operational Area primarily include cetaceans, whale sharks and turtles. The Operational Area overlaps a portion of the pygmy blue whale distribution biologically important area (BIA), the humpback whale migration BIA and the flatback turtle internesting buffer. Given the noise levels associated with routine operations of the vessel, the potential impacts are unlikely to be significant. It is reasonable to expect that fauna may demonstrate	**N/A** No activity required therefore no noise impacts	**Low** Partial removal would encounter similar conditions to full removal but likely to occur over a shorter time span.

			avoidance or attraction behaviour to the noise generated by the vessel and helicopter activities. It is considered that noise generated by the vessel and helicopters will result in short-term localised impacts to marine fauna.		
Routine and non-routine discharges from the vessel	Routine discharges from the vessel (sewage, grey water, putrescible wastes, deck and bilge water, cooling water or brine) to the marine environment.	Short-term - during decommissioning operations	**Low** The vessel will routinely generate/ discharge small volumes of treated sewage, putrescible wastes and grey water to the marine environment. It will also routinely/periodically discharge relatively small volumes of bilge water, and discharge deck drainage directly overboard or overboard via deck drainage systems. Cooling water is discharged from machinery engine units and brine water is produced during the desalination process of reverse osmosis to produce potable water onboard the vessel. Routine and non-routine discharges will be temporary and intermittent in nature for the duration of the decommissioning activities. It is possible that marine fauna transiting the area may come into contact with these discharges (such as marine turtles, pygmy blue whales and whale sharks), as they traverse the Operational Area. However, it is expected that the small volumes of discharges will be rapidly diluted and dispersed in the open water marine environment. Therefore, impacts are expected to be localised and short-term	**N/A** No activities would be required and, therefore, there would be no impacts from routine and non-routine vessel discharges.	**Low** Partial removal would encounter similar conditions to full removal but likely to occur over a shorter time span.
Atmospheric emissions	Internal combustion engines and incinerators on the vessel used for decommissioning.	Short-term - during decommissioning operations	**Low** Atmospheric emissions will be generated by the vessel from internal combustion engines (including all equipment and generators) and incineration activities (including on-board incinerators). Emissions will include SO_2, NO_x, ozone-depleting substances, CO_2, particulates and volatile organic compounds. Given the short duration of the activity and the exposed location of the Operational Area, rapid dispersion of the low volumes of atmospheric emissions in an offshore environment is expected. Therefore, impacts are expected to be localised and short-term.	**N/A** No activities would be required and, therefore, there would be no impacts from atmospheric emissions.	**Low** Partial removal would encounter similar conditions to full removal but likely to occur over a shorter time span.

Light emissions	External lighting onboard the vessel used for decommissioning.	Short-term - during decommissioning operations	**Low** Artificial lighting can cause a change in the behaviour of fauna, particularly nesting turtles and birds. The main implication of artificial lighting from offshore vessels for marine turtles is the disruption of hatchling sea-finding behaviour, as hatchlings can be disoriented if lights or atmospheric glow occurs out at sea. As the Operational Area is located approximately 40 km from the nearest turtle nesting beach at Barrow Island, light emissions from vessels are not expected to affect the sea-finding behaviour of hatchling turtles. A BIA for wedge-tailed shearwater foraging (during breeding) overlaps the Operational Area (Section 5), with the breeding period occurring from August to April. The risk associated with collision from seabirds attracted to the light is considered to be low, given that there is no critical habitat for these species within the Operational Area. Light emissions from vessels have the potential to cause slight temporary impacts to EPBC-listed species.	**N/A** No activities would be required and, therefore, there would be no impacts from light emissions.	**Low** Partial removal would encounter similar conditions to full removal but likely to occur over a shorter time span.
Introduction of invasive marine species (IMS)	Introduction of IMS from Decommissioning vessels.	Short-term - during decommissioning operations	**Medium** The deep offshore open waters of the Operational Area are not conducive to the settlement and establishment of IMS. The Operational Area is in water depths of approximately 100 m, precluding light penetration to the seabed, distant from any coastline (more than 30 km) and more than 12 NM from shorelines and/or critical habitat. The likelihood that any marine organisms could become established at the field is rare. Once introduced, IMS have the potential to outcompete indigenous species for food, space or light and can also interbreed with local species, creating hybrids such that the endemic species is lost. These changes to the local marine environment result in changes to the natural ecosystem. Therefore, the risk associated with IMS introduction is classified as medium.	**N/A** No activities would be required and, therefore, there would be no risk of IMS introduction.	**Medium** Partial removal would encounter similar conditions to full removal but likely to occur over a shorter time span.
			Medium	**N/A**	**Medium**

Accidental hydrocarbon release as a result of vessel collision	Loss of diesel to the marine environment resulting from a vessel collision event (500m^3).	Short-term - during decommissioning operations	Vessel collision resulting in a release of marine diesel would see a mixture of both volatile and persistent hydrocarbons released to the marine environment. Given the ocean and weather conditions of the NWS, it is likely the spill would undergo rapid spreading and evaporative loss. Therefore, the spill is likely to dissipate rapidly. Potential impacts to marine species may be caused, including behavioural impacts, sub-lethal biological effects and, in rare circumstances, lethal biological effects. The Operational Area overlaps with BIAs for humpback whales, wedge-tailed shearwater, whale sharks and the flatback turtle. Some marine turtles may be exposed to patchy occurrences of low concentrations of entrained hydrocarbons. There is also potential for lethal and sub-lethal impacts to turtles in the offshore waters near the release site; however, given the depth of the Operational Area and the distance from the nearest nesting beaches (on Barrow Island), this may only affect small numbers of individuals. Impacts to wedge-tailed shearwaters and other seabirds may include mortality due to oiling of feathers or ingestion of hydrocarbons. However, it is also expected that this would only occur in small numbers due to the location of the Operational Area. Whales and whale sharks are likely to display behavioural impacts by avoiding the area that the spill impacts. A hydrocarbon release as a result of a vessel collision is rare and if it occurred would result in minor, short-term impacts to species and habitat.	No vessel activities would be required therefore, there would be no risk of vessel collision causing a hydrocarbon spill.	Vessel collision resulting in a release of marine diesel would see a mixture of both volatile and persistent hydrocarbons released to the marine environment. Given the ocean and weather conditions of the NWS, it is likely the spill would undergo rapid spreading and evaporative loss. Therefore, the spill is likely to dissipate rapidly. Potential impacts to marine species may be caused, including behavioural impacts, sub-lethal biological effects and, in rare circumstances, lethal biological effects. The Operational Area overlaps with BIAs for humpback whales, wedge-tailed shearwater, whale sharks and the flatback turtle. Some marine turtles may be exposed to patchy occurrences of low concentrations of entrained hydrocarbons. There is also potential for lethal and sub-lethal impacts to turtles in the offshore waters near the release site; however, given the depth of the Operational Area and the distance from the nearest nesting beaches (on Barrow Island), this may only affect small numbers of individuals. Impacts to wedge-tailed shearwaters and other seabirds may include mortality due to oiling of feathers or ingestion of hydrocarbons. However, it is also expected that this would only occur in small numbers due to the location of the Operational Area. Whales and whale sharks are likely to display behavioural impacts by avoiding the area that the spill impacts. A hydrocarbon release as a result of a vessel collision is rare and if it occurred would result in minor, short-term impacts to species and habitat.
Minor hydrocarbon or chemical release	Accidental release of minor quantities of other hydrocarbons and chemicals from the deck of project vessels and equipment (e.g. ROVs and cranes).	Short-term - during decommissioning operations	**Low** An unplanned release of hydrocarbons/chemicals from vessels or equipment will result in a decrease in water quality in the immediate area of the spill. This has potential to cause minor impacts to marine megafauna, particularly humpback whales and whale sharks which have BIAs that overlap the Operational Area (impact	**N/A** No vessel activities would be required therefore, there would be no risk of a spill from vessel decks or equipment.	**Low** An unplanned release of hydrocarbons/chemicals from vessels or equipment will result in a decrease in water quality in the immediate area of the spill. This has potential to cause minor impacts to marine megafauna, particularly humpback whales and whale sharks which have BIAs that overlap the Operational Area (impact could include ingestion and irritation). It could also impact plankton and fish populations

			could include ingestion and irritation). It could also impact plankton and fish populations (surface and water column biota) in the immediate vicinity of the spill. Unplanned discharges from deck and subsea spills are credible and may result in slight, short-term impacts to species and habitat.		(surface and water column biota) in the immediate vicinity of the spill. Unplanned discharges from deck and subsea spills are credible and may result in slight, short-term impacts to species and habitat.
Accidental loss of non-hazardous and hazardous waste	Accidental loss of solid wastes from vessels including hazardous and non-hazardous waste. This excludes sewage, grey water, putrescible waste and bilge water.	Short-term - during decommissioning operations	**Medium** The potential impacts of solid wastes accidentally discharged to the marine environment includes direct pollution and contamination of the environment and secondary impacts relating to potential contact of marine fauna with wastes, resulting in entanglement or ingestion and leading to injury and death of individual animals. The likelihood of accidental loss of solids waste is credible and may result in slight, short-term impacts to species and habitat.	**N/A** No vessel activities would be required; therefore, there would be no risk of accidental release of solid wastes from vessels to the marine environment.	**Medium** The potential impacts of solid wastes accidentally discharged to the marine environment includes direct pollution and contamination of the environment and secondary impacts relating to potential contact of marine fauna with wastes, resulting in entanglement or ingestion and leading to injury and death of individual animals. The likelihood of accidental loss of solids waste is credible and may result in slight, short-term impacts to species and habitat.
Vessel collisions with marine fauna	Accidental collision between a project vessel and protected marine fauna.	Short-term - during decommissioning operations	**Low** Although project vessels are likely to be slow moving or stationary during removal activities, there is potential for vessels to collide with marine fauna and cause death, or for marine fauna to be caught in thrusters. The Operational Area overlaps with BIAs for marine turtles, whale sharks and humpback whales; therefore, there is increased potential that these species could be present in the Operational Area. However, given the speed that vessels are likely to be moving, it is unlikely interactions would occur. A vessel collision with marine fauna is unlikely and may result in slight, short-term impacts to species and habitat.	**NA** No vessel activities would be required; therefore, there is no potential for vessels to interact with protected marine fauna.	**Low** Although project vessels are likely to be slow moving or stationary during removal activities, there is potential for vessels to collide with marine fauna and cause death, or for marine fauna to be caught in thrusters. The Operational Area overlaps with BIAs for marine turtles, whale sharks and humpback whales; therefore, there is increased potential that these species could be present in the Operational Area. However, given the speed that vessels are likely to be moving, it is unlikely interactions would occur. A vessel collision with marine fauna is unlikely and may result in slight, short-term impacts to species and habitat.
Unplanned seabed disturbance	Dropped objects during infrastructure removal could result in disturbance to the seabed and benthic habitats.	Short-term - during decommissioning operations	**Low** As infrastructure is being lifted to vessels, there is a potential it could drop back to the seabed and cause seedbed disturbance. There is potential for this to occur with all infrastructure that is present. The seabed and benthic habitat in the Operational Area is not particularly sensitive, as it mostly comprises sandy sediments and any	**N/A** No vessel activities or infrastructure removal would occur; therefore, there is no potential for dropped objects.	**Low** infrastructure is being lifted to vessels, there is a potential it could drop back to the seabed and cause seedbed disturbance. There is potential for this to occur with all infrastructure that is present. The seabed and benthic habitat in the Operational Area is not particularly sensitive, as it mostly comprises sandy sediments and any communities that are present are largely represented in the region.

			communities that are present are largely represented in the region. Dropped objects may result in elevated turbidity and clogging of respiratory and feeding parts of filter-feeding organisms. The risk of dropped objects is unlikely and would result in temporary negligible impacts to benthic communities.		Dropped objects may result in elevated turbidity and clogging of respiratory and feeding parts of filter-feeding organisms. The risk of dropped objects is unlikely and would result in temporary negligible impacts to benthic communities.

3.6 Stakeholder Perspectives

Eni have consulted with a range of relevant stakeholders including Commonwealth and State agencies and departments, government agencies, fishing industry bodies and all relevant fishing licence holders. Consultation is summarised in Section 6. The preference of the majority of stakeholders was complete removal of infrastructure containing plastic

Western Australian Fishing Industry Council outlined their preference is for complete removal of all infrastructure. WAFIC supports the approach for Eni to remove the majority of the remain subsea infrastructure, in particular infrastructure containing plastic materials (refer Section 6.1).

3.7 Principles of Ecologically Sustainable Development

As outlined in Section 3A of the EPBC Act, the titleholder needs to ensure the activity is undertaken in a manner consistent with the principles of ecologically sustainable development. The equal or better environmental outcomes evaluation assesses the activity against the relevant principles of ESD, as shown in Table 3.7.

Table 3.7: Assessment of the decommissioning options against the Principles of Ecologically Sustainable Development

Principles of ESD	Assessment
Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations (the 'integration principle').	The Decommissioning Options Assessment process assessed the long-term and short-term environmental and social aspects associated with each option. The outcomes of this assessment are summarised in Section 3.8.
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 Decommissioning Options Assessment determined there is a low risk as result of leaving embedded potions of the anchors and chains in-situ. The anchors and chains are comprised entirely of steel which is mainly comprised of iron (~98%). Iron is not considered a significant contaminant in the marine environment and is considered to pose little or no risk to the environment.
The principle of intergenerational equity – that the present generation should ensure the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations (the 'intergenerational principle').	Leaving the anchors and below seabed components of the DSPM anchor chains in-situ results in negligible environmental impacts and poses no threat to other users.
The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making (the 'biodiversity principle').	The Operational Area consists of no known significant habitat or infauna habitat and is largely sandy substrate. Equipment left in-situ will be entirely below is the seabed, therefore negligible impact to any existing habitat is expected.

3.8 Decommissioning Options Assessment Summary

The outcomes of the decommissioning options assessment including the comparative assessment are summarised in Table 3.8. This summary combines the results of the comparative assessment and the equal or better outcomes for all the infrastructure. The highest risk ranking is used in each case to be conservative.

Table 3.8: Summary of the decommissioning options assessment

Option	Comparative Assessment outcomes			Equal or Better Outcomes Assessment		
	Technical and economic	Health and safety	Environment and socio-economic	Short-term	Medium-term	Long-term
Complete removal (base case)	High	Medium	Low	Low	N/A – no impacts	N/A – no impacts
Leave in-situ	N/A – no impacts	N/A – no impacts	Low	N/A – no impacts	Low	Medium
Partial removal	Medium	Medium	Low	Low	N/A – no impacts	N/A – no impacts

3.9 Recommendation

Partial removal of the Woollybutt infrastructure is the recommended option. This is on the basis that the overall impacts are lower than all feasible alternatives.

Partial removal results in lower technical and economic impacts than complete removal, along with reduced short-term environmental impacts.

4 DESCRIPTION OF THE ACTIVITY

4.1 Overview

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

The activity involves recovery and in-situ decommissioning of subsea infrastructure within the Woollybutt field. Refer to Table 4.1 for a list of equipment proposed to be removed and left in-situ.

Table 4.1: Equipment recovered and decommissioned in-situ

Equipment recovered	Equipment decommissioned in-situ
DSPM anchor chains (above seabed components) (Section 4.7.1)	DSPM anchors (Section 4.7.1)
Umbilical and flowline crossing mattresses and grout bags (Section 4.7.2)	DSPM anchor chains (below seabed components) (Section 4.7.1)
Umbilicals and umbilical jumpers (Section 4.7.3)	
Flexible and reinjection flowlines and jumpers (Section 4.7.4)	

Whilst wellheads and guide bases currently remain in the Woollybutt field, these will be recovered under the scope of the accepted Field Management EP (000105_DV_PR.HSE.1011.000). Section 3.8 of that EP provides detail of the recovery activities for the following wellheads and guide bases: SB1, WB4, WB2A, WB2, WB1H, WB3A, WB5A, WB5 and WB6H. Section 3.5.1 of that EP includes the details and locations of these wellheads and guide bases. Section 1.4 provides further detail on the scope of the Field Management EP (000105_DV_PR.HSE.1011.000).

4.2 Location and History

The Woollybutt field is located in Permit Area WA-25-L, approximately 65 km north of Onslow and 40 km west of Barrow Island (Figure 1.1). The field was discovered in 1997 and lies on the continental shelf in 100 m water depth. It produced crude (49°API) with a low gas-to-oil ratio of 135 scf/MMbbl.

The Woollybutt field was developed in three stages:

1. The original field development began as a two-well tie-back to the Woollybutt FPSO, Four Vanguard in 2003. These two wells were Woollybutt-1A (WBT1A) and Woollybutt-2A-ST1 (WBT2A ST1).
2. The Scalybutt-1 (SBT1) well was added in 2005 and a new Scalybutt manifold (SBT1 manifold) was installed near the WB2A ST1 well. The flowlines and control umbilical to and from the FPSO were reconfigured to connect WBT2A ST1 directly to the new manifold. Separate flowlines and control umbilicals from WBT2A ST1 and SBT1 were then run from these wells to the new manifold. WBT1A ST1 remained unchanged and was directly connected to the FPSO.

3. The Woollybutt-4 (WBT4) and Woollybutt-6 (WBT6) wells were added in 2008. The results from WBT6, when drilled, were found to be less productive than expected and WBT6 was not completed. Only WBT4 was tied back to the SBT1 manifold. The production fluid from WBT4, WBT2A ST1 and SBT1 were commingled at the SBT1 manifold and routed to the FPSO through the single 6-inch flexible flowline and riser. Similarly, gas lift was distributed from the FPSO via a single 2-inch flowline system and riser to the SBT1 manifold, and then to each well. A control distribution unit was installed at the WBT2A ST1 location to assume control of the SBT1 and WBT2A ST1 wells and to provide dual redundancy in the operation of the subsea control system.

Production ceased in 2012 and all associated subsea equipment remained in-situ while plug and abandonment and decommissioning activities were planned for. A P&A campaign under the scope of the Woollybutt Field Management EP (000105_DV_PR.HSE.1011.000) commenced on 26th October 2021 and was completed on 16th February 2022.

4.3 Operational Area

The Operational Area defines the spatial boundary of the Petroleum Activities Program, as described, risk assessed and managed by this EP. The Operational Area encompasses the infrastructure that is proposed to be removed/decommissioned in-situ, and a 1 km (1,000 m) radius around it (Figure 1.1 and Figure 4.1). A temporary 500 m radius exclusion zone will be maintained around the vessels during removal operations.

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

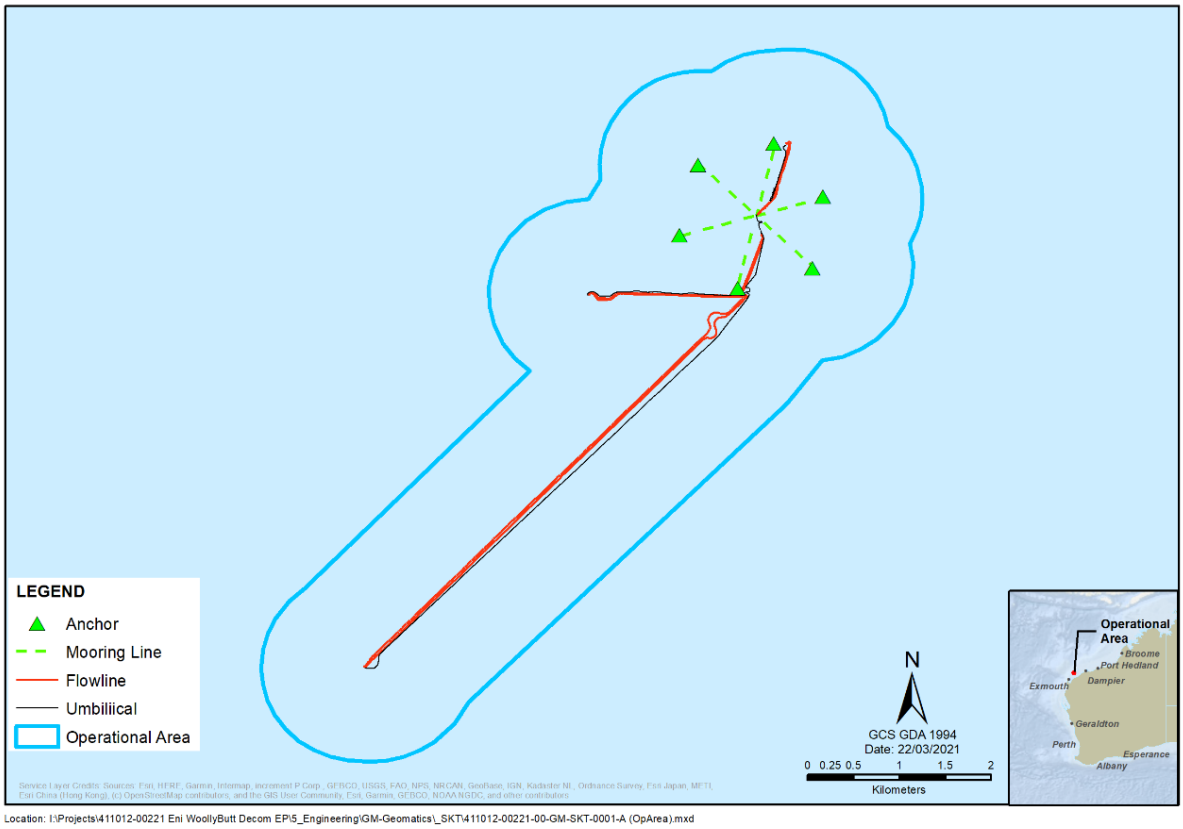


Figure 4.1: Operational Area

4.4 Schedule

Subsea equipment recovery activities (Refer to Section 4.8) will be take approximately 60 to 90 days and will be completed on or before 31st December 2022. This is within 12 months of the completion of the P&A activities covered under the Field Management EP (000105_DV_PR.HSE.1011.000), as required by Direction 2 of the General Direction (805) (refer Table 2.2).

Eni have completed the tendering process for the subsea equipment recovery activities (April 2022) .

4.4.1 Decommissioning

The following infrastructure is not proposed to be recovered and will be decommissioned in-situ:

- DSPM anchors
- DSPM chains (below seabed components only)

Decommissioning of the above-mentioned infrastructure in-situ is based on the options assessment (Section 3.5) that identifies leaving these components in-situ provides a better environmental outcome than the complete removal of subsea infrastructure.

4.5 Decommissioning Strategy

Eni proposes to remove all remaining infrastructure in the Woollybutt field with the exception of the DSPM anchors and the below seabed components of the DSPM chains. These components will be decommissioned in-situ and will remain in the Woollybutt field. This decommissioning strategy has been developed based on the outcomes of the options assessment described in Section 3.

Infrastructure that this decommissioning strategy applies to is described in Section 4.7.

4.6 Summary of Field Management and Plug & Abandon Activities

Field management, P&A activities, the removal of subsea infrastructure including wellheads and guide bases and leaving the Corkybark-1 wellhead in-situ is covered under a separate Field Management EP (000105_DV_PR.HSE.1011.000).

Any flushing and placement of infrastructure on the seabed will also be conducted under the Field Management EP (000105_DV_PR.HSE.1011.000).

4.7 Description of Infrastructure

4.7.1 Disconnectable Single Point Mooring Anchors and Chains

Six anchors and chains were installed for mooring the FPSO via a DSPM buoy (Figure 4.2). The anchors were located at a horizontal distance of 779.9 m from the centre of the buoy and each leg had a total length of 802 m.

As part of the activities under the Field Management EP (000105_DV_PR.HSE.1011.000), the chains will be cut from the DSPM and placed on the seabed, and the DPSM will be removed from the field.

The composition of the anchors and chains is steel. The anchors are coated in shipcoat steel paint (epoxy coating), used to protect metal surfaces, which has a thickness of 25 to 40 mu (standard thickness is one coat). Weights of the infrastructure are provided in Section 4.9.1.

It is proposed to recover all above seabed components of the chains.

Figure 4.3 shows the current state of the anchors and chains.

Table 4.2 provides coordinates of the DSMP anchors as built. Table 4.3 provides the as-found coordinates and is accurate of the position of the DSMP anchors at present. Three of the anchors (ANC 73, ANC 133 and ANC 253) could not be located as they are fully buried. ANC13 and ANC193 are buried but locatable (anchor jewellery visible at ANC13). ANC 313 is partially buried (Figure 4.4) with limited protrusion above the seabed (Fugro, 2021). The estimated protrusion is 70-90 cm above the seabed, based on the size of the anchor and what can be understood from the Fugro (2021) image.

The long term fate of the anchors and chains are detailed in Section 4.9.1.

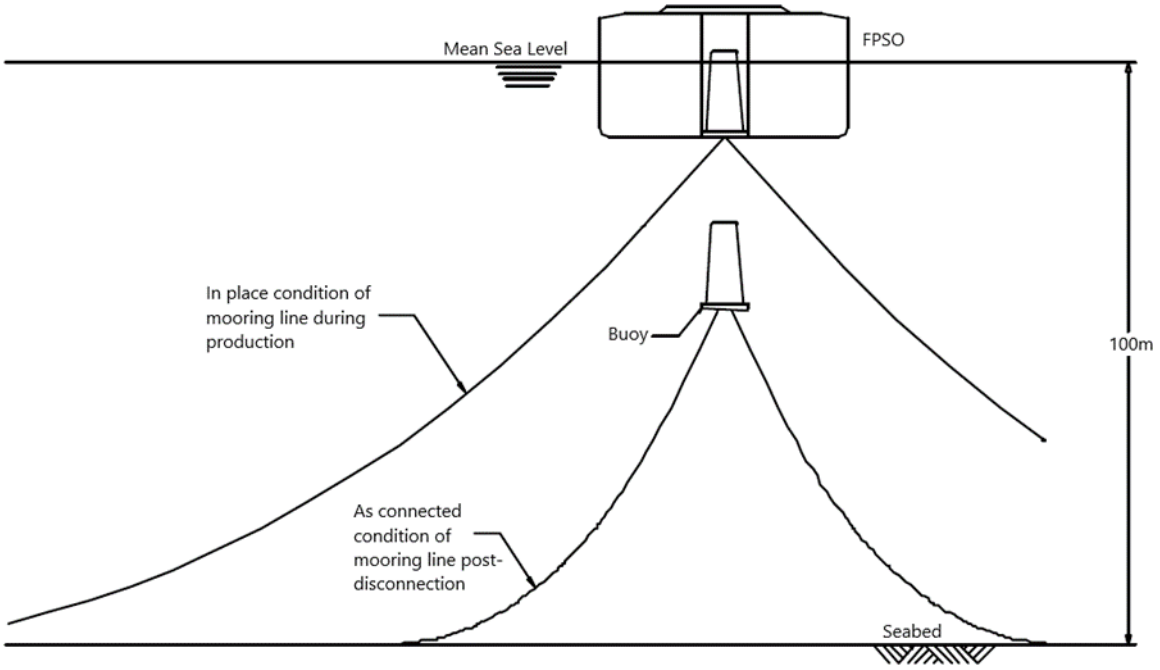


Figure 4.2: Mooring chain and buoy position during production (2002-2012) and post-disconnection (2012-2002)

Figure 4.3: DSPM anchors and chains

Table 4.2: DSPM Anchor Centre Coordinates (Fugro, 2021)

SPM Anchor	Easting [m]	Northing [m]	Latitude (WGS84)	Longitude (WGS84)
SPM ANC 13 Heading	282,514.885	7,687,158.581	20°54.186' S	114°54.544" E
SPM ANC 73 Heading	283,003.492	7,686,585.137	20°54.500' S	114°54.822" E
SPM ANC 133 Heading	282,918.255	7,685,837.437	20°54.905' S	114°54.767' E
SPM ANC 193 Heading	282,150.035	7,685,604.051	20°55.026' S	114°54.322' E
SPM ANC 253 Heading	281,571.577	7,686,155.057	20°54.723' S	114°53.993' E
SPM ANC 313 Heading	281,752.082	7,686,924.829	20°54.307' S	114°54.103' E

Table 4.3: DSPM Anchor Centre Coordinates As Found (Fugro, 2021)

SPM Anchor	Easting [m]	Northing [m]	Range To Target	Bearing To Target (True)
SPM ANC 13 Heading*	282,508	7,687,167	10.7m	324.1°
SPM ANC 73 Heading	Buried			
SPM ANC 133 Heading	Buried			
SPM ANC 193 Heading	282.150	7,685,605	1.45m	20.7°
SPM ANC 253 Heading	Buried			
SPM ANC 313 Heading	281,564	7,686,153.9	7.5m	261.9°

Note:

*SPM ANC13 Heading was buried but anchor jewellery was visible

SPM ANC 73 Heading, SPM ANC 133 Heading and SPM ANC 253 Heading were buried and no visible sign could be seen of them

Figure 4.4: DSMP Anchor 313 (Fugro, 2021)

4.7.2 Umbilical and Flowline Crossing Mattresses and Grout Bags

Eight concrete mattresses and 16 grout bags were installed over umbilical and flowline infrastructure for stabilisation during operations. The mattresses are approximately eight feet by 20 feet by 4.5 inches in size and are constructed predominantly of concrete, with small amounts of stabilised copolymer extruded fibre rope and polyvinylchloride. Figure 4.5 shows examples of the current state of the mattresses, taken during ROV surveys.

The grout bags are plastic bulka bags made from polypropylene and are typically 0.9 m by 0.9 m by 0.9 m in size. The bulka bags are 1 Te rated and are packed with twenty 20 kg dry cement bags, typically weighing 400 kg per bag in air. Figure 4.6 shows an example of a grout bag, taken during ROV surveys.

It is proposed to recover all crossing mattresses and grout bags.

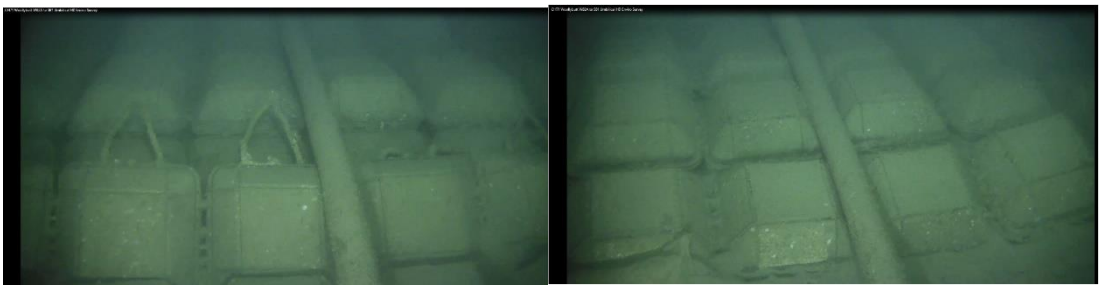


Figure 4.5: Example of concrete mattresses

Figure 4.6: Example of grout bag

4.7.3 Umbilicals and Umbilical Jumpers

Umbilicals and umbilical jumpers comprise carbon steel, polymers and small amounts of lead, copper and aluminium.

During production, the subsea control modules included control umbilicals which contained cores for hydraulic fluid, chemical injection and power and signal cores for control and data recovery from the wells' horizontal Xmas trees and downhole gauges.

The umbilical system also included umbilical baskets, subsea umbilical termination units and umbilical termination assemblies. Any discharge of fluids contained in the umbilicals as a result of cutting is covered under the Field Management EP (000105_DV_PR.HSE.1011.000).

It is proposed to recover all remaining umbilicals and umbilical jumpers in the Woollybutt field (Table 4.4). Material components and weights of the umbilicals are provided in Appendix E.

Table 4.4: Umbilical and umbilical jumpers to be removed

Description	Qty	Length (m)	Total Length (m)
EHU Jumper (SB1M to WB2A)	1	22	22
EHU Jumper (SB1M to SB1)	1	5-10	10
Infield EHU (SUTU to SUTU)	1	1,670	1,670
EHU Jumper	2	8	16
Infield EHU (UTA1 to UTA2)	1	5,750	5,750
Wellhead Unit Jumper (WB4M to WB4)	2	50	100
Umbilical Jumper, UTA1 to SB1M	3	50	150
Umbilical Jumper, UTA2 to WB4M	3	50	150
EHU, FPSO to WB2/SB1 FPSO SUTU	1	1,075	1,075
EHU, DSPM to WBT DSPM SUTU	1	1,075	1,075
		Total	8,300

4.7.4 Flexible and Reinjection Flowlines and Jumpers

A number of flowlines and jumpers were located at the Woollybutt field for transporting gas from the wells. At the end of operations, the flowlines were left with seawater treated with a multi-functional inhibitor, Hydrosure O-3670R, at a concentration of approximately 850 ppm. The cutting of the flowlines, except for the 6" and 2 ½" lines from DSPM to SB1M, was completed as an approved activity under the Field Management EP (000105_DV_PR.HSE.1011.000).

Flowlines and jumpers are comprised of carbon steel, stainless steel and polymers with small amounts of alloy steel and aluminium. Figure 4.7 shows examples of the current state of the flexible and reinjection flowlines and jumpers.

Residual hydrocarbons at a concentration of approximately 30 ppm will be released at the time of cutting the 6" and 2 ½" DSPM to SBM1 flowlines, with no further discharges are expected to occur during the Petroleum Activities Program.

It is proposed to remove all flowlines and jumpers from the Woollybutt field (as listed in Table 4.5).

Material components and weights of the flowlines are provided in Appendix E.

NORMS may be present in the flowlines (refer Section 8.7).

Table 4.5: Flowlines and jumpers to be removed

Description	Length (m)	Total Length (m)
Six-inch flowlines		
6" Flexible Jumper	17	17
6" Flexible Flowline (SB1M to SB1)	1,670	1,670
6" Flexible Flowline (SB1M to WB4M)	5,750	5,750
6" Flexible Jumper (WB4M to WB4)	50	50
6" Flexible riser, DSPM to SB1M	1,045	2,090
6" Flexible riser, DSPM to WB1A	1,045	1,045
Four-inch gas lift lines		
4" Flexible Flowline (SB1M to WB4M)	5,750	5,750
4" Flexible Jumper (WB4M to WB4)	50	50
Two-and-a-half-inch gas lift lines		
2-1/2" Flexible Jumper	21	21
2-1/2" Flexible Flowline (SB1M to SB1)	1,670	1,670
2-1/2" flexible riser, DSPM to SB1M	1,035	1,035
2-1/2" flexible riser, DSPM to WB1A	1,035	1,035

Image 2.6-01 - 2" Gas Lift - Exposed

Image 2.6-02 - 2" Gas Lift - Marine Growth

Image 2.6-03 - 2" Gas Lift - Marine growth

Image 2.6-04 - 2" Gas Lift - Free Span

Image 2.6-05 - 2" Gas Lift - Shallow Burial

Image 2.6-06 - 2" Gas Lift - Manifold Connection

Figure 4.7: Flexible and reinjection flowlines

4.8 Subsea Equipment Recovery

Subsea equipment will be recovered using a combination of the vessels detailed in Section 4.12. The equipment proposed to be recovered and taken to shore for disposal, recycling or reuse, in accordance with applicable legislation are:

- DSPM chains (above seabed only) (Section 4.7.1)
- umbilical and flowline crossing mattresses and grout bags (Section 4.7.2)
- umbilical's and umbilical jumpers (Section 4.7.3)
- flexible and reinjection flowlines and jumpers (Section 4.7.4)

Subsea equipment recovery comprises:

- surveying location of infrastructure on seabed and identifying clean lift points and cutting sites
- disconnecting/cutting flowlines, umbilicals, chains into manageable sections for recovery using a subsea hydraulic shear cutter, super grinder or multi cutter
- retrieving equipment from the seabed using a combination of engineered recovery beam or rigging or subsea pipe baskets or grabs.
- Final as-left survey (Section 4.11).

4.8.1 Recovery of DSPM Anchor Chains

Removal of the DSPM is covered under the Woollybutt Field Management EP (000105_DV_PR.HSE.1011.000). Works carried out to remove the DSPM include cutting the mooring chains and leaving them on the seabed. Removal of the DSPM anchor chains is covered under this EP.

DSPM chains will be recovered using an anchor handling tug boat (AHTB) in combination with a MSV and an ROV, which will be deployed to the marine environment from a support vessel.

The following describes the proposed steps for the recovery of the DSPM chains:

- the MSV connects the chain to the AHTB winch wire
- mooring chains will be cut at the first link below the seabed by an ROV
- the AHTB recovers the DSPM anchor chain backing along the chain line while transferring the chain to storage lockers and storing on the back deck as required

All above seabed components of the mooring chains will be recovered.

4.8.2 Recovery of Crossing Mattresses and Grout Bags

Eight umbilical crossing mattresses and 16 grout bags will be recovered.

The following describes the proposed steps for the recovery of the crossing mattresses and grout bags:

- Deploy basket (Figure 4.8) and deposit on seabed in predetermined location
- Deploy claw grab (Figure 4.8) and position at mattresses and grout bags
- ROV will connect to claw grab intervention panel to make grab
- Mattress/grout bags lifted into basket using crane movement observed and assisted by ROV
- Basket connected to crane and lifted to deck
- Mattresses/grout bags removed from basket and placed in storage location

Figure 4.8: Recovery basket and claw grab

4.8.3 Recovery of Umbilicals and Umbilical Jumpers

For umbilical sections of less than 200 m in length, the "Cut and Recover" methodology will be employed:

- umbilical sections are cut into 22 – 26 m lengths on the seabed
- cut lengths are grabbed in the centre by a recovery clamp deployed by a crane on the recovery vessel
- cut lengths are lifted to the deck of the recovery vessel where further handling and cutting may be required

A recovery basket may be deployed to the seabed and cut lengths placed in the recovery basket to reduce crane excursions.

For umbilical sections of more than 200 m in length, the "Recovery and Cut" methodology will be employed:

- umbilical sections are lifted to the vessel over an over boarding chute then passed through a tensioner which is used to control and recover the product in a stepped, continuous process

- umbilical sections are routed to a cutting table where they are cut into equal length sections, bundled and stored

The Recovery and Cut methodology is continued until all umbilicals remaining in the Woollybutt field have been recovered.

4.8.4 Recovery of Flexible and Reinjection Flowlines and Jumpers

Flowlines and jumpers will be recovered via the methodology described in Section 4.8.3.

4.9 In-situ Decommissioning

4.9.1 DSPM Anchors and Below Seabed Mooring Chains

Anchor chains will be cut at the first link below the seabed as detailed in Section 4.8.1. The DSPM anchors and below seabed components of the mooring chains will be decommissioned in-situ. Refer to Section 4.10 for details on how these components will degrade over time.

The status of the anchors and chains are presented in 4.7.1. One anchor (ANC 313) is partially buried (refer to Figure 4.4) with limited protrusion above the seabed (Fugro, 2021) (estimated at 70 – 90 cm, refer Section 4.7.1). As per the other anchors in the field this anchor is anticipated to bury also. This is based on the progressive burying of all anchors within the field since installation (refer Section 4.10.2).

4.10 Long Term Fate of Infrastructure Left In-situ

4.10.1 Infrastructure Degradation

Eni commissioned Atteris to complete a degradation assessment of the equipment that is proposed to be left in-situ under the Petroleum Activities Program. This report is based on the operational history of the Woollybutt field to date and the current decommissioning status of the Woollybutt system, as well as behavioural evidence and academic studies. The study involved engineering assessments to estimate the credible degradation mechanisms and degradation timelines. The study ultimately provides an assessment of the materials that are likely to be released during degradation and their subsequent environmental fate.

The anchors and below seabed components of the mooring chains comprise approximately 174.9 t of steel, with an epoxy coating (thickness of 25 to 40 mu) (Table 4.6). The rate at which metals break down in the marine environment depends on the level of cathodic protection on the infrastructure. DSPM anchors and anchor chains have no cathodic protection and have already begun to corrode. The external corrosion will take three forms: pitting, microbe-induced corrosion and general corrosion. A long-term steady state corrosion rate will establish, based on the diffusion of oxygen and nutrients to the surface of the steel. It is expected that corrosion will occur at a rate of 2.1 mm/year. Based on the thickness of the chains and anchors, full corrosion could occur within 40 to 150 years.

Table 4.6 shows the total volume of materials in the infrastructure that may be subject to corrosion and degredation.

Impacts associated with the corrosion and degradation of anchors and chains are presented in Section 8.8.

Table 4.6: Volume of materials in the Woollybutt infrastructure decommissioned in-situ

Infrastructure	Material	Weight
Anchors	Iron	156 tonnes
	Epoxy coating*	10 kg (estimate)
Chains	Iron	18.9 tonnes

*thickness of 25 to 40 mu

4.10.2 Anchor Burial (ANC 313)

One anchor (ANC 313) is partially buried (refer to Figure 4.4) with limited protrusion above the seabed (Fugro, 2021) (estimated at 70 – 90 cm, refer Section 4.7.1). It is not fully known why this anchor has not completely buried over time like the others in the field, however it is possible that ANC 313 was previously buried and has been dislodged whilst attached to the DSPM due an external force, subsequently becoming visible at the seabed. Another theory may be that there is some harder layer subsurface sediments under surface soft sediments, slowing the lowering of the anchor into the seabed.

As per the other anchors in the field, it is anticipated that the partially buried anchor (ANC 313) will bury further over time. Anchors were originally laid a horizontal distance of 779.9 m from the centre of the DSPM buoy, embedded in seabed and were partially exposed. As detailed above, all but one anchor (ANC 313) have fully buried over time, since installation in 2002. This burial is likely due to a gradual lowering of anchors into the soft sediments of the seabed, as well as the natural sedimentation and accumulation of the new sediment over time. Based on the burial of the other anchors in the field it is likely that ANC 313 will also further bury, eventually becoming fully buried and not visible.

In the event that ANC 313 does not fully bury its level of protrusion is not a level that would impact current or future marine users (refer Section 8.1).

4.11 Final As-left Survey

The post infrastructure removal activities, a final as-left survey will be performed:

- confirm final burial status of ANC 313
- determine evidence of adjacent seabed disturbance

The survey will also obtain representation of the completed infrastructure removal scope.

4.12 Intervention Vessel and Support Vessels

4.12.1 Support Vessels

Support vessels will be selected based on the activity that will be undertaken. The removal of infrastructure from the field would require the use of two or more vessels. Vessels will be selected with the ability to recover the specifications (such as weight and size) of the remaining infrastructure. Although the exact vessel requirements would be subject to change, a support vessel, anchor handling tugboat (AHTB), multipurpose support vessel (MSV) and intervention vessel (IV) are representative of the vessels likely to be required.

A maximum of three support vessels will be utilised to support the IV (Section 4.12.2) during decommissioning activities and recovery of subsea equipment.

All vessels will be commercial vessels with a suitable survey class for activities in the Operational Area. The vessels will run on marine diesel; no intermediate or heavy fuel oils will be used. Specifications for vessels supporting equipment recovery activities are provided in Table 4.7, Table 4.9 and Table 4.9. All vessel uses Dynamic Positioning (DP) to maintain a position and heading by using its own propellers and thrusters.

Table 4.7: Typical equipment recovery support vessel details

Parameter	Description
Draft (max)	3.25 m (max)
Length	56.8 m
Gross tonnage	1,475 Gt
Hull	Steel
Fuel type	Marine diesel
Total fuel volume	138.2 m³
Volume of largest fuel tank	30.4 m³

Table 4.8: Typical anchor handling tugboat vessel details

Parameter	Description
Draft (max)	8 m
Length	91 m
Berths	60 persons
Gross tonnage	7,475 Gt
Hull	Steel
Fuel type	Marine diesel
Total fuel volume	1,223.8 m³
Volume of largest fuel tank	167.6 m³

Table 4.9: Typical equipment recovery multipurpose support vessel details

Parameter	Description
Draft (max)	6-8 m
Length	85 to 130 m
Berths	100 persons
Gross tonnage	4,000-13,000 Gt
Fuel type	Marine diesel
Total fuel volume	2,000-2,500 m³
Volume of largest fuel tank	250 m³

4.12.2 Intervention Vessel

An IV will be used to conduct equipment recovery activities (refer to Section 4.8). Allowance for IV use has been included to allow operational flexibility to conduct equipment recovery with the schedule (Section 4.4).

Specification of a typical IV are provided in Table 4.10.

Table 4.10: Typical IV details

Parameter	Description
Draft	9 m (transit) 18.25 m (operating)
Length	110 to 130 m
Berths	100 persons
Gross tonnage (International)	22,725 GRT
Hull	Steel
Fuel type	Marine diesel
Total fuel volume	1,800 m³
Volume of largest fuel tank	490 m³ (located on the internal side of the pontoon) 204 m³ (located on the inside corners of the columns)

4.12.3 Vessel Selection

Selection of the IV will be based on technical requirements for decommissioning and equipment recovery operations and on Eni's vessel selection criteria, which considers technical and HSE suitability for the recovery of subsea equipment activity.

IV selection criteria include:

- the Contractor must be able to meet Eni's and Australian Regulatory environmental and safety standards and requirements, and must operate under a NOPSEMA accepted Vessel Safety Case
- the Contractor must meet Eni's Pre-qualification assessment

- qualify for 50-year seasonal extreme weather survival.

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

4.12.4 Installation Vessel and Vessel Operations

This section describes the scope of the Petroleum Activities Program used for consideration of the environmental risks and impacts presented in Section 8 and Section 9.

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

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

Deck Drainage

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

Putrescible Waste and Sewage

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

Oily Water

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

Cooling Water

Seawater is used as a heat exchange medium for the cooling of machinery engines. Seawater is drawn from the ocean and flows counter current through closed-circuit heat exchangers, transferring heat from the vessel engines and machinery to the seawater. The seawater is then discharged to the ocean (i.e., it is a once-through system). Cooling water temperatures vary depending upon the vessel's engines workload and activity.

Cooling water may contain inhibitors to protect against corrosion cavitation erosion, mineral scale deposits and electrolysis.

Desalination Plant Effluent (Brine) and Backwash Water Discharge

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

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

Ballast Water

Support vessels contain ballast seawater for stability reasons and may need to exchange ballast seawater on location. This will be done in accordance with the Australian Ballast Water Management Requirements 2017 (see Section 9.1).

Solid and Liquid Waste

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

4.12.5 Refuelling

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

4.12.6 Helicopters

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

4.12.7 Remotely Operated Vehicles

ROVs will also be used for subsea operations and observations during decommissioning and recovery of subsea equipment.

5 DESCRIPTION OF THE ENVIRONMENT

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

5.1 Zone of Potential Impact

The ZPI is based on the largest credible spill scenario identified and modelled during the risk assessment process, details of the ZPI are presented in Table 5.1 along with the thresholds applied. The ZPI is shown in Figure 5.1.

Table 5.1: Credible spill scenarios and thresholds applied to create ZPI

Spill scenario	Threshold applied to create ZPI	EP Section
Vessel or IV collision leading to release of (500 m³) marine diesel	Shoreline contact hydrocarbon (10 g/m²) Surface hydrocarbon (1 g/m²) Entrained hydrocarbon (100 ppb) Dissolved aromatic hydrocarbon (6 ppb)	Section 9.5

Further discussion on the thresholds applied and potential impacts on the environment are contained in Section 9.5.

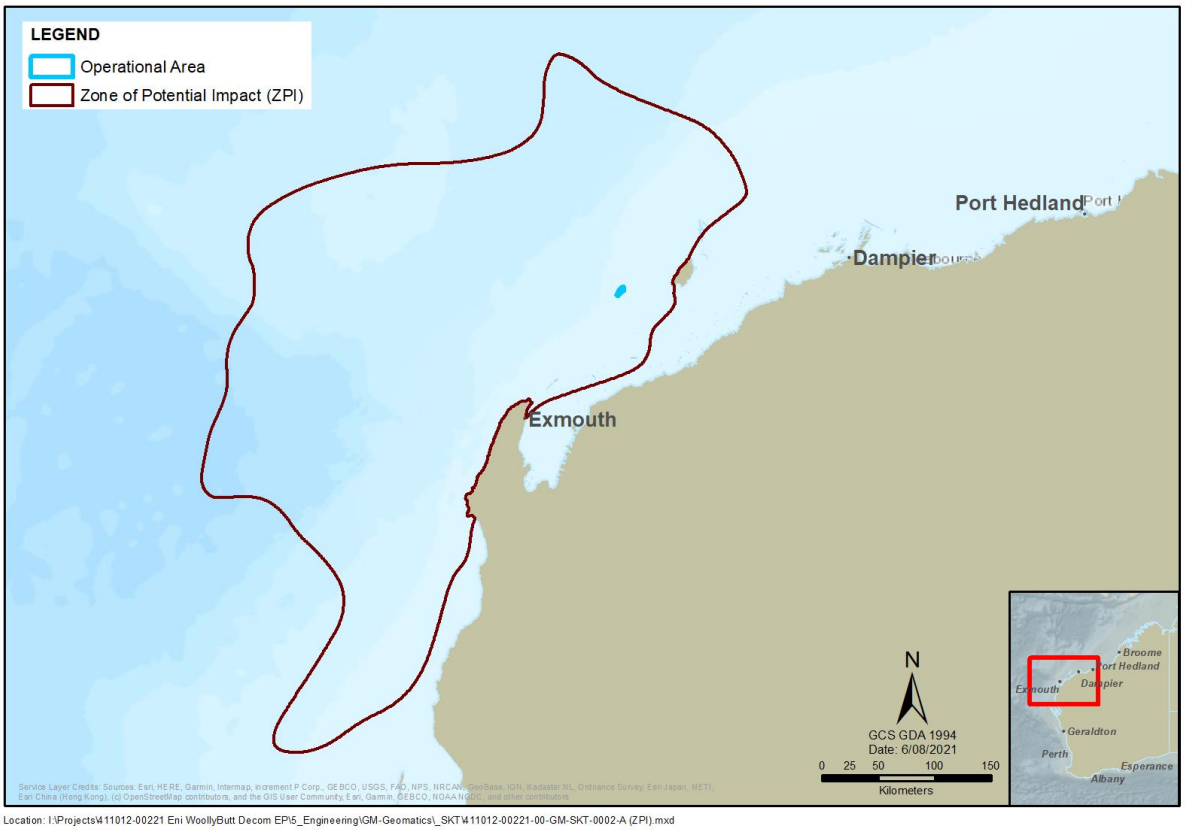


Figure 5.1: The ZPI for Woollybutt Decommissioning Petroleum Activities Plan

5.2 Bioregion

The Operational Area lies on the continental shelf within the North-West marine region, which covers the Commonwealth Marine Area extending from the Western Australian-Northern Territory border to Kalbarri, south of Shark Bay in Western Australia (Figure 5.2). The Northwest Commonwealth Marine Area covers approximately 1.07 million square kilometres, is characterised by tropical and sub-tropical marine areas and includes shallow waters on the continental shelf at the state water's boundary, 3 nautical miles (5.5 kilometres) from shore to deep ocean habitat 200 nautical miles (370 kilometres) from shore (Commonwealth of Australia, 2012).

The major physical features of the region include:

- highly diverse coral reefs including Ashmore, Hibernia, Scott, Seringapatam, Ningaloo and the Rowley Shoals, all of which sustain species of both conservation and commercial importance
- coralline algal reefs carbonate pinnacles and shoals in the region's far north
- vast areas of continental shelf and slope, plateaux and terraces, including the Exmouth and Scott plateaux, the Northwest and Sahul shelfs, the Wallaby Saddle and Rowley Terrace
- Australia's narrowest continental shelf, which occurs close to Northwest Cape, at just 7 kilometres in width

- the Indonesian Throughflow, a low-salinity water mass that acts as a major element of the global transfer of heat and water between oceans and plays a key role in initiating the Leeuwin Current
- the Joseph Bonaparte Gulf, a basin with a soft sediment floor, which is home to a low coverage of mobile invertebrates and sessile filter-feeding organisms
- major canyons on the continental slope that facilitate sediment and nutrient transport, including Cape Range, Cloates, Carnarvon and Swan canyons
- two areas of abyssal plain (Cuvier and Argo) with depths greater than 5000 metres.

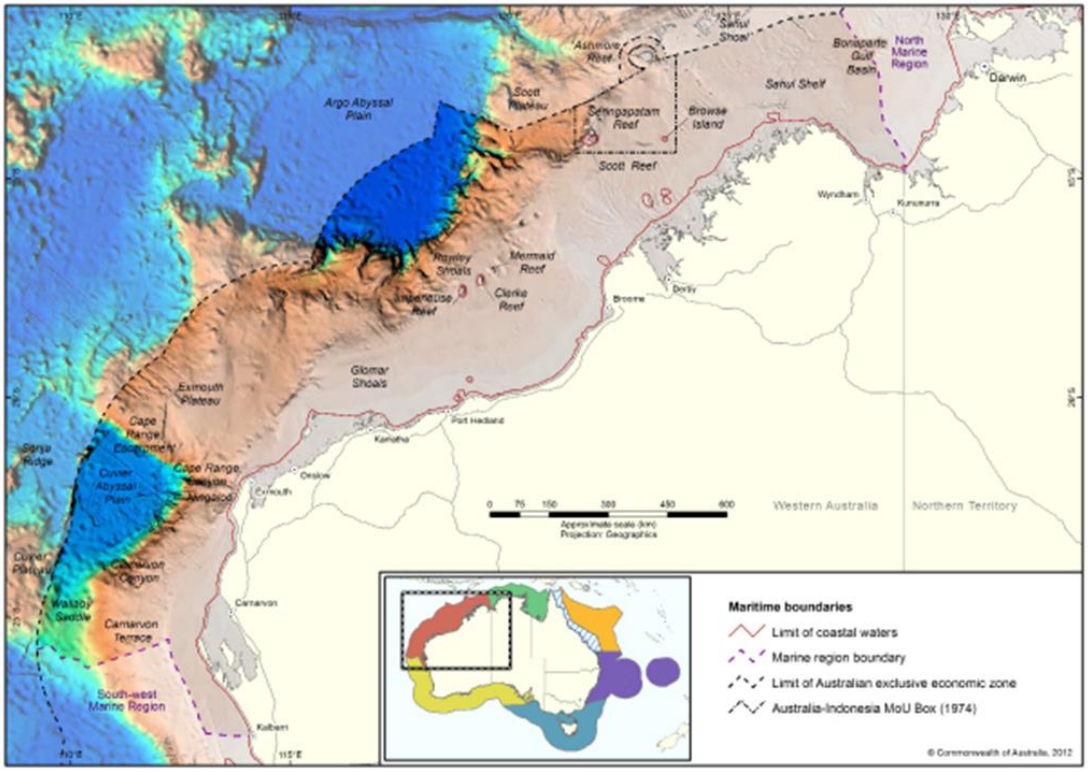


Figure 5.2: North-West marine region (Commonwealth of Australia, 2012)

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

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

The NWMR is relatively shallow, with more than 40% of the region being less than 200 metres deep. Therefore, surface currents have a strong influence. Another major factor

driving ecological processes in the region is the strong seasonality of rainfall and wind direction (Commonwealth of Australia, 2012). The weakening of the Indonesian Throughflow and Leeuwin Current in the dry season (April to September and particularly during El Niño years), paired with the seasonal reversal in wind, boosts productivity through increased mixing of surface waters and deeper, nutrient-rich waters (Commonwealth of Australia, 2012).

5.3 Woollybutt Sediment Sampling

In 2014 a pre-decommissioning sediment sampling survey was undertaken of the sediments adjacent to subsea infrastructure in the Woollybutt (Jacobs, 2014). Sediment samples were collected over the period 8–9 of August 2014 by ROV though the use of push cores at 11 predefined sites. Figure 5.3 to Figure 5.5, show the location of the predefined sites. Ten sites were situated in close proximity to areas with increased risk of contamination, including the flow line connection points on subsea X-mas trees and manifolds (infrastructure referenced is defined under the scope of the Field Management EP (000105_DV_PR.HSE.1011.000). A reference site was located approximately 2 km west of the subsea infrastructure. Collected samples were processed by Jacobs' personnel on board the ROV survey vessel, before being sent off to National Association of Testing Authorities (NATA) accredited laboratories for analysis.

Sediments were tested for:

- Metals/metalloids (Arsenic, Barium, Cadmium, Cobalt, Chromium, Copper, Iron, Manganese, Mercury, Molybdenum, Nickel, Lead and Zinc)
- Total Organic Carbon (TOC)
- Total Recoverable Hydrocarbon (TRH)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Naturally Occurring Radioactive Material (NORM)

A summary of results of the analyses are outlined below.

Metals/Metalloids:

- All metals, with the exception of nickel at site S05, were below the Australian and New Zealand Guidelines for Fresh and Marine Water Quality interim sediment quality guideline (ISQG) trigger values, where an ISQG-Low trigger value exists for that particular metal or metalloid (ANZACC/ARMCANZ, 2000). The concentration of Nickel in the sediments sampled at S05 (33 mg/kg) remained below the ISQG-High trigger value.
- Barium showed elevated concentrations across all sample locations when compared to concentrations recorded in sediment sampled at the reference site, Ref 01 (17 mg/kg), with the highest concentration of barium recorded at site S02 (1000 mg/kg), located at the Woollybutt 4 Complex X-mas tree.

- Barium, in the form of barite (BaSO4), is a major component of drilling fluids. Barite in drilling muds and sediments has a low solubility in seawater, because of the high natural concentration of sulfate in the ocean. Because it is insoluble in seawater, it has a low bioavailability and toxicity to marine organisms (Neff, 2005).

Total Organic Carbon (TOC):

- The highest percentage content of TOC (0.33%) was recorded in the sediments at the reference site, Ref 01.
- The content of TOC in the sediment at sites S03 and S05 were comparable to TOC content at the reference site, Ref 01. Sediment sampled at all remaining sites recorded lower TOC content compared to that in the sediment sampled at site, Ref 01.
- No ISQG-Low trigger value exists for TOC, however it is an important parameter to test in order to normalise TRH.

Total Recoverable Hydrocarbons (TRH):

- Concentrations of TRH were below detection limits at all sites sampled, with the exception of site S07 which had a TRH concentration of 180 mg/kg (normalised to 1% TOC).
- No ISQG-Low trigger value is listed for TRH in the ANZACC/ARMCANZ (2000) guidelines therefore the screening level of 550 mg/kg listed in the National Australian Guidelines for Dredging (CA 2009) is instead referred to for comparison.

Polycyclic Aromatic Hydrocarbons (PAH):

- Concentrations of PAH were below detection limits at all sampled sites.

Benzene, Toluene, Ethylbenzene and Xylenes (BTEX):

- Concentrations of BTEX were below detection limits at all sampled sites.

Naturally Occurring Radioactive Material (NORM):

- Concentrations of Radium-226 and Radium-228 in sediment sampled were below detection for all sample locations with the exception of Radium-226 at site, S08, which recorded a concentration marginally higher than the limit of reporting.
- In comparison to all other sample locations in this survey, the sediment sampled at site S08 experienced the highest concentrations of Radium-226 (0.036 Bq/g) and Uranium-238 (3.5 ppm).
- The sediment sampled at site S09 recorded the highest concentration of Thorium-232 (2.0 ppm).

- Concentrations of Uranium-238 and Thorium-232 were relatively consistent for all sediments sampled at each site and comparable to the concentrations recorded for sediment sampled at the reference site, Ref 01.

- No ISQG-Low trigger values are listed for Radium-226, Radium-228, Uranium-238 or Thorium-232 in the ANZACC/ARMCANZ (2000) guidelines or National Australian Guidelines for Dredging (CA, 2009).

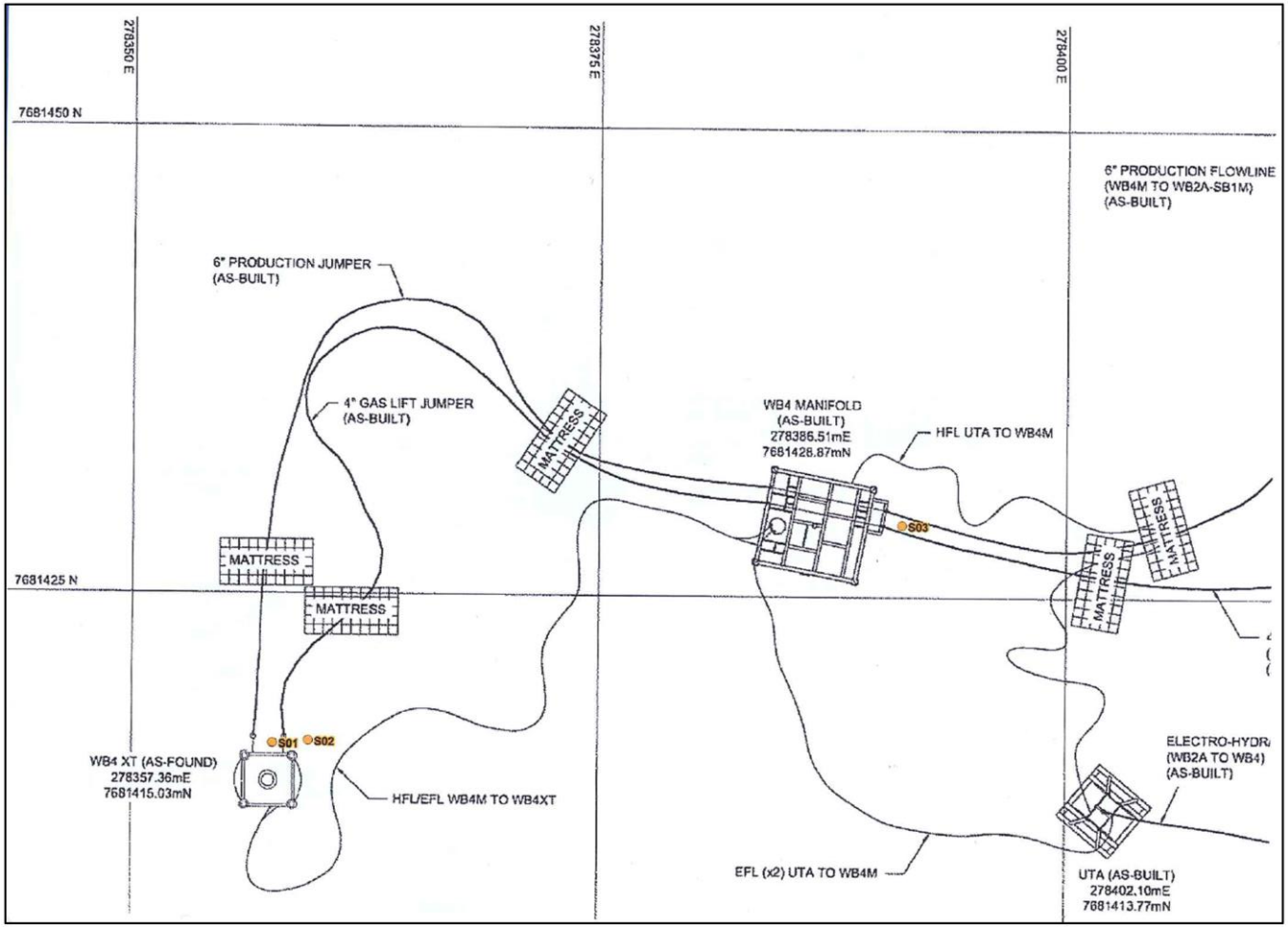


Figure 5.3: Predefined sample locations - Woollybutt 4 Complex

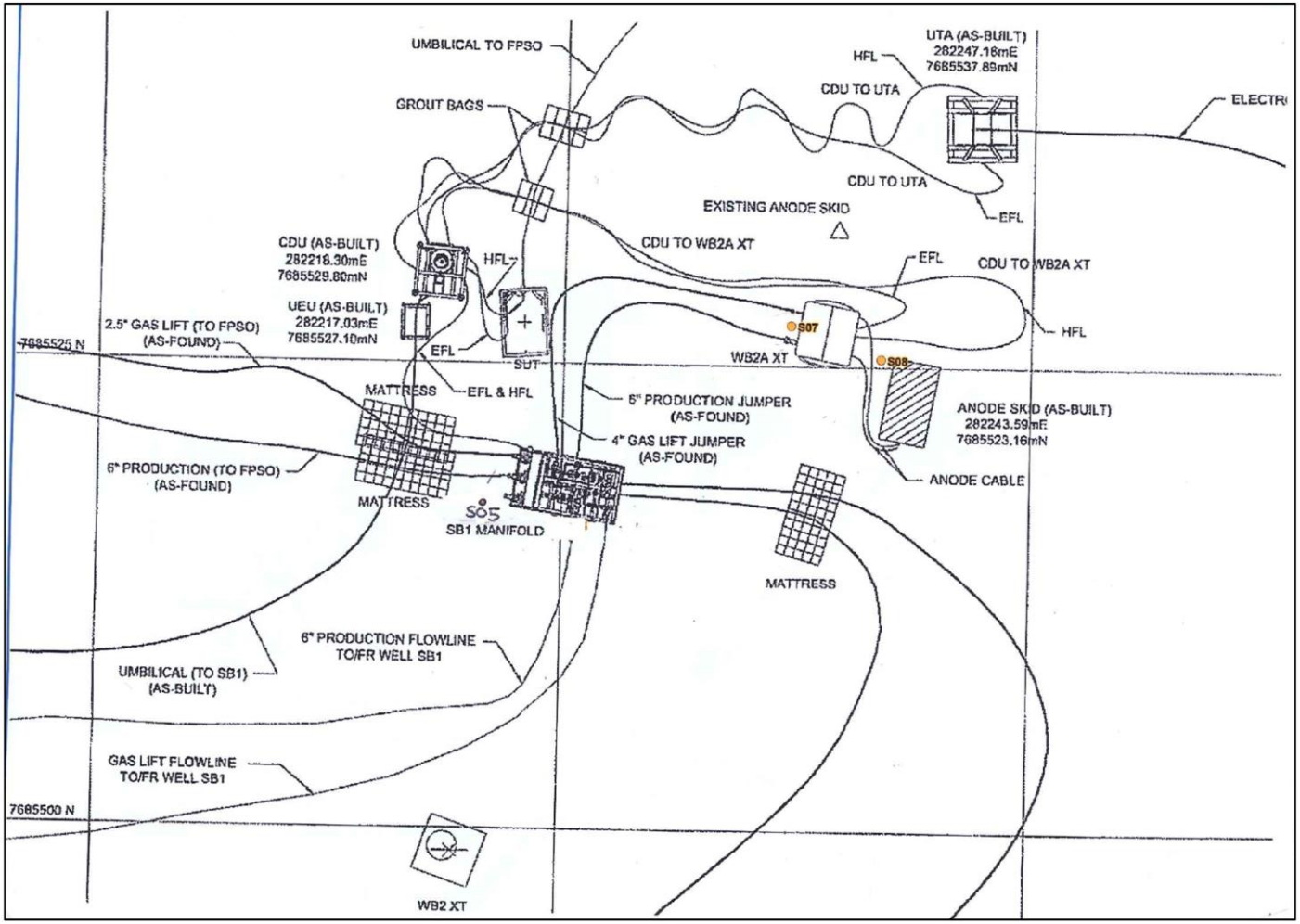


Figure 5.4: Predefined sample locations - Woollybutt 2A Complex

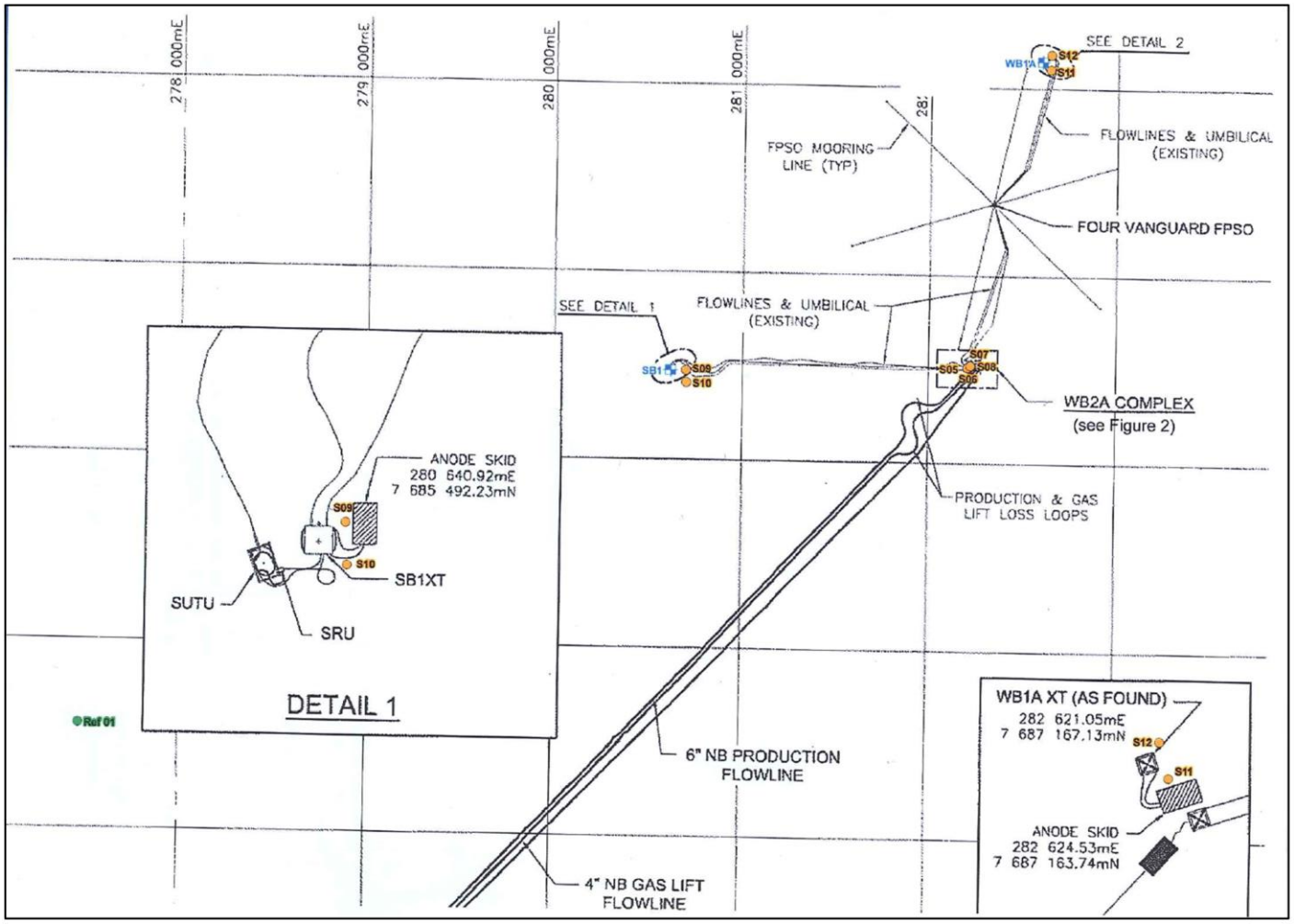


Figure 5.5: Predefined sample locations - Woollybutt 1A complex and Scallybutt 1 Complex

5.4 Threatened and Migratory Species and Ecological Communities

Searches for protected species listed under the EPBC Act were undertaken on 10 December 2021 using areas that covered the full extent of the Operational Area and ZPI. The threatened/migratory species identified using the EPBC Act Protected Matters Search Tool are listed in Table 5.2. The EPBC Act Protected Matters reports for the Operational Area are provided in Appendix B, Section 1.6.

The PMST search identified 24 species listed as 'threatened' and 35 species listed as 'migratory' within the Operational Area. In the wider ZPI, the PMST search identified 50 species listed as `threatened' and 62 species listed as `migratory'. Listed marine species that may occur within the Operational Area and ZPI are shown in Table 5.2, with further detail provided in Appendix B. Note that terrestrial species (such as terrestrial mammals, reptiles and bird species) that appear in the PMST results of the ZPI and do not have habitats along shorelines are not relevant to Petroleum Activities Program and have been excluded from Table 5.2. There are no listed threatened ecological communities within the Operational Area or ZPI. Appendix B.

Table 5.2: EPBC Act listed species within the Operational Area (DoAWE, 2021)

Species	Common Name	Status	Presence in Operational Area	Presence in ZPI
Birds				
Calidris canutus	Red Knot, Knot	Endangered / Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Calidris ferruginea	Curlew Sandpiper	Critically Endangered / Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Charadrius leschenaultia	Greater Sand Plover	Vulnerable / Migratory	NA	Species or species habitat known to occur within area
Falco hypoleucos	Grey Falcon	Vulnerable	NA	Species or species habitat likely to occur within area
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit	Critically Endangered / Migratory	NA	Species or species habitat known to occur within area
Macronectes giganteus	Southern Giant-Petrel, Southern Giant Petrel	Endangered / Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Critically Endangered / Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Phaethon lepturus fulvus	Christmas Island White-tailed Tropicbird	Endangered	Species or species habitat may occur within area	Species or species habitat may occur within area
Pterodroma mollis	Soft-plumaged Petrel	Vulnerable	NA	Foraging, feeding or related behavior likely to occur within area
Rostratula australis	Australian Painted Snipe	Endangered	NA	Species or species habitat likely to occur within area
Sternula nereis	Australian Fairy Tern	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	Breeding known to occur within area Overlap with breeding BIA
Thalassarche carteri	Indian Yellow-nosed Albatross	Vulnerable / Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area

Species	Common Name	Status	Presence in Operational Area	Presence in ZPI
Thalassarche cauta	Shy Albatross	Endangered / Migratory	NA	Species or species habitat may occur within area
Thalassarche impavida	Campbell Albatross, Campbell	Vulnerable/ Migratory	NA	Species or species habitat may occur within area
Thalassarche melanophris	Black-browed Albatross	Vulnerable/ Migratory	NA	Species or species habitat may occur within area
Thalassarche cauta steadi	White-capped Albatross	Vulnerable/ Migratory	NA	Species or species habitat may occur within area
Actitis hypoleucos	Common Sandpiper	Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Anous stolidus	Common Noddy	Migratory	Species or species habitat may occur within area	Species or species habitat likely to occur within area
Apus pacificus	Fork-tailed Swift	Migratory	NA	Species or species habitat likely to occur within area
Ardenna carneipes	Flesh-footed Shearwater, Fleshy-footed Shearwater	Migratory	NA	Species or species habitat likely to occur within area
Ardenna pacifica	Wedge-tailed Shearwater	Migratory	NA Overlap with breeding BIA	Breeding known to occur within area Overlap with breeding BIA
Calidris acuminata	Sharp-tailed Sandpiper	Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Calidris melanotos	Pectoral Sandpiper	Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area
Calonectris leucomelas	Streaked Shearwater	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Charadrius veredus	Oriental Plover, Oriental Dotterel	Migratory	NA	Species or species habitat may occur within area
Fregata ariel	Lesser Frigatebird, Least Frigatebird	Migratory	Species or species habitat likely to occur within area	Species or species habitat known to occur within area

Species	Common Name	Status	Presence in Operational Area	Presence in ZPI
Fregata minor	Great Frigatebird, Greater Frigatebird	Migratory	NA	Species or species habitat may occur within area
Glareola maldivarum	Oriental Pratincole	Migratory	NA	Species or species habitat may occur within area
Hydroprogne caspia	Caspian Tern	Migratory	NA	Breeding known to occur within area
Limnodromus semipalmatus	Asian Dowitcher	Migratory	NA	Species or species habitat may occur within area
Limosa lapponica	Bar-tailed Godwit	Migratory	NA	Species or species habitat known to occur within area
Onychoprion anaethetus	Bridled Tern	Migratory	NA	Breeding known to occur within area
Pandion haliaetus	Osprey	Migratory	Species or species habitat may occur within area	Breeding known to occur within area
Sternula albifrons	Little Tern	Migratory	NA	Species or species habitat may occur within area
Sterna dougallii	Roseate Tern	Migratory	NA	Breeding known to occur within area Overlap with breeding BIA
Thalasseus bergii	Greater Crested Tern	Migratory	NA	Breeding known to occur within area
Tringa nebularia	Common Greenshank, Greenshank	Migratory	NA	Species or species habitat likely to occur within area
Fish, Sharks and Rays				
Carcharias taurus (west coast population)	Grey Nurse Shark (west coast population)	Vulnerable	Species or species habitat may occur within area	Species or species habitat known to occur within area
Carcharodon carcharias	White Shark, Great White Shark	Vulnerable/ Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Centrophorus zeehaani	Southern Dogfish	Conservation Dependent	NA	Species or species habitat likely to occur within area
Milyeringa veritas	Blind Gudgeon	Vulnerable	NA	Species or species habitat known to occur within area

Species	Common Name	Status	Presence in Operational Area	Presence in ZPI
Ophisternon candidum	Blind Cave Eel	Vulnerable	NA	Species or species habitat known to occur within area
Pristis clavate	Dwarf Sawfish	Vulnerable/ Migratory	NA	Species or species habitat known to occur within area
Pristis zijsron	Green Sawfish	Vulnerable/ Migratory	Species or species habitat known to occur in area	Species or species habitat known to occur within area
Rhincodon typus	Whale Shark	Vulnerable/ Migratory	Foraging, feeding or related behaviour likely to occur within area Overlap with foraging BIA	Foraging, feeding or related behaviour known to occur within area Overlap with foraging BIA
Sphyrna lewini	Scalloped Hammerhead	Conservation Dependent	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
Thunnus maccoyii	Southern Bluefin Tuna	Conservation Dependent	Species or species habitat likely to occur within area	Breeding known to occur within area
Anoxypristis cuspidata	Narrow Sawfish	Migratory	Species or species habitat may occur within area	Species or species habitat likely to occur within area
Carcharodon longimanus	Oceanic Whitetip Shark	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Isurus oxyrinchus	Shortfin Mako	Migratory	Species or species habitat likely to occur in area	Species or species habitat likely to occur within area
Isurus paucus	Longfin Mako	Migratory	Species or species habitat likely to occur in area	Species or species habitat likely to occur within area
Lamna nasus	Porbeagle	Migratory	NA	Species or species habitat may occur within area
Manta alfredi	Reef Manta Ray	Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Manta birostris	Giant Manta Ray	Migratory	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
Marine Mammals				
Balaenoptera borealis	Sei Whale	Vulnerable/ Migratory	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour likely to occur within area

Species	Common Name	Status	Presence in Operational Area	Presence in ZPI
Balaenoptera musculus	Blue Whale	Endangered / Migratory	Species or species habitat likely to occur within area Overlap with distribution and migration BIA	Migration route known to occur within area Overlap with distribution, foraging and migrations BIA
Balaenoptera physalus	Fin Whale	Vulnerable/ Migratory	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Eubalaena australis/Balaena glacialis australis	Southern Right Whale	Endangered / Migratory	Species or species habitat may occur within area	Species or species habitat likely to occur within area
Megaptera novaeangliae	Humpback Whale	Vulnerable/ Migratory	Species or species habitat known to occur within area Overlap with migration BIA	Breeding known to occur within area Overlap with resting and migration BIA
Balaenoptera bonaerensis	Antarctic Minke Whale	Migratory	NA	Species or species habitat likely to occur within area
Balaenoptera edeni	Bryde's Whale	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Dugong dugon	Dugong	Migratory	NA	Breeding known to occur within area Overlap with foraging, (high density grass beds), breeding, nursing and calving BIA
Orcinus orca	Killer Whale	Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area
Physeter macrocephalus	Sperm Whale	Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area
Sousa sahulensis	Australian Humpback Dolphin	Migratory	NA	Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations)	Spotted Bottlenose Dolphin (Arafura/Timor Sea populations)	Migratory	Species or species habitat known to occur within area	Species or species habitat known to occur within area

Species	Common Name	Status	Presence in Operational Area	Presence in ZPI
Reptiles				
Aipusurus apraefrontalis	Short-nosed Seasnake	Critically Endangered	NA	Species or species habitat likely to occur within area
Aipusurus foliosquama	Leaf-scaled Seasnake	Critically Endangered	NA	Species or species habitat known to occur within area
Caretta	Loggerhead Turtle	Endangered / Migratory	Species or species habitat known to occur within area	Breeding known to occur within area
Chelonia mydas	Green Turtle	Vulnerable/ Migratory	Species or species habitat known to occur within area	Breeding known to occur within area Overlap with foraging, nesting, interesting, aggregation and mating BIA
Dermochelys coriacea	Leatherback Turtle, Leathery Turtle, Luth	Endangered / Migratory	Species or species habitat likely to occur within area	Foraging, feeding or related behavior known to occur within area Overlap with foraging, nesting and internesting BIA
Eretmochelys imbricata	Hawksbill Turtle	Vulnerable/ Migratory	Species or species habitat known to occur within area	Breeding known to occur within area Overlap with foraging, nesting, internesting and mating BIA
Natator depressus	Flatback Turtle	Vulnerable/ Migratory	Congregation or aggregation known to occur within area Overlap with internesting buffer BIA	Breeding known to occur within area Overlapping with foraging, nesting, internesting, aggregation and mating BIA

Each of the species are listed in Table 5.2 and discussed below on the basis they may occur in the Operational Area and/or ZPI at various times of the year, generally as transient visitors to the area during migration and feeding. No known breeding grounds or sensitive habitat critical to the species outlined in Table 5.2 are known to occur within the Operational Area. Breeding grounds for birds, whales, dugongs and turtles fall within the ZPI.

A number of other marine species that are protected under the EPBC Act and relevant international agreements, but are not listed as Matters of National Environmental

Significance under the EPBC Act are also described below, as these species could also occur in the ZPI. A list of these species is provided in Table 5.3.

Table 5.3 descriptions of threatened marine species and their presence relative to the Operational Area and ZPI are presented in Appendix B.

Table 5.3: Conservation advice for EPBC Act listed threatened species within the ZPI (DoEE, 2017)

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

Common Name	Conservation Advice/ Recovery Plan	Relevant Threats Identified	Relevant Management Advice/ Conservation Actions
Tasmanian shy albatross	National recovery plan for threatened albatrosses and giant petrels 2011-2016 (DoSEWPC, 2011)	Vessel disturbance Oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat.
Common sandpiper, sharp-tailed sandpiper, red knot, oriental plover, oriental pratincole, bar-tailed godwit, common greenshank	Wildlife conservation plan for migratory shorebirds (Commonwealth of Australia, 2015c)	Habitat degradation/ modification (oil pollution)	• No explicit relevant management actions; oil spills recognised as a threat.
Grey Falcon	Commonwealth Conservation Advice for *Falco hypoleucos* (grey falcon) (TSSC, 2020)	Habitat degradation/modification	• None relevant to the proposed activity
Fish			
Blind gudgeon	Commonwealth Conservation Advice on *Milyeringa veritas* (Blind Gudgeon) (TSSC, 2008)	Habitat degradation/modification Invasive species (predatory fish)	• None relevant to the proposed activity. Manage sites to control introduced fish species.
Blind cave eel	Commonwealth Conservation Advice on *Ophisternon candidum* (Blind Cave Eel) (TSSC, 2008)	Habitat degradation/modification Invasive species (predatory fish)	• None relevant to the proposed activity. Manage sites to control introduced fish species.
Grey nurse shark (west coast population)	Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DotE, 2014)	None	• No explicit relevant management actions.
White shark, great white shark	Recovery Plan for the White Shark (*Carcharodon carcharias*) (DoSEWPC, 2013)	None	• No explicit relevant management actions.

Common Name	Conservation Advice/ Recovery Plan	Relevant Threats Identified	Relevant Management Advice/ Conservation Actions
Dwarf sawfish, Queensland sawfish	Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (TSSC, 2009) Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis, Pristis zijsron, Pristis clavata, Glyphis and Glyphis garricki*) (Commonwealth of Australia, 2015)	Habitat degradation/modification	• No explicit relevant management actions. Threats identified include habitat loss, disturbance and modification. • Identify risks to important habitats for sawfish and the mitigation measures required.
Green sawfish, Dindagubba, narrowsnout sawfish	Approved Conservation Advice for *Pristis zijsron* (Green Sawfish) (TSSC, 2008) Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis, Pristis zijsron, Pristis clavata, Glyphis and Glyphis garricki*) (Commonwealth of Australia, 2015)	Habitat degradation/modification	• Reduce and, where possible, eliminate any adverse impacts of marine debris on sawfish and river shark species. • Assess the impacts of marine debris including plastics on sawfish and river shark species.
Whale shark	Approved Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015)	Vessel disturbance Habitat degradation/modification	• Assess impacts to whale sharks from offshore installations and associated environmental changes (chronic noise, light spill, water temperature changes, altered nutrient levels) and the mitigation measures required. • Evaluate risk of vessel interactions and ensure appropriate mitigation measures are implemented if required (collision avoidance systems). • Minimise offshore development and transit of large vessels near habitats which correlate with whale shark aggregations and along the northward migration route along the 200 m isobath off the northern Western Australian coastline.

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

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

Common Name	Conservation Advice/ Recovery Plan	Relevant Threats Identified	Relevant Management Advice/ Conservation Actions
Humpback whale	Approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) (TSSC, 2015)	Noise interference Vessel disturbance	• Evaluate risk of sound impacts to cetaceans and, if required, appropriate mitigation measures are implemented. • Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented. • Ensure all vessel strike incidents are reported in the National Vessel Strike Database.
Marine Reptiles			
Short-nosed seasnake	Commonwealth Conservation Advice on *Aipysurus apraefrontalis* (Short-nosed Seasnake) (TSSC, 2011)	Habitat degradation/modification	• No explicit relevant management actions.
Leaf-scaled seasnake	Commonwealth Conservation Advice on *Aipusurus foliosquama* (Leaf-scaled seasnake) (TSSC, 2011)	Habitat degradation/modification	• No explicit relevant management actions.
Loggerhead turtle Green turtle Hawksbill turtle Flatback turtle	Recovery plan for marine turtles in Australia (DoEE, 2017)	Vessel disturbance Light emissions Oil Pollution	• Vessel interactions identified as a threat. No explicit relevant management actions relating to vessels prescribed in the plan. • Ensure spill risk response programs and strategies include management of turtles and turtle habitats.
Leatherback turtle, leathery turtle, luth	Commonwealth Conservation Advice on *Dermochelys coriacea* (TSSC, 2008) Recovery plan for marine turtles in Australia (DoEE, 2017)	Vessel disturbance	• No explicit relevant management actions. Vessel interactions identified as a threat.

5.4.1 Biologically Important Areas

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

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

- wedge tailed shearwater – breeding (Figure 5.6)
- whale shark – (Figure 5.7)
- pygmy blue whale – distribution and migration (Figure 5.8)
- humpback whale – migration (Figure 5.8)
- flatback turtle – internesting buffer (Figure 5.9)

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

- loggerhead turtle – internesting buffer and nesting (Figure 5.10)
- flatback turtle – internesting buffer, nesting, foraging, mating and aggregation (Figure 5.9)
- green turtle – internesting buffer, nesting, foraging, mating and basking (Figure 5.11Figure 5.11)
- hawksbill turtle – internesting buffer, nesting, foraging and mating (Figure 5.12)
- dugong – foraging including high density seagrass beds, breeding, nursing and calving (Figure 5.13)
- wedge-tailed shearwater – breeding (Figure 5.6)
- lesser crested tern – breeding (Figure 5.6)
- roseate tern – breeding (Figure 5.6)
- fairy tern – breeding (Figure 5.6)
- whale shark – foraging (high density) (Figure 5.7)
- pygmy blue whale – foraging (Figure 5.8)
- humpback whale – resting (Figure 5.8)

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

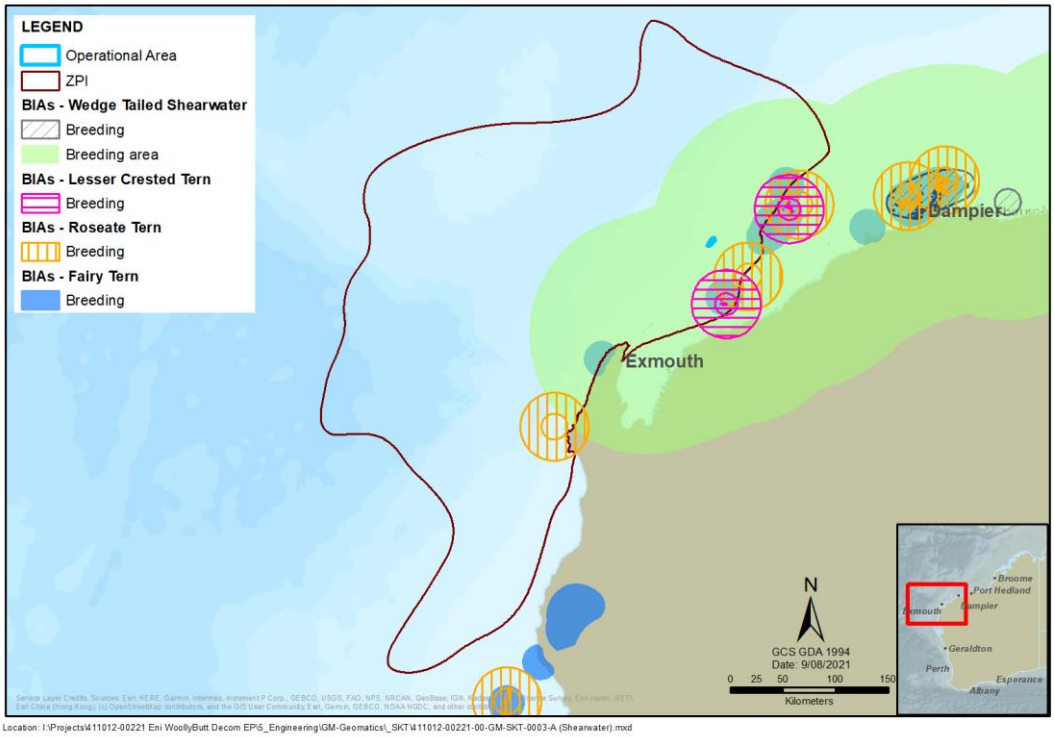


Figure 5.6: BIAs for bird species

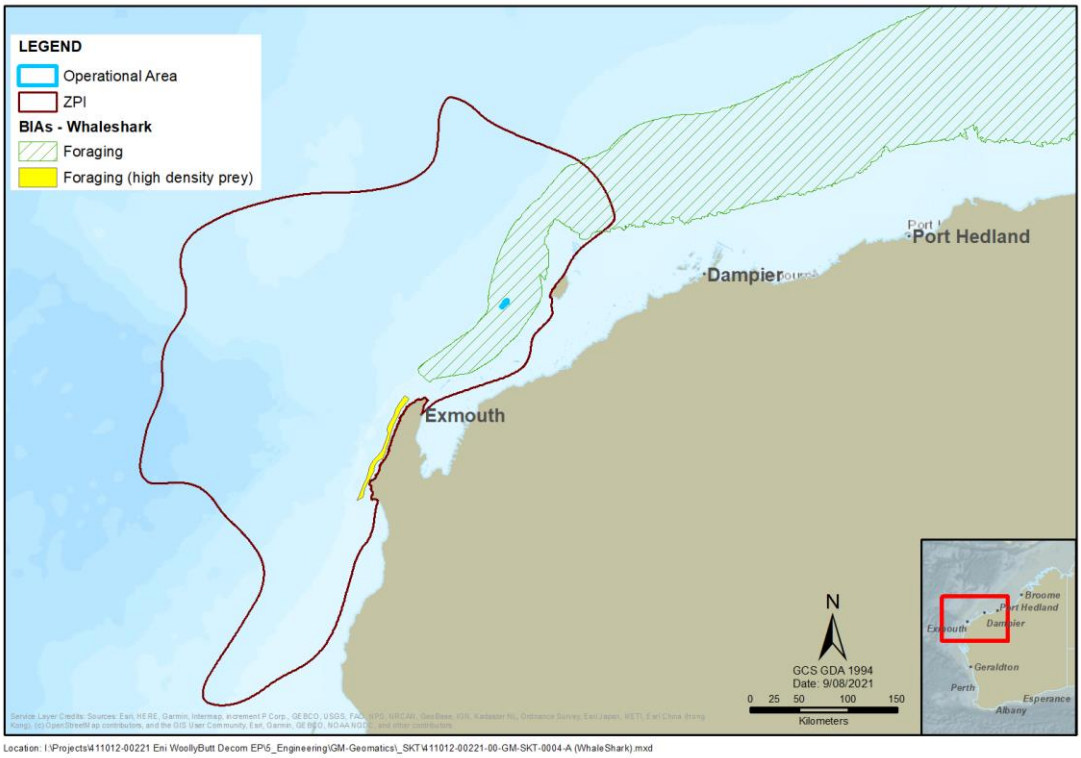
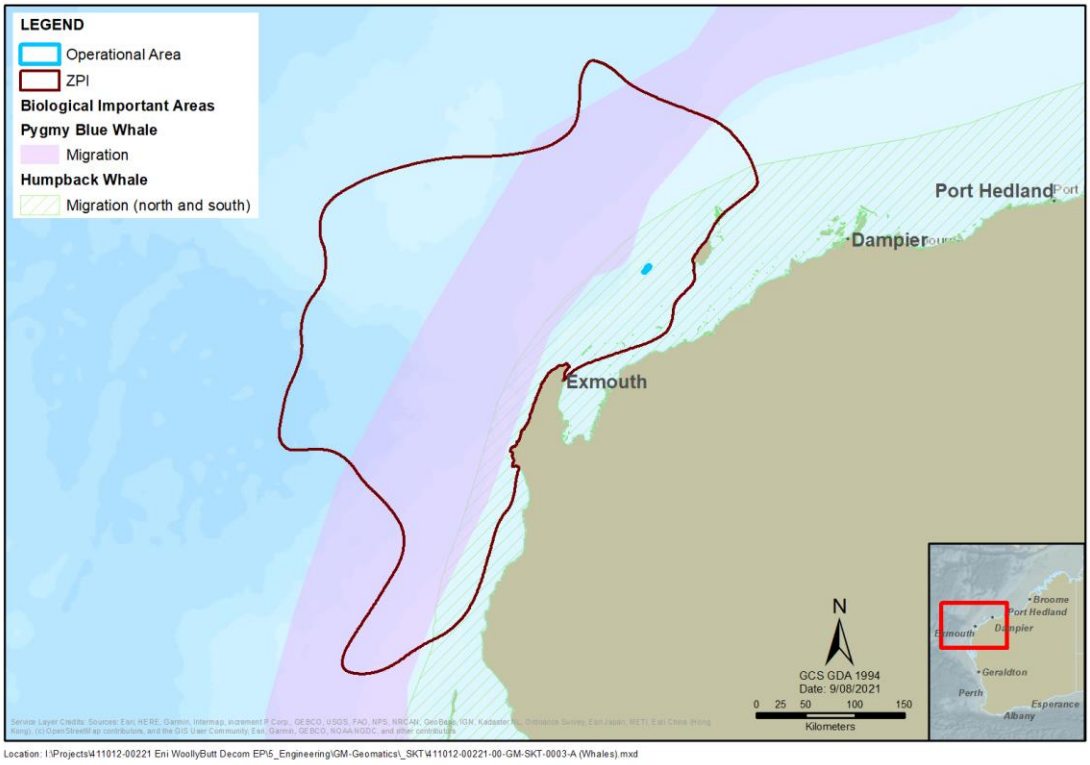


Figure 5.7: BIA for whale shark



Location: I:\Projects\411012-00221 Eni WoollyButt Decom EP\5_Engineering\GM-Geomatics_SKT\411012-00221-00-GM-SKT-0003-A (Whales).mxd

Figure 5.8: BIAs for cetaceans

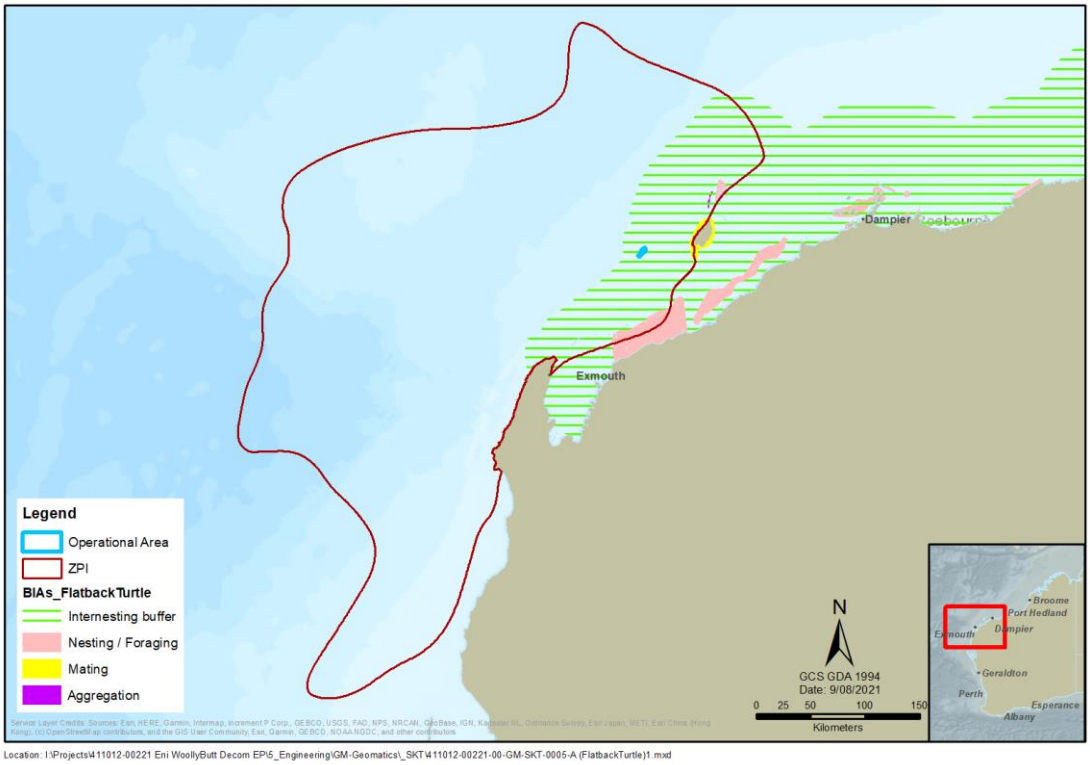


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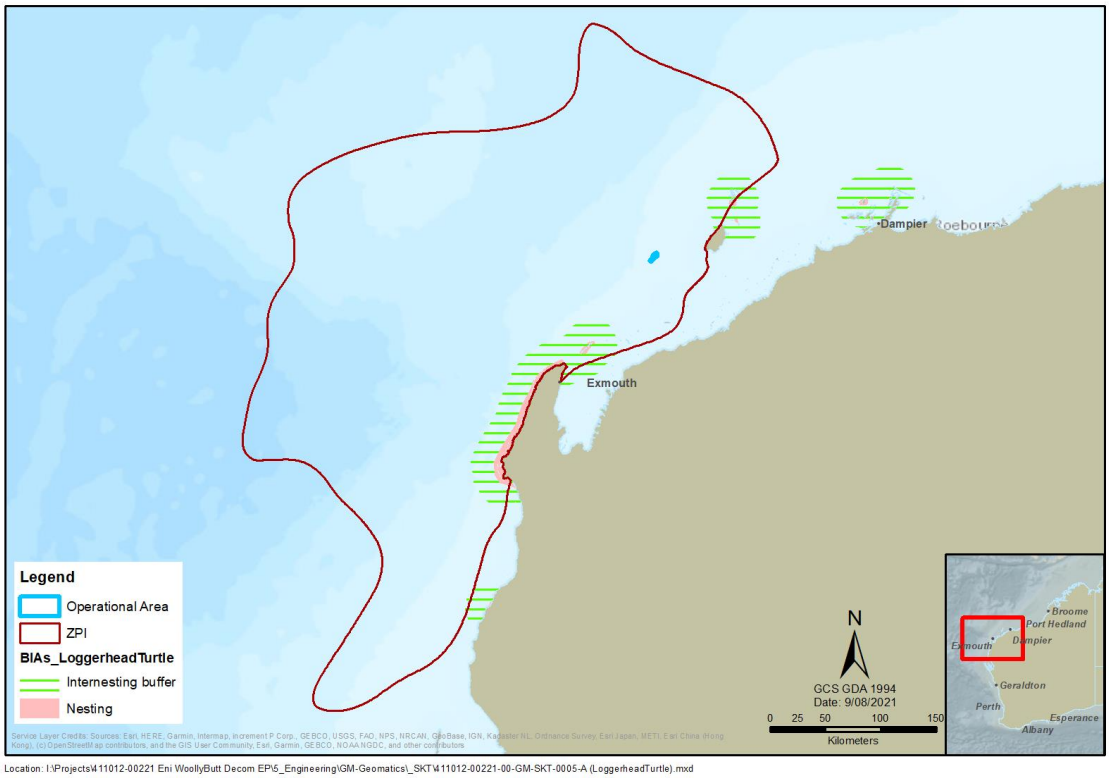
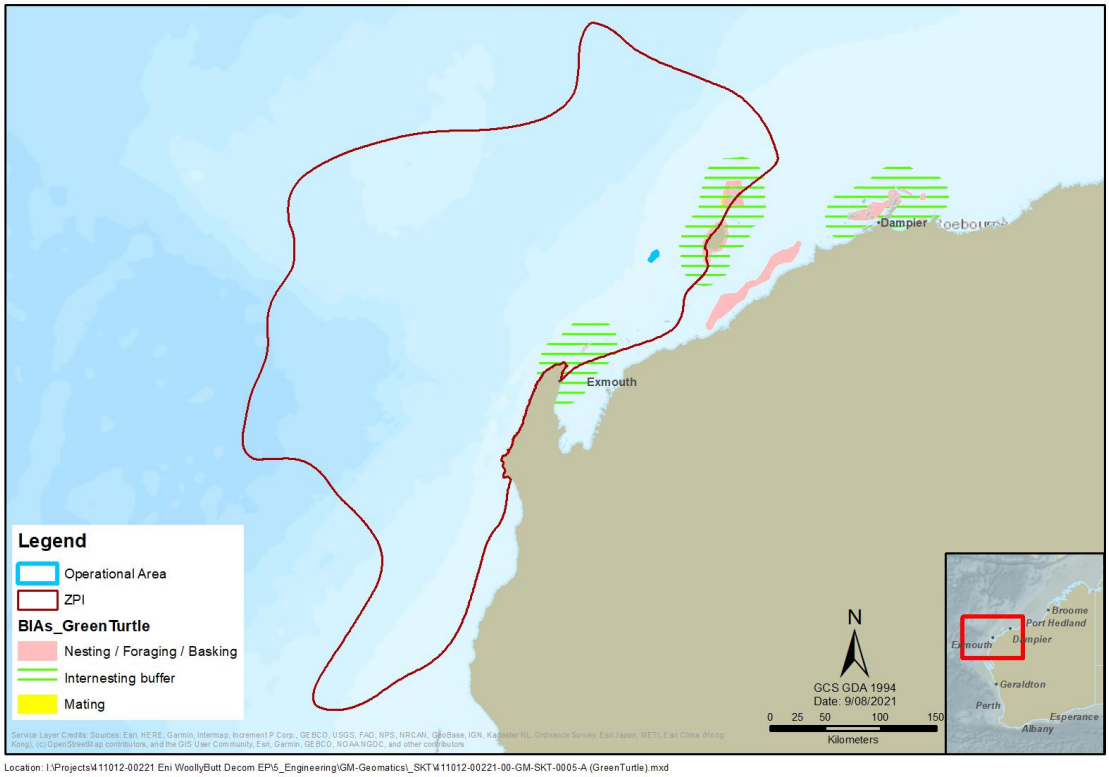
Figure 5.9: BIAs for Flatback turtle



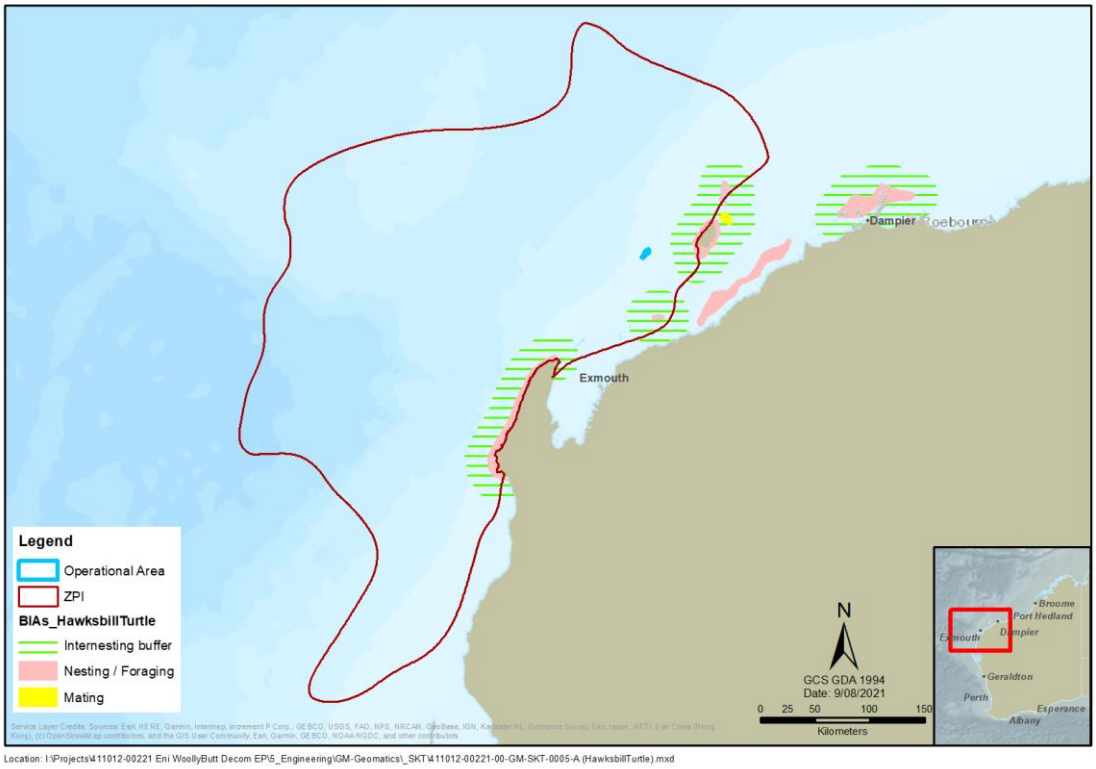
Location: I:\Projects\411012-00221 Eni WoollyButt Decom EP\5_Engineering\GM-Geomatics_SKT\411012-00221-00-GM-SKT-0005-A (LoggerheadTurtle).mxd

Figure 5.10: BIAs for Loggerhead turtle



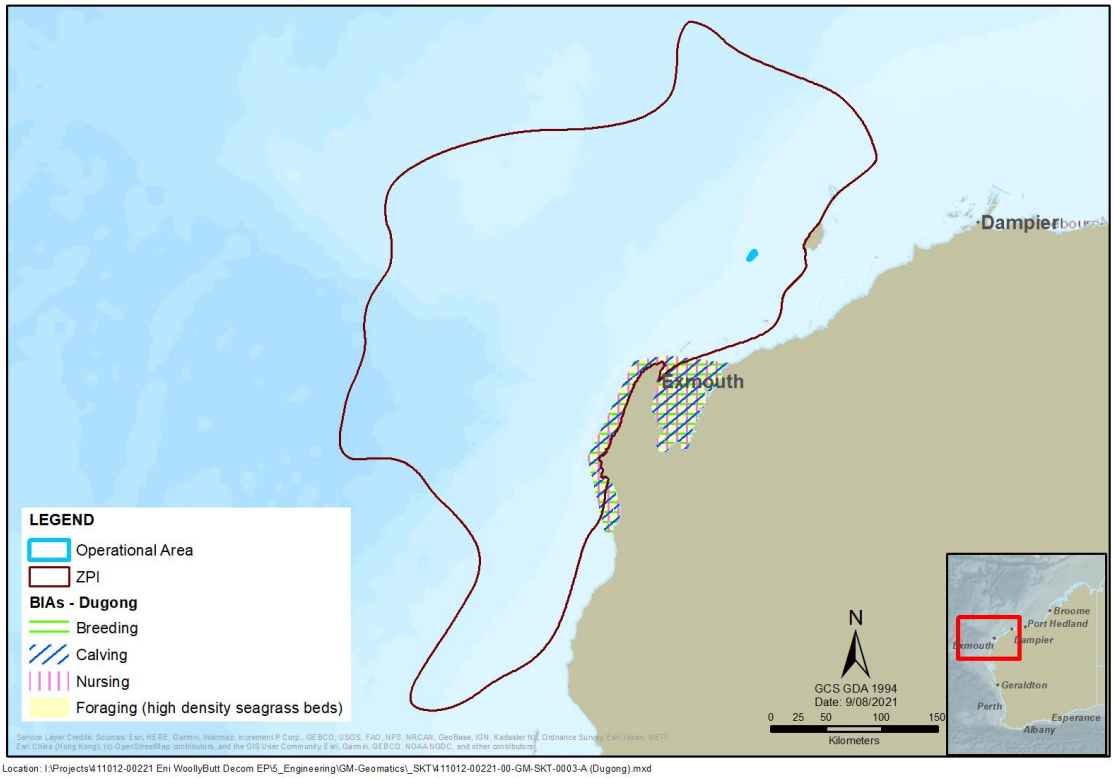
Location: I:\Projects\411012-00221 Eni WoollyButt Decom EP\5_Engineering\GM-Geomatics_SKT\411012-00221-00-GM-SKT-0005-A (GreenTurtle).mxd

Figure 5.11: BIAs for Green turtle



Location: I:\Projects\411012-00221 Eni WoollyButt Decom EP\5_Engineering\GM-Geomatics_SKT\411012-00221-00-GM-SKT-0005-A (HawksbillTurtle).mxd

Figure 5.12: BIAs for Hawksbill turtle



Location: I:\Projects\411012-00221 Eni WoollyButt Decom EP\5_Engineering\GM-Geomatics_SKT\411012-00221-00-GM-SKT-0003-A (Dugong).mxd

Figure 5.13: BIAS for Dugong

5.5 Cultural and Socio-Economic Environment

5.5.1 Commercial Fisheries

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

5.5.1.1 Commonwealth Fisheries

Commonwealth fisheries within the ZPI are listed in Table 5.4. The locations of these fisheries in relation to the ZPI and Operational are shown in Figure 5.14.

Table 5.4: Commonwealth fisheries within the ZPI and Operational Area

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

[1] OA = Operational Area

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

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

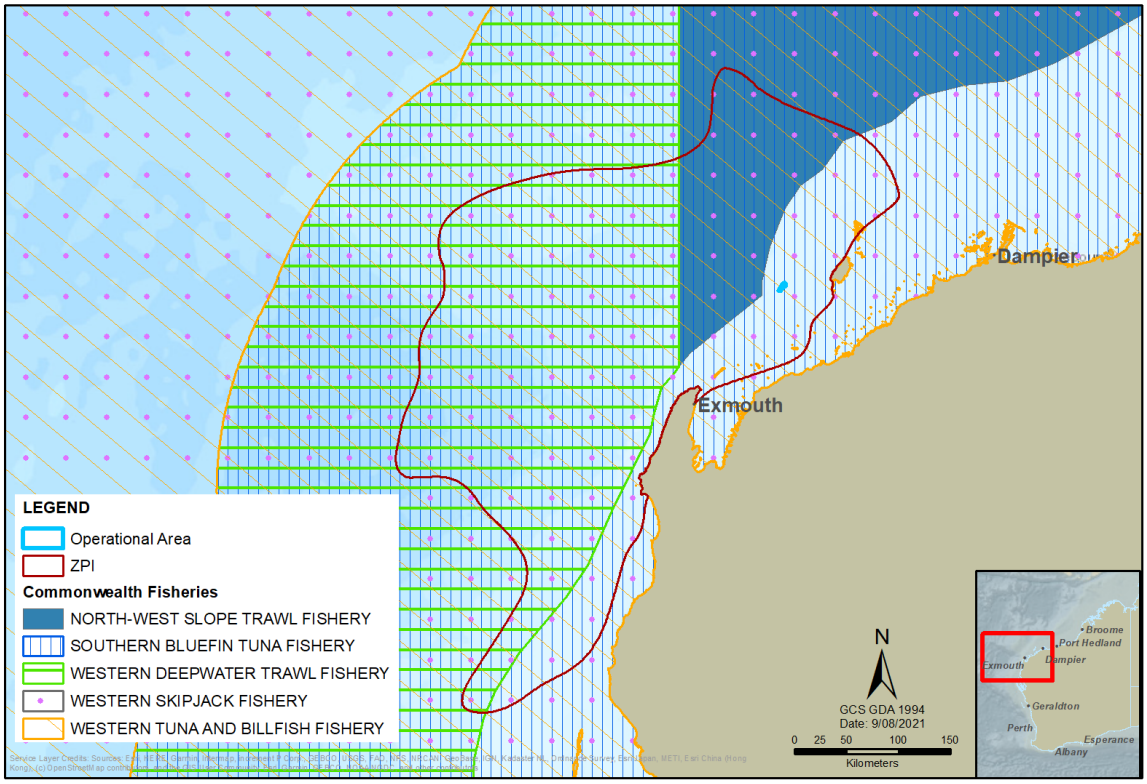


Figure 5.14: Commonwealth fisheries within the Operational Area

5.5.1.2 State Fisheries

State-managed fisheries within the Operational Area and ZPI are listed in Area. The locations of these fisheries in relation to the ZPI and Operational are shown in

Table 5.5: State fisheries within the Operational Area

Fishery	Licensed to fish in operational area	Potential for interaction	Description
State Managed Fisheries			
Mackerel Managed Fishery	✓	✓	**Description:** The Mackerel Managed Fishery (MMF) targets Spanish mackerel (*Scomberomorus commerson*) using near-surface trawling gear from small vessels in coastal areas around reefs, shoals and headlands. Jig fishing is also used to capture grey mackerel (*S. semifasciatus*), with other species from the genera Scomberomorus (Lewis *et al.*, 2020). The commercial fishery extends from Cape Leeuwin to the Northern Territory border. There are three managed fishing areas: Kimberley (Area 1), Pilbara (Area 2), and Gascoyne and West Coast (Area 3). The operational area is located within Area 3. The majority of the catch is taken from waters off the Kimberley coasts (Lewis and Jones, 2018), reflecting the tropical distribution of mackerel species (Molony *et al.*, 2015). The majority of fishing activity occurs around the coastal reefs of the Dampier Archipelago and Port Hedland area, with the seasonal appearance of mackerel in shallower coastal waters most likely associated with feeding and gonad development prior to spawning (Mackie *et al*. 2003). Spanish mackerel spawn between August and November when inhabiting coastal reef areas of the Exmouth/Gascoyne region, with females exhibiting serial spawning behaviour (spawning every one to three days) over the spawning period. Outside the main fishing season (December to April), it is unclear where the mackerel populations inhabit. However, there is anecdotal evidence to suggest populations move into deeper offshore waters (Mackie *et al.*, 2003). Records show that no vessels were active in the 60 NM block that covers the operational area between 2018 and 2020. **Licences/vessels:** 15 boats fished in the MMF during 2019 (Lewis et al. 2020)

Fishery	Licensed to fish in operational area	Potential for interaction	Description
Pilbara Demersal Scalefish Fishery – Line	✓	✓	**Description:** The PLF encompasses all of the 'Pilbara waters', extending from a line commencing at the intersection of 21°56'S latitude and the boundary of the Australian Fishing Zone and north to longitude 120°E (Newman *et al.*, 2014). The PLF targets tropical demersal scalefish and is the smallest scale fishery within the Pilbara Demersal Scale Fishery (PDSF) in terms of monetary value, attaining a commercial catch of 40 t (Newman *et al.,* 2015b). There are no stated depth limits and the western extent of the fishery is the boundary of the AFZ (Newman *et al.*, 2015b). The PLF is managed under the Prohibition on Fishing by Line from Fishing Boats (Pilbara Waters) Order 2006 with the exemption of nine fishing vessels for any nominated five-month block period within the year. Fishing in Area 3 has also been a closed to line fishing since 1998 (Newman *et al.*, 2015b). Records show that a maximum of four vessels that were active in the 60 NM block that covers the operational area between 2018 and 2020. **Licences/vessels:** five vessels were active in the trap fishery during 2019 (Newman et al, 2020a).
Pilbara Demersal Scalefish Fishery – Trap	✓	✓	**Description:** The PTMF covers the area from Exmouth northwards and eastwards to the 120° line of longitude, and offshore as far as the 200 m isobath. Like the trawl fishery, the trap fishery is also managed by the use of input controls in the form of individual transferable effort allocations monitored with a satellite-based vessel monitoring system (VMS). Waters inside of the 50 m isobath are permanently closed to trap fishing and Area 3 has also been closed to trapping since 1998 (Newman *et al.*, 2015b). Traps are limited in number with the greatest effort in waters greater than 50 m depth. This fishery targets high value species such as red emperor and goldband snapper (Newman et al, 2020a). Records show that less than three vessels were active in the 60 NM block that covers the operational area between 2018 and 2020. **Licences/vessels:** three vessels were active in the trap fishery during 2019 (Newman et al, 2020a).

Fishery	Licensed to fish in operational area	Potential for interaction	Description
Pilbara Demersal Scalefish Fishery – Trawl	×	×	**Description:** The PFTIMF is divided into two zones and waters inside of the 50 m isobath are permanently closed to fish trawling. The operational area is located within Zone 1, which has been closed to fish trawling since 1998 (Gaughan *et al*., 2019). Only if this fishery was to reopen would there be any potential for interaction. The PFTIMF operates with standard stern trawling gear (single net with extension sweeps). Records show that there two vessels were active in the operational trawl sector (zone 2) of the PDSF in 2019. (Newman et al, 2020a).
Marine Aquarium Managed Fishery	✓	×	**Description:** The Marine Aquarium Managed Fishery operates within Western Australian waters, between the Northern Territory and South Australia borders. The operational area is located within the managed fishery. The fishery is primarily a dive-based with fishers using hand-held nets to capture the desired target species and is restricted to safe diving depths (typically < 30 m). The fishery is typically active more active in waters south of Broome with higher levels of effort around the Capes region, Perth, Geraldton, Exmouth, Dampier and Broome. The landed catch was predominantly ornamental fish but also included hermit crabs, seahorses, invertebrates, corals and live rock (Newman *et al.*, 2014). Records show that no vessels were active in the 60 NM block that covers the operational area between 2018 and 2020. **Licences/vessels:** there were 12 licences in 2019, ten of which were active (Newman et al. 2020b).
Pilbara Crab Managed Fishery	✓	×	**Description:** The Pilbara Crab Managed Fishery (PCMF) primarily targets blue swimmer crabs using hourglass traps, primarily within inshore waters around Nichol Bay and the Exmouth Gulf. The blue swimmer crab is most abundant sandy benthic habitats with water depths of less than 20 metres (Johnston et al. 2020a). Catch rates for the fishery in 2019 saw a significant increase (88%) from 2018. This catch rate was well above the preliminary harvest strategy threshold, indicating there should be adequate egg production under typical environmental conditions (Johnston et al. 2020b). Records show that no vessels were active in the 60 NM block that covers the operational area between 2018 and 2020. **Licences/vessels:** Two people were employed as skippers and crew on vessels operating in the PCMF in 2019 (Johnston et al. 2020b).

Fishery	Licensed to fish in operational area	Potential for interaction	Description
Specimen Shell Managed Fishery	✓	×	**Description:** The Specimen Shell Managed Fishery (SSMF) can be conducted anywhere within Western Australia waters and targets the collection of specimen shells for display, collection, cataloguing and sale. The Specimen Shell Managed Fishery encompasses the entire WA coastline but effort is concentrated in areas adjacent to the largest population centres such as: Broome, Exmouth, Shark Bay, Geraldton, Perth, Mandurah, the Capes area and Albany (Hart et al. 2020). Collection is predominately by hand when diving or wading in shallow, coastal waters though a deeper water collection aspect to the fishery has been initiated with the employment of ROVs operating at depths up to 300 m (Hart et al., 2020). A number of areas are closed to the SSMF, including various marine parks and aquatic reserves such as Reef Observation Areas and Fish Habitat Protection Areas (Hart et al., 2020). Records show that no vessels were active in the 60 NM block that covers the operational area between 2018 and 2020. **Licences/vessels:** 31 licences in 2019/20 (each licence allows a maximum of four divers in the water at any one time), 17 were utilised for fishing in 2019 (Hart et al., 2020).
South-west Coast Salmon Fishery	✓	×	**Description: Description:** The South West Coast Salmon Managed Fishery (SWCSMF) is one of 10 commercial fisheries that make up the West Coast Nearshore and Estuarine Finfish Resource (WCNEFR). The main commercial methods are haul, beach seine and gill netting (Duffy & Blay, 2020). In 2019, the SWCSMF was a major contributor to the total commercial catch for the WCNEFR, with two fish species (Western Australian salmon and sea mullet) making up the majority of the catch. Records show that no vessels were active in the 60 NM block that covers the operational area between 2018 and 2020. **Licences/vessels:** N/A

Fishery	Licensed to fish in operational area	Potential for interaction	Description
Onslow Prawn Managed Fishery	✓	×	**Description**: The Onslow Prawn Managed Fishery (OPMF) encompasses a portion of the continental shelf off the Pilbara. The fishery targets a range of penaeids including king prawns (*Penaeus latisulcatus*), brown tiger prawns (*Penaeus esculentus*) and blue endeavour prawns (*Metapenaeus endeavouri*), which typically inhabit soft sediments < 45 m water depth. Fishing is carried out using trawl gear over unconsolidated sediments (sand and mud). Total prawn catches in 2019 were less than 50 tonnes, below the target catch range (Kangas *et al.*, 2020). Records show that no vessels were active in the 60 NM block that covers the operational area between 2018 and 2020. **Licences/vessels**: One vessel fished in the OPMF during 2019 (Kangas *et al.* 2020).
West Australian Abalone Fishery	✓	×	**Description**: The Western Australian abalone fishery includes all coastal waters from the Western Australian and South Australian border to the Western Australian and Northern Territory border. The fishery is concentrated on the south coast (greenlip and brownlip abalone) and the west coast (Roe's abalone). Abalone are harvested by divers, limiting the fishery to shallow waters (typically < 30 m). No commercial fishing for abalone north of Moore River (Zone 8 of the managed fishery) has taken place since 2011–2012. A restocking project has been successful in a trial scale but has yet to be implemented on a commercial scale to determine if restocking would recover the entire stock in the longer term. (Strain et al., 2020); interactions with participants in the fishery will not occur during the Petroleum Activities Program. Records show that no vessels were active in the 60 NM block that covers the operational area between 2018 and 2020. **Licences/vessels:** 21 vessels were active in Roe's abalone fishery (Strain et al., 2020).
West Coast Deep Sea Crustacean	✓	×	**Description:** The West Coast Deep Sea Crustacean (WCDSC) fishery is a 'pot' fishery that operates in a long-line formation in the shelf edge waters (> 150 m) of the West Coast and Gascoyne bioregions (How & Orme, 2020). The fishery targets three crab species; Crystal (snow) (*Chaceon albus*), Champagne (*Hypothalassia acerba*) and Giant (king) (*Pseudocarcinus gigas*). Crystal crab makes up the vast majority (99% in 2019) of annual total landings. Records show that no vessels were active in the 60 NM block that covers the operational area between 2018 and 2020. **Licences/vessels**: Four vessels operated in the fishery in 2019 (How & Orme, 2020).

5.5.2 Tourism and Recreational Fishing

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

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

5.5.3 Commercial Shipping

Most shipping that occurs within and near the Operational Area is associated with the oil and gas industry, the field being located inshore of major shipping lanes between Australia and Asia. The closest major ports to the field are Dampier and Port Hedland to the north-east of the field.

Figure 5.15 shows historical automatic identification system (AIS) traffic plots, with data collected up until January 2021. Vessel point density analysis conducted by AMSA indicates the Operational Area is located outside of local shipping lanes of the NWS, and vessel density in the vicinity of the field is low (i.e., less than or equal to five vessel reports per km²). It is possible transient shipping traffic may occur albeit in low volumes.

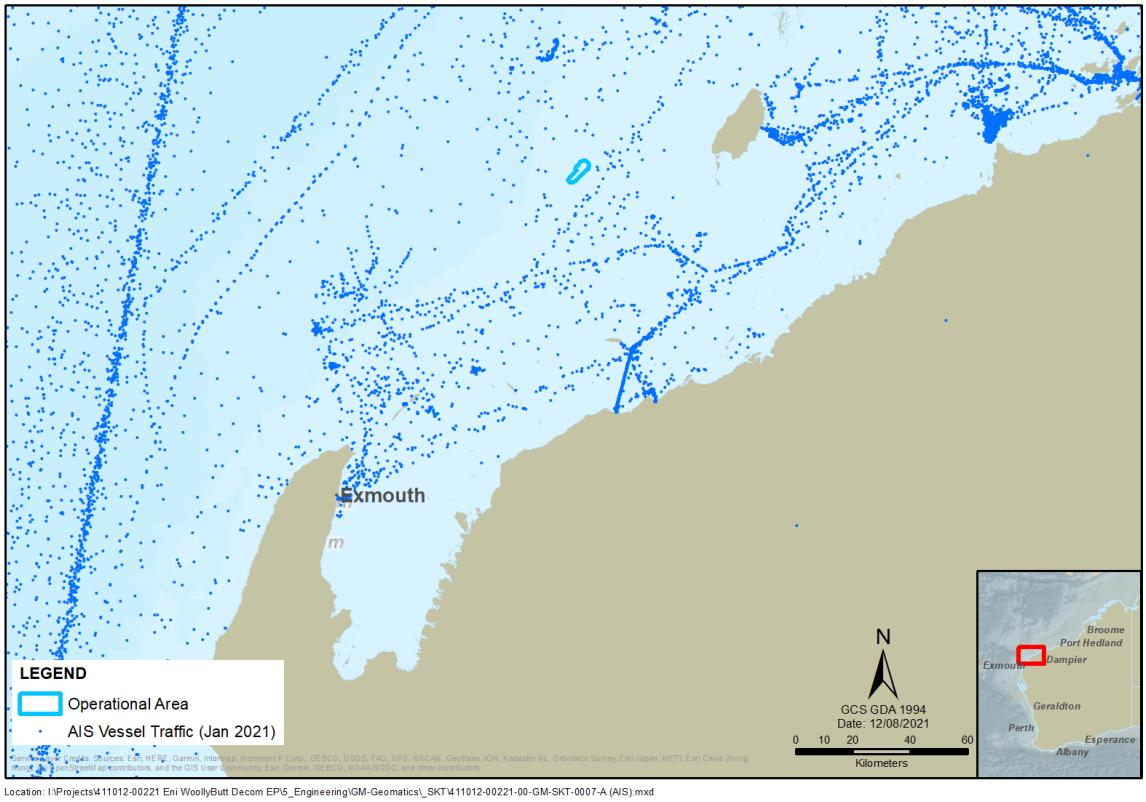


Figure 5.15: Map showing the Woollybutt oil field with AIS data (January 2021)

5.5.4 Defence Activities

The Operational Area is located within Sectors R852A and R852B of the North West Australia Exercise Area, a Defence Practice Area. Each of these is declared as a military flying training area activated by Notice to Airmen, existing in height blocks from 10,000 ft to 28,000 ft and 28,000 ft to 60,000 ft, respectively (Figure 5.16).

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

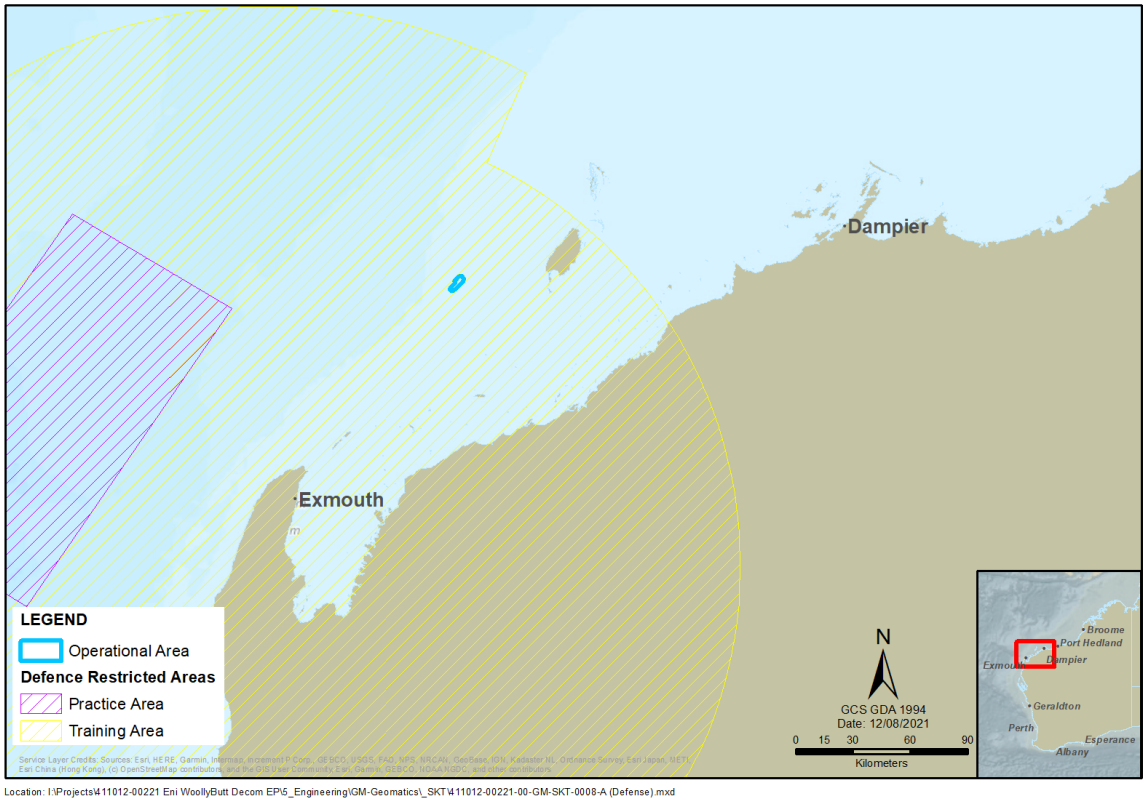


Figure 5.16: Defence-restricted areas

5.5.5 Oil and Gas Activities

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

The Operational Area is located approximately 40 km west of Barrow Island, where Chevron Australia has been producing oil since 1967. The Operational Area is also located approximately 45 km south of the Gorgon gas fields, and approximately 35 km south-east of the nearest exploration well, Zola-1, which was completed in 2011. The exclusion zone for the Chevron-operated Wheatstone pipeline lies within the westernmost extent of the Operational Area.

5.5.6 Cultural Heritage and Shipwrecks

Neither shipwrecks nor heritage sites are known to occur within the Operational Area (Commonwealth of Australia, 2012). The nearest shipwreck is the English ship *Tryal,* located approximately 110 km north-east of the Operational Area, which was wrecked on what are now known as the Tryal Rocks just north of the Montebello Islands in 1622. This shipwreck is protected by the *Marine Archaeological Act 1973* and has 'National Estate' status.

A further uncharted wreck (the 19th Century ship *Wild Wave*) is understood to be located on the seaward side of the southwest section of the Montebello's barrier reef. Two other wrecks, one believed to be of a lugger wrecked about 1915 and one of a more recent

vessels, are reported in or near the vicinity of Willy Nilly Lagoon in the central part of the Montebello Islands.

A search of registered Aboriginal heritage sites was also undertaken using the Aboriginal Heritage Enquiry Tool. This search found no registered Aboriginal heritage sites within the Operational Area. A copy of the search results is attached in Appendix D.

5.6 Values and Sensitivities

There are a number of key sensitive areas that overlap the Operational Area and/or ZPI. These are summarised in Table 5.6 and further described in Appendix B.

Table 5.6: Key sensitive areas within Operational Area and/or ZPI

Key sensitive area	IUCN category*	Overlaps Operational Area	Distance from Operational Area (km)
World Heritage Areas			
Ningaloo Coast	Not applicable	No	84
Ningaloo Marine Area – Commonwealth Waters	Not applicable	No	102
Wetlands of International or National Significance			
Cape Range Subterranean Waterways	Not applicable	No	116
Australian Marine Parks (AMP)			
Gascoyne AMP	IV (II, IV and VI)**	No	115
Ningaloo AMP	IV (II and IV)**	No	102
Montebello AMP	VI (VI)**	No	35
Shark Bay AMP	VI (VI)**	No	419
State Marine Protected Areas			
Marine Parks			
Ningaloo	IA, II and IV	No	103
Barrow Island	IA, IV, VI	No	40
Montebello Islands	IA, II, I and VI	No	65
Marine Management Areas			
Muiron Islands	IA and VI	No	84
Barrow Island	IV and VI	No	34
Key Ecological Features			
Ancient coastline at 125 m depth contour	Not applicable	No	4
Continental Slope Demersal Fish Communities	Not applicable	No	14
Canyons Linking the Cuvier Abyssal Plain and the Cape Range Peninsula	Not applicable	No	58
Commonwealth Waters adjacent to Ningaloo Reef	Not applicable	No	103

* IUCN categories and objectives:

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

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

** IUCN category for the Australian Marine Park is provided and in brackets the IUCN categories for specific zones within each Marine Park as assigned under the North-west Marine Parks Network Management Plan 2018.

5.7 Australian Marine Parks

The Operational Area does not overlap with any Australian Marine Parks (AMP), however the Gascoyne AMP, Ningaloo AMP, Shark Bay AMP and Montebello AMP do fall within the ZPI (Figure 5.17). Details of the values of the AMPs is provided in Appendix B.

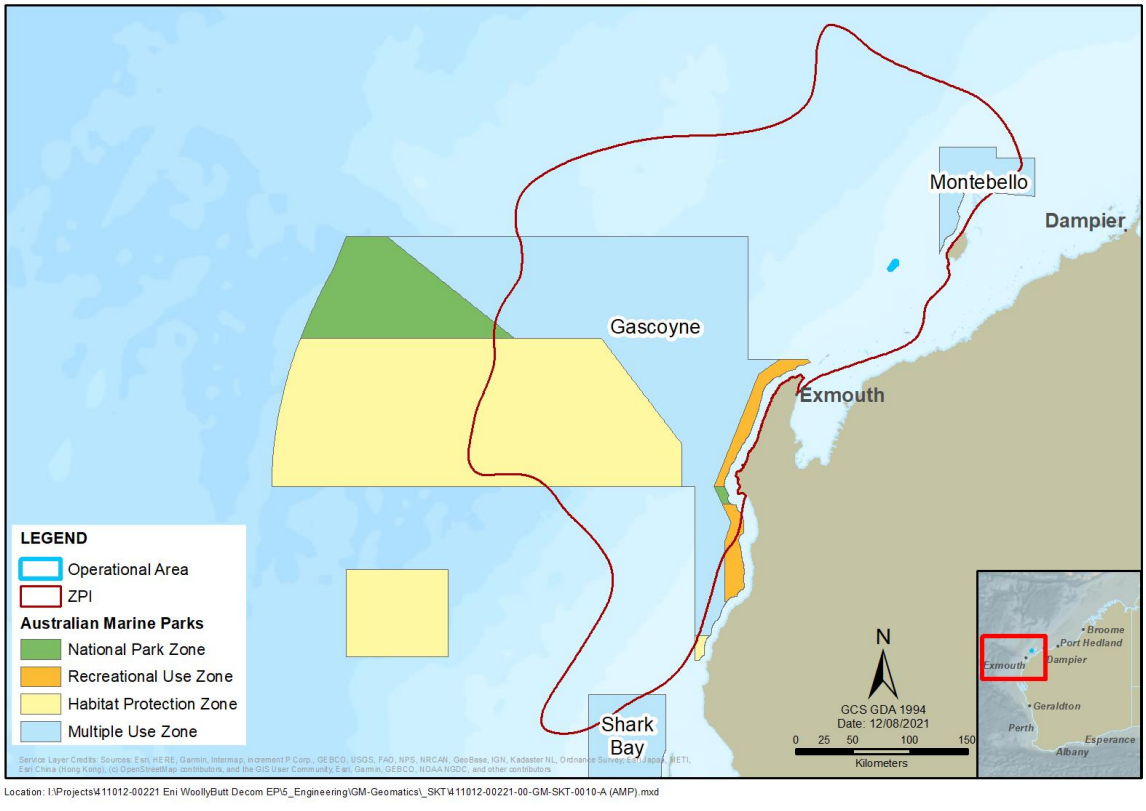


Figure 5.17: Australian marine parks

5.8 State Marine Protected Areas

No State-managed Marine Parks occur within the Operational Area. Two suites of conservation areas occur within the ZPI; the Ningaloo Marine Park and Muiron Islands Marine Management Area, and the Barrow Island Marine Park/Marine Management Area and Montebello Islands Marine Park (Figure 5.18).

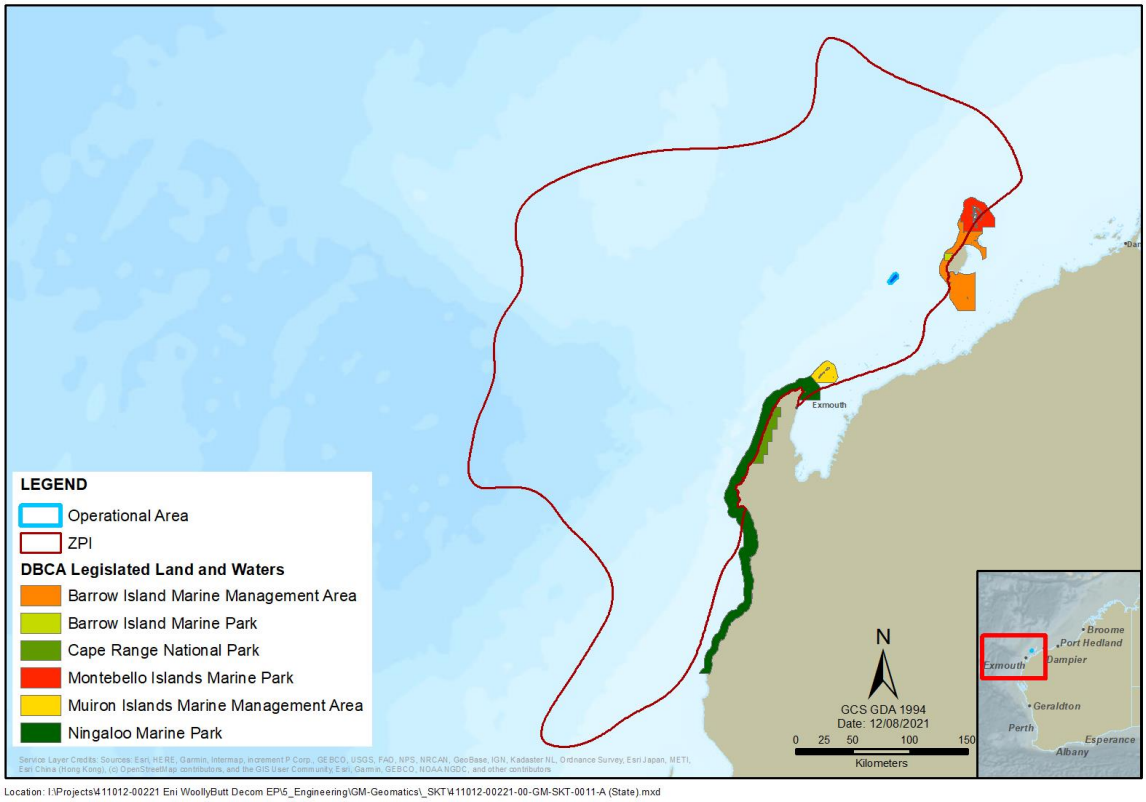


Figure 5.18: State marine protected areas

5.9 Key Ecological Features

An EPBC Protected Matters Search shows that the Operational Area did not identify any Key Ecological Feature (KEF). A search of the ZPI identified five KEFs which have been identified in the North-West Marine Bioregional Plan (Commonwealth of Australia, 2012). Under section 176 of the EPBC Act, once a bioregional plan has been made the minister responsible for the environment must have regard to it when making any decision under the Act to which the plan is relevant (DoEE, 2019).

The KEFs identified in the EPBC Protected Matters Search are shown in Figure 5.19:

- Ancient Coastline at 125 m depth contour (4 km west of Operational Area, within ZPI)
- Continental Slope demersal fish communities (13 km west of Operational Area, within ZPI)
- Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula (58 km southwest of Operational Area, within ZPI)
- Commonwealth waters adjacent to Ningaloo Reef (102 km southwest of Operational Area, within ZPI)
- Exmouth Plateau (130 km west of Operational Area, within ZPI)

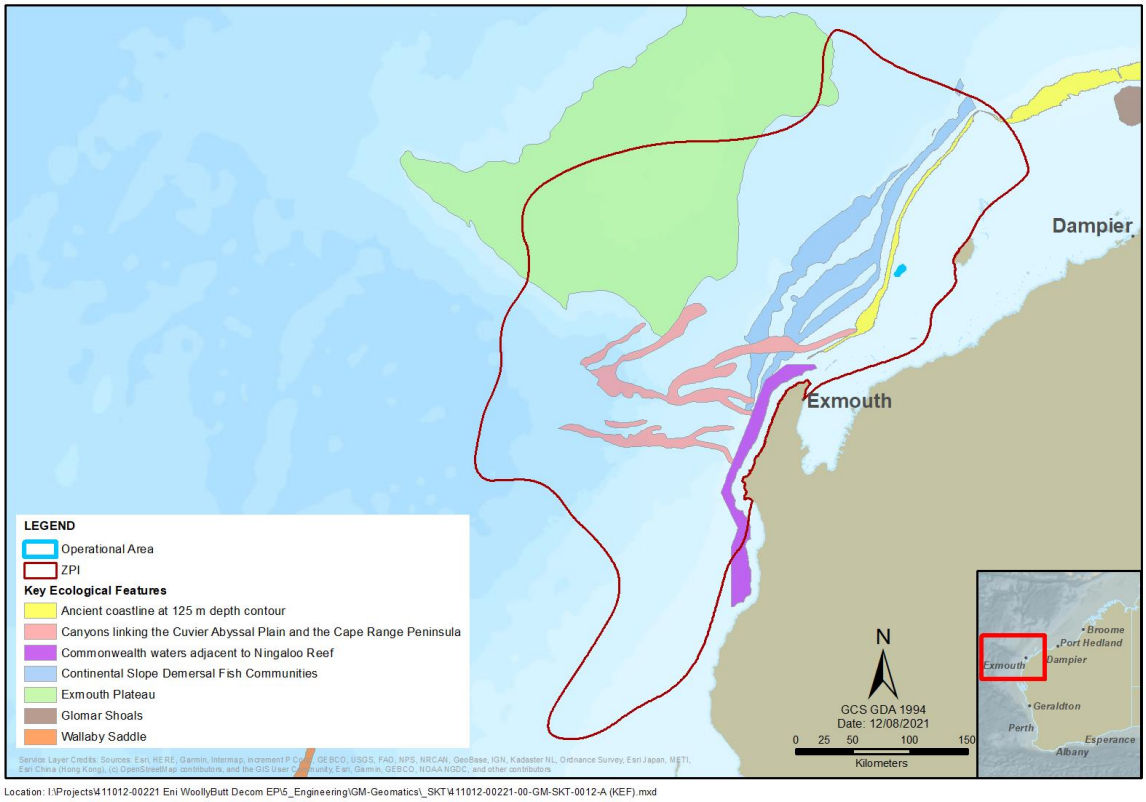


Figure 5.19: Key ecological features

6 STAKEHOLDER CONSULTATION

6.1 Consultation Summary

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

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

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

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

As part of the larger scale consultation regarding the Woollybutt field activities, Eni has specifically consulted relevant stakeholders regarding decommissioning activities that form the Petroleum Activities Program (see Section 6.3).

Eni has allowed each relevant person a reasonable period for assessing consultation material it provided. No objections were received from stakeholders in relation to the proposed decommissioning activities described in this EP.

Eni concludes all relevant stakeholders have been well-informed of upcoming activities in the Woollybutt field through ongoing discussions regarding decommissioning activities, as evidenced in Appendix C.

6.2 Identification of Relevant Stakeholders

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

- Each Department or agency of the Commonwealth to which the activities to be performed under the EP, or the revision of the EP, may be relevant.
- Each Department or agency of a State or the Northern Territory to which the activities to be performed under the EP, or the revision of the EP, may be relevant.
- The Department of the responsible State Minister, or the responsible Northern Territory Minister.
- A person or organisation whose functions, interests or activities may be affected by the activities to be performed under the EP, or the revision of the EP,
- Any other person or organisation that the titleholder considers relevant.

Relevant stakeholders are summarised in Table 6.1.

Table 6.1: Relevant authorities, persons and organisations for consultation

Relevant Authority, Person or Organisation	Justification
Commonwealth Federal Government	
Australian Fisheries Management Authority	Australian Fisheries Management Authority is the Australian Government agency responsible for the efficient management and sustainable use of Commonwealth fish resources.
Australian Hydrographic Office (AHO)	The AHO is the Commonwealth Government agency responsible for publishing and distributing nautical charts and other information required for the safety of ships navigating in Australian waters.
Australian Maritime Safety Authority	AMSA is the national maritime agency whose responsibilities include protecting the marine environment from the impacts of shipping.
Department of Agriculture, Water and the Environment (DoAWE)	DoAWE implements the Australian Government's policies and programmes to protect and conserve the environment, water and heritage and promote climate action. In February 2015, environmental approvals were streamlined, with NOPSEMA becoming the sole assessor for offshore petroleum activities.
Department of Defence	The Australian Defence Force is constituted under the *Defence Act 1903*. Its mission is to defend Australia and its national interests. In fulfilling this mission, Defence serves the Government of the day and is accountable to the Commonwealth Parliament which represents the Australian people to efficiently and effectively carry out the Government's defence policy.
Western Australia State Government	
Department of Mine, Industry Regulation and Safety (formerly Department of Mines and Petroleum)	Responsible for ensuring the State's resources sector is developed and managed responsibly and sustainably for the benefit of all Western Australians. Prior to NOPSEMA it was the Designated Authority for adjacent Commonwealth waters.
Department of Primary Industries and Regional Development (formerly Department of Fisheries) (DPIRD)	Conserve, develop and manage Western Australian aquatic resources; commercial & recreational; fishing licencing; protecting aquatic environment & fish ecosystems.
Department of Biodiversity, Conservation and Attractions	Conserve Western Australia's biodiversity, cultural and natural values and providing world-recognised nature-based tourism and recreation experiences for the community. Includes the Parks and Wildlife Service.
Department of Transport	Provides support in the event of a marine oil spill reaching State waters.
Fishing Industry	
Commonwealth Fisheries Association	Industry Non-Government Organisation – Peak body representing the collective rights, responsibilities and interests of commercial fishing industry in Commonwealth regulated fisheries.
A Raptis and Sons	Owns and operates 15 commercial fishing vessels that work out of the Northern Prawn Fishery, the Gulf of Carpentaria Developmental Finfish Trawl Fishery, the Gulf of Saint Vincent and the Great Australian Bight Trawl Fishery as well as participating in many international fishing operations.

Relevant Authority, Person or Organisation	Justification
Pearl Producers Association	The Pearl Producers Association promotes the economic, social and environmental importance of the Australian pearling industry to key decision-makers and the wider community, formulating responses to issues that affect its members and assisting with the provision of strategic direction in support of Australian South Sea Pearl Producers.
Recfishwest	Industry Non-Government Organisation – Peak recreational fishing body and advocate for fisheries.
Western Australian Fishing Industry Council	Western Australian Fishing Industry Council is Western Australia's peak industry body representing the interests of commercial fishing, pearling and aquaculture sectors.
Westmore Seafoods (Seafresh Holdings)	Fishing operator in the area holding three out of the 12 licences in the Pilbara Trawl Fishery; zero out of six licences in the Pilbara Trap Fishery and one out of 30 licences in the Onslow Prawn Fishery.
Southern Blue Fin Tuna Industry Association	Western Australian Fishing Industry Council recommended consultation with Southern Blue Fin Tuna Industry Association as Western Australia is an important migratory route for Southern Blue Fin Tuna.
Individual State Commercial Licence Holders	• Mackerel Managed Fishery • Onslow Prawn Managed Fishery • Pilbara Fish Trawl (Interim) Managed Fishery • Pilbara Trap Managed Fisher • Pilbara Line Fishery.
Individual Commonwealth Commercial Licence Holders	• Southern Bluefin Tuna Fishery • Western Tuna and Billfish Fishery.

6.3 Consultation Undertaken

Eni has undertaken specific stakeholder consultation with regard to the Petroleum Activities Program in March 2021. An update was provided to stakeholders in December 2021 as the base case of complete removal was adopted in response to NOSPEMA assessment. However, decommissioning activities were first introduced to stakeholders during the consultation that occurred for the P&A and removal activities EP in 2020.

Full transcripts of consultation undertaken, and responses received are provided in Appendix C and a summary and assessment of consultation is shown in Table 6.2.

No concerns were received from stakeholders in relation to the proposed Petroleum Activities Program. All feedback from consultation is evidenced in Appendix C and a summary is shown in Table 6.2.

Table 6.2: Consultation summary and assessment

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
AFMA	13.01.2022 – Email response from AFMA received 20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 24.05.2021 – Email update sent 04.05.2021 – Email update sent 24.03.2021 – Email update sent 09.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	AFMA iterated the importance to continue consulting with all fishers who have entitlements to fish within the proposed area, which can be done through consultation with the relevant fishing industry associations or directly with fishers who hold entitlements in the area (e.g. North West Slope Trawl Fishery concession holders, Western Australia Fishing Industry Council (WAFIC)).	Impacts to fisheries have been considered in this EP in Section 9.1. Relevant fishing industry bodies have been consulted with during the preparation of this EP (as detailed in this Table).

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
AHO (previously AHS)	20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 24.03.2021 – Email update sent 09.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	AHO had not provided feedback on the activities proposed in this EP at the time of submitting the EP to NOPSEMA for assessment.	At the time this EP was submitted to NOPSEMA for assessment no direct response to AHO was required. However, impacts to other marine users have been considered in this EP in Section 9.1. AHO will be notified of the equipment recovery activities as per Table 11.4
AMSA	20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 24.03.2021 – Email update sent 11.03.2021 – Email received 09.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	AMSA had not provided feedback on the activities proposed in this EP at the time of submitting the EP to NOPSEMA for assessment.	At the time this EP was submitted to NOPSEMA for assessment no direct response to AMSA was required. However, impacts to other marine users have been considered in this EP in Section 9.1. AMSA will be notified of the equipment recovery activities as per Table 11.4

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
DBCA (previously DPAW)	20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 24.03.2021 – Email update sent 09.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	DBCA had not provided feedback on the activities proposed in this EP at the time of submitting the EP to NOPSEMA for assessment.	At the time this EP was submitted to NOPSEMA for assessment no direct response to DBCA was required. The proposed activities are not located within waters or on lands managed by DBCA.
DOD	11.02.2022 – Follow-up email sent to DOD 20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 24.03.2021 – Email update sent 09.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	DoD had not provided feedback on the activities proposed in this EP at the time of submitting the EP to NOPSEMA for assessment.	At the time this EP was submitted to NOPSEMA for assessment no direct response to DoD was required. However, impacts to other marine users have been considered in this EP in Section 9.1. DOD will be notified of the equipment recovery activities as per Table 11.4
DoT	10.02.2022 – DoT acknowledged the clarification 07.02.2022 – Email response sent to DoT advising that whilst there is a spill risk to	DoT acknowledged receipt of consultation material and confirmed consultation procedure that would need to be followed in the instance there is risk of oil spill impacting state waters.	Whilst there is a spill risk to State waters, Eni are utilizing the already NOPSEMA accepted Woollybutt OPEP (000105_DV_PR.HSE.1045.000), which

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
	State waters, Eni are utilizing the already NOPSEMA accepted Woollybutt OPEP (000105_DV_PR.HSE.1045.000), which covers all response requirements from a spill during the Woollybutt decommissioning. 19.01.2022 – Email response received from DoT 20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 07.04.2021 – Email received 24.03.2021 – Email update sent 18.03.2021 – Email received 09.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.		covers all response requirements from a spill during the Woollybutt decommissioning. A link to that OPEP can be found here: https://docs.nopsema.gov.au/A786335.

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
DoAWE	20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 22.03.2021 – Teleconference between Eni and DoAWE 16.03.2021 – Email received with an update on the regulatory review of the sea dumping permitting framework 11.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent	DoAWE acknowledged Eni's proposed strategy and confirmed the abandonment of the remaining structures, as per this EP, requires approval under the Sea Dumping Act. DoAWE recommended submitting an application for a permit to dispose of vessels at sea.	Eni is in the process of gaining approval for leaving infrastructure within the Woollybutt field in-situ. This includes: 1. Confirming the absence of marine pests 2. Providing further detail on the location of the anchors. Anchor locations and status are presented in Section 4.7.1. Risk of marine pests on the remaining infrastructure is addressed in Section 9.1.
DMIRS (formerly DMP)	31.01.2021 – Email received from DMIRS 20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 24.05.2021 – Email response sent 18.05.2021 – Email received 27.04.2021 – Email response sent 20.04.2021 – Email received 24.03.2021 – Email update sent 09.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	DMIRS notes that the proposed activity will be assessed under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and regulated by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).	Whilst DMIRS requested further information on the leaving in-situ of plastics in May 2021. Eni are proposing to remove all infrastructure containing plastics from the field under a revised scope. Full transcript is available in Appendix C

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
DPIRD	20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 17.05.2021 – Email sent 11.05.2021 – Phone call 06.05.2021 – Email sent 24.03.2021 – Email received 24.03.2021 – Email update sent 10.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	DPIRD had not provided feedback on the activities proposed in this EP at the time of submitting the EP to NOPSEMA for assessment.	At the time this EP was submitted to NOPSEMA for assessment no direct response to DPIRD was required. However, impacts to other marine users, including fisheries, have been considered in this EP in Section 8.1.

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
Commonwealth Fisheries Association (CFA)	07.02.2022 – Email sent to Commonwealth Fisheries Association to follow up on comment 20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 01.04.2021 – Email sent to alternative contact within CFA by WAFIC on behalf of Eni. 24.03.2021 – Email update sent 09.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	CFA had not provided feedback on the activities proposed in this EP at the time of submitting the EP to NOPSEMA for assessment.	At the time this EP was submitted to NOPSEMA for assessment no direct response to CFA was required. However, impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 8.1.
Chevron	19.01.2022 - Meeting occurred with Chevron which included an update of the removal scope.	Informed only.	No response required. Chevron will continue to be informed as required.

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
Raptis and Sons	20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 24.03.2021 – Email update sent 10.03.2021 – Email received 10.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	Raptis had not provided feedback on the activities proposed in this EP at the time of submitting the EP to NOPSEMA for assessment.	At the time this EP was submitted to NOPSEMA for assessment no direct response to Raptis and Sons was required. However, impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 8.1.

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
Recfishwest	28.01.2022 - Consultation letter received 20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 22.04.2021 – Email update sent 31.03.2021 – Email received 24.03.2021 – Email update sent 10.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	Recfishwest has no objections to the updated decommissioning strategy. For information, Recfishwest previously responded with the request for more information to answer the following questions: • How was the recreational fishing community involved in the completed comparative assessment given it's a stakeholder? • How did ENI assess the environmental risks? How were these deemed low when degradation and fish habitat studies have not been completed? • What are the materials and potential contaminants in the subsea infrastructure to be decommissioned (particularly the umbilicals, flowlines and jumpers)? • What State and Commonwealth approvals processes will be undertaken to abandon this infrastructure? These previous requests and feedback are no longer applicable given the updated decommissioning strategy and feedback provided to Eni on 28.01.2022.	Eni responded confirming the recreational fishing community was not directly involved in the comparative assessment, provided explanation of how risks were assessed, provided details of the materials and contaminants in the infrastructure and confirmed the State and Commonwealth approval process that have been or will be undertaken. Impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 8.1.
Western Australian Fishing Industry Council (WAFIC)	03.03.2022 - Email received from WAFIC 14.02.2022 – Email sent to WAFIC 07.02.2022 – Email received from WAFIC 20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 13.05.2021 – Meeting with WAFIC	WAFIC provided initial comments to consultation made in 2021 on how the fishing industry generally views leaving infrastructure in-situ. WAFIC also provided advice on engaging with commercial fishers and agreed to review and dispatch consultation material to relevant parties on behalf of Eni. WAFIC raised concerns with: • Long term safety from plastic infrastructure being left in-situ	The scope of the EP includes full removal of all plastic components. Section 4.7.1 provides the status and locations of the anchors. Three of the anchors (ANC 73, ANC 133 and ANC 253) could not be located as they are fully buried. ANC13 and ANC193 are buried but locatable. ANC 313 is partially buried, with limited protrusion above the seabed and likely to become

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
	06.05.2021 – Email sent 06.05.2021 – Email received 05.05.2021 – Email sent 27.04.2021 – Email received 27.04.2021 – Email sent 09.04.2021 – Email received 06.04.2021 – Email sent 01.04.2021 – Email received 30.03.2021 – Email received 30.03.2021 – Email sent 26.03.2021 – Email received 26.03.2021 – Email sent 25.03.2021 – Email received 24.03.2021 – Email sent 16.03.2021 – Meeting with WAFIC, Advisian and Eni 12.03.2021 – Email received 08.03.2021 – Email sent and follow up telephone call made	• Cumulative impacts of micro plastic pollution • Combined totals of plastics that are proposed to be left in-situ • Eni's financial security to cover the cost of the risks in the future. On 20.12.2021 Eni advised WAFIC that all plastic components would be removed from the field and that only the DSPM anchors and anchor chains below the seabed would remain in-situ. WAFIC advised that they support the approach for ENI to remove the majority of the remain subsea infrastructure, in particular infrastructure containing plastic materials. WAFIC advised they would like further information on: • footprint size of the proposed objects that will remain in-situ (anchor chains, below seabed component and anchors) and to confirm what Navigational requirements will be in place for these objects. • the expected long-term degradation of subsea infrastructure left in-situ and the impacts to the marine environment from the breakdown of materials Eni have provided full details regarding WAFICs request. WAFIC advised they had no further comment. Full transcript is available in Appendix C	fully buried as per other anchors (Fugro, 2021). Section 8.8 includes a risk assessment of the degradation of the left in-situ infrastructure and its breakdown in the marine environment. Full transcript is available in Appendix C.

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
Westmore Seafoods (Seafresh Holdings)	20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 24.03.2021 – Email update sent 10.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	Seafresh Holdings had not provided feedback on the activities proposed in this EP at the time of submitting the EP to NOPSEMA for assessment.	At the time this EP was submitted to NOPSEMA for assessment no direct response to Seafresh Holdings was required. However, impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 9.1.
Pearl Producers Association (PPA)	20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 1.04.2021 – Email sent to alternative contact within PPA 24.03.2021 – Email update sent 10.03.2021 – Email sent to alternative contact provided by PPA 09.03.2021 – Email received 09.03.2021 – Consultation letter (OPS.LT.6416.SD v2) sent confirming decommissioning strategy. 25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent primarily outlining P&A and removal activities, but which also mentioned preliminary plans for decommissioning.	PPA automatic email response was received on 09.03.2021 informing that the contact details Eni had on file were no longer up to date and provided alternative contacts within DPIRD. The DPIRD contacts had not provided feedback on behalf of PPA at the time of submitting the EP to NOPSEMA for assessment.	At the time this EP was submitted to NOPSEMA for assessment no direct response to PPA (via DPIRD) was required. However, impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 9.1

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
Mackerel Managed Fishery (Area 2)	01.04.2021 - Email sent by WAFIC on behalf of Eni	At the time this EP was submitted to NOPSEMA no comment had been received.	At the time this EP was submitted to NOPSEMA for assessment no direct response was required. However, impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 9.1
Onslow Prawn Managed Fishery	01.04.2021 - Email sent by WAFIC on behalf of Eni	At the time this EP was submitted to NOPSEMA no comment had been received.	At the time this EP was submitted to NOPSEMA for assessment no direct response was required. However, impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 9.1
Pilbara Trap Managed Fishery	01.04.2021 - Email sent by WAFIC on behalf of Eni	At the time this EP was submitted to NOPSEMA no comment had been received.	At the time this EP was submitted to NOPSEMA for assessment no direct response was required. However, impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 9.1
Pilbara Trawl Interim Managed Fishery	01.04.2021 - Email sent by WAFIC on behalf of Eni	At the time this EP was submitted to NOPSEMA no comment had been received.	At the time this EP was submitted to NOPSEMA for assessment no direct response was required. However, impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 9.1
Pilbara Line Fishery	01.04.2021 - Email sent by WAFIC on behalf of Eni	At the time this EP was submitted to NOPSEMA no comment had been received.	At the time this EP was submitted to NOPSEMA for assessment no direct response was required. However, impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 9.1

Stakeholder	Consultation Summary	Consultation Feedback summary	Eni response
Western Tuna and Billfish Fishery	01.04.2021 - Email sent by WAFIC on behalf of Eni	At the time this EP was submitted to NOPSEMA no comment had been received.	At the time this EP was submitted to NOPSEMA for assessment no direct response was required. However, impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 9.1
Australian Southern Bluefin Tuna Industry Association	07.02.2022 – Email received from Australian Southern Bluefin Tuna Industry Association 07.02.2022 – Email sent to Australian Southern Bluefin Tuna Industry Association to follow up on comment 20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 01.04.2021 - Email sent by WAFIC on behalf of Eni	Australian Southern Bluefin Tuna Industry Association advised that they were not actively fishing the area. They also have the expectation that any infrastructure remaining in the water would be free of hydrocarbons	Impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 9.1 As detailed in Section 4, infrastructure left in-situ is free from hydrocarbons.
Tuna Australia	07.02.2022 – Email received from Tuna Australia 07.02.2022 – Email sent to Australian Southern Bluefin Tuna Industry Association to follow up on comment 20.12.2021 – Consultation letter (HSE.LT.6636.JVP.JCO) sent outlining removal of remaining infrastructure and in-situ decommissioning of below seabed components. 01.04.2021 - Email sent by WAFIC on behalf of Eni	Tuna Australia advised they have no concerns about the proposed decommissioning activity at the Woollybutt field site and do not currently have any pelagic longline fishing operations occurring in the area.	Impacts to other marine users, including commercials fisheries, have been considered in this EP in Section 9.1

6.4 Ongoing Consultation

Stakeholder consultation for the activities will be ongoing and Eni will work with stakeholders to address any future concerns if they arise throughout the duration of this EP. Should any new stakeholders be identified (see Section 6.1), they will be added to the stakeholder database and included in all future correspondence as required, including specific activity notifications.

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

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

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

7 ENVIRONMENTAL RISK ASSESSMENT METHODOLOGY

7.1 Risk Assessment

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

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

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

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

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

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

1. identifying each project activity and its associated environmental aspects
2. identifying the environmental values within and adjacent to the area
3. defining the potential environmental effects (impacts) of aspects identified in Step 1 above on the values identified in Step 2 above
4. identifying the potential environmental consequences and severity of the impact (Table 7.2)
5. identifying the likelihood of occurrence of the consequence, according to a six-level scale (Table 7.1)
6. evaluating overall environmental risk levels using the Eni environmental risk matrix (Figure 7.1)
7. identifying mitigation measures, assigning management actions and further recommended risk reduction measures according to risk levels (Table 7.3) to reduce the risk to ALARP.

Table 7.1: Likelihood scale

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

Table 7.2: Environmental consequence descriptors

Descriptor	Description
(1) Slight	No stakeholder impact or temporary impact on the area. Involved area < 0.1 sq. mile. Spill < 1 m³ – 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 & use. Negligible financial consequences.
(2) Minor	Some local stakeholder concern or less than one week for clean-up or one year for natural recovery or impact on small no. of not-compromised species. Involved area < 1 sq. mile. Spill < 10 m³ – 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 no. of non-threatened species). Slight impact due to GHG emissions. Adequate materials/energy/water selection & use. Single breach of statutory or prescribed limit, or single complaint.
(3) Local	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 < 10 sq. miles. Spill < 100 m³. Limited discharges affecting the neighbourhood and damaging the environment with longer effects. Short term, more widespread impact on water/air/soil and biodiversity (on a higher no. of non-threatened species). Limited impact due to GHG emissions. Inadequate materials/energy/water selection & use. Repeated breaches of statutory or prescribed limit, or many complaints.

Descriptor	Description
(4) Major	National stakeholder concern or impact on licences or two to five years for natural recovery or up to five months for clean-up or threatening to biodiversity or impact on interesting areas for science. Involved area < 100 sq. miles. Spill < 1000 m³. 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 & use. Extended breaches of statutory or prescribed limits, or widespread nuisance.
(5) Extensive	International stakeholder concern or impact on licences/acquisitions or > 5 years for natural recovery or more than five months for clean-up or reduction of biodiversity or impact on special conservation areas. Involved area > 100 sq. miles. Spill > 1000 m³. 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.

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

Figure 7.1: Eni environmental risk matrix

Table 7.3: Risk management actions

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

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

7.2 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 to reduce the residual risk.

Risk assessment is an iterative process of:

1. identifying a risk
2. assessing a risk
3. deciding whether residual risk is tolerable
4. if not tolerable, generating a new risk or mitigation measures
5. 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 7.3.

7.3 ALARP and Acceptance Criteria

7.3.1 ALARP Criteria

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

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

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

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

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

7.3.2 Acceptance Criteria

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

Eni considers a range of factors when evaluating the acceptability of environmental impacts associated with its activities. This evaluation is outlined in Table 7.4.

Table 7.4: Eni acceptability factors

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

7.4 Risk Identification and Assessments

Risk identification and assessment for the Petroleum Activities Program was undertaken through a series of assessments and workshops. Firstly, a comparative assessment was undertaken to inform the decommissioning strategy and identify the preferred decommissioning option. Although this process was intended to identify a preferred option, the process included identification and ranking of environmental, technical, health and safety, economic and socio-economic impacts associated with all options, including the option that forms the Petroleum Activities Program. The comparative assessment was informed by a workshop that was held on Wednesday 5 September 2018, and which was attended by engineering, health and safety and environmental professionals from Eni and Advisian. The outcomes of the comparative assessment have since been reviewed and updated for the scope of this EP and revised to incorporate outcomes from studies that have been undertaken, including degradation and fish habitat studies.

The decommissioning options have also been assessed using an options assessment process, where each option was compared with the base case and tested against "equal or better outcomes" criteria. This assessment was undertaken by an environmental professional and reviewed by Eni. The options assessment was designed so detailed environmental risk and impacts could be identified and ranked in accordance with the Eni risk assessment methodology. The option that presented better or equal outcomes was then carried forward as the Petroleum Activities Program. Risks and impacts identified during the options assessment have been assessed in this EP, including ALARP and acceptability assessments.

Environmental risks from planned activities and unplanned events are provided in Sections 8 and 9 respectively. Performance outcomes, standards and measurement criteria are outlined in Section 10.

8 PLANNED ACTIVITIES

8.1 Interaction with Other Users (Risk ID 1)

8.1.1 Summary of Environmental Risk

Vessel, IV Presence

Hazard	Vessel Interaction with Other Users		
	Frequency	Severity	Risk
Inherent Risk	C	1	L
Residual Risk	B	1	L

Anchors and Chains Left In-situ

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

8.1.2 Description of Hazard

8.1.2.1 Vessel, IV Presence

The presence of support vessels and IV during the subsea equipment removal activities have the potential to interact with other activities in the area such as fishing, shipping, tourism and defence activities.

The exclusion zone for the Chevron operated Wheatstone pipeline lies within westernmost extent of the Operational Area (Section 5.5.5). Vessel interaction has the potential to occur where Chevron is conducting pipeline maintenance at the same time that Eni is conduction equipment removal activities in this area. Vessel / vessel interaction with the potential for collision and release of MDO has been addressed in Section 9.5. Chevron have been informed of the subsea equipment removal activities (refer Section 6.1).

8.1.2.2 Below Seabed Components Left In-situ

The DSPM anchors and below seabed components of the DSPM anchor chains are proposed to be decommissioned in-situ as detailed in Section 4.9. As detailed in Section 4.7.1, all anchors except one, anchor (ANC 313) are fully buried. ANC 313 is partially buried (Figure 4.4) however is expected to fully bury over time (refer Section 4.10.2). As the full burial cannot be confirmed as a worst case the impact assessment includes the risk to other user for the event that ANC 313 does not fully bury.

8.1.3 Potential Environmental Impact

8.1.3.1 Fishing

The Operational Area coincides with a number of Commonwealth and State managed fisheries (refer to Section 5.5). However, low levels of effort at the field location and surrounding area have been recorded, and/or a low number of fishing vessels are known to operate.

The Pilbara Fish Trawl Area Zone 1, which over overlaps the Operational Area, is currently closed to trawl fishing and has not been open since 1998 (DoF, 2014) (refer to Section 5.5.1). All anchors and chains (except ANC 313) will sit beneath the seabed and therefore do not pose a risk to any present or future commercial trawling operations. The only credible interaction of other users with ANC 313 is in the event that trawl fishing was to resume. Even in this event any interaction potential is extremely rare, and assumes that the ANC 313 has not buried further.

ANC 313 has been present in the field for approximately 20 years. Should Zone 1 of the Pilbara Trawl Fishery reopen in the future, the potential risk does remain for accidental damage (through snagging of nets) to trawling equipment. The Pilbara Trawl Fishery is a demersal (bottom) otter trawl fishery that operates with standard stern trawling gear with one net and two otter boards. Modern trawl vessels have sophisticated navigation and monitoring systems to detect and avoid obstacles and would be able to easily identify and avoid the ANC 313. The shape and degree of estimated protrusion (refer Section 4.7.1 and Figure 4.4) of ANC 313 also means trawling nets will be likely be able to pass over without incident / snag.

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

Given the above, in the rare event of trawl fishing equipment snagging on the ANC 313 (in the event that ANC 313 has not fully buried) during trawling activities, the impacts to the fishery are expected to be minor and short-term, based on interruption to fishing operations and damage to individual trawl equipment.

Commercial fishing groups have been consulted regarding the recovery of subsea equipment activities and in-situ decommissioning of below seabed components, and no issues have been raised. WAFIC supports the approach for Eni to remove the majority of the remain subsea infrastructure, in particular infrastructure containing plastic materials (refer Section 6.1). As detailed in Table 6.2, WAFIC have been provided an image of the protruding anchor (ANC 313) and have made no further comment on its impact to current or future fishing activities.

8.1.3.2 Shipping

Traffic is relatively light within the Operational Area, with the exception of the southern region. AIS data indicates that a number of tankers transit through this area, most likely on their way into and out of the ports of Ashburton and Onslow (see Section 5.5.3).

A Notice to Mariners (NTM) will be issued by the Australian Hydrographic Office (AHO) to notify mariners of the support vessel and/or IV location during subsea infrastructure removal activities (refer Table 11.4).

8.1.3.3 Defence

The Operational Area is located within a defence practice area (refer to Section 5.5.4). The Department of Defence operations are not anticipated to interact with the proposed subsea equipment removal activities. Eni will notify Department of Defence a minimum of five weeks notification prior to the commencement of activities (refer Table 11.4).

8.1.3.4 Tourism

Apart from the possibility of occasional passing private motor vessels or yachts, there are no known tourism interests. No known tourism occurs in the Operational Area (Refer to Section 5.5.2).

8.1.3.5 Oil and Gas users

The exclusion zone for the Chevron operated Wheatstone pipeline falls within the westernmost extent of the Operational Area (refer to Section 5.5.5). In the event that Chevron is conducting pipeline maintenance, SIMOPS could occur during subsea equipment recovery activities in the western extent of the Operational Area, potentially impacting operator works programs.

Vessels will operate on DP (no anchoring) during subsea equipment recovery, limiting potential for crossover into the Wheatstone Pipeline exclusion zone.

8.1.4 Environmental Performance Outcomes and Control Measures

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

- information provided to regulatory authorities and marine users directly affected by planned activities (EPO-1)
- activity is managed in accordance with navigational and safety requirements (EPO-2)

- no unplanned interactions with other users (EPO-3).

Control Measures relating to this risk include:

- navigation equipment and procedures (lighting as required for safe work conditions and navigational purposes) (CM-1)
- maritime notices (CM-2)
- exclusion zone (CM-3)
- notify marine users of the location of the infrastructure that will remain in-situ permanently (CM-23)
- adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised (CM-24)
- consultation with the Wheatstone pipeline operator during planning and undertaking the subsea equipment recovery (CM-25)
- navigation charts (CM-27)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

8.1.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Eliminate	Eliminating the use of vessels in the Operational Area	Interactions between the support vessels and other maritime traffic cannot be eliminated, though the risk is extremely low given the 500 m exclusion zone in place around the vessels.	×
	Removal of ANC 313	Section 3 determined that leaving the anchors in-situ provides equal or better environmental outcomes compared to complete removal.	×
Substitute	No alternative arrangements have been identified. The use of support vessels and IV are required to undertake the activities	N/A.	N/A

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Engineering	Navigation lighting and aids in accordance with AMSA Marine Orders Part 30: Prevention of Collisions, and with Marine Orders Part 21: Safety of Navigation and Emergency Procedures	Negligible costs of operating navigational equipment. Navigation lighting and aids are a requirement under Marine Orders.	✓
	Install over-trawlable protection on ANC 313	Installing trawl protection over ANC 313 provides limited to no benefit given the degree of protrusion above the seabed. There is also a risk that long term scour, corrosion or movement of anti-trawl structure may occur, compromising its effectiveness. The costs and risks associated with installing an over trawlable structure on ANC 313 grossly outweigh the environmental benefit.	×
Isolation	N/A	N/A.	N/A
Administrative	The Australian Hydrographic Office (AHO) and AMSA Rescue Coordination Centre (RCC) (as part of marine safety division) notifications	Minor administrative costs in notifying AHO and RCC. Ensures other users are aware of the activities.	✓
	Exclusion Zone around vessels	No additional costs. Other marine users may be temporarily excluded from the exclusion zone around the vessels undertaking the removal activities. Note: it will be revoked within six months of the decommissioning monitoring activity has been completed.	✓
	Ongoing consultation with relevant stakeholders	Minor administrative costs in keeping relevant stakeholders informed outweighs benefits of keeping them informed of activities.	✓
	Consultation with the Wheatstone pipeline operator during planning and operations	Consultation with the Wheatstone pipeline operator will ensure that during the subsea equipment recovery activity any SIMOPs can be managed and impacts to works programs avoided.	✓

8.1.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	Vessels and IV compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 30 (Prevention of Collisions) 2009. Vessels and IV compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 21 (Safety of navigation and emergency procedures) 2016. The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. Prior to permanently leaving any structure in-situ, Eni will obtain a Sea Dumping Permit in accordance with the requirements of the Sea Dumping Act.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	A process of consultation has been carried out with other potential users of the area, and an NTM will be issued to mariners to notify them of the subsea equipment removal activities. A process is available for ongoing consultation and is outlined in Section 6. Eni will consult with the Wheatstone pipeline operator during planning and operations to ensure any work programs can be managed simultaneously.
Area Sensitivity/ Biodiversity	Fishing levels are low in the area and no major shipping routes coincide with the area. No known tourism occurs in the area. The Operational Area is located within a defence practice area. The Department of Defence has confirmed that operations would not affect the proposed field management activities or impact on the field.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

8.2 Underwater Noise (Risk ID 2)

8.2.1 Summary of Environmental Risk

Vessel and Helicopter

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

8.2.2 Description of the Hazard

During the subsea equipment recovery, noise emissions will be generated through the operation of support vessels, helicopters and IV operation and the use of bow thrusters to maintain position. A maximum of three support vessels and one IV will be active in

the Operational Area at any one time. Sound from these sources can be broadly defined as non-impulsive (vessel / helicopter operations).

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

8.2.2.1 Vessel Activities

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

Support Vessels

McCauley (1998) measured underwater broadband noise equivalent to approximately 182 dB re 1 µPa SPL @ 1 m with a frequency range of 20 Hz to 10 kHz from a support vessel using DP in the Timor Sea; it is expected that similar noise levels will be generated by support vessels used for Petroleum Activities Program. The thruster noise dropped below 120 dB re 1 µPa (thresholds that could result in behavioural response for cetaceans for continuous noise sources, refer Table 8.1) within 3 to 4 km and was audible above ambient noise up to 20 km away (McCauley, 1998).

Intervention Vessel

IVs are longer and of larger mass than support vessels (refer Section 4.12), therefore larger thrusters are required for manoeuvring. Sound source levels from IVs are not widely available, therefore a vessel of comparable size and weight (a bulk cargo ship), has been used a conservative proxy for the noise generated from an IV. Table 8.1 provides a comparison between the size of the IV and a bulk cargo ship.

Table 8.1: IV and bulk cargo ship comparison

Vessel	Gross tonnage	Length	Reference
IV	8,842	110 to 130 m	Refer Section 4.12.2
Bulk cargo ship	25,515	173	Arveson and Vendittis, 2000

Sound levels from bulk cargo ship propellers have been measured by Arveson and Vendittis, 2000, with levels estimated at 178 dB re 1 µPa (at speeds of 8 knots) to 192 dB re 1 µPa (at speeds of 16 knots). Noise modelling for the Woodside Scarborough development has shown that, assuming a source level of 186 dB re 1µPa SPL @ 1 m, sound levels will be reduced to 120 dB re 1µPa SPL (thresholds that could result in behavioural response for cetaceans for continuous noise sources) within 4.9 km of the

source (Woodside, 2020). Given the size of the vessel used for the Scarborough modelling (length 135 m, breadth 27 m and draft 6.85 m) is comparable to the IV, length 110-130 m and 8 m draft) this modelling can be used to aid prediction of the distance of IV noise to reduce to 120 dB re 1µPa SPL. Based on the Scarborough modelling, the noise measured by McCauley, 1998 for support vessels and understanding that sound levels from the IV selected for the activities are not available, a conservative distance of 6km has been assumed for IV noise to reduce to 120 dB re 1µPa SP (the behavioural response threshold for cetaceans).

Summary

Table 8.2 presents a summary of the expected source levels and frequencies from support vessels and IV relevant to the subsea equipment recovery activities.

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

Table 8.2: Sound source levels and frequencies from vessels relevant to the subsea equipment recovery activities

Source of aspect	Operating frequency	Source Level (@1 m)		Sound category
		SPL (L_p)	PK (L_{pk})	
Support vessel	0.2 to 1 kHz [1]	182 to 186 [1]	-	Continuous – non impulsive
IV	10 Hz - 40 kHz [2]	178.2 -192.1 [2]		

[1] McCauley (1998)
[2] Arveson and Vendittis (2000)

8.2.2.2 Helicopters

Crew changes will be required during subsea equipment recovery activities and will be undertaken using helicopters.

The main acoustic source associated with helicopters is the impulse noise from the main rotor, which consists of blade-vortex interaction noise in decent or level flight at low and medium velocities and high-speed impulsive noise related to trans-sonic effects on the advancing blade. The rotating blades of helicopters produce tones with fundamental frequencies proportional to the rate and number of blades. Noise levels for typical helicopters used in offshore operations (Eurocopter Super Puma AS332) at 150 m separation distance have been measured at up to a maximum of 90.6 dB (BMT Asia Pacific, 2005). Unconstrained point source noise in the atmosphere (such as helicopter noise) spreads spherically (Truax, 1978), with noise received at the sea surface decreasing with increasing distance from the aircraft (Nowacek et al., 2007). Noise levels reported for a Bell 212 helicopter during fly-over was reported at 162 dB re 1 µPa and for Sikorsky-61 is 108 dB re 1 µPa at 305 m (Simmonds et al., 2004).

Table 8.3 presents the source levels and frequencies from helicopter operations.

Table 8.3: Sound source levels and frequencies from helicopter operations

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

8.2.3 Potential Environmental Impact

Potential environmental impacts from noise include:

- behavioural change in marine fauna (localised avoidance/attraction)
- permanent Threshold Shift (PTS) and/or Temporary Threshold Shift (TTS) to marine fauna hearing ability
- inducing stress in marine fauna
- disruption to marine fauna underwater acoustic cues
- secondary ecological effects – alterations of predator prey relationship.

8.2.3.1 Impacts from non-impulsive sound sources (vessel, IV operations)

For non-impulsive noise, only weighted Sound exposure level (SEL) metrics are provided in the literature (Table 8.4). Estimating SEL provides a metric that integrates cumulative exposures. For PTS and TTS thresholds to non-impulsive noise, 24 hours has been provided as a suitable timeframe to estimate SEL (Southall et al. 2007). Since TTS and PTS thresholds are not provided in SPL, it is not possible to directly compare these thresholds with the predicted SPL @ 1m for the vessels / IV as described in Section 8.2.2.

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

Table 8.4: PTS, TTS and behavioural thresholds for non-impulsive sources

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

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

Vessel and IV noise levels may exceed behavioural response levels in cetaceans (refer to Table 8.4) out to the distances presented in Table 8.5. Within this area cetaceans may exhibit localised avoidance/attraction behaviour.

Table 8.5: Sounds levels and frequencies from vessels relevant to the Petroleum Activities Program and distances to behavioural thresholds for cetaceans.

Source of aspect	Operating frequency	Source Level (@1 m)		Sound category	Distance to behavioural response threshold for cetaceans for continuous noise sources
		SPL (L_p)	PK (L_{pk})		
Support vessel	0.2 to 1 kHz [1]	182 to 186 [1]	-	Continuous	4 km [1]
IV	10 Hz - 40 kHz [2]	178.2 - 192.1 [2]	-	Continuous	6 km [3]

[1] McCauley (1998)
[2] Arveson and Vendittis (2000)
[3] Estimated based on Woodside (2020) and McCauley (1998)

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

Marine mammals that may occur within the Operational Area are detailed in Table 5.2 and include low-frequency (e.g. baleen whales), medium frequency (ondocetes, e.g. orca and sperm whale) and high frequency (e.g. dolphins) cetaceans. Of these species, the humpback whale is expected to be the most frequently encountered, particularly during annual migrations, given the overlap of the Operational Area with the migration BIAs, however, the nearest area of known importance to humpback whales is the Exmouth Gulf resting area, located approximately 96 km south-west of the Operational Area.

The Operational Area overlaps the BIA for the wedge-tailed shearwater (breeding). The species is highly mobile and has an extensive open ocean breeding range off the NWS.

Potential for vessel interaction is low, with the species likely to relocate if vessels are encountered.

Five species of species of turtle may pass through the Operational Area (Section 5.4), and the Operational Area overlaps with the BIA for the Flatback Turtle (internesting buffer) (Figure 5.9); however, turtle species are not likely to be resident or occur in the area in significant numbers. Water depths in the Operational Area suggest the area is unlikely to comprise important habitat for the turtles during any life history phase of the species.

Thresholds for non-impulsive noise emissions have not been identified for marine turtles, however, playback study of diamondback terrapins (Malaclemys terrapin terrapin) using boat noise, some animals were observed to increase or decrease swimming speed while others did not alter their behaviour at all (Lester et al., 2013). Popper et al. (2014) identified mortality or permanent injury as being low risk to marine turtles, and TTS is moderate close to the source only.

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

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

- Given cetaceans mobility and ability to avoid the sound source, PTS and TTS criteria (Table 8.4), which is based on a 24 hour exposure is not anticipated to be exceeded
- Behavioural responses in cetaceans may occur out to a distance of 4 km (McCauley, 1998) and 6 km (Woodside, 2020) for support vessels and IV respectively
- The presence of support vessels and IV will occur within a localised area of the operational area, where the activities will be centred. Cumulative impact from the use of multiple vessels is not considered to present significant impacts to marine fauna given their mobility and ability to avoid the sound source, impacts will relate to behavioural disturbance / avoidance only. The operational area is not within an area of high shipping density (Section 5.5.3), therefore should avoidance behaviour occur it is anticipated that the marine fauna would be able to move to an area below the behavioural threshold
- Marine turtles are at low risk of mortality or permanent injury due to continuous noise sources, such as vessels or subsea infrastructure, even near the source (Popper et al. (2014)
- Marine mammals and turtles are transitory, and given the low frequency and limited duration of the monitoring activity (Section 4.4), behavioural impacts are expected to be temporary and at the individual level only
- Reactions of marine mammals to circling aircraft (fixed wing or helicopter) are sometimes conspicuous if the aircraft is below an altitude of 300 m, uncommon

at 460 m and generally undetectable at 600 m (NMFS, 2001). Impacts to marine mammals will be behavioural (diving and avoidance) and short term only, with no lasting effect.

8.2.4 Environmental Performance Outcomes and Control Measures

EPOs relating to this risk include:

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

Control Measures relating to this risk include:

- regulations and measures for interacting with marine fauna (CM-5)
- marine fauna observations/reporting undertaken (CM-6).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

8.2.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Eliminate	Eliminating the helicopters, vessels and IV use	The noise associated with the use of helicopters, vessels and IV cannot be eliminated. Elimination of helicopters, vessels and IV would mean the activities cannot be competed.	×
Substitute	Substitute support vessels and IV	The support vessels and IV will be contracted to meet the specifications of the scheduled work and cannot be substituted.	N/A
Engineering	N/A	N/A.	N/A
Isolation	N/A	N/A.	N/A
Administrative	Compliance with administrative controls (e.g. EPBC Regulations 8 (Part 8)	Minor cost in complying, with benefit in reducing impact to marine fauna from noise impacts.	✓
	Scheduling activity outside of whale shark aggregation and migratory period (April–November) and peak humpback whale southbound migratory period (August-October)	The timing of the subsea equipment removal activities will be subject to vessel 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 (MFO) on vessels	May improve ability to spot and identify marine fauna at risk of impact from noise. However, the high cost of contracting MFOs is grossly disproportionate to the low risk (refer to Section 8.2.3) of vessel and MBES noise sources on marine fauna.	×

8.2.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	The *EPBC Regulations 2000* Part 8 and the Australian National Guidelines for Whale and Dolphin Watching (DEH, 2005) will be implemented. The Petroleum Activities Program is in compliance with EPBC 2001/365 approval.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to underwater noise.
Area Sensitivity/ Biodiversity	The Operational Area is within a BIA for: • wedge-tailed shearwater - breeding • pygmy blue whale – distribution • humpback whale – migration • flatback turtle – internesting buffer and suitable mating habitat • whale shark – foraging including high density prey. Vessel disturbance/interaction is identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 5.3). Control measures implemented will minimise the potential risks and impacts from the activity to relevant species identified in Recovery Plans and Conservation Advice. The following Recovery Plans or Conservation Advice / Plans identify noise as a threat: • Recovery Plan for Marine Turtles in Australia (DoEE, 2017) • Conservation Management Plan for the Blue Whale, 2015-2025 (Commonwealth of Australia, 2015) • Approved Conservation Advice for Megaptera novaeangliae (humpback whale) (TSSC, 2015) The Recovery Plan for Marine Turtles in Australia (DoEE, 2017) identifies noise interference as a threat to marine turtle recovery. Noise interference to marine turtles is classified depending on whether the exposure is short (acute) or long-term (chronic), with activities such as pile driving, seismic activity and some forms of dredging generating being forms of acute noise threat, and sources including shipping channels and the operation of some oil and gas infrastructure being forms of chronic noise threats. A key action from the Recovery Plan for Marine Turtles in Australia (DoEE, 2017) relating to noise is 'Understand the impacts of anthropogenic noise on marine turtle behaviour and biology'. Section 8.2.3 provides a detailed assessment on the impact of noise from the Petroleum Activities Program on marine turtles. Impacts to marine turtles are not considered significant and relate to behavioural disturbance only. The Petroleum Activities Program is determined not

Demonstration of Acceptability	
	inconsistent with the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). The Conservation Management Plan for the Blue Whale, 2015-2025 (Commonwealth of Australia, 2015) identifies noise interference as a threat that may inhibit the recovery of blue whale populations in Australian waters. An action in the plan relating to noise threat is 'assessing the effect of anthropogenic noise on blue whale behaviour. Section 8.2.3 provides a detailed impact assessment of the vessel and MBES noise on marine mammals. Impacts have been determined to be behavioural only, within 6 km of the source (refer Section 8.2.3). The approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) (TSSC, 2015) identifies impacts of anthropogenic noise sources on marine mammals as an area of increasing concern. Noise sources identified include: include seismic exploration, industrial noise (pile driving, some forms of dredging, use of explosives, blasting and drilling), shipping noise, and sonar systems. A key action in the plan is to 'Assessing and addressing anthropogenic noise; shipping, industrial and seismic surveys'. Section 8.2.3 provides a detailed assessment of noise impacts from the Petroleum Activities Program on the humpback whale and a number of controls have been investigated to reduce noise impacts (Section 8.2.3). MBES sound levels are outside the auditory range to cause of low frequency species / baleen whales (e.g. humpbacks). Impacts have been determined to be behavioural only, within 6 km of the source (refer Section 8.2.3). Eni has considered the actions and objectives of the aforementioned Recovery Plans. While the Petroleum Activities Program is not inconsistent with these Recovery Plans, relevant actions and objectives within these Recovery Plans have been addressed and impacts to species have been determined to be slight and relate to behavioural disturbance only. Therefore, it is determined that the impacts from underwater noise generated by the Petroleum Activities Program to species detailed in the Recovery Plans are acceptable.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk demonstrates to be ALARP.

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

During the Environmental Risk Identification Workshop, it was identified that the risk of underwater noise impacts on cetaceans may be reduced by scheduling the subsea equipment removal activities outside of the peak humpback southern migration period (August to October) for the Northwest Cape or whale shark aggregation and migratory period (April–November). Given the low risk to marine fauna in the Operational Area and constraints relating to vessel availability and weather, scheduling subsea removal activities outside of peak migratory periods was rejected.

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

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

A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 7.3.1). The residual risk associated with disturbance/interaction is considered low, which is acceptable in accordance with Eni's acceptability criteria (Table 7.4). Potential impacts associated with noise emissions are therefore acceptable and ALARP.

8.3 Light Emissions (Risk ID 3)

8.3.1 Summary of Environmental Risk

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

8.3.2 Description of Hazard

Lights on support vessels and IV will be required on a 24-hour basis during the subsea equipment recovery activities for safety and navigational purposes in accordance with requirements of the Navigation Act 2012 (Marine Orders Part 30 [Prevention of Collisions]). External lighting on the support vessels and IV will generate light glow and direct illumination of surrounding surface waters. The distance at which direct light and sky glow may be visible from the source depends on the vessel lighting and environmental conditions.

The light assessment boundary of 20 km from the source is used as the extent of light exposure, in accordance with National Light Pollution Guidelines for Wildlife (DoEE, 2020). The demonstrated impacts on which this buffer is based were in response to light emissions associated with a liquified natural gas (LNG) plant. Although details around the individual light sources of the case study and the light sources on the vessels are unknown, it is expected that light emissions associated with the support vessels and IV will be notably lower compared to an LNG plant.

8.3.3 Potential Environmental Impact

Receptors that have important habitat within a 20 km buffer of the Operational Area are considered for the impact assessment within this section, based on recommendations of National Light Pollution Guidelines for Wildlife (DoEE, 2020). A 20 km buffer provides a precautionary limit based on observed effects of sky glow on marine turtle hatchlings demonstrated to occur at 15 to 18 km and fledgling seabirds grounded in response to artificial light 15 km away (DoEE, 2020).

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

Potential impacts to marine fauna from artificial lighting may include:

- disorientation, attraction or repulsion to the light
- disruption to natural behaviour patterns and cycles
- indirect impacts such as increased predation risks through attraction of predators.

These potential impacts depend on:

- the wavelength and intensity of the lighting, and the extent to which the light spills into important wildlife habitat (such as foraging, breeding and nesting)
- the timing of light spill relative to the timing of habitat use by marine fauna sensitive to lighting effects
- the physiological sensitivity and resilience of the fauna populations that are at risk of potential effects.

Light-sensitive species have been identified by reviewing the National Light Pollution Guidelines for Wildlife (DoEE, 2020).

Fish and zooplankton

Fish and zooplankton may be directly or indirectly attracted to light. Light during night-time activities in particular, is likely to result aggregations of fish around the support vessels and IV as they are attracted to the light and increased food availability. Whilst there is the potential for increased predation activity, the impact to fish and zooplankton from light is anticipated to be slight and temporary.

Marine Turtles and Sea Snakes

The main implication of artificial lighting from offshore vessels for marine turtles is the disruption of hatchling sea-finding behaviour. Hatchling turtles can be disorientated and unable to find the ocean in the presence of direct light or sky glow (Witherington, 1992; Lorne & Salmon, 2007; Thums et al., 2016; Price et al., 2018). Adult marine turtles may also avoid nesting on beaches that are brightly light (Witherington, 1992; Price et al., 2018).

Once in the ocean, hatchlings are thought to remain close to the surface, orient by wave fronts and swim into deep offshore waters for several days to escape the more predator-filled shallow inshore waters. During this period, light spill from coastal port infrastructure and ships may 'entrap' hatchling swimming behaviour, reducing the

success of their seaward dispersion and potentially increasing their exposure to predation via silhouetting (Salmon et al., 1992).

The Recovery plan for Marine Turtles in Australia (DoEE, 2017) highlights artificial light as one of several threats to marine turtles. Specifically, the plan indicates that artificial light may cause a gradual decline in the reproductive output of a nesting area by:

- inhibiting nesting by females (Salmon, 2003)
- disrupting hatchling orientation and sea finding behaviour (Whittock et al. 2016. Pilibosian, 1976).
- creating pools of light that attract swimming hatchlings and increase their risk of predation (Thums et al., 2016)

The National Light Pollution Guidelines for Wildlife (DoEE, 2020) states that a 20 km buffer (based on sky glow) to important habitat for turtles should be applied when considering possible impacts. The Operational Area is located 40 km from the nearest marine turtle nesting sites at Barrow Island and therefore exceed the 20 km buffer set by the National Light Pollution Guidelines for Wildlife (DoEE, 2020). Light emissions from support vessels and the IV are therefore not expected to affect the sea finding behaviour of hatchling turtles or imapct reproductive output of a nesting area. In addition adult green turtles nesting on the west coast of Barrow Island also tend to remain close to shore (within 5 km of nesting beaches) during inter-nesting periods (Pendoley, 2005).

All five species of marine turtle may pass through the Operational Area (Section 4.3), which overlaps with the BIA for the flatback turtle (internesting buffer and suitable mating habitat). The Operational Area is located 40 km from the nearest marine turtle nesting sites at Barrow Island. It is possible individual turtles may be encountered traversing the Operational Area during the Petroleum Activities Program; however, considering the water depths of the Operational Area (around 100 m) and distance to nesting beaches (more than 40 km), large numbers of internesting adults are not expected. The potential impacts of light emissions to turtles, including flatback turtles, from the Petroleum Activities Program are expected to be restricted to localised attraction and temporary disorientation to individual species transiting the Operational Area. As such, behavioural impacts to marine turtles from light emissions from the support vessels and the IV are anticipated to be temporary and slight. The Petroleum Activities Program will not displace females from nesting habitats. It is considered that the Petroleum Activities Program will not compromise the objectives as set out in the Recovery Plan for Marine Turtles (DoEE, 2017).

Sea snakes may also occur at the within the Operational Area. Whilst the direct effect of artificial light on sea snakes is largely unknown, they may experience indirect effects such as changes in predator-prey relationships and disorientation, attraction or repulsion may occur.

Behavioural impacts to marine turtles and sea snake from light emissions from the project vessels are anticipated to be slight and temporary.

Seabirds and Migratory Shorebirds

The Operational Area overlaps the BIA for the wedge-tailed shearwater (breeding). The species is highly mobile and has an extensive open ocean breeding range off the NWS.

Lighting can attract seabirds from large catchment areas (Wiese et al., 2001) and studies have seabirds are attracted to and accumulated around illuminated offshore infrastructure in the North Sea (Marquenie et al., 2008). Availability of roosting refuge at sea and increased food availability may be the most important reasons why seabirds are attracted to offshore oil and gas infrastructure (Wiese et al., 2001).

Potential impacts to seabirds and migratory shorebirds attracted by artificial lighting have been addressed in the National Light Pollution Guidelines for Wildlife. Artificial lighting impacts can include disorientation causing collision, entrapment, stranding, grounding and interference with navigation (being drawn off course from usual migration routes) (DoEE, 2020). The degree of disruption is determined by a combination of physical, biological and environmental factors including the location, visibility, colour and intensity of the light, its proximity to other infrastructure, landscape topography, moon phase, atmospheric and weather conditions and species present (DoEE, 2020).

The nearest island where wedged-tailed shearwaters are present is Barrow Island (approximately 40 km to the east) of the Operational Area, known breeding and nesting occurs further east at Dampier Archipelago (approximately 150 km to the east), where a nesting BIA is located. Fledgling seabirds can be affected by lights up to 15 km away (DoEE, 2020). Barrow Island and Dampier Archipelago are far enough that fledglings would not be at risk from light emissions from the support vessels and the IV. Foraging wedged-tailed shearwaters are less vulnerable to light attraction compared to fledglings, but they may forage out to location of the Operational Area. Therefore wedged-tailed shearwaters could be attracted to the support vessels and the IV, particularly during their breeding.

During the Petroleum Activities Program, it is possible a small number of seabirds and migratory shorebirds may be attracted to the support vessels and the IV within the Operational Area. However, as this is not expected to result in impacts to birds beyond a temporary change in behaviour, any impact is anticipated to be slight and temporary. Any collision between the birds and project vessels as a result of the attraction are highly unlikely due to the slow-moving vessels undertaking the Petroleum Activities Program.

Marine Mammals

Marine mammals that may occur within the Operational Area are detailed in Section 5.4. Marine mammals predominantly utilise acoustic senses to monitor their environment rather than visual sources (Simmonds et al., 2004), so light is not considered to be a significant factor in marine mammal behaviour or survival. Marine mammals are not expected to be affected by light generated by the subsea equipment recovery activities.

Species Recovery Plans, Approved Conservation Advice and Threat Abatement Plans

Eni has considered information contained in both the Recovery Plan for Marine Turtles in Australia (DoEE, 2017) and the National Light Pollution Guidelines for Wildlife (DoEE, 2020).

The overarching objective of the Recovery Plan for Marine Turtles in Australia (DoEE, 2017) is to reduce detrimental impacts on Australian populations of marine turtles and hence promote their recovery in the wild.

Action Area A8 relates to minimising light pollution, specifically:

- 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 (relevant to the hawksbill – western australia stock)
- Manage artificial light from onshore and offshore sources to ensure biologically important behaviours of nesting adults and emerging/dispersing hatchlings can continue (relevant to green turtle– north west shelf stock)

Given the Operational Area location (over 35 km from turtle nesting beaches), lighting from support vessels and the IV is not anticipated to displace marine turtles from critical habitats or impact nesting adults and emerging/dispersing hatchlings. Light emissions may cause localised and temporary behavioural disturbance to transient individual marine turtles (as described in the above sections).

Appropriate controls have been considered (refer Section 8.3.5) such as those within the National Light Pollution Guidelines for Wildlife (DoEE, 2020) to reduce the impacts of light emissions to ALARP and acceptable levels.

The Petroleum Activities Program is not inconsistent with the actions and objectives within the Recovery Plan for Marine Turtles in Australia (DoEE, 2017) or the National Light Pollution Guidelines for Wildlife (DoEE, 2020).

8.3.4 Environmental Performance Outcomes and Control Measures

EPO relating to this risk is:

- Reduce impacts to marine fauna from lighting on the support vessels and the IV through limiting lighting to that required by safety and navigational lighting requirements (EPO-5)

Control Measures relating to this risk include:

- navigation equipment and procedures (lighting as required for safe work conditions and navigational purposes) (CM-1)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

8.3.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/management**	**Evaluation**	**Adoption?**
Eliminate	Eliminate light sources on vessels and IV	Lighting levels cannot be reduced or eliminated as this would introduce navigational and occupational safety hazards and non-compliance with codes and regulations.	×
	No night-time operations	Reducing lighting at night would restrict the activity hours to during the daytime, resulting in the activity taking approximately twice as long to complete. Given the low levels of lighting already on the vessels, there would be little environmental benefit.	×
Substitute	Adopt measures designed to minimise impacts and marine turtles (as per National Light Pollution Guidelines for Wildlife (management actions) by: • using flashing/intermittent lights instead of fixed beam • using motion sensors to turn lights on only when needed • using luminaires with spectral content appropriate for the species present • avoiding high intensity light of any colour • extinguishing outdoor and deck lights not necessary for safety or navigation at night • using available block-out blinds on portholes and windows not necessary for safety and/or navigation at night	Substituting external lighting with for lights such those identified in the National Light Pollution Guidelines for Wildlife would result in significant cost sacrifice and time expenditure, as would the retrofitting of block-out blinds on portholes. Given the distance of the operational area from the nearest nesting sites (over 35 km) and the already slight impacts of lighting from the Petroleum Activities Program on marine fauna, cost of adopting measures (management actions) within the National Light Pollution Guidelines for Wildlife within 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

Demonstration of ALARP			
Administrative	Navigation lighting and aids in accordance with AMSA Marine Orders Part 30: Prevention of Collisions, and with Marine Orders Part 21: Safety of Navigation and Emergency Procedures	This control is already a requirement under Marine Orders and discussed in Section 8.1. It does not relate to reducing lighting effects on marine fauna.	✓ (as a control in Section 8.1)

8.3.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	Vessels will comply with safety and navigation requirements outlined in the *Navigation Act 2012* (Marine Orders Part 30 [Prevention of Collisions]), the Vessel Operating Procedure and APPEA Code of Environmental Practice 2008. The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. Management of light is consistent with: • Recovery Plan for Marine Turtles in Australia: 2017 to 2027 • National Light Pollution Guidelines for Wildlife (DoEE, 2020).
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to light emissions.
Area Sensitivity/ Biodiversity	Artificial lighting can cause a change in the behaviour of fauna, particularly nesting turtles and birds. Light generated by activities is temporary and short term in nature (see Section 4.4), and given the limited area over which light emissions are likely to extend and location of the Operational Area (located approximately 40 km from the nearest turtle nesting beach at Barrow Island), impacts to marine fauna are highly unlikely.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

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

Appropriate controls (management actions) have been considered (refer Section 8.3.5) such as those within the National Light Pollution Guidelines for Wildlife (DoEE, 2020) to reduce the impacts of light emissions to ALARP and acceptable levels.

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

Undertaking the subsea equipment recovery activities in daylight hours only would extend the duration of activity, increasing the potential of other risks occurring and increasing costs of the Petroleum Activities Program. Since lighting would still be required at night for safety reasons (see above), no environmental benefit is gained from eliminating night-time operations. No additional controls were identified during the risk workshop to reduce the risk further. Given the short duration of the Petroleum Activities Program (refer Section 4.4) and the distance of the Operational Area from the nearest turtle nesting beaches (40 km from Barrow Island), impacts to marine fauna are unlikely. A number of controls have been evaluated and in accordance with the ALARP criteria (Section 7.3.1). The residual risk associated with light emissions is considered low, which is acceptable in accordance with Eni's acceptability criteria (Table 7.4). Therefore, potential impacts associated with light emission are acceptable and ALARP.

8.4 Atmospheric Emissions (Risk ID 4)

8.4.1 Summary of Environmental Risk

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

8.4.2 Description of Hazard

Exhaust gases are produced from combustion for power generation on board the support vessels and IV and are ultimately released into the atmosphere. A vessel on DP typically uses approximately 16 t of diesel per day.

Vessel and IV activity within the Operational Area will be short term (refer to Section 4.4) and atmospheric emissions from these sources are therefore limited to periods relating to that specific activity (e.g. monitoring).

Products of hydrocarbon combustion emitted to the atmosphere include emissions of greenhouse gases (GHG), such as carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O), along with non-GHG such as sulphur oxides (SOX) and nitrogen oxides (NOX). There may also be emissions of particulate matter, and hydrocarbons, including BTEX (benzene, ethyl benzene, toluene, and xylene).

8.4.3 Potential Environmental Impact

Hydrocarbon combustion from support vessels and IV during subsea equipment removal activities may result in a temporary, localised reduction of air quality in the environment immediately surrounding the discharge point.

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

Local impacts typically associated with the emissions are mitigated by the dispersive nature of the offshore environment. Any potential local elevated concentrations of emissions will be short lived and unlikely to be detectable except in the near vicinity of the release. Combustion of fuels within the Operational Area will not impact on air quality at any nearby settlement areas, the nearest being approximately 78 km south at Onslow and 40 km east at Barrow Island.

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

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

8.4.4 Environmental Performance Outcomes and Control Measures

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

- atmospheric emissions in compliance with Marine Order 97 requirements to restrict emissions to those necessary to perform the activity (EPO-6).

Control Measures relating to this risk include:

- air pollution prevention certification (CM-7)
- fuel type used (CM-8)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

8.4.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Eliminate	Eliminating the use of vessels in the Operational Area	Vessels are required to carry out equipment removal activities and vessel use cannot be eliminated.	×
	No incineration of waste on vessels	Eliminate the potential for emissions due to waste incineration to impact air quality. However, increases health risk from storage of wastes. Increase in risk due to transfers (increased fuel usage, potential increase in collision risk, disposal on land).	×

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Substitute	Use green energy sources on support vessels or IV	Alternatives such as renewable energy generators (wind and/or sun) are not viable options as they are weather-dependant and do not supply continuous base load power. The vessels will use marine diesel, which is low in sulphur dioxide (rather than heavy fuel oil).	×
	Use of low sulphur fuel on the support vessels and IV, in accordance with Marine Order 97	Reduces emissions through use of low sulphur fuel in accordance with Marine Order 97. Minimal cost as vessels required to comply with Marine Orders.	✓
Engineering	N/A	N/A.	N/A
Isolation	The Operational Area is located in an isolated offshore environment that will assist in the dispersion and dilution of atmospheric emissions	N/A.	N/A
Administrative	Vessels Air Pollution Prevention Certificate (IAPP)/comply with the requirements of MARPOL 73/78 Annex VI and Marine Order 97	Reduces probability of potential impacts to air quality due to ODS emissions, high NOx, SOx and incineration emissions. Benefits of ensuring vessel is compliant outweighs the minimal administrative costs and it is a legislated requirement.	✓

8.4.6 Acceptability Demonstration

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

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

Given the short duration of the Petroleum Activities Program (Refer to Section 4.4) and limited receptors in the Operational Area, potential impacts associated with atmospheric emissions are slight. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (refer to Section 7.3.1). The residual risk is considered low, which is acceptable in accordance with Eni's acceptability criteria (Table 7.4). Therefore, potential impacts associated with atmospheric emissions are acceptable and ALARP.

8.5 Discharge of Contaminated Water (Risk ID 5)

8.5.1 Summary of Environmental Risk

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

8.5.2 Description of Hazard

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

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

8.5.3 Potential Environmental Impact

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

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

8.5.4 Environmental Performance Outcomes and Control Measures

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

- no unplanned discharge of oily water or chemicals that are not in accordance with Marine Order 91 requirements (EPO-7).

Control Measures relating to this risk include:

- oily water treatment system in place (CM-9)
- oily water prevention system in place (CM-10).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

8.5.5 ALARP Demonstration

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

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

8.5.6 Acceptability Demonstration

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

Demonstration of Acceptability	
Area Sensitivity/ Biodiversity	Any water quality impacts are likely to be localised and subject to rapid mixing. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 5.3). Control measures implemented will minimise the potential risks and impacts from the activity to relevant species identified in Recovery Plans and Conservation Advice.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

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

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

Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 5.3). Given the short, intermittent duration of the Petroleum Activity Program, the low volume of discharge from support vessels and IV relating to contaminated water discharge and receptors in the Operational Area, the potential impacts associated with discharge of contaminated water are considered to be slight and will not compromise the objectives set out in the Recovery Plans and Conservation Advice. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (7.3.1).

8.6 Sewage, Grey Water and Putrescible Waste Discharge (Risk ID 6)

8.6.1 Summary of Environmental Impact

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

8.6.2 Description of Hazard

Support vessels and IV will produce putrescible wastes such as greywater, sewage and food scraps during the subsea equipment recovery activities. Approximately 100 L of sewage/greywater and approximately 1 L of food waste will be produced per person per day, per vessel.

8.6.3 Potential Environmental Impact

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

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

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

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

8.6.4 Environmental Performance Outcomes and Control Measures

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

- no unplanned discharges to sea of untreated sewage, greywater, putrescible wastes, bilge and deck drainage (EPO-8)

Control Measures relating to this risk include:

- sewage and waste management (CM-11)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

8.6.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Eliminate	Eliminating discharge on vessels and IV	The generation of sewage, greywater and putrescible waste by personnel cannot be eliminated on the vessels or IV, as storing the waste would present a safety issue. 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 IV 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. This discharge is permitted under Marine Orders and is not anticipated to present significant environmental impact.	
Substitute	N/A	N/A.	N/A
Engineering	N/A	N/A.	N/A
Isolation	N/A	N/A.	N/A
Administrative	Implementation of measures in Marine Order 95 (Marine pollution prevention – garbage) and Marine Order 96 (Prevention of pollution – sewage).	Marine Order 95 reduces potential impacts of inappropriate discharge of sewage. Marine Order 96 reduces probability of garbage being discharged to sea, reducing potential impacts to marine fauna. Marine Order 95 stipulates putrescible (food) waste disposal conditions and limitations. Environmental benefit outweighs the minor administrative costs in implementing the Marine Orders.	✓ (through compliance with Marine Orders 95 and 96)

8.6.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	Support vessels and IV compliant with MARPOL Annex V 73/78 and Marine Order 95. Support vessels and IV compliant with MARPOL 73/78 Annex IV/Marine Order 96. The Petroleum Activities Program is in compliance with EPBC 2001/365 approval.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to discharge of sewage, greywater and putrescible waste.
Area Sensitivity/ Biodiversity	There are no resident sensitive water column environmental receptors in the Operational Area. The volumes of putrescible waste, sewage and grey water discharged will be small and will be rapidly broken down. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 5.3). Control measures implemented will minimise the potential risks and impacts from the activity to relevant species identified in Recovery Plans and Conservation Advice.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

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

Deteriorating water quality and marine pollution are identified in relevant Recovery Plans and Conservation Advice (Table 5.3) as potential threats to a number of marine fauna species. Given the short, intermittent duration of the Petroleum Activities Program in the Operational Area, the potential impacts associated with discharge of sewage, greywater and putrescible wastes are considered to be slight and do not compromise the objectives set out in the Recovery Plans and Conservation Advice. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 7.3.1). The residual risk is considered to be low, which is acceptable in accordance with Eni's acceptability criteria (Table 7.4). Potential impacts associated with discharge of sewage, greywater and putrescible wastes are acceptable and ALARP.

8.7 Recovery of Subsea Equipment, Discharges and Waste Generation (Risk ID 7)

8.7.1 Summary of Environmental Impact

Flowline and Umbilical Cutting and Recovery

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

Loss of NORMS from Recovered Equipment

Hazard	Loss of NORMs		
	Frequency	Severity	Risk
Inherent Risk	A	1	L
Residual Risk	A	1	L

Marine Growth Removal

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

Waste Generation

Hazard	Waste Generation		
	Frequency	Severity	Risk
Inherent Risk	A	1	L
Residual Risk	A	1	L

8.7.2 Description of Hazard

8.7.2.1 Flowline and Umbilical Cutting and Recovery

Work carried out under the Field Management EP (000105_DV_PR.HSE.1011.000) included the flushing of flowlines with chemicals in order to reduce residual hydrocarbons to acceptable levels. All flowlines were cut and remain open on the seabed with the exception of the 6" and 2 ½" DSPM to SB1M flowlines.

During equipment recovery, flowlines and umbilicals will be cut into sections suitable for recovery and storage on the vessel (see Section 4.8.3). Residual hydrocarbon concentrations of approximately 30ppm will be released to the marine environment during the cutting of the 6" and 2 ½" DSPM to SB1M flowlines, and negligible concentrations of residual hydrocarbons may be released to the marine environment during equipment recovery and transfer to the vessel.

8.7.2.2 NORMS from Recovered Equipment

NORMS form where naturally occurring radioactivity in host rock is drawn into the hydrocarbon extraction process. As temperatures and pressure reduce within subsea infrastructure, extracted radioactive material forms scales on the internal surfaces of infrastructure. Where the concentration of radioactive material in the scale meets the technical definition of 'radioactive', the scale is referred to as NORMs. NORMs are a common occurrence in oil and gas extraction.

NORM refers to materials containing radionuclides that exist in the natural environment. Radionuclides of interest include long-lived radionuclides such as uranium-238, uranium-235 and thorium-232 and their radioactive decay products (such as isotopes of radium, radon, polonium, bismuth and lead), and individual long-lived radionuclides such as potassium-40, rubidium-87 and indium-115. Wastes that might contain NORM should undergo specific screening in order to verify compliance with applicable legislation.

All recovered subsea hardware that has come into contact with produced hydrocarbons during the lifespan of the field shall be considered to be contaminated with NORMs, however it is more likely that any NORMs would accumulate particularly within flowlines. A non-invasive survey was undertaken of flowlines in 2014, but could not confirm the presence of NORMs in the subsea equipment. Based on current information the majority of the NORMs material is assumed to be barium sulphate and any NORMs present in remaining infrastructure is similarly likely to be in the form of scale.

During the cutting and recovery of flowlines (Section 4.8.3), minor quantities of NORMs scale may be released to the marine environment.

Once on board the vessel, equipment will be checked for NORMs and if present, segregated from other waste as per a NORMs Management Plan. All NORMs material will be transported to shore for disposal at an approved facility in accordance with local requirements.

8.7.2.3 Marine Growth Removal

Marine growth from recovered subsea infrastructure will be removed on the vessel deck using a high-pressure water and brushes. Removed marine growth will be discharged to the marine environment from the deck. Significant marine growth is not anticipated given significant marine growth has not been observed on infrastructure to date (refer to Section 4.7).

8.7.2.4 Waste Generation

Vessels

Vessels generate a variety of solid wastes, including domestic and industrial wastes. These include aluminium cans, bottles, paper and cardboard, scrap steel, chemical containers, batteries and medical wastes. This waste is segregated on-board and stored in designated skips and waste containers. Wastes are segregated into the categories of:

- non-hazardous waste (or general waste)
- hazardous waste
- recyclables.

General non-hazardous waste includes domestic and galley waste, and recyclables such as scrap materials, packaging, wood and paper and empty containers. Volumes of non-hazardous waste generated on vessels are generally minor. Accidental loss of hazardous and non-hazardous waste is covered in Section 9.2.

Recovered Subsea Infrastructure

Recovered subsea infrastructure (as detailed in Section 4.5) will be removed from the title area and disposed of in accordance with the Woollybutt Waste Management Plan (000105_DV_PR.HSE.1115.000). The Waste Management Plan includes the waste hierarchy. The waste management hierarchy (Figure 8.1) prefers the avoidance or reuse of waste and containment and disposal are the least preferred options.

Figure 8.2: presents the waste management hierarchy specific to decommissioning and removed infrastructure. The hierarchy stipulates that:

- reuse of the decommissioned infrastructure is the preferred choice to recycling;
- reuse in the current location is preferred to reuse in a new location; and
- recycling of the decommissioned facilities is the preferred choice to disposal.

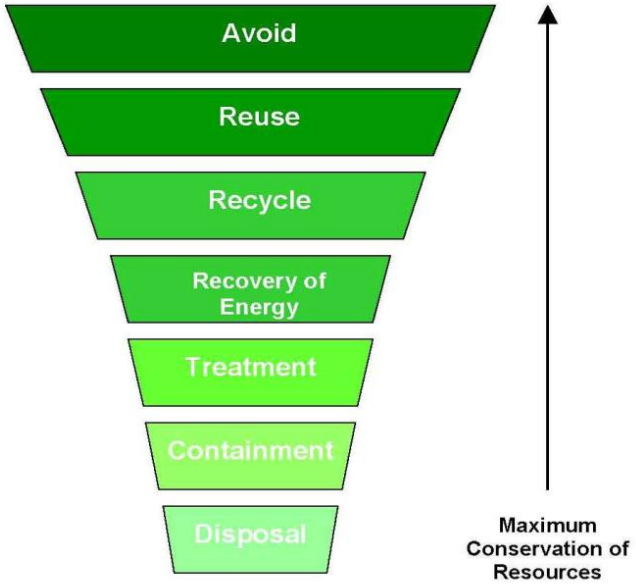


Figure 8.1: General waste management hierarchy

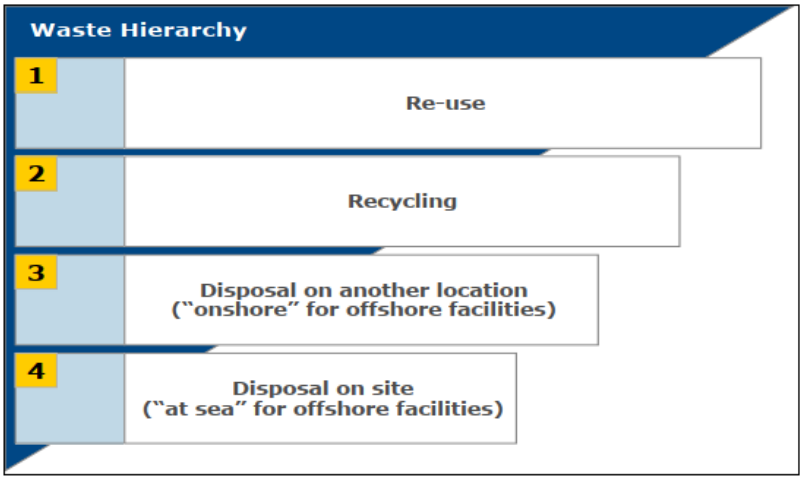


Figure 8.2: Decommissioning waste management hierarchy

A breakdown of total materials within the recovered infrastructure is provided in Appendix E.

Waste monitoring and data requirements are included in Section 11.5.2.

NORMs may be present on the recovered flowlines (refer Section 8.7.2.2)

8.7.3 Potential Environmental Impacts

8.7.3.1 Residual Hydrocarbons

Residual hydrocarbon concentrations rapidly disperse in the water column and are generally below threshold levels for acute toxic effects. Any hydrocarbon concentrations within the flowlines are expected to occur in minimal residual quantities (refer to Section 4.7.4). It is expected that residual hydrocarbons will disperse rapidly on release to the water column and toxicity effects to benthic fauna are not expected, particularly given the low sensitivity of the immediate environment (refer Section 1.2, Appendix C).

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

8.7.3.2 NORMS

Given the small release volumes, any exposure to NORMs would be highly temporary due to rapid dilution and dissipation in the marine environment. Marine fauna in the open water environment are highly mobile, transient species, making it unlikely any species would be exposed to discharged material for long enough to cause toxicity. The benthic habitat in the Operational Area comprises soft sediment, with unconsolidated sediment supporting infauna and epifauna (Section 1.2.1 of Appendix C). Potential impacts are likely to be highly localised and restricted to the Operational Area.

NORMs recovered on the vessel, will be classified and managed in accordance with the Woollybutt NORMs Management Plan.

8.7.3.3 Marine Growth

Marine growth discharge from the vessel is not anticipated to be significant given the marine growth observations on the subsea infrastructure made to date (refer to Section 4.7). The marine growth discharged from the vessel deck may float or sink to the seabed causing local disturbance.

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

8.7.3.4 Waste Generation

All waste generated will be transported to and managed appropriately by third-parties. Environmental impacts associated with onshore disposal of vessel and recovered infrastructure relate to the small incremental increase in waste volumes received at the

onshore licensed waste recycling and disposal sites. The environmental impacts associated with waste disposal onshore are anticipated to be slight, based on quantities involved and recycling of some materials.

8.7.4 Environmental Performance Outcomes and Control Measures

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

- No unplanned releases of solid hazardous or non-hazardous waste to the marine environment (EPO-9)

Control Measures relating to this risk include:

- Removal of subsea equipment (CM-4)
- Hazardous and non-hazardous waste management processes are implemented (CM-15)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

8.7.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption**
Eliminate	Eliminating umbilical and flowline contents discharge	It is possible to cap the flowline and umbilicals once cut. The contents of the flowlines and umbilicals will then remain contained and not impact the marine environment. However, during the removal/recovery to a vessel, flowline and umbilical contents must be discharged as the equipment cannot be reeled to the vessel deck with its contents. Given the low volume and negligible consequence of the discharge to marine environment it is not considered that capping the flowlines provides any significant environmental benefit.	*
Substitute	N/A	N/A.	N/A

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption**
Engineering	Capture any NORMs from flowline.	It is possible to cap the flowline once cut. The contents of the flowlines will then remain contained and not impact the marine environment. However, much of the scale within equipment is a very hard and built up on the inner walls of the flowline, it is therefore unlikely that it would be released to the marine environment. The relatively small quantities of scale that may be discharged would pose little radiological risk to the environment. Given the low volume and negligible consequence of the discharge to marine environment, it is not considered that capping the flowlines provides any significant environmental benefit.	×
Isolation	NORMs waste/ equipment will be segregated in accordance with an offshore NORMs Management Plan	Will isolate the NORMs waste and eliminate cross-contamination and loss of the waste to the marine environment. Minor cost involved in segregating the NORMs waste.	✓
Administrative	Water quality and/or sediment monitoring of hydrocarbons during activity	No environmental benefit would be gained by implementing monitoring during the activity. However, can be used to understand if any impact has occurred. Cost/sacrifice of monitoring (e.g. vessel use, time, personnel) outweighs benefit to be gained in the context of existing environment.	×
	Re-use all removed infrastructure	Most of the Woollybutt subsea equipment has crossed its design life (5 years) and was on the seabed for more than 17 years. Hence the re-use option is not feasible in this case.	×

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption**
	Re-cycle all removed infrastructure	As per recent mid-depth buoy (removed infrastructure) remediation campaign, mid-depth buoy's have been scrapped and company received a recycle credit at the end of the campaign from the contractor. A similar strategy will be followed for remaining retrieved subsea equipment except for plastics from flowlines, umbilicals. Plastics could either be recycled or disposed at a landfill location. Potential for plastic recycling (e.g. manufacture of 'green steel') is currently being investigated before finalising the final route for plastic disposal. The Woollybutt Waste Management Plan (000105_DV_PR.HSE.1115.000) provides details of the opportunities for recovered equipment recycling.	×
	NORMs waste/ equipment will be managed for disposal in accordance with an offshore NORMs Management Plan	Implementing a NORMS management plan ensures that NORMS waste materials containing NORMS will be stored in a safe place and segregated from other waste and disposed of appropriately. A NORMS management plan includes requirements for safe handling and disposal of NORMS waste. Minor cost involved in implementing a NORMS management plan outweighs the benefits.	✓
	Waste / recovered equipment will be managed in accordance with the Woollybutt Waste Management Plan (000105_DV_PR. HSE.1115.000)	The Woollybutt Waste Management Plan (000105_DV_PR.HSE.1115.000) includes a review of opportunities for waste in accordance with the waste hierarchy for decommissioning (Figure 8.2:), including: • Re-use • Recycling And includes details on: • Storage of waste • Transport and disposal of waste • Waste legislation and standards • Waste monitoring and reporting Minor cost involved in implementing the Woollybutt Waste Management Plan (000105_DV_PR.HSE.1115.000) outweighs the benefits.	✓

8.7.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	The Petroleum Activities Program is in compliance with EPBC 2001/365 approval.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to discharges associated with the recovery of equipment.
Area Sensitivity/ Biodiversity	Given the minor quantities of discharges, short and infrequent discharge durations and the low toxicity and high dispersion in the open, offshore environment, any impacts on the marine environment from discharges are expected to be slight. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 5.3). Control measures implemented will minimise the potential risks and impacts from the activity to relevant species identified in Recovery Plans and Conservation Advice.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 5.3). Recovery Plans and Conservation Advice objectives will not be compromised. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 7.3.1). The residual risk is considered low, which is acceptable in accordance with Eni's acceptability criteria (Table 7.4). Potential impacts associated recovery of equipment discharges are acceptable and ALARP.

8.8 Marine Discharges from Corrosion / Breakdown of Mooring Chains and Anchors (Risk ID 8)

8.8.1 Summary of Environmental Risk

Corrosion/breakdown of Mooring Chains and Anchors

Hazard	Marine Discharges		
	Frequency	Severity	Risk
Inherent Risk	C	1	L
Residual Risk	C	1	L

8.8.2 Description of Hazard

The anchors and below seabed components of the mooring chains comprise approximately 174.9 t of steel, with an epoxy coating (thickness of 25 to 40 mu) (refer

Table 4.6). As detailed in Section 4.7.1, one anchor (ANC 313) is partially buried (Figure 4.4) with limited protrusion above the seabed (Fugro, 2021) (estimated at 70 – 90 cm, refer Section 4.7.1). All other anchors and chains are buried. Corrosion and degradation of the materials within the anchors and chains will occur over time, causing particles to be released to the marine environment.

Eni commissioned a degradation assessment (Atteris, 2021) on the breakdown of various subsea infrastructure within the Woollybutt field, including the mooring chains and anchors. As presented in Section 4.10, the estimated time to the first perforation / complete loss of steel thickness due to external corrosion on the anchors is 40 to 150 years. Table 8.6 presents the estimated breakdown of the mooring chains and anchors and material particle sizes.

The breakdown of mooring chains and anchors will result in an introduction of metals, such as iron (refer Section 4.10), to the marine environment. As the mooring chains and anchors break down approximately, 174.9 t of steel, with an epoxy coating (thickness of 25 to 40 mu) (refer Table 4.6) will be released to the marine environment. The release of these materials has the potential to change the marine sediment quality in the immediate vicinity of the anchors (refer Section 8.8.3).

Table 8.6: Estimated Material Breakdown Outcomes – Mooring chains and Anchors (Atteris, 202110

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

8.8.3 Potential Environmental Impact

Potential environmental impacts from corrosion include:

- release of materials to the marine environment as infrastructure degrades, leading to a localised change in sediment quality.

8.8.3.1 Discharge of Trace Amounts of Metals

As detailed in Section 4.7.1, one anchor (ANC 313) is partially buried (Figure 4.4) with limited protrusion above the seabed (Fugro, 2021). All other anchors and chains are buried. Any degraded buried material which lies below the regional scour depth will remain buried. Buried material is unlikely to disperse within the water column**.** Over the

period of degradation /corrosion ANC 313 is expected to fully bury (refer Section 4.10.2), it is anticipated that only a limited amount of material from the areas of exposed metal will be released to the water column, prior to the anchors full burial.

Steel particles

The mooring chains and anchors are predominately comprised entirely of steel (refer Table 4.6), of which the main constituent is iron (approximately 98%). Iron is not considered a significant contaminant in the marine environment and is only toxic to marine organisms at high concentrations (Grimwood and Dixon, 1997).

Steel is expected to degrade into iron oxides and iron hydroxides. These are not likely to be present in a bioavailable form given the origin (hard metal parts) and the pH of the ocean (8.2) (Atteris, 2021).

The breakdown of steel is expected to occur over 40 – 150 years. Steel from the exposed areas ANC 313, prior to full burial, may enter the water column and disperse. Any dissolved particles that enter the water column remain in low concentrations (Atteris, 2021). Given such minor volumes this will not be measurable or present an impact to species within the water column or nearby protected areas

Elevated levels of iron may appear in the marine sediments directly adjacent to the anchors as they corrode and degrade, however given the rate of corrosion (40 – 150 years) and lack on sensitive habitat, iron levels are unlikely to result in an impact greater than a localised change in sediment quality.

The Operational Area consists of no known significant habitat or infauna habitat and is largely sandy substrate. There are no reefs or key ecological features within the Operational Area, with the closest being the Ancient Coastline at 125 m Depth Contour key ecological feature, approximately 8 km northwest. Steel particles will remain in the Operational Area and unlikely to cause significant impact to benthic habitats. Additionally, the infrastructure proposed to be left in situ is fully or partially buried below the seabed (refer Section 4.7.1) reducing the likelihood that particles will disperse into the marine environment. Any impact is anticipated to be low and relate to a localised change in sediment quality.

Epoxy coating

Volumes of epoxy coating the anchors is minor (refer Table 4.6). Released volumes from the buried anchors will remain buried as the infrastructure corrodes and degrades. Coating from the exposed areas ANC 313, prior to full burial, may enter the water column and disperse, however given such minor volumes this will not be measurable or present impact to species within the water column. The release of epoxy coating, given the minor volumes are unlikely to result in an impact greater than a localised change in sediment quality within the operational area.

8.8.4 Environmental Performance Outcomes and Control Measures

During the evaluation of the potential impacts of discharges from corrosion of the anchor chains and anchors it was determined that no control measures were available that would further reduce the likelihood or consequence of the impact. Therefore, no

additional management controls are required to reduce the risk to ALARP. Risk is ALARP and acceptable in its current state.

8.8.5 ALARP Demonstration

Type	Control/ management	Evaluation	Adoption?
Eliminate	Removal of subsea equipment	Section 3 determined that leaving the anchors and below seabed components of the chains in-situ has the potential to provide more environmental benefits than complete removal, as removal requires dredging which would result in seabed disturbance.	x
Substitute	N/A	N/A.	N/A
Engineering	N/A	N/A.	N/A
Isolation	N/A	N/A.	N/A
Administrative	Implement a monitoring program to assess any changes in seabed and sediment over time in the vicinity of the anchors	An ROV would need to be deployed from a vessel to conduct the monitoring activity. As such, the activity introduces health and safety risk to personnel and additional environmental risks (vessel and ROV based risks, disturbance to seabed). Components proposed to be left in-situ are low toxicity and low risk to the marine environment. All anchors except ANC 313 are entirely below the seabed, limiting the dispersal of particles into the marine environment as the steel corrodes. The seabed in the vicinity of the anchors does not present any significant epibenthic flora and fauna and the previous sediment survey within the Woollybutt field (Jacobs, 2014) did not show any toxic contamination of the sediments (refer Section 11.5.4) Given the above, there is limited environmental benefit (information) to be gained from environmental monitoring in the vicinity of the anchors. Section 11.5.4 presents further justification for not implement a monitoring program for the anchors and chains remaining in-situ.	x

8.8.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. Prior to permanently leaving any structure in-situ, Eni will obtain a Sea Dumping Permit in accordance with the requirements of the Sea Dumping Act.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to the corrosion of infrastructure.
Area Sensitivity/ Biodiversity	Corrosion particles will remain in the Operational Area, which does not overlap any sensitive areas. Dissolved particles are unlikely to reach concentrations that impact sensitive areas nearby (with the closest being 8 km from the Operational Area).
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

Impacts to the marine environment from the corrosion of anchors and chains are expected to be low. This is on the basis that the majority of materials will remain in buried within the sediment adjacent to the infrastructure, and within the Operational Area, where there are no sensitive receptors. Although some of the material may result in particles with potential to be toxic in the environment, it is unlikely they will be bioavailable, given the pH of the seawater and the origin of the particles (Atteris, 2021). The leave in-situ decommissioning of the anchors and below seabed components of anchor chains has been determined ALARP and environmentally acceptable.

8.9 Seabed Alteration (Risk ID 9)

8.9.1 Summary of Environmental Risk

ROV Use

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

Subsea Equipment Removal

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

DSPM anchors and Anchor Chains Remaining In-situ Altering the Seabed

Hazard	DSPM Anchors and Anchor chains Remaining In-situ Permanently Altering the Seabed		
	Frequency	Severity	Risk
Inherent Risk	E	1	L
Residual Risk	E	1	L

8.9.2 Description of Hazard

8.9.2.1 Remotely Operated Vehicle

Where ROV use during subsea equipment removal activities is required, the ROV may station on the seabed for short periods. The footprint of a typical ROV is approximately 2.5 m by 1.7 m. Impacts to the seabed are expected to be limited to minor sediment dispersion around the immediate footprint of the ROV.

Where an IV is used for subsea equipment removal activities, the IV will operate on DP so anchoring would not be required, except potentially in emergency circumstances. Support Vessels will also operate on DP and are not expected to anchor in the Operational Area.

8.9.2.2 Subsea Equipment Removal

Cutting of flowlines, umbilicals and DSPM anchor chains will not require the use of ROV-mounted suction pump. Any movement of sediment will be limited to the seabed immediately around the subsea components being cut and removed from the seabed.

8.9.2.3 DSPM Anchor Chains and Anchors Remining In-situ Permanently

As detailed in Section 4.7.1, one anchor (ANC 313) is partially buried (Figure 4.4) with limited protrusion above the seabed (Fugro, 2021). All other anchors and chains are buried. As such, negligible disturbance to the seabed and benthic habitats is expected.

8.9.3 Potential Environmental Impact

As the benthic fauna in the Operational Area are expected to be widely represented on the shelf (refer Section 1.2.1 of Appendix C), seabed disturbance, described in the above Sections, is not expected to result in widespread loss or degradation of environmentally significant habitats. Due to the localised area of disturbance, impacted benthic communities are expected to rapidly recolonise any damaged areas (Currie & Isaacs, 2004).

Increased suspended sediment in the water around the subsea equipment may occur during removal activities and settle in the vicinity of the subsea equipment. Any sedimentation will be localised and smothering effects are not anticipated.

Eni have completed a pre-decommissioning sediment sampling program of the Woollybutt field in 2014 (Jacobs, 2014) (refer Section 5.3) Whilst there was elevated levels of Nickel at site S05, the level (33 mg/kg) remained below the ANZACC/ARMCANZ (2000) ISQG-High trigger value. Barium concentrations were also elevated across all sample locations when compared to concentrations recorded in sediment sampled at the reference site, Ref 01 (17 mg/kg). Barite is one of the main constituents used WBM, and its use results in elevated levels of barium in cuttings.

In the event of cuttings pile disturbance during the subsea equipment removal activities, a proportion of a disturbed cuttings pile is likely to resettle on seabed sediment. Barite in drilling muds and sediments has a low solubility in seawater, because of the high natural concentration of sulfate in the ocean. Because it is insoluble in seawater, it has a low bioavailability and toxicity to marine organisms (Neff, 2005). The potential impact this has on benthic communities results from a combination of physical smothering, changes in sediment texture/grain size, oxygen depletion, organic enrichment.

The Ancient Coastline at 125 m Depth Contour KEF overlaps the Operational Area in the outmost northwest corner. Seabed disturbance activities are not planned to occur on the KEF, therefore no impact is anticipated.

8.9.4 Environmental Performance Outcomes and Control Measures

During the evaluation of the potential impacts to benthic habitat, it was determined that no control measures were available that would further reduce the likelihood or consequence of the impact. Therefore, no additional management controls are required to reduce the risk to ALARP. Risk is ALARP and acceptable in its current state.

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

- seabed disturbance limited to the Operational Area (EPO-10)

8.9.5 ALARP Demonstration

Type	Control/ management	Evaluation	Adoption?
Eliminate	Eliminate ROV use	The ROV is required for the activities. Without the use of the ROV, subsea equipment removal activities cannot be undertaken.	×
	Eliminate equipment removal	Leaving the equipment in-situ has been investigated The base case is to remove subsea equipment at the end of field life. As per Section 3.4.1.1.	×
	Removal of DSPM anchors and below seabed components of anchor chains	The comparative assessment (Section 3.4) determined that leaving the DSPM anchors and below seabed components of the anchor chains provides more environmental benefits than complete removal.	×
Substitute	N/A	N/A.	N/A
Engineering	N/A	N/A.	N/A
Isolation	N/A	N/A.	N/A
Administrative	Implement a monitoring program to assess any changes in seabed and sediment over time in the vicinity of the anchors	Refer to Section 8.8.5	×

8.9.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. Prior to permanently leaving any structure in-situ, Eni will obtain a Sea Dumping Permit in accordance with the requirements of the Sea Dumping Act.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to benthic habitat.
Area Sensitivity/ Biodiversity	The provision of hard substrate for benthic habitats will benefit the existing environment.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk demonstrates to be ALARP.

Leaving the DSPM anchors and below seabed components of anchor chains in-situ will not result in change to the seabed in the Operational Area.

Due to the small disturbance area and the subsea equipment removal activities being located in an area of low benthic diversity (Refer Section 1.2 of Appendix C), the residual risk of seabed disturbance is considered low which is acceptable in accordance with Eni's acceptability criteria (Table 7.4). A number of controls were evaluated above however there are no controls available that would further reduce impacts to benthic habitats and therefore the impact is ALARP.

9 UNPLANNED EVENTS

9.1 Introduction of Marine Pest Species (Risk ID 10)

9.1.1 Summary of Environmental Impact

Hazard	Introduction of Marine Pest Species		
	Frequency	Severity	Risk
Inherent Risk	C	4	H
Residual Risk	A	4	M

9.1.2 Description of Hazard

Instruction from Vessel Activities

The activities that have the potential to result in the introduction of Invasive Marine Species (IMS) are:

- discharge of vessel ballast containing foreign species
- translocation of species through biofouling of vessel hull or niches (e.g. sea chests, bilges or strainers)
- translocation of species on submerged equipment such as ROV
- removal of marine growth during monitoring activities

Support vessels and IV will be sourced locally, within Australian waters.

Support vessel and IV activity is not constant within the Operational Area and IMS risk is therefore limited for periods when monitoring activities are taking place.

Vessels will ballast and de-ballast to improve stability, spread vessel stresses and adjust vessel draft, list and trim, with regard to the weight of equipment, fuel and potable water on board at any time. Ballast water may contain organisms such as fish, invertebrate larvae and phytoplankton from foreign source waters.

Similarly, despite the use of antifouling systems, there will inevitably be some degree of hull fouling on the vessel(s). Anti-fouling paints are used to coat the bottoms of support vessels and IV to prevent marine organisms such as algae and molluscs attaching themselves to the hull – thereby slowing down the ship and increasing fuel consumption.

Presence on Anchors

For IMS to be established on the Woollybutt anchors, either:

- The IMS must have been present on the anchors when they were installed, or

- The IMS must have subsequently become established on the anchors after installation.

As the anchors were new when installed and not lowered into seawater prior to installation, IMS being present on the anchors when they were installed is not a credible vector for IMS.

IMS may have been introduced to the Woollybutt field as biofouling on vessels or equipment, or in ballast water discharged in the field. IMS introduced through biofouling may become established either through the release of propagules (e.g., eggs, larvae) or becoming dislodged and subsequently becoming established. IMS that grow as biofouling on vessels and equipment are typically adapted to shallow-water environments. For example, many species of mussels have been identified as potential IMS. These species can cause heavy fouling, but only occur in relatively shallow waters. If such fouling organisms were dislodged from vessels or equipment in the Woollybutt field, they are extremely unlikely to survive and become established on the anchors.

The release of propagules, such as eggs or larvae, may occur from biofouling or the discharge of ballast water. Such propagules are generally the planktonic phase of sessile IMS. Any such release of propagules will be advected away from the Woollybutt field by currents, and hence are extremely unlikely to recruit to the anchors. Any recruitment of such propagules is most likely to occur wherever the propagules were taken by the current.

Once installed in the seabed, relatively little of the hard surface of the anchor is exposed and available to IMS for attachment. The surface of the anchors is painted, making the anchors less suitable for attachment of sessile IMS than unpainted surfaces. A review of sessile IMS requiring hard substrate identified as being of concern in Australia indicated the conservative maximum depths at which most can survive is shallower than the anchors in the Woollybutt field (Figure 9.1). Only two sessile species of IMS were identified as potentially occurring at up to 100 m water depth - *Bonnemaisonia hamifera* and *Grateloupia turuturu* - both of which are red macroalgae. All macroalgae are photosynthetic and hence constrained to habitats that receive sufficient photosynthetically active radiation (i.e., within the photic zone of the water column). On the North West Shelf, macroalgae are uncommonly observed in water depths greater than 30 m, and are extremely unlike to occur in the water depths of the anchors (100 m). This is evidenced by the absence of fouling macroalgae observed on infrastructure at the seabed in the Woollybutt field.

Visual inspection of the anchors in the Woollybutt field shows they are largely embedded in the seabed (as intended by design), with little exposed hard surface (Figure 4.4). The exposed hard surfaces of the anchors show a general absence of macroscopic fouling organisms. The anchors were installed in 2002, and the time which the hard substrate of the anchors has been in the environment is sufficient for fouling communities to develop. The absence of substantial biofouling indicates the anchors may not be suitable for sessile organisms. Biofouling loads generally reduce substantially with depth, and the absence of biofouling in 100 m of water is consistent with observations of equipment installed in similar depths in the region.

Based on the information presented above, it is reasonable to conclude that the likelihood of IMS being, or becoming, attached to the anchors is very low. The water depth and consequent lack of photosynthetically active radiation is not conducive for the survival of the vast majority of sessile potential IMS. While hard substrate in the region is limited, such substrate does naturally occur widely (although at typically low densities) throughout the North West Shelf region. Hence, removal of the anchors will not substantially modify the risk of IMS becoming established in the region.

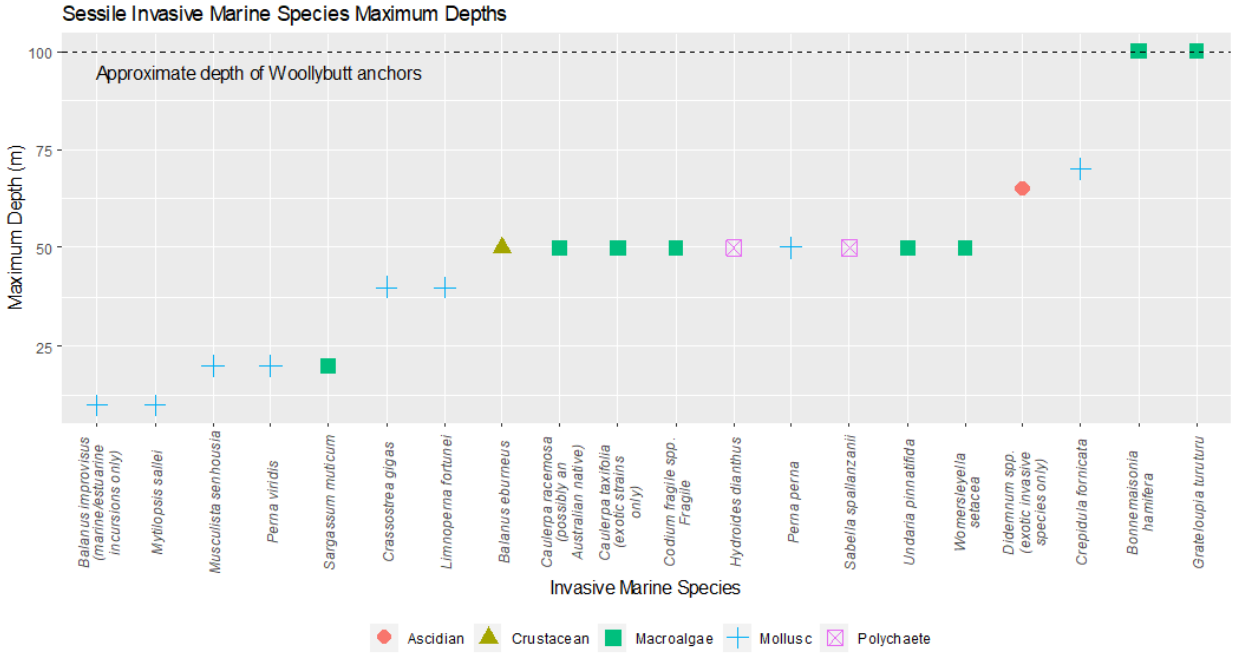


Figure 9.1: Sessile invasive marine species maximum depths

9.1.3 Potential Environmental Impact

Non-endemic marine species transported into areas where they have not previously been found can displace native species or interfere with ecosystem processes in other ways (e.g., through predation).

The successful establishment of an exotic species transported via either ballast or hull-fouling depends primarily on three factors:

1. colonisation and establishment of the marine pest on a vector (vessel, equipment or structure) in a donor region (e.g., a home port, harbour or coastal project site where a marine pest is established)
2. survival or marine pests on the vector during the voyage from the donor to the recipient region
3. colonisation (for example, by reproduction or dislodgement) of the recipient region by the marine pest, followed by successful establishment of a viable new population.

The deep offshore open waters of the Operational Area are not conducive to the settlement and establishment of IMS. The Operational Area is in water depths of

approximately 100 m, precluding light penetration to the seabed, distant from any coastline (> 35 km) and more than 14 NM from shorelines and/or critical habitat. The likelihood that any marine organisms could become established at the field is rare.

9.1.4 Environmental Performance Outcomes and Control Measures

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

- no introduction of marine pest species to the Operational Area (EPO-11)

Control Measures relating to this risk include:

- Implementation of an IMS risk assessment tool, applied to Support vessels and IV (CM-12)
- Support vessels and IV have approved ballast water treatment method/system (CM-13)
- IMS Management Methods applied to Support Vessels and IV (CM-14).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section10.

9.1.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Eliminate	Do not use support vessels or IV	The use of vessels and IV 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 support vessels and IV	Contract IV only operating in local, State or National waters to reduce potential for IMS; however, may present significant costs and delay in activity schedule.	×
	Alternative ballast system which does not require a discharge	Utilising an alternative ballast system to avoid uptake/discharge of water would reduce the requirement for ballast water exchange; however, sourcing such vessels may present significant costs and delay in activity scheduling and ballast water exchange is standard practice on many vessels.	×

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Engineering	Heat treatment of ballast water to eliminate IMS	Would reduce potential for IMS to establish by eliminating individuals present in ballast water; however, discharge of water at much higher temperature than surrounding marine environment would likely result in death of native marine species.	×
Isolation	N/A	N/A.	N/A
Administrative	Dry-docking prior to entering field to clean vessel and/or equipment and remove biofouling	Would minimise risk of IMS; however, presents significant cost and would lead to scheduling delays. Would be considered only to reduce IMS risk level.	×
	Implementation of an IMS risk assessment tool, applied to support vessels and IV	Ensures vessels and IV are assessed to low IMS risk before mobilising for the activity. Minimal cost involved in demonstrating IV and vessels are of 'low risk' of introducing IMS through completion of an IMS risk assessment. Additional controls (e.g. dry docking) would be considered based on the outcome of the IMS risk assessment.	✓
	Support vessels and IV have approved ballast water treatment method/system	Eni will adopt the *Biosecurity Act 2015* and Australian Ballast Water Management Requirements 2017 (DAWR). Pursuant to the requirements: Support vessel and IV carrying ballast water and engaged in international voyages shall manage ballast water in accordance with a Ballast Water Management Plan so marine pest species are not introduced. Requirements also include: 1. Vessels carrying internationally sourced ballast water must conduct ballast water exchanges as far as possible from the nearest land, which is: • at least 14 nautical miles from the nearest land, and in water greater than 50 metres deep • where possible, more than 200 NM miles from the nearest land and in water greater than 200 metres deep • no closer than 500 metres from the offshore installation. 2. Ballast water exchange must be conducted to the equivalent of a 95 per cent (or greater) volumetric	✓

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
		exchange, using one of the acceptable methods under the Regulations. 3. Vessels constructed on or after 8 September 2017 will be required to meet the Regulation D-2 discharge standard from the date they are put into service. 4. Vessels constructed before 8 September 2017 will need to comply with the Regulation D-2 standard by either the first or second five-year renewal survey of the vessel associated with the International Oil Pollution Prevention Certificate under MARPOL Annex I. *Note:* *The D-2 standard specifies that discharge ballast water that meets the following criteria:* • *less than 10 viable organisms per cubic metre which are greater than or equal to 50 micrometres in minimum dimension;* • *less than 10 viable organisms per millilitre which are between 10 micrometres and 50 micrometres in minimum dimension;* • *less than 1 colony-forming unit (cfu) per 100 millilitres of Toxicogenic Vibrio cholerae;* • *less than 250 cfu per 100 millilitres of Escherichia coli; and* • *less than 100 cfu per 100 millilitres of Intestinal Enterococci.*	
		Eni will implement the Australian Ballast Water Management Requirements 2017 (DAWR), which is a legal requirement. Pursuant to the requirements: • Vessels/IV must carry a valid ballast water management plan. • Vessels/IV will have ballast water management certificate (unless exemption has been granted). • Vessels/IV with a ballast water management system (BWMS) will carry a Type Approval Certificate specific to the type of BWMS. • Vessels/IV will maintain a complete and accurate record of all ballast water movements.	✓

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
	IMS Management Methods applied to IV and support vessels	IMS management measures will be applied to support vessels and IV according to risk to minimise the likelihood of IMS being introduced (such as the treatment of internal systems, IMS Inspections or cleaning).	✓

9.1.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	Compliance with: • Australian Ballast Water Requirements-Version 7 (Department of Agriculture and Water Resources, 2017) • International Maritime Organisation's Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species • Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships • *Biosecurity Act 2015* • Fish Resources Management Regulations 1995 • WA DPIRD Biofouling and Biosecurity Policy. The Petroleum Activities Program is in compliance with EPBC 2001/365 approval.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to the introduction of marine pest species have been raised.
Area Sensitivity/ Biodiversity	The main risks associated with the introduction of marine pest species are the displacement native species or interference with ecosystem processes in other ways (e.g. through predation). Provided the biosecurity controls are implemented during the activities, the risk of introduction of marine pest species is deemed low. The deep offshore open waters of the Operational Area are not conducive to the settlement and establishment of IMS. The Operational Area is in water depths of approximately 100 m, precluding light penetration to the seabed, distant from any coastline (> 30 km) and more than 12 nm from shorelines and/or critical habitat. The likelihood that any marine organisms could become established at the Operational Area is rare.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

Surface cleaning of all vessel hulls at a licensed vessel maintenance facility was considered but is not warranted, given the management measures in place and the low risk from IMS.

The use of support vessels and IV cannot be reduced, as they are required to undertake monitoring activities.

An IMS risk assessment process is undertaken on all vessels and IV prior to contracting to ensure vessel IMS risk is 'low'. All vessels are required to provide Australian biosecurity documentation as part of pre-hire documentation. Pre-hire vessel audits are also undertaken, including checking recent movements, anti-fouling coating, internal cleaning and compliance against the Australian Ballast Water Requirements – Version 7 and the International Maritime Organisation's Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species.

The assessment is designed to reduce the likelihood of transferring IMS and support ongoing effective management of vessel biofouling, encourage best practice, and may also provide evidence to support a defence to any change under the Fish Resources Management Act 1994 (FRMA). Factors affecting the risk output from the assessment tool include:

- presence and age of antifouling coating
- recent inspection, cleaning and treatment for IMS
- seawater pipework treatment
- duration of stay in interstate or overseas location
- vessel movements and history
- date of departure from last Port of Call.

Support vessels and IV are to be assessed prior to contracting. IMS management measures may be applied to ensure vessels and IV are at 'low risk' of introducing IMS as per the assessment. These may include measures such as:

- recoating of antifouling coating
- inspection (biofouling inspector considered suitably qualified by the Department), cleaning and treatment for IMS
- seawater pipework treatment.

Pursuant to the Biosecurity Act 2015 and Australian Ballast Water Management Requirements 2017 (DAWR), support vessels carrying ballast water shall manage ballast water in accordance with a Ballast Water Management Plan so that marine pest species are not introduced. Pursuant to the Australian Ballast Water Management Requirements 2017 (DAWR):

- all vessels must carry a valid ballast water management plan.
- vessels will have ballast water management certificate (unless exemption has been granted).

- vessels with a ballast water management system (BWMS) will carry a Type Approval Certificate specific to the type of BWMS.
- Vessels will maintain a complete and accurate record of all ballast water movements.

A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 7.3.1). The residual risk is considered medium, which is acceptable in accordance with Eni's acceptability criteria (Table 7.4). Therefore, the risk associated with the introduction of marine pests is acceptable and ALARP.

9.2 Accidental Loss of Hazardous and Non-Hazardous Waste (including Naturally Occurring Radioactive Materials) (Risk ID 11)

9.2.1 Summary of Environmental Impact

Loss of Non-Hazardous and Hazardous Waste

Hazard	Non-Hazardous and Hazardous Waste		
	Frequency	Severity	Frequency
Inherent Risk	B	Inherent Risk	B
Residual Risk	A	Residual Risk	A

9.2.2 Description of Hazard

9.2.2.1 Accidental Loss of Non-Hazardous and Hazardous Waste

Generated solid wastes may be broadly classified into one of two categories:

1. general non-hazardous solid wastes
2. hazardous wastes.

Non-hazardous solid wastes produced on support vessels and IV include cardboard, plastic, aluminium and paper. These waste materials will be stored on board the support vessels in suitable containers (segregated from hazardous waste materials) for transport back to shore for disposal/recycling in accordance with local regulations.

Hazardous wastes are defined as being waste materials that are harmful to health or the environment. Chemicals and other hazardous materials that may be stored on the vessels include:

- lubricating oils, cleaning and colling agents
- oil filters and batteries
- oily rags
- paint, aerosol cans

- acids/caustics and solvents.

All hazardous waste generated will be documented and tracked, segregated from other waste streams and stored in suitable containers. Recyclable hazardous wastes, such as oils and batteries, will be stored separately from non-recyclable materials. All hazardous waste materials will be transported to shore for disposal or recycled at an approved facility in accordance with local requirements.

9.2.3 Potential Environmental Impact

No discharge of non-hazardous or hazardous waste to sea is planned during Petroleum Activities Program. Potential impacts of solid waste discharge to sea include potential physical harm to marine fauna resulting from ingestion or entanglement with solid waste (garbage).

If accidentally lost overboard, hazardous waste would result in a temporary and highly localised hazardous water quality zone. This could have a toxic effect on marine fauna that are present within this zone. The exposure and toxicity would be highly temporary due to rapid dilution and dissipation in the marine environment expected on the NWS. Potential impacts are likely to be limited to one or a few individual marine animals in the immediate vicinity of the accidental release site, with the most likely fauna affected being those within the surface waters.

9.2.4 Environmental Performance Outcomes and Control Measures

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

- no unplanned releases of solid hazardous or non-hazardous waste to the marine environment (EPO-9)

Control Measures relating to this risk include:

- hazardous and non-hazardous waste management processes are implemented (CM-15).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

9.2.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Eliminate	Eliminate production of non-hazardous and hazardous waste	Eliminates the risk release of non-hazardous solid to the marine environment; however, eliminating the use of consumable products is not possible due to operational requirements; waste will therefore be generated. The use of vessels and IV (which generate waste) is required to perform the Petroleum Activities Program and therefore risk cannot be eliminated.	×
Substitute	N/A	N/A.	N/A
Engineering	N/A	N/A.	N/A
Isolation	Hazardous and non-hazardous waste will be segregated as per in accordance with Marine Order 95	Securely segregating and isolating the hazardous and non-hazardous waste in accordance with Marine Order 95 will reduce the likelihood of it being lost to the marine environment. Minor cost involved in segregating the hazardous and non-hazardous waste.	✓
Administrative	Implement a hazardous and non-hazardous waste management process in accordance with Marine Order 95	Reducing the risk of impact to the environment from loss of hazardous and non-hazardous waste outweighs the personnel cost associated with implementing procedures.	✓

9.2.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	Compliance with MARPOL 73/78 Annex V (Prevention of pollution by garbage/ Marine Order 95 (Marine pollution prevention – garbage) as required by vessel class. The Petroleum Activities Program is in compliance with EPBC 2001/365 approval.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to unplanned waste discharge.
Area Sensitivity/ Biodiversity	Impacts are limited to a few individual marine fauna in the immediate vicinity of the accident release site. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 5.3). However, with controls in place the objectives of Recovery Plans and Conservation Advice will be met.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 5.3). However, with controls in place the objectives of the plans and advice will be met.

Hazardous materials are required for the safe and efficient operation of machinery and cannot be eliminated or substituted. The residual risk ranking for non-hazardous and hazardous waste is low. This is acceptable in accordance with Eni's acceptability criteria (Table 7.4). A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 7.3.1). Given the short, intermittent duration of the activity, the low potential risk and the controls that will be implemented, Eni considered that the risks associated with hazardous and non-hazardous waste are acceptable and managed to ALARP.

9.3 Vessel Collision with Marine Fauna (Risk ID 12)

9.3.1 Summary of the Environmental Impact

Hazard	Non-Hazardous and Hazardous Waste		
	Frequency	Severity	Risk
Inherent Risk	B	2	L
Residual Risk	A	1	L

9.3.2 Description of the Hazard

There is the potential for vessels to collide with marine fauna including cetaceans, fish, marine reptiles and seabirds during the Petroleum Activity Program. The main collision risk associated with the Petroleum Activities Program is through vessel collision with large, slow-moving cetaceans; potentially resulting in severe injury or mortality.

For the subsea equipment removal activities, a maximum of three support vessels may be in the Operational Area at any one time supporting the IV. The equipment removal activity schedule and duration is provided in Section 4.4.

9.3.3 Potential Environmental Impact

Vessel collision with marine fauna may result in injury or death of marine fauna. Marine fauna that are present in surface waters such as marine turtle and cetaceans are most susceptible to vessel strikes due to their proximity to the vessel (hull, propeller or equipment).

The Operational Area is within the BIA for:

- wedge-tailed shearwater - breeding
- pygmy blue whale – distribution
- humpback whale – migration
- flatback turtle – internesting buffer
- whale shark – foraging including high density prey

All five species or turtle may pass through the Operational Area (Section 4.3) which overlaps with the BIA for the flatback turtle (internesting buffer and suitable mating habitat). It is possible individual turtles may be encountered during the Petroleum Activities Program; however, considering the water depths of the Operational Area compared to observed water depths of internesting turtles, large numbers of the species are not expected. Marine turtles on the sea surface have also been observed avoiding approaching vessels by typically moving away from the vessels track (Hazel et al., 2007).

Marine mammals that may occur within the Operational Area are detailed in Section 5.4.

The Operational Area overlaps the BIA for the wedge-tailed shearwater (breeding). The species is highly mobile and has an extensive open ocean breeding range off the NWS. Potential for vessel interaction is low, with the species likely to relocate if vessels are encountered.

The most commonly sighted whale in continental shelf waters of the region is the humpback whale and a BIA for humpback whale migration overlaps the Operational Area. The humpback whale is expected to be the most frequently encountered cetacean in the Operational Area, particularly during annual migrations. Cetaceans including humpback whales demonstrate a variety of behaviours in response to approaching

vessels (attributed to vessel noise), including longer dive times and moving away from the vessel's path with increased speed (Baker & Herman, 1989; Meike et al., 2004). These behaviours may contribute to reducing the likelihood of an interaction.

Pygmy blue, sei, fin, sperm whale and southern right whales may also transit through the Operational Area and a pygmy blue whale BIA for distribution overlaps the Operational Area. Although it is unlikely there will be significant numbers of these species encountered, there is still the potential for interaction with all these species.

The Operational Area lies within a foraging BIA for whale shark; however, given the offshore location, large numbers of species are not anticipated. It is, however, possible that individuals may transit through the Operational Area, therefore the potential exists for marine fauna interaction.

Approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) indicates humpback whales are one of the most frequently reported whale species involved in vessel strikes worldwide (Laist et al., 2001; Jensen & Silber, 2003). This observation is supported by Australian studies referenced in The Draft National Strategy for Mitigating Vessel Strike of Marine Mega-fauna (2018). Similarly, boat strike is recognised by the Approved Conservation Advice for Rhincodon typus (whale shark) as one of the threats to their recovery.

Given that cetaceans, marine turtles and other marine fauna exhibit avoidance behaviour, the likelihood of vessel collision with marine fauna is low. During movements into or out of the Operational Area, vessels will move slowly (5 knots or less), this also reduces the risk of collision allowing time for any marine fauna to move out of the immediate area. Management controls will also be implemented for further reduced the potential risk of collision.

9.3.4 Environmental Performance Outcomes and Control Measures

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

- No injury or mortality to EPBC Act and WA Biodiversity Conservation Act 2016 listed fauna during operational activities (EPO-4)
- no vessel collision with protected marine fauna during the activity (whales, whale sharks and turtles) (EPO-12).

Control Measures relating to this risk include:

- regulations and measures for interacting with marine fauna (CM-5)
- marine fauna observations/reporting undertaken (CM-6).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

9.3.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Eliminate	Eliminate vessel use	Would eliminate risk. However, vessel movements cannot be eliminated as the vessels are required to undertake monitoring activities.	×
Substitute	No substitute possible– the vessels will be contracted to meet the specification of the scheduled work	N/A.	N/A
Engineering	N/A	N/A.	N/A
Isolation	N/A	N/A.	N/A
Administrative	Regulations and measures for interacting with marine fauna	Vessels will comply with EPBC Regulations 2000 – Part 8 Division 8.1 (Interacting with cetaceans). Reduces risk of physical and behavioural impacts to marine fauna Minor cost in complying. Is a legislated requirement.	✓
	The use of a dedicated marine fauna observer	Improves ability to spot and identify marine fauna at risk of collision. However, costs involved with implementing a dedicated marine fauna observer is grossly disproportional to the environmental benefit given low risk.	×
	Use of spotter planes to identify marine fauna in the region	Improves ability to spot and identify marine fauna at risk of collision. However, costs involved with implementing a dedicated marine fauna observer is grossly disproportional to the environmental benefit given low risk.	×
	Plan vessel movements during periods when sensitive marine fauna is 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 (e.g. higher probability of inclement weather). In addition, there is a low likelihood of encountering marine mammals in the Operational Area.	×

9.3.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	Vessels will comply with *EPBC Regulations 2000* – Part 8 Division 8.1 (Interacting with cetaceans) and the Australian National Guidelines for Whale and Dolphin Watching 2017 (DoEE 2017). The Petroleum Activities Program is in compliance with EPBC 2001/365 approval.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to potential vessel collision with marine fauna.
Area Sensitivity/ Biodiversity	Pelagic marine megafauna including cetaceans and marine turtles at most risk. However, no turtle nesting beaches or feeding or breeding areas are located near the operational area and cetaceans and marine turtles exhibit avoidance behaviour. The Operational Area is within a BIA for: • wedge-tailed shearwater breeding • pygmy blue whale –distribution • humpback whale – migration • flatback turtle – internesting buffer • whale shark – foraging including high density prey. Vessel disturbance/strike is a threat within: • Conservation Management Plan for the Southern Right Whale 2011-2021 (2012) • Approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) (2015) • Approved Conservation Advice for *Balaenoptera borealis* (sei whale) (2015) • Conservation Management Plan for the Blue Whale 2015-2025 (2015). Turtle/vessel interactions/disturbance arising from increased vessel traffic is recognised as one of several key impacts to marine turtles in the Recovery Plan for Marine Turtles. Control measures implemented will minimise the potential risks and impacts from the activity to relevant species identified in Recovery Plans and Conservation Advice.
ESD Principles	The EIA presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

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

- scheduling activities outside of the main humpback whale migration period (July to early October) or whale shark migratory and aggregation period (April to November)
- using a Marine Mammal Observer (MMO)

- not undertaking the activities and eliminating presence of support vessels
- reducing vessel speed.

The control measures proposed are consistent with applicable actions described in the relevant Recovery Plans and Approved Conservation Advice. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (7.3.1). The residual risk ranking for vessel collision with marine fauna is low. This is acceptable in accordance with Eni's acceptability criteria (Table 7.4). Given the short, intermittent duration of the activity, the low potential risk and the controls that will be implemented, Eni considered that the risks associated with hazardous and non-hazardous waste are acceptable and managed to ALARP.

9.4 Spill Risk Assessment Modelling Methodology

Spill modelling was undertaken by RPS APASA on behalf of Eni. The following spill scenario was modelled:

Modelling provider	Software	Scenario
RPS APASA	SIMAP	Vessel collision leading to release of 500 m³ marine diesel

OILMAP and SIMAP

OILMAP and SIMAP modelling was used for the loss of marine diesel scenario. Surface oil spill modelling was undertaken using a three-dimensional oil spill trajectory and weathering model, SIMAP, which is designed to simulate the transport, spreading and weathering of specific oil types under the influence of changing meteorological and oceanographic forces.

Modelling is applied to repeatedly simulate the defined credible spill scenarios using different samples of current and wind data. These data samples were selected randomly from an historic time-series of wind and current data representative of the study area.

Results of the replicate simulations were then statistically analysed and mapped to define contours of percentage probability of contact at identified thresholds around the hydrocarbon release point. The stochastic approach captures a wide range of potential weathering outcomes under varying environmental conditions, which is reflected in the aggregated spatial outcomes showing the areas that might be affected by sea surface and subsurface oil.

The modelling outcomes provide a conservative understanding of where a large-scale hydrocarbon release could travel in any condition, plotted all in one figure. The modelling does not take into consideration any of the spill prevention, mitigation and response capabilities that would be implemented in response to the spill. Therefore, the modelling results represent the maximum extent that may be influenced by the released hydrocarbons.

9.4.1 Representative Hydrocarbons

9.4.2 Zone of Potential Impact and Hydrocarbon Contact Thresholds

The outputs of the spill modelling are used as a tool to assess the environmental risk. It can provide an insight into the areas of the marine environment that could be exposed to hydrocarbon levels exceeding hydrocarbon threshold concentrations (presented in Table 9.1).

A conservative approach to adopting contact thresholds that are documented to impact the marine environment have been used to define the ZPI. To identify appropriate exposure values Eni have considered the advice provided by NOPSEMA Bulletin #1 Oil Spill Modelling (April 2019) and scientific literature. The selected hydrocarbon thresholds are presented in Table 9.1 and described further below.

Table 9.1: Summary of environmental impact thresholds applied to the quantitative hydrocarbon spill risk modelling results

Spill scenario	Threshold applied to modelling
Vessel collision leading to release of 500 m³ marine diesel	Shoreline Contact Hydrocarbon (10 g/m²) Surface Hydrocarbon (1 g/m²) Entrained hydrocarbon (100 ppb) Dissolved aromatic hydrocarbon (6 ppb)

9.4.3 Surface Hydrocarbon Threshold

Thresholds for registering biological impacts resulting from contact of surface slicks have been estimated by different researchers at approximately 10–25 g/m² (French et al. 1999; Koops et al., 2004; NOAA, 1996). Potential impacts of surface slick concentrations in this threshold range may include harm to seabirds through ingestion from preening of contaminated feathers or the loss of the thermal protection of their feathers. A conservative surface hydrocarbon threshold of 1 g/m² was selected which is an order of magnitude below the minimum concentration that will result in harm to seabirds and other wildlife.

Surface hydrocarbons at a concentration of 1 g/m² have rainbow sheen in appearance, according to the Bonn Agreement Oil Appearance Code (Bonn Agreement, 2009) and are the lowest practical limit of observing oil in the marine environment (AMSA, 2012).

9.4.3.1 Entrained Hydrocarbon/Total Water Accommodated Fraction Threshold

Entrained hydrocarbons (also referred to as total Water Accommodated Fraction (WAF)) are insoluble oil droplets suspended in the water column). A wider range of LC50 values have been reported for species of crustacea and fish, ranging from 100 to 258,000,000 ppb (Gulec et al., 1997; Gulec and Holdway, 2000) The 100 ppb threshold is considered conservative in terms of potential for toxic effects leading to mortality for sensitive mature individuals and early life stages of species. This threshold has been defined to indicate a potential zone of acute exposure, which is more meaningful over shorter exposure durations. Contact within this exposure zone may result in impacts to the

marine environment, such as sub-lethal impacts to most species and lethal impacts to sensitive species.

OSPAR has published a predicted no effect concentration (PNEC) for produced formation water (PFW), which accounts for the dispersed oil fractions, which is representative of the WAF. The OSPAR PNEC is 70 ppb (median estimate (50% confidence) at 5% of the hazardous concentration and is based on biomarker and whole organism testing to total hydrocarbons by Smit et al. (2009). This PNEC represents an acceptable long-term chronic exposure level from continuous point source discharges in the North Sea, which is one of the most concentrated areas in the world for oil and gas production.

9.4.3.2 Dissolved Aromatic/Dissolved Water Accommodated Fraction Thresholds

The 6-ppb threshold value for species toxicity in the water column is based on global data from French et al. (1999) and French-McCay (2002, 2003), which showed that species sensitivity (fish and invertebrates) to dissolved aromatics exposure > 4 days (96-hour LC50) under different environmental conditions varied from 6 ppb-400 ppb, with an average of 50 ppb. This range covered 95% of aquatic organisms tested, which included species during sensitive life stages (eggs and larvae).

Based on scientific literature, a minimum threshold of 6 ppb is used to define the low exposure zones (Engelhardt, 1983; Clark, 1984; Geraci & St. Aubin, 1988; Jenssen, 1994; Tsvetnenko, 1998). The exposure zone is not considered to be of significant biological impact. The exposure zone represents the area contacted by the spill and conservatively defines the outer boundary of the area of influence from a hydrocarbon spill.

9.4.3.3 Shoreline Contact Threshold Concentrations

French-McCay (2009) defines accumulated hydrocarbons ≥ 100 g/m² to be the threshold that could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat. As a conservative measure a threshold of 10 g/m² has been applied to represent shoreline impact and represents a low contact value for interpreting shoreline accumulation modelling results (French-McCay, 2005, 2006).

A shoreline concentration of 100 g/m^2, or above, is likely to be representative of the minimum limit that the oil can be effectively cleaned according (AMSA, 2015; NOPSEMA, 2019) and is therefore used as a guide for shoreline clean-up planning.

9.5 Marine Diesel Spill to Sea (Risk ID 13)

9.5.1 Summary of Environmental Impact

Bunkering Incident

Hazard	Marine Diesel Spill to Sea – Bunkering Incident		
	Frequency	Severity	Risk
Inherent Risk	C	2	M
Residual Risk	B	2	L

Vessel Collision

Hazard	Marine Diesel Spill to Sea – Vessel Collision		
	Frequency	**Severity**	**Risk**
Inherent Risk	B	3	M
Residual Risk	A	3	L

9.5.2 Description of Hazard

Marine diesel fuel will be used by all support vessels and IV. No intermediate or heavy fuel oil powered vessels will be used.

There are two causes of loss of marine diesel from the vessels and IV during the Petroleum Activities Program:

- refuelling/bunkering incident
- collision with another vessel

Refuelling/bunkering at sea will occur during recovery of subsea equipment activities. Spills of marine diesel to sea surface during refuelling can be caused by a damaged refuelling hose, coupling failures, loss of connection, vessel collision or loss of vessel position. Spills resulting from overfilling will be contained within the vessel drains and slops tank system. In the event the refuelling pipe is ruptured, the fuel bunkering activity will cease by turning off the pump; the fuel remaining in the transfer line will escape to the environment as well as fuel that was released prior to the transfer operation being stopped. The guidance provided by AMSA (2013) for a refuelling spill under continuous supervision is considered appropriate given refuelling will be constantly supervised. The maximum credible spill volume during refuelling is calculated as transfer rate multiplied by 15 minutes of flow. The detection time of 15 minutes is seen as conservative but applicable following failure of multiple barriers followed by manual detection and isolation of the fuel supply. Based on an expected pumping rate of 150 m^3/hour and a conservative time of 15 minutes to shut down the pumping operation once the fuel spill had been identified, a total spill volume of approximately 37.5 m^3 is proposed as the worst-case credible volume for a refuelling incident.

A surface release of marine diesel from a vessel may result from an external impact (vessel collision) which ruptures a fuel tank. The largest tank for a support vessel (see Section 4.12.1) is likely to be 167.6 m^3 and the largest tank for an IV (see Section 4.12.2) is 500 m^3. AMSA (2015) defines the maximum credible spill volume of a vessel collision to be the volume of the largest fuel tank. Therefore, the maximum release in the event of a collision is 500 m^3.

It is not credible that the total storage volume of a vessel would be lost, as fuel is stored in multiple tanks.

For the purpose of a hydrocarbon spill risk assessment from vessel collision, Eni determined that 500 m^3 release would provide a conservative cover of all credible vessel spill scenarios. This is on the basis that the optimal fuel operating capacity is generally

at 80% of tank capacity to prevent loss of fuel from vents in rough seas and vessels will not always carry maximum fuel during activities.

The exclusion zone for the Chevron operated Wheatstone pipeline falls within the westernmost extent of the Operational Area (refer to Section 5.5.5). In the event that Chevron is conducting pipeline maintenance, SIMOPS have the potential to occur in this area and there will be additional potential for a vessel collision / vessel collision risk.

9.5.3 Diesel Characteristics and Weathering

Marine diesel is a light, refined petroleum product with a relatively narrow boiling range. When spilled on water, most of the oil will evaporate or naturally disperse within a few days or less. Marine diesel fuel properties (including the components) are summarised in Table 9.2.

Table 9.2: Marine diesel fuel properties

Oil Type	Volatiles (%)	Semi-Volatiles (%)	Low Volatiles (%)	Residual (%)	Aromatics (%)
Boiling point (°C)	< 180 C4 to C10	180-265 C11 to C15	265-380 C16 to C20	> 380 > C20	Of whole oil < 380 BP
	Non-persistent			Persistent	
Marine Diesel	6	34.6	54.4	5	3

APASA (2021) conducted weathering simulations to illustrate the potential behaviour of marine diesel when exposed at the water's surface. The results are detailed below:

- The mass balance forecast for the constant-wind case (Figure 9.2) for marine diesel shows that approximately 41% of the oil is predicted to evaporate within 24 hours. Under these calm conditions the majority of the remaining oil on the water surface will weather at a slower rate due to being comprised of the longer-chain compounds with higher boiling points. Evaporation of the residual compounds will slow significantly, and they will then be subject to more gradual decay through biological and photochemical processes.
- Under the variable-wind case (Figure 9.3) where the winds are of greater strength, entrainment of marine diesel into the water column is indicated to be significant. Approximately 24 hours after the spill, around 72% of the oil mass is forecast to have entrained and a further 24% is forecast to have evaporated, leaving only a small proportion of the oil floating on the water surface (<1%). The residual compounds will tend to remain entrained beneath the surface under conditions that generate wind waves (approximately >6 m/s).

The increased level of entrainment in the variable-wind case will result in a higher percentage of biological and photochemical degradation, where the decay of the floating slicks and oil droplets in the water column occurs at an approximate rate of 2.4% per day. Given the large proportion of entrained oil and the tendency for it to remain mixed in the water column, the remaining hydrocarbons will decay and/or evaporate over time scales of several weeks to a few months.

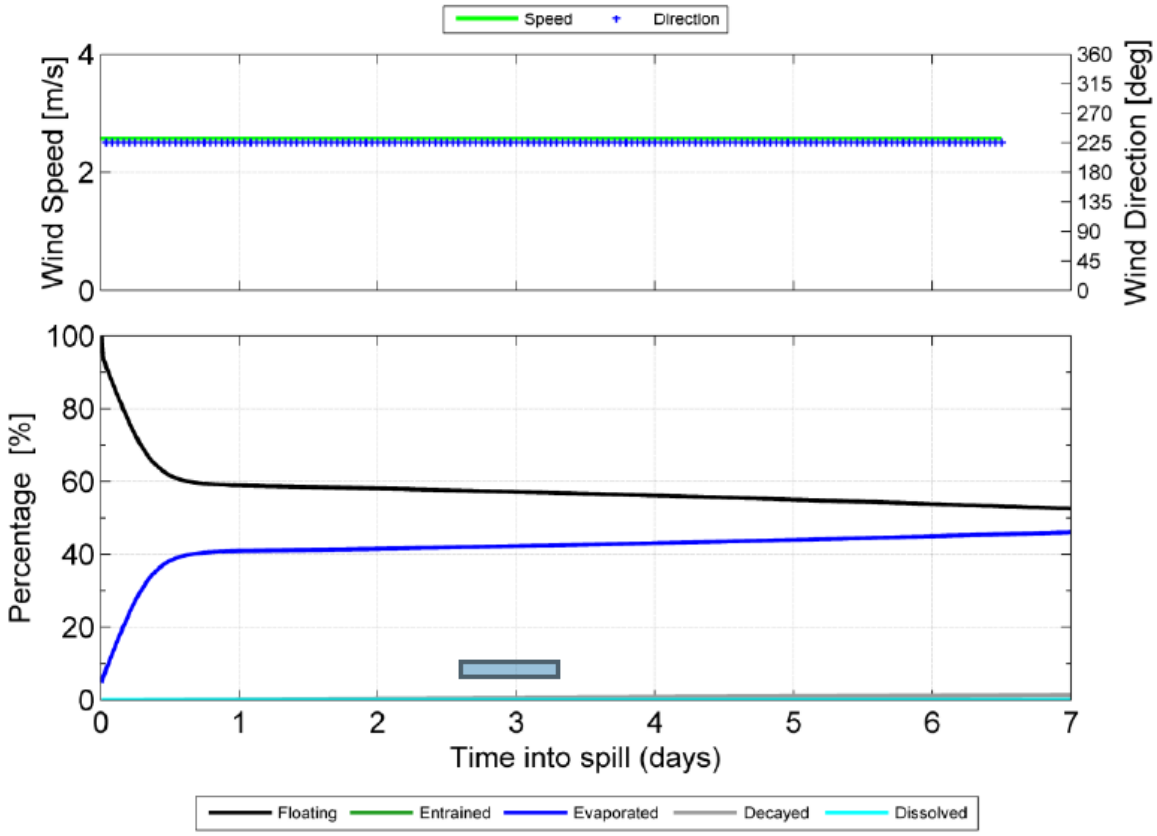


Figure 9.2: Proportional mass balance plot representing the weathering of marine diesel spilled onto the water surface as a one-off release (50 m³) and subject to a constant 5 km (2.6 m/s) wind at 27 °C water temperature and 25 °C air temperature.

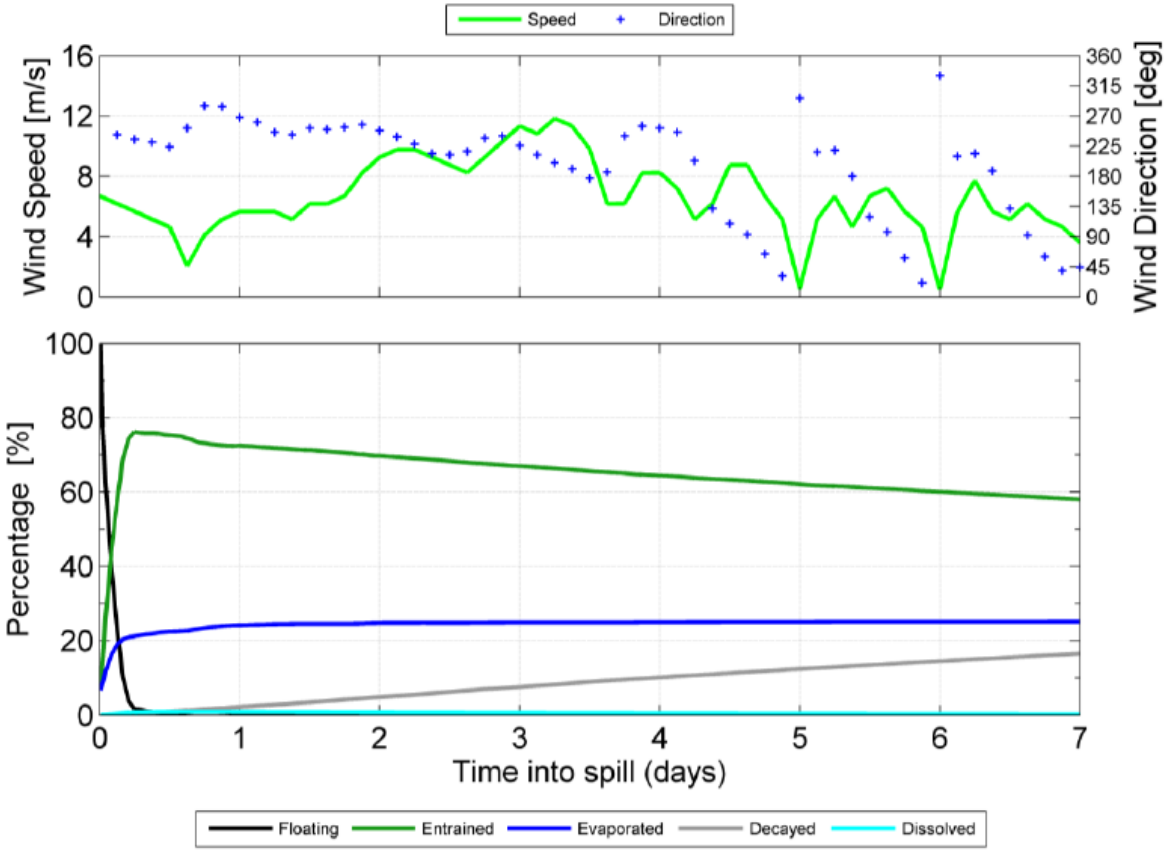


Figure 9.3: Proportional mass balance plot representing the weathering of marine diesel spilled onto the water surface as a one-off release (50 m³) and subject to variable wind at 27 °C water temperature and 25 °C air temperature.

9.5.4 Diesel Spill Modelling

A 500 m³ marine diesel surface release was modelled by APASA (2021) at the Woollybutt-5 well (closest well to the coastline) for summer, winter and transitional seasons and is considered appropriate, although conservative, for informing the approximate spatial extent of potential impacts from a vessel collision event during the Petroleum Activities Program.

Table 9.3 presents the parameters and justifications used in the modelling.

Table 9.3: Summary of parameters and justifications for marine diesel spill modelling from the Woolybutt-5 well

Parameter	Description
Number of spill simulations	100
Hydrocarbon type	Marine diesel
Release type	Surface release
Total spill volume	500 m^3
Spill volume justification	Largest tank volume of an IV (refer Section 4.12.2)
Release duration	Instantaneous

9.5.4.1 Surface and Shoreline Hydrocarbons

The predicted seasonal probability contour figures (Figure 9.4 to Figure 9.6) indicate that, in a worst case scenario, floating oil concentrations at or greater 1 g/m^2 could travel up to 48 km from the release location (in the summer season).

The worst-case shoreline accumulation is 2 m^3, predicted to occur at a concentration of 25 g/m^2 after 428 hours at the following locations:

- Dugong BIA
- Marine Turtle BIA
- Seabird BIA
- Exmouth
- Ningaloo Coast
- Ningaloo Marine Park (State)
- Cape Range

No other shoreline receptors are predicted to be contacted by hydrocarbons.

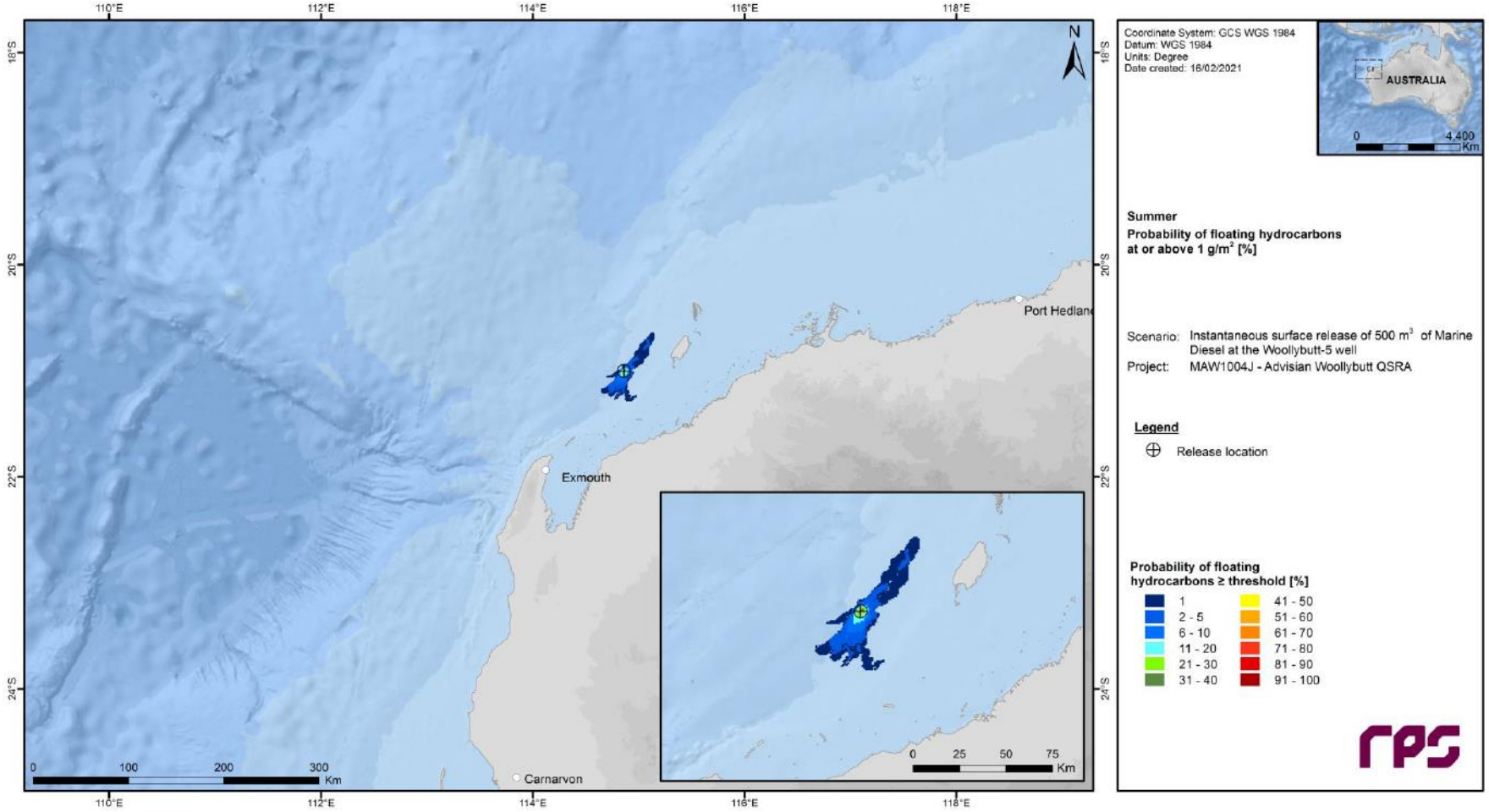


Figure 9.4: Predicted probability of floating oil concentrations at or above 1 g/m² resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during summer (APASA, 2021)

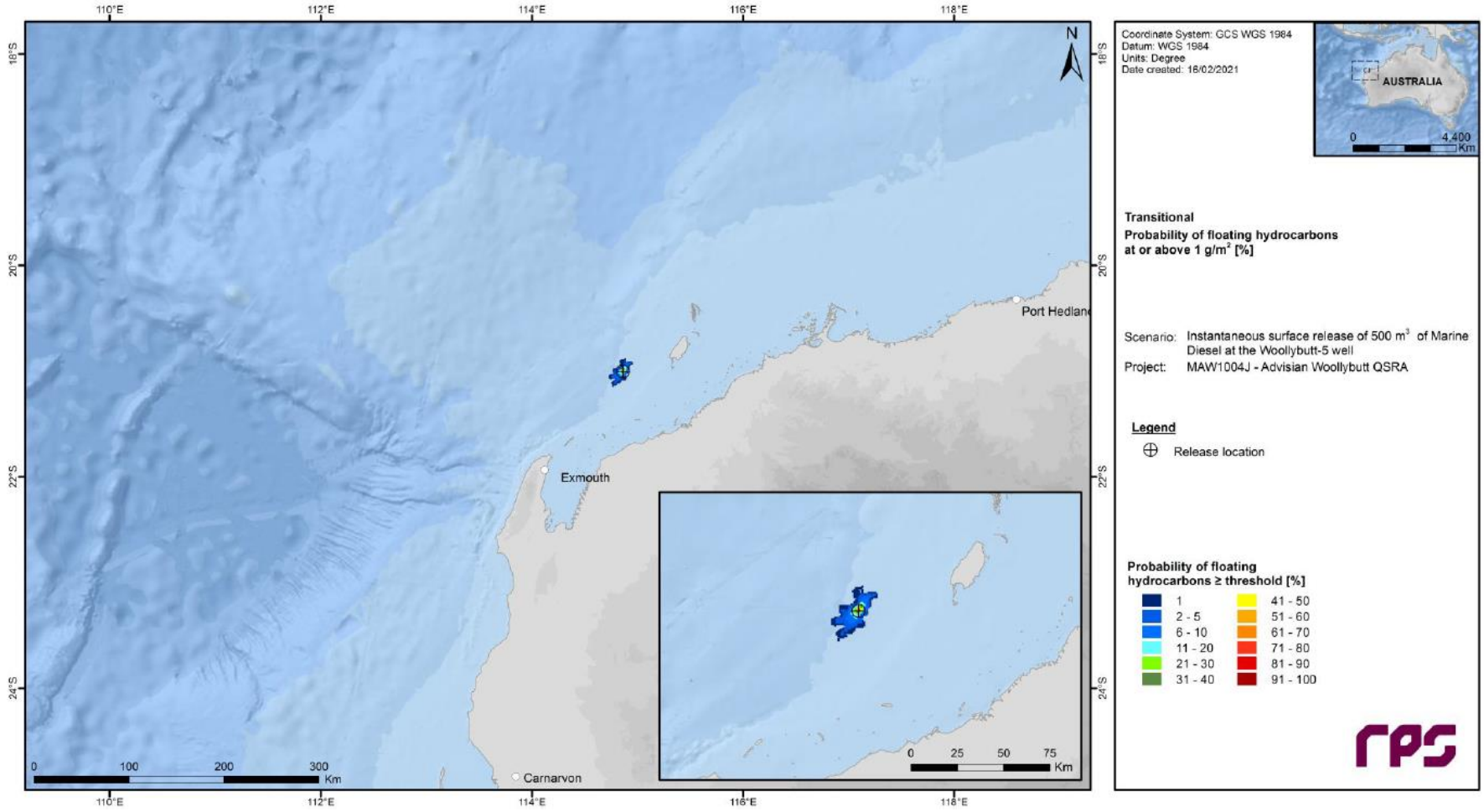


Figure 9.5: Predicted probability of floating oil concentrations at or above 1 g/m² resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during transitional months (APASA, 2021)

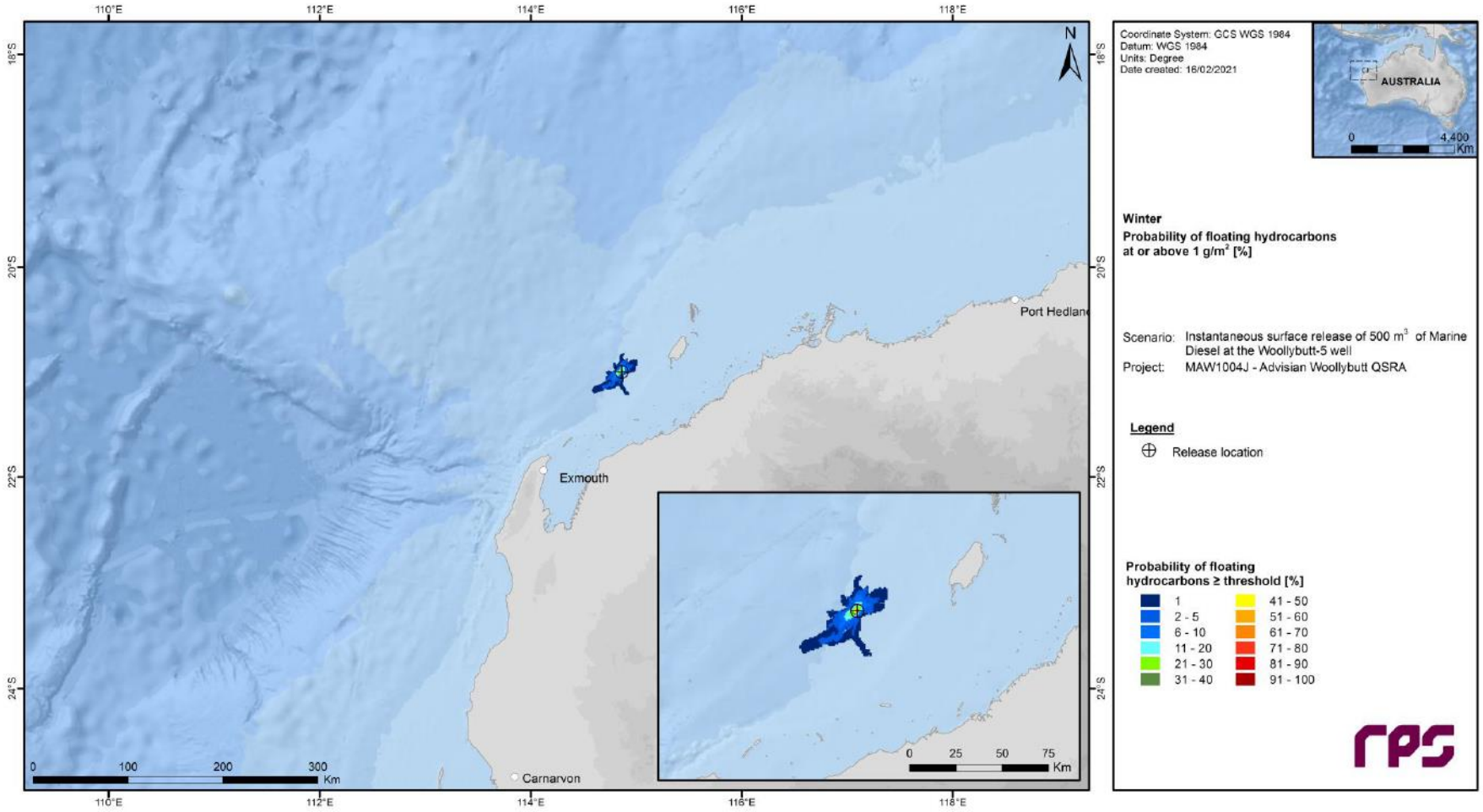


Figure 9.6: Predicted probability of floating oil concentrations at or above 1 g/m² resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during winter (APASA, 2021)

9.5.4.2 Subsurface – Entrained Hydrocarbons

The seasonal probability contour figures (Figure 9.7 to Figure 9.9) indicate entrained oil concentrations at or greater than 100 ppb could travel up to 481 km from the release location in summer.

Probability of contact by entrained oil concentrations are predicted to be greatest in the winter season at the Ancient Coastline at 125m Depth Contour KEF (Table 9.4).

Table 9.4: Expected entrained oil outcomes at sensitive receptors resulting from a from an instantaneous surface release of marine diesel (APASA, 2021)

Receptor	Probability (%) of entrained hydrocarbon concentration contact at ≥ 100 ppb			Minimum time to receptor waters (hours) at ≥ 100 ppb			Maximum entrained hydrocarbon concentration (ppb) (worst case replicate)		
	Summer	Winter	Transitional	Summer	Winter	Transitional	Summer	Winter	Transitional
Gascoyne AMP	8	14	9	81	90	93	1587	1072	759
Montebello AMP	8	1	5	98	139	94	1033	345	1139
Ningaloo AMP	9	19	4	81	86	100	1583	1773	1034
Exmouth coastline	4	5	1	119	165	244	651	345	440
Muiron Islands	1	8	-	230	84	-	130	380	-
Montebello Islands	1	-	1	190	-	215	156	-	153
Thevenard Island	-	1	-	-	267	-	-	223	-
Barrow Island	-	-	1			174			79
Ningaloo Coast WH	9	19	4	81	86	100	1583	1773	1034
Ningaloo MP (State)	7	8	2	95	104	163	1040	640	624
Muiron Islands MP	2	8	-	151	84	-	354	380	-
Cape Range National Park	4	5	1	119	199	257	651	331	324
Ancient Coastline at 125m Depth Contour KEF	41	47	44	7	5	8	756	976	9300
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF	12	33	13	46	43	62	62	43	3328
Commonwealth waters adjacent to Ningaloo Reef KEF	9	19	4	81	86	100	54	19	1773
Continental Slope Demersal Fish Communities	22	22	21	29	36	27	119	122	1470
Exmouth Plateau	3	1	3	186	288	253	6	7	192

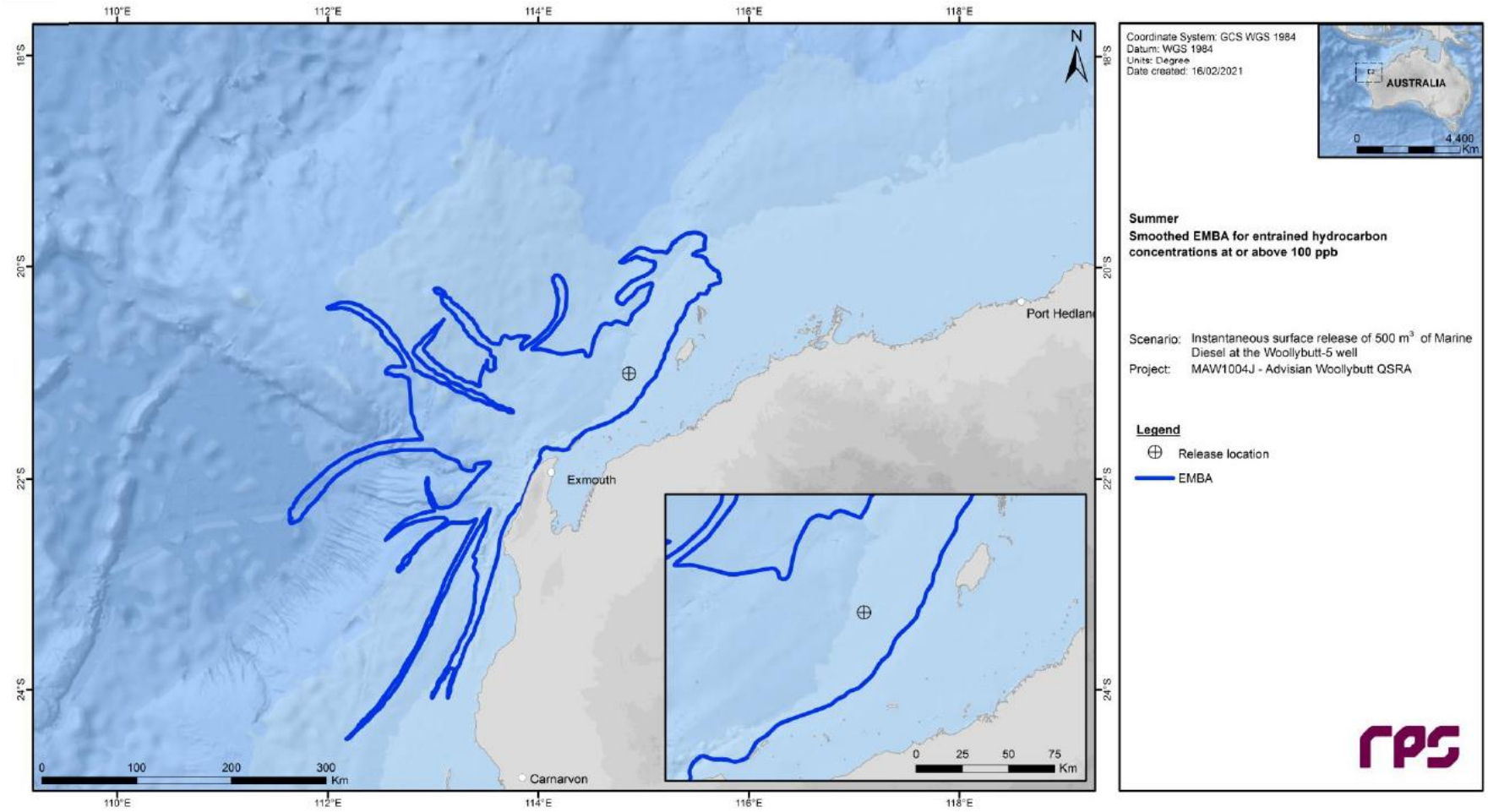


Figure 9.7: Predicted ZPI of entrained oil concentrations at or above 100 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during summer (APASA, 2021)

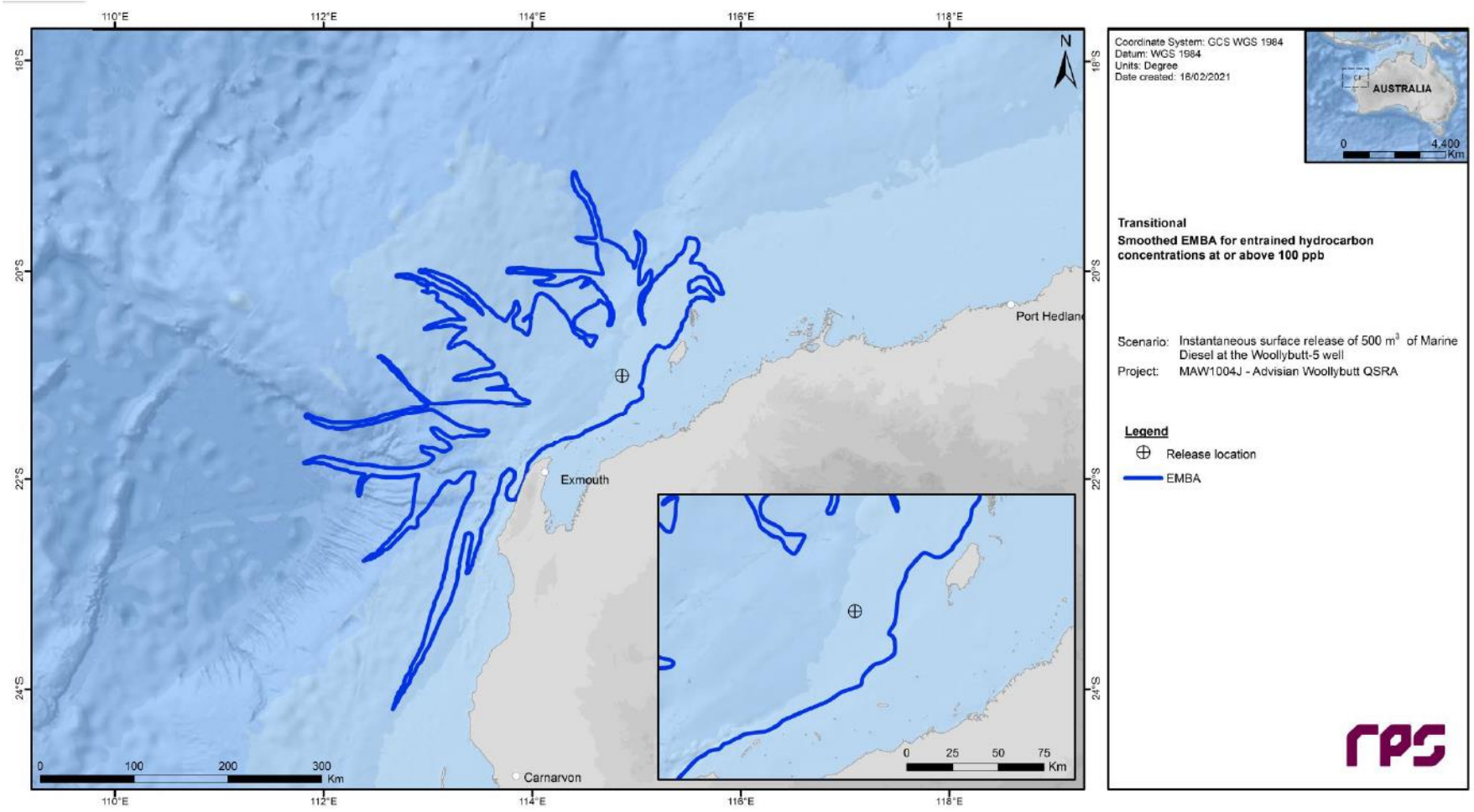


Figure 9.8: Predicted ZPI of entrained oil concentrations at or above 100 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during transitional months (APASA, 2021)

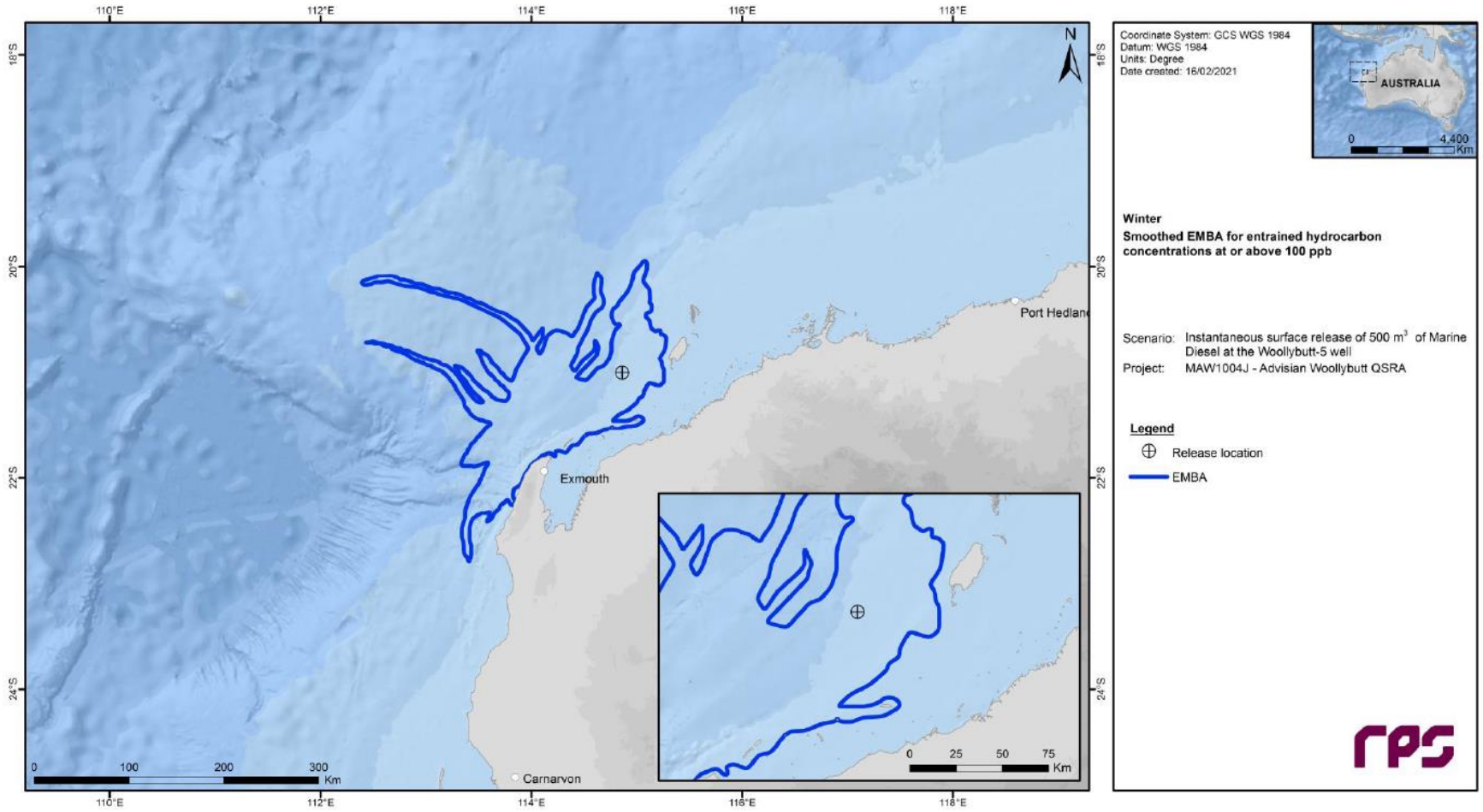


Figure 9.9: Predicted ZPI of entrained oil concentrations at or above 100 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during winter (APASA, 2021)

9.5.5 Subsurface – Dissolved Aromatics

The seasonal probability contour figures (Figure 9.10 to Figure 9.12) indicate that dissolved aromatic hydrocarbon concentrations at or greater than 6 ppb could travel up to 421 km from the release location in summer.

The worst-case instantaneous dissolved aromatic hydrocarbon concentration at any receptor is predicted at Ancient Coastline at 125m Depth Contour KEF (Table 9.5).

Table 9.5: Expected dissolved oil outcomes at sensitive receptors resulting from a from an instantaneous surface release of marine diesel (APASA, 2021)

Receptor	Probability (%) of entrained hydrocarbon concentration contact at ≥ 6 ppb			Maximum dissolved hydrocarbon concentration (ppb) (worst case replicate)		
	Summer	Winter	Transitional	Summer	Winter	Transitional
Gascoyne AMP	5	8	5	54	35	30
Montebello AMP	3	1	2	36	9	43
Ningaloo AMP	7	9	2	67	60	37
Exmouth coastline	2	2	1	16	15	10
Muiron Islands	1	2	-	8	20	-
Ningaloo Coast WH	7	9	2	67	60	37
Ningaloo MP (State)	3	5	1	63	40	20
Muiron Islands MP	-	3	-	-	50	-
Cape Range National Park	1	2	1	9	7	10
Ancient Coastline at 125m Depth Contour KEF	24	26	29	174	210	193
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF	8	19	8	96	90	51
Commonwealth waters adjacent to Ningaloo Reef KEF	7	9	2	67	60	37
Continental Slope Demersal Fish Communities	11	8	11	118	84	135
Exmouth Plateau	1	-	1	17	-	9

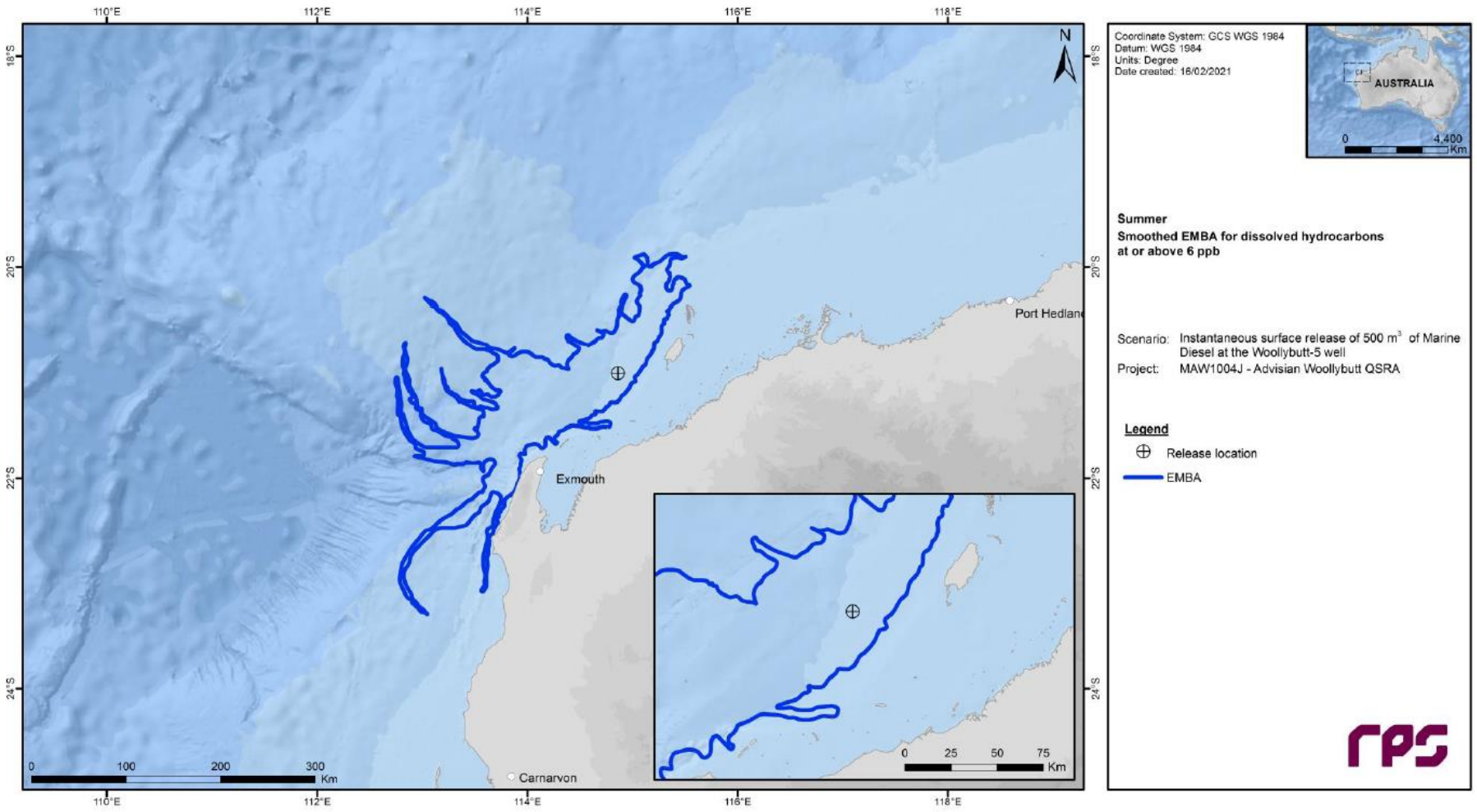


Figure 9.10: Predicted ZPI of dissolved aromatic hydrocarbon concentrations at or above 6 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during summer (APASA, 2021)

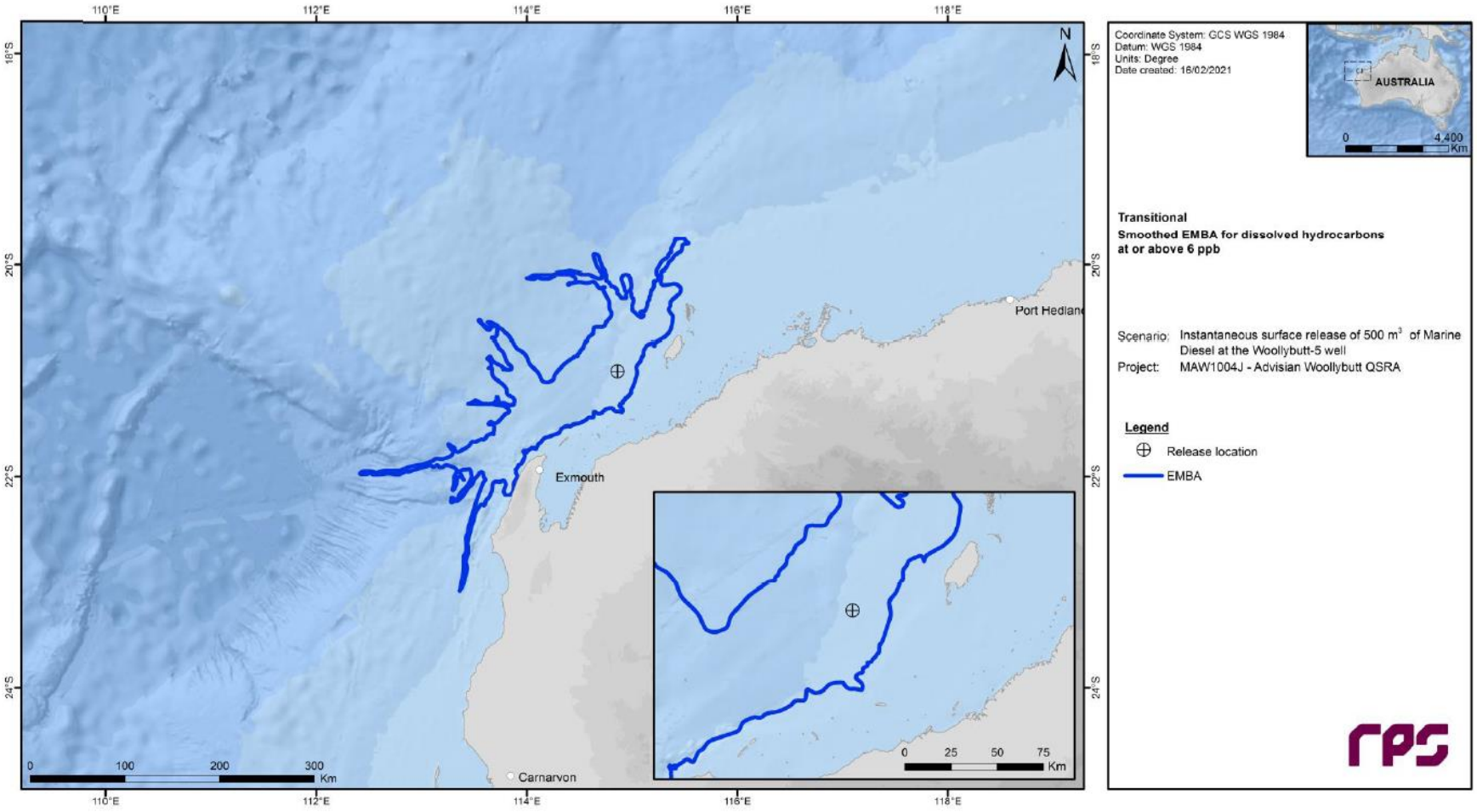


Figure 9.11: Predicted ZPI of dissolved aromatic hydrocarbon concentrations at or above 6 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during transitional months (APASA, 2021)

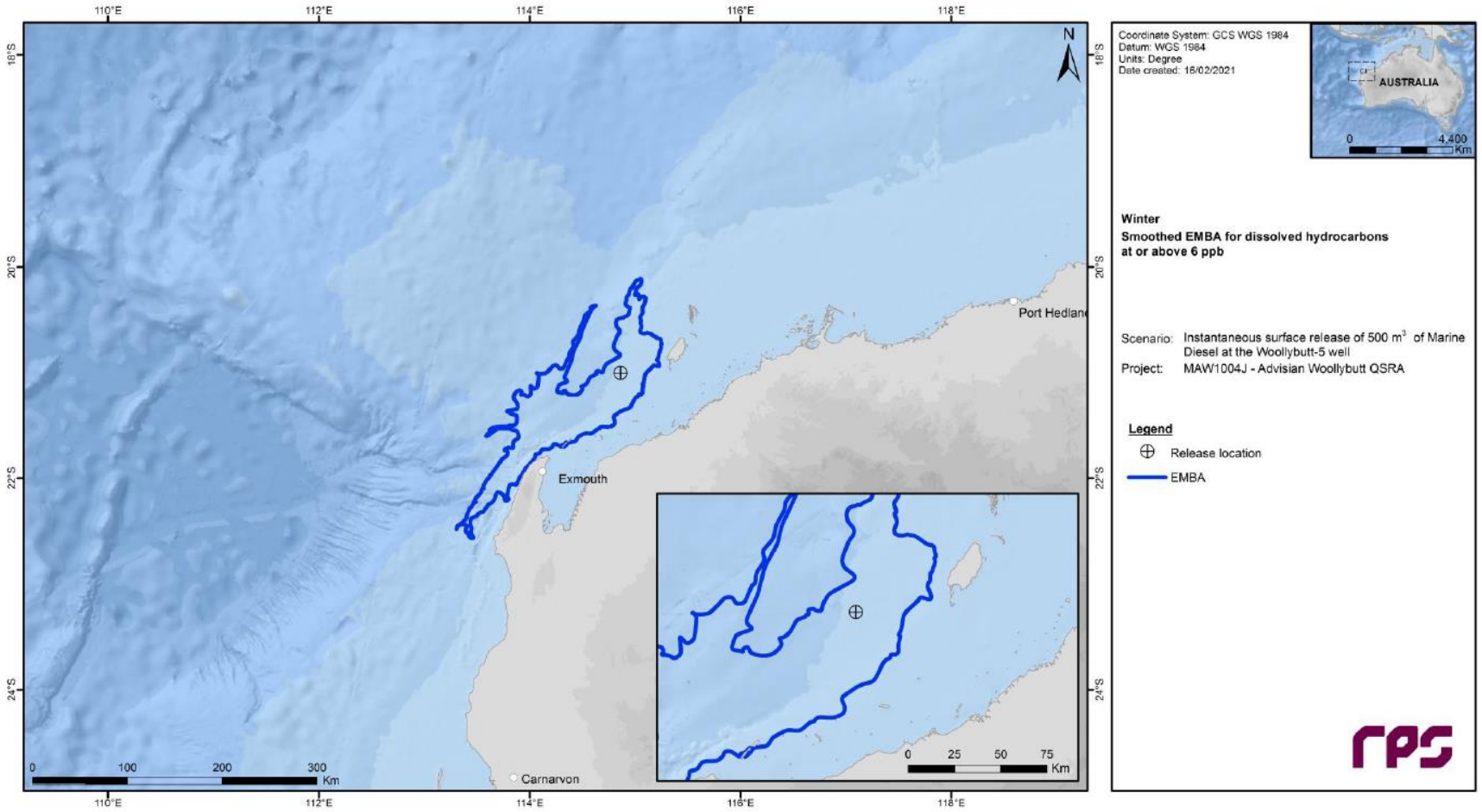


Figure 9.12: Predicted ZPI of dissolved aromatic hydrocarbon concentrations at or above 6 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during winter (APASA, 2021)

9.5.6 Potential Environmental Impact

The potential impacts of a hydrocarbon release (marine diesel) are described in Table 9.6.

A surface release of 500 m^3 diesel has the potential to contact the Gascoyne, Montebello, Shark Bay and Ningaloo AMPs. Impacts to the value of the AMPs within the ZPI have been discussed in Section 9.5.6.1.

Table 9.6: Potential impacts of hydrocarbons on sensitive receptors

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
Marine fauna			
Plankton (including zooplankton; fish and coral larvae)	Surface hydrocarbons will have no impact on plankton as plankton is present in the water column only.	There is potential for localised mortality of plankton due to reduced water quality and toxicity. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest.	N/A
	As fish and sharks dwell in the water column, impacts are most likely from the entrained hydrocarbons, through the pathways of ingestion or the coating of gill structures. This could lead to respiratory problems or accumulation of hydrocarbons in tissues. In the worst instance this could lead to mortality, or sub-lethal stress. Site-attached fish, such as reef fish, have small home ranges and are at higher risk from hydrocarbon exposure than more wide-ranging species. The exact impact on resident fish populations at impacted shoals or reefs will be dependent on actual hydrocarbon concentration, duration of exposure and water depth of the affected communities. The larval stage of fish is more likely to be susceptible; however, in comparison to predation and natural loss, any impacts would be over a small proportion of the marine environment in which they may occur and any measurable impact at the population level is considered to be low. The Operational Area is not anticipated to provide spawning grounds for fish species, given their preference for spawning in oceanic conditions on reef edges and area.		N/A
Marine mammals	Marine mammals may be come in contact with hydrocarbons through surfacing within slick. Effects include irritation of eyes/mouth and potential illness. Surface respiration could lead to accidental ingestion of hydrocarbons or result in the coating of sensitive epidermal surfaces. Fresh hydrocarbons may have a higher potential to cause toxic effects when ingested, while weathered hydrocarbons are considered to be less likely to result in toxic effects. Modelling in the marine diesel release scenario indicates that the maximum distance to the outer extent of the 1 g/m² surface hydrocarbons is predicted to be 48 km.	Marine mammal that physically come in contact with surface, entrained or dissolved aromatic hydrocarbons may suffer surface fouling, ingestion of hydrocarbons (from prey, water and sediments), aspiration of oily water or droplets and inhalation of toxic vapours (Deepwater Horizon Natural Resource Damage Assessment Trustees 2016). Effects such as irritation of eyes/mouth and potential illness may also occur.	N/A

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
	Surface hydrocarbons concentrations exceeding 25 g/m² are predicted to reach a maximum extent of 29 km. It is therefore predicted the impact area from surface hydrocarbons is confined to around the spill site and not the wider region. In addition the weathering results for the variable-wind case for marine diesel (Figure 9.3) indicate that the wind conditions will have a large impact on the proportion of oil that remains afloat, with very little oil mass predicted to persist on the sea surface (< 1% after 24 hours). Behavioural disturbance (i.e. avoiding spilled hydrocarbons) in some instances has been observed (Geraci, 1988) or several species of cetacean suggesting that cetaceans have the ability to detect and avoid surface slicks. Observations during spills have noted larger whales (both mysticetes and odontocetes) and smaller delphinids traveling through and feeding in oil slicks (Aichinger Dias *et al*., 2017). The highest potential risks for dugongs are related to direct ingestion of seagrass or macro-algae exposed to acute or chronic toxicity and or drastic reduction on seagrass coverage due to hydrocarbon spills (Heinsohn *et al.,* 1977).	Whales and dolphins could potentially ingest dissolved oil when feeding in open water. Ingestion of oil at the quantities required to induce direct toxic effects is considered unlikely in a spill scenario (Geraci, 1998).	
	Twelve migratory marine mammal species were identified by the EPBC Protected Matters search (Section 5.4) for the ZPI. Of these, three are listed as threatened and one as vulnerable. Sei whale: In the unlikely event of a hydrocarbons spill, transient individuals may encounter entrained and surface hydrocarbons. However, the absence of any known feeding, resting or breeding areas means significant numbers are unlikely to be impacted. There is currently no BIA for the sei whale (DoEE, 2016b) Blue whales: Blue whales show preference for water depths > 500 m, and a small number of individuals may encounter entrained or surface hydrocarbons from a release. It is believed Antarctic blue whales do not generally migrate further north than subtropical waters and are therefore unlikely to occur in ZPI (Commonwealth of Australia, 2015). The BIA for pygmy blue whales, however, shows that the Operational Area lies within their distribution range and the ZPI intersects their distribution, foraging and migration range. Significant numbers are unlikely to be impacted.		N/A

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
	Fin whale: In the unlikely event of a hydrocarbon spill, transient individuals may encounter entrained and surface hydrocarbons. There is currently no BIA for fin whales (DoEE, 2016b). Based upon the low numbers of sightings in the ZPI and Operational Area, it is unlikely that significant populations of fin whale would be present at any time. Significant numbers are unlikely to be impacted. Southern Right Whale: The nearest BIA for the southern right whale is 900 km from the Operational Area and ZPI, suggesting it is highly unlikely that the ZPI provides key habitat for biological processes associated with this species. Humpback whale: The Operational Area and ZPI lie within the BIA for humpback whale migratory range. The migration path usually stays within 50 km offshore south of Shark Bay and extends to up to 100 km offshore in the Kimberley region (DoEE, 2017). The southward migration path is typically closer to the coastline. Considering the steadily-increasing humpback whale population size in WA, it is possible that this species may come into contact with entrained and dissolved hydrocarbons during the migration period, however, is unlikely to come in contact with surface hydrocarbons which are more centred around the spill location. Given that diesel is expected to evaporate and weather rapidly when released to the environment, relatively fresh entrained, dissolved and surface hydrocarbons (closer to the release location) are considered to have the greatest potential for impact.		
Marine reptiles	Risk of direct contact with hydrocarbons is due to chance of surfacing within slick. Effects include irritation of eyes/mouth and potential illness. Irritation of mucous membranes in the nose, throat and eyes leading has been observed to cause inflammation and infection (National Oceanic and Atmospheric Administration, 2010). Surface respiration could lead to accidental ingestion of hydrocarbons or result in the coating of sensitive epidermal surfaces and may also impact turtles if they inhale toxic vapours. This can lead to lung damage and congestion, interstitial emphysema, inhalant pneumonia and neurological impairment (National Oceanic and Atmospheric Administration, 2010). Adult sea turtles exhibit no avoidance behaviour when they encounter hydrocarbon spills (National Oceanic and Atmospheric Administration, 2010).	Lethal or sub-lethal physical and toxic effects such as irritation of eyes/mouth and potential illness. Irritation of mucous membranes in the nose, throat and eyes leading has been observed to cause inflammation and infection (National Oceanic and Atmospheric Administration, 2010).	Shoreline contact and beached hydrocarbons may result in toxic impacts to turtle nesting habitat potentially impacting adults, eggs and hatchlings. Important turtle nesting sites within the ZPI include the Ningaloo coast, Montebello/Barrow/Lowendal Islands and the Ningaloo Coast. In the unlikely event that hydrocarbons did accumulate at a turtle nesting area, there is potential for adult turtles and/or hatchlings to be impacted. Potential impacts include smothering of adults and hatchling and/ or

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
	Modelling in the marine diesel release scenario indicates that the maximum distance to the outer extent of the 1 g/m² surface hydrocarbons is predicted to be 48 km. Surface hydrocarbons concentrations exceeding 25 g/m² are predicted to reach a maximum extent of 29 km. It is therefore predicted the impact area from surface hydrocarbons is confined to around the spill site and not the wider region. In addition the weathering results for the variable-wind case for marine diesel (Figure 9.3) indicate that the wind conditions will have a large impact on the proportion of oil that remains afloat, with very little oil mass predicted to persist on the sea surface (< 1% after 24 hours). Therefore, impacts from surface oil are considered localised and temporary.		avoidance behaviour of adult turtles. This could result in failed or aborted nesting attempts or a reduction in survival rates of hatchlings. Limited volumes of accumulated hydrocarbons on the shoreline are predicted from the loss of marine diesel scenario. A maximum predicted volume of 2 m^3 (2 tonnes) is predicted to arrive on any single shoreline. As such, the number of individuals potentially affected would be low.
	Seven species of threatened marine reptile were identified by the EPBC Protected Matters search (Section 5.4) for the ZPI. Short-nosed seasnake, leaf-scaled seasnake, flatback, hawksbill, leatherback, green, and loggerhead turtles are widely dispersed in the continental shelf within the North-west marine region and in the unlikely event of a hydrocarbon spill occurring, individuals traversing open water may come into contact with entrained, dissolved aromatic or surface hydrocarbons. A number of turtle nesting beaches are within the ZPI which may receive accumulated hydrocarbons above 10 g/m². The largest volume of accumulated hydrocarbons above 25 g/m^2 is 2m^3 at Cape Range. The number of hatchlings or transient adults encountering hydrocarbons at this volume are likely to be very low and would not represent a significant proportion of the local population. Given that hydrocarbons are expected to rapidly weather case and significant surface oil concentrations (no concentrations above 50 g/m²) are not predicted, relatively fresh surface, entrained and dissolved hydrocarbons (closer to the release location) are considered to have the greatest potential for impact.		
Seabirds	Seabirds are particularly vulnerable to surface hydrocarbons. As most fish survive beneath floating slicks, they will continue to attract foraging seabirds, which typically do not exhibit avoidance behaviour. Smothering can lead to reduced water proofing of feathers and ingestion while preening. In addition, hydrocarbons can	Lethal or sub-lethal physical and toxic effects such as irritation of eyes/mouth and potential illness. May encounter entrained and dissolved aromatics while diving and foraging.	Beached hydrocarbons pose a risk to species that utilise the shoreline for foraging. A variety of endemic and migratory bird species are dependent on the productive feeding grounds of the

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
	erode feathers causing chemical damage to the feather structure that subsequently affects ability to thermoregulate and maintain buoyancy on water. Modelling in the marine diesel release scenario indicates that the maximum distance to the outer extent of the 1 g/m² surface hydrocarbons is predicted to be 48 km. Surface hydrocarbons concentrations exceeding 25 g/m² are predicted to reach a maximum extent of 29 km. It is therefore predicted the impact area from surface hydrocarbons is confined to around the spill site and not the wider region. In addition the weathering results for the variable-wind case for marine diesel (Figure 9.3) indicate that the wind conditions will have a large impact on the proportion of oil that remains afloat, with very little oil mass predicted to persist on the sea surface (< 1% after 24 hours).		WA mangroves and intertidal flats. Some species are mangrove specialists, such as the mangrove robin, white-breasted whistler, mangrove honeyeater and mangrove kingfisher. Shorebirds inhabit coastal mudflats and adjacent areas, and include the great knot, black-tailed godwit, lesser sand plover, bar-tailed godwit and grey-tailed tattler. Ground nesting species may also be impacted. Direct contact with surface hydrocarbons can lead to irritation of skin and eyes. Smothering can lead to reduced water proofing of feathers leading to hypothermia. Smothering of feathers can also lead to excessive preening, diverting time away from other behaviours leading to starvation and dehydration. Preening of oiled feathers will also result into ingestion of hydrocarbons and the associated impacts of toxicity and potential illness. Limited volumes of accumulated hydrocarbons on the shoreline are predicted from the loss of marine diesel scenario. A maximum predicted volume of 2 m^3 (2 tonnes) is predicted to arrive on any single shoreline. As such, the number of

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
			individuals potentially affected would be low.
	A number of bird species were identified by the EPBC Protected Matters search (Section 5.4) for the ZPI. The following species have pollution as a key threat in their conservation advice: • red knot, knot • curlew sandpiper • bar-tailed godwit (baueri), western Alaskan bar-tailed godwit • northern Siberian bar-tailed godwit, bar-tailed godwit • southern giant-petrel • eastern curlew, far eastern curlew • Australian fairy tern • Tasmanian shy albatross. Due to the rapid weathering and dispersion of marine diesel, and the low surface concentrations predicted from the spill scenario (Surface hydrocarbons concentrations exceeding 25 g/m² are predicted to reach a maximum extent of 29 km) significant impacts are not anticipated. Weathering effects are expected to rapidly reduce surface hydrocarbons limiting the duration of seabird exposure. While Wedge-tailed Shearwater has a BIA for breeding over the ZPI, the area does not overlap the surface and the species is unlikely to be impacted given the localised area of surface hydrocarbons. Given the relatively low likelihood of encounters between seabirds, the low surface hydrocarbon concentrations on the surface as a result of both a blowout and leak scenario band the rapid weathering of the hydrocarbon, impacts to seabirds in offshore waters are expected to consist of short term effects, such as reduced prey abundance.		Reduced prey may be available to foraging shorebirds due to mortality or avoidance, and nesting individuals may be temporarily disrupted.
Fish and sharks	While fish and sharks do not generally break the sea surface, individuals may feed at the surface. However, since the marine diesel is expected to weather rapidly and low surface concentrations are predicted from the spill scenario (concentrations exceeding 25 g/m² are predicted to reach a maximum extent of 29 km), significant impacts are not anticipated. The probability of prolonged exposure to a surface slick by fish and shark species is low.	Hydrocarbon droplets can physically affect fish and sharks exposed for an extended duration (weeks to months). Smothering through coating of gills can lead to the lethal and sub-lethal effects of reduced oxygen exchange, and coating of body surfaces may lead to increased incidence of irritation and infection. Fish may also ingest hydrocarbon droplets or	

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
		contaminated food leading to reduced growth. Site-attached fish, such as reef fish, have small home ranges and are at higher risk from hydrocarbon exposure than more wide-ranging species. The closest significant coral reefs to the Operational Area are found fringing the Barrow/Montebello Island groups, Muiron Islands and Ningaloo reef, which also occur within the ZPI. Entrained hydrocarbons may contact these locations however at low concentrations (<500 ppm concentration). The exact impact on resident fish populations at impacted shoals or reefs will be dependent on actual hydrocarbon concentration, duration of exposure and water depth of the affected communities. There is potential for localised mortality of fish eggs and larva due to reduced water quality and toxicity. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest and therefore demersal fish communities are not expected to be impacted.	
	The NWS supports a diverse assemblage of fish, particularly in shallower water near the mainland and islands. Threatened species identified by the EPBC protected matters search include blind gudgeon and blind cave eel (coastal and inlet species), manta ray, sawfish, grey nurse shark, great white shark, porbeagle, whale shark, shortfin and longfin mako the which may be present in the ZPI. However, given the absence of critical habitat for most of these species, significant numbers are not expected to be impacted. A BIA for whale shark foraging overlaps the Operational Area and ZPI. The whale shark may occasionally feed within the operational area or ZPI at Ningaloo coast during April–November.		

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
Habitats			
Sandy beaches (including intertidal and subtidal sand)	Hydrocarbons may accumulate on sandy beaches, impacting the area by physically smothering the habitat. Stranded oil may have toxic effects on invertebrates with knock on impacts on the shorebirds that forage upon them.		Beached hydrocarbons may accumulate on sandy beaches, impacting the area by physically smothering the habitat. Stranded oil may have toxic effects on invertebrates with subsequent impacts on the shorebirds that forage upon them. Impacts to nesting turtles are described above.
	Sandy beaches have a relatively low biodiversity although they do provide important habitats for nesting turtles, breeding and foraging seabirds, and shorebirds. They also provide habitat for polychaetes, molluscs, marine crustaceans, semi-terrestrial crustaceans and insects. Sandy beaches do not occur in the Operational Area but are widespread within the ZPI on Barrow/Montebello/Lowendal islands, Murion Islands and the mainland coast. A major green turtle rookery is located on the west coast of Barrow Island within the ZPI and one of the largest known flatback turtle rookeries in WA is located along the east coast of Barrow Island. The WA loggerhead turtle population nests on mainland beaches from Carnarvon to the Ningaloo Marine Park and offshore islands from Shark Bay to the Muiron Islands (Limpus, 2009). Limited shoreline accumulation is predicted as a result of a marine diesel spill, with a maximum shoreline accumulation of 2 m^3 occurring at any single receptor (refer to Section 9.5.4). Given the low volume of shoreline accumulation the impacts are not considered significant.		
Intertidal reefs (including coral communities, intertidal limestone pavement and macroalgae communities)	Intertidal reefs occur within the ZPI. The closest significant coral reefs to the Operational Area are found fringing the Barrow/Montebello Island groups, Muiron Islands and Ningaloo reef, which also occur within the ZPI.		
	Surface hydrocarbons are not anticipated to make contact with intertidal reefs.	Physical effects from entrained oil have the potential to coat contacted coral reefs. The phenomena of smothering of exposed coral surfaces or polyps by oil spills has only been reported where very large oil spill quantities, or very sticky oil slicks, have been encountered. Response to hydrocarbon exposure can include impaired feeding, fertilisation, larval settlement and metamorphosis, larval and tissue death and decreased growth rates. Entrained oil	N/A

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
		also has the potential to impact reef fauna (fish, turtles, and marine mammals) as outlined in rows above.	
	Intertidal reefs occur within the ZPI and may potentially impacted by a spill. Entrained hydrocarbons may contact these locations however at low concentrations (<500 ppm concentrations). The exact impact will be dependent on actual hydrocarbon concentration, duration of exposure and water depth of the affected communities. Given the concentrations predicted to contact the reef locations are low, significant impacts are not anticipated.		
Mangroves	The shoreline is not considered to be a significant mangrove area. Isolated groups of mangroves are within the ZPI, particularly around Barrow Island and along the Ningaloo coastline.		
	The impacts of surface hydrocarbons on mangroves include damage as a result of smothering of lenticels (mangrove breathing pores) on pneumatophores or prop roots, or by the loss of leaves (defoliation) due to chemical burning. It is also known that mangroves take up hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death.	Entrained hydrocarbons may potentially impact mangrove communities through the sediment/mangrove root interface. Entrained hydrocarbons contain contaminants that may become persistent in the sediments (e.g. trace metals, PAHs), leading to direct effects on mangroves due to direct uptake, or indirect effects due to impacts on benthic infauna and thus leading to reduced rates of bioturbation and subsequent oxygen stress on the plants root systems.	See 'Surface'.
	Isolated groups of mangroves occur within the ZPI potentially impacted by hydrocarbon spill. Significant impacts to mangrove habitats are not expected as a result of a marine diesel spill, with a maximum shoreline accumulation of 2 m^3 occurring at any single receptor (refer to Section 9.5.4). Given the low volume of shoreline accumulation the impacts are not considered significant.		
Socioeconomic			
Fisheries	In addition to the effects of entrained oil, petroleum safety zones/exclusion zones surrounding a spill can directly impact fisheries by restricting access for fishermen.	Entrained hydrocarbon can have toxic effects on fish (as outlined above) reducing catch rates and rendering fish unsafe for consumption.	N/A
	Both entrained and surface hydrocarbons have the potential to lead to temporary financial losses.		N/A

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
Tourism	In the waters immediately surrounding the Operational Area, tourism activities are expected to be low. However, nearer shore areas there are many sources of marine-based tourism within the environment that may be affected. Most popular marine tourism activities include recreational fishing and diving/snorkelling. Ningaloo is the most significant area in the NWS region for nature-based tourism. Petroleum safety zones/exclusions surrounding a spill will reduce access for vessels for the duration of the response undertaken for spill clean-up (if applicable).		Stranding of hydrocarbons on sandy beaches is anticipated to low volumes (maximum of 2 m^3 at any single receptor) occurring at a concentration of 25 g/m^2 428 hours after the modelled spill event. Tourism activity on the Ningaloo beaches is high, particularly around Cape Range National Park, however given the low volumes of accumulated hydrocarbons impact is not anticipated to be significant.
Shipping	Petroleum safety zones/exclusions surrounding a spill will reduce access for shipping vessels for the duration of the response undertaken for spill clean-up (if applicable); vessel may have to take large detours leading to potential delays and increased costs.	Entrained oil will have no effect on shipping.	N/A
Defence	The level of defence activities carried out is in the airspace only, therefore interference of defence activities due to a hydrocarbon spill are likely to be minimal.		Beached hydrocarbons will have no impacts on defence activities.
Shipwrecks	Surface oil will have no impact on shipwrecks. Entrained oil from a vessel collision will remain in the surface waters and is therefore unlikely to have an impact on shipwrecks.		N/A
Indigenous	The level of activities undertaken by indigenous users is expected to be low. Along the north-western coastline of Australia, traditional and subsistence fishing is generally limited to shorelines, creeks and nearshore reefs (Leprovost *et al.,* 1997). Interference due to a hydrocarbon spill are likely to be minimal, however in event there is a requirement for land-based response activities/ disturbance relevant representatives will be contacted.		Stranding of hydrocarbons and response activities may impact indigenous values of land masses.
Existing oil and gas activity	Petroleum safety/exclusion zones surrounding spills will reduce access potentially leading to delays to work schedules with subsequent financial implications.		N/A
Protected Areas			
Protected areas	The ZPI overlaps several KEFs (Section 5.9). The following KEFs could be contacted at the thresholds described in Table 5.1.		

Receptor	Impacts of a hydrocarbon spill		
	Surface	**Entrained and dissolved aromatic hydrocarbons**	**Shoreline**
	• Continental Slope Demersal Fish Communities – the eggs/larvae fish within these communities could be impacted from direct contact with entrained hydrocarbons. • Commonwealth waters adjacent to the Ningaloo Marine reserve • Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula -Aggregations of pelagic species, including whale sharks, manta rays, humpback whales, sharks, large predatory fish and seabirds, may be impacted by entrained and surface hydrocarbons as described above; • Ancient coastline at 125 m depth contour –May support enhanced productivity and may attract opportunistic feeding by larger marine life including humpback whales, whale sharks and large pelagic fish, these species could be impacted by entrained or surface hydrocarbons; • Exmouth Plateau –May support enhanced productivity supporting pelagic fish species and potentially sperm whales. Pelagic fish and sperm whales may be contacted by entrained hydrocarbons as described above.		
Commonwealth and State Marine Protected Areas	Protected areas within the ZPI are detailed within Section 5.7 and 5.8, and include: • Gascoyne AMP • Ningaloo AMP • Montebello AMP • Ningaloo Marine Park and Murion Island Management Area • Montebello Islands Marine Park, Barrow Island Marine Park and Barrow Island Marine Management Area. As discussed above, marine mammals, seabirds, sharks and reptiles within protected areas are at risk of direct contact with hydrocarbons due to chance of surfacing within slick. Effects include irritation of eyes/mouth and potential illness. Surface respiration could lead to accidental ingestion of hydrocarbons or result in the coating of sensitive epidermal surfaces.		Potential impacts of beached hydrocarbons on receptors listed in each protected area are described in rows above.

9.5.6.1 Impacts to Value of Australian Marine Parks

The AMPs within the ZPI are:

- Gascoyne AMP
- Ningaloo AMP
- Montebello AMP
- Shark Bay

Potential impacts may include: the contamination of sediments, impacts to benthic fauna/habitats and associated impacts to fish populations and reduced biodiversity. However, given the low concentrations the AMPs are anticipated to receive and the low persistent component (5%) of marine diesel (Table 9.2) it is not anticipated the AMP will be significantly impacted. However, the values which may be impacted for a period include:

- natural values
- cultural values
- socio economic values.

The impacts to each value are discussed below:

Natural Values

The key ecological feature in the Montebello AMP is the ancient coastline at the 125-m depth contour where rocky escarpments are thought to provide biologically important habitat in areas otherwise dominated by soft sediments. In addition, the AMP includes Trial Rocks, a prominent seafloor feature consisting of two close coral reefs. The reefs are emergent at low tide. These features may be impacted from entrained hydrocarbon at low concentrations.

The Ningaloo AMP includes three key ecological features:

- canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula
- Commonwealth waters adjacent to Ningaloo Reef
- continental slope demersal fish communities.

The Ningaloo AMP is located in a transition zone between tropical and temperate waters and sustains tropical and temperate plants and animals, with many species at the limits of their distributions. Impacts to these species have been discussed in Table 9.6.

The Gascoyne AMP includes four key ecological features:

- canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula

- Commonwealth waters adjacent to Ningaloo Reef
- continental slope demersal fish communities.
- Exmouth Plateau – a regionally and nationally unique deep-sea plateau in tropical waters.

The Gascoyne AMP supports a diverse range of marine fauna species and benthic slope communities which may receive entrained hydrocarbons at low concentrations. Impacts to these species have been discussed in Table 9.6.

The ZPI extends to the northern point of the Shark Bay AMP. Key features of the AMP include:

- diverse seagrass assemblages
- an estimated population of about 11,000 dugongs
- populations of bottlenose dolphins
- green turtle and loggerhead turtle, which nest on the beaches.

Impacts to the range of species and habitats which AMPs support have been discussed in Table 9.6. The susceptibility of marine fauna to hydrocarbons is dependent exposure duration, however given that exposures would be limited in extent (maximum extent of surface hydrocarbons at the 1 g/m² threshold concentration is 48 km) and duration (the hydrocarbons are expected to weather rapidly in a variable wind scenario, see Section 9.5.4), exposure to marine fauna from a marine diesel spill is not expected to result in a fatality.

Cultural Values

Sea country is valued for indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli people have responsibilities for sea country in the Gascoyne and Ningaloo AMPs. There is limited information about the cultural significance of the Montebello AMP.

As described above, the spill will impact the AMPs for a short period, whilst the hydrocarbon disperses and weathers, however lasting impact is not anticipated.

Socio-economic Values

Tourism, commercial fishing and recreation including fishing, are important activities in the AMPs. As described above a crude spill will impact the AMPs for a short period, whilst the crude disperses and weathers, however lasting impact is not anticipated.

9.5.7 Environmental Performance Outcomes and Control Measures

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

- no loss of containment of hydrocarbons to the marine environment (EPO-13).

Control Measures relating to this risk include:

- bulk refuelling transfer procedures (CM-16)
- vessel spill response plan (SOPEP) (CM-17)
- on-board spill response kits (CM-18)
- navigation equipment and procedures (CM-1)
- exclusion zone (CM-3)
- consultation with the Wheatstone pipeline operator during planning and operations (CM – 38)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

9.5.8 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/management**	**Evaluation**	**Adoption?**
Eliminate	Eliminate vessel use	The potential for vessel collision leading to diesel spill is highly unlikely but the likelihood cannot be completely eliminated, as the vessels are necessary to undertake the Petroleum Activities Program.	×
	Eliminate bunkering activities during monitoring activities	Would remove the spill risk from bunkering. However, the equipment recovery requires that bunkering of fuel occur so the activity can be completed. Refuelling at sea may be necessary and is preferable (less risk, reduces time) to steaming back to port to refuel.	×
Substitute	Zero fuel bunkering via hose	Removes spill risk from hose operations. Drums could be used, however, presents cost associated with multiple vessel transits and Health and Safety issues during transfer of drums.	×
	Use of marine diesel rather than Heavy Fuel Oil (HFO) on vessels and IV	Marine diesel is lighter than HFO and will evaporate faster and persist less in the marine environment. Marine diesel is already used on the vessels and IV in accordance with Marine Orders.	✓

Demonstration of ALARP			
Type	**Control/management**	**Evaluation**	**Adoption?**
Engineering	Navigation equipment	Vessels will be compliant with standard maritime safety/navigation procedures including AMSA Marine Order Part 30 (Prevention of Collisions) 2009. Negligible costs of operating navigational equipment.	✓
	Contract double hulled vessels only	Vessels are subject to availability and are required to meet Eni standards. double hull requirement would be of high cost and subject to vessel availability which could cause project delay.	×
Isolation	N/A	N/A.	N/A
Administrative	Compliance with administrative control measures, such as: • marine notices • contractor bunkering procedures.	Administrative control can reduce potential for collision and bunkering spills with minimal cost involved.	✓
	Exclusion zone around vessels	No additional costs. Other marine users may be temporarily excluded from areas.	✓
	Vessel spill response plan (SOPEP)	Environmental benefit outweighs minor costs in implementing and testing the vessel spill response plan (SOPEP), which contains plans to prevent spills reaching the marine environment. The SOPEP is a requirement under MARPOL Annex 1 requirements (all vessels larger than 400 gross tonnage have Shipboard Oil Pollution Emergency Plan (SOPEP) or Shipboard Marine Pollution Emergency Plans (SMPEP) outlining options to control the source of a hydrocarbon spill).	✓

Demonstration of ALARP			
Type	**Control/management**	**Evaluation**	**Adoption?**
	Consultation with the Wheatstone pipeline operator during planning and operations	Consultation with the Wheatstone pipeline operator will ensure that subsea equipment removal work undertaken in the westernmost extent of the Operational Area and any pipeline maintenance activities will be spatially and temporally separated. Consultation will also be undertaken in relation to emergency arrangements.	✓

9.5.9 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	Vessels compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 30 (Prevention of Collisions) Vessels compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 21 (Safety of navigation and emergency procedures) Vessels comply with MARPOL 73/78 Annex I EPBC approval conditions (EPBC 2001/365) were considered for this risk. Condition number 3 relates to potential spills. The Woollybutt OPEP (000105_DV_PR.HSE.1045.000) is considered to meet this condition.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to the potential risk of a marine diesel spill to sea.
Area Sensitivity/ Biodiversity	See Section 9.5.4. In the unlikely event of a 500 m³ marine diesel spill, the zone of potential impact contains only open waters where transient fauna may traverse no impacts to marine habitats are predicted. Impacts to transient marine fauna within the vicinity of the spill include the potential to impact air breathing animals such as cetaceans, turtles and sea snakes due to of inhalation of vapours if they surface in the diesel slick. Seabirds have also been identified as at risk if they contact the diesel slick by oiling their feathers leading to loss of buoyancy and the potential for hypothermia. However, the rapid rates of evaporation will limit exposure to transient animals and limit the extent of potential impacts. Habitat modification/degradation/disruption/loss, deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 5.3). However, with controls in place the objectives of the plans/advice will be met.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.

ALARP	The residual risk has been demonstrated to be ALARP.

Subsea equipment removal activities could not be completed without the use of support vessels and IV and therefore, elimination of vessel use is not a feasible option. Refuelling at sea may be necessary and is preferable to steaming back to port to refuel. Returning to port for refuelling would extend the duration of the removal activities, increasing the potential for other risks to occur, in addition to adding unnecessary costs to the project. Therefore, elimination or substitution of refuelling at sea was not considered practicable. The residual risk of a marine diesel spill as a result of a vessel collision during equipment removal activities is low as the duration of the activity is relatively short (see Section 4.4). This is acceptable in accordance with Eni's acceptability criteria (Table 7.4).

A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (7.3.1). The residual risk of a marine diesel spill as a result of a vessel collision was classified as low, which is acceptable in accordance with Eni's acceptability criteria (refer to Table 7.4).

Given the short duration of the equipment removal activities (refer to Section 4.4), the low potential risk and the controls that will be implemented, Eni considered that the risk of a marine diesel spill is acceptable and managed to ALARP.

9.6 Minor Hydrocarbon or Chemical Leaks (Risk ID 14)

9.6.1 Summary of Environmental Impact

Leak from ROV, fixtures and fittings

Hazard	Leak from fittings and connections		
	Frequency	Severity	Risk
Inherent Risk	B	2	L
Residual Risk	B	1	L

9.6.2 Description of Hazard

9.6.2.1 Hydraulic Fluid Leak from ROV, Fixtures and Fittings

The types of fluids stored on support vessels and IV range from lubricating fluids to hydraulic fluids, which are used in fittings and connections. Leaks could occur due to a failure of a mechanical component. Outside vessels, the largest credible spill would be a release of < 1 m³ of stern tube oil (non-hydrocarbon-based lube oil) from a vessel thruster/propeller stern tube.

Accidental release of hydraulic fluids volumes from ROV failure are expected to be low (maximum of 20 L) and may occasionally occur from operation of the ROV, if hydraulic lines are pinched during subsea work.

9.6.3 Potential Environmental Impact

The hydraulic fluid typically used during vessel operations is a water-based hydraulic fluid, Oceanic HW443. Oceanic HW443 is reported to have a low toxicity to the marine environment and has been classified under the Offshore Chemical Notification Scheme (OCNS) as Class D, which represents a low toxicity (CEFAS, 2016). It has been used widely in marine environments worldwide with no observed environmental effect (MacDermid, 2007).

The release of hydraulic fluid has the potential to result in a localised temporary reduction in water quality. Hydraulic oils behave similarly to marine diesel when spilt to the marine environment. These are medium oils of light to moderate viscosity. They have a relatively rapid spreading rate and will dissipate quickly in ocean conditions. Similar to diesel, the spill will have a tendency to sit on the surface during calm conditions and will readily entrain during variable winds between 4 19 knots; readily returning to the surface when conditions return to calm.

9.6.4 Environmental Performance Outcomes and Control Measures

The following mitigation measures have been identified to reduce the potential of leaks:

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

- no significant leaks to the marine environment from fittings and connections (EPO-14)
- no loss of containment of hydrocarbons to the marine environment (EPO-12).

Control Measures relating to this risk include:

- vessel spill response plan (SOPEP) (CM-17)
- on board spill response kits (CM-18)
- oily water prevention system in place (CM-10)
- ROV equipment maintenance (CM-19)
- pre-dive ROV checks (CM-20).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

9.6.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Eliminate	Eliminate hydraulic systems and ROVs	Would eliminate the environmental risk associated with hydraulic fluids. 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	Support vessels and IV are equipped with Oily water prevention system and IMO approved oil filtering equipment	Bunding of high-risk areas on (e.g. machinery) and subsequent drainage to an IMO approved oil filtering equipment will ensure that discharge is complaint with Marine Order 91. Minor costs involved to implement as vessels and IV will be required to comply with Marine Order 91.	✓ (through compliance with Marine Order 91)
Isolation	N/A	N/A.	N/A
Administrative	Compliance with administrative aspects of Marine Order 91 requirements	Environmental benefit outweighs minor costs in implementing and complying to Marine Order 91 requirements.	✓ (through compliance with Marine Order 91)
	Placement of spill kits in high spill risk areas of IV and vessel decks	Environmental benefit outweighs minor costs in implementing and locating spill response kits in proximity to hydrocarbon storage/bunkering areas.	✓
	Vessel SOPEP, which contains plans to prevent spills reaching the marine environment	Environmental benefit outweighs minor costs in implementing and testing the vessel spill response plan (SOPEP), which contains plans to prevent spills reaching the marine environment. The SOPEP is a requirement under MARPOL Annex 1 requirements, (all vessels over 400 gross tonnage have Shipboard Oil Pollution Emergency Plan (SOPEP) or Shipboard Marine Pollution Emergency Plans (SMPEP) outlining options to control the source of a hydrocarbon spill).	✓

9.6.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	Compliance with MARPOL 73/78 Annex I, as applied in Australia under the *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Part II Prevention of pollution by oil); and Marine Order 91 (Marine pollution prevention – oil). The Petroleum Activities Program is in compliance with EPBC 2001/365 approval.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to unplanned hydraulic fluid leak/chemical releases.
Area Sensitivity/ Biodiversity	A hydraulic fluid leak/chemical release has the potential to cause a localised temporary reduction in water quality. Given the low predicted release volume, the low toxicity and rapid dilution in the marine environment, toxicity impacts to marine fauna are highly unlikely. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 5.3). However, with controls in place the objectives of the plans/advice will be met.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

Hydraulic fluid is necessary to ensure safe and efficient operation of machinery, its use cannot be eliminated and there is no feasible substitution.

The ROV and other control systems onboard the support vessels will have maintenance programs to reduce the likelihood of hydraulic fluid leaks. The ROV operator will also conduct pre-dive checks prior to deployment. In the unlikely event of a release of hydraulic fluid to the environment, the low toxicity, water-based hydraulic fluids used in such systems are not expected to result in significant environmental impacts.

Deteriorating water quality and marine pollution are identified in relevant Recovery Plans and Conservation Advice (Table 5.3) as potential threats to a number of marine fauna species. However, with controls in place the objectives of the plans and advice will be met.

The potential impacts associated with loss of hydraulic fluids is considered to be minor. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 7.3.1). The residual risk ranking is low. This is acceptable in accordance with Eni's acceptability criteria (Table 7.4). No additional controls were identified to further reduce risk. Given the low potential risk and the controls that will be implemented, Eni considers that the risks are acceptable and managed to ALARP.

9.7 Unplanned Seabed Disturbance (Risk ID 15)

9.7.1 Summary of Environmental Impact

Dropped Object

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

9.7.2 Description of Hazard

It should be noted that unplanned seabed disturbance risk is only present prior to and during the planned equipment removal activities (Section 4.8). Planned seabed alteration from subsea equipment removal is described in Section 8.9.

9.7.2.1 Dropped Object

During the recovery of equipment there is the potential for dropped objects to occur as a result of human error or failure of lifting equipment during the recovery of subsea equipment. The largest object that could be dropped during recovery is an anchor chain. The spatial extent in which dropped objects can occur is restricted to Operational Area.

In the event that subsea infrastructure is dropped during subsea equipment recovery activities, the lost equipment will be located and recovered, therefore these impacts will be temporary in nature.

9.7.3 Potential Environmental Impact

The benthic fauna in region are expected to be widely represented on the shelf, so a dropped object is not expected to result in widespread loss or degradation of environmentally significant habitats. Due to the localised area of disturbance, impacted benthic communities are expected to rapidly recolonise any damaged area. ROV footage confirms seabed is sandy/silty with no significant flora.

9.7.4 Environmental Performance Outcomes and Control Measures

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

- seabed disturbance limited to the Operational Area (EPO-10)

Control Measures relating to this risk include:

- removal of subsea equipment (CM-4)
- lifting procedures (CM-21)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 10.

9.7.5 ALARP Demonstration

Demonstration of ALARP			
Type	**Control/ management**	**Evaluation**	**Adoption?**
Eliminate	Removal of subsea equipment	Subsea equipment will be removed will be removed as per Section 4.8. Benefits of removing the subsea equipment (e.g. removal of risk) outweigh the costs of its removal.	✓
Substitute	N/A	N/A	N/A
Engineering	N/A	N/A	N/A
Isolation	N/A	N/A.	N/A
Administrative	Lifting procedures	Lifting procedures will ensure that lifts are carried out in a safe manner and to reduce risk of dropped infrastructure. There is a minor administrative cost in following the procedure. Environmental benefits outweigh the cost.	✓

9.7.6 Acceptability Demonstration

Demonstration of Acceptability	
Compliance with Legal Requirements/Laws/ Standards	The Petroleum Activities Program is in compliance with EPBC 2001/365 approval.
Policy Compliance	Eni's HSE Statement objectives will be met.
Social Acceptability	Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to unplanned seabed disturbance.
Area Sensitivity/ Biodiversity	Benthic fauna present in the operational area are widely represented in the NWS.
ESD Principles	The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD.
ALARP	The residual risk has been demonstrated to be ALARP.

It should be noted that unplanned seabed disturbance risk is only present prior to and during the planned equipment removal activities (Section 4.8). Planned seabed alteration from subsea equipment removal is described in Section 8.9.

Lifting procedures will be followed to reduce the risk of a dropped object (subsea equipment) during the equipment removal.

The residual risk ranking for an unplanned seabed disturbance is low. This is acceptable in accordance with Eni's acceptability criteria (Table 7.4). Given the low potential risk and the controls that will be implemented, Eni considers that the risk of unplanned seabed disturbance is acceptable and managed to ALARP.

9.8 Oil Spill Response (Risk ID 16)

9.8.1 Summary of Environmental Impact

Hazard	Oil Spill Response Risk Assessment		
	Frequency	Severity	Risk
Inherent Risk	A	3	L
Residual Risk	A	1	L

9.8.2 Description of Hazard

In the event of a hydrocarbon spill, response strategies will be implemented where possible to reduce environmental impacts to ALARP. The selection of strategies will be undertaken through the Net Environmental Benefit Analysis (NEBA) process, outlined in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000). Spill response will be under the direction of the relevant Control Agency, as defined within the Woollybutt OPEP (000105_DV_PR.HSE.1045.000). The response strategies and supporting activities deemed appropriate for the oil spill scenarios for the activities are detailed in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000), and identified as:

- operational monitoring
- shoreline clean-up
- oiled wildlife response
- scientific monitoring.

Section 9.8.3 presents the evaluation on the implementation of these strategies and discounted strategies based on their suitability for the credible spill scenarios identified in this EP.

Response strategies are intended to reduce the environmental consequences of a hydrocarbon spill. However, the nature of some of the strategies (such as those requiring vessel use) means that environmental risk from their implementation is inevitable. In addition, lack of planned and coordinated response activities or guidance can result in inadequate response implementation causing further environmental impact.

All potential risks that may arise through implementation of response strategies are summarised in Table 9.7.

Table 9.7: Summary of risks associated with implementation of response strategy

Risk	Operational monitoring	Shoreline Clean-up	Oiled Wildlife	Scientific monitoring
Vessel movements	X	X	-	X
Light emissions	X	X	X	X
Noise	X	-	X	X
Atmospheric emissions	X	X	-	X
Disturbance to natural habitat	-	X	X	
Operational discharge of waste	-	X	-	-

Offshore risks are consistent with vessel operations described within this EP for the planned operations. The greatest potential for impacts additional to those described for planned operations are from oiled wildlife response, nearshore protection and deflection and shoreline clean-up operations where disturbance to the environment may occur through implementation efforts. Specific risks relating to response operations are described further below.

9.8.2.1 Light Emissions

Offshore lighting may cause behavioural changes to fish (including sharks), birds and marine turtles and have been described in planned risks Section 8.3.

A maximum volume of 2 m^3 of shoreline oil accumulation is predicted to occur at a number of locations (refer to 9.5.4) under the worst-case scenario. No other shoreline receptors are predicted to be contacted by hydrocarbons. No other shoreline receptors are predicted to be contacted by hydrocarbons.

Spill response activities which require lighting may also take place in nearshore and on shorelines through response strategy implementation. The receptors considered most sensitive to lighting from vessel and shoreline operations (in event of shoreline clean-up operations) are seabirds and marine turtles. Barrow Island and the Ningaloo coast have a number of turtle nesting beaches. During the nesting period (November to January) and hatching periods (December to March) turtle sensitivity to light will be greater.

However, given the scale of the response any impacts are expected to be short term, geographically confined and minor. In addition, shoreline operations will only be conducted in daytime hours and light impacts would be considered when locating any shoreline camps. Light impacts will also be considered in the operational NEBA process.

9.8.2.2 Noise Emissions

Offshore noise may cause behavioural changes to marine mammals, turtles and fish and have been described in planned risks Section 8.2.

Spill response activity from onshore operations (noise generating mobile equipment and vehicles) has the potential to disturb nesting, roosting or feeding birds, as well as nesting turtles and other onshore fauna through noise and vibration. The shoreline response equipment used is not considered to have excessive sound levels and its use will also be considered in the operational NEBA process, the consequence to onshore fauna from noise is expected to be low. Given the scale of the response any impacts are expected to be short term, geographically confined and minor.

9.8.2.3 Atmospheric Emissions

Offshore atmospherics may result in a temporary, localised reduction of air quality and have been described in planned risks Section 8.4.

Atmospheric emissions from spill response equipment will be localised and while there is potential for fauna and flora impacts, the use of mobile equipment, vessels and vehicles is not considered to create emissions on a scale where noticeable impacts would be predicted. Atmospheric emissions from spill response equipment is expected to be low.

9.8.2.4 Physical Presence and Disturbance

The movement and operation of response vessels, including anchoring and operating in the nearshore environment has potential to cause disturbance to the marine environment. Onshore, vehicles, personnel and equipment associated with the response strategy, have the potential to disturb the physical marine/coastal habitats and fauna. Vehicle, equipment, and personnel associated with the strategy could also introduce or spread non-indigenous flora and fauna.

Oiled wildlife response activities may involve deliberate disturbance (hazing), capture, handling, cleaning, rehabilitation, and release of wildlife which could lead to additional impacts to wildlife.

9.8.2.5 Potential Environmental Impact

Offshore impacts are consistent with vessel operations described within this EP for the planned operations. Specific impacts relating to response operations risks, identified above are described further below

9.8.2.6 Light Emissions

Offshore lighting may cause behavioural changes to fish (including sharks), birds and marine turtles and have been described in planned risks Section 8.3.

A maximum volume of 2 m^3 of shoreline oil accumulation is predicted to occur at a number of locations (refer to 9.5.4) under the worst-case scenario. No other shoreline receptors are predicted to be contacted by hydrocarbons.

Spill response activities which require lighting may also take place in nearshore and on shorelines through response strategy implementation. The receptors considered most sensitive to lighting from vessel and shoreline operations (in event of shoreline clean-up operations) are seabirds and marine turtles. Barrow Island and the Ningaloo coast have a number of turtle nesting beaches. During the nesting period (November to January) and hatching periods (December to March) turtle sensitivity to light will be greater.

However, given the scale of the response any impacts are expected to be short term, geographically confined and minor. In addition, shoreline operations will only be conducted in daytime hours and light impacts would be considered when locating any shoreline camps. Light impacts will also be considered in the operational NEBA process.

9.8.2.7 Noise Emissions

Offshore noise may cause behavioural changes to marine mammals, turtles and fish and have been described in planned risks Section 8.2.

Spill response activity from onshore operations (noise generating mobile equipment and vehicles) has the potential to disturb nesting, roosting or feeding birds, as well as nesting turtles and other onshore fauna through noise and vibration. The shoreline response equipment used is not considered to have excessive sound levels and its use will also be considered in the operational NEBA process, the consequence to onshore fauna from noise is expected to be low. Given the scale of the response any impacts are expected to be short term, geographically confined and minor.

9.8.2.8 Atmospheric Emissions

Offshore atmospherics may result in a temporary, localised reduction of air quality and have been described in planned risks Section 8.4.

Atmospheric emissions from spill response equipment will be localised and while there is potential for fauna and flora impacts, the use of mobile equipment, vessels and vehicles is not considered to create emissions on a scale where noticeable impacts would be predicted. Atmospheric emissions from spill response equipment is expected to be low.

9.8.2.9 Physical Presence and Disturbance

The use of vessels may result from deployment of anchor/chain, and grounding and may disturb benthic habitats in coastal waters including corals, seagrass, macroalgae and mangroves if used in nearshore waters. Vessel use in shallow coastal waters also increases the chance of contact or physical disturbance with marine fauna such as turtles, dolphins which have been identified along the shorelines.

Shoreline response activities may require vehicles, clean-up equipment and deployment of clean-up personnel which have the potential to damage coastal habitats such as dune vegetation, mangroves and habitats important to threatened and migratory fauna including nests of turtles and birds and bird roosting/feeding areas.

Impacts from offshore invasive marine species released from vessel biofouling include out-competition, predation and interference with other ecosystem processes as described in Section 9.1. In shallower coastal areas, such as areas where vessel-based spill response activities may take place, conditions are likely to be more favourable.

Impacts from terrestrial invasive species are similar to offshore, whereby the invasive species can out-compete local species (e.g. weeds) and interfere with ecosystem processes. Non-native species may be transported attached to equipment, vehicles and personnel clothing. Such an introduction would be especially detrimental to the relatively undisturbed flora and fauna communities along the Ningaloo coastline and Barrow, Montebello and Muiron Islands.

The disturbance to marine and coastal natural habitat, as well as the potential for disruption to culturally sensitive areas may have flow on impacts to socio-economic values and industry (e.g. tourism, fisheries).

A NEBA will take into account the vehicles and equipment selected and will aim to reduce habitat damage. The establishment of access routes/demarcation zones, and operational restrictions on equipment/vehicles use will limit sensitive habitat damage and damage to important fauna areas. Following these and other control measures the resultant consequence to the physical environment and habitat is assessed as low.

As with all spill response activities, response strategies which may cause habitat disturbance will be considered in the operational NEBA process. It is not considered that an extensive shoreline clean-up operation, requiring camps and significant vehicle/equipment use is required, given the limited volume of accumulated hydrocarbons on shorelines. Disturbance will therefore be short term, geographically confined and minor and only occur if there is a net benefit to accessing and cleaning shoreline areas.

9.8.2.10 Operational Discharges and Waste

Offshore operational discharges from vessels may create a localised and temporary reduction in water quality and have been described in planned risks Section

9.8.3 Spill Response Strategies

A number of spill response strategies have been evaluated for implementation in the event of a spill. Strategy identification is based on strategies which have been implemented in the past or are considered to be good industry practice. Table 9.8 presents the evaluation on the implementation of these strategies based on their suitability for the credible spill scenarios identified in this EP.

The key considerations taken into account in the evaluation were as follows:

- properties and weathering profile of marine diesel (refer to Section 9.5.3)
- nature and scale of the credible spill scenario
- safety and environmental risks and impacts involved with the response.

Table 9.8: Spill response strategies considered for the mitigation of contact from hydrocarbon spills

Strategy	Description	Applicability and Environmental Benefit	Hydrocarbon	Adopt/Reject
Source Control	Vessel SOPEP	SOPEP is the procedure for responding to a ruptured fuel tank incident.	Marine Diesel	**Adopt**
Monitor and Evaluate	Monitor and evaluate is used to predict and monitor the trajectory and fate of the spill, to determine the effectiveness of response strategies and to identify and report on any potential/actual contacts to flora, that occurs.	There are various specific techniques (vessel/aerial surveillance, oil spill modelling) within this response strategy which may be suitable. Use will be based on the spill fate/volumes as well as other considerations such as access to locations and environmental/metocean conditions. Monitor and evaluate is used to inform further response planning and execution and the operational NEBA.	Marine Diesel	**Adopt**
Surface chemical dispersant	Chemical dispersant is applied to break down the hydrocarbons and allow/enhance dispersion into the water column, thereby preventing/reducing potential shoreline contact and increasing biodegradation.	Diesel is not conducive to chemical dispersion due to rapid evaporation and low surface concentrations. The application of chemical dispersant is not anticipated to have a significant effect on reduction of surface accumulations.	Marine Diesel	**Reject**
Physical Dispersion	Physical dispersion is undertaken by running vessels through the hydrocarbon plume and using the turbulence developed by the propellers or hydro-blasting from vessel hydrants to break up the slick. The process enhances dispersion.	Marine diesel is not conducive to physical dispersion due to low surface concentrations. Surface concentrations are not expected to exceed 10 g/m2 up to 48 km from the spill location.	Marine Diesel	**Reject**
Containment and recovery	Containment and recovery of hydrocarbons can offer a preventive form of protection to sensitive receptors. Skimmers	Marine diesel is not conducive to containment and recovery due to low surface concentrations. Containment and recovery is only effective on oil concentrations > 50 g/m² and therefore not effective.	Marine Diesel	**Reject**

Strategy	Description	Applicability and Environmental Benefit	Hydrocarbon	Adopt/Reject
	(mechanical) and booms will be used at sea. This strategy is only effective in calm conditions.			
Protection and deflection	Protection and deflection activities involve the use of booms to deflect spills away from sensitive receptors and deflect spills to an area that provides increased opportunity for recovery activities.	Marine diesel is not conducive to protection and deflection due to low surface concentrations.	Marine Diesel	**Reject**
Shoreline clean-up	During a spill response, clean-up of the oiled shorelines will be implemented using suitable methods, provided it will be beneficial to the environment based on the NEBA performed on the affected areas based on actual site conditions.	Owens and Sergy (1994) define accumulated hydrocarbon < 100 g/m² to have an appearance of a stain on shorelines. French-McCay (2009) defines accumulated hydrocarbons ≥ 100 g/m² to be the threshold that could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat. Whilst no shoreline accumulation at >100 g/m^2 is predicted to occur, and an extensive shoreline response requirements are not anticipated, the strategy is available to Eni and is adopted as a precautionary measure and for the event that monitoring predicts impacts to key shoreline sensitives.	Marine Diesel	**Adopt**
Oiled wildlife response (OWR)	Oiled wildlife response aims at preventing wildlife from becoming oiled and/or the treatment of animals that do become oiled.	A number of receptors (refer to Section 9.5.4) have the potential to receive a very limited volume of hydrocarbons. These shorelines have been identified as having potential wildlife inhabiting it. Mobilisation of experts, trained work forces, facilities and equipment will then be needed. Wildlife response activities may take place at sea, on shorelines and in specialised treatment facilities further inland. Options for wildlife management have to be considered and a strategy determined guided by the Western Australian Oiled Wildlife Response Plan (WAOWRP).	Marine Diesel	**Adopt**

Strategy	Description	Applicability and Environmental Benefit	Hydrocarbon	Adopt/Reject
		Turtle nesting occurs between the months of December to January, and hatchlings can be expected between February and March. Avifauna are present year round. Whilst an extensive OWR is not anticipated, the strategy is available to Eni and is adopted as a precautionary measure for the event that monitoring predicts impacts to key shoreline sensitives and species.		
In-situ burning	Technique involves the controlled burning of oil that has spilled (from a vessel or a facility). On conducive hydrocarbons, and when conditions are favourable and conducted properly, in-situ burning will reduce the amount of oil on the water.	Diesel is not conducive to in-situ burning due to rapid evaporation and low surface concentrations.	Marine Diesel	**Reject**
Operational Scientific Monitoring	This is the main tool for determining the extent, severity and persistence of environmental impacts from an oil spill and allows operators to determine whether their environmental protection outcomes have been met (via scientific monitoring activities). This strategy also evaluates the recovery from the spill.	Scientific monitoring is especially beneficial for the purpose of monitoring entrained and dissolved oil impacts as response strategies are generally targeted to manage the surface oil impacts.	Marine Diesel	**Adopt**

9.8.4 Spill Response and Operational Monitoring Plan Strategies ALARP Assessment

Table 9.9 presents an ALARP assessment on the level of resourcing for spill response strategies identified for adoption in Table 9.8.

Table 9.10 presents an ALARP assessment on the level of resourcing for Operational Monitoring Plan (OMP) strategies spill response strategies identified in the Woollybutt Operational and Scientific Monitoring Plan (000105_DV_PR.HSE.1025.000).

Table 9.9: ALARP assessment of the level of resourcing available for spill response strategies

Strategy	Resourcing	Justification	Additional resource consideration	Proportionality – cost/benefit	ALARP assessment
Monitor and Evaluate					
Aerial surveillance	Helicopter services available through Eni primary contracted supplier based out of Darwin and Truscott, WA. Visual observation – from aircraft/ helicopter can be made within 24 hours of mobilisation. Aircraft are also available through AMOSC and AMSA. Trained observers will be sourced from AMOSC, AMSA and OSRL to undertake the required aerial surveillance in the event of a spill. Can make visual observations within 24 hours of mobilisation.	Given location of spill site, mobilisation helicopters from Darwin is considered adequate for surveillance. If aerial surveillance is required, an over-flight schedule is developed by the IMT. The frequency of flights will be sufficient to ensure that the information collected during each flight (i.e. observer log and spill mapping) meets the information needs to validate dispersion of the spill.	Resource not considered limiting. Primary supplier of aerial surveillance on contract with additional providers available to provide desired overpass frequency. Trained observers can be provided on rotation 24 hours after mobilisation.	No additional cost to maintain capability as helicopters are currently contracted for other operational needs. In the event that additional overpasses are required due to data gaps the cost of the additional flights will be added to the cost of the response.	There is no value in increasing capabilities, therefore the arrangements are considered ALARP however opportunistic aerial surveillance can be provided through the shared use of aircraft deployed for other purposes.
Vessel surveillance	Vessel of opportunity (VOO) from other operators.	Additional mobilisation of vessels can be made through Eni's contracted vessel providers.	Eni contract additional vessels or purchase vessels specifically for spill response	Based on the likelihood of vessels available on site during decommissioning activities (vessel based monitoring), additional	There is no benefit in having additional dedicated surveillance vessels given surveillance can be

Strategy	Resourcing	Justification	Additional resource consideration	Proportionality – cost/benefit	ALARP assessment
	Vessels on location during decommissioning/ monitoring activities. Additional vessels contracted through Eni vessel provider. Visual observations from these vessels occur within 72 hours of mobilisation.	This strategy is not designed to perform 'whole of spill' coverage which is provided by aerial surveillance (i.e. it is a secondary strategy).	monitoring to be able to respond immediately.	vessels for the purpose of oil spill surveillance is not required. Surveillance will also be conducted through a number of complementary strategies (aerial surveillance, oil spill trajectory modelling, satellite monitoring). The current vessels arrangements and contracts are considered to provide the required function. Dedicated vessels on standby for vessel surveillance would cost tens of thousands of dollars per day and are not considered required.	performed from any vessel and these duties will be shared amongst spill response vessels.
Satellite Monitoring	Eni has contracted KSAT to provide satellite monitoring for its operations. KSAT has a 24/7 Emergency Image Delivery Service and stand-by support.	KSAT will operate out of its Tromsø Network Operations Centre (TNOC) in Norway. KSAT will provide Near Real-Time services for oil spill and support vessel detection targeting delivery in 15 minutes from data availability (in the case of a spill being detected or suspected). The SAR satellites will provide two images per day and a report shall be provided daily to Eni.	Additional contracts with satellite monitoring providers.	Resource is not considered limiting with no environmental benefit from dedicating additional monitoring capability KSAT provide satellite monitoring through a contract with Eni.	There is no environmental benefit in having additional satellite monitoring capabilities

Strategy	Resourcing	Justification	Additional resource consideration	Proportionality – cost/benefit	ALARP assessment
Oil spill trajectory modelling (OTSM)	The OSTM will be sourced, via AMOSC or Eni HQ, within 24 hours using their 24/7 emergency capability. OSTM is also available through panel consultants.	The modelling supplier can provide updates to the IMT of trajectory model outputs to inform response planning.	Additional contracts with oil spill trajectory modelling providers	Predictive oil spill modelling will be used to forecast (using real-time data) the trajectory and fate of the spill. Resource is not considered limiting with no environmental benefit from dedicating additional modelling capability. Supplied through AMOSC or Eni HQ. As a member company of AMOSC, Eni has access to AMOSC's oil spill recovery and response equipment, training, technical capabilities along with those resources held by member companies as outlined in the AMOSPlan. Eni HQ in Milan maintains oil spill trajectory modelling capability and also have 24/7 emergency capability.	There is no environmental benefit in having additional modelling capabilities.
Shoreline clean-up					
Shoreline clean-up	Manual clean-up and flushing equipment (AMOSC, AMSA) Clean-up team leaders (through AMOSC and AMSA) Labour personnel (labour hire as required)	Whilst no shoreline accumulation at >100 g/m^2 is predicted to occur, and an extensive shoreline response requirements are not anticipated, the strategy is available to Eni and is adopted as a precautionary measure for the event that monitoring	The main limitation of undertaking a shoreline clean-up response is based around access for plant and personnel to remote offshore island locations. Additional resources may include permanent	The limiting factor is considered to be numbers of personnel available to undertake shoreline clean-up and access to shoreline. Mobilising additional personnel to undertake shoreline clean-up via vessel to remote offshore locations presents increased	The level of resources available are considered to be appropriate, given shoreline accumulation is not anticipated. The outcome of oil spill modelling/surveillance and a NEBA would be

Strategy	Resourcing	Justification	Additional resource consideration	Proportionality – cost/benefit	ALARP assessment
	Eni has arrangements in place with TOLL Group, which includes vessel hire such as barges, vessels and landing craft from Darwin. Time for the shoreline assessment team to be deployed can be 24 hours from mobilisation.	predicts impacts to key shoreline sensitives.	pre-positioning clean-up equipment on the shoreline prior to a spill event occurring.	associated health and safety risks. Personnel mobilised via helicopter is limited to 10 passengers per trip. Once at the locations there is a need to provide adequate facilities. An extensive shoreline response and personnel requirement is not anticipated. Pre-positioning clean-up equipment on the shoreline prior to a spill event occurring provides no benefit at a significant cost.	used to identify priorities for protection at specific locations given the time of year e.g. during turtle nesting season, where shoreline clean-up efforts would be directed at nesting beaches. Decision to implement shoreline clean-up will be undertaken by the IMT when the findings of the NEBA demonstrate that shoreline clean-up techniques used will deliver environmental benefits.
Oiled wildlife response					
Oiled wildlife response	Oiled wildlife response kits and containers available through AMOSC. OWR personnel.	Whilst an extensive OWR is not anticipated, the strategy is available to Eni and is adopted as a precautionary measure for the event that monitoring predicts impacts to key shoreline sensitives and species.	Pre-positioning of staging areas and responders has been considered. As Eni has access to OWR kits through third party agreements that can be mobilised in a timely manner, it is not considered to be necessary to increase resources.	The cost of personnel (Level 1 responders) on standby is $1,500 per person per day. Given that personnel on this level can be arranged within relatively short timeframes through other bodies there is not considered sufficient environmental value in having dedicated OWR responders on standby.	Resourcing required for any OWR is considered to be within the capacity of existing response arrangements and are considered ALARP.

Strategy	Resourcing	Justification	Additional resource consideration	Proportionality – cost/benefit	ALARP assessment
			Purchasing of an OWR kit by Eni has been discounted as any OWR would be in consultation with DBCA upon completion of a NEBA.	Whilst an extensive OWR is not anticipated, the strategy is available to Eni and is adopted as a precautionary measure.	

Table 9.10: ALARP assessment of the level of resourcing available for Operational Monitoring Plan (000105_DV_PR.HSE.1025.000) strategies

Strategy	Resourcing	Justification	Additional resource consideration	Proportionality – cost/benefit	ALARP assessment
OMP1: Monitoring of Surface Hydrocarbon Distribution at Sea and Marine Megafauna Observations					
Aerial surveillance	Refer to Monitor and Evaluate in Table 9.9, above.				
Vessel surveillance	Refer to Monitor and Evaluate in Table 9.9, above.				
Satellite Monitoring	Refer to Monitor and Evaluate in Table 9.9, above.				
Oil spill trajectory modelling (OTSM)	Refer to Monitor and Evaluate in Table 9.9, above.				
Unmanned aerial vehicle (UAV)	Access to various Unmanned Ariel Vehicle (UAV) providers via OSRL on a best endeavours basis	UAVs provide an additional monitoring capacity to cover specific areas of interest identified during the response via aerial or vessel surveillance. UAVs are accessed through OSRL as they require trained operators and specific maintenance.	Purchasing UAVs and training Eni personnel as operators, so UAV access can be guaranteed immediately in the event of a spill.	Cost of purchasing UAVs and training personnel outweighs benefit. Given that the main strategy for monitoring the spill is from aerial surveillance (helicopter) and vessel surveillance, purchasing UAVs specifically and training Eni personnel as operators does not result in better coverage of the spill initially and is a costly process. The access to UAVs through an existing OSRL contract is aimed to monitor specific areas identified by the vessel and aerial surveillance and its use is not required immediately	There is no environmental benefit in purchasing UAVs and training Eni personnel as UAV operators given coverage of the spill can initially be made using vessels and aerial observation.

Strategy	Resourcing	Justification	Additional resource consideration	Proportionality – cost/benefit	ALARP assessment
				during the spill event. In addition, sensitive shoreline receptors which may be monitored using a UAV are not anticipated to be contacted in the event of a diesel release (Section 9.5)	
Aerial surveillance trained observer	Trained observers will be sourced from AMOSC, AMSA and OSRL to undertake the required aerial surveillance in the event of a spill. Can make visual observations within 24 hours of mobilisation.	In the event of a diesel release (Section 9.5), very minor shoreline contact is predicted to occur. The spill will move with the currents and sensitive receptors are not anticipated to be contacted by surface oil. Given the spill size, a large scale response is not required. Mobilising aerial surveillance trained observers within 24 hours is considered adequate.	Access to personnel in less than 24 hours to monitor the spill	Does not provide any additional environmental benefit or quicker coverage of the spill. Visual observation – from aircraft/ helicopter can be made within 24 hours of mobilisation. Access to vessels and aerial surveillance would be a limiting factor and has been discussed in Table 9.9, above.	Costs of having personnel ready to mobilise in less than 24 hours to monitor the spill grossly outweighs the environmental benefit. Access to personnel is not a limiting factor Does not provide any additional environmental benefit or quicker coverage of the spill.
OMP2: Monitoring of Hydrocarbons: Weathering and Behaviour in Marine Waters					
Water sampling equipment to detect hydrocarbon presence and estimate oil concentrations	Access to: 1 x Turner C3 Fluorometer (submersible) 1 x OSRL fluorometry unit operator Within 24 hours via OSRL	Fluorometers and backscatter sensors to detect hydrocarbon presence and estimate oil concentrations in the marine environment. Access timing aligns with access to the vessel (24 hours)	Access to additional fluorometers	Provides no additional benefit. Additional fluorometers can be mobilised, however not within 24 hours. Given the size of the spill, one fluorometer has been determined to be required initially.	No additional environmental benefit gained

Strategy	Resourcing	Justification	Additional resource consideration	Proportionality – cost/benefit	ALARP assessment
Autonomous underwater vehicle to provide understanding of entrained hydrocarbons	Access to: 1 x Autonomous underwater vehicle (AUV) with fluorometry sensor 1 x AUV engineer On a best endeavours basis via OSRL	Autonomous underwater vehicle to provide understanding of entrained hydrocarbons.	Contracted access within a defined timeframe (e.g. 34 hours)	High cost with little environmental benefit. Submersible fluorometers are able to provide an assessment of hydrocarbon presence in first instance.	No additional environmental benefit gained
OMP3: Shoreline Assessment Surveys					
Shoreline assessment team and surveyors	Shoreline assessment team Shoreline surveyors Onsite within 5 days, or 24 hours prior to shoreline contact (if prolonged time to shoreline contact). Access through: AMOSC, National Plan resources through AMSA, OSRL	In the event of a diesel release (Section 9.5), shoreline contact is not anticipated at a threshold at which a response can be effectively undertaken. The spill will move with the currents and sensitive receptors are not anticipated to be contacted by surface oil. Given maximum volume of shoreline oil predicted ($2m^3$), a large scale shoreline assessment response is not required. Access to personnel through AMOSC, National Plan resources through AMSA, OSRL is determined adequate.	Additional access of shoreline assessment personnel within 5 days.	Does not provide any additional benefit given the spill size, volume of shoreline contacted and time to contact (7 days).	No environmental benefit gained from access to personnel within 5 days.
Unmanned aerial vehicle (UAV)	Refer to OMP1: Monitoring of Surface Hydrocarbon Distribution at Sea and Marine Megafauna Observations, above				
Aerial surveillance	Refer to Monitor and Evaluate in Table 9.9, above.				

Strategy	Resourcing	Justification	Additional resource consideration	Proportionality – cost/benefit	ALARP assessment
Vessel surveillance	Refer to Monitor and Evaluate in Table 9.9, above.				

9.8.5 Environmental Performance Outcomes and Control Measures

For EPOs, EPS and measurement criteria relating to spill response in event of a spill during this activity, refer the Woollybutt OPEP (000105_DV_PR.HSE.1045.000).

10 ENVIRONMENTAL OUTCOMES, STANDARDS AND MEASUREMENT CRITERIA

Regulation 13(7) of the OPGGS(E) Regulations require an EP to include EPOs, environmental performance standards and measurement criteria that:

- address legislative and other controls that manage environmental features of the activity
- define objectives and set standards for measuring Eni's performance in protecting the environment during its operations
- include measurement criteria for assessing whether performance outcomes and standards have been met.

The terms used for measuring the environmental performance are defined below:

- Performance outcome – a statement of the goal Eni aims to achieve with regard to the management of a given hazard.
- Performance standard – a statement of performance required of a system, an item of equipment, a person or a procedure that is used as a basis for managing environmental risk. Generally, a number of standards may relate to a single objective.
- Measurement criteria – defines how the application of the performance standard will be verified. Several measurement criteria may relate to a single performance standard. Measurement criteria are defined in a manner that enables efficient inspection and/or audit against the performance outcomes and allows for an audit trail.

To ensure environmental risks and impacts will be of an acceptable level, EPOs have been defined and are listed in Table 10.1. These outcomes will be achieved by implementing the identified control measures to the defined performance standards.

Table 10.1: Environmental performance outcomes

Reference	Environmental Performance Outcomes
EPO-1	Information is provided to regulatory authorities and marine users directly affected by planned activities
EPO-2	Activity is managed in accordance with navigational and safety requirements
EPO-3	No unplanned interactions with other marine users
EPO-4	No injury or mortality to EPBC Act and WA Biodiversity Conservation Act 2016 listed fauna during operational activities
EPO-5	Reduce impacts to marine fauna from lighting on the support vessels and the IV through limiting lighting to that required by safety and navigational lighting requirements
EPO-6	Atmospheric emissions in compliance with Marine Order 97 requirements to restrict emissions to those necessary to perform the activity
EPO-7	No unplanned discharge of oily water or chemicals that are not in accordance with Marine Order 91 requirements
EPO-8	No unplanned discharges to sea of untreated sewage, greywater, putrescible wastes, bilge and deck drainage
EPO-9	No unplanned releases of solid hazardous or non-hazardous waste to the marine environment
EPO-10	Seabed disturbance limited to the Operational Area
EPO-11	No introduction of marine pest species to Australia from the activities
EPO-12	No vessel collision with protected marine fauna during the activity (whales, whale shark and turtles)
EPO-13	No loss of containment of hydrocarbons to the marine environment
EPO-14	No significant leaks to the marine environment from fittings and connections
EPO-15	Currency of information to the assessment of impact and risk maintained

10.1 Control Measures and Performance Standards

The control measures that will be used to manage identified environmental impacts and risks, and the associated statements of performance required of the control measure (i.e., environmental performance standards), are listed in Table 10.2. Measurement criteria outlining how compliance with the control measure, and the expected environmental performance, could be evidenced are also listed. A separate set of performance standards based on the oil spill response operational control measures are included in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000).

Table 10.2: Control measures and environmental performance standards

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
EPO-2 **EPO-3** **EPO-5**	**CM-1** Navigation equipment and procedures (lighting required for safe work conditions and navigational purposes)	**EPS-1.1.** Support vessels and IV compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 30 (Prevention of Collisions) 2009: • Adhere to steering and sailing rules including maintaining lookouts (e.g. visual, hearing, radar etc.), proceeding at safe speeds, assessing risk of collision and taking action to avoid collision (monitoring radar). • Adhere to navigation light display requirements, including visibility, light position/shape appropriate to activity. • Adhere to navigation noise signals as required.	**MC-1.1.** Support vessels and IV have a current (< 12 months) IMCA or OVID certificate prior to mobilisation	**1** **3**
		EPS-1.2. Support vessels and IV compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 21 (Safety of Navigation and Emergency Procedure) 2012: • 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). • Automatic Identification System (AIS) installed as required by vessel class in accordance with SOLAS Chapter V (Regulation 19).		

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
EPO-1 **EPO-3**	**CM-2** Maritime notices – Notices to Mariners (NTM) and AUSCOAST warnings	**EPS-2.1.** The Australian Hydrographic Office (AHO) is notified 4 weeks prior to commencing subsea equipment removal activities so they can then issue a Notice to Mariners.	**MC-2.1.** Notice to AHO completed	**1**
		EPS-2.2. The AMSA Rescue Coordination Centre (RCC) (as part of marine safety division) will be notified of the subsea equipment removal activities 4 weeks prior to mobilisation to ensure navigation AUSCOAST warnings can be issued and kept up to date.	**MC-2.2.** Notice to AMSA RCC completed	
EPO-1 **EPO-2** **EPO-3**	**CM-3** Exclusion zone around vessels to reduce potential for collision or interference with other marine users	**EPS-3.1** A 500 m exclusion zone is maintained around the vessels during subsea equipment removal activities.	**MC-3.1** Records show no vessels entered into the 500 m exclusion zone without permission	**1** **13**
EPO-9 **EPO-10**	**CM-4** Removal of subsea equipment	**EPS-4.1** Removal of subsea equipment occurs per Section 4.8.	**MC-4.1** Removal of subsea equipment has occurred as per Section 4.8	**7** **15**
EPO-4 **EPO-12**	**CM-5** Regulations and measures for interacting with fauna	**EPS-5.1** EPBC Regulations 2000 – Part 8 for interacting with marine fauna are enforced during the activities, including Part 8 Division 8.1 (Regulation 8.05): • a vessel will not travel greater than 6 knots within 300 m of a whale (caution zone) and not approach closer than 100 m from a whale • a vessel will not approach closer than 50 m of a dolphin and/or 100 m of a whale (with the exception of animals bow riding)	**MC-5.1** Conformance to EPBC Regulations 2000 – Part 8 is checked on receipt of marine fauna sighting datasheets	**2** **12**

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
		EPS-5.2 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: • vessel will not approach closer than 300 m to a calf (whale or dolphin) (the exclusion zone) • then the vessel must be immediately stopped; and must either: • 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		
		EPS-5.3 Helicopters will comply with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.07), which includes the following measure: • helicopters shall not operate lower than 1,650 feet or within a horizontal radius of 500 m of a cetacean known to be present in the area, except for take-off and landing.		
EPO-4 **EPO-12**	**CM-6** Marine fauna observations/reporting undertaken	**EPS-6.1** Marine fauna sighting data reported to DoAWE.	**MC-6.1** Records of marine fauna sighting data submission to DoAWE	**2** **12**

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
EPO-6	**CM-7** Air pollution prevention certificate	**EPS-7.1** IV and support vessels comply with MARPOL 73/78 Annex VI, as applied in Australia under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Part IIID Prevention of air pollution), and Marine Order 97 (marine pollution prevention – air pollution 2007, as required by vessel class: • IV and support vessels will have valid International Air Pollution Prevention Certificate (IAPP) where required.	**MC-7.1** Current IAPP certificate or equivalent for IV and support vessels.	**4**
	CM-8 Fuel type used	**EPS-8.1** Marine Order 97 compliant fuel oil is used by vessels.	**MC-8.1** Records of fuel type for vessels show use of low sulphur fuel when available.	

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
EPO-7	**CM-9** Oily water treatment system in place	**EPS-9.1** V and support vessels comply with Marine Orders 91 – oil (as relevant to vessel class) requirements which include mandatory measures for the processing of oily water prior to discharge including: • Machinery space bilge/oily water shall have International Maritime Organisation (IMO) approved oil filtering equipment (oil/water separator) with an on-line monitoring device to measure oil in water (OIW) content to be less than 15 ppm prior to discharge. • IMO approved oil filtering equipment shall also have an alarm and an automatic stopping device or be capably of recirculating in the event that OIW concentration exceeds 15 ppm. • A deck drainage system shall be capable of controlling the content of discharges for areas of high risk of fuel/oil/grease or hazardous chemical contamination. • There shall be a waste oil storage tank available, to restrict oil discharges. In the event that machinery space bilge and deck drainage discharges cannot meet the oil content standard of <15 ppm without dilution or be treated by an IMO approved oil/water separator, they will be contained on-board and disposed of onshore.	**MC-9.1** Records demonstrate vessels are compliant with Marine Order 91 – pollution prevention (as appropriate to vessel).	**5**
EPO-7 **EPO-14** **EPO-12**	**CM-10** Oily water prevention system in place	**EPS-10.1** Valid International Oil Pollution Prevention Certificate, which confirms that required measures to reduce impacts of planned oil discharges are in place on vessels.	**MC-10.1.** Current International Oil Pollution Prevention Certificate or equivalent is available for vessels	**5**

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
		EPS-10.2. Preventative maintenance on oil filtering equipment completed as scheduled on vessels.	**MC-10.2.** Maintenance records or evidence of maintenance in operational reports available for vessels	
EPO-8	**CM-11** Sewage and waste management	**EPS-11.1.** IV and support vessels comply with MARPOL 73/78 Annex V (Prevention of pollution by garbage)/Marine Order 95 (Marine pollution prevention – garbage): • Putrescible waste will only be discharged to sea if comminuted to 25 mm or less and discharged en route when greater than 3 nautical miles from the 'territorial sea baseline'. • If putrescible waste is not comminuted to 25 mm or less, it will be discharged greater than 12 nautical miles from the territorial sea baseline while en route.	**MC-11.1.** Records demonstrate vessels are compliant with Marine Order 95 – pollution prevention (as appropriate to vessel class)	**6**

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
		EPS-10.2. Vessels comply with Marine Order 96 – pollution prevention – sewage (as appropriate to vessel class) which include the following requirements: • 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 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-10.2.** Records demonstrate vessels have valid International Sewage Pollution Prevention Certificates	
EPO-11	**CM-12** Implementation of an IMS risk assessment check tool, applied to IV and support vessels	**EPS-12.1.** IV and support vessels to be risk assessed (e.g. the DPIRD vessel check tool or similar) demonstrating support vessels and IV are at 'low risk; of introducing invasive marine species. IMS management measures will be applied to vessels to reduce IMS risk to 'low risk'.	**M-12.1.** Completed vessel check report demonstrating IV and support vessels are 'low risk' of IMS	**10**
		EPS-12.2. Vessel check assessment has been reviewed or completed by member of the Eni HSE Team.	**EPS-12.2.** Records show vessel check assessment has been reviewed completed by member of the Eni HSE Team	

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
	CM-13 Support vessels and IV have approved ballast water treatment method/system	**EPS-13.1.** Compliance with Australian Ballast Water Management Requirements (as defined under the *Biosecurity Act 2015*) (aligned with the International Convention for the Control and Management of Ships' Ballast Water and Sediments) to prevent the introduction of IMS.	**MC-13.1.** Administrator-approved ballast water management plan Completed ballast water record book or log	**10**
	CM-14 IMS management measures applied to IV and support vessels	**EPS-14.1.** IMS management measures will be applied to IV and support vessels according to risk to minimise the likelihood of IMS being introduced (such as the treatment of internal systems, IMS Inspections or cleaning) to minimise the likelihood of IMS being introduced and reduce risk to 'low risk'.	**MC-14.1.** Records of management measures which have been implemented where identified to reduce risk to 'low'	**10**
EPO-9	**CM-15** Hazardous and Non-Hazardous Waste Management processes are implemented.	**EPS-15.1.** IV and support vessels comply with measures outlined in MARPOL 73/78 Annex V (Prevention of pollution by garbage/ Marine Order 95 (Marine pollution prevention – garbage) as required by vessel class: • Vessel(s) will have a Garbage Management Plan in place which outlines procedures for handling storing, processing and disposing of garbage.	**MC-15.1.** Garbage Management Plan in place for IV and support vessels	**11**
		EPS-15.2. 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-15.2.** Garbage record book in place for IV and support vessels	
		EPS-15.3. All hazardous and non-hazardous wastes generated at sea will be retained on IV and support vessels and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage).	**MC-15.3.** Hazardous and non-hazardous wastes records for IV and support vessels	

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
		EPS-15.4. All personnel will be notified of the correct waste management procedures through the induction process.	**MC-15.4.** Waste management procedures included in induction material for IV and support vessels	
		EPS-15.5. All hazardous wastes and chemicals will be stored in a bunded area capable of containing leakage or spillage, prior to onshore disposal.	**MC-15.5.** Inspection Report shows all hazardous wastes and chemicals are stored in a bunded area capable of containing leakage or spillage	
		EPS-15.6. A Woollybutt NORMs management plan is in place and includes requirements for safe handling and disposal of NORMS waste.	**MC-15.6.** Records show that a Woollybutt NORMs management plan is in place during the Petroleum Activities Program and includes requirements to be followed for safe handling and disposal of NORMS waste	
		EPS-15.7 Woollybutt NORMs Management Plan is in place and adhered to. The plan includes: • During the equipment retrieval campaign, a Radiation Inspector will be on board the vessel to inspect equipment for NORMs. • If NORMs are identified, the affected equipment will be stored in a dedicated, demarcated area on the vessel and segregated from other equipment.	**MC-15.7.** Records show that Radiation Inspector is on board the vessel to inspect equipment for NORMs and NORMs identified equipment is stored in a dedicated, demarcated area on the vessel and segregated from other equipment	

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
		EPS-15.8. The Woollybutt Waste Management Plan (000105_DV_PR.HSE.1115.000) includes a review of opportunities for waste in accordance with the waste hierarchy for decommissioning (Figure 8.2:), including: • Re-use • Recycling And includes details on: • Storage of waste • Transport and disposal of waste • Waste monitoring and reporting	**MC-15.8.** Records show that the Woollybutt Waste Management Plan (000105_DV_PR.HSE.1115.000) is in place during the Petroleum Activities Program and includes a review of opportunities for waste in accordance with the waste hierarchy for decommissioning (Figure 8.2:), including: • Re-use • Recycling And includes details on: • Storage of waste • Transport and disposal of waste • Waste legislation and standards • Waste monitoring and reporting	
			Records show the following occurs in accordance with the Woollybutt Waste Management Plan (000105_DV_PR.HSE.1115.000): • Storage of waste • Transport and disposal of waste • Waste monitoring and reporting	

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
EPO-13	**CM-16** Bulk refuelling transfer procedures	**EPS-16.1** Bunkering procedure implemented for all hydrocarbon vessel bunkering and helicopter refuelling activities, and will include the following requirements: • A completed PTW and/or JSA shall be implemented for the hydrocarbon bunkering/refuelling operation • Visual monitoring of gauges, hoses, fittings and the sea surface during the operation • Hose checks prior to commencement	**MC-16.1** Records demonstrate refuelling undertaken in accordance with contractor bunkering procedures	**13**
		EPS-16.2 Bunkering not undertaken in adverse weather conditions and addressed within JSA.	**MC-16.2** Records demonstrate consideration of daylight and weather conditions prior to undertaking bunkering/refuelling operations	
EPO-13 **EPO-14**	**CM-17** Vessel spill response plan (SOPEP)	**EPS-17.1.** SOPEP kept on board IV and support vessels and contains plans in case of an oil spill to prevent spills reaching the marine environment, as appropriate to vessel class.	**MC-17.1.** Approved SOPEP available onboard IV and support vessels, as appropriate to vessel class.	**13** **14**
	CM-18 On board spill response kits	**EPS-18.1.** Spill response kits located in proximity to hydrocarbon storage/bunkering areas and appropriately stocked/replenished as required to prevent spills reaching the marine environment.	**MC-18.1.** Inspection Report completed show spill kits located in proximity to hydrocarbon storage/bunkering areas	**13** **14**
	CM-19 ROV equipment maintenance	**EPS-19.1.** ROV is maintained in accordance with manufacturer recommendations.	**MC-19.1.** ROV maintenance records	**13**

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
	CM-20 Pre-dive ROV checks	**EPS-20.1.** A ROV check is conducted prior to dive which includes check of line/connection integrity.	**MC-20.1.** ROV pre-dive checklist is completed and shows check of line/connection integrity	**13**
EPO-10	**CM-21** Lifting procedures	**EPS-21.1.** Lifting Operations Standard ENI-HSE-ST-007 details processes to reduce risk of dropped object, including: • competency of persons undertaking lift • planning and preparation process for undertaking lifts.	**MC-21.1.** Lifting Operations have been made in accordance with Lifting Operations Standard ENI-HSE-ST-007	**15**
EPO-1	**CM-23** Notify marine users of the location of the infrastructure that will remain in-situ permanently	**EPS-23.1.** Eni will notify relevant State and Commonwealth fisheries that the infrastructure will remain in-situ.	**MC-23.1.** Records show State and Commonwealth fisheries are notified of the location of infrastructure and that infrastructure will remain in- situ	**1**
		EPS-23.2. Eni will notify AHO to ensure infrastructure left in-situ is marked on nautical charts.	**MC-23.2.** Records show infrastructure wellhead is marked on nautical charts.	
	CM-24 Adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised	**EPS-24.1.** Adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised.	**MC-24.1** Records show that the monitoring activity was planned and occurred outside of the Wheatstone pipeline exclusion zone unless otherwise authorised	**1**
	CM-25 Consultation with the Wheatstone pipeline operator during planning and undertaking monitoring activity	**EPS-25.1.** Consultation with the Wheatstone pipeline operator occurs to ensure that any SIMOPs during the activities can be managed, and impacts/ risks avoided.	**MC-25.1** Records show that consultation with the Wheatstone pipeline operator during planning and operations for the activities	

EPO References	Control Measure (CM)	Environmental Performance Standards (EPS)	Measurement criteria (MC)	Risk ID
EPO-1	**CM-26** Regulatory notification issued to NOPSEMA	**EPS-26.1.** NOPSEMA notified that equipment removal activities are to commence at least 10 days before the activity commences.	**MC-26.1.** Submitted Regulation 29(1)	**1**
		EPS-26.2. NOPSEMA notified that the equipment removal activities are completed within 10 days after finishing.	**MC-26.2.** Submitted Regulation 29(2) notification form	
EPO-1	**CM-27** Navigation charts	**CM-27.1** Eni will notify AHO of the location of all subsea infrastructure remaining in-situ so that AHO can update navigation charts accordingly.	**MC-27.1** Records demonstrate that AHO has been notified	**1**
EPO-14	**CM-28** Review of the EP Risks prior to Petroleum Activities Program	**EPS-28.1.** A review of the EP will be undertaken prior to subsea equipment removal operations being undertaken to ensure that risks remain ALARP and are pertinent to the activity.	**MC-28.1.** Documented review of the EP has been recorded	N/A

11 IMPLEMENTATION STRATEGY

The purpose of the implementation strategy section is to manage the activities and their associated environmental risks to ALARP and ensure environmental performance is monitored. Regulation 14(1) of the OPGGS(E) Regulations requires that the EP contain an implementation strategy. To meet this Regulation, this section:

- describes the environmental management system for the activity, including specific measures to be used to ensure that, for the duration of the activity:
    a. the environmental impacts and risks of the activity continue to be identified and reduced to a level that is ALARP
    b. control measures detailed in the EP are effective in reducing the environmental impacts and risks of the activity to ALARP and an acceptable level
    c. EPOs and standards set out in the EP are being met. (Regulation 14[3]).
- establishes a clear chain of command and the setting out of roles and responsibilities of personnel responsible for the implementation, management and review of the EP (Regulation 14[4])
- presents measures to ensure all personnel directly undertaking works or associated works related to the activity have the appropriate competencies and training and are aware of their responsibilities under this EP (Regulation 14[5])
- provides sufficient monitoring, recording, audit, management of non-conformance and review of the titleholder's environmental performance and the implementation strategy to ensure the EPOs and standards in the EP are being met (Regulation 14[6])
- provides for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the EPOs and standards in the EP are being met (Regulation 14[7])
- includes a process for maintaining an Oil Pollution Emergency Plan (Regulation 14[8]).

This section presents the implementation strategy for the Petroleum Activities Program.

11.1 Systems, Practices and Procedures

11.1.1 HSE Management System Overview

Eni's management of HSE matters is arranged hierarchically in two distinct levels:

1. Corporate level Management System
2. Regional (Eni Australia) level HSE Integrated Management System (HSE IMS).

Within Eni Australia, HSE management is delivered at the regional and asset level through the Eni HSE IMS, which is the means by which all HSE hazards and risks are

controlled. The HSE IMS refers to the totality of Eni Australia's management systems in terms of the:

- concepts, policies, strategies, HSE goals, processes, procedures and work instructions that comprise the formal content of the HSE IMS
- organisational structures, communication systems, safety-related data, roles and responsibilities, competencies and training needed by the personnel to implement the HSE IMS
- physical elements that are critical to safety (equipment, structures and engineered systems), including the codes and standards used to design and construct them.

This section describes Eni's HSE IMS from the corporate level through to implementation.

11.1.2 Eni Corporate Management System Guidelines

Eni Australia adopts the guidelines provided by its corporate parent, Eni Upstream, which issued a *Divisional Directive for the development of Management System Guideline* – HSE (MSG-HSE-ENI-SPA-eng). This section provides structure and guidance notes for Safety Management System development based on the five main elements and 18 sub-elements of the system shown in Figure 11.1.

These elements are largely based on the structure of ISO 14001 and OSHAS 18001 series of standards and therefore provide a consistent and recognisable platform for managing safety, while also ensuring the intent of the principle of continuous improvement is followed.

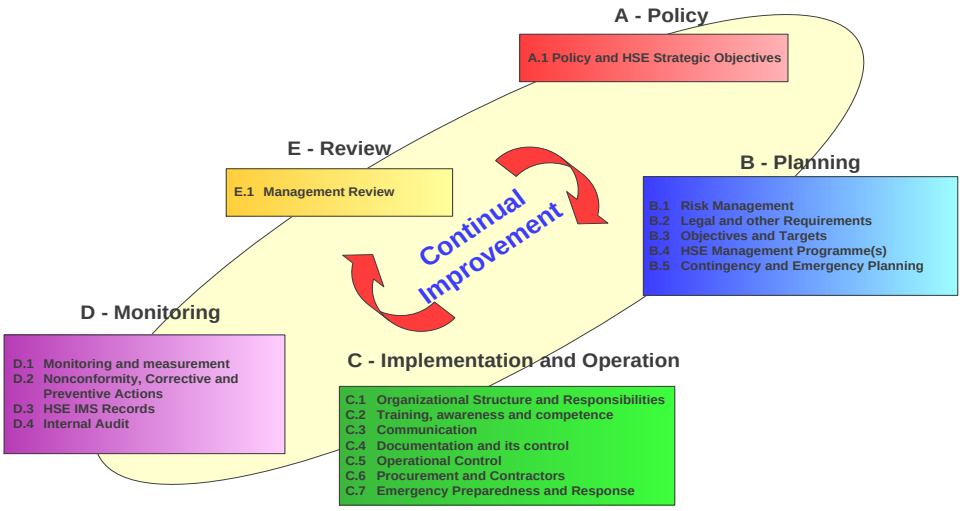


Figure 11.1: Eni HSE IMS five elements

11.1.3 Regional Eni Australia Health, Safety and Environment Integrated Management System

The Eni Australia HSE IMS, which covers Woollybutt equipment removal and decommissioning activities, has been certified against the standards of:

- ISO 14001: Environmental Management System
- OHSAS 18001: Occupational Health and Safety Management System
- AS/NZS 4801: Occupational Health and Safety Management System.

In addition, the system uses the guidelines of ISO 17776 in its overall risk assessment approach.

Audits are performed to verify conformance with these standards and the Eni Upstream Corporate Directive.

The current HSE IMS structure is illustrated in and shows the interface between Eni Australia's HSE IMS and the asset-level management system. Note that the structure provided is for guidance only and is subject to change.

The HSE IMS Framework Document (ENI-HSE-IN-002) serves as the key reference for Eni Australia's HSE IMS and is an information source for Eni employees and contractors.

The HSE IMS Framework Document provides an overview of the strategies that are used to manage HSE aspects of Eni Australia's operations, including emergency response, risk and security, and ensure their continual improvement in line with established objectives and targets. This document also describes the core elements of the HSE IMS and their interaction with related documentation.

The HSE IMS Framework Document sets out functional requirements for HSE management. Eni Australia has developed supporting documents that provide standards, processes, guidelines and criteria and information by which the functional requirements can be met. The documents are generally classified as either information, 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 International Oil & Gas Producers Association 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.

The HSE IMS Framework document also describes how occupational health and safety are managed by Eni Australia in a style promoted by a philosophy of objective or risk-based regulation and continuous improvement.

At the apex of the system is Eni's HSE Statement (Appendix A). The statement is approved by the Managing Director and provides a public statement of Eni's commitment to the environment and improving environmental performance.

11.2 Roles and Responsibilities

11.2.1 Field Operations

Figure 11.2 presents the organisational structure in place for Woollybutt Operations and project roles. Table 11.1 summarises key roles and responsibilities personnel and contractors for implementing Woollybutt Petroleum Activities Program.

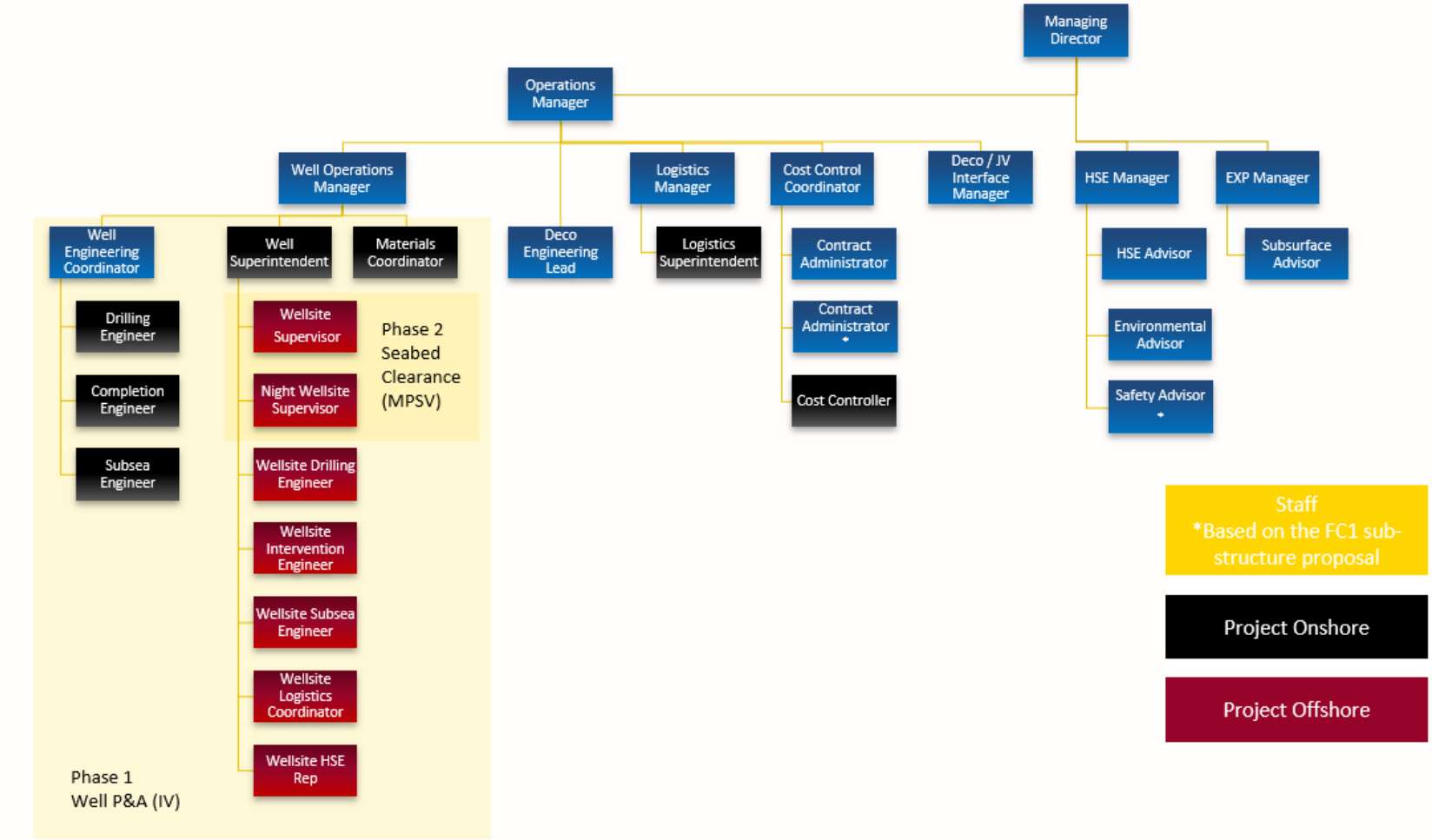


Figure 11.2: Woollybutt Eni operations organisation and proposed project roles

Table 11.1: Key roles and responsibilities for HSE management

Role	Responsibilities
Onshore personnel	
Managing Director	Overall responsibility for HSE and ensuring resources are available to effectively implement this EP. Approving this EP and confirming that all significant environmental risks have been identified and that mitigation strategies will be implemented.
Operations Manager (office-based)	Implementing the HSE IMS within the operational area, by the application of the EP. Approving this EMP and confirming that all significant environmental risks have been identified and that mitigation strategies will be implemented. Allocating personnel with the relevant competencies to specific roles in accordance with the Eni organisation chart and position descriptions. Assisting the IMT/CMT in the event of an emergency. Ensuring Notice to Mariners are issued and maintained. Notifying NOPSEMA of the details of reportable incidents and providing updates on the status of the incident (Section 11.8)
Decommissioning Lead (office based)	Reviewing this EP and confirming all environmental risks have been identified, mitigation strategies are effective and will be undertaken during the Petroleum Activities Program, including emergencies or potential emergencies. Ensuring: • compliance with all environmental regulations and the EP • that 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 support 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 Operations Manager, HSE & CSR Manager and IMT Leader.
HSE Manager (office-based)	Reviewing this EP and confirming that all environmental risks have been identified, mitigation strategies are effective and will be undertaken during activities, including emergencies or potential emergencies. Providing and maintaining effective emergency response arrangements for project activities where there is potential environmental risk. Performing incident investigations. Submission of annual environmental compliance report to NOPSEMA.

Role	Responsibilities
Senior Environmental Advisor (office-based)	Reviewing HSE Management Plans for acceptability and ensuring compliance with this EP. Reporting all incidents to NOPSEMA in accordance with Section 11.8. 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	NOPSEMA monthly environment reporting of 'recordable incidents'.
Eni IMT Leader	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/CMT, government, stakeholders and media in the event of an incident.
Eni IMT Duty Officer	Acting as the first point of contact in an incident. Notifying the Eni IMT Leader of the incident.
Offshore personnel (during subsea equipment recovery)	
Vessel Masters (Contractor)	Ensuring the safe operation of their vessel. Ensuring that the operations on the vessel(s) are in compliance with Contractor's and Eni's HSE systems, regulations and this EP. Ensuring compliance with the Vessel Safety Case. Ensuring all incidents are reported to Eni. Providing support to the Eni's IMT as required. Ensuring all personnel are adequately trained, competent and have the ability to carry out duties as required in this EP. Notifying the Eni Offshore Representative of any incidents arising from operations that do not comply with the performance outcomes and/or standards identified in this EP. Reports hydrocarbon or chemical spills in accordance with the OPEP. Reports should go to Eni Offshore Rep if present, or relevant Ops department focal point and IMT Duty Manager. Establishing communications with other vessels in the area.
Vessel Crew/Offshore support personnel	Undertake HSE and EP induction prior to undertaking any offshore activities. Ensuring all operations aboard vessel(s) are carried out in a manner consistent with this EP. Undertaking operations in accordance with Eni and Contractor HSE systems, including reporting all hazards and incidents to the Vessel Master and Eni Offshore Representative. Report any HSE hazards or incidents to the Vessel Master and the Eni Offshore Representative. Follow housekeeping procedures and work practices. Ensuring all operations aboard the vessel(s) is carried out in a manner consistent with this EP (e.g. report cetacean sightings).
Eni Offshore Representative	Notifying the Eni Operations Manager, HSE & CSR Manager should additional environmental risks arise during the activities that have not been identified in this EP.

Role	Responsibilities
	Ensuring all offshore personnel comply with the health, safety and environmental requirements. Providing a daily log of activities and reports reportable and recordable incidents to the 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 monitoring is undertaken in accordance with this EP (Section 11.5) and data is made available to Decommissioning Lead. 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 Eni Senior Environment Advisor. Investigating hydrocarbon spills, should they occur.
OIM/Vessel Master	Ensuring full compliance with all applicable navigational safety standards and regulations. Conducting emergency drills. Supervision of IV and support 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 IV and support 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 that all crew are appropriately qualified, trained and equipped for their roles on the IV and support vessel. Ensuring IV, support vessel activities are in compliance with the requirements of this EP. Notification of all IV and, support vessel related incidents immediately to the Eni Site Representative.
IV and support vessel operators, technicians and crew	Apply operating procedures in letter and in spirit. Follow good housekeeping procedures and work practices. Encourage improvement in environmental performance, wherever possible. Immediately report environmental incidents or spillage of hydrocarbons or chemicals to the support vessel and IV Vessel Master.

11.3 Training

All staff and contractors working on the Woollybutt Petroleum Activities Program must undertake an induction. The induction programs include:

- Company induction
- Cultural awareness program

Training is provided to employees and contractors at Eni as appropriate in order to ensure that individuals have the skills, knowledge and competencies to fulfil their roles.

The Eni approach to training and development is managed under the Eni Training and Development Procedure ENI-HRO-PR-020 which describes the mechanisms by which training, and competency are managed and outlines the process by which operations staff are trained. Eni utilises a number of training matrices which define the competency requirements for the roles. For each position, the training matrices indicate the minimum training requirements. An employee's training needs are based upon the matrix and any other training identified by the Line Manager and are recorded within the individuals Personal Development Plan (which outlines training needs on an annual basis).

The training process has been established to ensure that training activities are interactive, effective, competency-based and auditable, in terms of frequency of sessions and attendance of individuals.

Mandatory HSE training for both contractors and employees includes:

- Eni company induction, which includes
  - Eni Golden Rules
  - HSE IMS
  - substance abuse
- HSE Standards
- Job Hazard Analysis.

Other HSE training, based on roles and responsibilities include:

- dangerous goods awareness
- Management of Change
- Safety Case awareness/legislation
- hazard ID and risk management
- manual handling
- HSE Management System and auditing

- Taproot incident investigation
- HSE for supervisors.

OPEP training requirements are outlined in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000).

11.3.1 Inductions

All personnel will be required to undertake an environmental induction upon boarding the support vessels and IV undertaking the Petroleum Activities Program. The environmental induction will instruct personnel on the issues and management actions identified in this EP as well as their roles and responsibilities with regards to environmental performance. The induction will cover aspects such as:

- environmental regulatory requirements of the activity
- the importance of marine communications regarding any potential interactions with active commercial fishing
- overview of the physical environment
- marine mammal interaction:
  - requirements to record and report sightings of whales and dolphins.
- requirements waste, segregation, labelling, handling and storage
- requirements for recording waste movements and transfers in Garbage Record Book
- housekeeping and spill prevention:
  - requirements to store chemicals, oils and wastes in designated area
  - location of spill kits.
- spill preparedness and response:
  - alerting procedure and immediate spill response actions.
- environmental incident reporting:
  - requirements for reporting reportable and recordable events

11.4 Competency

All Eni Contractors must have satisfied the general HSE prerequisites in the contractor selection process in accordance with the Eni Contractor HSE Management Procedure ENI-HSE-PR-008 and Eni Contractor HSE specification and requirements ENI-HSE-SP-002.

In addition to this, Eni ensures that contractor personnel receive appropriate training on their HSE responsibilities in connection with Woollybutt subsea equipment recovery activities. This may be achieved in a number of ways; in particular all workforce,

including Contractors, attend HSE Forums which contain a range of HSE awareness presentations and training.

Eni will agree and approve the competencies of the Contractor's technicians before they start work on Woollybutt subsea equipment activities. All sub-contractors and specialist services providers that are engaged under the maintenance services contract will similarly be approved by Eni.

11.4.1 Verification of Competence

In accordance with the Eni Verification of Competence Procedure ENI-HSE-PR-024, it is mandatory for verification of competency to be undertaken for all personnel who operate equipment and/or carry out work that requires a High-Risk Work Licence. Eni Australia adheres to the National Standard for Licensing Persons Performing High Risk Work 2006. This standard requires persons performing the high-risk work of scaffolding, rigging, crane and hoist operations, to hold a High-Risk Work Licence.

The procedure requires checks and verifies that the competency already held by personnel is authentic and current and they can safely perform the high-risk activity to the required standard.

11.5 Monitoring

11.5.1 Emissions and Discharge Monitoring

Records relating to the environmental monitoring of planned and unplanned discharges from the activities are listed in Table 11.2. Records will be stored by Eni for at least five years in accordance with OPGGS (E) Regulations.

Planned and unplanned discharges are also documented in the daily report for the activity.

Table 11.2: Environmental monitoring parameters

Sources of Risk	Monitoring Criteria	Threshold Limit	Monitoring Method
Atmospheric emissions from combustion engines	Volume of diesel consumed	Not prescriptive limit but principle of ALARP to be applied	Diesel consumption
Generation and disposal of non-hazardous and hazardous wastes	Volume of solid waste transferred for onshore disposal	No prescriptive limit but principle of ALARP to be applied	Calculated based on capacity of storage containers
Discharge of sewage, grey water and putrescible wastes	Estimated volume of sewage, greywater, and mass of food scraps discharged overboard	No prescriptive limit but principle of ALARP to be applied	Estimated based on POB, storage capacity and dimensions of discharge point
Discharge of contaminated water	OIW concentration of treated wastewater	≤ 15 mg/L	Continuous automatic OIW monitor
Recovered NORMS	Refer Section 11.5.2	N/A	Waste Records
Recovered Equipment [1]	Refer Section 11.5.2	N/A	Waste Records

NOTE [1] : The total amount of waste disposed will be included in the environmental performance report submitted by Eni to NOPSEMA (refer Section 11.8).

11.5.2 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 the following information:

- Manifest identification number;
- Quantity (m3/Kg);
- Waste description;
- Waste container(s) number and description;
- Date of shipment;
- Final Destination Description (e.g.: incineration, landfill, etc.);
- Generator data;
- Transporter(s) data and waste acceptance declaration;
- Receiver data and waste acceptance declaration.
- DG class and UN number (for environmentally hazardous waste)
- Special handling instructions
- Any other information required by the waste contractor.

11.5.3 Activity Monitoring

This occurs from the mobilisation of the Petroleum Activities Program and continues until the completion of the activity.

For each activity, information is collected for monitoring of compliance to the EPOs, controls, standards and measurement criteria in this EP. At a minimum, evidence identified the measurement criteria in Table 10.2 will be collected and will be used to demonstrate the EPOs and standards are met.

The following systems may be used by Eni and contractors to monitor environmental performance throughout the subsea equipment recovery activities:

- daily vessel or IV reports during relevant offshore activities
- monthly HSE IV reports, which include the number of toolboxes/trainings undertaken, waste discharges and cetacean sightings
- reports from monitoring detailed in Table 11.2
- contractor inspections and audits
- review of waste management and recycling records
- audits against the EP requirements or other requirements (Section 11.6)

Eni will have the ability to identify compliance issues, identify non-conformance, activity risks and impacts through the Monitoring and Auditing systems and tools described above.

11.5.4 Monitoring of Anchors and Chains Decommissioned In-situ

The Offshore Petroleum Decommissioning Guideline (Commonwealth of Australia, 2018), Section 572 Maintenance and Removal of Property (NOPSEMA, 2020) and draft Section 270 NOPSEMA Advice - Consent to Surrender Title (NOPSEMA, 2021) describe the requirement for titleholders to address arrangements for long-term monitoring of equipment abandoned in-situ. General Direction issued to Eni under Section 574 of the OPGGS Act on 23 December 2020 (refer Section 2.1.2) also includes two requirements that Eni need to meet which relate to Section 270 of the OPGGS Act:

- Direction 3: To provide, to the satisfaction of NOPSEMA, for the conservation and protection of the natural resources in the title area within 12 months after all the wells referred to in direction 1 are plugged or closed off to the satisfaction of NOPSEMA.
- Direction 4: To make good, to the satisfaction of NOPSEMA, any damage to the seabed or subsoil in the title area caused by any person engaged or concerned in those operations within 12 months after all the wells referred to in direction 1 are plugged or closed off to the satisfaction of NOPSEMA.

In order to confirm the above requirements have been met prior to relinquishing the title and ending this EP, Eni propose to undertake an as-left survey (Section 4.11), which will:

- Obtain evidence of adjacent seabed disturbance
- Obtain representation of the completed infrastructure removal scope
- Confirm final burial status of ANC 313

Eni have also completed a pre-decommissioning sediment sampling program of the Woollybutt field in 2014 (Jacobs, 2014) (refer Section 5.3) and have routinely

undertaken inspections of the equipment in the Woollybutt field during the operational and cessation of production phases. The 2014 sediment survey showed that sediments within the field are not been contaminated from the Woollybutt operations such that Direction 3 and 4 would not be met. Whilst there was elevated levels of Nickel at site S05, the level (33 mg/kg) remained below the ANZACC/ARMCANZ (2000) ISQG-High trigger value. Widespread contamination with Nickel was also not observed. Barium also showed elevated concentrations across all sample locations when compared to concentrations recorded in sediment sampled at the reference site, Ref 01 (17 mg/kg). The higher concentrations recorded in sediments sampled close to well locations may be attributed to remnant drilling fluids deposited on the seafloor during the development drilling phase of the Woollybutt field.

Barite is one of the main constituents used water based muds used for drilling, and its use results in elevated levels of barium in cuttings. Barite in drilling muds and sediments has a low solubility in seawater, because of the high natural concentration of sulfate in the ocean. Because it is insoluble in seawater, it has a low bioavailability and toxicity to marine organisms (Neff, 2005). There is no indication that the levels of trace metals in fish and shellfish collected close to offshore installations are signif icantly above natural background concentrations (Bakke et al., 2013). Marine fauna that are exposed in the laboratory or field to cuttings in sediments do not bioaccumulate significant quantities of metals (Hartley et al., 2003). There is some evidence of a limited bioavailability of a few metals, such as Pb and Zn (note, elevated levels were not observed in the 2014 sediment survey), which are present in cuttings piles, however doubt remains that metal bioaccumulation in marine fauna from cuttings piles is sufficient to cause harmful effects in marine fauna living on or near cuttings piles (OSPAR, 2019).

The increased Barium concentration across all survey locations and the elevated level of Nickel at S05 are not considered to present a damage to the seabed or subsoil or compromise the conservation and protection of the natural resources in the title area.

Eni believe the following has already been established within this EP:

- Predicting the future condition of the equipment as it degrades (Section 8.8).
- Determining if additional risk management is required (Section 8.1, 8.8 and 8.9).

Materials will be released to the environment as they degrade (Section 8.8). As outlined in Section 4.7.1, steel constitutes most of the material in the anchors and chains, with some very minor quantities of epoxy coating. The materials do not pose credible risk of toxic effects in the marine environment and their impacts on the environment are reliably predicted (refer Section 8.8). As such, monitoring for potential toxicants in sediments or biota (e.g., fishes) is not warranted.

As detailed in Section 4.7.1, all anchors except one, anchor (ANC 313) are fully buried. ANC 313 is partially buried (Figure 4.4) however is expected to fully bury over time (refer Section 4.10.2). As the full burial cannot be confirmed as a worst case the impact assessment includes the risk to other user for the event that ANC 313 does not fully bury (refer Section 8.1). The only credible interaction of other users with ANC 313 is in the event that trawl fishing was to resume. Even in this event any interaction event is extremely rare (refer Section 8.1), and assumes that the ANC 313 has not buried.

There are no unacceptable impacts and risks to the seabed and subsoil from the anchors and chains remaining in the field and it is considered that the seabed is remediated to enable future unrestricted access, beneficial use and re-release for future use. Impacts and risks have been demonstrated to be reduced to ALARP and acceptable levels (refer Section 8.1) and no long-term monitoring to confirm the burial of ANC 313 is warranted given the low risk to other users.

Given the burial status of the anchors and chains (refer Section 4.7.1), no long-term monitoring to confirm the ongoing position of the equipment is warranted or required.

11.6 Auditing and Inspection

Compliance verification and auditing processes for the management of HSE is carried out on a number of levels.

At the Eni Australia HSE IMS level, there is a management system element dedicated to the audit and review process and an HSE Auditing Procedure (ENI-HSE-PR-005). This requires that the management system is formally reviewed to ensure ongoing effectiveness and continual HSE improvement. It also ensures that critical HSE processes are in place, for example, the HSE auditing of contractors and sub-contractors, and annual audit of the PTW system.

At a contractor management level, the HSE performance of the Maintenance Services Contractor, and other contractors, is assessed as part of the contractual performance review process. Eni also reserves the right to undertake HSE audits on Contractors and their subcontractors.

At an activity level, HSE monitoring is carried out as part of the execution work scopes. For these activities a project specific plan is prepared that will identify HSE audits, e.g. pre-mobilisation, during activity execution. This process applies to the audit/inspection of vessels and equipment to be utilised in projects (e.g. ROV).

Environmental audits and inspections aim to:

- identify potential new, or changes to existing environmental impacts and risk, and methods for reducing those to ALARP
- confirm that mitigation measures detailed in this EP are effectively reducing environmental impacts and risk, that mitigation measures proposed are practicable and provide appropriate information to verify compliance
- confirm compliance with the Performance Outcomes, Controls and Standards detailed in this EP.

Eni is certified against the relevant standards, including the OHSA 18001 ISO 14001 and AS/NZ 4801 management systems by a Third-Party verification body.

Further detail regarding specific audits are outlined in below (Sections 11.6.1 and 11.6.2).

11.6.1 Vessel and IV Compliance

Prior to 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 OVID or IMCA inspection will be requested. Vessels used regularly are required to have a vessel audit completed every 12 months.

Internal auditing is also undertaken for vessels to collect evidence for/assure compliance with Environment Plan commitments. Compliance documentation and evidence is collected on an ongoing basis.

Prior to subsea equipment recovery activities, the proposed IV will also be inspected to verify suitability and compliance with Eni requirements, see below Section.

11.6.2 Equipment Removal Monitoring Activity Environmental Audits and Inspections

During equipment removal activities, internal environmental inspections and audits will be conducted to ensure the requirements of this EP are being met. Table 10.2 will be used as a basis for the audit checklist.

The environmental inspection will be conducted by the Offshore HSE Representative or Environmental Advisor and may include verifying:

- environment containment including of chemical storage, spill response equipment and housekeeping
- other relevant measurement criteria applicable during the activity
- environment equipment survey to be undertaken by a specialist auditor of the contracted IV against the internationally recognised standards, local legislative requirements, safety and operating standards, equipment manufacturer maintenance and operating specification and accepted oilfield operating and safety practice
- one activity audit during the subsea equipment recovery, conducted by an onshore Environment Advisor against the relevant aspects of the EP. Table 11.2 will be used as a basis for the audit checklist.

11.7 Non-Conformance, Corrective and Preventative Actions

The incident investigation team makeup is based upon the investigation level. As a general guide, the investigation teams consist of the following:

- Level A: Team may be comprised exclusively of site personnel
- Level B: Team should consist of combined site and office personnel

- Level C: Team should consist of combined site, office and external or HQ experts.

Non-conformances can result from audits. Close-outs of non-conformances are recorded and tracked in an action tracking data base in accordance with ENI-HSE-PR-015 – Corrective Action Tracking and Non-conformance Reporting.

Corrective and preventative actions are raised for all identified hazards and incidents according to ENI-HSE-PR-003 Eni Australia Procedure Hazard and Incident Reporting. Corrective and preventative actions are registered and maintained within the SharePoint system.

Corrective and preventative actions are raised for all identified hazards and incidents according to *ENI-HSE-PR-003 Eni Australia Procedure Hazard and Incident Reporting*. Corrective and preventative actions are registered and maintained within the SharePoint system.

It is the responsibility of Department Managers to ensure that corrective and preventative actions relevant to their area of responsibility are undertaken, tracked and completed. The HSE Manager ensures that all corrective and preventative actions are tracked and that appropriate reminders are communicated to relevant Department Managers.

HSE hazards and incidents are investigated in accordance with *ENI-HSE-PR-025 – Incident Investigation Procedure*. Root cause analysis of incidents is performed to determine the cause and aid identification of corrective actions.

External incident reporting is detailed in Section 11.8.

11.7.1 Contractor Management

Breaches of this EP by Eni's contractors can be managed through issuing a formal Non-Conformance Report, in accordance with Procedure Vendor Management (ENI-PRC-PR-001), which links with legal management of the contract and would be initiated by the Eni contract holder. The procedure provides for contractor qualification, evaluation, due diligence, feedback and serious non-performance management. This would apply to any serious or repeated breaches of Eni procedures that could cause environmental harm.

11.8 External Reporting

11.8.1 Routine Woollybutt Reporting

Routine regulatory reporting requirements for the Woollybutt Petroleum Activities Program are summarised in Table 11.3. The requirements include that Eni develops and submits an annual Environmental Performance Report to NOPSEMA, with the first report submitted within 12 months of the commencement of activities covered by this EP (as per the requirements of Regulation 14(2) (b)).

Table 11.3: Routine Woollybutt external reporting requirements

Report	Recipient	Frequency	Content
Annual Environment Plan Performance Report	NOPSEMA	Should an activity be continuous for 12 months, then a summary environmental performance report will be submitted before the end of this period.	As required by Regulation 14 (2) and 26C the report will assess compliance with the EPOs and EPSs outlined in Section 10.1 of this EP. The reporting period is 1 January to 31 December each year.
National Pollutant Inventory (NPI) Report	DoAWE	Annual, by 30 September each year.	Summary of the emissions to land, air and water including those from the facility. Reporting period 1 July to 30 June each year.
National Greenhouse and Energy Reporting (NGERS)	Clean Energy Regulator	Annual, by 31 October each year	Summary of energy use and greenhouse gas emissions including those from the facility. Reporting period is 1 July to 30 June each year.
Environment Protection and Biodiversity Conservation Compliance Certificate	DoAWE	Annual, by 1 July each year	Summary of compliance against conditions of the Approval 2001/365. Reporting period is 1 July to 30 June each year.

11.8.2 Routine Subsea Equipment Removal Activities Reporting

Routine regulatory reporting requirements for subsea equipment removal activities are summarised in Table 11.4. The requirements include that Eni develop and submit an end-of-activity EP Performance Report to NOPSEMA for the subsea equipment recovery in accordance with Regulation 26C(c) of the OPGGS(E).

Table 11.4: Routine external reporting requirements - Subsea Equipment Removal

Requirements	Recipient	Timing	Content
Before the Activity			
Notify the Australian Hydrographic Office (AHO) of the activity commencement date and duration to enable a Notice to Mariners to be issued.	AHO	Email the AHOS 4 weeks prior to the confirmed activity start date.	Witten
Notify AMSA's Joint Rescue Coordination Centre (JRCC) through rccaus@amsa.gov.au (Phone: 1800 641 792 or +61 2 6230 6811) for promulgation of radio-navigation warnings	AMSA	24-48 hours before activities commence.	Written
Notify NOPSEMA of the start date of the activity in accordance with Reg. 29 of the OPGGS(E) (submissions@nopsema.gov.au).	NOPSEMA	Email NOPSEMA at least 10 days prior to the activity starting.	Complete NOPSEMA's Regulation 29 Start or End of Activity Notification form prior to petroleum activity
Notify DMIRS of the start date of the subsea equipment recovery executions, (petroleum.environment@dmirs.wa.gov.au).	DMIRS	Prior to subsea equipment recovery.	Notify DMIRS of the start date recovery executions, (petroleum.environment@dmirs.wa.gov.au)
Notify Defence of the start date of the subsea equipment recovery executions	Defence	Minimum of five weeks notification prior to the commencement of activities	Written
During the Activity			
Notify NOPSEMA of the end date of the activity in accordance with Reg. 29 of the OPGGS(E) (submissions@nopsema.gov.au).	NOPSEMA	Email NOPSEMA within 10 days of the end of the activity.	Written
Notify DMIRS of the end date of the subsea equipment recovery executions, (petroleum.environment@dmirs.wa.gov.au).	DMIRS	Prior to subsea equipment recovery.	Notify DMIRS of the end date recovery executions, (petroleum.environment@dmirs.wa.gov.au)

Requirements	Recipient	Timing	Content
AMSA notification of any oil pollution incidents in Commonwealth waters	AMSA	Within two hours of any oil pollution incidents in Commonwealth waters	In accordance with the Navigation Act 2012, any oil pollution incidents in Commonwealth waters will be reported by the Vessel Master to AMSA within 2 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
Department of Transport Reporting - All actual or impending MOP incidents that are in, or may impact, State waters resulting from an offshore petroleum activity.	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 (OSRC) Unit within the DoT as soon as practicable (within 2 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: • Marine Pollution Form (POLREP) http://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-PollutionReport.pdf and/ or

Requirements	Recipient	Timing	Content
			• Marine Pollution Situation Report (SITREP) http://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-SituationReport.pdf
Director of National Parks (DNP) 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 any changes to intended operations (requested through consultation	DNP	So far as reasonably practicable prior to response action being written.	Oral and written. The DNP should be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible. Notification should be provided to the 24 hour Marine Compliance Duty Officer on 0419 293 465. The notification should include: • 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 that the DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident.
DPIRD Reporting	DPIRD	Within 24 hours.	Notification (written) of any suspected marine pests or diseases including any organism listed

Requirements	Recipient	Timing	Content
If marine pests or disease are suspected this must be reported to DPIRD.			in the Western Australian Prevention List for Introduced Marine Pests and any other non-endemic organism that demonstrates invasive characteristics.
DoAWE Reporting Any harm or mortality to EPBC Act-listed threatened marine fauna.	DoAWE	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.
DBCA Reporting Any harm or mortality to fauna listed as threatened under the WA Biodiversity Conservation Act 2016.	DBCA	A fauna report will be submitted to DBCA 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 Biodiversity Conservation Act 2016 as a result of activities.
Australian Marine Mammal Centre Reporting Any ship strike incident with cetaceans will also be reported to the National Ship Strike database.	DoAWE	As soon as practicable.	Ship strike report provided to the Australian Marine Mammal Centre: https://data.marinemammals.gov.au/report/shipstrike
NOPSEMA reportable incident	Refer Section 11.8.3		
NOPSEMA recordable incident	Refer Section 11.8.3		
After the Activity			
Submit an end-of-activity EP Performance Report to NOPSEMA, in accordance with Regulation 26C(c) of the OPGGS(E).	NOPSEMA	Submit to NOPSEMA within 3 months within three months of submission of each Regulation 29(2) end-of-activity notification to NOPSEMA. E.g. 3 months of decommissioning subsea	This reports compliance against each of the performance outcomes and standards as outlined in Section 11 of this EP and: • reportable and reportable incidents, investigation details, corrective actions determined and actioned • monitoring records • inspection/audit outcomes

Requirements	Recipient	Timing	Content
		equipment recovery completion.	• summary of the activity operations conducted. The total amount of waste disposed will be included in the environmental performance report (details on waste records are included in Section 11.5.2) As detailed in draft Section 270 NOPSEMA Advice - Consent to Surrender Title (NOPSEMA, 2021) the report will also cover: • demonstration that all conditions and obligations included in the EP have been met • evidence that assumptions, performance standards and measurement criteria have been met where applied to conditions or obligations • detail of any criteria or obligation that has not been met, and any changes to the conditions or obligations approved in the accepted EP • any variations from the accepted decommissioning operations and work plan • confirmation the control measures applied to manage the impacts and risks associated with an accepted deviation have been effective • any immediate consequences observed as a result of decommissioning operations and works.

Requirements	Recipient	Timing	Content
DoAWE Marine fauna observation data	DoAWE	Submit to DoAWE within 3 months of activity completion.	Provide marine fauna observation data to the DoAWE through their online Cetacean Sightings Application.
To provide, to the satisfaction of NOPSEMA, for the conservation and protection of the natural resources in the title area within 12 months after all the wells referred to in direction 1 are plugged or closed off to the satisfaction of NOPSEMA. In accordance with NOPSEMA General Direction (574) (A746447)	NOPSEMA	Within 12 months after all the wells referred to in direction 1 are plugged or closed off	The as-left survey report will be provided to NOPSEMA. Details of the scope and aim of the as-left survey is provided in Section 4.11. The End-of-activity EP Performance Report submitted to NOPSEMA, in accordance with Regulation 26C(c) of the OPGGS(E) will also include details and confirmation that the General Direction requirements (Section 2.1.2) have been met.
To make good, to the satisfaction of NOPSEMA, any damage to the seabed or subsoil in the title area caused by any person engaged or concerned in those operations within 12 months after all the wells referred to in direction 1 are plugged or closed off to the satisfaction of NOPSEMA. In accordance with NOPSEMA General Direction (574) (A746447) [1]	NOPSEMA	Within 12 months after all the wells referred to in direction 1 are plugged or closed off	The as-left survey report will be provided to NOPSEMA. Details of the scope and aim of the as-left survey is provided in Section 4.11. The End-of-activity EP Performance Report submitted to NOPSEMA, in accordance with Regulation 26C(c) of the OPGGS(E) will also include details and confirmation that the General Direction requirements (Section 2.1.2) have been met.

Note 1: Eni have determined that any damage to the seabed or subsoil in the title area is of Low risk, ALARP and acceptable (refer Section 8.1 and 8.9). The conservation and protection of the natural resources in the title area is not compromised (refer Section 11.5.4)

11.8.3 Incident Reporting (Reportable and Recordable)

11.8.3.1 Reportable Incidents

Under OPGGS(E) Regulation 16(c), 26 and 26A – Reportable Incident, NOPSEMA must be notified of any reportable incidents. For the purposes of Regulation 16(c), a reportable incident is defined as an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage.

For the Petroleum Activities Program, a reportable incident includes:

- oil spills of more than 80 L in Commonwealth waters
- an incident that has caused or has the potential to cause environmental damage with a consequence level of Local (3) or above (Table 7.2). This includes:
  - Introduction of IMS (Section 9.1)
  - Marine Diesel Spill to Sea (Section 9.5)

Table 11.5 details the reportable incident requirements.

Table 11.5: Reportable Incident reporting requirements

Requirement/Required Information	Timing	Type	Recipient
The oral notification must contain: • all material facts and circumstances concerning the reportable incident known or 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 2 hours after the first occurrence of a reportable incident, or if the incident was not detected at the time of the first occurrence, at the time of becoming aware of the reportable incident.	Oral	NOPSEMA
A written record of the oral notification must be submitted. The written record is not required to include anything that was not included in the oral notification.	As soon as practicable after the oral notification.	Written	NOPSEMA NOPTA
A written report must contain: • all material facts and circumstances concerning the reportable incident known or 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	Must be submitted as soon as practicable, and in any case not later than 3 days after the first occurrence of the reportable incident unless NOPSEMA specifies otherwise. Same report to be submitted to NOPTA and DMIRS within 7 days after giving the written report to NOPSEMA.	Written	NOPSEMA NOPTA

• 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.			

In addition, any injury or death of whales, dolphins or turtles related to the activity (e.g. vessel strike) must be reported immediately to DoAWE, as these species are protected under the EPBC Act.

In addition, as per the Woollybutt OPEP:

- Eni will contact DPIRD Response Officer within 24 hours after reporting to NOPSEMA an oil spill or discharge of any other pollutant into the marine environment
- Make the Director of National Parks (DNP) aware of incidences that occur within an Australian Marine Park (AMP) or are likely to impact and AMP as soon as possible.

11.8.3.2 Recordable Incidents

Under the OPGGS Act, a "recordable incident" for an operator of an activity is "a breach of an environmental performance outcome or standard that applies to the activity and is not a reportable incident".

Recordable incidents will be reported to the Regulatory Authority as per the OPGGS (E) Regulations (i.e. monthly report of recordable incidents sent by the 15th of the following month), including the submission of 'nil' reports if no environmental incidents have occurred.

11.9 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)
- incorrect disposal of wastes onshore by waste contractors.

11.10 Knowledge-Sharing and Health, Safety and Environment Communication

HSE communications include both internal communication to employees and external communication to stakeholders and is managed in accordance with ENI-HSE-PR-016 procedure *HSE Communications, Consultation and Participation*. Emergency Communications are described in the Emergency Response Plan (000036_DV_PR.HSE.0675.000). HSE commitments and obligations are established, recorded, maintained, communicated and managed within Eni in accordance with ENI-HSE-PR-006 procedure *Maintaining Knowledge of HSE Commitments and Obligations*.

11.10.1 Internal Communications with Eni Exploration and Production Division

Regular communications from the Eni Upstream Division regarding HSE matters include:

- guidelines for the establishment of annual HSE objectives
- requests of monthly, quarterly and annual reports
- documentation relevant to the establishment of budgetary provisions for HSE activities
- highlighted actions to improve certain objectives
- reports on HSE audits that may have taken place
- incident reporting and investigation and lessons learnt
- publication of HSE articles in the Company's publications
- distribution of the Policy, Procedures and other documents of the HSE Management System
- publication of Eni's annual Sustainability Report
- any other communication specific to a particular HSE event.

Eni Australia regularly communicates HSE performance information to Eni's Upstream Division via:

- monthly, quarterly and annual reports
- accident/incident reports and investigation
- Audit and Corrective Action close out status
- HSE Qualitative Report (Four Year Plan) (ENI-HSE-RP-011) and HSE Annual Plan (ENI-HSE-PL-031).

11.10.2 Internal Eni Australia Communications

Typical examples of key internal communication are:

- Weekly Management Meetings
- Activity Morning Calls
- Back-to-back Roster Handovers
- HSE Meetings
- Pre-start Meetings
- Safety Initiatives and Communications
- Management Safety Visits.

11.10.3 Non-Verbal Communication

In addition to the meetings described above there are a number of non-verbal means of communicating HSE issues within Eni, including:

- Eni intranet websites
- emails
- HSE noticeboards

The Eni Intranet site has an HSE page which contains links to:

- HSE IMS
- reporting forms
- incident and crisis management documentation
- Woollybutt Safety Case documentation
- Woollybutt Decommissioning Environmental Plan.

Emails are regularly used to communicate HSE issues with Eni. Typically, these would be:

- HSE Alerts. HSE Alerts are specific alert notices that arise from Hazard and Incident Reports, and are typically only considered for high potential incidents. The HSE Manager will decide on whether to issue an HSE Alert to inform the wider workforce.
- HSE Bulletins. Notices on HSE topics that need to be raised in the workforce can be done so using HSE Bulletins. They can focus on an HSE theme or just

raise a specific item of interest. The HSE Manager coordinates the development of new HSE Bulletins.

HSE Noticeboards are present in all Eni offices and plants. They function to inform the workforce about HSE issues. Regular items which are placed on the HSE noticeboards include:

- HSE Commitment Statement
- incident statistics
- Incident Descriptions
- audit reports
- Hazard Cards (for reporting hazards).

11.10.4 External Communications

External communication on HSE matters is typically made to a range of recipients including Governments (including government agencies and regulators), community groups, NGOs, customers, industry bodies, and the media (Table 11.6).

Table 11.6: External communication summary

External communication	Details on communication level
Government	Eni Australia's HSE communications with government authorities is undertaken according to legislative requirements and guidelines, or where none exist, best practice. Generally, HSE communications between Eni Australia and relevant government departments are carried out through the Eni Operations and HSE Departments. Records of key communications are maintained by the Eni relevant Department. The Managing Director may address communications with government bodies in certain circumstances (e.g. major accident investigation), in which case Eni upstream may also become involved.
Non-Government Organisations and Community Groups	HSE communication and consultation with NGOs and Community Groups will generally be coordinated by the HSE Department. Technical HSE communications to NGOs and Community Groups may be handled via an HSE specialist assigned to the particular project. Technical HSE communications may be undertaken by an HSE specialist.
Customers	Eni Australia actively engages with its customers, to ensure there is a common understanding of HSE issues as they are related to the supply of products. HSE communication with customers will generally be coordinated by the relevant department(s) with advice from the HSE Department.
Business and Industry Organisations	Eni is a member of the APPEA and the WA and NT Chambers of Commerce. Interaction with the business community also occurs in Eni's day to day business. Industry forums, such as the APPEA conferences and South East Asian & Australian Offshore Conference (SEAAOC) allow Eni to further communicate HSE aspects. HSE communication with Unions is coordinated by the Human Resources Department with advice from the HSE Department.
Media	Media liaison in relation to crisis and emergency situations are managed in accordance with the Eni Crisis Management Plan.
Public HSE Reporting	Eni Australia, through its corporate head company Eni Upstream, communicates externally to the public about Eni's significant HSE aspects through a public Sustainability Report. This report contains information on the HSE performance of Eni Divisions and Business Units, including Eni Australia. The Sustainability Report enables Eni to share its vision and commitment to sustainable development with its staff, all relevant stakeholders and the public. It is available on the Eni internet site (www.eni.it).

11.11 Management Review and Improvement

The HSE IMS is reviewed on a minimum five-yearly basis in association with risk assessment outcome and incident reviews for required changes. This review includes the review of any triggers requiring update to the HSE IMS (as detailed below), as well as general business planning outcomes and assessments of the effectiveness of performance standards. The review also documents actions and requirements for items,

including the review and update of procedures and systems as identified in the HSE IMS review.

The HSE IMS review also incorporates feedback from the public and Regulators with respect to performance and expectations.

The changes that may initiate review of the HSE IMS include:

- legislative changes, including changes to the regulatory regime (such as modification to Pipeline Licence conditions)
- advancement in technology
- significant changes arising from hazard/event investigations to prevent recurrence
- significant changes due to complaints and changing community expectations
- significant changes/improvements identified from various risk assessments, including ongoing hazards and operability, hazard identifications, job hazard analyses and other hazard identification processes
- significant changes in activities (methodology in work processes)
- significant changes in organisation structure, business policies and objectives
- significant changes resulting from monitoring HSE key performance indicators
- remedial actions from audits.

11.11.1 HSE Management Review

A formal management review is conducted yearly to assess overall implementation of the HSE IMS as per the procedure *HSE Management Review* (ENI-HSE-PR-014). Areas in need of reinforcement are identified and as a result the elements of the system that need to be reinforced are highlighted. Action plans and responsibilities are agreed to improve risk management and the overall HSE performance of Eni Australia.

This includes reviews of the:

- changes in:
  - external 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 on environmental performance, including trends in:
  - non-conformities 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 Australian marine parks)
- advances in relevant environmental technology and new scientific information.

Reviews of oil spill arrangements and testing are carried out in accordance with the Woollybutt OPEP (000105_DV_PR.HSE.1045.000).

11.11.2 Continuous Improvement

Continuous environmental improvement of performance within Eni is driven by a number of mechanisms, which include:

- corporate initiatives
- auditing (see Section 11.6)
- hazard and incident reporting (see Section 11.8.2 and Section 11.7)
- incident investigation (see Section 11.7)
- HSE data monitoring and reporting (see Section 11.5).

Reporting of incidents and the monitoring of this data draws Management's attention to trends resulting from potential weaknesses. Thorough investigation of incidents can be used to alert Management to system failures.

HSE auditing can uncover system failures before incidents occur. Auditing, reporting and monitoring can notify Management of a deficiency in the HSE IMS or of a problem with implementation of the HSE IMS.

Eni is responsible for implementing an ongoing process to identify and assess suitable measures for improving plant reliability and availability, plant safety levels and for reducing maintenance activities workload and material costs.

11.12 Management of Change and Reviews of this Environment Plan

Change is managed in accordance with the Eni Australia *Management of Change* (MOC) *Procedure* [ENI-HSE-PR-002].

The *Management of Change Procedure* applies to changes in operational assets, systems, processes, operations, products, organisation and staffing that have the potential to alter hazard or risk levels, or affect environmental outcomes, including compliance with applicable laws or standards, or to significantly affect a stakeholder involved with the above items. Standard modifications or changes that occur within existing work processes (such as Permit to Work system) or are of a routine nature are not included in this procedure. Descriptions of changes where this procedure applies are listed in Table 11.7.

Table 11.7: Example of changes (HSE-critical) to which the MOC procedure applies

Type of change	Explanation
Changes to design or operating conditions	• Alteration to critical design or key assumptions operating data. • Change in composition and/or rate of feed or products. • Alternative type or manufacturer of workplace substances. • Operating outside design or manufacturer's recommendations.
Deviations from critical procedures	Deviations from: • Work Management Procedures • Critical Operating Procedures • Critical Maintenance Procedures.
Critical non-routine operations	Critical non-routine operations, with potential for significant risk (not covered by an existing critical procedure) managed with special preparation and procedures to ensure positive control.
Statutory-approved processes	Changes to operations, drilling or seismic programs approved through Safety Cases, EPs or Oil Spill Contingency Plans, or other statutory processes.
Changes in engineering	Where equipment being replaced is not 'like for like'. Design changes for improvements in equipment/process.
Major plant and equipment tests	Includes tests which could: • result in operating outside normal operating limits • adversely affect product quality • breach regulatory limits • require isolation of safety or shutdown systems • result in major equipment or plant shutdown • create an additional hazard or increase in risk • cause a change in risk profile.
Software changes	Permanent changes to alarm and shutdown settings. Permanent changes to control software, logic or configuration changes.
Systems changes	Changes to existing work systems and procedures that manage HSE risks or hazards.
People/organisation changes	Changes, introduction of removal of key personnel, work groups or functions within the business.

Potential changes in risk originating from external factors may lead to EP reviews. Changes which may lead to an EP review may include:

- those concerning the scope of the activity description (Section 4)
- advances in technology
- new scientific information
- changes in understanding of the environment, such as advice on species protected under EPBC Act and current requirements for Australian marine parks (Section 5)
- potential new advice from external stakeholders (Section 6). These will be reviewed in regard to Regulation 17 of the OPGGS(E) Regulations.

External factors which may lead to EP review are identified through a number of means, including:

- internal knowledge sharing and HSE communication (Section 11.10)
- internal communications
- HSE Management Review (Section 11.11.1)
- non-verbal communications
- external communications.

If a review of the activity and the environmental risks and impacts do not trigger a requirement for a revision, the change is considered minor. Minor change will be considered a 'minor revision', under Regulation 17 of the OPGGS(E) Regulations. Minor administrative changes to this EP, where an assessment of the environmental risks and impacts is not required (such as document references and 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.

In accordance with the requirements of Regulation 19 of the OPGGS(E) Regulations, Eni will submit a proposed revision to this EP to NOPSEMA at least 14 days before the end of each period of five years, commencing on the day on which the original and subsequent revisions of the EP is accepted under Regulation 11 of the OPGGS(E) Regulations.

Regulation 23 Petroleum Pipelines (Environment) Regulations 2012 requires the Woollybutt OPEP (000105_DV_PR.HSE.1045.000) to be revised every two and a half years.

Management review (Section 11.11) may trigger a review of the EP and internal reviews will address matters such as the overall design and effectiveness of the EP, progress in environmental performance, changes in environmental risks, changes in business conditions, and any relevant emerging environmental issues or change in understanding of the environment (such as protected matters requirements). Reviews may also trigger adoption or reconsideration of once-rejected controls within the EP.

This EP will be revised and resubmitted to NOPSEMA:

- if/when an environmental inspection/audit (see Sections 11.6.1 and 11.6.2) finds significant breaches of the EP requirements
- if any significant new environmental risk or effect, or significant increase in an existing environmental risk or effect, occurs that is not provided for in the existing EP as required by OPGGS(E) Regulation 17.

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

A review of the EP will be undertaken prior to subsea equipment removal activities to ensure that risks remain ALARP and are pertinent to the activity. This will include review of impacts, risks and controls. Any relevant findings or information gathered from other Eni activities under this EP will be taken into account.

Post review of the EP, the findings may identify new impacts or trigger a review impacts and risks associated with upcoming activities (both included within this EP or within other EPs). The process will identify or review controls to ensure impacts and risks remain/are reduced to ALARP and acceptable levels. New controls may be added that were previously excluded as part of the ALARP assessment. Any changes will be managed by the MOC process.

11.13 Dangerous Weather Response

Tropical cyclones and other storm conditions have the potential to cause damage to personnel, the environment and equipment. ENI-HSE-ST-031 Standard Adverse Weather includes procedures for preparing for and responding to cyclone events. The response goal during a cyclone event is to ensure protection of personnel, the environment, equipment and the subsea equipment integrity, and the corresponding priorities include:

- securing any subsea equipment in the process of being moved
- vessel(s) sail away to sheltered location
- evacuating personnel.

Eni utilises experienced weather service providers such as the Bureau of Meteorology (BOM) and Weatherzone to provide up to date location specific forecasts. Eni utilises specifically tailored services for its real-time forecasting and severe weather forecasting capabilities. They advise key Eni personnel of any severe weather or potential severe weather to support our operations and strategic planning. The Decommissioning Coordinator must ensure that he/she receives email notification of cyclones from the provider. This includes:

1. Tropical Cyclone seven day lookout
2. Tropical Cyclone forecast

The IV and support vessels will receive daily forecasts from a weather forecast provider. In the event that the cyclone (or severe weather) is forecast and it has the potential to affect the activities, the cyclone management plan will be actioned. If required, vessels can transit from the proposed track of the cyclone (or severe weather).

11.14 Oil Pollution Emergency Plan

11.14.1 Overview

The environmental risk assessment for subsea equipment recovery identified one potential spill scenario:

- vessel collision resulting in fuel tank rupture and release of diesel -maximum volume 500 m³) (Section 9.5)
- outboard leaks of hydraulic fluids (e.g. ROVs) hydraulic fluid spill – maximum volume of 5 L (Section 9.6).

The requirements of the Woollybutt OPEP (000105_DV_PR.HSE.1045.000) and the location of the information required is given in Table 11.8.

Table 11.8: OPEP requirements

Regulation	Description	Location
14 (8)	The implementation strategy must contain an oil pollution emergency plan and provide for the updating of the plan.	Woollybutt OPEP (000105_DV_PR.HSE.1045.000))
14 (8AA)	The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following:	-
(a)	the control measures necessary for timely response to an emergency that results or may result in oil pollution;	Woollybutt OPEP (000105_DV_PR.HSE.1045.000)
(b)	the arrangements and capability that will be in place, for the duration of the activity, to ensure timely implementation of the control measures, including arrangements for ongoing maintenance of response capability	Woollybutt OPEP (000105_DV_PR.HSE.1045.000)
(c)	the arrangements and capability that will be in place for monitoring the effectiveness of the control measures and ensuring that the environmental performance standards for the control measures are met;	Woollybutt OPEP (000105_DV_PR.HSE.1045.000)
(d)	the arrangements and capability in place for monitoring oil pollution to inform response activities.	Woollybutt OPEP (000105_DV_PR.HSE.1045.000)
14 (8A), (8B0 and (8C)	The implementation strategy must include arrangements for testing the response arrangements in the oil pollution emergency plan that are appropriate to the response arrangements and to the nature and scale of the risk of oil pollution for the activity.	Section 11.14.2
14(8D)	The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that: (a) is appropriate to the nature and scale of the risk of environmental impacts for the activity; and (b) is sufficient to inform any remediation activities.	Section 9.8 as well as Section 3.5 of the Woollybutt OPEP (000105_DV_PR.HSE.1045.000)
14(8E)	The implementation strategy must include information demonstrating that the response arrangements in the oil pollution emergency plan are consistent with the national system for oil pollution preparedness and response.	Section 2 of the Woollybutt OPEP (000105_DV_PR.HSE.1045.000)

11.14.2 Arrangements for Testing the Oil Pollution Emergency Plan

Arrangements for testing the response arrangements are summarised in Table 11.9.

Table 11.9: Testing requirements and arrangements

OPGGS(E) Requirements	Description
As per Regulation 14(8B) of the OPGGS(E)R 2009, the arrangements for testing the response arrangements must include:	
A statement of the objectives of testing	SOPEP testing provides an opportunity for crew to gain confidence in using onboard spill equipment and implementing incident response procedures, increase efficiency in the event of an emergency, review the efficiency of procedures and detect any failures in equipment.
	Testing will be organised in accordance with the Professional Operating Instruction for Planning and Execution of Emergency Drills, including setting an objective for the emergency drill. Testing oil spill preparedness is carried out against defined oil spill preparedness performance objectives and standards which are provided in the OPEP. Testing of will also ensure that the timings presented in the OPEP are able to be met, that contracts are in place and contractors have maintained their response capabilities as per the contract.
A proposed schedule of tests	Regular drills and exercises (three monthly) are carried out on all vessels in line with IMO/SOPEP. These drills include, but are not limited to, spill response, collision and grounding, fire and explosion and helicopter emergency.
	A desk based OPEP exercise will occur prior to the subsea equipment recovery commencing.
Mechanisms to examine the effectiveness of response arrangements against the objectives of testing	In particular: • issues raised (if any) will be described in daily report • weekly checklist ensures that spill monitoring equipment is in place and fully stocked • rudiments described for the review of the EP and OPEP • requirements described for testing below.
Mechanisms to address recommendations arising from tests	As mentioned, issues raised (if any) resulting from testing will be described in daily report. The Vessel Master is made aware that the change is managed to the OPEP and this EP through MoC described in Section 11.12.
As per Regulation 14(8C) of the OPGGS(E)R 2009, the proposed schedule of tests must provide for the following:	
Testing the response arrangements when they are introduced	A SOPEP drill onboard all vessels will be carried out prior to the commencement of the activity.
	A desk based OPEP exercise will occur prior to the subsea equipment recovery commencing.

OPGGS(E) Requirements	Description
Testing the response arrangements when they are significantly amended	Any changes to the OPEP or EP will be introduced through the MOC described in Section 11.12. Where changes reasonably affect the arrangements in place, the changed arrangements will be tested prior to finalising the MoC.
Testing the response arrangements not later than 12 months after the most recent test	SOPEP drills will occur every three (3) months.
	A desk based OPEP exercise will occur prior to the subsea equipment recovery commencing.
If a new location for the activity is added to the EP after the response arrangements have been tested, and before the next test is conducted—testing the response arrangements in relation to the new location as soon as practicable after it is added to the plan	No activity will occur outside the Operational Area described in Section 4.3.
If a facility becomes operational after the response arrangements have been tested and before the next test is conducted—testing the response arrangements in relation to the facility when it becomes operational	Not applicable.

12 FINANCIAL ASSURANCE

Eni has calculated the level of Financial Assurance required for the activities described in this EP in accordance with the 2018 APPEA Method (Appendix F).

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APPENDICES

APPENDIX A:

ENI HEALTH, SAFETY AND ENVIRONMENT STATEMENT

health safety & environment statement

Eni Australia Ltd, in its natural resources and energy evolution activities is committed to providing a safe work place, safe systems of work, a competent workforce and a culture conducive to exercising prudent Health, Safety and Environment (HSE) practices and behaviours.

This commitment statement applies to all operational activities undertaken by Eni Australia Ltd, including activities carried out by our contractors.

Eni Australia Ltd will:

- Provide a safe and healthy workplace for the prevention of worker related injury and ill health.
- Set objectives and targets to ensure continual improvement in overall HSE performance.
- Comply with relevant legislation and other obligations, or apply company standards where laws and regulations do not exist.
- Assess and manage HSE risks across the business life cycle.
- Adopt high management and technical standards to prevent and mitigate major accidents associated with process safety events.
- Include HSE performance in appraisal of staff and contractors.
- Respect the environment and prevent pollution by actively monitoring and managing emissions, effluents, discharges and other impacts on the environment.
- Endeavour to reduce greenhouse gas emission intensity, fugitive emissions and process flaring as part of our climate strategy.
- Provide systems, resources and skills to maintain emergency response capabilities.
- Consult with stakeholders, local communities and public interest groups, workers and their representatives.
- Remain committed to sustainable development and the welfare of our host communities, and
- Promote HSE best practice in all our activities.

All staff and contractors at Eni Australia Ltd have a personal responsibility to support this HSE Statement and are encouraged to openly report any HSE issue or concern. In addition, everyone is obliged to intervene in unsafe acts or conditions to prevent injury, environmental impact or damage to assets.

Managing Director _____
Ernie Delfos

Date 10 August 2020

eni australia

APPENDIX B:

EXISTING ENVIRONMENT

Contents

1 DESCRIPTION OF THE ENVIRONMENT

This Appendix supplements Section 4 of the EP and describes the environment within the Operational Area. It includes details of the relevant values and sensitivities of the environment as required by the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and State Western Australian Petroleum (Submerged Lands) (Environment) Regulations 2012.

Searches for protected species listed under the EPBC Act were undertaken on 4 and 5 July 2021 for the Operational Area and Zone of Potential Impact (ZPI) (refer to Section 1.6) respectively, using the DoAWE Protected Matters Search Tool for the purpose of identifying matters of national environmental significance listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This document is informed by this search. Descriptions of all fauna are provided, with a focus on protected species that are threatened and migratory.

1.1 Physical Environment

1.1.1 Climate

The climate of the NWMR is subtropical with moderate winters and very hot summers. Climate statistics provided in this section are derived from recordings at Barrow Island (between 1967 and 2000). Barrow Island is located approximately 40 km to the east of the Operational Area. Daily temperatures in summer (December to March) range from 24 °C to 35 °C. Winter (June to August) daily temperatures range from 17 °C to 26 °C (Figure 1-1) (BOM, 2017).

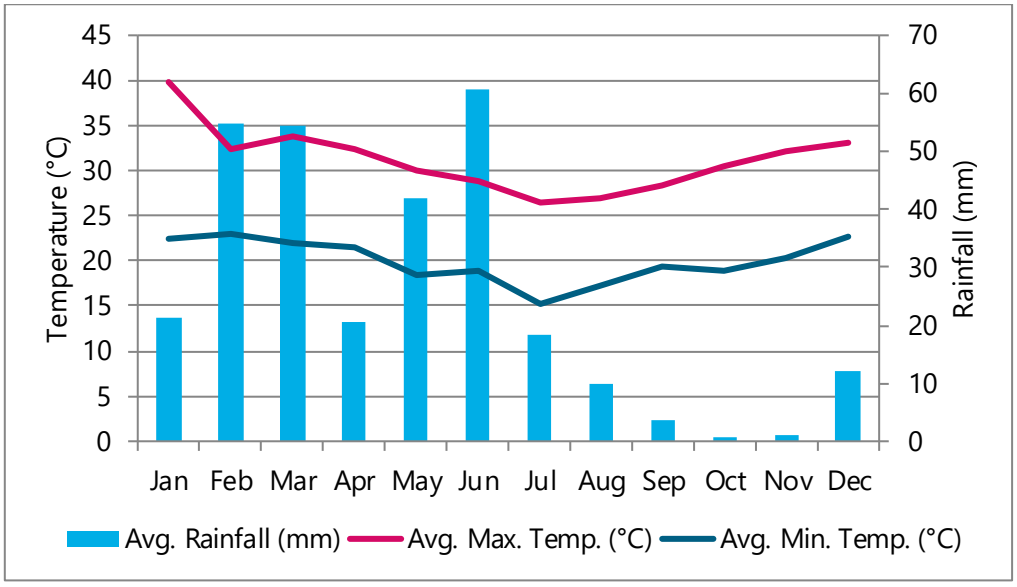

Figure 1-1: Mean monthly average maximum and minimum temperature and mean rainfall from 1967 to 2000 at Barrow Island (BOM 2017)

1.1.2 Rainfall

The region experiences low rainfall, with an annual average of 306 mm. The highest rainfall generally occurs from January to April, associated with tropical cyclones, and

then from May to June, associated with winter weather systems. On average, two tropical cyclones each year are expected to affect the Operational Area each year. However, this number is highly variable.

1.1.3 Wind Pattern

During October to March, winds are predominantly south-westerly or southerly in the morning, tending more westerly in the afternoon. The strongest prevailing winds are generally experienced between October and January, with wind speeds often ranging between 25 and 40 km/hr. During May to July, winds are mainly easterly, sometimes swinging southerly in the afternoon.

April is a transitional period when the winds are light and variable (mostly less than 20 km/hr). Wind direction is southerly or south-easterly in the morning, turning either north-easterly or south-westerly in the afternoon. August is the second transitional period of variable winds with directions generally southerly or south-easterly in the morning, with south-westerly or north-easterly winds in the afternoon. Hurricane-force winds associated with cyclones within the region can reach speeds of up to 240 km/h.

1.1.4 Bathymetry

The bathymetry of the NWMR is defined in four zones, each characterised by different water depths and geomorphic features. These zones include the inner continental shelf, middle continental shelf, the continental slope/outer shelf and the abyssal plain. Water depths range between 0 to 30 m within the inner continental shelf area, increasing from 30 to 120 m along the middle continental shelf. The continental slope/outer shelf area features depths greater than 120 m and gradients between 5 and 20 degrees representing a paleo-shoreline.

The water depth in the Operational Area is approximately 100 m. To the north-west, the water deepens gradually across the outer continental shelf before falling more steeply to form the continental slope. To the east, the seafloor shallows slowly before rising to form the shoals and islands that include Barrow Island and the Montebello Islands, located approximately 35 km and 65 km to the north-east respectively. Further east and to the south, the seafloor rises towards the shallow waters and shoreline of the Exmouth Peninsula and Pilbara Coast.

1.1.5 Oceanography

The major surface currents in the Region flow polewards, away from the equator. Their waters are warm, have low salinity and are oligotrophic (low in nutrients). The major surface currents influencing the Region include the Indonesian Throughflow, the Leeuwin Current, the South Equatorial Current and the Eastern Gyral Current (Figure 1-2). In addition, the Ningaloo Current, the Holloway Current, the Shark Bay Outflow and Capes Current are seasonal surface currents in the Region (Commonwealth of Australia, 2012). The effect of these currents is described in subsequent sections of this chapter.

Water circulation in the Northwest Shelf Province is highly seasonal. During winter, when the southern flow of the Throughflow is greatest, it dominates the water column. During summer when the Throughflow is weaker, strong winds from the southwest cause

intermittent reversals of the currents, which may be associated with occasional weak upwellings of colder, deeper water onto the shelf. The Ningaloo Current is also thought to intrude into the southern part of this bioregion during summer, flowing through the Operational Area towards the north as far as Barrow Island.

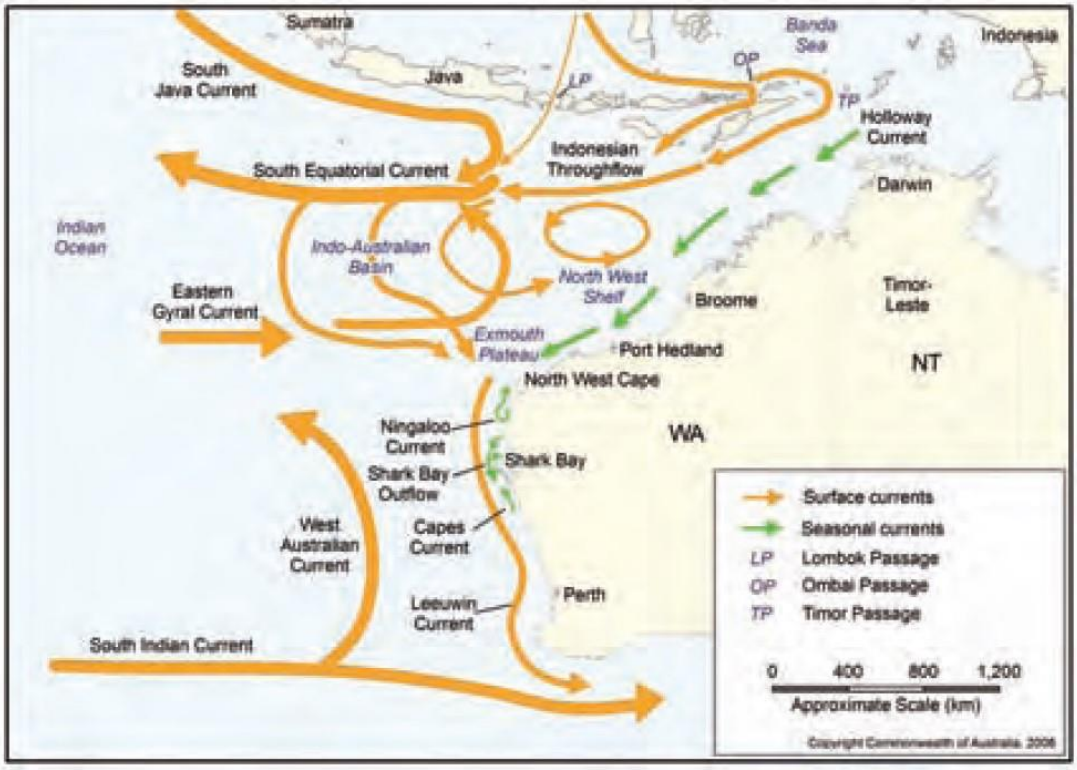

Figure 1-2: Surface currents in the North-West marine region

Tides are semi-diurnal with ranges of about 1 m on neap tides, increasing to 2.5 m on spring tides (AEL, 2010). Tidal movement is generally east-west at 0.1 m/s (AEL, 2010). In contrast to tidal currents, surface wind-driven currents range up to 0.8 m/s. Internal waves in the lower water column may have speeds of up to 0.7 m/s, and currents of up to 0.3 m/s can be encountered near the bottom.

Internal tides, although generated primarily around the shelf break, may have an influence in this bioregion as the crests of internal waves radiate onshore from the shelf break as far as the stratification of the water layer extends. When internal waves break they can cause mixing of more nutrient-rich water within the photic zone, which may in turn result in a burst of biological productivity.

Cyclones are another significant physical driver in this bioregion. The North West Shelf experiences an average of four cyclones each year, two of which make landfall. Cyclone-generated storm currents can cause significant sediment movement on the seafloor as well as vertical mixing of the water column. While cyclones can be very influential at the local scale, the overall contribution of cyclones to regional biological productivity is considered to be low.

Swell waves consistently propagate from the southwest, generated by distant storms (Chevron Australia, 2005), with heights of up to 2 m, rising to 3 m during the winter.

Extreme swell conditions of greater than 8 m can be encountered during cyclones. Short period waves (1–10 seconds) propagate from the southwest in summer and the east in winter at heights of less than 2 m, but this can increase and the direction change during storms. The largest seas (greater than 2 m) occur during winter (Chevron Australia, 2005).

Water temperatures in the vicinity of the field vary due to seasonal conditions and depth. Temperatures close to the sea surface range from 22°C to 31°C, typical of tropical waters in this region (Chevron Australia, 2005). Temperatures close to the seafloor will be lower.

The offshore waters in the vicinity the Operational Area are relatively clear. As with most of the waters off WA, the ocean in the region is oligotrophic, with very low nutrient and phytoplankton levels (Commonwealth of Australia, 2012). Turbidity increases in summer, mainly due to the increase in plankton load. However regional scale events, such as flooding associated with cyclonic rainfall, may cause occasional periods of increased turbidity.

1.1.6 Geomorphology and Geology

There have been four geophysical and ROV surveys in the Woollybutt Field undertaken in August 2001 (URS, 2001), June 2005 (Fugro, 2005), August 2014 (Neptune, 2014) and most recently in 2016.

The URS survey in 2001 showed that the seabed slopes gently down towards the west at a gradient of 1:1000 before dropping away more steeply beyond the western edge of the Operational Area. It also reports that the thickness of the surficial seafloor sediments varied between 0.9 and 5.1 m with approximately 85% of the area having a thickness of <4 m. This layer was interpreted as comprising soft to very soft very silts and fine sand, which are easily disturbed and pock marked by occasional burrows. The underlying layer was interpreted as comprising variably cemented sands or calcarenite.

1.2 Key Marine Habitats

1.2.1 Regional Overview

Primary productivity in the Northwest Shelf Province is thought to occur predominantly in pelagic environments, where phytoplankton plays an important primary producer role, rapidly multiplying when nutrients become available. Although the region has generally low productivity, there are pockets of high species richness and diversity, in particular at the tropical reef sites, such as Ningaloo Reef and around Barrow Island and the Montebello Islands.

The marine habitat within the Operational Area mainly consists of soft sediment and epibenthic flora and fauna, as described below. The broader region also contains a diverse range of other habitats, including, seagrasses, hard corals, mangroves, intertidal mudflats and sandflats, sandy beaches and rocky shores.

1.2.1.1 Benthic Communities

The Operational Area comprises of soft sediment habitat in deep water. Unconsolidated sediments support benthic fauna living both in the sediments (infauna) and on the surface (epifauna). In shallow areas soft sediments also support seagrass. However, there is no seagrass habitat in the Operational Area due to its depth. Predominant infauna species in soft sediment habitats are mobile burrowing species including molluscs, crustaceans (crabs, shrimps and smaller related species), polychaetes, sipunculid and platyhelminth worms, asteroids (sea stars), echinoids (sea urchins) and other small animals. Surface species include small crustaceans and molluscs, echinoderms and larger sessile organisms such as sponges, corals, sea whips and sea squirts (DEC, 2006).

Beyond the Operational Area, soft sediment habitats and the infauna are widespread in deeper offshore areas and in more protected inshore environments throughout the ZPI (CALM & MPRA, 2005; DEC, 2006).

1.2.1.2 Epibenthic Flora and Fauna

URS (2001) reports that biota on the seafloor of the Operational Area includes sponges, gorgonians (sea whips and sea fans), soft corals, crinoids (feather stars), ophiuroids (brittle stars), crustaceans (e.g. hermit crabs) and bryozoans (lace corals). The predominant infauna recovered from sediment samples were burrowing and tube-dwelling polychaete worms, brittle stars, gastropods and bivalves (molluscs) and amphipods (crustaceans).

Overall the density of sessile fauna was found to be low, with the larger organisms (feather stars, soft corals and fan corals estimated at occur at a density of approximately 1 per 10 m² for crinoids to 1 per 100 m² for soft corals and less for other species. Burrows, probably occupied by shrimp and gobioid fish, occurred more frequently, but patchily, with a density estimated at between 1 and 5 /m², while small worm tubes were more common.

Surveys undertaken at night showed a marked diurnal pattern in fauna, with small fish, shrimps, mantis shrimps and hermit crabs on or immediately above the seafloor. Larger fish were also more active in the late afternoon and night, as shown by the number of fish observed around the suspended Woollybutt WHs (URS, 2001).

The more recent survey in 2014 (Neptune, 2014) focussed on marine growth on the subsea infrastructure. Sparse to patchy coverage was found on the wells WB1A, WB2A and WB4 Xmas trees, consisting of hydroid/bryozoan turf, barnacles and encrusting sponges. Growth on well SB1 was denser, consisting of moderate to dense coverage of hydroids and bryozoans and included barnacles, sponges and gorgonians (sea fans). The diversity of marine growth observed on or adjacent to the subsea flow-lines was similar across all locations with varying densities observed along the length of individual flow-lines. Marine growth was observed to occur on buried, partially buried and exposed sections of the subsea flow-lines. Growth observed on or adjacent to the subsea flow-lines of the Woollybutt Field included hydroids, bryozoans, soft corals, sponges, gorgonians (sea whips and sea fans), ascidians and other filter feeders.

Soft-bottom substrates, of the Operational Area are similar to those found in other areas of the NWMR such as the Joseph Bonaparte Gulf and along the Pilbara coast. Soft sediments of the NWMR occur in the wider region and support seagrasses, muddy infaunal communities, and deep sessile communities of filter and deposit feeders in the abyssal plains (Commonwealth of Australia, 2012).

1.2.1.3 Coral Reef

Across the NWS, corals tend to occur in relatively shallow areas with strong currents where water movement provides a constant supply of nutrients and particulate food. Hard (Order Scleractinia) and soft (Order Alcyonacea) corals are unlikely to be present within the Operational Area due to the water depth being too great to support zooxanthellae and a lack of hard substrate for coral recruitment.

Coral reefs are known to occur within the wider region are unlikely to occur within the Operational Area. Notable coral habitat within the wider region include (approximate distance and direction from the closest point of the Operational Area in brackets):

- Montebello Island group (70 km north-east)
- Barrow Island (40 km north-east)
- Ningaloo Coast World Heritage Area (WHA) (incl. Muiron Islands) (100 km south-west).

The closest significant coral reefs to the Operational Area are found fringing the Barrow/Montebello Island groups, Muiron Islands and Ningaloo reef. Significant coral spawning occurs in autumn for a number of species, although some taxa such as Porites and Acropora spp. may spawn in spring and summer (Baird *et al*., 2011; Rosser and Gilmour, 2008). Mass spawning events have been observed along the Ningaloo Coast during March in the North and in April in the South (Gilmour *et* al., 2010).

Further information on sensitive locations with coral reef habitats is provided in Section 1.5.

1.2.1.4 Seagrass Beds and Macroalgae

Seagrasses typically grow in soft sediments in water depths between 2 m and 10 m where there is sufficient light to support photosynthesis. Seagrasses are important primary producers in tropical in-shore waters as they provide energy and nutrients for detrital grazing food webs. They are also directly grazed by protected animals such as dugongs and green turtles, and provide refuge areas for fishes and invertebrates (DEC, 2006).

Seagrasses do not occur within the Operational Area due to its water depth precluding light penetration to the sea floor.

Macroalgae generally attach to hard substrates although some species such Caulerpa, Halimeda, Udotea and Penicillus can anchor in soft sediments or attach to shell fragments. Macroalgae are important primary producers and support diverse and abundant fauna of small invertebrates that are the principal food source for many in-shore fish species.

Macroalgae does not occur on the benthic substrate within the Operational Area, due to water depth and lack of hard substrate on which to attach.

1.2.1.5 Mangroves

Mangroves are productive coastal forest systems, providing habitat and shelter for infauna, epifauna and gastropods, and are important nursery areas for fish, lobster and prawn species. Mangroves may also provide shelter for other species such as juvenile turtles (DEC, 2007a). Ospreys (*Pandion haliaetus*) and white-bellied sea eagles (*Haliaeetus leucogaster*) roost in mangroves, while brahminy kites (*Haliastur indus*) and a range of smaller birds nest in them (DEC, 2007a). Mangroves are also recognised for their capacity to protect coastal areas from erosion due to storms and storm surge.

Mangrove communities in the NWS represent Australia's only 'tropical arid' mangroves (Pedretti and Paling, 2000). WA does not support any unusual, endemic or restricted mangrove species and all mangrove species within WA are common and widespread elsewhere in Australia or in the Indo-pacific region.

Mangroves do not occur in the Operational Area. The closest mangrove locations are as follows (approximate distance and direction from the closest point of the Operational Area in brackets):

- Barrow Island (40 km north-east)
- Ningaloo Coast (100 km south-west).

1.2.1.6 Sandy Beaches

Sandy beaches provide habitat for a variety of burrowing invertebrates and subsequently provide foraging areas for seabirds. Sandy beaches can also provide turtle nesting habitat, particularly at the Barrow/Montebello/ Lowendal islands and Ningaloo Coast (see Section 1.3.2).

Sandy beaches do not occur in the Operational Area. The closest sandy beaches are as follows (approximate distance and direction from the closest point of the Operational Area in brackets):

- Montebello Island group (70 km north-east)
- Lowendal Island group (70 km north-east)
- Barrow Island (40 km north-east)
- Ningaloo Coast (incl. Muiron Islands) (85 km south-west).

1.2.1.7 Spawning, Nursery, Resting and Feeding Areas

Spawning, nursery, resting and feeding grounds are critical habitats for conservation and vary for each species. Biologically Important Areas (BIAs) have been designated for species occurring in the Operational Area. These are discussed further in subsequent sections of this appendix.

1.2.1.8 Migration Corridors

Seasonal migration of cetaceans, whale sharks, seabirds, shorebirds and other marine species occurs through migration corridors for spawning, nursing and feeding purposes. Migration corridors for protected species passing within the Operational Area are detailed in Section 1.3.

1.2.1.9 Plankton

Plankton within the Operational Area is expected to reflect the conditions of the wider NWMR.

Phytoplankton is a source of primary productivity in the region and is largely driven by offshore influences. Periodic upwelling and cyclonic events drive coastal productivity and nutrient cyclin. Zooplankton in the region may include organisms which remain as plankton for their entire life cycle (e.g. copepods) in addition to larval stages of other taxa such as fish, coral and molluscs. Zooplankton biomass can peak at certain times of year through coral mass spawning events and fish spawning seasons.

1.3 Threatened and Migratory Species and ecological communities

1.3.1 Marine Mammals

Threatened and migratory marine mammal species within the Operational Area are listed in Section 4.3 of the EP. Details on the species identified are included below.

1.3.1.1 Blue Whale (Endangered/Migratory)

Two subspecies of blue whale are recorded in Australian waters; the southern (or true) blue whale (Balaenoptera musculus intermedia) and the pygmy blue whale (Balaenoptera musculus brevicauda). Southern blue whales are believed to occur in waters south of 60°S and pygmy blue whales occur in waters north of 55°S (i.e. not in the Antarctic) (DEWHA, 2008). By this definition all blue whales in waters from Busselton to the Northern Territory border are assumed to be pygmy blue whales, and are discussed below.

Pygmy blue whales have a southern hemisphere distribution, migrating from tropical water breeding grounds in winter to temperate and polar water feeding grounds in summer (Bannister *et al.*, 1996; Double *et al.*, 2014). The Western Australian migration path takes pygmy blue whales down the Western Australian coast to coastal upwelling areas along southern Australia (*Gill, 2002*) and south at least as far as the Antarctic convergence zone (Gedamke *et al.*, 2007).

The northern migration passes the Perth Canyon from January to May and north bound animals have been detected off Exmouth and the Montebello Islands between April and August (Double *et al.*, 2012, *McCauley & Jenner, 2010*). During the southern migration, pygmy blue whales pass south of the Montebello Islands and Exmouth from October to the end of January, peaking in late November to early December (Double *et al.*, 2012).

A species recovery plan has been prepared for the blue whale which provides details of their distribution in Australian and potential threats, which include climate variability, noise interference and vessel disturbance (Commonwealth of Australia, 2015).

The BIA for pygmy blue whales, shows that the Operational Area lies within their distribution range. It is during their bi-annual migrations between north and south that pygmy blue whales may pass through the Operational Area, widely distributed and in low numbers.

1.3.1.2 Humpback Whale (Vulnerable/Migratory)

Humpback whales (*Megaptera novaeangliae*) have been observed in all oceans worldwide, and are considered the most common baleen whale species in Australia during the Austral winter. They were listed as vulnerable due to their small population size following unsustainable historic whaling practices (Threatened Species Scientific Committee, 2015).

Humpback whales have migration patterns similar to those of blue whales, with seasonal migration through the waters of northwest Australia, from Antarctic summer feeding grounds to winter calving grounds off the Kimberley coast. Southern migration from the calving grounds peaks from late-August to early September but can extend to as late as November in some years (Jenner *et al.*, 2001).

The migration path usually stays within 50 km offshore south of Shark Bay and extends to up to 100 km offshore in the Kimberley region (DoEE, 2017). The southward migration path is typically closer to the coastline (generally in waters less than 200 m water depth), through some areas identified as important corridors which include the coastal waters off Geraldton and around the Abrolhos Islands (more than 800 km away), as well as the coastal area from Point Cloates, at the base of the Ningaloo Coast, extending toward the North West Cape (Jenner *et al.*, 2001). Considering the steadily-increasing humpback whale population size in WA, it is possible that humpback whales may travel through the Operational Area in small numbers during the migratory season. The Operational Area lies within the BIA for humpback whales migratory distribution range (DoEE, 2017b).

1.3.1.3 Sei Whale (Vulnerable/Migratory)

The Sei whale (*Balaenoptera borealis*) has a patchy and wide-ranging distribution, favouring deep, offshore habitat more than other large whale species. During the summer they are found between latitudes of 40° to 50° south, and lower winter latitudes are unknown (DotE, 2016b). As Sei whales are not often found near the coastline, the species is infrequently recorded in Australian waters. There is currently no BIA for the sei whale (DoEE, 2016b). As they prefer higher latitudes and colder waters, it is considered unlikely that significant numbers of the species will be present in the Operational Area.

1.3.1.4 Fin Whale (Vulnerable/Migratory)

Fin whales *(Balaenoptera physalus)* inhabit offshore waters from tropical to polar regions worldwide. They have been recorded in small numbers in the waters off Western Australia, South Australia, Victoria and Tasmania. As there is a lack of recorded sightings

in Australia, abundance and distribution in Australia has been interpolated primarily from whaling records and stranding events. It is likely that fin whales migrate between Australian waters and Antarctic and subantarctic feeding areas and tropical breeding areas in Indonesia (DotE, 2016c). There is currently no BIA for fin whales (DoEE, 2016b). Based upon the low numbers of sightings in the Operational Area, it is unlikely that significant populations of fin whale would be present at any time.

1.3.1.5 Southern Right Whale (Endangered / Migratory)

Southern right whales (*Eubalaena australis*) occur primarily between the latitudes of 20° to 60° south and are seasonally present in Australian waters between late April and early November (IWC, 2001). In Australian waters, the species has a preference for the cooler waters off the southern coast of Australia, occurring in the highest densities off the coasts of Western Australia and South Australia (DoEE, 2018). Significant calving locations in Western Australia include Doubtful Island Bay and the area east of Israelite Bay. Based on the species preference for waters cooler than those of the Operational Area, it is unlikely that significant populations of the southern right whale would be present at any time.

1.3.2 Marine Reptiles

Threatened and migratory marine reptiles within the Operational Area are listed in Section 4.3 of the EP. Details on the species identified are included below.

1.3.2.1 Marine Turtles

Threatened and migratory marine turtles within the Operational Area are listed in Section 5.4 of the EP. Details on the species identified are included below.

Due to open oceanic conditions, there are no particular features that would result in feeding or breeding aggregations of turtle species within the Operational Area.

Green Turtle (Vulnerable/Migratory)

Green turtles (*Chelonia mydas*) are found in tropical and subtropical waters throughout the world. There are seven distinct genetic populations of green turtles in Australia, the largest of which nests in WA. This WA population is thought to be one of the largest green turtle populations worldwide (Limpus, 2009). Given the water depths in the Operational Area, the area is unlikely to represent important habitat for green turtles during any life history phase.

Green turtle foraging habitats within WA are poorly described. In eastern Australia, juvenile and adult green turtles feed in intertidal and sub-tidal habitats, including coral and rocky reefs, seagrass meadows, algal turfs on sand or mud flats (Limpus, 2009) and it is likely that they feed in similar habitats within WA. None of these habitats are present within the Operational Area and therefore it is unlikely green turtles would be attracted to the Operational Area for feeding.

A major green turtle rookery is located on the west coast of Barrow Island, outside the Operational Area. The Barrow Island rookery is estimated to support a total female reproductive population of 20,000 individuals. Green turtles nest on Barrow Island from October to March with a December–January peak (Pendoley, 2005). Mating generally occurs adjacent to the nesting beach, and mating turtles are regularly observed off the west coast of Barrow Island (Chevron Australia, 2009). Based on the known nesting season, mating at Barrow Island is likely to occur between September and November. Between nesting events, green turtles generally remain within 12 km of their nesting beach, and have been observed to remain within 5 km of nesting beaches on the west coast of Barrow Island (Pendoley, 2005). The Muiron Islands also support a major Green Turtle rookery (Limpus, 2004).

Flatback Turtle (Vulnerable/Migratory)

Flatback turtles (*Natator depressus*) are found only in the tropical waters of northern Australia, Papua New Guinea and Indonesia. There are four known genetic populations of this species, namely eastern Australia, Gulf of Carpentaria, western Northern Territory and WA (Limpus, 2009). The species is listed as Vulnerable (and Migratory) under the EPBC Act and Data Deficient under the IUCN Red List of Threatened Species.

Nesting is restricted to the northern Australian coastline, from Exmouth, WA, to Bundaberg, Queensland (Limpus, 2009). One of the largest known flatback turtle

rookeries in WA is located along the east coast of Barrow Island, with a female reproductive population estimated to comprise approximately 3,900 turtles. A further 3,000 female flatback turtles are also found nesting on the nearby Lowendal and Montebello Islands; bringing the total estimated female reproductive population size for the Barrow-Montebello-Lowendal Island complex to 6,900 (Chevron Australia, 2009). Lesser numbers of flatback turtles are also known to nest on islands between Barrow Island and Exmouth, including Thevenard Island, Ashburton Island and Locker Island (Limpus, 2009; RPS, 2010).

The peak nesting season for flatback turtles in the southern Pilbara is from December–January (Pendoley, 2005; Chevron Australia, 2009) and the full nesting season is likely to extend from October–March (RPS, 2010). Based on the inferred nesting season, mating is likely to occur from about September–November each year. Flatback turtle mating areas in WA are unknown (Chevron Australia, 2009), but are likely to be near the nesting beaches (Hamann *et al.*, 2002).

Between nesting events, flatback turtles either remain near their nesting beach, or travel up to 70 km to the mainland of WA (Chevron Australia, 2009; RPS, 2010). Some flatback turtles that nest in the southern Pilbara migrate to the northern Pilbara/Kimberley at the end of the nesting season (Chevron Australia, 2009; RPS, 2010). These turtles generally remain within the 70 m isobath while in the vicinity of the Barrow-Montebello-Lowendal Island complex (Chevron Australia, 2009; RPS, 2010). Other flatback turtles that nest in the southern Pilbara remain there at the end of the nesting season (Chevron Australia, 2009; RPS, 2010).

Adults are known to inhabit soft bottom habitat and forage in turbid shallow near-shore water in areas 5 to 20 m deep (Limpus *et al.*, 1983). Recent satellite telemetry data suggests that areas of 20–100 m water depth between Barrow Island and the Muiron Islands may be important for flatback turtle foraging (RPS, 2010). Flatback turtles feed on invertebrates such as cuttlefish, jellyfish, soft corals, sea pens and holothurians (DotE, 2016h; Limpus, 2009) and are likely to be found foraging in habitats that support these organisms.

Considering the significant numbers of flatback turtles that occur in WA, it is possible that some may travel through the Operational Area on occasion, which overlaps the BIA for the flatback turtle. Water depths in the Operational Area suggest the area is unlikely to comprise important habitat for the turtles during any life history phase of the species.

Hawksbill Turtle (Vulnerable/Migratory)

Hawksbill turtles (*Eretmochelys imbricate*) are found in tropical, subtropical and temperate waters in all oceans of the world. The total population of hawksbill turtles in Australia is unknown. However, it is known that Australia holds the largest breeding populations of hawksbill turtles in the world, and the largest rookeries (DotE, 2016i). It is estimated that around 3,000 females nest in WA each year (DotE, 2016i).

Hawksbill turtles spend the first five to ten years of their life drifting on ocean currents (DotE, 2016i). During this pelagic phase, they are often found in association with rafts of Sargassum (DotE, 2016i). Once hawksbill turtles reach 30 to 40 cm in length, they settle to forage in tropical tidal and sub-tidal rocky and coral reef habitat. They have also been found, those less regularly, in coastal seagrass habitat and within the deep

waters of trawl fisheries. Foraging areas for hawksbill turtles in WA are poorly described, however nesting hawksbill turtles from the Lowendal Islands and Dampier Archipelago have been tracked to presumed foraging grounds in the Pilbara region, including the De Grey River mouth, Great Sandy Island, the Mary Anne Islands and Nickol Bay, and Sholl Island (Pendoley, 2005). Hawksbill turtles feed primarily on sponges, but also forage on cephalopods, gastropods, cnidarians, seagrass and seaweed (Carr & Stancyk, 1975; Witzell, 1983; Limpus, 1992; Spotila, 2004) and are likely to be found foraging in habitats that support these organisms.

Nesting is mainly confined to tropical beaches (DotE, 2016i). The major nesting areas of hawksbill turtles in WA are the Dampier Archipelago, the Ningaloo and Jurabi Coasts, as well as Thevenard, Barrow, Lowendal and Montebello Islands.

The peak hawksbill turtle nesting season in the Pilbara is between October and December (Pendoley, 2005). Mating can therefore be expected to occur from about September–October and is likely to occur in shallow waters close to nesting beaches. The inter-nesting period is generally spent close to the nesting beach (Pendoley, 2005).

Hawksbill turtles occur a number of WA marine reserves (DotE, 2016i), which are managed to protect feeding grounds, nesting grounds and inter-nesting habitat (where females occur during non-breeding times) for marine turtles in Australia, including the hawksbill turtle:

- Ashmore and Cartier Nature Reserves
- Ningaloo Marine Park
- Shark Bay World Heritage Area
- Dampier Archipelago Nature Reserve
- Thevenard Island Nature Reserve
- Barrow Island Nature Reserve
- Montebello Conservation Park
- Cape Range Conservation Park
- Muiron Islands Nature Reserve.

Average incubation periods for hawksbill turtle nests in northern Queensland are between 55 and 59 days (Limpus, 2009). Therefore, the peak hatching period in WA is expected to be between December and February. The in-water dispersal patterns and habitat use for hawksbill turtle hatchlings in WA are not known but it is likely that they travel to deep water, offshore habitats (Limpus, 2009).

No BIAs for the Hawksbill turtle are located within the Operational Area.

Loggerhead Turtle (Endangered/Migratory)

Loggerhead turtles (*Caretta caretta*) are known to have a broad distribution (DotE, 2016q), occurring in proximity to coral and rocky reefs, seagrass beds and muddy bays throughout eastern, northern and Western Australia. Loggerhead turtles nest on sandy beach and the juvenile turtles spend their first several years adrift on the ocean currents. Once they become large enough, loggerhead turtles enter the benthic habitat

to forage. Loggerhead turtles are carnivorous, feeding primarily on crustaceans and molluscs (Spotila, 2004) and are likely to be found foraging in areas that support high densities of these organisms.

The WA loggerhead turtle population nests on mainland beaches from Carnarvon to the Ningaloo Marine Park and offshore islands from Shark Bay to the Muiron Islands (Limpus, 2009). Very low density nesting occurs in other areas further north, including Locker Island and Ashmore Reef (Limpus, 2009).

Given the distance of the Operational Area from known loggerhead turtle rookeries and prospective foraging areas, it is unlikely that significant numbers of loggerhead turtles will be present at the location.

Leatherback Turtle (Endangered/Migratory)

The leatherback turtle (*Dermochelys coriacea*) has the widest distribution of any marine turtle species, and can be found in tropical, subtropical and temperate waters throughout the world (Marquez, 1990). Leatherback turtles are relatively rare in northern Australian waters. The species is more commonly observed in southern coastal waters around Australia.

No major breeding sites of leatherback turtles have been recorded in Australia (Limpus, 2009); however, scattered nesting occurs in the Northern Territory, along the coast of Arnhem Land. For example, low numbers of nesting females have been recorded at Cobourg Peninsula in north-west Arnhem Land (Chatto & Baker, 2008), with breeding occurring mostly during December and January.

Nesting occurs on tropical beaches and subtropical beaches (Marquez 1990) but no major centres of nesting activity have been recorded in Australia, although scattered isolated nesting (1-3 nests per annum) occurs in southern Queensland and Northern Territory (Limpus & McLachlin, 1994). However, leatherback turtles are the most pelagic of all marine turtles, and make long migrations between foraging areas and nesting beaches (DotE, 2016j).

Leatherback turtles may occasionally transit through the Operational Area, however, given the distance from known leatherback turtle rookeries and prospective foraging areas, it is unlikely that significant numbers will occur at the location.

1.3.3 Fish, Sharks and Rays

The North West Cape region is considered an important area for fish and shark biodiversity in Australia. The Operational Area is located approximately 110 km north-east of the North West Cape, which marks a boundary for a transition between demersal tropically dominated shelf and slope fish communities to dominant temperate species communities (Last *et al.*, 2005; Commonwealth of Australia, 2012).

The benthic and pelagic fish communities of the Northwest Shelf Province are strongly depth-related, indicative of a close association between fish communities and benthic habitats (Commonwealth of Australia, 2012). Deep water fish species, such as goatfish, lizardfish, ponyfish, threadfin bream, adult trevally, billfish and tuna are found in areas where water depths range between 100–200 m.

Table 1-1 presents spawning aggregation times for key fish species within the North Coast bioregion.

Table 1-1: Spawning aggregation times for key species within the North Coast bioregion (Dept of Fisheries)

Bioregion	Key Fish Species Within Zone	Spawning Aggregation Times
North Coast	Black shark (*Carcharhinus tilstoni and C. limbatus*)	Nov – Dec
	Goldband snapper (*Pristipomoides multidens*)	Jan – Apr
	Rankin cod (*Epinephelus multinotatus*)	Aug – Oct
	Red emperor (*Lutjanus sebae*)	Jan, Mar
	Pink snapper (*Pagrus auratus* (rare)	May – Jul
	Sandbank shark (*Carcharhinus plumbeus*)	Oct – Jan
	Spanish mackerel (*Scomberomorus commerson*)	Aug – Nov

Threatened and migratory fish, shark and rays within the Operational Area are listed in Section 5.4 of the EP. Details on the species identified are included below.

1.3.3.1 Whale Shark (Vulnerable/Migratory)

The whale shark (*Rhincodon typus)* has a broad distribution in tropical and warm temperate seas, usually between latitudes 30°N and 35°S (Wilson *et al.*, 2001; Wilson *et al.*, 2006). Whale sharks are highly migratory and the species' movements are closely associated with productivity pulses, ocean circulation and water temperatures, although this is little understood (DoEE, 2016c). Whale shark presence coincides with the coral mass spawning period, when there is an abundance of food (krill, planktonic larvae and schools of small fish) in the waters adjacent to the reef.

The whale shark may occasionally feed within the Operational Area and may travel through during migration. The foraging BIA (including high density prey) for the whale shark overlaps with the Operational Area.

1.3.3.2 Great White Shark (Vulnerable/Migratory)

The great white shark (*Carcharodon carcharias*) has a wide distribution, and is located throughout temperate and sub-tropical waters, from central Queensland, around the south coast and up to the north-west coast of Western Australia (DotE, 2016p). Great white sharks can be found from close to shore around rocky reefs, surf beaches and shallow coastal bays to outer continental shelf and slope areas (DotE, 2016p). Although they typically occur between the coast and the 100 m depth contour, they have been observed diving to 1,000 m (Bruce *et al.*, 2006). Great White Sharks have been recorded travelling very large distances and do not seem to reside in one area (DotE, 2016p). They are transient within the NWMR as they are known to prey on humpback whales and have been recorded at the North West Cape waters during migration season. The great white shark is often found close in-shore and penetrates shallow bays in continental coastal waters. There is no BIA for the great white shark located within the vicinity of the Operational Area, with the closest BIA being associated with the seal colony of the Houtman Abrolhos Islands off the coast of Geraldton, 800 km south of the Operational Area (DoEE, 2016b).

Given the transient nature of great white sharks, and the lack of critical habitat present for this species, they are only expected to be present in low numbers in the Operational Area, either transiting through or foraging in the area.

1.3.3.3 Grey Nurse Shark (Vulnerable)

The Grey Nurse Shark *(Carcharias taurus*) has a wide-ranging in-shore distribution, focused around main continental landmasses in sub-tropical to cool, temperate waters. The species is often recorded near in-shore rocky reefs, rocky caves, islands and sandy-bottomed gutters. They have also been observed in the surf zone and close to coral reefs. It is thought that this species is not restricted to any particular habitat. They tend to hover above the seabed at depths between 15 and 40 m. Grey Nurse sharks have also been recorded at depths of approximately 200 m on the continental shelf (Bennett & Bansemer 2004).

Grey nurse sharks have been recorded around most of the southern half of Australia and northwards to Shark Bay in WA (Cavanagh *et al.*, 2003). Within WA, grey nurse sharks are distributed along the coast and encountered with low and irregular frequency (DotE, 2016r). As the species occurs mainly on the south western-coastal waters (Chidlow *et al.*, 2006) it is considered unlikely to occur within the Operational Area. There are no identified BIAs for the grey nurse shark on the west coast of Australia (DoEE, 2016b).

1.3.3.4 Green Sawfish (Vulnerable)

The green (*Pristis zijsron)* occurs in in-shore coastal waters and riverine environments of tropical northern Australia (cited in DotE, 2016s; DotE, 2016t). The green sawfish are widespread in the Indo-west Pacific.

Sawfish are usually observed along the north-west coast of WA down to the Pilbara region. Green sawfish have historically been recorded in the coastal waters off Broome, WA, around northern Australia and down the east coast as far as Jervis Bay, New South Wales (NSW) (DotE, 2016s). Green Sawfish migration patterns are unknown (DotE,

2016s). Green sawfish been recorded in inshore marine waters, estuaries, river mouths, embankments and along sandy and muddy beaches (DotE, 2016s). Green sawfish have been recorded in very shallow water (< 1 m) to offshore trawl grounds in over 70 m of water (DotE, 2016s).

There is no biologically important area for sawfish within the Operational Area.

1.3.3.5 Scalloped Hammerhead (Conservation Dependent)

The scalloped hammerhead (*Sphyrna lewini*) has a broad distribution, occurring in tropical and sub-tropical waters globally (Duncan et al. 2006). In Australia they occur in waters off New South Wales, around the north of Australia and as far south as Geographe Bay in Western Australia (TSSC, 2018). They rarely venture into deep ocean waters and have a wide range throughout shallow coastal shelf waters. There are no identified BIAs for the species.

1.3.3.6 Southern Bluefin Tuna (Conservation Dependent)

The southern bluefin tuna (*Thunnus maccoyii*) is a highly migratory species occurring in globally in waters between 30° – 50° south, with distribution concentrated in the eastern Indian Ocean and south west Pacific Ocean. In Australia, it is present in the waters off north Western Australia, south to Tasmania and as high as northern New South Wales (TSSC, 2010). The species is though to congregate at seamounts, lumps and reefs in the Great Australian Bight due to the high concentrations of prey around these features (Fujioka et al. 2010). The southern bluefin tuna feeds on a wide variety of marine species including fish, crustaceans and cephalopods (TSSC, 2010).

1.3.4 Seabirds/Shorebirds

Barrow, Lowendal and Montebello Islands are significant sites for migratory and resident seabirds and shorebirds (Commonwealth of Australia, 2012). Barrow, Lowendal and Montebello islands are internationally significant sites for six species of migratory shorebirds, supporting greater than 1% of the East Asian-Australasian Flyway populations of these species (Commonwealth of Australia, 2012). In addition, the Montebello/Barrow islands region is a significant rookery for at least 15 seabird species, with the largest breeding colony of Roseate tern in Western Australia found on the Montebello Islands (DEC, 2006).

Many of the species on the Montebello and Barrow islands are listed under the Japan-Australia Migratory Bird Agreement (JAMBA) and China migratory Bird Agreement (CAMBA) and it is expected that some individuals of these species would pass near the Operational Area during their annual migration and may form temporary feeding aggregations, subject to food availability.

Threatened and migratory seabirds and shorebirds within the Operational Area are listed in Section 5.4 of the EP. Details on the species identified are included below.

1.3.4.1 Red Knot (Endangered/Migratory)

Distribution of the red knot in Western Australia is widespread, including the coast from Ningaloo and Barrow Island to the south-west Kimberly Division. Migration occurs to

high northern latitudes during the northern hemisphere summer to breeding grounds where food is readily abundant, then southward to escape severe winter conditions under which energy demands are high and prey is scarce. Both Australia and New Zealand host significant populations of red knots during the non-breeding period (Bamford *et al.*, 2008). Important sites for the red knot in Western Australia include Eighty Mile Bay (population of 80,700) and Roebuck Bay (11,200) located over 500 km northwest of the ZPI (Bamford *et al.*, 2008). Similar to other migratory shorebirds, the red knot frequents intertidal sands, mudflats and coastal wetlands. As these habitats are not present within the Operational Area, occurrence of the species within the area is unlikely outside of brief migratory transit. There is currently no BIA for this species.

1.3.4.2 Curlew Sandpiper (Critically Endangered/Migratory)

The curlew sandpiper (*Calidris ferruginea)* is a slim, small sandpiper with a long neck and long legs. Within Australia, Curlew Sandpipers are widespread across coastal habitats and also quite broadly distributed inland. In Western Australia, Curlew Sandpipers are widespread on coastal and subcoastal plains between Cape Arid to the south-west Kimberley Division, and are more sparsely distributed between Carnarvon and Dampier Archipelago (DotE, 2016v). There is currently no BIA for the curlew sandpiper, however the species is known to occur within the Operational Area.

1.3.4.3 Southern Giant-Petrel (Endangered/Migratory)

The southern giant-petrel is widespread throughout the Southern Ocean, breeding on six subantarctic and Antarctic islands within Australian territory. The worldwide population of the species is estimated at 62,000 individuals and is in continued rapid decline (DotE, 2016k). There are an estimated 7090 breeding pairs within Australian territory. In summer, it occurs predominantly in subantarctic to Antarctic waters, dispersing north during winter towards the Tropic of Capricorn, located south of the Operational Area and ZPI. The southern giant-petrel is an opportunistic feeder, scavenging in coastal and island environments and surface seizing in open water environments (DotE, 2016k).

The only BIA for this species is on the east coast of Australia along the New South Wales coastline, which is listed as foraging habitat (DoEE, 2016b). Given that the northernmost extent of this species' described distribution does not overlap with the Operational Area, the southern giant petrel is not expected to be present in significant numbers within the Operational Area.

1.3.4.4 Eastern Curlew (Critically Endangered/Migratory)

The eastern curlew (*Numenius madagascariensis)* is Australia's largest shorebird. It is a long-haul flyer and easily distinguished by its long, downwards curving bill. The Eastern Curlew breeds in the Northern Hemisphere and arrives in Australia in August to forage for crabs and molluscs in intertidal mudflats (DotE, 2016n). It may transit through the area and could be expected to be occasionally sighted within the Operational Area. Suitable habitat for the eastern curlew is located on Barrow Island, the Ningaloo Coast, within Exmouth Gulf and along the shoreline of the Pilbara coast, these sites are all outside the Operational Area. The closest habitat, on Barrow Island, is located over 40 km away from the Operational Area. There is no BIA for this species.

1.3.4.5 Christmas Island White-tailed Tropicbird (Endangered)

The Christmas Island white-tailed tropicbird (*Phaethon lepturus fulvus*) is endemic to Christmas Island, it's only known breeding location (DoE, 2014). The species forages over the Indian Ocean and has been recorded as far as 1,500 km from Christmas Island, at the edge of the Western Australian continental shelf (Dunlop et al. 2001). It feeds on fish and cephalopods and roosts primarily at sea, with only incubating or brooding adults remaining on nests. The Christmas Island subspecies nests in deep, shaded crevices in a range of habitats including hollows in rainforest trees, crevices on rock faces, cliffs and quarries (Dunlop et al. 2001).

1.3.4.6 Australian Fairy Tern (Vulnerable/Migratory)

The Australian fairy tern (Sternula nereis nereis) feeds almost entirely on fish, foraging in in-shore waters around sheltered islands where it nests on sandy beaches. Foraging and breeding BIA for the fairy tern (DoEE, 2016b) are located at Barrow Island, the Ningaloo Coast near Turquoise Bay and the marine waters near Thevenard Island, all outside the Operational Area. Additionally, the nearby Montebello Islands are also an important breeding and foraging location for the species, these are also located outside the Operational Area. The species also has breeding grounds listed as BIAs on the Exmouth Peninsula within the Ningaloo Marine Park and on the mainland coastline 60 km south of Dampier (DoEE, 2016b).

1.3.4.7 Indian Yellow-nosed Albatross (Vulnerable / Migratory)

The Indian yellow-nosed albatross (*Thalassarche carteri*) forages primarily in the southern Indian Ocean, particularly off the coast of Western Australia (Marchant & Higgins, 1990). The species concentrates over productive waters of continental shelves, often occurring at coastal upwellings and along the edge of currents (Weimerskirch et al. 1985). They breed on islands of the Southern Indian Ocean, nesting on tussock covered coastal cliffs and slopes (Weimerskirch et al. 1986). The species feeds on cephalopods and fish.

1.4 Cultural and Socio-Economic Environment

1.4.1 Commercial Fisheries

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

1.4.2 Commonwealth Fisheries

1.4.2.1 Western Tuna and Billfish Fishery

The Commonwealth managed Western Tuna and Billfish Fishery (WTBF) overlaps with the Operational Area, occupying a large area of the Australia Fishing Zone, extending westward from Cape York Peninsula (142°30' E) off Queensland to 34°S off the west

coast of Western Australia. It also extends eastward from 34°S off the west coast of WA, across the Great Australian Bight to 141°E at the South Australian/Victorian border (AFMA, 2012).

The WTBF also includes Australian waters outside of 12 nautical miles off Christmas Island and Cocos Keeling Islands. The WTBF Management Plan also applies to Australian vessels fishing on the high seas within the Indian Ocean Tuna Commission's (IOTC) Area of Competence (AFMA, 2012).

The 4 target species include Albacore Tuna (*Thunnus alalunga*), Bigeye tuna (*Thunnus obesus*), yellowfin tuna (*Thunnus albacares*), and broadbill sword fish (*Xiphius gladius*). The target species of the WTBF are highly migratory and internationally managed by the Indian Ocean Tuna Commission (IOTC).

Pelagic trawling is the main fishing method used in the WTBF; including the methods of pelagic longline, minor line (hand line, rod and reel, troll and poling) and purse seine. Most longliners that have operated in the WTBF have been 15-30 m long and have deployed monofilament longline gear.

352 tonnes of catch were landed in the 2013 season from four vessels using pelagic long lines (ABARES, 2014). This reduced to 316 tonnes of catch in 2014 from the same vessel effort (ABARES, 2015). Catch mainly consisted of striped marlin, swordfish, albacore, bigeye tuna and yellowfin tuna. Some fishing effort overlapped with the operational and regional areas in the 2013 season (ABARES, 2014); however, in recent years, effort has concentrated off south-west Western Australia, between Geraldton and Bunbury, over 740 km south of the ZPI (ABARES, 2015, 2017).

There is one active licence holder in the Western Tuna and Billfish Fishery, Ray Davies of Ocean Wild Tuna, who was consulted in March 2019.

Due to the low levels of effort in this fishery (fewer than five vessels active in the fishery each year since 2005 (ABARES, 2017)), the large area the fishery encompasses, concentration of fishing effort far south of the Operational Area, and the PSZ that has been in place for the duration of the Woollybutt Field operations, it is unlikely that significant fishing effort coincides with the Operational Area.

1.4.2.2 Southern Bluefin Tuna Fishery

Although the area is licensed as part of the federally managed Southern Bluefin Tuna fishery, fishing does not occur within the Operational Area. Spawning of southern bluefin tuna (*Thunnus maccoyi)* has been recorded on the North West Shelf from September to March and larvae are likely to be abundant in surface waters of the region throughout these months (Collette & Nauen, 1983; Davis *et al.*, 1990). Adult southern bluefin tuna may migrate through the region to the Southern Ocean, which is a key fishing ground for the Southern Bluefin Tuna Fishery.

1.4.2.3 Western Skipjack Fishery

The Western Skipjack Fishery extends westward from the South Australian-Victorian border across the Great Australian Bight, around the west coast of WA to Cape York Peninsula. Effort in this fishery is mainly confined to the southern coast of Australia, well

outside of the Operational Area. In recent years there has been very little activity; no vessels were reported in 2015 (Patterson and Bath, 2016). As such, interactions with fishers are not expected.

1.4.3 State Fisheries

State-managed fisheries within the Operational Area are listed in Section 5.5.1 of the EP.

1.5 Values and Sensitivities

1.5.1 World Heritage Areas

There are no World Heritage Areas (WHA) within the Operational Area.

1.5.2 National Heritage Areas

There are no national heritage areas within the Operational Area

1.5.3 Commonwealth Heritage

There are no Commonwealth Heritage Areas in the Operational Area.

1.5.4 Wetlands of International or National Importance

There are no wetlands of international or national importance within the Operational Area.

1.5.5 Australian Marine Parks

The Operational Area does not overlap with any Australian Marine Parks (AMP).

The closest AMP is the Montebello AMP, approximately 35 km from the Operational Area.

1.5.6 State Marine Protected Areas

No State-managed Marine Parks occur within the Operational Area.

The closest State marine park is the Barrow Island Marine Management Area, approximately 35 km from the Operational Area.

1.5.7 Key Ecological Features

An EPBC Protected Matters Search shows that the Operational Area contains no Key Ecological Features (KEF).

The closest KEF is the Ancient Coastline at the 125 m depth contour, approximately 4 km from the Operational Area.

1.6 Protected Matters Search Tool Results

Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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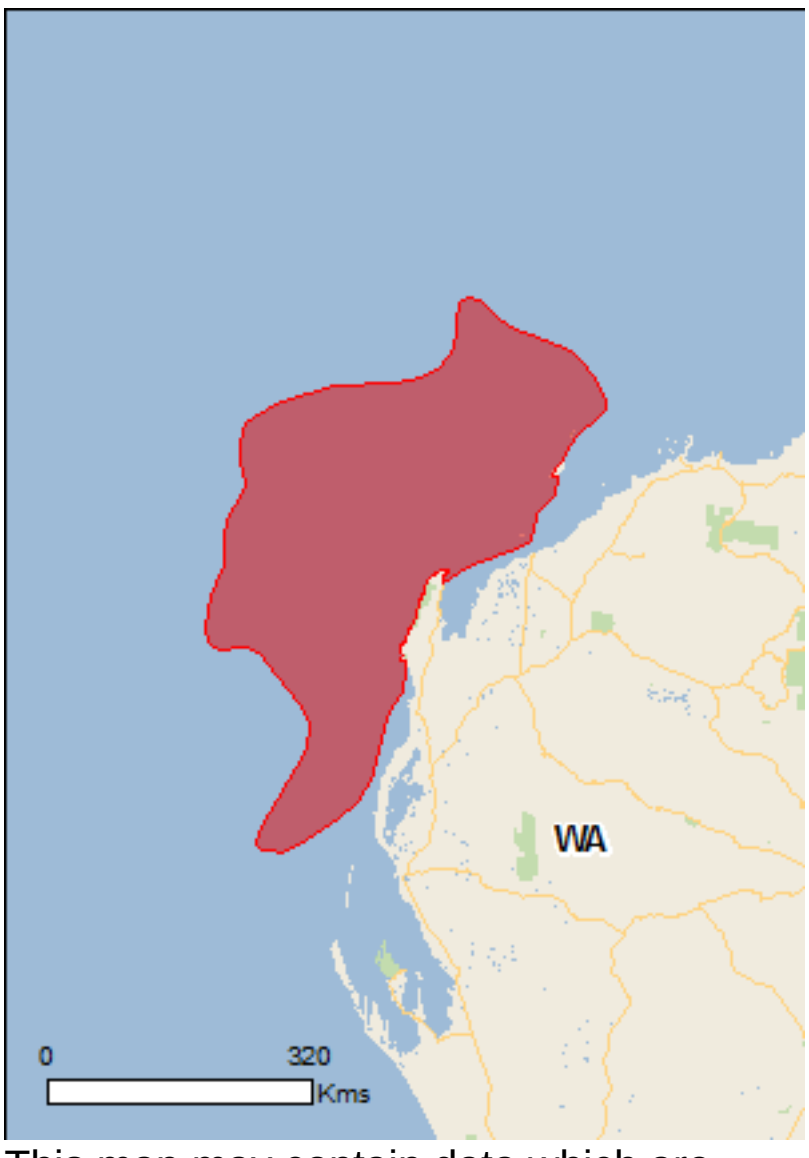

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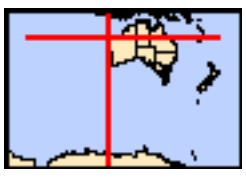

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	43
Listed Migratory Species:	58

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	3
Commonwealth Heritage Places:	2
Listed Marine Species:	103
Whales and Other Cetaceans:	31
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	7

Extra Information

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

State and Territory Reserves:	13
Regional Forest Agreements:	None
Invasive Species:	11
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	5

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Status
The Ningaloo Coast	WA	Declared property

National Heritage Properties [Resource Information]

Name	State	Status
Natural		
The Ningaloo Coast	WA	Listed place

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
North-west

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Malurus leucopterus edouardi White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren [26194]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Fish		
Milyeringa veritas Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
Ophisternon candidum Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia lesueur Barrow and Boodie Islands subspecies Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021]	Vulnerable	Species or species habitat known to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isoodon auratus barrowensis Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes conspicillatus conspicillatus Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Lagorchestes hirsutus Central Australian subspecies		
Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Osphranter robustus isabellinus		
Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area
Petrogale lateralis lateralis		
Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
Rhinonicteris aurantia (Pilbara form)		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Aipysurus apraefrontalis		
Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus foliosquama		
Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus zastictus		
Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur

Name	Threatened	Type of Presence within area
[Pristis zijsron](#) Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Sousa chinensis](#) Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
[Tursiops aduncus (Arafura/Timor Sea populations)](#) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat may occur within area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
[Glareola maldivarum](#) Oriental Pratincole [840]		Species or species habitat may occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
[Pandion haliaetus](#) Osprey [952]		Breeding known to occur within area
[Thalasseus bergii](#) Greater Crested Tern [83000]		Breeding known to occur within area

Name	Threatened	Type of Presence
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Defence - EXMOUTH ADMIN & HF TRANSMITTING
Defence - EXMOUTH VLF TRANSMITTER STATION

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Learmonth Air Weapons Range Facility	WA	Listed place
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna fuscata Sooty Tern [794]		Breeding known to occur within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied		Species or species

Name	Threatened	Type of Presence
Pipefish [66194]		habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Breeding known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Aipysurus pooleorum Shark Bay Seasnake [66061]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Seasnake [1121]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrophis czeblukovi Fine-spined Seasnake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Pelamis platurus		
Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis		
Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis		
Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Feresa attenuata		
Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus		
Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus		
Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Indopacetus pacificus		
Longman's Beaked Whale [72]		Species or species habitat may occur within area
Kogia breviceps		
Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus		
Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenodelphis hosei		
Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area

Name	Status	Type of Presence
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Name	Label
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Multiple Use Zone (IUCN VI)

Name	Label
Gascoyne	National Park Zone (IUCN II)
Montebello	Multiple Use Zone (IUCN VI)
Ningaloo	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)
Shark Bay	Multiple Use Zone (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Barrow Island	WA
Bessieres Island	WA
Boodie, Double Middle Islands	WA
Bundegi Coastal Park	WA
Cape Range	WA
Jurabi Coastal Park	WA
Montebello Islands	WA
Muiron Islands	WA
Round Island	WA
Serrurier Island	WA
Unnamed WA40828	WA
Unnamed WA41080	WA
Unnamed WA44665	WA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Cape Range Subterranean Waterways	WA

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Canyons linking the Cuvier Abyssal Plain and the	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-24.54126 112.10645,-24.42252 112.12413,-23.60399 112.63951,-23.36398 112.67993,-23.21998 112.6294,-23.03556 112.48287,-22.8764 112.32624,-22.75514 112.23277,-22.64398 112.11403,-22.5884 111.9675,-22.60103 111.67697,-22.53029 111.57087,-22.39135 111.5456,-22.05787 111.60118,-21.73702 111.73508,-21.61576 111.74771,-21.46923 111.74013,-21.27723 111.78055,-21.07007 111.92203,-20.93618 111.9675,-20.79723 111.9574,-20.70628 111.93213,-20.49407 111.9094,-20.31217 111.99024,-20.10754 112.2934,-19.92312 112.93509,-19.88522 113.61467,-19.83217 113.89257,-19.75638 114.06436,-19.60732 114.22604,-19.40522 114.26899,-19.25869 114.26899,-19.06669 114.31194,-19.02121 114.3852,-19.05658 114.54184,-19.19806 114.70605,-19.31427 114.87531,-19.45827 115.24416,-19.57953 115.53974,-19.69827 115.68121,-19.89533 115.83532,-20.07975 115.90858,-20.16312 115.90858,-20.27428 115.7949,-20.42586 115.60416,-20.53323 115.51826,-20.62923 115.47026,-20.82881 115.33132,-20.85281 115.33005,-20.8566 115.373,-21.02965 115.34142,-21.15344 115.23658,-21.22544 115.16458,-21.29113 115.14437,-21.39723 115.12795,-21.48818 115.09131,-21.56271 115.00163,-21.77618 114.40605,-21.81597 114.30752,-21.93505 114.14562,-21.93913 114.1351,-21.86541 114.14798,-21.8531 114.15588,-21.82847 114.17325,-21.81978 114.18304,-21.81489 114.19062,-21.80683 114.17972,-21.80194 114.17435,-21.78899 114.16851,-21.78686 114.16267,-21.80312 114.13741,-21.80676 114.13077,-21.8077 114.11846,-21.80391 114.10867,-21.81686 114.07993,-21.82855 114.07267,-21.83233 114.06098,-21.84749 114.03888,-21.85255 114.02719,-21.87497 113.99877,-21.88791 113.99562,-21.93762 113.96544,-21.96185 113.94501,-22.00005 113.93283,-22.00552 113.92829,-22.00652 113.92598,-22.02389 113.92101,-22.02934 113.91797,-22.03609 113.91296,-22.05204 113.90925,-22.09017 113.89156,-22.09704 113.89061,-22.09885 113.88667,-22.10541 113.88754,-22.12416 113.88272,-22.14942 113.86977,-22.17747 113.85898,-22.19142 113.85639,-22.19365 113.85716,-22.21458 113.84915,-22.22413 113.84836,-22.24063 113.83802,-22.26148 113.83391,-22.27434 113.83478,-22.3394 113.80636,-22.36719 113.78551,-22.38108 113.78015,-22.38598 113.7672,-22.40871 113.75157,-22.41535 113.75267,-22.45845 113.74494,-22.49777 113.72394,-22.50029 113.71509,-22.51671 113.7173,-22.53061 113.70372,-22.54356 113.69078,-22.54356 113.68257,-22.55177 113.66772,-22.58145 113.65699,-22.58714 113.67404,-22.6124 113.67657,-22.62693 113.67151,-22.66924 113.6892,-22.69577 113.6772,-22.71472 113.67846,-22.70714 113.70688,-22.72735 113.73909,-22.82588 113.73151,-23.03809 113.68604,-23.15556 113.61025,-23.31093 113.53446,-23.52693 113.47004,-23.92104 113.34499,-24.13704 113.20477,-24.2962 112.99635,-24.39094 112.81446,-24.5122 112.65151,-24.62968 112.39003,-24.61452 112.26119,-24.59936 112.17024,-24.54126 112.10645

Acknowledgements

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

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

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

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

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APPENDIX C:

STAKEHOLDER CONSULTATION RECORDS

Stakeholder	Consultation Transcripts
Australian Fisheries Management Authority (AFMA)	**13.01.2022 – Email response from AFMA received** Good afternoon [redacted], I refer to your recent email regarding the decommissioning strategy for the Woollybutt Field. Due to limited resources AFMA is unable to comment on individual proposals, however, it is important to continue consulting with all fishers who have entitlements to fish within the proposed area. This can be done through the relevant fishing industry associations or directly with fishers who hold entitlements in the area (e.g. North West Slope Trawl Fishery concession holders, Western Australia Fishing Industry Council (WAFIC)). Details for these associations can be found on AFMA's website at: http://www.afma.gov.au/sustainability-environment/petroleum-industry-consultation/ Lists of Commonwealth Concession holders in each fishery can be found on the AFMA website at: http://www.afma.gov.au/fisheries-services/concession-holders-conditions/ Once you have identified relevant operators you can request their individual contact details through licensing@afma.gov.au. There is a cost associated with this service and the total price will depend on the complexity of the request. Warmest regards [redacted]
	20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO) Dear [redacted] As a stakeholder with interests in the area, Eni would like to provide an update on the decommissioning strategy for the Woollybutt Field. Please refer to the attached bulletin. Previous correspondence relating to the decommissioning strategy for the Woollybutt Field has been included in the email chain below. The Woollybutt Field Decommissioning Environment Plan (EP) is currently under National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) assessment. In response to NOPSEMA comments made during the assessment of the EP a review of comparative assessment of decommissioning options has been undertaken for all remaining subsea infrastructure. As a result a revised decommissioning strategy has been selected by Eni. Based on internal evaluation, Eni will recover the majority of the remaining subsea infrastructure (including all components containing plastics) which provides better environmental, technical and safety outcomes than leaving in situ. The following Woollybutt Field subsea infrastructure proposed to be decommissioned in situ under the Woollybutt Field Decommissioning EP: • anchor chains (below seabed component) • anchors In situ decommissioning of the above infrastructure does not require any vessel based activities. However recovery of subsea infrastructure will require mobilisation of vessels to the Woollybutt Field. Please refer to the attached bulletin for further information. Your comment is sought in relation to any potential impacts that this decommissioning program might have on your functions, interests or activities. If you wish to provide any feedback, please do so by 28 January 2022 to [redacted] Kind Regards **Stakeholder Consultation Letter (HSE.LT.6636.JVP.JCO)** **Woollybutt Field Decommissioning – Stakeholder Consultation** **Introduction** Eni Australia Limited (Eni) is currently planning for the decommissioning of the Woollybutt field, located in Production Licence WA-25-L. The Woollybutt field is in approximately 100 m of water, located within Commonwealth waters 65 km north of Onslow and 35 km west of Barrow Island (Attachment 1). The Woollybutt Field Decommissioning Environment Plan (EP) is currently under National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) assessment. In response to NOPSEMA comments made during the assessment of the EP a review of comparative assessment of all decommissioning options has been undertaken for all remaining subsea infrastructure. As a result a revised decommissioning strategy has been selected by Eni. Based on internal evaluation, Eni will remove the majority of the remaining

subsea infrastructure which provides better environmental, technical and safety outcomes than leaving in situ. Details on the subsea infrastructure that will be removed are provided in Table 2.

Consultation material provided in 2015, 2016, 2019 and 2021 has kept stakeholders informed regarding the status of the Woollybutt field and future plans. Eni are providing this stakeholder engagement update as the Woollybutt decommissioning strategy has changed to complete removal of the majority of the remaining infrastructure.

Background

Woollybutt oil production ceased in 2012 and all associated subsea infrastructure has remained in situ while decommissioning activities were planned for.

Field maintenance and management activities have been ongoing since 2012. Eni submitted a Plug and Abandonment (P&A) EP to NOPSEMA on 25 November 2020, the EP was accepted on 1 July 2021. Activities covered under the current P&A EP included field management, P&A activities, and recovery of subsea infrastructure, including:

- Mid-depth buoys, chains/tether and gravity bases
- Disconnect able Single Point Mooring (DSPM)
- Subsea structures, including manifolds and umbilical termination assemblies

Remaining Subsea Infrastructure covered by this updated Woollybutt Field Decommissioning EP

The following subsea infrastructure is proposed to be decommissioned under the Updated Woollybutt Field Decommissioning EP:

- Anchors and chains
- Umbilical crossing mattresses and grout bags
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers.

A summary of this infrastructure is provided in Table 1. Attachment 2 shows figures of all Woollybutt infrastructure, including the components listed in Table 1 and the components that will be removed under the P&A EP.

Table 1: Summary of Subsea Infrastructure covered by the Decommissioning EP

Infrastructure	Description
Anchors and chains	Six (6) anchors weighing approximately 35 Te each, and six (6) anchor chains
Umbilical crossing mattresses and grout bags	Eight (8) umbilical crossing mattresses Sixteen (16) grout bags
Umbilicals and umbilical jumpers	Umbilicals and umbilical jumpers up to approximately 5.8 km in length
Flexible and reinjection flowlines and jumpers	Four (4) flowlines 2-1/2 inch to 6 inch and 1700 to 5750 m in length. Four (4) jumpers 2-1/2 inch to 6 inch and 17 to 50 m. Four (4) risers 6 inch and 2-1/2 inch 1035 to 1045 m in length.

Activities

Activities undertaken as part of the scope of the Decommissioning EP are presented in Table 2.

Table 2: Summary of Activities in scope of Decommissioning EP

Activity	Summary	Frequency and duration
Recovery of subsea infrastructure	Mobilisation of an Intervention Vessel (IV) to the field. The recovery of subsea infrastructure will be undertaken using the IV and support vessels. The following equipment is proposed to be recovered from the field and taken to shore for disposal, recycling or reuse, in accordance with applicable legislation: • anchor chains (above seabed component) • umbilical crossing mattresses and grout bags • umbilicals and umbilical jumpers • flexible and reinjection flowlines, jumpers, and risers	Target execution window is Q2-Q4 2022.

Permanent Decommissioning in situ	The following subsea infrastructure is proposed to be decommissioned in situ: • anchor chains (below seabed component) • anchors	NA – infrastructure to be left in situ will be separated from recovered components during recovery operations

Comparative assessment

A comparative assessment process was undertaken to inform the decommissioning activities. This included evaluation of a range of decommissioning options for the Woollybutt infrastructure, including complete removal, partial removal and leave in situ. Options were assessed with respect to technical, health and safety, environmental, economic and socioeconomic risks.

The assessment has determined that the removal of the majority of the remaining infrastructure (refer to Table 2) would provide the best overall outcome.

Eni have commissioned a degradation study to inform and support the leaving the anchors and below seabed component of anchor chains in situ. This study assessed long term impacts of degradation of infrastructure on the marine environment.

The findings of this study are available in the Woollybutt Field Decommissioning EP submitted to NOPSEMA.

Environmental Management

Eni assessed the environmental risk assessment for the proposed decommissioning activities, giving consideration to activity timing, durations, location and potential environmental impacts. Management measures will be implemented to reduce the impacts and risks to as low as reasonably practicable and to an acceptable level.

Table 3 provides a summary of potential key environmental risk and/or impacts and associated management measures identified.

Table 3: Potential Key Environmental Risks and Management Measures

Environmental Risk and/or Impact	Risk Description	Mitigation and/or Management Measure
Interaction with other users – vessels and subsea equipment	Presence of vessels and the 500 m PSZ in the field may exclude other marine users from the area. The infrastructure proposed to be left in situ will be below the seabed and have negligible potential to interact with other marine users. Potential impacts will be assessed in the decommissioning EP, including mitigation measures such as long term identification of infrastructure on marine charts.	Eni will notify regulatory authorities and marine users on the activities as required.
Discharge of material to the marine environment	Long term degradation of subsea infrastructure left in situ may occur. The Decommissioning EP will assess the potential impacts to the marine environment from the breakdown of materials.	All infrastructure containing plastic materials/components to be removed.
Routine marine discharges	Vessels will discharge water, cooling water and sewage/grey water to the marine environment.	All routine marine discharges will be managed according to legislative requirements.
Seabed disturbance	Removal of subsea infrastructure will disturb the area in which the equipment was once placed.	Procedures will be followed to limit seabed disturbance during recovery of subsea equipment.
Marine fauna interaction	Vessels used for the activities have the potential to interact with marine fauna (e.g. collisions).	Measures will be taken to protect marine fauna from vessel activities.
Loss of containment	Loss of containment of hydrocarbons to the marine environment may occur during refuelling at sea or in the event of a vessel collision.	Appropriate fuel transfer procedures and equipment will be used to prevent spills Procedures to reduce the potential for uncontrolled hydrocarbon releases will be followed.

		Response plans and equipment will be in place and maintained to manage spills to the environment.
Introduction of marine pest species	Introduction and establishment of invasive marine pests to the area via vessels ballast water or biofouling on vessel hulls.	All vessels will be assessed and managed as appropriate to prevent the introduction of marine pests. Vessels will comply with biosecurity requirements.

Stakeholder Comment and Feedback

Your comment is sought in relation to any potential impact that the proposed decommissioning activities, covered by the Decommissioning EP, may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 21 January 2022 to the contact details provided below.

All comments provided will be considered in the Decommissioning EP to be submitted to NOPSEMA, in accordance with the OPGGS Act.

All communications in relation to this should be directed to:

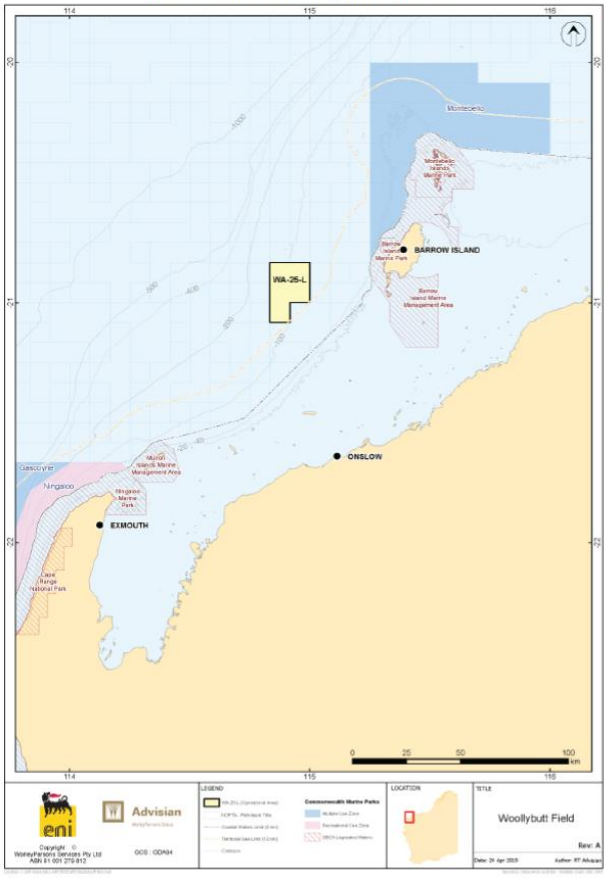
[redacted]

[redacted]

[redacted]

[redacted]

Attachment 1: Location of WA-25 L



Attachment 2: Woollybutt field layout

Figure 1 of 3

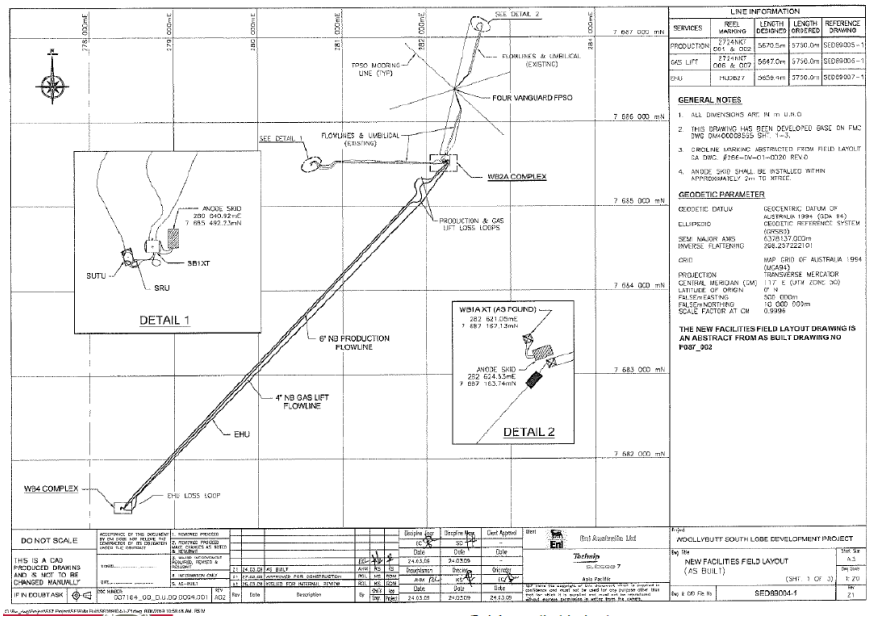


Figure 2 of 3

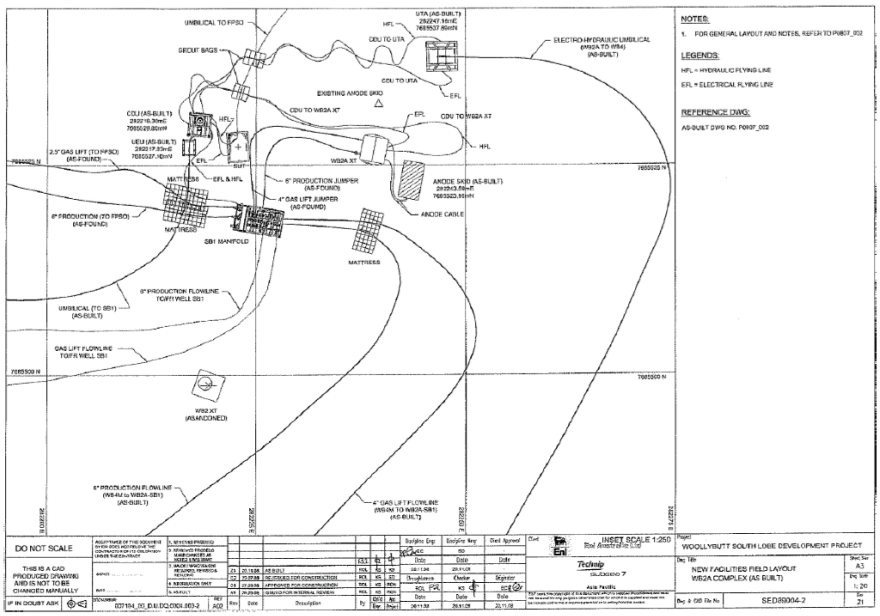
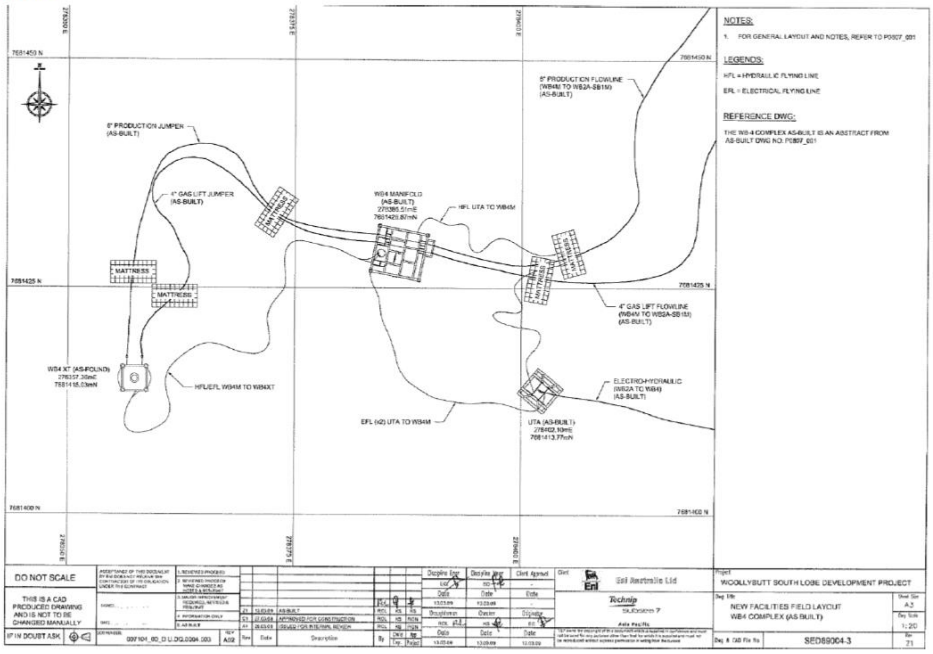


Figure 3 of 3



24.05.2021 – Email update sent

Dear Sir/Madam

On 4th May Eni contacted you regarding their plans to decommission the Woollybutt field. This correspondence stated that Eni were considering rock dumping over the Corkybark wellhead to mitigate snag risks that may be presented by leaving the wellhead in situ.

We are now writing to update AFMA following further consultation with the fishing industry. We have received feedback from State fisheries and the DPIRD on the proposal and the possibility of rock dumping over the Corkybark wellhead to reduce the snag risk. Both parties have advised that rock dumping or installation of other over trawlable structures is not preferred as there is no evidence that this would completely remove the snag risk. Therefore, the control that Eni will commit to in the Woollybutt Decommissioning EP is to mark the infrastructure on navigation charts. This is aligned with how snag risk from other oil and gas infrastructure is managed, particularly during construction.

If AFMA have any further comments please let me know by COB 28th May.

Thanks

[redacted]

04.05.2021 – Email update sent

Dear Sir/Madam,

Eni would like to follow up on the consultation information sent on the 9 and 24 March 2021.

In particular, during earlier consultation in 2015, AFMA has expressed a preference "for all subsea equipment to be removed to minimise the prospect of interference with fishing gear especially trawl gear" (email attached).

The potential risk to trawl fishing has been assessed during the preparation of the Decommissioning EP and the P&A EP and assessment of decommissioning options. The Woollybutt field does not overlap any Commonwealth trawl fisheries, however it overlaps the WA Pilbara Trawl Fishery and is located within Zone 1 of the fishery, which has been closed to trawl fishing since 1998. Therefore, there is currently no risk to trawl gear. Eni is not aware of any plans to reopen the area to trawl fishing, however acknowledges this is a possibility and is liaising further with WA Fisheries and WAFIC.

To manage any future potential risks to trawl fishers, the following mitigation measures will be applied:

- Remaining infrastructure (umbilicals, flowlines, chains and buried anchors) will be marked on the nautical charts; and

We are also considering rock dumping over the Corkybark wellhead and are interested in your views on rock dumping to minimise snag risk.

Should Zone 1 be reopened to trawl fishing, the remaining infrastructure would exclude trawlers from an area <1% of the total area of Zone 1. Zone 1 and Zone 2, which remains open to trawl fishing, cover a total area of 1590 sq nm and 14,980 sq nm, respectively.

We welcome any further feedback you have on the project, and we are available to discuss the project in more detail should you have any further comments or concerns.

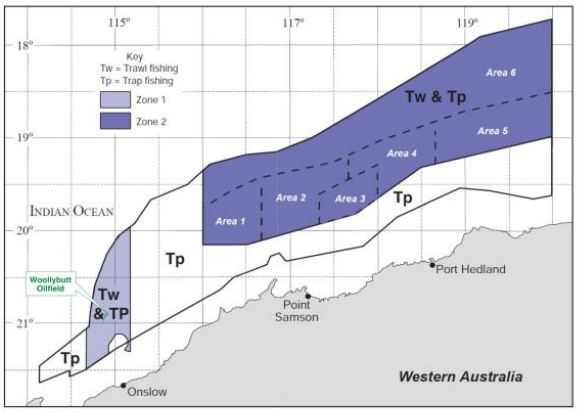


Figure 6.9: Demersal Scalefish Fisheries of the Pilbara (Source: DoF 2011)

24.03.2021 – Email update sent

Dear Sir/Madam

Further to my email dated 9 March 2021 Eni have updated their decommissioning strategy and would like to inform you of one additional piece of infrastructure that is proposed to be decommissioned in situ, the Corkybark wellhead.

The Corkybark well is an abandoned exploration well, located within the Woollybutt field at the following coordinates:

Eastings	Northings	Longitude	Latitude
289233	7688393	114.9736806	-20.8928668

The figure showing the location of the Woollybutt field is attached.

In 2000 Eni attempted to remove the wellhead, however due to technical and safety issues the wellhead could not be completely removed. The portion of the wellhead that was unable to be removed remains on the seabed, extending up to 1.3m in height. The wellhead is comprised entirely of steel and does not contain any operational fluids or plastics. A photo showing the Corkybark wellhead is also attached.

As part of Eni's strategy for decommissioning the Woollybutt field, they are seeking approval from NOPSEMA to leave Corkybark wellhead in situ. The potential impacts from this are detailed in the table below:

Environmental Risk and/or Impact	Risk Description
Interaction with other marine users	Leaving the Corkybark wellhead in situ will result in a long term physical presence on the seabed. This has potential to interact with other marine users, particularly those who have activities that also interact with the seabed. These potential impacts will be assessed in the EP and will include mitigation measures such as long term identification of infrastructure on marine charts.
Discharge of material to the marine environment	Long term degradation of the Corkybark wellhead may occur. As the wellhead corrodes and degrades the constituents making up the wellhead will be released to the environment. Iron, the main consistent of wellheads (about 98%) is not considered a significant contaminate in the marine environment. Other constituents represent less than 2% of the wellhead's composition and impacts to marine environment from these is extremely low. Degradation modelling of the wellhead has shown that it could take up to 250 years to corrode. The EP will assess the potential impacts to the marine environment from the breakdown of materials.
Benefits to benthic habitats	Observations of the Woollybutt infrastructure indicate that benthic habitat has become established. This is expected to provide ongoing benefits to benthic habitats in the Woollybutt field area. Fish habitat studies are underway to quantify the benefit that the long term presence of the subsea infrastructure may have on benthic habitats and an assessment of this will be provided in the EP.

Eni are now also seeking your feedback on the Corkybark wellhead being left in situ in addition to the infrastructure already communicated in previous correspondence, being:

- DSPM anchors and chains
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers
- Umbilical crossing mattresses

Our original correspondence sought feedback by the 31st March 2021, however we have now extended this to the 16th April 2021 to allow for this additional information to be considered.

Thanks

09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2)

Stakeholder Consultation

Woollybutt Field Decommissioning – Stakeholder Consultation

Introduction

Eni Australia Limited (Eni) is currently planning for the decommissioning of the Woollybutt field, located in Production Licence WA-25-L. The Woollybutt field is in approximately 100 m of water, located within Commonwealth waters 65 km north of Onslow and 35 km west of Barrow Island (Attachment 1).

Decommissioning activities are planned in three stages, summarised below with the associated environmental permissioning documents:

Activity	Permissioning document	Status
1. Plug and abandonment of wells	P&A and Equipment Removal EP	Under preparation
2. Removal of the majority of Woollybutt subsea infrastructure		
3. Leaving of the remaining subsea infrastructure in situ	Decommissioning EP	Under preparation – subject of this consultation bulletin

This decommissioning strategy has been selected by Eni following comparative assessment of all decommissioning options. The assessment found that leaving certain elements of the subsea infrastructure in situ provided better environmental, technical and safety outcomes than complete removal, partly due to the presence of subsea habitats that have formed on the infrastructure since it was first installed.

Eni are now preparing an Environment Plan (EP) for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) covering this remaining subsea infrastructure (**Decommissioning EP**).

Background

Woollybutt oil production ceased in 2012 and all associated subsea infrastructure has remained in situ while decommissioning activities were planned for.

Field maintenance and management activities have been ongoing since 2012 in accordance with a long standing EP, which was last revised and accepted in 2019. This **P&A and Equipment Removal EP** also covers plug and abandonment (P&A) activities and is currently being revised to include the removal of the majority of the Woollybutt field subsea infrastructure including:

- Wellheads and xmas trees
- Subsea manifolds
- Subsea umbilical termination units
- Umbilical termination assembly
- Control distribution unit
- Disconnectable single point mooring (DSPM) excluding anchors and chains
- Anode skids
- Flowline transition guide base.

In accordance with consultation material provided in 2019, the well plug and abandonment activities are due to commence in Quarter 3 2021, with removal of the majority of the subsea infrastructure including that listed above to follow, pending NOPSEMA acceptance of the revised EP.

Remaining Subsea Infrastructure covered by the Decommissioning EP

The following subsea infrastructure is proposed to be decommissioned under the Decommissioning EP:

- DSPM anchors and chains
- Umbilical crossing mattresses
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers.

A summary of this infrastructure is provided in Table 1. Attachment 2 shows figures of all Woollybutt infrastructure, including the components listed in Table 1 and the components that will be removed under the Plug, Abandonment and Removal EP.

Table 1: Summary of Subsea Infrastructure covered by the Decommissioning EP

Infrastructure	Description
DSPM anchors and chains	Six (6) anchors weighing approximately 35 Te each, and six (6) anchor chains
Umbilical crossing mattresses	Eight (8) umbilical crossing mattresses
Umbilicals and umbilical jumpers	Ten (10) umbilicals and umbilical jumpers up to approximately 5.8 km in length
Flexible and reinjection flowlines and jumpers.	Four (4) flowlines 2-1/2 inch to 6 inch and 1700 to 5750 m in length.

	Four (4) jumpers 2-1/2 inch to 6 inch and 17 to 50 m Four (4) risers 6 inch and 2-1/2 inch 1035 to 1045 m in length

Activities

Activities undertaken as part of the scope of the Decommissioning EP are presented in Table 2.

Table 2: Summary of Activities in scope of Decommissioning EP

Activity	Summary	Frequency and duration
Permanent decommissioning in situ	All subsea infrastructure within the scope of this EP is proposed to be decommissioned in situ. No vessel activities or removal activities are within the scope of this EP. All infrastructure has been flushed and cleaned under separate EPs.	Not applicable, no infield activities planned

Comparative assessment

A comparative assessment process was undertaken to inform the decommissioning activities. This included evaluation of a range of decommissioning options for the Woollybutt infrastructure, including complete removal, partial removal and leave in situ the remaining subsea equipment. Options were assessed with respect to technical, health and safety, environmental, economic and socioeconomic risks.

The assessment has determined that leaving the remaining components in situ would provide the best overall outcome. In particular, the equipment would continue to provide hard substrate for marine habitat growth on an otherwise featureless seabed.

Eni have commissioned studies to inform and support the leave in situ decommissioning option for certain remaining subsea infrastructure, including

- Degradation studies that assess how the infrastructure will react in the marine environment and to understand potential long term impacts; and
- Fish habitat studies to assess the habitat supported by the remaining Woollybutt field infrastructure and to inform the assessment of long term benefits to benthic habitats.

The preliminary findings of these studies will be available in the Decommissioning EP submitted to NOPSEMA.

Environmental Management

Eni assessed the environmental risk assessment for the proposed decommissioning activities, giving consideration to activity timing, durations, location and potential environmental impacts. Management measures will be implemented to reduce the impacts and risks to as low as reasonably practicable and to an acceptable level.

Table 3 provides a summary of potential key environmental risk and/or impacts an associated management measures identified.

Table 3: Potential Key Environmental Risks and Management Measures

Environmental Risk and/or Impact	Risk Description
Interaction with other marine users	Leaving certain subsea infrastructure in situ will result in a long term physical presence on the seabed. This has potential to interact with other marine users, particularly those who have activities that also interact with the seabed. These potential impacts will be assessed in the decommissioning EP and will include mitigation measures such as long term identification of infrastructure on marine charts.
Discharge of material to the marine environment	Long term degradation of subsea infrastructure may occur. The extent of this will be informed by degradation studies that are currently being undertaken. The Decommissioning EP will assess the potential impacts to the marine environment from the breakdown of materials.

Benefits to benthic habitats	Observations of the Woollybutt infrastructure indicate that benthic habitat has become established. This is expected to provide ongoing benefits to benthic habitats in the Woollybutt field area. Fish habitat studies are underway to quantify the benefit that the long term presence of the subsea infrastructure may have on benthic habitats and an assessment of this will be provided in the Decommissioning EP.

Stakeholder Comment and Feedback

Your comment is south in relation to any potential impact that the proposed decommissioning activities, covered by the Decommissioning EP, may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 March 2021 to the contact details provided below.

All comments provided will be considered in the Decommissioning EP to be submitted to NOPSEMA, in accordance with the OPGGS Act.

All communications in relation to this should be directed to:

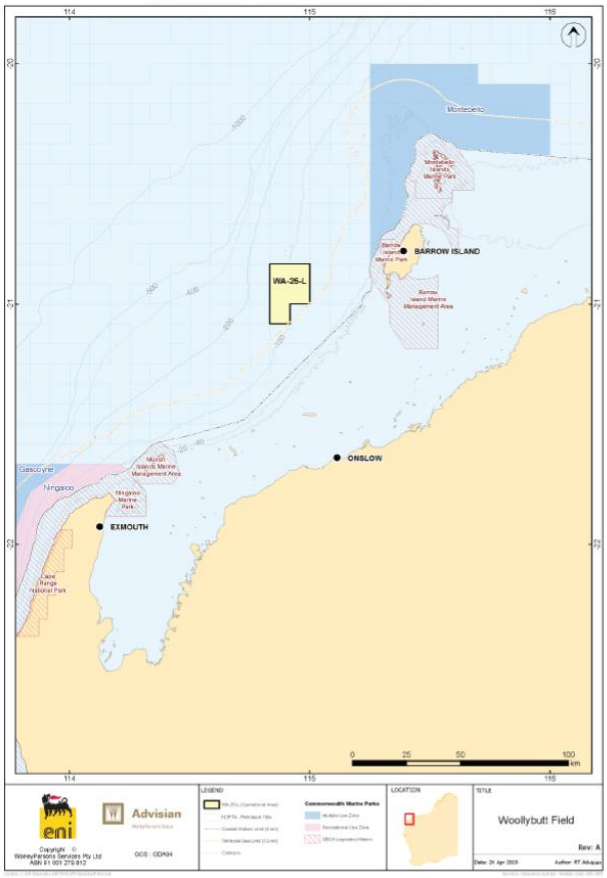
[redacted]

[redacted]

[redacted]

[redacted]

Attachment 1: Location of WA-25 L



Attachment 2: Woollybutt field layout

Figure 1 of 3

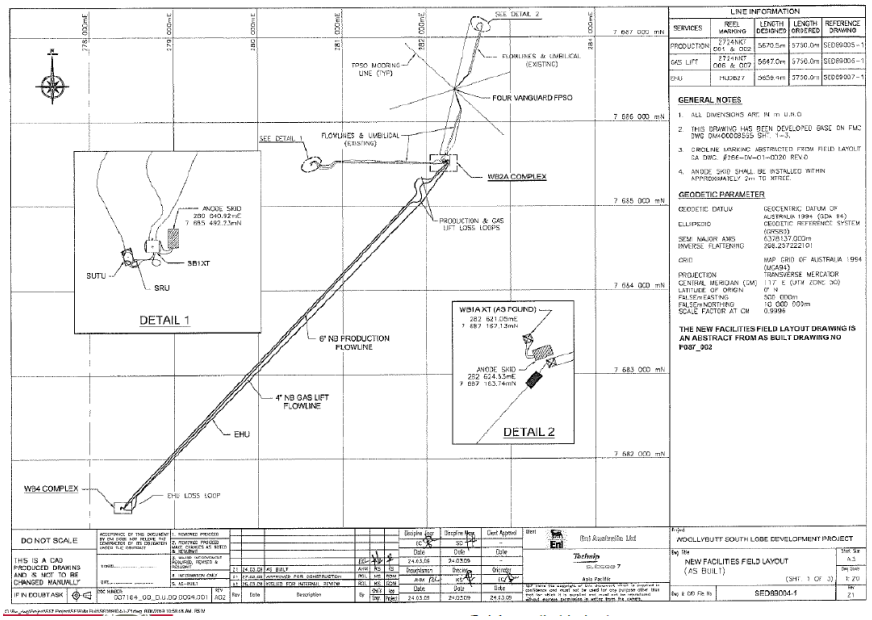


Figure 2 of 3

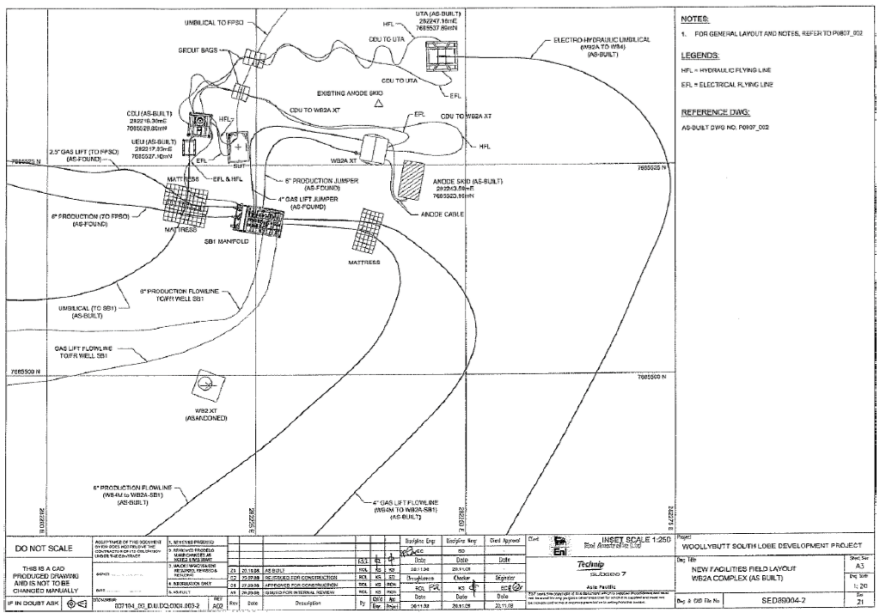
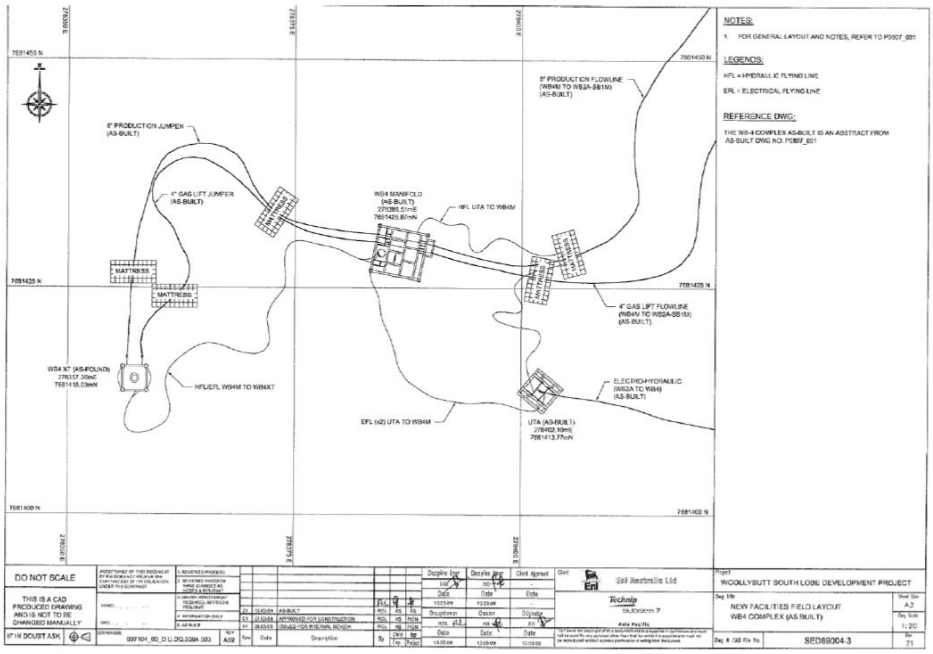


Figure 3 of 3


NOTES:
1. FOR GENERAL LAYOUT AND NOTES, REFER TO P0927_001
LEGENDS:
HFL = HYDRAULIC FLYING LINE
EFL = ELECTRICAL FLYING LINE
REFERENCE DWG:
THE WB-4 COMPLEX AS-BUILT IS AN ABSTRACT FROM AS-BUILT DWG NO. P0927_001
6" PRODUCTION JUMPER (AS-BUILT)
6" GAS LIFT JUMPER (AS-BUILT)
WB4 MANIFOLD (AS-BUILT) 270385.51mE 7651429.87mN
HFL UTA TO WB4M
6" PRODUCTION FLOWLINE (WB4M TO WB2A-SB1M) (AS-BUILT)
4" GAS LIFT FLOWLINE (WB4M TO WB3A-SB1M) (AS-BUILT)
MATTRESS
WB4 XT (AS-FOUND) 270337.20mE 7651418.53mN
HFL/EFL WB4M TO WB4XT
ELECTRO-HYDRAULIC (WB2A TO WB4) (AS-BUILT)
EFL (x2) UTA TO WB4M
UTA (AS-BUILT) 270402.93mE 7651413.77mN
7651450 N
7651425 N
7651400 N
DO NOT SCALE
THIS IS A CAD PRODUCED DRAWING AND IS NOT TO BE CHANGED MANUALLY
IF IN DOUBT ASK
Eni Australia Ltd
Technip
Subsea 7
Asia Pacific
WOOLLYBUTT SOUTH LOBE DEVELOPMENT PROJECT
NEW FACILITIES FIELD LAYOUT
WB4 COMPLEX (AS-BUILT)
SED89004-3
A3
1:20
21

25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)

Stakeholder Consultation

Eni Australia Limited (Eni) is currently undertaking ongoing field management activities within the Woollybutt field, located in Production Licence WA-25-L within Commonwealth waters. Woollybutt production ceased in 2012 and all associated subsea equipment remains in the Woollybutt field and within a 500 m Petroleum Safety Zone (PSZ).

Eni has an Environment Plan (EP) in place for the current ongoing field management activities, which was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in 2019.

Eni is submitting a revised EP to NOPSEMA for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (the regulations) to reflect the current status of the subsea field infrastructure, the proposed P&A activities and the proposed recovery of certain subsea production equipment.

Consultation material provided in 2015, 2016 and 2019 has kept stakeholders informed regarding the status of the Woollybutt field and future plans. This consultation bulletin provides an update on ongoing field management, field status and proposed plug and abandonment (P&A) and equipment recovery activities.

Current status of equipment

In January 2020, during visual inspection by a remotely operated vehicle (ROV), the Woollybutt Disconnectable Single Point Mooring (DSPM) was noted to have sunk to the seabed from its previous location at 35 m water depth due to a buoyancy failure.

In August 2020, one mid-depth buoy (MDB) was noted to have risen to the sea surface from its previous location at 50 m water depth, due to tether failure.

The floating buoy remains stationary within the 500 m Petroleum Safety Zone and is under 24-hour surveillance by a dedicated vessel on location. Inspection confirms there is no evidence of hydrocarbon release. At the time of writing, remediation planning is ongoing to remove the hazard.

All other subsea production equipment, including the second MDB, remains in place within the Woollybutt Field 500 m PSZ.

Location

The Woollybutt field is located in production license WA-25-L in approximately 100 m of water, 65 km north of Onslow and 35 km west of Barrow Island (Attachment 1) within Commonwealth waters. A summary of the key field infrastructure, locations and status are provided in Table 1.

The Woollybutt field subsea infrastructure are marked on nautical charts surrounded by a 500 m Petroleum Safety Zone (PSZ), which excludes other marine users from the area (Attachment 2).

Table 1: Summary of the Key Woollybutt Infrastructure

Infrastructure	Longitude	Latitude	Status
Scallybutt-1 well (SB1)	114 53.447	-20 55.078	Shut-in production wells to be P&A.
Woollybutt-4 well (WB4)	114 52.102	-20 53.27	
Woollybutt-2A well (WB2A)	114 54.373	-20 55.069	
Woollybutt-1 well (WB1)	114 54.524	-20 54.266	
Woollybutt-3A (WB3A)	114 52.406	-20 58.043	Suspended wells – may be included in P&A campaign.
Woollybutt-5A (WB5A)	114 51.703	-21 00.000	
Disconnectable Single Point Mooring (DSPM)	114 54.441	-20 54.599	The DSPM is currently located on the seabed,

			located within the 500 m PSZ.
Mid-depth buoy (north), chains and gravity base	114 54.450	-20 54.582	The northern mid-depth buoy is currently floating on the sea surface within the 500 m PSZ and is under 24-hour surveillance.
Mid-depth buoy (south), chains and gravity base	114 54.444	-20 54.646	The southern mid-depth buoy remains in place at 50 m water depth.

Activities

The revised EP includes activities relating to the field management, well plug and abandonment (P&A) activities and recovery of certain subsea production equipment.

Activities undertaken as part of the scope of the revised EP are presented in Table 2.

Table 2: Summary of Activities

Activity	Summary	Frequency and duration
Field Management	Use of remotely operated vehicles (ROV) deployed from a vessel to perform field management scopes, including: • Cathodic Protection (CP) surveys; • General Visual Inspections (GVI); • Inspection, monitoring, maintenance and repair (IMMR).	On an ongoing basis, as per the Eni Integrity Management Plan (IMP) strategy. Typically undertaken in 7-14 days.
P&A	Mobilisation of an Intervention Vessel (IV) to the field with integrated services to perform well P&A on four to six wells. Logistical support is provided by up to three offshore support vessels and helicopter services. Well P&A activities will include the setting of plugs and cement barriers at specified depths in the wells to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment. Following plugging, wellheads will be cut at the seabed and retrieved.	Target execution window is 2Q 2021 – 2Q 2022[1]. It is anticipated P&A of each well will take approximately 10-20 days.
Recovery of subsea production equipment	The recovery of subsea production equipment will be undertaken using the IV and support vessels. The following equipment is proposed to be recovered from the field and taken to shore for disposal, recycling or reuse, in accordance with applicable legislation: • Mid-depth buoys, chains/tether and gravity bases; • Disconnectable Single Point Mooring; • Subsea structures (including manifolds and umbilical termination assemblies). During the activity, anchors, chains, flowlines and umbilicals will be disconnected, and remain in situ until future decommissioning.	Target execution window for mid-depth buoy removal is Q4 2020[1]. Removal of DSPM and listed subsea structures to follow the P&A campaign and anticipated to take approximately 20-30 days.

Note 1: subject to project variables including but not limited to vessel availability, regulatory approvals and weather.

Environmental Management

Eni assessed the environmental risk assessment for the ongoing field management, proposed P&A activities and removal of subsea production equipment, giving consideration to activity timing, durations, location and

potential environmental impacts. Management measures will be implemented to reduce the impacts and risks to as low as reasonably practicable and to an acceptable level.

Table 3 provides a summary of potential key environmental risk and/or impacts and associated management measures identified.

Table 3: Potential Key Environmental Risks and Management Measures

Environmental Risk and/or Impact	Risk Description	Mitigation and/or Management Measure
Interaction with other users – vessels and subsea equipment	Presence of vessels and the 500 m PSZ in the field may exclude other marine users from the area.	Eni will notify regulatory authorities and marine users on the activities as required.
Routine marine discharges	Vessels will discharge water, cooling water and sewage/grey water to the marine environment.	All routine marine discharges will be managed according to legislative requirements.
Chemical use / discharge	Minor quantities of chemicals will be released to the marine environment during field management, P&A and recovery of subsea equipment.	Chemical use will be managed in accordance with an environmental selection process.
Seabed disturbance	Removal of subsea infrastructure will disturb the area in which the equipment was once placed.	Procedures will be followed to limit seabed disturbance during recovery of subsea equipment.
Floating mid-depth buoy interaction with other users	Movement of the floating mid-depth buoy outside of the 500 m PSZ could present a navigational hazard to other users.	The floating mid-depth buoy is under 24-hour surveillance and will be removed and disposed of onshore in accordance with legislative requirements.
Marine fauna interaction	Vessels used for the activities have the potential to interact with marine fauna (e.g. collisions).	Measures will be taken to protect marine fauna from vessel activities.
Loss of containment	Loss of containment of hydrocarbons to the marine environment may occur during refuelling at sea or in the event of a vessel collision or a loss of well control / well leak.	Appropriate fuel transfer procedures and equipment will be used to prevent spills Procedures to reduce the potential for uncontrolled hydrocarbon releases will be followed. Response plans and equipment will be in place and maintained to manage spills to the environment.
Introduction of marine pest species	Introduction and establishment of invasive marine pests to the area via vessels ballast water or biofouling on vessel hulls.	All vessels will be assessed and managed as appropriate to prevent the introduction of marine pests. Vessels will comply with biosecurity requirements.

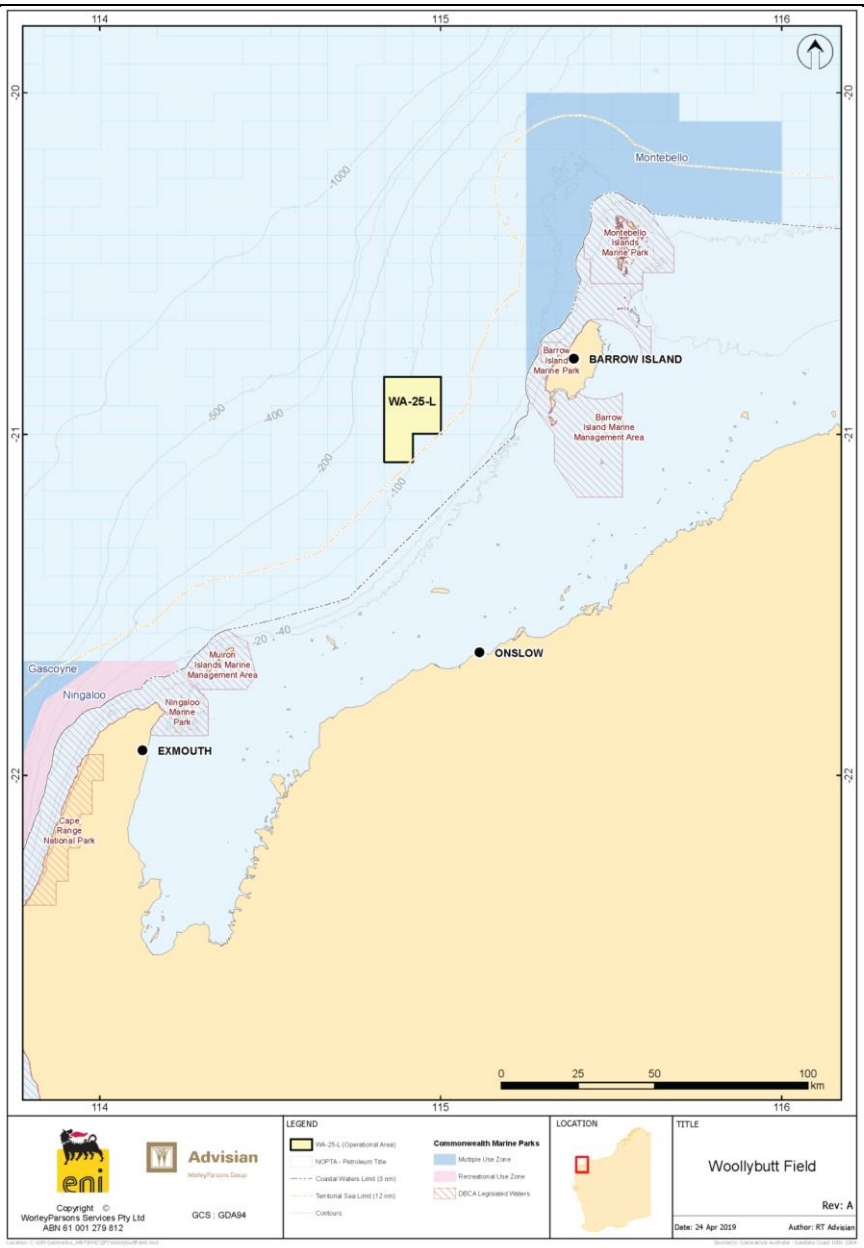
Future Decommissioning

Decommissioning of the remaining Woollybutt field subsea components (anchors, chains, four non-production well heads, flowlines and umbilicals) will be subject of a separate EP.

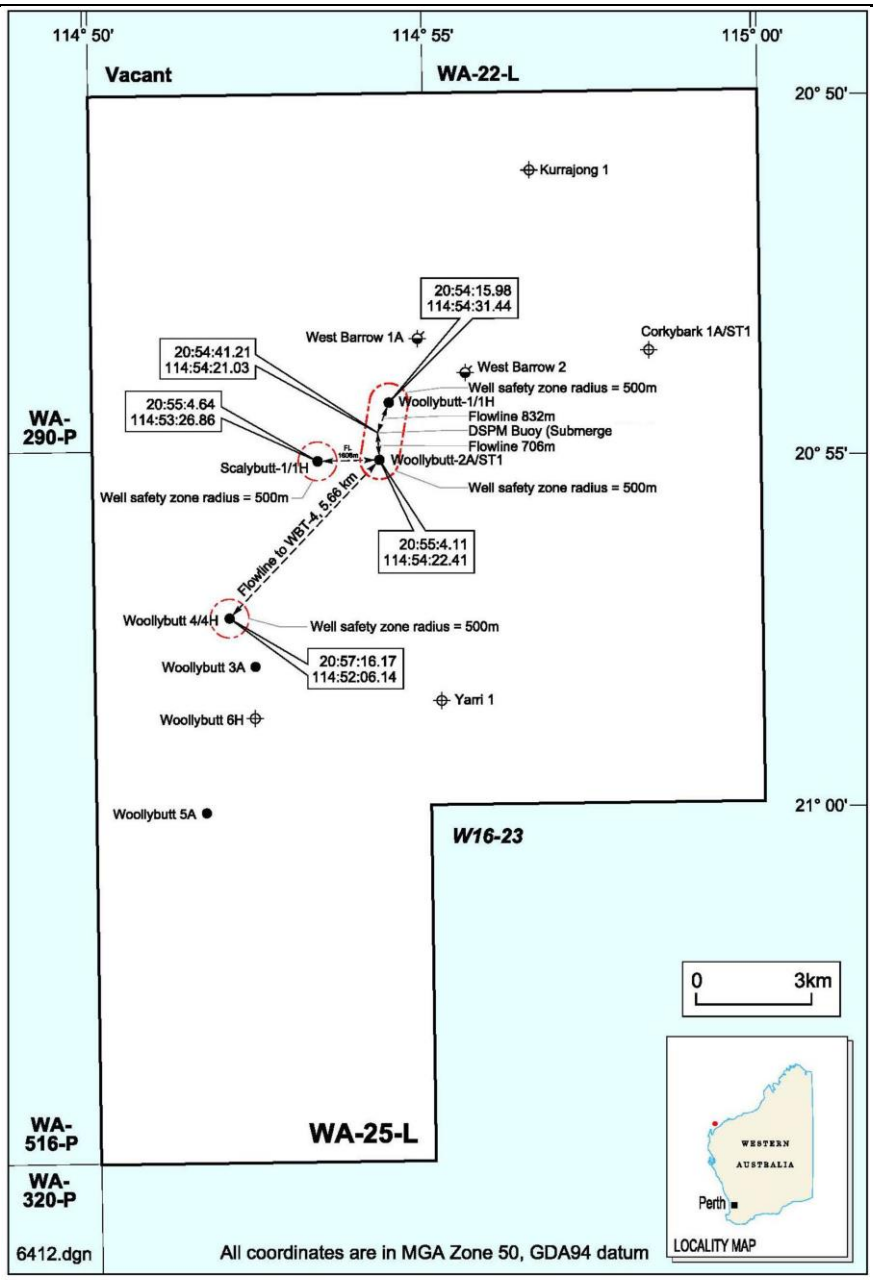
Until decommissioning, field management will be ongoing to maintain remaining components in accordance with Section 572 of the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGS Act). Remaining flowlines range from 2½" to 6" in diameter and approximately 20 km in total length, and umbilicals are 3½" in diameter and approximately 8 km in total length.

A comparative assessment process has been undertaken to evaluate a range of decommissioning options for the remaining components, including complete removal, partial removal and leave insitu. Options were

	assessed with respect to technical, health and safety, environmental, economic and socioeconomic risks. The assessment has determined that leaving the remaining components insitu would provide the best overall outcome. In particular, the equipment would continue to provide hard substrate for marine habitat growth on an otherwise featureless seabed. Studies are ongoing and stakeholder feedback will be taken into consideration. **Stakeholder Comment and Feedback** Your comment is sought in relation to any potential impact that the ongoing field management, proposed well P&A activities and recovery of subsea production equipment may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 26 October 2020 to the contact details provided below. Eni also seeks any comment from stakeholders regarding insitu decommissioning of remaining subsea components, and whether they would like to continue to be consulted in these matters as the decommissioning EP is developed. All comments provided will be considered in the respective revision of Eni's Woollybutt EP to be submitted to NOPSEMA, in accordance with the OPGGS Act. All communications in relation to this should be directed to: [redacted]



Attachment 1: Location of WA-25 L



Attachment 2: Woollybutt Field 500m Petroleum Safety Zone

AHO (previously AHS)	**20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO)** (see details of correspondence under AFMA above)
	24.03.2021 – Email update sent (see details of correspondence under AFMA above)
	09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2) (see details of correspondence under AFMA above)
	25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD) (see details of correspondence under AFMA above)
AMSA	**20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO)** (see details of correspondence under AFMA above)
	24.03.2021 – Email update sent (see details of correspondence under AFMA above)
	11.03.2021 – Email response from AMSA received Good morning [redacted]

	Thank you for contacting the Australian Maritime Safety Authority regarding the Woollybutt Field Decommissioning. We note the update and have no concerns as the decommissioning infrastructure will remain in-situ and will not require any vessel based activities. Regards [redacted]
	09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2) (see details of correspondence under AFMA above)
	25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD) (see details of correspondence under AFMA above)
DBCA (previously DPAW)	**20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO)** (see details of correspondence under AFMA above)
	24.03.2021 – Email update sent (see details of correspondence under AFMA above)
	09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2) (see details of correspondence under AFMA above)
	25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD) (see details of correspondence under AFMA above)
DoD	**11.02.2022 – Email follow-up sent** Dear Sir/Madam, Just following up if you have any comment on the proposed activity detailed in the email below. Kind Regards [redacted]
	20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO) (see details of correspondence under AFMA above)
	24.03.2021 – Email update sent (see details of correspondence under AFMA above)
	09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2) (see details of correspondence under AFMA above)
	25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD) (see details of correspondence under AFMA above)
DoT	**10.02.2022 – Email response received from DoT** Hi [redacted] Thank you for the clarification. Kind Regards, [redacted]
	07.02.2022 – Email response sent to DoT Hi [redacted] Thanks for your reply. Whilst there is a spill risk to State waters, Eni are utilizing the already NOPSEMA accepted Woollybutt OPEP (000105_DV_PR.HSE.1045.000), which covers all response requirements from a spill during the Woollybutt decommissioning. A link to that OPEP can be found here: https://docs.nopsema.gov.au/A786335 Kind Regards [redacted]

19.01.2022 – Email response received from DoT

Hi [redacted]

If there is a risk of a spill impacting State waters from the proposed revised activities, please ensure that the Department of Transport is consulted as outlined in the Department of Transport Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020) which can be accessed here - https://www.transport.wa.gov.au/mediaFiles/marine/MAC_P_Westplan_MOP_OffshorePetroleumIndGuidance.pdf

Kind Regards,

[redacted]

Maritime Environmental Emergency Response Intelligence Officer | Maritime | Department of Transport

20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO)

(see details of correspondence under AFMA above)

30.08.2021 – Email update sent

Hi [redacted]

I refer to the last email correspondence between yourself and Sarah Blackford on 24 March 2021. Further to this email, Eni have updated their decommissioning strategy and would like to inform you of an additional activity that will be required as part of the decommissioning.

ENI propose to undertake decommissioning monitoring to:

- Verify decommissioning activities have been completed in accordance with the approved EPs
- Determine if there has been any change in sediment quality from the baseline monitoring data.

The monitoring will require vessel-based activities and therefore there is a risk of a potential vessel based spill.

Risks of vessel-based spills (500 cubic meter diesel spill) have been previously assessed in Section 8.7 of the approved Woollybutt Field Management, Plug and Abandonment and Equipment Removal Environmental Plan (EP) available at the following link and will be the same risks for the decommissioning monitoring. These risks will also be included in the decommissioning EP currently being prepared.

https://docs.nopsema.gov.au/A786331

An Oil Pollution Emergency Plan (OPEP) is also available for the approved Woollybutt Field Management, Plug and Abandonment and Equipment Removal EP. Decommissioning monitoring activities will be undertaken in accordance with measures relating to vessel-based activities in the approved OPEP located at the following link for your reference:

https://docs.nopsema.gov.au/A786335

Your comment is sought in relation to any potential impact that the decommissioning monitoring might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 30 September to [redacted].

Kind regards,

07.04.2021 – Email response received

Hi [redacted]

Thank you for your update. We do not have any further queries from the oil spill response perspective.

Kind Regards,

24.03.2021 – Email update sent

Hi [redacted]

Thanks for your response. I can confirm that there is no oil spill scenario associated with the activity that Eni propose and no vessel based activities are planned.

Further to my email dated 10 March 2021 Eni have updated their decommissioning strategy and would like to inform you of one additional piece of infrastructure that is proposed to be decommissioned in situ, the Corkybark wellhead.

The Corkybark well is an abandoned exploration well, located within the Woollybutt field at the following coordinates:

Eastings	Northings	Longitude	Latitude
289233	7688393	114.9736806	-20.8928668

The figure showing the location of the Woollybutt field is attached.

In 2000 Eni attempted to remove the wellhead, however due to technical and safety issues the wellhead could not be completely removed. The portion of the wellhead that was unable to be removed remains on the seabed, extending up to 1.3m in height. The wellhead is comprised entirely of steel and does not contain any operational fluids or plastics. A photo showing the Corkybark wellhead is also attached.

As part of Eni's strategy for decommissioning the Woollybutt field, they are seeking approval from NOPSEMA to leave Corkybark wellhead in situ. The potential impacts from this are detailed in the table below:

Environmental Risk and/or Impact	Risk Description
Interaction with other marine users	Leaving the Corkybark wellhead in situ will result in a long term physical presence on the seabed. This has potential to interact with other marine users, particularly those who have activities that also interact with the seabed. These potential impacts will be assessed in the EP and will include mitigation measures such as long term identification of infrastructure on marine charts.
Discharge of material to the marine environment	Long term degradation of the Corkybark wellhead may occur. As the wellhead corrodes and degrades the constituents making up the wellhead will be released to the environment. Iron, the main consistent of wellheads (about 98%) is not considered a significant contaminate in the marine environment. Other constituents represent less than 2% of the wellhead's composition and impacts to marine environment from these is extremely low. Degradation modelling of the wellhead has shown that it could take up to 250 years to corrode. The EP will assess the potential impacts to the marine environment from the breakdown of materials.
Benefits to benthic habitats	Observations of the Woollybutt infrastructure indicate that benthic habitat has become established. This is expected to provide ongoing benefits to benthic habitats in the Woollybutt field area. Fish habitat studies are underway to quantify the benefit that the long term presence of the subsea infrastructure may have

		on benthic habitats and an assessment of this will be provided in the EP.

Eni are now also seeking your feedback on the Corkybark wellhead being left in situ in addition to the infrastructure already communicated in previous correspondence, being:

- DSPM anchors and chains
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers
- Umbilical crossing mattresses

Our original correspondence sought feedback by the 31st March 2021, however we have now extended this to the 16th April 2021 to allow for this additional information to be considered.

Thanks

18.03.2021 – Email response received

Hi [redacted]

If there is a risk of a spill impacting State waters from the proposed activities, please ensure that the Department of Transport is consulted as outlined in the Department of Transport Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020) which can be accessed here - https://www.transport.wa.gov.au/mediaFiles/marine/MAC_P_Westplan_MOP_OffshorePetroleumIndGuidance.pdf

Kind Regards,

09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2)

(see details of correspondence under AFMA above)

25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)

(see details of correspondence under AFMA above)

DoAWE

20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO) (see details of letter contents under AFMA above)

Dear Sir/Madame,

As a stakeholder with interests in the area, Eni would like to provide an update on the decommissioning strategy for the Woollybutt Field. Please refer to the attached bulletin (HSE.LT.6636.JVP.JCO).

The Woollybutt Field Decommissioning Environment Plan (EP) is currently under National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) assessment. In response to NOPSEMA comments made during the assessment of the EP a review of comparative assessment of decommissioning options has been undertaken for all remaining subsea infrastructure. As a result a revised decommissioning strategy has been selected by Eni. Based on internal evaluation, Eni will recover the majority of the remaining subsea infrastructure (including all components containing plastics) which provides better environmental, technical and safety outcomes than leaving in situ.

Previous consultation with DoAWE relating to the decommissioning strategy for the Woollybutt Field has been included in the attached (previous consultation). Previous consultation advised that Eni were planning to leave in situ flowlines and umbilicals, concrete mattresses, grout bags and mooring anchors and chains. The decommissioning strategy has been revised and flowlines and umbilicals, concrete mattresses, grout bags and anchor chains (above the seabed) are now to be recovered. The following Woollybutt Field subsea infrastructure is proposed to be decommissioned in situ:

- anchor chains (below seabed component)
- anchors (partially buried and embedded in a cemented sand, risk of snagging is low)

In situ decommissioning of the above infrastructure does not require any vessel based activities. However recovery of subsea infrastructure (including flowlines and umbilicals, concrete mattresses and grout bags)

will require mobilisation of vessels to the Woollybutt Field. Please refer to the attached bulletin for further information (HSE.LT.6636.JVP.JCO).

Eni have submitted a sea dumping permit application (SD2021-4011) for leaving infrastructure within the Woollybutt field in situ. This application is currently under assessment with DoAWE and Eni are providing further information to support the application. Correspondence relating to this application will be made separately.

Your comment is sought in relation to any potential impacts that this updated decommissioning program, which is covered by the Woollybutt Field Decommissioning EP might have on your functions, interests or activities. If you wish to provide any feedback, please do so by 28 January 2022 to [redacted]

Kind Regards

22.03.2021 – Teleconference between Eni and DoAWE

MINUTES OF MEETING:

SUBJECT: Woollybutt Field – Sea Dumping Consultation

HELD AT: Level 5, 226 Adelaide Terrace, Perth 6000 (Teleconference)

DATE OF MEETING: 22 March 2021, 12:30 pm

ATTENDEES: [redacted] (Eni) [redacted] (Associated Director – Sea Dumping Section) [redacted] (Eni) [redacted] (Sea Dumping Section)

DISTRIBUTION: Eni attendees, [redacted], [redacted], [redacted], [redacted]

- Introductions
- TL – Overview of Equipment and Woollybutt Field. Equipment proposed for insitu abandonment includes:
  - Corkybark-1 wellhead
  - Flowlines and umbilicals
  - Concrete mattresses and grout bags
  - Mooring anchors and chains
- TL – Eni intends to submit the applications in the next couple of months and would like to understand the typical sea dumping application submission and assessment and whether there will be any impacts from the ongoing regulatory review. Eni has previously submitted an SDP for the two Vesta wells in 2017 – and at that time both NOPSEMA and Department of Environment and Energy were both keen to see mutual progress of the EP and SDP applications before making any decision.
- DAWE – overview of Sea Dumping Act and Permit

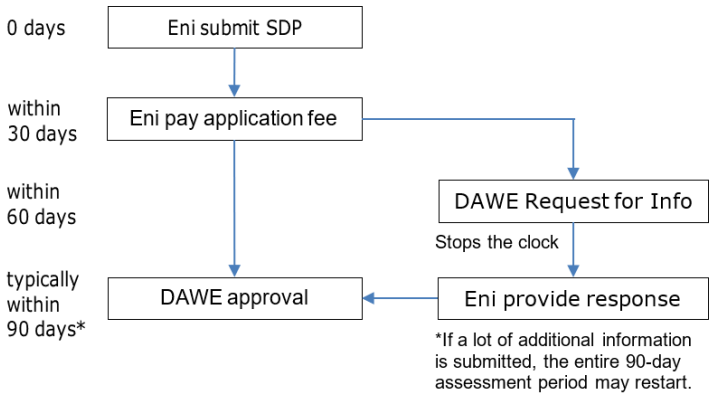
  o Sea dumping permits are issued in accordance with the Environment Protection (Sea Dumping) Act 1981 and the London Protocol. This legal framework is supplemented by guidance material published by the International Maritime Organisation (IMO). Guidelines are intended for use by national authorities responsible for regulating dumping of wastes to guide the evaluation of applications for dumping of wastes in a matter consistent with the provisions of the London Protocol. However, the guidelines do not replace the requirements described in Annex 1 ("Wastes or other matter that may be considered for dumping") or Annex 2 ("Assessment of Wastes or other matter that may be considered for dumping") of the London Protocol.

  o In October 2019, the Revised specific guidelines for assessment of platforms or other man-made structures at sea were approved at the Meeting of the Parties to the London Protocol and subsequently issued by the IMO. The revised guidelines provide a broadened definition of platforms, which may have implications for the department's approach to permitting of abandoned infrastructure at sea. Accordingly, the department is reviewing its regulatory arrangements for decommissioning of offshore oil and gas infrastructure, including consideration of the amendments to these guidelines, and plan to consult with industry in due course regarding potential changes to our approach. Until our position is resolved, the department will continue to consider proposals to abandon infrastructure at sea on a case-by-case basis.
- EP & SDP interaction
  - TL asked whether the DAWE will need to see EP acceptance before they make a decision on the SDP. DAWE confirmed that the EP and SDP are separate regulatory processes and

EP acceptance is not a pre-requisite for SDP approval. SDP is an independent application irrespective of EP outcome. However the following need to be considered in the SDP:

- ☐ Assessment against EPBC matters (which are also assessed in the EP);
- ☐ Any related approvals, including DME, WOMP and EP.

- SDP assessment timeframe
  - o TL asked about the typical assessment timeframe. DAWE explained the assessment timeframe as follows:
  - o The minimum assessment period is 90 days (not including the day of submission).
  - o Once an SDP application is confirmed to be complete and all necessary fields have been filled in, the clock starts.
  - o Within 30 days, the application fee must be paid otherwise the application is considered to have not been made.
  - o Within 60 days, DAWE will typically revert with a Request for Information, at which point the clock stops on the assessment period.
  - o When the additional information is provided, the assessment restarts – if the additional information is limited, then a decision may be reached within the remaining 90 days on the assessment timeframe, otherwise if a lot of information has been requested, the entire 90-day assessment period may restart.
  - o DAWE encouraged Eni to provide as much relevant information as possible in the initial submission.
  - o Note: the application fee is per application, regardless of the number of equipment included.



- DAWE – other considerations for the Sea Dumping Permit
  - o The SDP needs to consider Matters of National Significance under the EPBC Act and should include a Protected Matters Search and also assessment against the requirements for an EPBC Referral.
  - o The SDP needs to assess potential impacts and present a hypothesis for likely impacts, including:
    - ☐ Timeline for degradation;
    - ☐ Types and quantity of material released;
    - ☐ Whether the release is localised or diffuse;
    - ☐ Where released materials will end up etc.
  - o The SDP needs to assess waste management against requirements of any relevant conventions (e.g. London Protocol, Stockholm Convention on Persistent Organic Pollutants) and demonstrate alternatives have been considered (e.g. comparative assessment).
  - o Should any research or external specialist technical advice be required for DAWE to complete their assessment, the proponent may be requested to carry out the research or may be required to cover the cost of the research or external specialist technical advice.
- Multiple vs combined SDPs
  - o SG queried whether, for multiple pieces of equipment, it is better to combine the equipment in one SDP or split across multiple SDPs – DAWE declined to comment on how a proponent structures its applications, but noted that

	o SDP fee is applicable to each application, irrespective of equipment included. • Anchors o TL queried whether an SDP is required for the anchors even through buried – DAWE confirmed an SDP is required for materials in the subsoil. • PVC associated with grout bags and concrete mattresses o TL queried whether the PVC bags and fibres associated with the grout bags and concrete mattresses would present an issue for obtaining SDP approval – DAWE declined to comment on those specific elements but suggested to include it in the SDP and ensure all relevant information is provided, e.g. degradation rate, current condition and dispersion timeframes. DAWE offered to provide any other advice about the SDP approval process and regulations.
	18.03.2021 – Email received Hi [redacted], Would you be available for a MS teams call Monday the 22nd 330pm AEST? My colleague [redacted] will join us. Let me know and I'll send an invite for you. Regards, [redacted]
	17.03.2021 – Email sent Dear [redacted], Thank you for the information. I appreciate the regulatory review is ongoing and complex. We do intend to submit sea dumping permit in the near future. I would like to have a chat to understand how we should best approach the Sea Dumping Permit application and assist the assessment process while the Department is reviewing its future permitting approach. Would you be available for a phone call later this week? Kind regards [redacted]
	16.03.2021 – Email received Dear [redacted], Thank you for your email in relation to the proposed abandonment of subsea infrastructure associated with the Woollybutt Field. As you would be aware sea dumping permits are issued in accordance with the Environment Protection (Sea Dumping) Act 1981 and the London Protocol. This legal framework is supplemented by guidance material published by the International Maritime Organisation (IMO). Guidelines are intended for use by national authorities responsible for regulating dumping of wastes to guide the evaluation of applications for dumping of wastes in a matter consistent with the provisions of the London Protocol. However, the guidelines do not replace the requirements described in Annex 1 ("Wastes or other matter that may be considered for dumping") or Annex 2 ("Assessment of Wastes or other matter that may be considered for dumping") of the London Protocol. As you may be aware, in October 2019, the Revised specific guidelines for assessment of platforms or other man-made structures at sea were approved at the Meeting of the Parties to the London Protocol and subsequently issued by the IMO. The revised guidelines provide a broadened definition of platforms, which may have implications for the department's approach to permitting of abandoned infrastructure at sea. Accordingly, the department is reviewing its regulatory arrangements for decommissioning of offshore oil and gas infrastructure, including consideration of the amendments to these guidelines, and plan to consult with industry in due course regarding potential changes to our approach. Until our position is resolved, the department will continue to consider proposals to abandon infrastructure at sea on a case-by-case basis. As the scenarios you have presented fall within the scope of the department's review, we are unable to provide with specific advice on your proposals until we have finalised the broader permitting approach on this issue. The department is currently working to finalise this review as expeditiously as possible, however, this is a highly complex matter and I am currently unable to provide you with a definitive date at this time. If you are proposing to abandon infrastructure in situ in the near future, prior to the department's permitting

	approach being finalised, you should submit an application to the department utilising the following form: https://www.environment.gov.au/resource/dispose-vessels-sea. We would be happy to further discuss this project, as it pertains to abandonment, at your convenience. Kind regards, Regards, [redacted]
	11.03.2021 – Consultation letter sent (OPS.LT.6416.SD v2) Dear Sir/Madam We would like to consult with the Department regarding the proposed abandonment of some subsea infrastructure associated with the Woollybutt Field. Attached is a bulletin outlining the current status of the field and proposed activities (e.g. P&A). The structures proposed for abandonment are outlined below, and details attached.

Structure	Qty	Description
Corkybark-1 wellhead	1	Abandoned well with temporary guide base and casing remaining
Mooring anchor chains	6	Steel
Mooring anchors	6	Steel coated with two-part epoxy. Embedded and buried beneath seabed
Concrete mattresses	8	Concrete, PVC, fibre
Umbilicals	~10km total	Bend stiffener material components include: Carbon Steel, Polyurethane, Silicone Base, Aluminium (Exposed Surface coated with Two-Part Epoxy) Bend restrictor material components include: stainless steel, polyurethane
6-inch flowlines	~10km total	Material components include: Carbon Steel, Polyethylene, Polypropylene, Polyurethane, Lead, Copper, PA11, Polyester, Aramid Fibre (Kevlar)
4-inch flowlines	~6km	
2½-inch flowlines	~4km	

	Could we arrange a meeting to discuss the project and the best way to approach the sea dumping permits? *(see details of correspondence under AFMA above for copy of the bulletin that was attached)*
DMIRS (formerly DMP)	**31.01.2021 – Email received from DMIRS** Hi [redacted] Thank you for the clarification. The Department of Mines, Industry Regulation and Safety (DMIRS) acknowledges receipt of the information sent on behalf of ENI on 20 December 2021 and 31 January 2022 relating to the updated decommissioning strategy for the Woollybutt Field. DMIRS notes that the proposed activity will be assessed under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and regulated by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). DMIRS has reviewed the notification and does not require any further information at this stage. Please provide pre-start notification confirming the start date of the proposed activity and a cessation notification to inform DMIRS upon completion of the activity to petroleum.environment@dmirs.wa.gov.au. Please see the Consultation Guidance Note for information pertaining to the reporting of incidents that could potentially impact on any land or water under State jurisdiction. Kind regards
	20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO) (see details of correspondence under AFMA above)
	04.06.2021 – Email received

Hi [redacted]

Thanks for the information below and for your time a short while ago to discuss.

Regarding Direction 805, it is DMIRS' understanding that Eni will seek to deviate from the requirement for full removal of property, pursuant to NOPSEMA's Section 572 maintenance and removal of property policy. I note the policy reflects that *"an EP must demonstrate that a deviation delivers equal or better environmental outcomes compared to complete property removal"*.

If the infrastructure was removed in full, the plastics would not be released to the marine environment. Regarding Eni's proposed decommissioning approach, offsetting the plastics in infrastructure to be decommissioned in-situ could reasonably be expected to have an equal environmental outcome. DMIRS recommends that Eni offset the plastics in infrastructure that will not be removed and adopt this in the related environment plan that Eni intends to submit to NOPSEMA.

Please note I was unable to locate the "end of 2023" timeframe referred to in your email below. The timeframes specified in the directions listed in schedule 1 are "on or before 31 December 2021" for direction 1, and then directions 2, 3 and 4 appear to be due within 12 months after all wells are plugged or closed off. As such, the matters in the directions would seem to be due by 31 December 2022 (at latest). You may wish to revisit or seek clarification regarding the timeframes.

Notwithstanding this, I note that page 10 of the abovementioned policy states *"where deviation/s to removal of property or relocation of property is proposed, titleholders are to address arrangements for long term monitoring and management"*. You may wish to seek legal advice and/or guidance from NOPSEMA if there is reasonable doubt as to whether the timeframes specified in the directions would exclude monitoring or other arrangements described in an EP (such as plastic/debris removal) occurring thereafter (i.e. after 31 December 2022).

DMIRS has no further comments at this time and welcomes further engagement with Eni on this proposal.

Please feel free to give me a call if you have any queries or wish to discuss.

Kind regards

[redacted]

24.05.2021 – Email sent

Hi [redacted]

Thanks for your email to [redacted] last week.

Eni have considered the possibility of partnering with other companies in the industry to participate in marine debris removal initiatives. However, given the timing of these initiatives they are not able to be committed through the Woollybutt Decommissioning EP. This is on the basis that decommissioning of the Woollybutt field needs to be completed by the end of 2023 (in accordance with a directive from NOPSEMA) and any marine debris removal initiative is likely to extend beyond this timeframe. This doesn't preclude Eni from continuing to explore options for participating in similar initiatives but Eni do not plan to specifically commit to it in the Woollybutt Decommissioning EP.

Please let me know if you have any further questions.

[redacted]

18.05.2021 – Email received

Hi [redacted]

Thanks for the clarifications below and apologies for my delayed response.

In some other proposals I'm aware of that involved decommissioning in-situ, where plastics may eventually be released to the marine environment measures were identified to offset them (e.g. through ocean plastics recovery initiatives). Have ENI considered similar measures for this proposal? Does it intend to implement such measures and will that extend to the full amount of ~206m^3 of plastics?

Kind regards

[redacted]

27.04.2021 – Email response sent

Hi [redacted]

Thank you for your email. I'm replying on Sarah's behalf as she is on leave.

Please see responses below:

Did the ERA identify any risks/impacts to State waters/lands from the proposed decommissioning approach?	There are no direct impacts to State waters or lands. There is potential for the unburied plastic portion (10-40%) of infrastructure to degrade over time (1000-10,000 years) and be released to the marine environment. These particulates will be dispersed by wind and ocean currents. There is potential for plastics to be released to state waters.
Is all of the infrastructure mentioned in your email on the seabed (e.g. risers)?	Yes all of the infrastructure is on the seabed and will not extend further 1 m above the sea floor.
Are there plastics in the infrastructure? If so, do you have an estimate of how much?	Volumes of plastics in Woollybutt infrastructure are outlined below. A degradation study recently undertaken on the Woollybutt infrastructure predicts that it is likely to self-bury between 60-90% over the next 30 years, therefore the majority of the plastic component of the infrastructure is expected to remain buried in-situ. Degradation of plastics is also expected to occur slowly over a period of 1000-10,000 years.

Infrastructure	**Volume of plastics (m^3)**
Flowlines	170
Umbilicals	36
Anchors and chains	0
Mattresses	<1

Please let me know if you require any additional information.

Kind regards,

[redacted]

20.04.2021 – Email received

Hi [redacted]

I tried giving you a call a short time ago but missed you.

I had a few quick queries as follows please:

- Did the ERA identify any risks/impacts to State waters/lands from the proposed decommissioning approach?
- Is all of the infrastructure mentioned in your email on the seabed (e.g. risers)?
- Are there plastics in the infrastructure? If so, do you have an estimate of how much?

Kind regards

[redacted]

24.03.2021 – Email update sent

(see details of correspondence under AFMA above)

09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2)

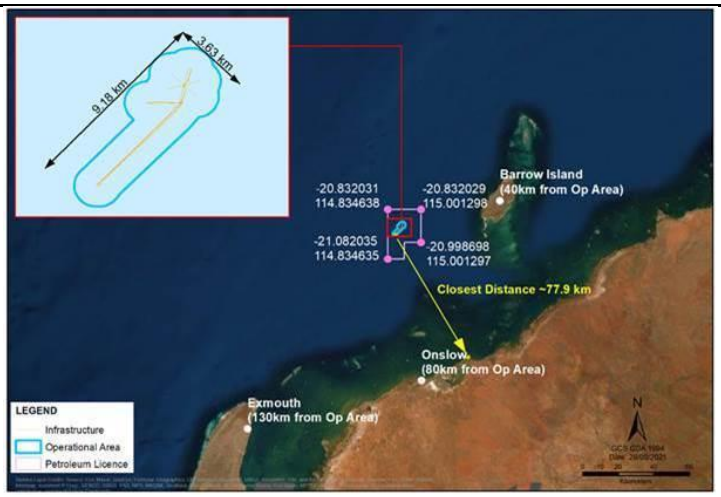
(see details of correspondence under AFMA above)

25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)

(see details of correspondence under AFMA above)

DPIRD	**20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO)** (see details of correspondence under AFMA above)
	09.08.2021 – Email sent Hi [redacted], I hope you are well. Just wondering if you have any feedback on the consultation material provided in March (attached for reference) and the additional comments provided below. Please feel free to call me if you have any questions. Kind regards, [redacted]
	28.05.2021 – Email sent Hi [redacted] I know you have been very busy and in and out of town for work recently, but have you had a chance to action the points in our email below? Thanks [redacted]
	17.05.2021 – Email sent confirming details of 11.06.2021 phone call Hi [redacted] Thanks for catching up with Advisian and Eni last Tuesday (11 May) to discuss the Woollybutt Decommissioning Environment Plan. As discussed, we have two points that we would like input from DPIRD on: 1. **Zone 1 of the Pilbara Trawl Fishery**: Other stakeholders have raised concerns about the potential for snag risks from the infrastructure that is proposed to be left in situ. As the area is currently in Zone 1 of the Pilbara Trawl Fishery it is currently closed to trawling and there are no short term snag impacts. However, we need to understand the potential for this area to be re-opened to trawlers in the future so that we can provide an assessment of the medium and long term snag risks. It would be useful if DPIRD could provide us with information on the likelihood of this area re-opening, or if that is not possible any other information such as the process for reopening a trawl area and reasons why the trawl area is currently closed would be useful. Furthermore, any information you can provide on the size of trawl equipment may be useful in helping us to determine what controls may be most appropriate for Eni to consider. Eni are also considering controls to mitigate the potential snag risk, these include rock dumping or installation of over-trawlable structures and marking infrastructure of nautical charges with a 500m exclusion zone. Can you please provide any comments or advice that DPIRD may have on these potential controls? 2. **DPIRD comments on the Proposal**: We provided DPIRD with consultation material in March and have not received feedback, if you do have feedback would you mind sending this through so that we can incorporate it into the EP, and work with DPIRD to close out any outstanding comments? Thanks [redacted]

	11.05.2021 – Phone call
	06.05.2021 – Email sent Hi [redacted] I just tried calling on the numbers below but both went to voicemail. I have a couple of questions for you in relation to Eni's proposal to decommission the Woollybutt Field and would also like to confirm whether DPIRD had any further comments on the material that we sent to you in March. If you have time would you mind calling me back on [redacted] Thanks [redacted]
	24.03.2021 – Email received Thanks for the update [redacted] Regards, [redacted]
	24.03.2021 – Email update sent (see details of correspondence under AFMA above)
	09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2) (see details of correspondence under AFMA above)
	25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD) (see details of correspondence under AFMA above)
Commonwealth Fisheries Association	**07.02.2022 – Email sent to Commonwealth Fisheries Association** Dear [redacted], Just following up on the below email. Do you have any comment on the proposed decommissioning and removal of infrastructure? Thanks [redacted]
	20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO) (see details of correspondence under AFMA above)
	01.04.2021 – Email sent *On behalf of Eni, WAFIC provided the following email correspondence to an alternative contact within Commonwealth Fisheries Association.* Dear [redacted] Eni Australia Limited (Eni) is currently planning and working on the decommissioning of the Woollybutt field, Eni is seeking your feedback as a stakeholder and peak body. This information has been sent to Ray Davies, the active Western Tuna and Billfish operator in this area, ASBTIA and the CFA. Please find in the attached fact sheet more information on the project activities. The focus of this consultation is the permanent abandonment of some infrastructure on the sea floor, for which a new environment plan (EP) titled 'Woollybutt Field Decommissioning EP' is being prepared (referred hereafter as the Decommissioning EP). **Location**: Approximately 80 km north of Onslow and 40 km west of Barrow Island.



Water Depth: Approximately 100 m.

Previous Activity Update:

- Plug and abandon all wells and remove a large amount of the site infrastructure planned for Q3 2021-2022.
- These activities have been previously communicated to you and the relevant EP is currently with NOPSEMA for assessment.

Activity Overview – Decommissioning EP:

The remaining Woollybutt infrastructure is planned to be decommissioned in situ (permanently left as is on the sea floor) and will be covered under the Decommissioning EP. It is the retiring of the remaining infrastructure and leaving this on site that Eni is specifically seeking your feedback on.

The Decommissioning EP involves zero activity at the Woollybutt site.

The infrastructure that is proposed to be left in situ includes:

- Disconnectable single point mooring anchors and chains
- Umbilical crossing mattresses
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers
- Corkybark wellhead

Potential impacts to commercial fishers:

The attached factsheet contains further information on the decommissioning activities as well as more information on each of the points below:

- The remaining infrastructure will be between 0.3m and 1m above the seabed with the Corkybark wellhead being the highest piece of infrastructure.
  - Potential snag hazard
- This infrastructure provides benthic habitat.
  - Fish aggregation site
  - See sub-sea photos in the attached fact sheet
- Eni have commissioned fish habitat surveys, preliminary results have identified habitat for the following commercial species: E. areolatus (Aerolate Grouper), L. malabaricus (Saddletail Snapper) and G. buergeri (Northern Pearl Perch).
- Eni have commissioned degradation studies to understand how the left behind infrastructure will react in the marine environment following decommissioning.
  - Made predominantly of steel and plastic, it is expected that the plastics will take 1,000 to10,000 years to degrade
  - 60% to 90% of the infrastructure is expected to self-bury within 30 years of decommissioning, which will mean some plastics will remain buried whilst others will over time enter the marine environment as microplastics and macroplastics
  - Long term degradation of subsea infrastructure may occur, especially micro and macro plastic
  - The Decommissioning EP will assess the potential impacts to the marine environment, marine mammals and key indicator species from the breakdown of these plastic and other materials

Exclusion Zones:

- All prior petroleum safety exclusion zones will be removed from the Woollybutt site.
- All remaining infrastructure will remain marked on navigation charts.

	WAFIC is sending this information out (via a blind email) on a fee-for-service basis on behalf of Eni to ensure peak bodies and commercial fishing license holders receive this in a timely manner via an accurate list. Eni needs your feedback. If you have any additional queries please contact [redacted] directly (on behalf of Eni) via: [redacted] or [redacted]. Best regards [redacted]
	24.03.2021 – Email update sent (see details of correspondence under AFMA above)
	09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2) (see details of correspondence under AFMA above)
	25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD) (see details of correspondence under AFMA above)
Raptis and Sons	**20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO)** (see details of correspondence under AFMA above)
	24.03.2021 – Email update sent (see details of correspondence under AFMA above)
	10.03.2021 – Email received Thanks for the update. No comment Regards [redacted]
	09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2) (see details of correspondence under AFMA above)
	25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD) (see details of correspondence under AFMA above)
Recfishwest	**28.01.2022 - Consultation letter received** Good morning [redacted] Thank you very much for providing Recfishwest with an update on the decommissioning strategy for the Woollybutt Field. Recreational fishing is an integral part of the Pilbara lifestyle. The region's unique coastline includes some of Australia's prime fishing locations and includes an array of offshore islands, coral reef systems and offshore habitats. This provides recreational fishers, ample fishing opportunities in the region. Recfishwest place the highest priority on preserving the marine environment and safeguarding the future of recreational fishing experiences which depend on healthy habitat and abundant fish stocks. Recfishwest believes that well considered decommissioning and reefing projects can provide positive social, environmental, and/or economic outcomes. Following a review of the bulleting you sent through, Recfishwest has no objections to the updated decommissioning strategy. Additionally, Recfishwest would like to kindly request to be consulted on any offshore decommissioning activities, irrespective of the distance from shore and that all charts are updated, so recreational fishers can locate the structure. Once again, thank you very much for providing Recfishwest with an update on the decommissioning strategy and for an opportunity to provide feedback. We wish to be regularly updated on the next steps for this decommissioning project and to continue discussions with you, as this project directly impacts recreational fishers and charter operators which we represent, and the healthy marine ecosystems we depend on. Kind regards,
	20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO) (see details of correspondence under AFMA above)
	22.04.2021 – Email sent Hi [redacted]

Thank you for your response. Eni acknowledges that more information is required for Recfishwest to establish a position regarding the decommissioning of the Woollybutt field and would welcome the opportunity to meet with you to discuss the decommissioning studies undertaken and Decommissioning Options Assessment further.

Please see Eni's response to your specific questions outlined below.

Comment	**Eni Response**
How was the recreational fishing community involved in the completed comparative assessment given it is a stakeholder	• The recreational fishing community was not involved in the Decommissioning Options Assessment process. This was on the basis that no recreational fishing is known to occur within the area of the Woollybutt field. Also it was acknowledged through the Decommissioning Options Assessment process that there is minimal fishing effort in and around the Woollybutt field generally, due to its deep offshore nature. • Eni would welcome the opportunity to meet with you to go through the Decommissioning Options Assessment process undertaken and supporting studies.
How did Eni assess the environmental risks? How were these deemed low when degradation and fish habitat studies have not been completed?	• Eni assessed environmental risks in accordance with Regulation 13 (5) of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* using the Eni Environmental Risk Assessment Process. Inputs to the risk assessment process included the completed version of the Woollybutt Degradation Assessment (Atteris, 2021), information from decommissioning engineers on the technical feasibility of removal and industry decommissioning experience, information from other fish ecology studies on flowlines and pipelines completed throughout the North West Shelf (NWS) and information from the Fish Ecology Study. A range of risk rankings were obtained from the risk assessment process, all impacts and risks will be managed to as Low as Reasonably Practical (ALARP). The risk assessment will be revisited once the Fish Ecology Report is finalized.
What are the materials and potential contaminants in the subsea infrastructure to be decommissioned (particularly the umbilical, flowlines and jumpers)?	• The infrastructure contains metals, plastics and concrete. All infrastructure has been cleaned and flushed under a separate EP and only fresh seawater will remain in the infrastructure at the commencement of the decommissioning EP. • The metal components consist predominantly of iron (~98%) which is not toxic in the marine environment. • The plastic components consist of a number of different polymers. The draft degradation report identifies one chemical that is classified as Persistent, Bioaccumulative and Toxic, this is PFOA (335-67-1). The draft degradation report is unable to conclusively say whether this chemical is likely to be present however, identified that there is potential for it to be a degradation product of the inner lining of the flowlines. However, given the slow rate of plastic degradation (1000-10,000 years), it is unlikely that if this chemical was present that it would occur in detectable concentrations.
What State and Commonwealth approval processes will be undertaken to abandon this infrastructure?	• An Environment Plan approved by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) will be required. • The Department of Agriculture, Water and Environment have confirmed that a sea dumping permit will be required to leave the infrastructure in-situ. • No state approvals are required given the infrastructure is proposed to remain in situ in commonwealth waters.

Should you require any further information in this regard please do not hesitate to contact me.

Thank you,

[redacted]

31.03.2021 – Email received

Dear [redacted],

WOOLLYBUTT FIELD DECOMISSIONING ON THE NORTH WEST SHELF – INVITATION TO CONSULT WITH ENI AUSTRALIA LIMITED

	Recreational fishing is an integral part of the Pilbara lifestyle. The region's unique coastline includes some of Australia's prime fishing locations and includes an array of offshore islands, coral reef systems and offshore habitats, providing ample recreational fishing opportunities which hold a plethora of high valued species including many species of emperor, tropical snapper, mackerel, billfish, trout, trevally and tuna, making it a key driver of visitation to the region, attracting visitors from around the state and country. The North West Shelf, where the Woollybutt field (Production Licence WA-25-L) is located, is close to recreational fishing and charter / tourism operator fishing locations and transit routes to the Montebello and Barrow islands, particularly for those travelling to and from Exmouth. Recfishwest is the recognised peak body representing the interests of the one in three Western Australians who go fishing every year. Recfishwest are a not-for-profit community-based organisation that strives to ensure high quality recreational fishing experiences are maintained and enjoyed. Recreational fishing in Western Australia is an important pastime with an estimated 750,000 Western Australians going fishing every year, making it the largest participation sport in the state. In addition to the numerous health and wellbeing benefits of fishing, recent studies have shown recreational fishers inject $2.4 billion dollars into the WA economy every year making fishing a vital economic driver for many regional centres. Recfishwest place the highest priority on preserving the marine environment and safeguarding the future of recreational fishing experiences which depend on healthy habitats and abundant fish stocks. Artificial reefs and alternative decommissioning strategies (Such as 'rigs-to-reefs' and similar programs) can create healthy and resilient marine ecosystems through the creation and retention of key marine habitats. Recfishwest have sought new opportunities in the reefing space and will continue to build our capability and knowledge about how marine infrastructure can benefit the environment, fish stocks, fishing experiences and our community. The North West Shelf is Australia's largest resources development, accounting for more than one third of Australia's LNG supplies. Between Exmouth and Port Hedland particularly, there are substantial oil and gas infrastructure developments. Recfishwest is becoming increasingly aware that much of this infrastructure is at the end of the operational life is scheduled for decommissioning. The base case for decommissioning oil and gas structures is through the complete removal from the marine environment. Recfishwest acknowledge that the complete removal of some infrastructure does not take account of the flow-on benefits that some structures currently provide to marine stakeholders and in some instances, it does not provide the greatest benefit to the marine environment. All decommissioning projects should assess the various possible decommissioning options; from complete removal through to the retention of infrastructure and enhancement with augmentation in the marine environment. Recfishwest believes that well considered decommissioning and reefing projects can provide positive social, environmental, and/or economic outcomes. Whichever option is chosen, it should strive for best practice. While we support retaining infrastructure along the North West Shelf on the principle that these structures provide important ecosystem functions and overall environmental benefit, the retention, augmentation and support of Recfishwest utilising any oil and gas infrastructure in the marine environment is dependent on Recfishwest's five Reefing principles. These principles stipulate that any reefing project utilizing marine infrastructure must; 1. Be defined by a distinct purpose which is focused on the best interest of the community; 2. Be environmentally safe and beneficial; 3. Be informed by science, where the design and configuration provide greatest benefit to the marine environment; 4. Contribute to a body of knowledge to provide continuous improvement and effectiveness of reefing practices; 5. Contribute to our long-term commitment to build capacity in the area of reefing by seeking new opportunities, building resilience, increasing stewardship, allowing for scalability and future proofing the environment and our fishing experiences. Recfishwest will not support any proposal for alternative decommissioning (including abandonment and the placement of artificial reefs) of assets from the petroleum industry that does not align to our reefing principles. The environment upon which our fishing experiences rely is our primary concern and we will never compromise the health of this environment. In reviewing the consultation bulletin we believe that there are currently substantial gaps that make it challenging to assess the impacts, risks and opportunities of this project, and consequently we cannot succinctly establish our position on the decommissioning outcomes of the Woollybutt Field on the North West Shelf. As such we would like to request further information with regards to the remaining subsea infrastructure covered by the decommissioning EP. This information includes: • How was the recreational fishing community involved in the completed comparative assessment given it's a stakeholder? • How did ENI assess the environmental risks? How were these deemed low when degradation and fish habitat studies have not been completed?

	• What are the materials and potential contaminants in the subsea infrastructure to be decommissioned (particularly the umbilicals, flowlines and jumpers)? • What State and Commonwealth approvals processes will be undertaken to abandon this infrastructure? Recfishwest would like to thank ENI Australia Limited for the opportunity to comment for on the Woollybutt Field decommissioning. We look forward to receiving additional information to assist us in assessing this project and its potential impact. We wish to be regularly updated on the next steps for this decommissioning project and to continue discussions with ENI, as this project directly impacts recreational fishers and charter operators which we represent, and the healthy marine ecosystems we depend on. Should you require any further information in this regard, please do not hesitate to contact me on [redacted] Regards, [redacted]
	24.03.2021 – Email update sent (see details of correspondence under AFMA above)
	09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2) (see details of correspondence under AFMA above)
	25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD) (see details of correspondence under AFMA above)
Western Australian Fishing Industry Council (WAFIC)	**03.03.2022 – Email received from WAFIC** [redacted] Thank you for providing the additional information, at this stage WAFIC as no further comment regarding the Woollybutt Decommissioning project. Kind regards [redacted]
	14.02.2022 – Email sent to WAFIC Hi [redacted] Thanks for your response. The below I hope provides the information to your questions. **Can you please confirm the footprint size of the proposed objects that will remain in situ (anchor chains, below seabed component and anchors), and can you confirm what Navigational requirements will be in place for these objects?** All anchors are Stevshark mooring anchors weighing 35 Te each. The table below provides the as-found coordinates from the most recent survey of the field in December 2021. It provides an accurate of the position of the DSMP anchors at present. Three of the anchors (ANC 73, ANC 133 and ANC 253) cannot be located as they are fully buried. ANC13 and ANC193 are buried but locatable. ANC 313 is partially buried, with limited protrusion above the seabed and likely to become fully buried as per other anchors (Fugro, 2021 survey). An image of ANC 313 is provided below.

SPM Anchor	Easting [m]	Northing [m]	Range To Target	Bearing To Target (True)
SPM ANC 13 Heading*	282,508	7,687,167	10.7m	324.1°
SPM ANC 73 Heading	Buried			
SPM ANC 133 Heading	Buried			
SPM ANC 193 Heading	282.150	7,685,605	1.45m	20.7°
SPM ANC 253 Heading	Buried			
SPM ANC 313 Heading	281,564	7,686,153.9	7.5m	261.9°

Whilst 5 or the 6 anchors are fully buried and the remaining anchor is anticipated to bury, Eni will contact the Australian Hydrographic Office (AHO) to ensure remaining infrastructure is marked on navigational charts should it be required.

Can you also please provide a summary of the expected long-term degradation of subsea infrastructure left in situ and the impacts to the marine environment from the breakdown of materials?

Eni commissioned a degradation assessment of the infrastructure to be left in-situ (anchors and below seabed components of anchor chains). The study involved engineering assessments to estimate the credible degradation mechanisms and degradation timelines, and provides an assessment of the materials that are likely to be released during degradation and their subsequent environmental fate.

The anchors and anchor chains are comprised of steel with an epoxy coating. The infrastructure has no cathodic protection and has already begun to corrode. External corrosion will take three forms: pitting, microbe-induced corrosion and general corrosion. A long-term steady state corrosion rate will establish, based on the diffusion of oxygen and nutrients to the surface of the steel. It is expected that corrosion will occur at a rate of 2.1 mm/year. Based on the thickness of the chains and anchors, full corrosion could occur within 40 to 150 years.

The mooring chains and anchors are comprised entirely of steel, of which the main constituent is iron (approximately 98%). Iron is not considered a significant contaminant in the marine environment and is only toxic to marine organisms at high concentrations. Steel is expected to degrade into iron oxides and iron hydroxides. These are not likely to be present in a bioavailable form given the origin (hard metal parts) and the pH of the ocean.

No known habitat or infauna habitat and is largely sandy substrate is present within the Operational Area, and there are no reefs or key ecological features within the Operational Area. As such, particles that remain in the Operational Area are unlikely to cause significant impact to benthic habitats. Additionally, the infrastructure proposed to be left in-situ is embedded in the seabed reducing the likelihood that particles will disperse into the marine environment, and the slow rate of corrosion will mean any dissolved particles that enter the water column remain in low concentrations

Thanks

[redacted]

07.02.2022 – Email received from WAFIC

Hi [redacted]

Thankyou for providing an update on the Woollybutt Decommissioning.

	Can you please confirm the footprint size of the proposed objects that will remain in situ (anchor chains, below seabed component and anchors), and can you confirm what Navigational requirements will be in place for these objects? Can you also please provide a summary of the expected long-term degradation of subsea infrastructure left in situ and the impacts to the marine environment from the breakdown of materials? WAFIC supports the approach for ENI to remove the majority of the remain subsea infrastructure, in particular infrastructure containing plastic materials. Kind regards [redacted]
	04.02.2022 – Email sent to WAFIC Hi [redacted] Just following up on the below email. Do WAFIC have any comment on the proposed decommissioning and removal of infrastructure? Thanks [redacted]
	20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO) (see details of letter contents under AFMA above) Dear [redacted] As a stakeholder with interests in the area, Eni would like to provide an update on the decommissioning strategy for the Woollybutt Field. Please refer to the attached bulletin. Previous correspondence relating to the decommissioning strategy for the Woollybutt Field has been included in the email chain below and in the attached (previous consultation). The Woollybutt Field Decommissioning Environment Plan (EP) is currently under National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) assessment. In response to NOPSEMA comments made during the assessment of the EP a review of comparative assessment of decommissioning options has been undertaken for all remaining subsea infrastructure. As a result a revised decommissioning strategy has been selected by Eni. Based on internal evaluation, Eni will recover the majority of the remaining subsea infrastructure (including all components containing plastics) which provides better environmental, technical and safety outcomes than leaving in situ. The following Woollybutt Field subsea infrastructure proposed to be decommissioned in situ under the Woollybutt Field Decommissioning EP: • anchor chains (below seabed component) • anchors (partially buried and embedded in a cemented sand, risk of snagging is low) In situ decommissioning of the above infrastructure does require any vessel based activities. However recovery of subsea infrastructure will require mobilisation of vessels to the Woollybutt Field. Please refer to the attached bulletin for further information. Your comment is sought in relation to any potential impacts that this decommissioning program might have on your functions, interests or activities. If you wish to provide any feedback, please do so by 28 January 2022 to [redacted] Kind Regards
	16.08.2021 – Email Received Hi [redacted] As previously advised below, the total removal of wellhead and other infrastructure would be the base case preferred option, this aligns with the NOPSEMA's policy - Section 572 Maintenance and removal of property *"Section 572(3) requires titleholders to remove property when it is neither used, nor to be used, in connection with the operations. NOPSEMA applies the following principles when considering compliance with this requirement: the Complete removal of all property is the base case*

for all offshore operations and should inform the basis for field development planning (as outlined in section 2.3 of the Australian Government's Offshore petroleum decommissioning guideline)"

Kind regards

[redacted]

09.08.2021 – Email Sent

Hi [redacted]

I hope you are well.

Just wondering if you have received any response from the Pilbara Trawl fishery on Woollybutt decommissioning?

Thank you,

[redacted]

04.06.2021 – Email Received

Hi [redacted]

Please find attached my suggested changes to the minutes.

To mitigate the snag risk and plastic issue, the best option is to remove the wellhead and the associated infrastructure, I assume this option is covered in the EP.

Have a good long weekend.

Kind regards

[redacted]

Minutes as agreed with WAFIC 04.06.21

Our Ref: TBC

SUBJECT:	Woollybutt Decommissioning Environment Plan (EP)
HELD AT:	Virtually via MS Teams
DATE OF MEETING:	13 May 2021
ATTENDEES:	[redacted]
DISTRIBUTION:	All attendees

Item	Agenda Items Agreed	Action By

	1	**Snag Risks** Background: During initial consultation WAFIC asked Eni to provide assurance of the long term safety case regarding infrastructure being left in situ. Eni responded confirming that the area is currently closed for trawling and in anticipation of the area re-opening to trawling in the future the infrastructure will continue to be marked on navigation charts. Points discussed at the meeting: WAFIC described the risk presented by seabed obstacles, whereby nets could become snagged and vessels may continue to travel some distance before the equipment becomes taut and exerts force on the vessel. WAFIC informed there have been instances in the industry where vessels have capsized. This is WAFIC's main concern when considering snag risks. WAFIC confirmed that the snag risk is not only related to the height of the infrastructure and also depends on the capacity of the catch at the time the snag happens. Eni discussed recent feedback received verbally from DPIRD which confirmed that for equipment left on the seabed the preference is for equipment to be marked on navigation charts rather than installation of over-trawlable structures. This is on the basis that there is not enough science to support that over-trawlable structures would completely illuminate the snag risk. WAFIC acknowledged this position. Eni confirmed that the controls that could be considered are: Marking infrastructure on navigation chats without an exclusion (already proposed in the EP) Marking infrastructure on navigation charts with an exclusion zone Install over trawlable structures and/or rock dumping WAFIC confirmed that marking on navigation charts should be a minimum expectation. WAFIC confirmed that the fishers would need to comment on the possibility of including an exclusion zone. Fishers preference would be to have no infrastructure left in situ to enable safe access to fishing grounds. WAFIC confirmed that there is not enough science to confirm whether over-trawlable structures would remove the snag risk completely and recommended options on future science that could be done to understand this further Cavitation Research Laboratory - Australian Maritime College | University of Tasmania (amc.edu.au) Proposed action to move forward: Eni to incorporate WAFIC feedback into the EP and accurately reflect the snag risk in the impact assessment of the EP WAFIC to follow up with trawl fishers on whether they have feedback on the controls that Eni could consider and provide the background and a reference on why that area is currently closed to the Pilbara Trawl Fishery.	Eni WAFIC
	2	**Potential for long term impact from plastics** Background: During initial consultation WAFIC asked Eni to comment on the impacts and cumulative impacts of plastic pollution and to provide comment on the combined total of plastics that are proposed to be left in situ offshore in the north west of Western Australia. Eni responded confirming key points on plastic degradation from the degradation report that has been prepared for the Woollybutt Decommissioning EP. Points discussed at the meeting: Eni confirmed that the information provided on degradation has come from the degradation modelling report prepared by Atteris specifically for the Woollybutt Decommissioning EP. Eni can provide a copy of this to WAFIC.	

		Eni confirmed that a sea dumping permit will be applied for under the *Environment Protection (Sea Dumping) Act 1981.* WAFIC suggested consideration of waste avoidance under the Sea Dumping Act will consider plastics and if this will remain in situ. Eni confirmed that cumulative impacts were difficult to provide a full picture of considering not all information on what is planned to be decommissioned has been made public by other operators. WAFIC confirmed that the international reputation of WA fish and the quality of seafood is outstanding and this is partially due to the fact that our oceans are clean. Therefore, concerns from fisheries around the impact of plastics on the marine environment and the actual impacts of plastics as well as the perceived impacts of plastics. This needs to be considered in the impact assessment of the EP. <u>Proposed action to move forward:</u> Eni will ensure the EP includes a full assessment of the impacts of leaving plastics in situ, this will include concerns raised by WAFIC. Eni will provide WAFIC with a copy of the Atteris report that has been prepared to inform the assessment of impacts from plastics in the EP.	Eni Eni
	3	**Requirement for ongoing financial security** <u>Background:</u> In initial consultation WAFIC asked Eni to provide comment on Eni's plan to provide financial assurance to cover the cost of long term risks from the proposal. <u>Points discussed at the meeting:</u> Eni confirmed that the cost of implementing any controls that are committed to in the EP would be covered by Eni before the EP is closed. Eni also confirmed that the Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations 2009 would prevent NOPSEMA from accepting the EP and/or would prevent Eni from closing the EP if ongoing costs were associated with the activity. Therefore Eni are not anticipating any scenarios where ongoing financial assurance would be required. <u>Proposed action to move forward:</u> None required	

04.06.2021 – Email Sent

Hi [redacted]

Have you had a chance to review the minutes from our meeting in May? If so, and you are happy for us to finalise them?

Thanks

[redacted]

24.05.2021 – Email Sent

Hi [redacted]

Thanks for sending that through.

Please also find attached minutes of our meeting on the 13 May. Please let me know if you have any updates that you would like me to make to the minutes. If you don't have any updates can you please reply letting me know that you accept them as is?

Also, I have attached the Atteris degradation study that has informed the risk assessment in the EP and which we agreed to provide at the meeting.

Thanks

[redacted]

19.05.2021 – Email Received

Hi [redacted]

As discussed at our meeting on the 13/5/21, please find attached a document that explains why the area was closed to trawling, which also includes the Woollybutt Field.

I have contacted some of the Pilbara Trawl Fishers, regarding snag risks but have not had a reply yet. From previous correspondence regarding this issue, the feedback is to ensure they can trawl in that area, so the total removal of wellhead and other infrastructure would be the base case preferred option.

Kind regards

[redacted]

13.05.2021 – Meeting with WAFIC

Minutes of meeting:

Insert once WAFIC have accepted

DRAFT_Minutes of Meeting_WAFIC Cons

06.05.2021 – Email sent

Hi [redacted]

Thanks for your email.

We have had a bit of correspondence with WAFIC prior to the email chain that I sent you yesterday.

We initially met with WAFIC ([redacted]) on the 16th March and presented the information that is in the attached powerpoint. At this meeting we agreed that we would engage WAFIC to assist us with consulting with fisheries, we also received initial, verbal comment, from WAFIC on the proposal in general.

We then had quite a bit of email correspondence with [redacted] to confirm the consultation material that we would send to fisheries and [redacted] sent that information out on Eni's behalf under a fee for service arrangement. Once that was done we formally sent the consultation material to WAFIC for their written comment, which is the email chain that I attached to my previous correspondence to you.

Feel free to call me any time to go through it, I realise you are coming into this mid-way through and am happy to do anything I can to make it easier for you.

Thanks

[redacted]

06.05.2021 – Email received

Hi [redacted]

I'll give you a call regarding WAFIC feedback early next week. I have only just started and playing a bit of catch-up. Is the email you attached the only information you have provided WAFIC regarding the decommissioning of the Woollybutt Field, if not can you please send through any other relevant information.

Kind regards

[redacted]

05.05.2021 – Email sent

Hi [redacted]

We have recently been in contact with [redacted] about a proposal by Eni to decommission the Woollybutt Field.

[redacted] has provided us with WAFICs initial comments on the proposal and has recently provided further comment on our responses, which I have attached for your reference.

Would you have time next week to meet with us and Eni to discuss the comments from WAFIC? I realise you have just started in the role and will be finding your feet so we appreciate any time you can make. We are all available on Thursday 13th May if that works for you? Otherwise feel free to propose a time that works better for you.

Thanks

[redacted]

27.04.2021 – Email received

Good afternoon Alison

Please see in **BLUE** below WAFIC's comments to the ENI response to our initial feedback.

Best regards

[redacted]

Hi [redacted]

Thank you or your reply. Eni acknowledges your concerns with regard to the long term safety of leaving plastics on site and provides the response to individual questions below:

Comment	**Proposed Response**
Provide assurance of the long term safety case regarding plastic infrastructure left in situ	• In the short term Eni note that the area is closed for trawling activity and therefore there is limited potential for vessels to interact with the infrastructure that is proposed to be left in situ. Furthermore, the infrastructure is in 100 m of water and will not extend further than 1 m above the seafloor. ***One meter above the sea floor is a clear snag hazard for trawl fisheries, This could potentially overturn a vessel with the resultant potential fatal outcome.*** • Eni acknowledges that there is the possibility that the area could open to trawl activities in the future and therefore all infrastructure that remains in situ will continue to be marked on navigation charts. ***It is a hazard created by ENI, it is <u>not</u> the responsibility of the commercial fishing sector to absorb ENI-created hazards.*** • Eni considers that the potential for interaction with commercial fishing vessels and their equipment is low given the absence of significant marine traffic or fishing effort in the immediate area. ***Current trawl impact potential is low, however, this EP is forever – this is not a permanent trawl closure area, therefore, consideration must be made for potential future trawl use.***
Provide comment on the current and potentially significant increase and cumulative impacts of micro plastic pollution	• All infrastructure is expected to self-bury between 60-90% therefore as the plastic components of the infrastructure break down the majority are expected to remain buried in situ, therefore not contributing to micro plastic pollution in the broader marine environment. ***90% was not used in the initial consultation, where did this mythical ENI 90% come from? ENI <u>cannot</u> say, in fact completely irresponsible to say, that leaving this significant amount of plastics behind (which may and or may not self-bury 60% to 90%) will not contribute to micro plastic pollution in the broader marine environment. Zero science and zero fact in this assertion.*** • The plastics that are not expected to bury do have potential to enter the marine environment, however this will occur slowly over a period of 1000-10,000 years. Therefore the quantity entering the marine

	environment will be at a quantity that is not expected to impact commercial fish stocks. ***It will impact. I noted in our first engagement that this is not only ENI's waste plastic, it is also the proposed waste plastic from other offshore proponents in the north-west of WA. This is not a standalone issue. Cumulative impacts must be acknowledged, recognised and mitigated now.*** • Eni acknowledge the broader issues of plastics in the marine environment and have assessed the proposed activity in the context of this. In particular Eni have assessed that the proposal is not inconsistent with the threat abatement plans and recovery plans issued by the Department of Agriculture, Water and Environment that specifically address marine debris. ***Marine debris usually refers to items etc accidentally dropped overboard, not a premeditated plan to leave a lot of (plastic) infrastructure behind in perpetuity – completely different.***
Provide comment on the combined total of plastics that are proposed to be left in situ offshore the north west of Western Australia	• The proposed EP quantifies the total amount of plastic from the Woollybutt Infrastructure that is proposed to be left in situ. ***This is one heck of a lot of plastic, kilometres and kilometres – not metres.*** • Eni acknowledge that there if a lot of infrastructure across the north west of Australia that will require decommissioning in future years. However Eni is unsure if other operators are proposing to leave infrastructure in-situ and the quantities of plastic involved at this stage. ***ENI has to be sure, this is part of the EP process, you don't submit an EP and "hope" that other factors don't come into play. ENI (and other proponents) must do their full due diligence – ENI not knowing, not attempting to find out is NOT due diligence.***
Provide comment on Eni's financial security to cover the cost of these risks into the future.	• Eni have assessed that the risks of leaving the infrastructure in situ are low and there are no credible scenarios whereby impacts from the activity would need to be addressed in the future. ***WAFIC has no doubt that the risk to ENI is low and the significant cost saving of not removing this plastic is very high. What ENI is not considering nor acknowledging is that the risk to commercial fishers – in perpetuity – is very high – the cumulative impacts potentially extremely ugly.***

Should you require any further information in this regard please do not hesitate to contact me. ***Please ensure WAFIC's full response is included in the ENI NOPSEMA EP. Many thanks.***

Kind regards,

[redacted]

27.04.2021 - Email sent

Hi [redacted]

Thank you or your reply. Eni acknowledges your concerns with regard to the long term safety of leaving plastics on site and provides the response to individual questions below:

Comment	**Proposed Response**

Provide assurance of the long term safety case regarding plastic infrastructure left in situ	• In the short term Eni note that the area is closed for trawling activity and therefore there is limited potential for vessels to interact with the infrastructure that is proposed to be left in situ. Furthermore, the infrastructure is in 100 m of water and will not extend further than 1 m above the seafloor. • Eni acknowledges that there is the possibility that the area could open to trawl activities in the future and therefore all infrastructure that remains in situ will continue to be marked on navigation charts. • Eni considers that the potential for interaction with commercial fishing vessels and their equipment is low given the absence of significant marine traffic or fishing effort in the immediate area.
Provide comment on the current and potentially significant increase and cumulative impacts of micro plastic pollution	• All infrastructure is expected to self-bury between 60-90% therefore as the plastic components of the infrastructure break down the majority are expected to remain buried in situ, therefore not contributing to micro plastic pollution in the broader marine environment. • The plastics that are not expected to bury do have potential to enter the marine environment, however this will occur slowly over a period of 1000-10,000 years. Therefore the quantity entering the marine environment will be at a quantity that is not expected to impact commercial fish stocks. • Eni acknowledge the broader issues of plastics in the marine environment and have assessed the proposed activity in the context of this. In particular Eni have assessed that the proposal is not inconsistent with the threat abatement plans and recovery plans issued by the Department of Agriculture, Water and Environment that specifically address marine debris.
Provide comment on the combined total of plastics that are proposed to be left in situ offshore the north west of Western Australia	• The proposed EP quantifies the total amount of plastic from the Woollybutt Infrastructure that is proposed to be left in situ. • Eni acknowledge that there if a lot of infrastructure across the north west of Australia that will require decommissioning in future years. However Eni is unsure if other operators are proposing to leave infrastructure in-situ and the quantities of plastic involved at this stage.
Provide comment on Eni's financial security to cover the cost of these risks into the future.	• Eni have assessed that the risks of leaving the infrastructure in situ are low and there are no credible scenarios whereby impacts from the activity would need to be addressed in the future.

Should you require any further information in this regard please do not hesitate to contact me.

Kind regards,

[redacted]

09.04.2021 – Email received

Good afternoon all at Advisian and ENI

Thank you for the information covering the proposed Woollybutt Decommissioning environment plan.

In all decommissioning environment plan consultation WAFIC has emphasised that the outcome must be the "best possible" environmental outcome, not the cheapest and not necessarily the easiest.

Broadly speaking, WAFIC welcomes infrastructure with a natural marine environment and fish aggregation site being left in situ, as long as it is environmentally safe and as long as it is safe for commercial fishers, especially trawl operators.

We welcome NOPSEMA's approach for a case by case assessment and consultation with the commercial fishing industry.

However, WAFIC has ongoing issues with the offshore industry regarding cumulative impacts, especially in relation to seismic surveys and the limitations or lack of research identifying and addressing the cumulative impacts knowledge shortfall.

We are now seeing a similar process with decommissioning environment plans not recognising cumulative impacts resulting from leaving certain infrastructure, in particular plastics, permanently on site.

The Eni Australia fact sheet notes that Eni is seeking to leave plastic infrastructure on site:

- it is expected that the plastics will take 1,000 to10,000 years to degrade
- 60% to 90% of the infrastructure is expected to self-bury within 30 years of decommissioning, which will mean some plastics will remain buried whilst others will over time enter the marine environment as microplastics and macroplastics
- Long term degradation of subsea infrastructure may occur, especially micro and macro plastic

Eni further notes that this decision to leave plastics in situ was after a comparative assessment and that this comparative assessment (along with other elements) deemed that leaving the plastics behind (despite the potentially significant long term impacts) "provided a better environmental . . . . outcome than complete removal". Eni notes that the Decommissioning EP will assess the potential impacts to the marine environment, marine mammals and key indicator species from the breakdown of these plastic and other materials. How? How can Eni make these substantial environmental statements in relation to plastics without acknowledging the emerging global issue of ocean pollution caused by microplastics and microplastic ingestion?

Micro plastics in marine mammals, turtles, our key indicator species are recognised as a global issue. A simple Google search will deliver a range of papers, and like our seismic situation, the acknowledgment that there is not enough research to understand the long term impacts and cumulative impacts of micro plastics on the marine environment.

WAFIC seeks Eni's review of their environmental safety case for leaving plastic infrastructure on site and especially seek your feedback regarding:

- assurance of the long term safety case regarding plastic infrastructure left in situ
- recognition of the current and potentially significant increase and cumulative impacts of micro plastic pollution
- recognising parallel decommissioning projects offshore in the north west of Western Australia – other plastic proposed to be left in situ – the combined total – will this be the asbestos of the next decades / next centuries???
- assurance of Eni's financial security to cover the cost of these risks long into the future

Look forward to your reply to the above.

[redacted]

06.04.2021 – Email sent

Dear WAFIC

As previously discussed, Eni Australia Limited (Eni) is currently planning and working on the decommissioning of the Woollybutt field, Eni is seeking your feedback as a stakeholder and potentially affected party with interests in this area.

Please find in the attached fact sheet more information on the project activities. The focus of this consultation is the permanent abandonment of some infrastructure on the sea floor, for which a new environment plan (EP) titled 'Woollybutt Field Decommissioning EP' is being prepared (referred hereafter as the Decommissioning EP).

Location: Approximately 80 km north of Onslow and 40 km west of Barrow Island.

Water Depth: Approximately 100 m.

Previous Activity Update:

- Plug and abandon all wells and remove a large amount of the site infrastructure planned for Q3 2021-2022.
- These activities have been previously communicated to you and the relevant EP is currently with NOPSEMA for assessment.

Activity Overview – Decommissioning EP:

The remaining Woollybutt infrastructure is planned to be decommissioned in situ (permanently left as is on the sea floor) and will be covered under the Decommissioning EP. It is the retiring of the remaining infrastructure and leaving this on site that Eni is specifically seeking your feedback on.

The Decommissioning EP involves zero activity at the Woollybutt site.

The infrastructure that is proposed to be left in situ includes:

- Disconnectable single point mooring anchors and chains
- Umbilical crossing mattresses
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers
- Corkybark wellhead

Potential impacts to commercial fishers:

The attached factsheet contains further information on the decommissioning activities as well as more information on each of the points below:

- The remaining infrastructure will be between 0.3m and 1m above the seabed with the Corkybark wellhead being the highest piece of infrastructure.
  - Potential snag hazard
- This infrastructure provides benthic habitat.
  - Fish aggregation site
  - See sub-sea photos in the attached fact sheet
- Eni have commissioned fish habitat surveys, preliminary results have identified habitat for the following commercial species: E. areolatus (Aerolate Grouper), L. malabaricus (Saddletail Snapper) and G. buergeri (Northern Pearl Perch).
- Eni have commissioned degradation studies to understand how the left behind infrastructure will react in the marine environment following decommissioning.
  - Made predominantly of steel and plastic, it is expected that the plastics will take 1,000 to10,000 years to degrade
  - 60% to 90% of the infrastructure is expected to self-bury within 30 years of decommissioning, which will mean some plastics will remain buried whilst others will over time enter the marine environment as microplastics and macroplastics
  - Long term degradation of subsea infrastructure may occur, especially micro and macro plastic
  - The Decommissioning EP will assess the potential impacts to the marine environment, marine mammals and key indicator species from the breakdown of these plastic and other materials

Exclusion Zones:

- All prior petroleum safety exclusion zones will be removed from the Woollybutt site.
- All remaining infrastructure will remain marked on navigation charts.

Please provide your feedback directly to [redacted] (on behalf of Eni) via [redacted] by 30 April 2021.

Best regards

[redacted]

Attachment:

Woollybutt Field Decommissioning Environment Plan (EP) Commercial Fishing Stakeholder Consultation

Introduction

Eni Australia Limited (Eni) is currently planning the decommissioning of the Woollybutt field in Production Licence WA-25-L.

This involves the preparation of the Woollybutt Field Decommissioning Environment Plan (EP) to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) covering the subsea infrastructure that remains in the Woollybutt Field – referred in this document as the Decommissioning EP.

Eni seeks to engage directly with the commercial fishing sector and looks forward to your comment and input regarding Eni's final plans for the decommissioning of the Woollybutt Field.

The Woollybutt field is 65 km north of Onslow and 35 km west of Barrow Island, in approximately 100 m water depth. See map on page 6. Decommissioning activities are planned in three stages, summarised below:

Activity	Key Approval Document	Status
1. Plug and abandonment (P&A) of wells	P&A and Equipment Removal EP	Consultation done, EP assessment in process.
2. Removal of the majority of Woollybutt subsea infrastructure		
3. Leaving of the remaining subsea infrastructure in situ.	Decommissioning EP	EP under preparation – subject of this consultation

Activity 1 and Activity 2 noted above covers the physical infrastructure removal activities for the Woollybutt site and is going through the NOPSEMA approval process through a separate EP.

The Decommissioning EP involves zero activity on site. Eni is seeking NOPSEMA acceptance of the Decommissioning EP which involves leaving all remaining infrastructure in situ (ie left as is).

The decommissioning strategy has been selected by Eni following comparative assessment of all decommissioning options. The assessment found that leaving certain elements of the subsea infrastructure in situ provided better environmental, technical and safety outcomes than complete removal, partly due to the presence of subsea habitats that have formed on the infrastructure since it was first installed.

Background

Woollybutt oil production ceased in 2012 and all associated subsea infrastructure has remained in situ while decommissioning activities were planned for.

Since production ceased, field maintenance and management activities have been ongoing in accordance with a long standing EP, which was last revised and accepted in 2019 (https://info.nopsema.gov.au/activities/28/show_public).

Diagrams of the Woollybutt infrastructure field Figures 1 – 3 are on pages 7 - 9.

This **P&A and Equipment Removal EP** also covers plug and abandonment (P&A) activities and is currently being revised to include the complete removal of the majority of the Woollybutt field subsea infrastructure including:

- Wellheads and Xmas trees (except the Corkybark wellhead, which will be left in situ)
- Subsea manifolds
- Subsea umbilical termination units
- Umbilical termination assembly
- Control distribution unit
- Disconnectable single point mooring (DSPM) (excluding anchors and chains, which will be left in situ)
- Anode skids
- Flowline transition guide base.

The well plug and abandonment activities are due to commence in Quarter 3 2021, with removal of the majority of the subsea infrastructure including that listed above to follow, pending NOPSEMA acceptance of the revised EP.

Remaining Subsea Infrastructure covered by the Decommissioning EP

In addition to the infrastructure to be completely removed noted above and covered by a separate EP, the following subsea infrastructure is proposed to be decommissioned and left on site on the sea floor as is under the Decommissioning EP:

- DSPM anchors and chains
- Umbilical crossing mattresses
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers.

Further information on the Decommissioning EP infrastructure to be left in situ is in **Table 1**. Please refer to the end of this document to see actual photos of the infrastructure that is proposed to be left in situ.

Table 1: Summary of Subsea Infrastructure covered by the Decommissioning EP

Infrastructure	Description
DSPM anchors and chains	Six (6) anchors weighing approximately 35 Te each, and six (6) anchor chains
Umbilical crossing mattresses	Eight (8) umbilical crossing mattresses
Umbilicals and umbilical jumpers	Ten (10) umbilicals and umbilical jumpers up to approximately 5.8 km in length
Flexible and reinjection flowlines and jumpers	Four (4) flowlines 2-1/2 inch to 6 inch and 1700 to 5750 m in length. Four (4) jumpers 2-1/2 inch to 6 inch and 17 to 50 m. Four (4) risers 6 inch and 2-1/2 inch 1035 to 1045 m in length.

In addition to the infrastructure noted above, Eni are proposing to leave the Corkybark wellhead in situ. Approval for this will be sought through the P&A and Equipment Removal EP; however, details of this wellhead

have been included in this factsheet as stakeholders have not previously been provided with relevant information on it.

The Corkybark wellhead is located at 114.9736806, -20.8928668 and sits approximately 1m above the seabed.

Activities

There are NO ACTIVITIES to be undertaken as part of the scope of the Decommissioning EP, see below in **Table 2**.

Table 2: Summary of Activities in scope of Decommissioning EP

Activity	Summary	Frequency and duration
Permanent Decommissioning in situ	All subsea infrastructure within the scope of this EP is proposed to be decommissioned in situ. No vessel activities or removal activities are within the scope of this EP. All infrastructure has been flushed and cleaned under separate EPs.	Not applicable, no infield activities planned

Comparative Assessment

A comparative assessment process was undertaken to inform the decommissioning activities. This included evaluation of a range of decommissioning options for the Woollybutt infrastructure, including complete removal, partial removal and leave in situ the remaining subsea equipment. Options were assessed with respect to technical, health and safety, environmental, economic and socioeconomic risks.

The assessment has determined that leaving the remaining components in situ would provide the best overall outcome. In particular, the equipment would continue to provide hard substrate for marine habitat growth on an otherwise featureless seabed.

Eni have commissioned studies to inform and support the leave in situ decommissioning option for certain remaining subsea infrastructure, including

- Degradation studies that assess how the infrastructure will react in the marine environment and to understand potential long term impacts; and
- Fish habitat studies to assess the habitat supported by the remaining Woollybutt field infrastructure and to inform the assessment of long term benefits to benthic habitats.

The preliminary findings of these studies will be available in the Decommissioning EP submitted to NOPSEMA. Once approved, the Decommissioning EP will be published in full on the NOPSEMA website. Eni is happy to share this information with commercial fishers prior to NOPSEMA publication, if you would like to receive a copy of these preliminary findings please contact Eni (details below).

Environmental Management

Eni assessed the environmental risk assessment for the proposed decommissioning activities. Management measures will be implemented to reduce the impacts and risks to as low as reasonably practicable and to an acceptable level.

Table 3 provides a summary of potential key environmental risk and/or impacts to commercial fishers and associated management measures identified.

Table 3: Potential Key Environmental Risks and Management Measures

Environmental Risk and/or Impact	Risk Description
Interaction with other marine users	Leaving certain subsea infrastructure in situ will result in a long term physical presence on the seabed. This has potential to interact with other marine users, particularly those who have activities that also interact with the seabed. A potential snag risk. These potential impacts will be assessed in the decommissioning EP and will include mitigation measures such as long term identification of infrastructure on marine charts.
Discharge of material to the marine environment	Long term degradation of subsea infrastructure may occur, releasing materials that include micro and macro plastic. Degradation modelling shows that the infrastructure is expected

	to self bury between 60-90% within 30 years of decommissioning and will take up to 10,000 years to fully degrade. The Decommissioning EP will assess the potential impacts to the marine environment, marine mammals and key indicator species from the breakdown of these plastic and other materials. At the time of abandonment none of the infrastructure is expected to contain any liquid chemicals.
Benefits to benthic habitats	Observations of the Woollybutt infrastructure indicate that benthic habitat has become established. This is expected to provide ongoing benefits to benthic habitats in the Woollybutt field area. Fish habitat studies are underway to quantify the benefit that the long term presence of the subsea infrastructure may have on benthic habitats and an assessment of this will be provided in the Decommissioning EP. Preliminary results have identified habitat for the following commercial species: *E. areolatus* (Aerolate Grouper), *L. malabaricus* (Saddletail Snapper) and *G. buergeri* (Northern Pearl Perch). It has also been found that 100 % of the Corkybark wellhead is covered in marine growth comprising 40% soft growth and 60% hard growth.

Commercial Fishing Stakeholder Comment and Feedback

As a relevant and potentially affected party to the Decommissioning EP, your comment as a commercial fisher is sought in relation to any potential impact that the proposed decommissioning activities, covered by the Decommissioning EP, may have on your functions, interests or activities. If you wish to provide any feedback, please do so by COB Friday 30th April 2021 to the contact details provided below.

All comments provided will be considered and included in the Decommissioning EP to be submitted to NOPSEMA, in accordance with the OPGGS Act.

All communications in relation to this should be directed to:

Email: [redacted]

Post: [redacted]

[redacted]

Phone: [redacted]

Yours sincerely

[redacted]

[redacted]

01.04.2021 – Email received

Hello [redacted] and [redacted]

Confirm the following:

- Blind email sent to licence holders in the following commercial fisheries
  - Mackerel Managed Fishery (Area 2)
  - Onslow Prawn Managed Fishery
  - Pilbara Trap Managed Fishery
  - Pilbara Trawl Interim Managed Fishery
  - Pilbara Line Fishery
  - Western Tuna and Billfish Fishery (one active fisher)

- Letter and fact sheet sent by traditional mail to Mackerel Area 2 licence holder Bilyara Holdings (copied above)

- Email sent to the following peak bodies:
  - Commonwealth Fisheries Association (CFA)
  - Australian Southern Bluefin Tuna Industry Association (ASBTIA)
  - Tuna Australia
  - Pearl Producers Association (PPA)

All emails were copied to you.

Many thanks for your support, WAFIC looks forward to working with Advisian and Eni in the future for EP engagement or any other required assistance.

Best regards

[redacted]

30.03.2021 – Email received

Hello [redacted]

Please find attached the two documents.

Zero changes to the covering email (saved above with all tracked changes absorbed).

One tiny edit at the bottom of page 1 of the fact sheet: "*Activity 1 and Activity 2 noted above covers the physical infrastructure removal activities for the Woollybutt site and will be approved through a separate EP".*

Can't "assume" it will be approved by NOPSEMA, changed to "*Activity 1 and Activity 2 noted above covers the physical infrastructure removal activities for the Woollybutt site and is going through the NOPSEMA approval process through a separate EP".*

All else ready to go!

Look forward to receiving the email directed to WAFIC before I leave.

Thank you for engaging WAFIC for this activity.

Many thanks and best regards

[redacted]

30.03.2021 – Email sent

Hi [redacted]

Thanks for your comments on the stakeholder fact sheet and covering email.

We have accepted all of your tracked changes and made some more minor wording changes, which we have kept as tracked changes for you to view.

Can you please confirm that you are happy with the covering email and fact sheet, as they currently stand? Once we receive this confirmation from you we will begin to circulate it to the stakeholder list you have provided below. Alternatively, if you have any further comments please let me know ASAP.

Thanks

[redacted]

26.03.2021 – Email received

Hello [redacted]

After a couple of false starts, here's WAFIC's suggested edits for the fact sheet and the covering email.

Important that:

- It's commercial fisher specific
- Potential issues are openly noted
- Clarity between the exiting EP being amended and the Decommissioning EP
- That the Decommissioning EP is in fact a zero activity EP
- There's no actual "attachments", attachments imply a separate document, all info is contained in the one fact sheet and paginated

Commercial fisheries which overlap the Woollybutt site are noted below. Whether they are / are not "relevant and potentially affected parties" to the Decommissioning EP and require consultation is also qualified below:

Fishery	Review	Consultation
State-Managed		
Roe's Abalone Fishery (Area 8)	There is no abalone fishing activity in the north in area 8. In addition this is a dive fishery, they do not dive for abalone in 100 metres of water.	No
Mackerel Managed Fishery (Area 2)	Yes, WAFIC agreed engagement with Mackerel fishers is for activities etc in water depths up to 100 metres, potential interest in this fish aggregation site. Strictly Area 2 only, not licence holders in areas 1 and 3.	Yes
Marine Aquarium Fish Managed Fishery	This is a dive and wade fishery, they do not dive / wade in 100 metres of water.	No
Onslow Prawn Managed Fishery	This is a trawl fishery, essential they are engaged, potential trawl net snag hazard. Onslow Prawn may not fish at this water depth, however, if they are doing a vessel turn around coming back, they may potentially go over this site.	Yes
Pilbara Crab Managed Fishery	Does not fish at this water depth.	No
Pilbara Fish Trawl (Interim) Managed Fishery	This is a trawl fishery, essential they are engaged, potential trawl net snag hazard. Currently in the Zone One closed area, this is not a permanent closure, must consult re potential future use.	Yes
Pilbara Trap Managed Fishery	Potential active fishing for Pilbara Trap at this water depth.	Yes
Pilbara Line Fishery	Potential active fishing for Pilbara Line at this water depth.	Yes
Specimen Shell Managed Fishery	This is a dive and wade fishery, they do not dive / wade in 100 metres of water.	No
South-West Coast Salmon Managed Fishery	No, this is a beach based fishery, they fish from the beach I the south west. The resource also does not need to be included I the RP, salmon do not migrate / breed in the north.	No
Pearl Oyster Managed Fishery	No pearl fishing activities at this water depth, they do not dive in 100 metres of water (see below ref the PPA)	No

Commonwealth-managed		
Western Skipjack Tuna Fishery	An inactive fishery, potential future use, the resource must be accounted for in the EP.	No
Southern Bluefin Tuna Fishery	There is no SBT fishing in this area, however, it is the SBT migratory route. Agreed engagement all EP consultation to go to ASBTIA (see below).	Yes
Western Tuna and Billfish Fishery	One active operator in the north, our agreed engagement is for activities in water depths greater than 300 metres. Engagement required with Tuna Australia (see below)	Yes

All commercial fisheries (and their key indicator species) overlapping the Decommissioning site EP must be included in the EP whether consultation is required or not. Eni must address long term potential degradation and potential micro/macro plastic absorption issues etc on the commercial fishing resource as part of the EP process.

In addition the following peak bodies must also be engaged:

- Commonwealth Fisheries Association
- Australian Southern Bluefin Tuna Industry Association (ASBTIA)
- Tuna Australia
- Pearl Producers Association (PPA)

Look forward to your next update.

Best regards

[redacted]

26.03.2021 – Email sent

Hi [redacted]

Thanks for your feedback, I think the language in the email and the stakeholder factsheet are just a bit confusing, I will try to explain and then let me know if you think we should do it differently.

The email will have two attachments, the fact sheet and the location map.

The fact sheet then refers to three attachments, another location map, the field layout and the photos. These are all included at the end of the fact sheet document. The location map shown as an attachment to the fact sheet is the one we have provided to all stakeholders, the reason we produced a second one was because the one that has been provided to all stakeholders doesn't incorporate the feedback you gave us at the meeting last week ie. It doesn't have coordinates or distance to shore.

My thoughts on how to make this more simple are as follows:

- Remove the second location map (the one that was provided to other stakeholders)
- Call the attachments to the fact sheet 'appendices'

Let me know what you think.

[redacted]

25.03.2021 – Email received

Hello [redacted]

The fact sheet above notes attachments including the location (since provided) and also notes the Woollybutt Field Infrastructure Layout and Infrastructure Photos.

Please send.

Without the attachments, the information at the bottom of page two refers to the table in the attachment and the table below (not clear).

Look forward to your update, I'm working on the rest.

Ciao for now

[redacted]

24.03.2021 – Email sent

Hi [redacted]

As discussed yesterday, please find attached the consultation material we propose to send to State Commercial Fishers to inform them of, and seek their feedback on, Eni's decommissioning activities in the Woollybutt Field.

I am still working with our GIS to produce a location figure that has distance to shore and long and lats on it. I should have this for you later today and will send it through as soon as it is updated. There is also a hold in the cover email where we will insert a thumbnail of the location so that Fishers can easily see the location when they open the email, this will also be updated once we have finalised the location figure. Given your time constraints this week I wanted to get the bulk of the review material to you ASAP instead of waiting for the location figure to be finalised.

The State Fisheries that have shown up in our search as having interests in the area are as follows. Can you please confirm which of these we should send the consultation material to? We are also still waiting for fish cube data.

- WA Abalone Fishery
- Mackerel Managed Fishery
- Marine Aquarium Managed Fishery
- Onslow Prawn Managed Fishery
- Pilbara Crab Managed Fishery
- Pilbara Trawl
- Pilbara Trap
- Specimen Shell Managed Fishery
- South-west Coast Salmon Managed Fishery

If you have any questions don't hesitate to call me. I am available for most of the day except for between 12-2pm.

[redacted]

16.03.2021 – Meeting with WAFIC

Meeting Record:

Attendees: [redacted] (WAFIC), [redacted] (Eni), [redacted] (Advisian), [redacted] (Advisian)

Location: WAFIC Office, Freemantle

Date and Time: 16.03.2021, 10 am– 11 am

Relevant meeting notes:

- Advisian, on behalf of Eni, presented powerpoint overview of the project, infrastructure size and location, infrastructure composition, overlapping fisheries and likely impacts from the Proposal (see slides provided below).
- WAFIC had the following initial comments on the Proposal:
  - Site enhancement is generally favoured by fisheries for leave in situ options
  - Confirmation that the area is currently closed to trawling, however Pilbara Trawl Interim Managed Fishery remains optimistic that the area will re-open for trawling in the future
  - Removal of petroleum activity exclusion zones are generally favoured by fisheries
  - Marking infrastructure that is left in situ on navigation charts is a key control for minimising interactions with fisheries
- Eni agreed to engage WAFIC to consult with State and Commonwealth fisheries on Eni's behalf. The following engagement advice was provided by WAFIC:

	○ Draft correspondence will be prepared by Eni and provided to WAFIC for review and input. Consultation material should include: ▪ Location map ▪ Photos showing the extent that benthic habitat has formed on the infrastructure ▪ Cover email containing all relevant information at a high level and attachment providing detailed information ▪ An 8 week consultation period is preferable ○ WAFIC will confirm fisheries that are required to be consulted with
	12.03.2021 – Email received Good afternoon [redacted] Many thanks for your email and follow-up telephone call. I have already sent the meeting invite for this coming Thursday 16th March from 10:00am at the WAFIC office in Fremantle. Please do not hesitate to on-send this invite to other members of your team who may need to attend this meeting. I have also attached above WAFIC's fee-for-service information. Best regards [redacted]
	08.03.2021 – Email and follow up phone call Hi [redacted] I hope you are well. I am currently working on the Woollybutt Decommissioning Environment Plan (EP) on behalf of Eni. As part of the Woollybutt decommissioning program, Eni propose to plug and abandon (P&A) the remaining wellheads and remove some of the subsea infrastructure. The removal and P&A activities are described in the Woollybutt Field Management , Plug and Abandonment and Equipment Removal EP, which is currently under NOPSEMA assessment. The Woollybutt Decommissioning EP will include the outcomes of various habitat and degradation studies undertaken by Eni and the outcomes of an Options Assessment to determine the most suitable decommissioning options for the remaining infrastructure. Eni would like the opportunity to meet with you to go through their proposed decommissioning program, including the outcomes of the studies undertaken and the decommissioning options assessment. Eni may also require your assistance with fisheries consultation, it would be good to also discuss this at the meeting. Are you available to meet someday next week? Thank you, [redacted]
Westmore Seafoods (Seafresh Holdings)	**20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO)** (see details of correspondence under AFMA above)
	24.03.2021 – Email update sent (see details of correspondence under AFMA above)
	09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2) (see details of correspondence under AFMA above)
	25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD) (see details of correspondence under AFMA above)
Pearl Producers Association (PPA)	**07.02.2022 – Email sent to PPA** Dear [redacted] Just following up on the below email. Do PPA have any comment on the proposed decommissioning and removal of infrastructure? Thanks [redacted]

20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO)

(see details of correspondence under AFMA above)

01.04.2021 – Email sent

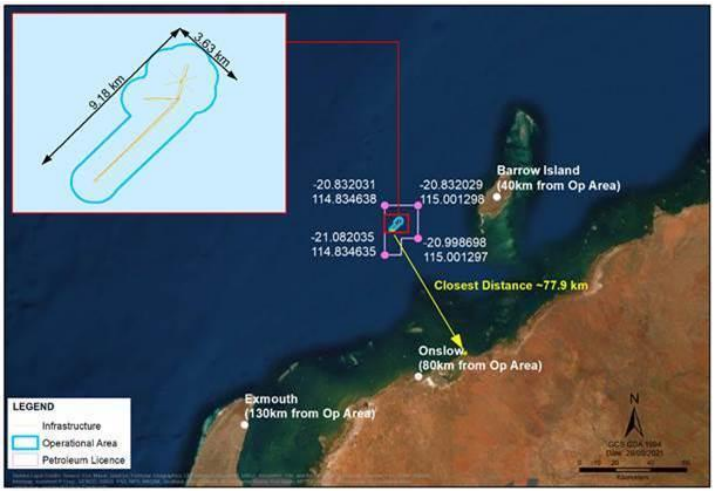
On behalf of Eni, WAFIC provided the following email correspondence to an alternative contact within PPA.

Dear [redacted]

Eni Australia Limited (Eni) is currently planning and working on the decommissioning of the Woollybutt field, Eni is seeking your feedback as a stakeholder and peak body. Our agreed engagement with the Pearl Producers Association is to send all EP information overlapping the Pearl Oyster Managed Fishery.

Please find in the attached fact sheet more information on the project activities. The focus of this consultation is the permanent abandonment of some infrastructure on the sea floor, for which a new environment plan (EP) titled 'Woollybutt Field Decommissioning EP' is being prepared (referred hereafter as the Decommissioning EP).

Location: Approximately 80 km north of Onslow and 40 km west of Barrow Island.



Water Depth: Approximately 100 m.

Previous Activity Update:

- Plug and abandon all wells and remove a large amount of the site infrastructure planned for Q3 2021-2022.
- These activities have been previously communicated to you and the relevant EP is currently with NOPSEMA for assessment.

Activity Overview – Decommissioning EP:

The remaining Woollybutt infrastructure is planned to be decommissioned in situ (permanently left as is on the sea floor) and will be covered under the Decommissioning EP. It is the retiring of the remaining infrastructure and leaving this on site that Eni is specifically seeking your feedback on.

The Decommissioning EP involves zero activity at the Woollybutt site.

The infrastructure that is proposed to be left in situ includes:

- Disconnectable single point mooring anchors and chains
- Umbilical crossing mattresses
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers
- Corkybark wellhead

Potential impacts to commercial fishers:

The attached factsheet contains further information on the decommissioning activities as well as more information on each of the points below:

- The remaining infrastructure will be between 0.3m and 1m above the seabed with the Corkybark wellhead being the highest piece of infrastructure.
  - Potential snag hazard
- This infrastructure provides benthic habitat.
  - Fish aggregation site
  - See sub-sea photos in the attached fact sheet
- Eni have commissioned fish habitat surveys, preliminary results have identified habitat for the following commercial species: E. areolatus (Aerolate Grouper), L. malabaricus (Saddletail Snapper) and G. buergeri (Northern Pearl Perch).

- Eni have commissioned degradation studies to understand how the left behind infrastructure will react in the marine environment following decommissioning.
  - Made predominantly of steel and plastic, it is expected that the plastics will take 1,000 to10,000 years to degrade
  - 60% to 90% of the infrastructure is expected to self-bury within 30 years of decommissioning, which will mean some plastics will remain buried whilst others will over time enter the marine environment as microplastics and macroplastics
  - Long term degradation of subsea infrastructure may occur, especially micro and macro plastic
  - The Decommissioning EP will assess the potential impacts to the marine environment, marine mammals and key indicator species from the breakdown of these plastic and other materials

Exclusion Zones:

- All prior petroleum safety exclusion zones will be removed from the Woollybutt site.
- All remaining infrastructure will remain marked on navigation charts.

WAFIC is sending this information out (via a blind email) on a fee-for-service basis on behalf of Eni to ensure peak bodies and commercial fishing license holders receive this in a timely manner via an accurate list. Eni needs your feedback. If you have any additional queries please contact [redacted] directly (on behalf of Eni) via: [redacted] or [redacted].

Best regards

[redacted]

24.03.2021 – Email update sent

(see details of correspondence under AFMA above)

10.03.2021 – Email sent

Hi [redacted]

Yesterday I sent the following email to the [redacted] email address with the hope of providing the Pearl Producers Association information on activities that Eni Australia Limited is currently planning at the Woollybutt field.

I received an out of office response from [redacted] stating that we should contact yourselves now that he is no longer the Executive Officer for the Pearl Producers Association.

Please find the attached bulletin that outlines the activities that Eni Australia Limited are proposing and feel free to contact me with any feedback or questions that you may have on these activities. We are seeking comment from stakeholders with interested in the area.

Kind regards

[redacted]

09.03.2021 – Email received

Hi all,

[redacted] is no longer the Executive Officer for the Pearl Producers Association (PPA) and as such is no longer contactable with this email address.

For information about Pearling generally please contact either:

[redacted]

Fisheries and Agriculture Resource Management

Sustainability and Biosecurity

Department of Primary Industries and Regional Development

[redacted]

or

[redacted]

Sustainability and Biosecurity

Department of Primary Industries and Regional Development

[redacted]

	For information about pearl diving, pearling safety and training or the hyperbaric unit please contact: [redacted] Regards, [redacted]
	09.03.2021 - Consultation letter emailed (OPS.LT.6416.SD v2) (see details of correspondence under AFMA above)
	25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD) (see details of correspondence under AFMA above)
Mackerel Managed Fishery (Area 2)	**01.04.2021 – Email sent by WAFIC on behalf of Eni** Dear Commercial Fisher Eni Australia Limited (Eni) is currently planning and working on the decommissioning of the Woollybutt field, Eni is seeking your feedback as a stakeholder and potentially affected party with interests in this area. Please find in the attached fact sheet more information on the project activities. The focus of this consultation is the permanent abandonment of some infrastructure on the sea floor, for which a new environment plan (EP) titled 'Woollybutt Field Decommissioning EP' is being prepared (referred hereafter as the Decommissioning EP). **Location:** Approximately 80 km north of Onslow and 40 km west of Barrow Island. **Water Depth**: Approximately 100 m. **Previous Activity Update:** • Plug and abandon all wells and remove a large amount of the site infrastructure planned for Q3 2021-2022. • These activities have been previously communicated to you and the relevant EP is currently with NOPSEMA for assessment. **Activity Overview – Decommissioning EP:** The remaining Woollybutt infrastructure is planned to be decommissioned in situ (permanently left as is on the sea floor) and will be covered under the Decommissioning EP. It is the retiring of the remaining infrastructure and leaving this on site that Eni is specifically seeking your feedback on. The Decommissioning EP involves zero activity at the Woollybutt site. The infrastructure that is proposed to be left in situ includes: • Disconnectable single point mooring anchors and chains • Umbilical crossing mattresses • Umbilicals and umbilical jumpers • Flexible and reinjection flowlines and jumpers • Corkybark wellhead **Potential impacts to commercial fishers:** The attached factsheet contains further information on the decommissioning activities as well as more information on each of the points below: • The remaining infrastructure will be between 0.3m and 1m above the seabed with the Corkybark wellhead being the highest piece of infrastructure. o Potential snag hazard • This infrastructure provides benthic habitat. o Fish aggregation site o See sub-sea photos in the attached fact sheet • Eni have commissioned fish habitat surveys, preliminary results have identified habitat for the following commercial species: E. areolatus (Aerolate Grouper), L. malabaricus (Saddletail Snapper) and G. buergeri (Northern Pearl Perch). • Eni have commissioned degradation studies to understand how the left behind infrastructure will react in the marine environment following decommissioning. o Made predominantly of steel and plastic, it is expected that the plastics will take 1,000 to10,000 years to degrade

- 60% to 90% of the infrastructure is expected to self-bury within 30 years of decommissioning, which will mean some plastics will remain buried whilst others will over time enter the marine environment as microplastics and macroplastics
- Long term degradation of subsea infrastructure may occur, especially micro and macro plastic
- The Decommissioning EP will assess the potential impacts to the marine environment, marine mammals and key indicator species from the breakdown of these plastic and other materials

Exclusion Zones:

- All prior petroleum safety exclusion zones will be removed from the Woollybutt site.
- All remaining infrastructure will remain marked on navigation charts.

WAFIC is sending this information out (via a blind email) on a fee-for-service basis on behalf of Eni to ensure commercial fishing license holders receive this in a timely manner via an accurate list. Eni needs your feedback. If you have any additional queries please contact [redacted] directly (on behalf of Eni) via: [redacted] or [redacted].

Best regards

[redacted]

Attachment:

Woollybutt Field Decommissioning Environment Plan (EP) Commercial Fishing Stakeholder Consultation

Introduction

Eni Australia Limited (Eni) is currently planning the decommissioning of the Woollybutt field in Production Licence WA-25-L.

This involves the preparation of the Woollybutt Field Decommissioning Environment Plan (EP) to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) covering the subsea infrastructure that remains in the Woollybutt Field – referred in this document as the Decommissioning EP.

Eni seeks to engage directly with the commercial fishing sector and looks forward to your comment and input regarding Eni's final plans for the decommissioning of the Woollybutt Field.

The Woollybutt field is 65 km north of Onslow and 35 km west of Barrow Island, in approximately 100 m water depth. See map on page 6. Decommissioning activities are planned in three stages, summarised below:

Activity	Key Approval Document	Status
4. Plug and abandonment (P&A) of wells	P&A and Equipment Removal EP	Consultation done, EP assessment in process.
5. Removal of the majority of Woollybutt subsea infrastructure		
6. Leaving of the remaining subsea infrastructure in situ.	Decommissioning EP	EP under preparation – subject of this consultation

Activity 1 and Activity 2 noted above covers the physical infrastructure removal activities for the Woollybutt site and is going through the NOPSEMA approval process through a separate EP.

The Decommissioning EP involves zero activity on site. Eni is seeking NOPSEMA acceptance of the Decommissioning EP which involves leaving all remaining infrastructure in situ (ie left as is).

The decommissioning strategy has been selected by Eni following comparative assessment of all decommissioning options. The assessment found that leaving certain elements of the subsea infrastructure in situ provided better environmental, technical and safety outcomes than complete removal, partly due to the presence of subsea habitats that have formed on the infrastructure since it was first installed.

Background

Woollybutt oil production ceased in 2012 and all associated subsea infrastructure has remained in situ while decommissioning activities were planned for.

Since production ceased, field maintenance and management activities have been ongoing in accordance with a long standing EP, which was last revised and accepted in 2019 (https://info.nopsema.gov.au/activities/28/show_public).

Diagrams of the Woollybutt infrastructure field Figures 1 – 3 are on pages 7 - 9.

This **P&A and Equipment Removal EP** also covers plug and abandonment (P&A) activities and is currently being revised to include the complete removal of the majority of the Woollybutt field subsea infrastructure including:

- Wellheads and Xmas trees (except the Corkybark wellhead, which will be left in situ)
- Subsea manifolds
- Subsea umbilical termination units
- Umbilical termination assembly
- Control distribution unit
- Disconnectable single point mooring (DSPM) (excluding anchors and chains, which will be left in situ)
- Anode skids
- Flowline transition guide base.

The well plug and abandonment activities are due to commence in Quarter 3 2021, with removal of the majority of the subsea infrastructure including that listed above to follow, pending NOPSEMA acceptance of the revised EP.

Remaining Subsea Infrastructure covered by the Decommissioning EP

In addition to the infrastructure to be completely removed noted above and covered by a separate EP, the following subsea infrastructure is proposed to be decommissioned and left on site on the sea floor as is under the Decommissioning EP:

- DSPM anchors and chains
- Umbilical crossing mattresses
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers.

Further information on the Decommissioning EP infrastructure to be left in situ is in **Table 1**. Please refer to the end of this document to see actual photos of the infrastructure that is proposed to be left in situ.

Table 1: Summary of Subsea Infrastructure covered by the Decommissioning EP

Infrastructure	Description
DSPM anchors and chains	Six (6) anchors weighing approximately 35 Te each, and six (6) anchor chains
Umbilical crossing mattresses	Eight (8) umbilical crossing mattresses
Umbilicals and umbilical jumpers	Ten (10) umbilicals and umbilical jumpers up to approximately 5.8 km in length
Flexible and reinjection flowlines and jumpers	Four (4) flowlines 2-1/2 inch to 6 inch and 1700 to 5750 m in length. Four (4) jumpers 2-1/2 inch to 6 inch and 17 to 50 m. Four (4) risers 6 inch and 2-1/2 inch 1035 to 1045 m in length.

In addition to the infrastructure noted above, Eni are proposing to leave the Corkybark wellhead in situ. Approval for this will be sought through the P&A and Equipment Removal EP; however, details of this wellhead have been included in this factsheet as stakeholders have not previously been provided with relevant information on it.

The Corkybark wellhead is located at 114.9736806, -20.8928668 and sits approximately 1m above the seabed.

Activities

There are NO ACTIVITIES to be undertaken as part of the scope of the Decommissioning EP, see below in **Table 2**.

Table 2: Summary of Activities in scope of Decommissioning EP

Activity	Summary	Frequency and duration
Permanent Decommissioning in situ	All subsea infrastructure within the scope of this EP is proposed to be decommissioned in situ. No vessel activities or removal activities are within the scope of this EP. All infrastructure has been flushed and cleaned under separate EPs.	Not applicable, no infield activities planned

Comparative Assessment

A comparative assessment process was undertaken to inform the decommissioning activities. This included evaluation of a range of decommissioning options for the Woollybutt infrastructure, including complete removal, partial removal and leave in situ the remaining subsea equipment. Options were assessed with respect to technical, health and safety, environmental, economic and socioeconomic risks.

The assessment has determined that leaving the remaining components in situ would provide the best overall outcome. In particular, the equipment would continue to provide hard substrate for marine habitat growth on an otherwise featureless seabed.

Eni have commissioned studies to inform and support the leave in situ decommissioning option for certain remaining subsea infrastructure, including

- Degradation studies that assess how the infrastructure will react in the marine environment and to understand potential long term impacts; and
- Fish habitat studies to assess the habitat supported by the remaining Woollybutt field infrastructure and to inform the assessment of long term benefits to benthic habitats.

The preliminary findings of these studies will be available in the Decommissioning EP submitted to NOPSEMA. Once approved, the Decommissioning EP will be published in full on the NOPSEMA website. Eni is happy to share this information with commercial fishers prior to NOPSEMA publication, if you would like to receive a copy of these preliminary findings please contact Eni (details below).

Environmental Management

Eni assessed the environmental risk assessment for the proposed decommissioning activities. Management measures will be implemented to reduce the impacts and risks to as low as reasonably practicable and to an acceptable level.

Table 3 provides a summary of potential key environmental risk and/or impacts to commercial fishers and associated management measures identified.

Table 3: Potential Key Environmental Risks and Management Measures

Environmental Risk and/or Impact	Risk Description
Interaction with other marine users	Leaving certain subsea infrastructure in situ will result in a long term physical presence on the seabed. This has potential to interact with other marine users, particularly those who have activities that also interact with the seabed. A potential snag risk. These potential impacts will be assessed in the decommissioning EP and will include mitigation measures such as long term identification of infrastructure on marine charts.
Discharge of material to the marine environment	Long term degradation of subsea infrastructure may occur, releasing materials that include micro and macro plastic. Degradation modelling shows that the infrastructure is expected to self bury between 60-90% within 30 years of decommissioning and will take up to 10,000 years to fully degrade. The Decommissioning EP will assess the potential impacts to the marine environment, marine mammals and key indicator species from the breakdown of these plastic and other materials. At the time of abandonment none of the infrastructure is expected to contain any liquid chemicals.

	Benefits to benthic habitats	Observations of the Woollybutt infrastructure indicate that benthic habitat has become established. This is expected to provide ongoing benefits to benthic habitats in the Woollybutt field area. Fish habitat studies are underway to quantify the benefit that the long term presence of the subsea infrastructure may have on benthic habitats and an assessment of this will be provided in the Decommissioning EP. Preliminary results have identified habitat for the following commercial species: *E. areolatus* (Aerolate Grouper), *L. malabaricus* (Saddletail Snapper) and *G. buergeri* (Northern Pearl Perch). It has also been found that 100 % of the Corkybark wellhead is covered in marine growth comprising 40% soft growth and 60% hard growth.

Commercial Fishing Stakeholder Comment and Feedback

As a relevant and potentially affected party to the Decommissioning EP, your comment as a commercial fisher is sought in relation to any potential impact that the proposed decommissioning activities, covered by the Decommissioning EP, may have on your functions, interests or activities. If you wish to provide any feedback, please do so by COB Friday 30th April 2021 to the contact details provided below.

All comments provided will be considered and included in the Decommissioning EP to be submitted to NOPSEMA, in accordance with the OPGGS Act.

All communications in relation to this should be directed to:

Email: [redacted]

Post: [redacted]

[redacted]

Phone: [redacted]

Yours sincerely

[redacted]

[redacted]

Onslow Prawn Managed Fishery	**01.04.2021 – Email sent by WAFIC on behalf of Eni** (see details of correspondence under Mackerel Managed Fishery (Area 2) above)
Pilbara Trap Managed Fishery	**01.04.2021 – Email sent by WAFIC on behalf of Eni** (see details of correspondence under Mackerel Managed Fishery (Area 2) above)
Pilbara Trawl Interim Managed Fishery	**09.08.2021 – Email sent** Hi[redacted], I hope you are well. Just wondering if you have received any response from the Pilbara Trawl fishery on Woollybutt decommissioning? Thank you, [redacted]

	19.05.2021 – Email sent Hi [redacted] As discussed at our meeting on the 13/5/21, please find attached a document that explains why the area was closed to trawling, which also includes the Woollybutt Field. I have contacted some of the Pilbara Trawl Fishers, regarding snag risks but have not had a reply yet. From previous correspondence regarding this issue, the feedback is to ensure they can trawl in that area, so the total removal of wellhead and other infrastructure would be the base case preferred option. Kind regards [redacted]
	01.04.2021 – Email sent by WAFIC on behalf of Eni (see details of correspondence under Mackerel Managed Fishery (Area 2) above)
Pilbara Line Fishery	**01.04.2021 – Email sent by WAFIC on behalf of Eni** (see details of correspondence under Mackerel Managed Fishery (Area 2) above)
Western Tuna and Billfish Fishery	**01.04.2021 – Email sent by WAFIC on behalf of Eni** (see details of correspondence under Mackerel Managed Fishery (Area 2) above)
Australian Southern Billfish Fishery	**01.04.2021 – Email sent by WAFIC on behalf of Eni** (see details of correspondence under Mackerel Managed Fishery (Area 2) above)
Australian Southern Bluefin Tuna Industry Association	**07.02.2022 – Email received from Australian Southern Bluefin Tuna Industry Association** Hi [redacted] Apologies for the delay responding - we are not actively fishing in that area. Best to focus consultation with the groups that are active in the region. We would however, have the expectation that any infrastructure remaining in the water would be free of hydrocarbons and that Eni has an ongoing commitment to inspect the plugged well to confirm there are no leaks. Kind regards [redacted]
	04.02.2022 – Email sent to Australian Southern Bluefin Tuna Industry Association Dear [redacted] Just following up on the below email. Do you have any comment on the proposed decommissioning and removal of infrastructure? Thanks [redacted]
	20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO) (see details of correspondence under AFMA above)
	01.04.2021 – Email sent by WAFIC on behalf of Eni (see details of correspondence under Mackerel Managed Fishery (Area 2) above)
Tuna Australia	**07.02.2022 – Email received from Tuna Australia** Hi [redacted] We note the date of this consultation has passed, but wanted to advise we have no concerns about the proposed decommissioning activity at the Woollybutt field site. We do not currently have any pelagic longline fishing operations occurring in the area. Appreciate if Tuna Australia could be kept in the loop as other activities occur. Cheers

	[redacted]
	04.02.2022 – Email sent to Tuna Australia Dear [redacted] Just following up on the below email. Do you have any comment on the proposed decommissioning and removal of infrastructure? Thanks [redacted]
	20.12.2021 - Consultation letter emailed (HSE.LT.6636.JVP.JCO) (see details of correspondence under AFMA above)
	01.04.2021 – Email sent by WAFIC on behalf of Eni (see details of correspondence under Mackerel Managed Fishery (Area 2) above)

APPENDIX D:

ABORIGINAL HERITAGE SEARCH RESULTS

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

Search Criteria

No Registered Aboriginal Sites in Shapefile - OperationArea_RevA

Disclaimer

The *Aboriginal Heritage Act 1972* preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

Copyright

Coordinate Accuracy

Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

APPENDIX E:

BREAKDOWN OF TOTAL MATERIALS IN REMOVED INFRASTRUCTURE

Breakdown of Total Materials from Flexibles

Description	Volume (m³)
1st Tensile Armour (Carbon Steel)	38.68
2nd Tensile Armour (Carbon Steel)	40.38
Anti-Wear Layer (PA11)	3.86
Carcass (Stainless Steel)	25.13
Inner Lining (HD Polyester)	2.19
Inner Lining (PA11)	14.22
Inner Lining (PVDF)	44.46
Intermediate (HD Polyester)	21.62
Intermediate (LD Polyester)	9.13
Outer Sheath (PA11)	12.26
Outer Sheath (Polyethylene)	62.55
Pressure Armour (Carbon Steel)	48.51

Breakdown of Total Materials from Umbilicals

Description	Volume (m³)
Umbilical External	
Armour Wire (Steel)	2.59
Inner Sheath (Polyethylene)	5.16
Outer Sheath (Polyethylene)	8.75
Strength Member (Steel)	13.5
Umbilical Internal	
Cable Filler (Lead)	0.22
Cable Filler (Polypropylene)	4.37
Cable Filler (Polyurethane)	2.76
Cable Outer (Polyurethane)	0.45
Conductor (Copper)	0.03
Drain Wire (Copper)	0.01
Insulation (Polyethylene)	0.28
Liner (PA11)	3.72
Outer Sheath (HD Polyester)	2.27
Outer Sheath (Polyethylene)	3.15
Outer Sheath (Polyurethane)	0.58
Reinforcement (Aramid Fibre)	4.16
Tape (Polyester/Aluminium)	0.02

Breakdown of Total Materials from Flexibles and Umbilical Ancillaries

Description	Volume (m³)
Anodes (Aluminium)	0.58
Bend Stiffener (Carbon Steel)	0.09
Bend Stiffener (Polyurethane)	1.95
Bend Stiffener (Silicone Base)	< 0.005
Bend Stiffener (Stainless Steel)	< 0.005
Body (Alloy Steel)	0.60
Body (Carbon Steel)	0.56
Bolts (Alloy Steel)	0.02
Bolts (Stainless Steel)	0.02
Cladding (Inconel)	0.03
Clamp (Alloy Steel)	0.02
Flange (Alloy Steel)	0.01
Flange (Carbon Steel)	0.15
Gasket (Incoloy)	< 0.005
Seal (Incoloy)	0.01
Seal (Inconel)	< 0.005
Seal Coating (Polytetrafluoroethylene)	< 0.005

APPENDIX F:

FINANCIAL DECLARATION