MINERVA PIPELINE MAINTENANCE ENVIRONMENT PLAN SUMMARY

Document No: 00MC-BHP-N00-0006

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Acronyms and Glossary

Term	Description
"	inch
µ	Micron
AHO	Australian Hydrographic Office
AIS	Automatic identification system
ALARP	As low as reasonably practicable
AMOSC	Australian Maritime Oil Spill Centre
AMSA	Australian Maritime Safety Association
ANZECC	Australian & New Zealand Environment and Conservation Council
APPEA	Australian Petroleum Production and Exploration Association
AS	Australian Standard
ASBTIA	Australian Southern Bluefin Tuna Industry Association
bbl/d	Barrels per day
bpm	Barrel per minute
BACI	Before-After-Control-Impact
BIA	Biologically important area
Cwlth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment (now the Department of Agriculture, Fisheries and Forestry[DAFF]) now DCCEW
DELWP	Department of Environment, Land, Water and Planning (Victoria)
DAFF	Department of Climate Change, Energy, the Environment and Water
DJPR	Department of Jobs, Precincts and Regions (Victoria)
EAG	
DNP	Director of National Parks
DoD	Department of Defence
DoEE	Department of Environment and Energy
DoT	Department of Transport (Victoria)
DP	Dynamic positioning
EERM	Environmental Emergency Response Manual (OPEP)
EMBA	Environment that may be affected
ENVID	Environment Impact (and risk) Identification
EP	Environment Plan, prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage Regulations 2021
EPA	Environmental Protection Authority (Victoria)
EP Act	Environmental Protection Act 2017 (Victoria)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPO	Environmental Performance Outcome
EP Regs	Environmental Protection Regulations 2021 (Victoria)
EPS	Environmental Performance Standard
ERP	Emergency Response Plan
FR	Flush return
GHG	Greenhouse gas
GVI	General Visual Inspection
HSE	health, safety and environment
IMO	International Maritime Organisation
IMS	Introduced marine species
IMT	Incident Management Team
ITOPF	International Tank Owners Federation
IUCN	International Union for Conservation of Nature
JSCC	Joint Strategic Coordination Committee
KEF	Key ecological feature
km	Kilometre
KP	kilometre point
L	Litre
LPG	Liquid petroleum gas
m	Metre
mm	Millimetre
m3	Cubic metre
m/s	Metres per second
MENSAR	Victorian SEMP Maritime Emergencies (non-search and rescue) Sub-Plan (edition 2) (2021)
MARPOL	The Convention for the Prevention of Pollution from Ships (MARPOL Convention)
MDO	Marine diesel oil
MNES	Matters of National Environmental Significance, according to the EPBC Act
MP	Marine Park
NatPlan	National Plan for Maritime Environmental Emergencies
nm	Nautical mile
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NORM	naturally occurring radioactive materials
NP	National Park

OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OPEP	Oil Pollution Emergency Plan
OSPAR	Oslo and Paris Convention (for the Protection of the Marine Environment of the North-East Atlantic)
OSV	Offshore support vessel
ppb	Parts per billion
ppm	Parts per million
PLONOR	OSPAR definition of a substance that Poses Little Or No Risk to the environment
PMST	Protected Matters Search Tool
POWBONS Act	Pollution of Waters by Oil and Noxious Substances Act 1986 (Victoria)
PSZ	Petroleum Safety Zone

RO	Reverse Osmosis
ROV	Remotely operated vehicle
SEL	Sound exposure level
SEMR	South East Marine Region
SESSF	Southern and Eastern Scalefish And Shark Fishery
SETFIA	South East Trawl Fishing Industry Association
SIMA	Spill Impact Mitigation Assessment
SINTEF	The Foundation for Scientific Research at the Norwegian Institute of Technology
SIV	Seafood Industry Victoria
SPL	Sound pressure level
TEC	Threatened Ecological Community
TH	Tubing hanger
Vic	Victoria
Woodside	Woodside Energy Global Pty Ltd

1 Introduction

1.1 Proposed Activity

Woodside Energy Global Pty Ltd (Woodside), as operator on behalf of the Joint Venture Participants Woodside Energy (Victoria) Pty Ltd and Cooper Energy (MF) Pty Ltd, is planning to undertake subsea decommissioning activities at end of field life for the offshore Minerva gas field located in offshore petroleum production licence (VIC/L22), and the Minerva subsea pipeline which runs from the Minerva wells in Commonwealth waters to nearshore Victorian State waters south/south-west of Port Campbell (within pipeline licence VIC/PL33 (Cwth) and VIC/PL33(v) (State)).

Production of the Minerva field ceased in September 2019 and the producing wells (Minerva-3 and Minerva-4) were suspended. Additionally, the production pipeline was depressurised and cleaned of hydrocarbons. A vessel-based campaign was conducted in Q1 2021 to disconnect flowlines from wells and install additional barrier plugs.

In Victorian State waters, the subsea pipeline (pipeline licence VIC/PL33(v)) runs from the low water mark out to the 3 nautical mile limit (State/Commonwealth waters boundary). The pipeline crosses the shoreline via two 1.6 km horizontal directional drill (HDD) underground boreholes from Two Mile Bay to the exit point approximately 800 m offshore. The pipeline is comprised of a single 250 mm gas production flowline, that previously transported gas from the Minerva field to the onshore gas plant, bundled with a single electro-hydro umbilical (for wellhead control), and two chemical injection lines.

This Environment Plan (EP) covers the ongoing maintenance and inspection of the portion of pipeline in Victorian State waters until final decommissioning. The EP has been prepared in accordance with the Victorian *Offshore Petroleum Greenhouse Gas Storage Regulations 2021* (Vic OPGGSR 2021).

1.2 Titleholder Details

The nominated Titleholder for this activity is Woodside Energy (Victoria) Pty Ltd, on behalf of the Joint Venture Participants:

- Woodside Energy (Victoria) Pty Ltd; and
- Cooper Energy (MF) Pty Ltd.

In accordance with Sub-regulation 18(1) of the Vic OPGGSR 2021, details of the titleholder are provided in Table 1-1.

Table 1-1: Titleholder Details

Name	Woodside Energy (Victoria) Pty Ltd
Business address	11 Mount Street, Perth, Western Australia 6000
Telephone number	1800 442977
Email address	feedback@woodside.com.au
Australian Company Number	39 006 923 879

In accordance with Sub-regulation 18(2) of the Vic OPGGSR 2021, details of the titleholder's nominated liaison person are provided in Table 1-2.

Table 1-2: Titleholder Nominated Liaison Person

Name	Steve Jeffcote
Position	Environment Manager
Business address	11 Mount Street, Perth, Western Australia 6000
Telephone number	+61 08 9348 4000
Email address	feedback@woodside.com.au

2 Description of Activity

2.1 Location of the Activity

The Minerva gas pipeline is located south south-west (SSW) of the township of Port Campbell, Victoria, Australia. The offshore section of the Minerva pipeline (within pipeline licence VIC/PL33) is approximately 11 km long extending from the low-water mark out to the Minerva-4 well location in Commonwealth waters. The section of pipeline within Victorian State jurisdiction (within pipeline licence VIC/PL33(v)), extends from the low water mark out to the 3 nautical mile (nm) limit of State waters. The subsea section of pipeline extends from the horizontal direction drill (HDD) exit site located approximately 800 m from shore to the 3 nm limit of Victorian State waters (a total length of approximately 4.756 km) (Figure 2-1). Water depths range from approximately 20 m at the HDD exit to 60 m at the 3 nm limit. Coordinates of the pipeline are provided within **Table 2-1**, including kilometre points (KP) measured from the end of the flowline in offshore Commonwealth waters.

Table 2-1: Pipeline Coordinates (State waters)

Description	Easting (m) Northing (m) (GDA 94 MGA Zone 54)	Latitude (South) Longitude (East) (GDA 94 MGA Zone 54)
KP 9.9 (HDD exit)	671030 5722483	38° 37' 46.94" 142° 57' 53.44"
KP 9	670940 5721518	38° 38' 18.29" 142° 57' 50.57"
KP 8	670848 5720522	38° 38' 50.65" 142° 57' 47.65"
KP 7	670763 5719526	38° 39' 23.00" 142° 57' 45.02"
KP 6	670673 5718530	38° 39' 55.36" 142° 57' 42.18"
KP 5	670587 5717534	38° 40' 27.71" 142° 57' 39.50"
3 nm State boundary (KP4.96)	670584 5717491	38° 40' 29.11" 142° 57' 39.42"

The relative distances of key values and sensitivities from the HHD exit site to the 3 nm limit within the operational area are provided in

Table 2-2.

Table 2-2: Location of Activity

Value / Sensitivity	Approx. Distance from Pipeline (km)	
	HDD exit	3 nm limit
Port Campbell	7.8	6.4
Peterborough	2.1	10.2
The Arches Marine Sanctuary	2.7	5.3
Twelve Apostles Marine National Park	7.9	6.0

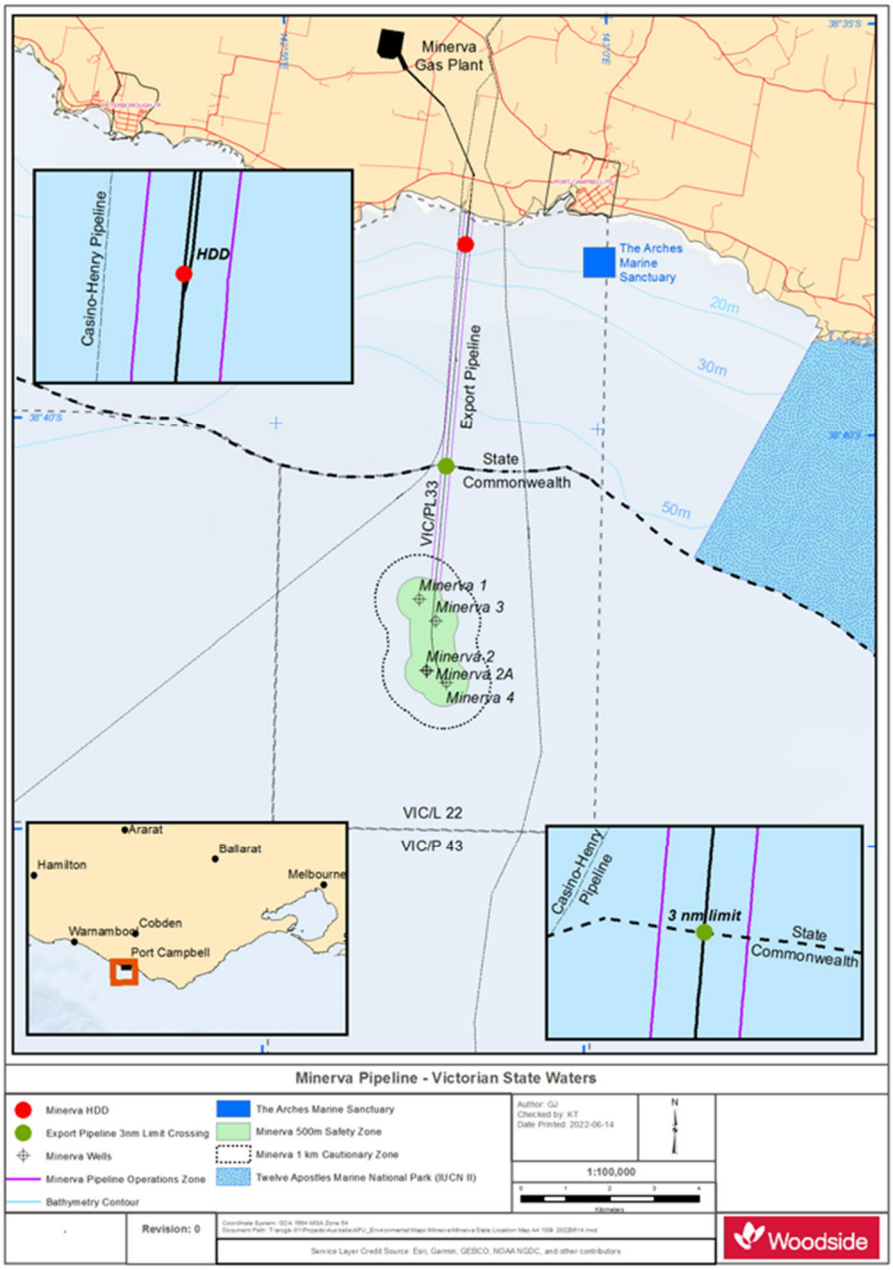

Figure 2-1: Location of the Minerva Pipeline

2.2 Minerva Pipeline General Details

A 10-inch common flowline (pipeline) connects the wells to the land-based gas plant near Port Campbell. The flowline is laid on the surface of the seabed from the subsea wells to the shoreline and has a total length of approximately 15 km, of which approximately 4 km is onshore. The flowline crosses underneath a rock platform at the shoreline through a 1,600 m horizontal directionally drilled crossing. The flowline was designed so that the 10-inch diameter and wall thickness selected were suitable for the flowrates, pressures and temperatures expected during operation.

The production flowline forms the basis for the pipeline bundle as the umbilical and both Monoethylene Glycol lines were laid concurrently in a bundle (**Figure 2-2**).

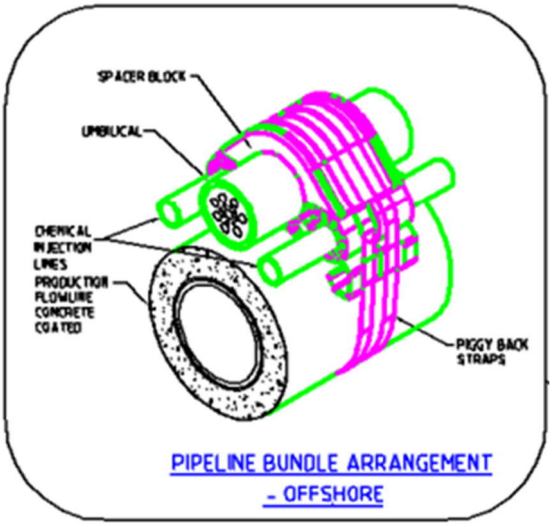

Figure 2-2: Minerva Pipeline Bundle Arrangement

2.3 Minerva Pipeline Status

Suspension of the pipeline occurred at the end of operational field life in September 2019. The pipeline was depressurised, cleaned and flushed of hydrocarbons and the returns tested to confirm that the pipeline was hydrocarbon free. The final fill of the 10" pipeline and 2" Chemical injection lines was completed with potable, filtered water treated to 500 ppm of "Hydrosure" which is a corrosion inhibitor/biocide/oxygen scavenger blend. The main production line also had a nitrogen purge and pack completed from the onshore facility side as a final step to provide a nitrogen gas blanket at the surface isolation blind for future intervention work.

The accumulation of pipeline integrity data over operational lifetime (approximately <15 years) provides sufficient level of information to satisfy Woodside with respect to internal pipe condition. Pipeline operating conditions and produced fluids were subject to frequent and consistent analysis over the operating life of field. All measured parameters fell within design parameters. In addition, the pipeline design corrosion allowances are 4 mm for 12.7 mm pipe and 6 mm for 15.9 mm pipe; for a design life of 15 years. Utilising a conservative corrosion rate based on measured data of 0.2 mm/year, the pipeline remains within corrosion allowance through to planned final decommissioning in 2025.

Chemical injection lines were depressurised and flushed. Hydraulic lines were depressurised and disconnected at the onshore plant to prevent inadvertent operation of the subsea valves. Electrical controls were also switched off. The wells were bull-headed and well barriers closed and tested to isolate the pipeline from the wells. The pipeline was suspended with internal preservation fluid and existing passive external corrosion protection intact, maintaining pipeline integrity during this phase.

All work was completed from the onshore gas plant; no infield operations were required. The condition of the as-left systems was recorded in a handover document. The work was completed in December 2019, prior to the plant and the onshore section of the pipeline being sold to Cooper Energy for reuse to process gas from other Otway basin gas fields.

Subsequent to initial cessation activities, a short offshore campaign was completed in March 2021, when the pipeline and flowlines were disconnected from the trees. The tree flowline connection and flowline were isolated through the introduction of a plug on each side.

The scope of work was:

- Cut both M3 and M4 8-inch production flowlines close to the subsea tree (total 2 lines), removing a section of the rigid flowlines to enable insertion of plugs. Pressure retaining plugs installed on both the tree side of the cuts. Environmental caps/plugs installed on the downstream side of the cut sections.
- Cut both M3 and M4 2-inch chemical injection lines close to the tree (total 4 lines), removing a section of the rigid lines to enable insertion of the plugs. Pressure retaining plugs installed on the tree side of the cuts. Environmental caps/plugs installed on the downstream side of the cut sections.

- Recover all cut section lengths of pipe to deck.

In addition to the cutting scope, the following activities were completed:

- Perform as left survey of tree's Structures and Tie-in spools.
- Visual inspection of M3 and M4 subsea trees, flowlines, CI flowlines and associated equipment.
- Cathodic Protection (CP) measurements.
- Environmental samples (soil, in fauna and water).
- Naturally Occurring Radioactive Material (NORM) measurement at trees and seabed.

The scope was performed by Remote Operated Vehicle (ROV) from a suitably equipped / specified vessel operating under its own safety case and operating under the controls described in Minerva Pipeline Cessation Safety Case.

Drawing upon integrity management during operations, pipeline integrity was managed for the planned cessation period via internal preservation (treated water and nitrogen purge), and existing external pipeline coating and sacrificial anode cathodic protection. This was based on current condition of the pipeline which is confirmed as having no risk of corrosion outside the design allowance based on ongoing pipeline integrity monitoring in the operational phase.

As part of the scope of activity for cessation, the flowline system was positively isolated from the hydrocarbon source, by severing the flowline spools and installing pressure retaining plugs within the flowline at the Xmas tree flow base. This eliminated the risk of future hydrocarbon contamination from the wells. Following subsea isolation, periodic general visual inspection (GVI) will no longer be conducted due to the limited risk potential risk and given that the recent campaign established that the pipeline protection from corrosion has been established with residual cathodic protection anode lifespan at >100 years.

The pipeline inspection undertaken in 2021 confirmed that the entirety of the pipeline bundle is buried below the seafloor with the exception of a 240 m section at KP5 (at the boundary of Commonwealth and Victorian State waters). Of the visible section of pipeline, no damage or degradation was observed, and marine growth coverage was confirmed over 100% of the exposed section (**Figure 2-3**).

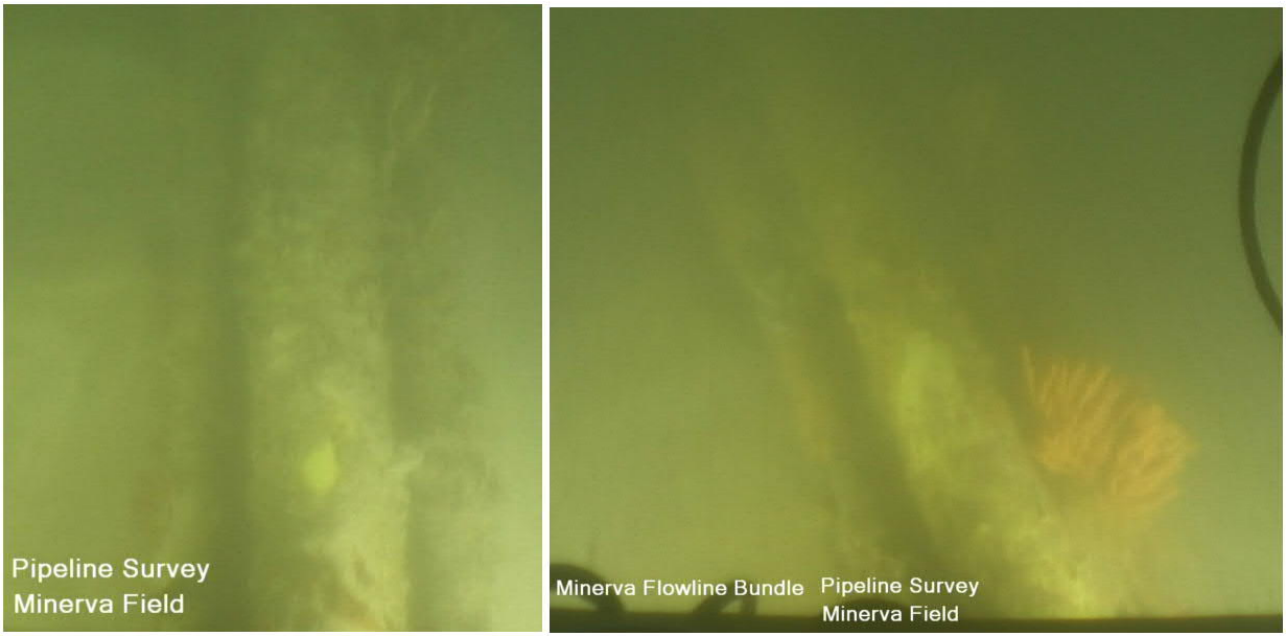

Figure 2-3: General Condition of Minerva Pipeline

2.4 Timetable of Operations

The Minerva pipeline and associated infrastructure are intended to be maintained in-situ until decommissioning, currently scheduled to occur by mid-2025.

If undertaken, it is expected that the general visual inspection would be undertaken within around 1-2 months of final decommissioning operations and would take under one week to complete.

2.5 Operational Area

The operational area shown in **Figure 2-1** is the spatial boundary of the Minerva Pipeline Operations Zone, within Victorian State waters from the HDD exit location out to 3 nm (VIC/PL33(v)).

2.6 General Visual Inspection

Prior to final decommissioning of the pipeline, there is potential that a GVI of the pipeline may occur, although given a full survey was undertaken in 2021 and the majority of the pipeline is buried, this may not be required. If an inspection takes place, it would be done on the basis of determining:

- Burial status and depths of flowline infrastructure;
- Location, length and height of freespans (if any);
- Location and general physical condition of pipeline anchors;
- Evidence of adjacent seabed disturbance;
- Evidence of debris or foreign objects;
- Evidence of anchor scars or other third-party interference; and
- Marine growth coverage, type and thickness.

The intention is that the GVI would be undertaken by a general offshore support vessel (OSV) with 'work-class' ROV capability. A smaller project vessel may be deployed to undertake the general visual inspection in shallower waters around the HDD exit location.

Given the nature of the inspection, the vessel would traverse the pipeline route at low speeds (approx. 2-3 knots).

All project vessels will be commercial vessels with a suitable survey class for the activities they are performing. The vessels will run on marine diesel oil (MDO); no intermediate or heavy fuel oils will be used. Whilst the particular vessel that may undertake the inspection is unknown, the specifications for a typical OVS are provided in Table 2-3 and have been used to inform the environmental impact and risk evaluation.

Table 2-3: Typical Offshore Support Vessel Specifications

Parameter	OSV
Draft (max) (m)	approx. 6 m
Length (m)	75 to 90 m
Berths (persons)	approx. 40
Gross tonnage (Gt)	2800
Fuel type	MDO
Total fuel volume (m^3)	800 (dedicated)
Volume of largest fuel tank (m^3)	approx. 200

2.6.1 Vessel Operations

In the event that a GVI is undertaken, the project vessel will be subject to Woodside's Marine Management Procedure. All required audits and inspections will assess compliance with the laws of the international shipping industry, which include safety and environmental management requirements, and maritime legislation

including International *Convention for the Prevention of Pollution from Ships 1973* as modified by the Protocol of 1987 (MARPOL) and other International Maritime Organisation (IMO) standards.

The project vessel will display navigational lighting and external lighting, as required for safe operations. Lighting levels will be determined primarily by operational safety and navigational requirements under relevant legislation, specifically the *Navigation Act 2012*. The vessels will be lit to maintain operational safety on a 24-hour basis.

No vessel crew changes would be anticipated for a potential GVI of the pipeline infrastructure.

Given the short duration of a potential inspection and as the pipeline is within 3 nm of the Victorian mainland, there would be no discharges of ballast water, putrescible waste, sewage / grey water or oily water. There would be discharges of:

- Deck drainage;
- Cooling water; and
- Desalination plant effluent (brine).

2.6.2 Refuelling

Given the proximity of the pipeline to Port Campbell, and the short duration of a potential inspection, no refuelling or bunkering at sea would occur.

2.6.3 Dynamic Positioning

The project vessel will not anchor in the operational area, instead using dynamic positioning (DP) to maintain station keeping. DP uses satellite navigation and radio transponders in conjunction with thrusters to maintain the position.

3 Description of Environment

The description of the environment applies to two spatial areas:

- The operational area. The operational area shown in **Figure 2-1** is the spatial boundary of the Minerva Pipeline Operations Zone, within Victorian State waters from the HDD exit location out to 3 nm (VIC/PL33(v)); and
- The wider 'environment that may be affected' (EMBA). This is the environment that may be affected by the worst-case MDO spill scenario identified as relevant to the activity (**Figure 3-1).**

The information contained in this section has been used to inform the evaluation and assessment of the environmental impacts and risks presented in Section 6 and 7. The level of detail is appropriate to the nature and scale of the impacts and risks to the particular values and sensitivities.

3.1 Determination of the Environment that May Be Affected

Stochastic hydrocarbon dispersion and fate modelling (described in **Section 7.1**), has been performed on the worst-case hydrocarbon release, which was determined to be a 330 m^3 marine diesel oil (MDO) release as a result of a vessel collision (described in Section 7.1.4). The results have been used to inform the EMBA. The EMBA (Figure 3-1) encompasses the outer most boundary of the worst-case spatial extent of four hydrocarbon phases (refer Table 3-1). The low exposure threshold values used to define the EMBA are presented in Table 3-1 and have been justified in Section 7.1.3.

Table 3-1: Hydrocarbon Components and EMBA Exposure Thresholds

Hydrocarbon Components	EMBA Exposure Value
Surface hydrocarbons	1 g/m^2
Shoreline hydrocarbons	10 g/m^2
Entrained hydrocarbons	100 ppb
Dissolved aromatic hydrocarbons	50 ppb

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

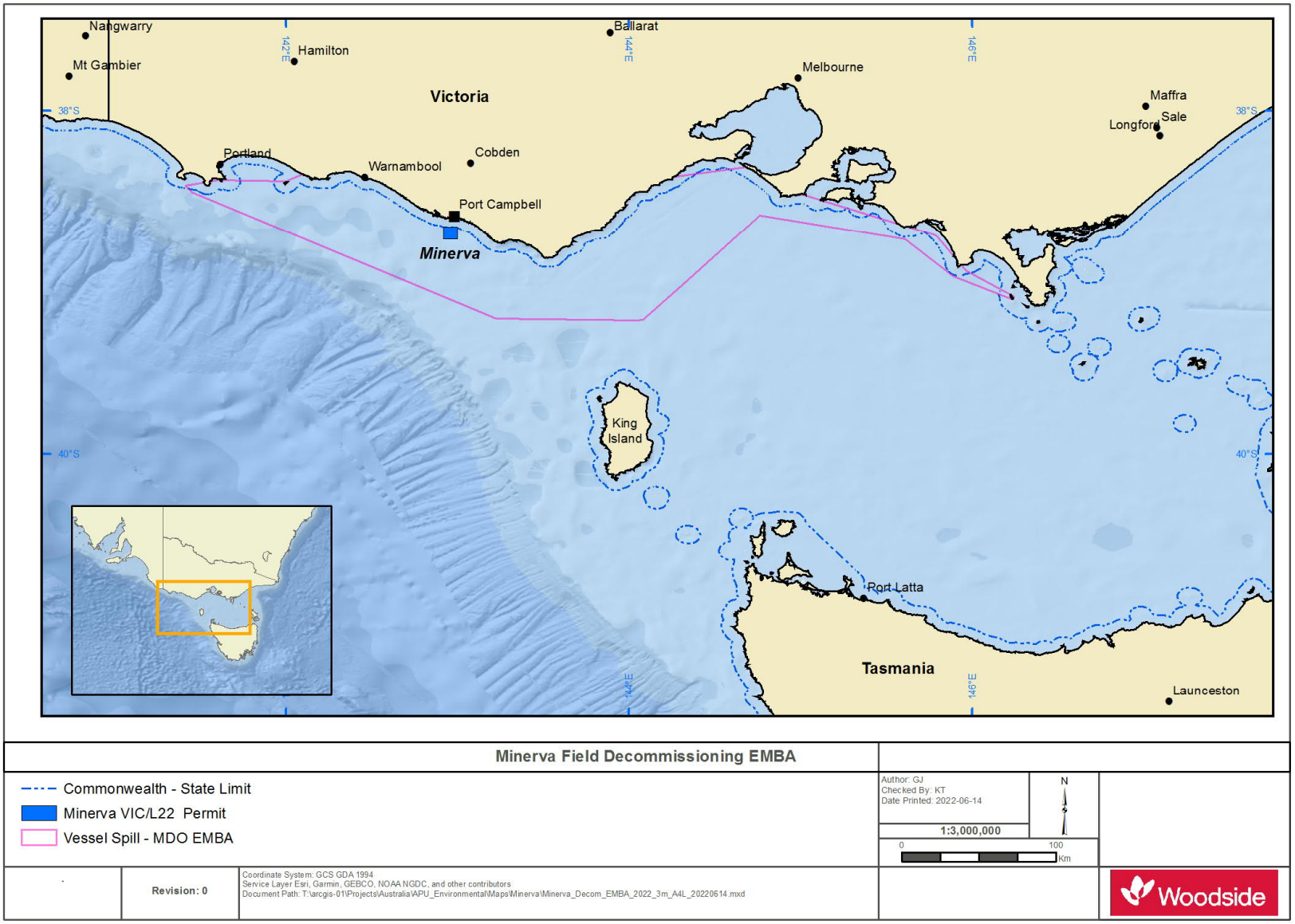

Figure 3-1: Environment that May Be Affected by the Petroleum Activity

3.2 Particular Relevant Values and Sensitivities of the Environment

Sub-regulation 15(2) of the Environment Regulations states that "the environment plan must:

15(2)(a) Describe the existing environment that may be affected by the activity; and

15(2)(b) Include details of the particular relevant values and sensitivities (if any) of that environment".

This section summarises environmental values and sensitivities, including physical, biological, socio-economic and cultural features in the marine and coastal environment that are relevant to the operational area and the EMBA. Searches for matters of national environmental significance (MNES) and other matters protected by the Environmental Protection and Biodiversity Act (EPBC) Act were undertaken for the operational area and the EMBA using the Protected Matters Search Tool (PMST).

3.2.1 South-East Marine Region and Bioregions

Australia's offshore waters have been divided into six marine regions to facilitate their management by the Australian Government under the EPBC Act. The operational area and EMBA intersects the South-east Commonwealth Marine Region (SEMR), which extends from the south coast of New South Wales to Kangaroo Island in South Australia and around Tasmania (DNP, 2013).

The SEMR is further regionalised by the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) version 4.0, with the Minerva field located in the Otway mesoscale region. The Otway bioregion extends from Cape Otway (Victoria) to Cape Jaffa (South Australia) and includes the western islands of Bass Strait such as King Island (DOEH, 2006).

3.2.2 Benthic and Shoreline Habitats

The presence of marine and coastal habitats within the operational area and EMBA are summarised in **Table 3-2**. The operational area does not contain does not contain any shoreline habitat with the Victorian coastline.

The dominant benthic habitat throughout the continental shelf, as described by the South-east Marine Region profile (DoE, 2015) is rocky reef and soft sediment.

Habitats identified within the EMBA include benthic primary producers (seagrasses, algae, mangroves), soft sediment, rocky substrate, wetlands, saltmarshes, rocky shorelines and sandy beaches.

Habitat diversity promotes a range of benthic fauna and infauna in the region and supports the wider ecosystem. Benthic primary producers are important components of ecosystems as they provide the source of energy driving food webs and provide shelter for a diverse array of organisms.

Table 3-2: Benthic and Coastal Habitats Occurring within the Operational Area and EMBA

Habitat Type	Description	Operational Area	MDO EMBA
Benthic Habitats			
Soft Sediment	Unvegetated soft sediments are a widespread habitat in both intertidal and subtidal areas, particularly in areas beyond the photic zone. Factors such as depth, light, temperature and the type of sediment present can vary the biodiversity and productivity of soft sediment habitat.	✓	✓
Seagrass Beds	Seagrasses are marine flowering plants, with around 30 species found in Australian waters.	X	✓
Macroalgal Beds	Macroalgae communities occur throughout the Australian coast and are generally found on intertidal and shallow subtidal rocky substrates. Macroalgal systems are an important source of food and shelter for many ocean species.	X	✓
Coral	Corals are generally divided into two broad groups: soft coral and hard coral. Hard corals are generally found in shallower (<50 m) waters while the soft corals are found at most depths.	X	X
Carbonate sands and exposed limestone	Carbonate sands and hard limestone substrates are reported to support benthic fauna and communities	✓	✓
Basalt Rises	Rises can be classified as deep reefs, defined as rocky habitat at depths greater than 20 m	X	✓
Coastal Habitats			
Rocky Shorelines	Hard and soft rocky shores, including bedrock outcrops, platforms, low cliffs (less than five metres), and scarps.	X	✓
Sandy Beaches	Sandy beaches are dynamic environments, naturally fluctuating in response to external forcing factors (e.g. waves, currents etc.).	X	✓
Mangroves	Mangroves grow in intertidal mud and sand, with specially adapted aerial roots.	X	✓
Wetlands	A wetland is a distinct ecosystem that is flooded by water, either permanently or seasonally.	X	✓
Saltmarsh	Saltmarshes are terrestrial halophytic (salt-adapted) ecosystems that mostly occur in the upper-intertidal zone and are widespread along the coast.	X	✓

3.2.3 Protected / Significant Areas

A number of EPBC Act protected areas can be found within the operational area and EMBA boundaries and are protected under state and federal legislation. **Table 3-3** lists the MNES areas identified as potentially occurring within the operational area and EMBA, as determined by the Protected Matters Search Tool (PMST) results. Noting that terrestrial areas that are not linked to the shoreline have been excluded as they are not relevant to consideration of potential affects from marine hydrocarbon spills. Summary information has been provided below.

There are no protected areas overlapping the operational area and no World Heritage Areas or Commonwealth Heritage Places overlapping the EMBA.

Wetlands provide important habitat for native species and wetlands of international or national significance are awarded a higher level of protection. Two RAMSAR sites are located within the EMBA and include Western Port and Port Phillip Bay. Six Wetlands of National Importance intercept the EMBA. However, only two of these show connectivity with the marine environment and they include Western Port and Aire River.

The Point Napean Defence National Heritage Place is located along the Victorian coastline and intersects the EMBA. It is recognised for its broad historic landscape, featuring a considerable array of historic values relating to national quarantine and defence (DCCEW, 2022a).

The EMBA overlaps the Apollo Australian Marine Park (AMP). The EMBA overlaps ten Victorian State Marine Protected Areas. AMPs are recognised under the EPBC Act for protecting and maintaining biological diversity and contributing to a national representative network of marine protected areas. Management plans for AMPs have been developed with the Apollo AMP managed under the South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (DNP, 2013). Under the various network management plans, AMPs are allocated conservation objectives (IUCN Protected Area Category) based on the Australian IUCN reserve management principles in Schedule 8 of the EPBC Regulations 2000. The relevant principles for each IUCN category identified within the EMBA is described in **Table 3-4**.

Three Threatened Ecological Communities (TECs) also have coastal connections and overlap the EMBA; the Giant Kelp Marine Forests of South East Australia, the Subtropical and Temperate Coastal Saltmarsh, and the Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community. Threatened Ecological Communities (TECs) provide wildlife corridors and / or habitat refuges for many plant and animal species.

Key ecological features (KEFs) are components of the marine ecosystem that are considered to be important for biodiversity or ecosystem function and integrity of the Commonwealth Marine Area are also included in the EPBC Act Protected Matters Database results. The EMBA overlaps two KEFs; the West Tasmania Canyons and the Bonney Coast Upwelling.

Table 3-3: Summary of protected areas in waters within the Operational Area and EMBA

Area Type	Title	IUCN Classification	Operational Area	MDO EMBA
World Heritage Areas	N/A	-	-	-
Wetland of International Importance (RAMSAR)	Western Port	-	-	✓
	Port Phillip Bay	-	-	✓
Wetlands of National Importance	Western Port	-	-	✓
	Aire River	-	-	✓
	Tower Hill	-	-	✓
	Princetown Wetlands	-	-	✓

Area Type	Title	IUCN Classification	Operational Area	MDO EMBA
	Lower Aire River Wetlands	-	-	✓
	Lower Merri River Wetlands	-	-	✓
National Heritage Places	Point Napean Defence	-	-	✓
Commonwealth Heritage Places	NA	-	-	-
Threatened Ecological Communities (TEC)	Subtropical and Temperate Coastal Saltmarsh	-	-	✓
	Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community	-	-	✓
	Natural Damp Grassland of the Victorian Coastal Plains	-	-	✓
	Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	-	-	✓
	Giant Kelp Marine Forests of South East Australia	-	-	✓
Key Ecological Features (KEF)	West Tasmania Canyons	-	-	✓
	Bonney Coast Upwelling	-	-	✓
Australian Marine Parks (AMP)	Apollo AMP	Multiple Use Zone (IUCN VI)	-	✓
State Marine Parks	Bunurong Marine National Park	National Park (IUCN II)	-	✓
	Point Addis Marine National Park	National Park (IUCN II)	-	✓
	Port Phillip Heads Marine National Park	National Park (IUCN II)	-	✓
	Twelve Apostles Marine National Park	National Park (IUCN II)	-	✓
	Wilsons Promontory Marine National Park	National Park (IUCN II)	-	✓

Area Type	Title	IUCN Classification	Operational Area	MDO EMBA
	Marengo Reefs Marine Sanctuary	Natural Monument or Feature (IUCN III)	-	✓
	The Arches Marine Sanctuary	Natural Monument or Feature (IUCN III)	-	✓
	Eagle Rock Marine Sanctuary	Natural Monument or Feature (IUCN III)	-	✓
	Merri Marine Sanctuary	Natural Monument or Feature (IUCN III)	-	✓
	Mushroom Reef Marine Sanctuary	Natural Monument or Feature (IUCN III)	-	✓

Note: the PMST also identified several protected areas which were deemed to be irrelevant to Woodside's petroleum activities due to their terrestrial location and have been excluded.

Table 3-4: Australian IUCN Reserve Management Principles

IUCN Classification	Description	IUCN Principles	Applicable Marine Parks
National Park (IUCN II)	Natural area of land and/or sea, designated to: (a) protect the ecological integrity of one or more ecosystems for this and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area, and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.	The reserve or zone should be protected and managed to preserve its natural condition according to the following principles. Natural and scenic areas of national and international significance should be protected for spiritual, scientific, educational, recreational or tourist purposes. Representative examples of physiographic regions, biotic communities, genetic resources, and native species should be perpetuated in as natural a state as possible to	Bunurong Marine National Park Churchill Island Marine National Park Discovery Bay Marine National Park Point Addis Marine National Park Port Phillip Heads Marine National Park Twelve Apostles Marine National Park Wilsons Promontory Marine National Park

IUCN Classification	Description	IUCN Principles	Applicable Marine Parks
		provide ecological stability and diversity.	
		Visitor use should be managed for inspirational, educational, cultural and recreational purposes at a level that will maintain the reserve or zone in a natural or near natural state.	
		Management should seek to ensure that exploitation or occupation inconsistent with these principles does not occur.	
		Respect should be maintained for the ecological, geomorphologic, sacred and aesthetic attributes for which the reserve or zone was assigned to this category.	
		The needs of indigenous people should be taken into account, including subsistence resource use, to the extent that they do not conflict with these principles.	
		The aspirations of traditional owners of land within the reserve or zone, their continuing land management practices, the protection and maintenance of cultural heritage and the benefit the traditional owners derive from enterprises, established in the reserve or zone, consistent with these principles should be recognised and taken into account.	
Natural Monument or Feature **(IUCN III)**	Area containing one or more specific natural or natural / cultural feature which is of outstanding value because of its inherent rarity,	The reserve or zone should be protected and managed to preserve its natural or cultural features based on the following principles.	Marengo Reefs Marine Sanctuary The Arches Marine Sanctuary

IUCN Classification	Description	IUCN Principles	Applicable Marine Parks
	representative or aesthetic qualities or cultural significance.	Specific outstanding natural features should be protected or preserved in perpetuity because of their natural significance, unique or representational quality or spiritual connotations.	Eagle Rock Marine Sanctuary Merri Marine Sanctuary Mushroom Reef Marine Sanctuary
		Opportunities for research, education, interpretation and public appreciation should be provided to an extent consistent with these principles.	
		Management should seek to ensure that exploitation or occupation inconsistent with these principles does not occur.	
		People with rights or interests in the reserve or zone should be entitled to benefits derived from activities in the reserve or zone that are consistent with these principles.	
Multiple Use Zone (IUCN VI)	Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.	The reserve or zone should be managed mainly for the sustainable use of natural ecosystems based on the following principles.	Apollo AMP Beagle AMP
		The biological diversity and other natural values of the reserve or zone should be protected and maintained in the long term.	
		Management practices should be applied to ensure ecologically sustainable use of the reserve or zone.	
		Management of the reserve or zone should contribute to regional and national development to the extent that this is consistent with these principles.	

Source: Environment Australia (2002)

3.3 Threatened and Migratory Species

A report was generated from the EPBC Act Protected Matters Search Tool (PMST) and was used to identify listed threatened and migratory species that may occur within the operational area and the EMBA. The PMST report identified a total of 46 species listed with a threatened status (27 of which are also listed as migratory) and a further 15 migratory species may potentially occur, or have habitat, within the operational area.

A total of 55 threatened species (31 of which are also listed as migratory) potentially occur within the EMBA.

The environmental values and sensitivities (threatened and migratory species) within the operational area and EMBA as identified in the PMST searches. For each species identified, the extent of likely presence is provided.

Relevant conservation advices, recovery plans and management plans for marine fauna identified in the PMST for the operational area and EMBA are provided in **Table 3-5**.

The BIAs and habitats critical to the survival of a species are which overlap the operational area and EMBA are shown in **Table 3-6**.

Note that terrestrial species (such as terrestrial mammals, reptiles and bird species) that appear in the EPBC search of the EMBA and do not have habitats along shorelines are not relevant to the activity, as such these have been excluded.

The following species have been identified as having an elevated level of protection through recognised BIAs and are considered independently of other species with descriptions provided in the following subsections.

- Pygmy Blue Whale
- Southern Right Whale
- White Shark
- Albatross
- Petrels
- Shearwaters
- Other Seabirds

3.3.1 Listed Species Recovery Plans, Conservation Advice and Threat Abatement Plans

Woodside considered recent updates to Recovery Plans, Conservation Management Plans, Threat Abatement Plans or approved Conservation Advice in place for EPBC Act-listed threatened species that may potentially occur or utilise habitat within the operational area or EMBA.

Recovery Plans set out the research and management actions necessary to stop the decline of, and support the recovery of listed threatened species. In addition, Threat Abatement Plans provide for the research, management, and any other actions necessary to reduce the impact of a listed key threatening process on native species and ecological communities.

Table 3-5 summarises the actions relevant to the activity with more information on the specific requirements of the relevant plans of management (including Conservation Advice and Conservation Management Plans) applicable to the Activity and demonstrates how current management requirements have been taken into account.

Table 3-5: Summary of relevant species recovery plans, approved conservation plans and threat abatement plans

Species or Group	Relevant Plan/Conservation Advice DCCEW 2022	Relevant Objectives	Threats and or Management Strategies Relevant to the Activity	Relevant Conservation Actions
All Vertebrate Fauna				
All vertebrate fauna	Threat Abatement Plan for the impacts of marine debris on vertebrate wildlife of Australia's coasts and oceans (DoEE, 2018)	There are four main objectives: • Contribute to the long-term prevention of the incidence of harmful marine debris • Remove existing harmful marine debris from the marine environment • Mitigate the impacts of harmful marine debris on marine species and ecological communities • Monitor the quantities, origins and impacts of marine debris and assess the effectiveness of management arrangements over time for the strategic reduction of debris.	Ship-sourced marine debris as a risk to vertebrate marine life through entanglement or ingestion	No explicit management actions for non-fisheries related industries (note that management actions in the plan relate largely to management of fishing waste (for example 'ghost' gear), and State and Commonwealth management through regulation.
Marine Mammals				
Sei Whale	Conservation Advice for the Sei Whale	Determine population abundance, trends and population structure for sei whales, and establish a long-term monitoring program in Australian waters. Describe the spatial and temporal distribution of Sei Whales and further define biologically important areas (feeding and breeding), and migratory routes within Australian and Antarctic waters.	Noise interference	Once the spatial and temporal distribution (including biologically important areas) of Fin Whales is further defined, assess the impacts of increasing anthropogenic noise (including seismic surveys, port expansion, and coastal development).
			Habitat degradation including pollution	No explicit relevant management actions; habitat degradation and pollution identified as threats.
			Vessel strike	Minimising vessel collisions: • Develop a national vessel strike strategy that investigates the risk of vessel strikes on Sei Whales and also identifies potential mitigation measures. • Ensure all vessel strike incidents are reported in the National Vessel Strike Database.
Blue Whale	Conservation Management Plan for the Blue Whale 2015-2025	The long-term recovery objective is to minimise anthropogenic threats to allow the conservation status of the Blue Whale to improve so that it can be removed from the threatened species list under the EPBC Act.	Noise interference	Assess and address anthropogenic noise: shipping, industrial and seismic noise.
			Habitat modification	No explicit relevant management actions; habitat modification identified as a threat.
			Vessel disturbance	Minimise vessel collisions: • Develop a national vessel strike strategy that investigates the risk of vessel strike on blue whales and also identifies potential mitigation measures. • Ensure all vessel strike incidents are reported in the National Ship Strike Database. • Ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented.
			Marine debris	No explicit relevant management actions; marine debris identified as a threat.
Fin Whale	Approved Conservation Advice for the Fin Whale	Determine population abundance, trends and population structure for fin whales, and establish a long-term monitoring program in Australian waters. Describe the spatial and temporal distribution of Fin Whales and further define biologically important areas (feeding and breeding), and migratory routes within Australian and Antarctic waters.	Noise interference	Once the spatial and temporal distribution (including biologically important areas) of Fin Whales is further defined, assess the impacts of increasing anthropogenic noise (including seismic surveys, port expansion, and coastal development).
			Habitat degradation including pollution	No explicit relevant management actions; habitat degradation and pollution identified as threats.

Species or Group	Relevant Plan/Conservation Advice DCCEW 2022	Relevant Objectives	Threats and or Management Strategies Relevant to the Activity	Relevant Conservation Actions
			Vessel strike	Develop a national vessel strike strategy that investigates the risk of vessel strikes on Fin Whales and identifies potential mitigation measures. Ensure all vessel strike incidents are reported in the National Vessel Strike Database.
Southern Right Whale	Conservation Management Plan for the Southern Right Whale 2011-2021	Long term recovery objective: • To minimise anthropogenic threats to allow the conservation status of the southern right whale to improve so that it can be removed from the threatened species list under the EPBC Act Interim Recovery Objective 5: • Anthropogenic threats are demonstrably minimised	Noise interference	Assess and address anthropogenic noise: shipping, industrial and seismic noise.
			Habitat modification	No explicit relevant management actions; habitat modification identified as a threat.
			Marine debris	No explicit relevant management actions; entanglement in marine debris identified as a threat.
			Vessel disturbance / strike	Address vessel collisions: • Develop a national ship strike strategy that quantifies vessel movements within the distribution ranges of southern right whales and outlines appropriate mitigation measures that reduce impacts from vessel collisions.
Australian Sea Lion	Recovery Plan for the Australian Sea Lion	The overarching objective of this recovery plan is to halt the decline and assist the recovery of the Australian sea lion throughout its range in Australian waters by increasing the total population size while maintaining the number and distribution of breeding colonies with a view to: • Improving the population status leading to the future removal of the Australian sea lion from the threatened species list of the EPBC Act • Ensuring that anthropogenic activities do not hinder recovery in the near future or impact on the conservation status of the species in the future.	Habitat degradation	No explicit management actions; habitat degradation recognised as a threat.
			Pollution and oil spills	Implement jurisdictional oil spill response strategies as required.
			Disease	No explicit management actions; disease and pathogens recognised as a threat.
			Marine debris	Identify the sources of marine debris having an impact on Australian sea lion populations. Assess the impacts of marine debris on Australian sea lion populations. Develop and implement measures to mitigate the impacts of marine debris on Australian sea lion populations, noting the linkages with the Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life.
			Vessel Strike	Collect data on direct killings and confirmed vessel strikes.
	Approved Conservation Advice on *Neophoca cinerea* Australian Sea Lion	Primary conservation actions: • Mitigate the impacts of marine debris on Australian Sea Lions	Marine debris	Assess the impacts of marine debris on Australian Sea Lion populations and identify the sources of marine debris which have an impact. Develop and implement measures to mitigate the impacts of marine debris on the species (including reducing the amount of these marine debris entering the oceans), noting linkages with the Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life.
			Disease and Parasites	Improve human wastewater management to minimise dispersal of bacteria, parasites and pollutants into the marine environment.
			Habitat degradation and pollution	Require all vessels to have oil spill mitigation measures in place, and implement jurisdictional oil spill response strategies as required.
			Noise interference	Monitor and mitigate impacts (including cumulative impacts) of human interactions on Australian Sea Lion colonies. Control access to breeding colonies to minimise the impacts of disturbance on Australian Sea Lions.

Species or Group	Relevant Plan/Conservation Advice DCCEW 2022	Relevant Objectives	Threats and or Management Strategies Relevant to the Activity	Relevant Conservation Actions
Marine Reptiles				
EPBC Act listed marine turtles in the EMBA: • Loggerhead Turtle • Green Turtle • Leatherback Turtle	National Light Pollution Guidelines for Wildlife, including marine turtles, seabirds and migratory shorebirds (DoEE, 2020)	Lighting objectives will need to consider the regulatory requirements and Australian standards relevant to the activity, location and wildlife present. Objectives should be described in terms of specific locations and times for which artificial light is necessary. Consideration should be given to whether colour differentiation is required and if some areas should remain dark – either to contrast with lit areas or to avoid light spill. Where relevant, wildlife requirements should form part of the lighting objectives. A lighting installation will be deemed a success if it meets the lighting objectives (including wildlife needs) and areas of interest can be seen by humans clearly, easily, safely and without discomfort.	Light pollution	Best practice lighting design incorporates the following design principles: • Start with natural darkness and only add light for specific purposes. • Use adaptive light controls to manage light timing, intensity and colour. • Light only the object or area intended – keep lights close to the ground, directed and shielded to avoid light spill. • Use the lowest intensity lighting appropriate for the task. • Use non-reflective, dark-coloured surfaces. • Use lights with reduced or filtered blue, violet and ultra-violet wavelengths.
	Recovery Plan for Marine Turtles	Long-term recovery objective: • Minimise anthropogenic threats to allow for the conservation status of marine turtles to improve so that they can be removed from the EPBC Act threatened species list. Interim objective 3: • Anthropogenic threats are demonstrably minimised.	Marine debris	Reduce the impacts from marine debris: • Support the implementation of the EPBC Act Threat Abatement Plan for the impacts of marine debris on vertebrate marine life.
			Chemical and Terrestrial Discharge	Minimise chemical and terrestrial discharge.
			Vessel disturbance	Vessel interactions identified as a threat; no specific management actions in relation to vessels prescribed in the plan.
			Light pollution	Minimise light pollution: • 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. • Develop and implement best practice light management guidelines for existing and future developments adjacent to marine turtle nesting beaches. • Identify the cumulative impact on turtles from multiple sources of onshore and offshore light pollution.
			Noise interference	Assess and address anthropogenic noise: • Understand the impacts of anthropogenic noise on marine turtle behaviour and biology.
			Habitat modification	Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival. Manage anthropogenic activities in Biologically Important Areas to ensure that biologically important behaviour can continue.
			Disease and pathogens	No explicit management actions; disease and pathogens recognised as a potential threat.
Leatherback Turtle	Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle)	No explicit relevant objectives.	Boat strike	No explicit relevant management actions; vessel strikes identified as a potential threat.
			Habitat degradation (changes to breeding sites and degradation to foraging areas)	Identify and protect migratory corridors between nesting beaches and common foraging areas to facilitate colonization.
			Marine debris	No explicit relevant management actions; marine debris identified as a potential threat.

Species or Group	Relevant Plan/Conservation Advice DCCEW 2022	Relevant Objectives	Threats and or Management Strategies Relevant to the Activity	Relevant Conservation Actions
Fish, Sharks and Rays				
Whale Shark	Approved Conservation Advice for the Whale Shark (*Rhincodon typus)*	To maintain existing levels of protection for the whale shark in Australia while working to increase the level of protection afforded to the whale shark within the Indian Ocean and Southeast Asian region to enable population growth so that the species can be removed from the threatened species list of the EPBC Act.	Marine debris Habitat disruption Boat strike	Minimise offshore developments and transit time of large vessels in areas close to marine features likely to correlate with Whale Shark aggregations along the northward migration route that follows the northern Western Australian coastline along the 200 m isobath (as set out in the Conservation Values Atlas, DoE, 2014).
White Shark	National Recovery Plan for the White Shark (*Carcharodon carcharias*	The overarching objective of this recovery plan is to assist the recovery of the white shark in the wild throughout its range in Australian waters with a view to: • Improving the population status leading to future removal of the white shark from the threatened species list of the EPBC Act • Ensuring that anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future. The specific objectives of the recovery plan (relevant to industry) are: • Objective 7: Continue to identify and protect habitat critical to the survival of the white shark and minimise the impact of threatening processes within these areas.	Habitat modification	No explicit relevant management actions; habitat modification and climate change identified as potential threats.
Seabirds and Shorebirds				
Seabirds and migratory shorebirds	National Light Pollution Guidelines for Wildlife, including marine turtles, seabirds and migratory shorebirds (DoEE, 2020)	Lighting objectives will need to consider the regulatory requirements and Australian standards relevant to the activity, location and wildlife present. Objectives should be described in terms of specific locations and times for which artificial light is necessary. Consideration should be given to whether colour differentiation is required and if some areas should remain dark – either to contrast with lit areas or to avoid light spill. Where relevant, wildlife requirements should form part of the lighting objectives. A lighting installation will be deemed a success if it meets the lighting objectives (including wildlife needs) and areas of interest can be seen by humans clearly, easily, safely and without discomfort.	Light pollution	Best practice lighting design incorporates the following design principles: • Start with natural darkness and only add light for specific purposes. • Use adaptive light controls to manage light timing, intensity and colour. • Light only the object or area intended – keep lights close to the ground, directed and shielded to avoid light spill. • Use the lowest intensity lighting appropriate for the task. • Use non-reflective, dark-coloured surfaces. Use lights with reduced or filtered blue, violet and ultra-violet wavelengths.
All Migratory Shorebirds	Wildlife Conservation Plan for Migratory Shorebirds	Anthropogenic threats to migratory shorebirds in Australia are minimised or, where possible, eliminated.	Habitat degradation and modification	No explicit relevant management actions; identified as a potential threat.
			Anthropogenic disturbance	Investigate the significance of cumulative impacts on migratory shorebird habitat and populations in Australia. Ensure all areas important to migratory shorebirds in Australia continue to be considered in development assessment processes (specifically for coastal developments).
Australasian Bittern	Approved Conservation Advice for *Botaurus poiciloptilus* (Australasian bittern)	The objective of this conservation advice is to provide guidance for actions that will expand the range and the number of Australasian Bitterns in Australia.	Habitat loss, disturbance and modifications	No explicit relevant management actions; habitat loss and degradation recognised as a potential threat.
Australian Painted Snipe	Approved Conservation Advice for Australian painted snipe (*Rostratula australis*)	No explicit relevant objectives	Habitat loss, disturbance and modification	Habitat recovery actions are a priority.
Bar-Tailed Godwit (baueri)	Approved Conservation Advice for the bar-tailed godwit (western Alaskan) (*Limosa lapponica baueri*)	No explicit relevant objectives	Habitat loss and degradation from pollution	Protect important habitat in Australia.

Species or Group	Relevant Plan/Conservation Advice DCCEW 2022	Relevant Objectives	Threats and or Management Strategies Relevant to the Activity	Relevant Conservation Actions
Curlew Sandpiper	Approved Conservation Advice for the curlew sandpiper (*Calidris ferruginea*)	Australian Objective: • Reduce disturbance at key roosting and feeding sites	Habitat loss and degradation from pollution	No explicit relevant management actions; oil pollution recognised as a potential threat.
Eastern Curlew	Approved Conservation Advice for eastern curlew (*Numenius madagascariensis*)	Australian objectives: • Achieve a stable or increasing population. • Maintain and enhance important habitat. • Reduce disturbance at key roosting and feeding sites.	Habitat loss and degradation from pollution	No explicit relevant management actions; habitat loss and degradation recognised as a potential threat.
Eastern Hooded Plover	Conservation Advice *Thinornis rubricollis rubricollis* hooded plover (eastern)	Relevant Primary Conservation Objectives: • Maintain, enhance and restore habitat, and integrate the subspecies needs into coastal planning	Oil spills	Prepare oil spill response plans to ensure effective rehabilitation of oiled birds.
Great Knot	Approved Conservation Advice for the great knot (*Calidris tenuirostris*)	No explicit relevant objectives	Habitat loss and degradation from pollution	Identifies research priorities and the need for actions to prevent destruction of key breeding and migratory staging sites.
			Disease	No explicit relevant management actions; disease recognised as a potential threat.
Greater Sand Plover	Approved Conservation Advice for the greater sand plover (*Charadruis leschenaultii*)	No explicit relevant objectives	Habitat loss and degradation from pollution	Identifies research priorities and the need for actions to prevent destruction of key breeding and migratory staging sites. Protect important habitat in Australia.
			Introduced species / disease	No explicit relevant management actions; introduced species and disease recognised as potential threats.
Lesser Sand Plover	Approved Conservation Advice *Charadrius mongolus* (Lesser sand plover)	No explicit relevant objectives	Habitat loss and degradation from pollution	Outlines research and survey priorities and recommends habitat restoration / maintenance.
			Introduced species / disease	No explicit relevant management actions; introduced species and disease recognized as potential threats.
Red Knot	Approved Conservation Advice for the red knot (*Calidris canutus*)	No explicit relevant objectives	Habitat loss and degradation Pollution/ contamination impacts	Protect important habitat in Australia. Maintain and improve protection of roosting and feeding sites in Australia
Birds – Seabirds				
All Seabirds	Draft Wildlife Conservation Plan for Seabirds	Seabirds and their habitats are protected and managed in Australia.	Habitat degradation and modification	No explicit relevant management actions; identified as a potential threat.
			Anthropogenic disturbance	Ensure all areas of important habitat for seabirds are considered in the development assessment process. Manage the effects of anthropogenic disturbance to seabird breeding and roosting areas.
			Pollution (marine debris, light, water)	Enhance contingency plans to prevent and/or respond to environmental emergencies that have an impact on seabirds and their habitats.
			Invasive species	Ensure seabirds are protected from the adverse effects of invasive species.

Species or Group	Relevant Plan/Conservation Advice DCCEW 2022	Relevant Objectives	Threats and or Management Strategies Relevant to the Activity	Relevant Conservation Actions
Relevant EPBC Act-listed seabirds: • Antipodean Albatross • Black-Browed Albatross • Buller's Albatross • Campbell Albatross • Gibson's Albatross • Indian Yellow-Nosed Albatross • Northern Buller's Albatross • Northern Giant Petrel • Northern Royal Albatross • Soft-Plumaged Petrel • Southern Giant Petrel • Shy Albatross • Sooty Albatross • Southern Royal Albatross • Wandering Albatross • White-Capped Albatross	Background Paper, Population Status and Threats to Albatrosses and Giant Petrels Listed as Threatened under the EPBC Act 1999 (DSEWPaC, 2011) National recovery plan for threatened albatrosses and giant petrels 2011-2016	Overall objective: • To ensure the long-term survival and recovery of albatross and giant petrel populations breeding and foraging in Australian jurisdiction by reducing or eliminating human related threats at sea and on land. Specific objectives: • Land-based threats to the survival and breeding success of albatrosses and giant petrels breeding within areas under Australian jurisdiction are quantified and reduced. • Marine-based threats to the survival and breeding success of albatrosses and giant petrels foraging in waters under Australian jurisdiction are quantified and reduced.	Marine pollution	Where feasible, population monitoring programs also monitor, in a standardised manner, the incidence of oiled birds at the nest.
			Parasites and disease	No explicit management actions; parasites and disease recognised as a potential threat.
Australian Fairy Tern	Approved Conservation Advice for Australian fairy tern (*Sternula nereis nereis*)	No explicit relevant objectives.	Oil spills	Ensure appropriate oil spill contingency plans are in place for the subspecies' breeding sites that are vulnerable to oil spills.
Blue Petrel	Approved Conservation Advice for the blue petrel (*Halobaena caerulea*)	No explicit relevant objectives.	Habitat loss, disturbance and modification	No explicit relevant management actions; habitat loss, disturbance and modification recognised as a potential threat.
Fairy Prion (southern)	Approved Conservation Advice for fairy prion (southern) (*Pachyptila turtur subantarctica*)	No explicit relevant objectives.	Habitat loss, disturbance and modification	No explicit management actions; habitat loss, disturbance and modification recognised as a potential threat.
Grey-Headed Albatross	Approved Conservation Advice for *Thalassarche chrysostoma* (Grey-headed Albatross)	No explicit relevant objectives.	Habitat loss, disturbance and modification	No explicit management actions; habitat loss, disturbance and modification recognised as a potential threat.
Shy Albatross	Approved Conservation Advice for *Thalassarche cauta* (Shy Albatross)	Conservation Advice refers to the objectives set out in the National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPaC 2011).	Marine debris (plastics)	No explicit management actions; marine debris recognised as a potential threat.
			Disease	No explicit management actions; disease recognised as a potential threat.
Soft-Plumaged Petrel	Approved Conservation Advice for the soft-plumaged petrel (*Pterodroma mollis*)	No explicit relevant objectives.	Habitat loss, disturbance and modification	No explicit management actions; habitat loss, disturbance and modification recognised as a potential threat.

3.3.2 Biologically Important Areas and Habitat Critical to the Survival of a Species

The Protected Matters Search Tool (PMST) identifies biologically important areas (BIAs) for some of the region's protected species. These are areas that are considered to be particularly important for the conservation of protected species and where aggregations of individuals display biologically important behaviour such as breeding, foraging, resting or migration. BIAs are not protected matters and should not be confused with 'critical habitat' as defined in the EPBC Act. There are no critical habitats identified within the operational area or EMBA.

A review of the PMSTs identified BIAs for 17 protected species that intersect with the operational area and EMBA. The identified protected species and their BIAs are shown in Table 3-6.

Table 3-6: BIAs within the Operational Area and EMBA

Species	BIA Type	Operational Area	MDO EMBA	Closest approx. distance to operational area (km) [1]
Whales				
Blue whale and pygmy blue whale	Distribution	✓	✓	Within
	Foraging (annual high use area)	✓	✓	Within
Southern right whale	Aggregation	-	✓	25 km
	Known Core Range	✓	✓	Within
	Migration and Resting on Migration	✓	✓	Within
Sharks				
White shark	Breeding (nursing area)	-	-	302 km
	Distribution	✓	✓	Within
	Foraging	-	✓	58 km
Seabirds				
Antipodean Albatross	Foraging	✓	✓	Within
Australasian Gannet	Aggregation	-	✓	117 km
	Foraging	-	✓	83 km
Black-browed Albatross	Foraging	✓	✓	Within
Black-faced Cormorant	Foraging	-	-	116 km
Buller's Albatross	Foraging	✓	✓	Within
Campbell Albatross	Foraging	✓	✓	Within
Common Diving Petrel	Breeding	-	✓	90 km
	Foraging	✓	✓	Within
Indian Yellow-nosed Albatross	Foraging	✓	✓	Within
Little Penguin	Breeding	-	✓	190 km
	Foraging	-	✓	120 km

Species	BIA Type	Operational Area	MDO EMBA	Closest approx. distance to operational area (km) [1]
Short-tailed Shearwater	Breeding	-	✓	192 km
	Foraging	-	✓	20 km
Shy Albatross	Foraging	✓	✓	Within
Wandering Albatross	Foraging	✓	✓	Within
Wedge-tailed shearwater	Breeding	-	✓	590 km
	Foraging	✓	✓	Within
White-faced Storm Petrel	Foraging	-	✓	56 km

[1] *Where multiple BIAs overlap with the wider EMBA, the distance shown is the distance of the closest BIA to the operational area.*

3.3.3 Blue Whale

The operational area intersects the distribution and foraging BIA for the Pygmy Blue Whale.

Blue whales (*Balaenoptera musculus*) are listed as endangered and migratory under the EPBC Act. There four subspecies of Blue Whale, two of these occur within Australian waters, the southern or 'true' blue whale (*Balaenoptera musculus intermedia*) and the 'pygmy' blue whale (*Balaenoptera musculus brevicauda*) (DoE, 2015a). As with other baleen whales, they generally migrate between breeding grounds at lower latitudes where both mating and calving takes place during the winter and feeding grounds at higher latitudes during the summer (DoE, 2015a).Woodside understand that the Bonney Upwelling is an important habitat and feeding ground for Pygmy Blue Whales and it is located within the EMBA. The Pygmy Blue Whale aggregates between Cape Otway, Victoria, and Robe, South Australia, in relatively shallow shelf waters enriched by seasonal cold-water upwelling driven by south-east winds. Aggregation in the Bonney Upwelling between the Great Australian Bight and Bass Strait occurs November–May (Gill et al. 2011). This upwelling event allows whales to feed on abundant krill surface swarms (DOE, 2015a).

3.3.4 Southern Right Whale

The operational area intersects the known core range and migration as well as migration BIAs for the Southern Right Whale, while the EMBA also overlap an aggregation BIA.

Woodside understands that the Southern right whale (*Eubalaena australis*) is listed as endangered and migratory under the EPBC Act. The species is a seasonal visitor to the Australian coast, arriving between May and November (occasionally as early as April and as late as November) and recorded in the coastal waters of all Australian states (Bannister *et al*., 1996). Southern Right Whales migrate from their summer feeding grounds in the Southern Ocean to calve and breed in warmer coastal waters (DoE, 2015). The species are known to regularly aggregate for breeding and calving off of Warrnambool, Victoria, with calving areas tending to be very close to the shore. The known calving and aggregation areas in the south-east region are Warrnambool, Port Fairy, Port Campbell and Portland (Victoria), and Encounter Bay (South Australia).

The species generally occupy shallow sheltered bays that offer protection from south westerly weather, within 2 km of the shore and in water depth of less than 10 m (Charlton, 2017).

3.3.5 White Shark

The operational area intersects the distribution BIA for the White Shark, while the EMBA also overlap a foraging BIA.

The White Shark (*Carcharodon carcharias*) is listed as vulnerable and migratory under the EPBC Act and is widely distributed throughout temperate and subtropical regions (Bruce et al., 2006; Last & Stevens 2009). They are typically found from close inshore habitats (e.g. rocky reefs and shallow coastal bays) to the outer continental shelf and slope areas (Bruce et al. 2006). The South-east Marine Region supports a white shark population that is thought to move seasonally along the southern and eastern Australian coasts, moving north along the east coast during autumn and winter, and returning to southern Australian waters by early summer (Bruce et al. 2006).

3.3.6 Seabirds

There are 14 seabird species with BIAs within the operational area and EMBA. The seabird species are grouped as follows:

- Albatross
  - Antipodean Albatross
  - Black-browed Albatross
  - Buller's Albatross
  - Campbell Albatross
  - Indian Yellow-nosed Albatross
  - Shy Albatross
  - Wandering Albatross
- Petrel
  - Common Diving Petrel
  - White-faced Storm Petrel
- Shearwater
  - Short-tailed Shearwater
  - Wedge-tailed Shearwater
- Other Seabirds
  - Australasian Gannet
  - Black-faced Cormorant
  - Little Penguin

Based on seabird group, details on seabird BIAs overlapping the operational area and EMBA are as follows:

Albatross

Albatross species are among the most oceanic of all seabirds, and seldom come to land unless breeding (DSEWPaC, 2011). Many species, such as Antipodean Albatross, are extremely dispersive, spending most of their time over the pelagic waters of the oceans. Albatross species exhibit a broad range of diets and foraging behaviours, and hence at-sea distributions are diverse. Given their ability to cover vast oceanic distances, all waters within Australian jurisdiction can be considered foraging habitat.

Woodside understands that Albatross species have a widespread distribution throughout the southern hemisphere. They feed mainly on cephalopods, fish and crustaceans, using surface feeding or plunge diving to seize their prey. Albatross are likely to overfly and forage within the operational area and EMBA with foraging BIAs recognised for Antipodean Albatross, Black-browed Albatross, Buller's Albatross, Campbell Albatross, Indian Yellow-nosed Albatross, Shy Albatross and Wandering Albatross.

No breeding colonies or nesting areas for listed albatross species are located within the operational area, however the South-east Marine Region Profile (DoE, 2015) recognises that fives species breed in or adjacent to the South-east Marine region with four sites listed: Macquarie Island, Albatross Island, Pedra Branca, and the Mewstone.

Petrel

Woodside understands that petrel species are oceanic and have a widespread distribution throughout the southern hemisphere. They are colonial and breed on sub-Antarctic and Antarctic islands in a circumpolar band generally between 40°S and 60°S. Petrel species feed on small fish, cephalopods (octopus, squid and cuttlefish) and crustaceans along the edge of the continental shelf and open waters (DSEWPaC, 2011).

Foraging BIAs have been identified within the operational area and EMBA for the Common Diving Petrel and the EMBA only for the White-faced Storm Petrel.

Breeding also occurs within the South-east Marine Region (DoE, 2015) with a breeding BIA identified within the EMBA for the Common Diving Petrel.

Shearwater

Woodside understands that shearwaters have a wide distribution including Antarctica, Siberia, Japan, South America and New Zealand. All shearwaters fish for their food with various techniques including diving whilst in flight, diving while swimming on the water's surface or fly underwater with half-open wings (NDPE, 2022). Fish, squid, crustaceans, molluscs and plankton form the main part of their diet, but some species of shearwater are known to follow ships for scraps or scavenge for food at offshore waste-disposal points (NDPE 2022). Usually, shearwaters only visit land to breed. They establish colonies on remote islands, capes or coastal mountains in places where take-offs are helped by winds and there are few land predators.

Two species of Shearwater have identified BIAs within the operational area and EMBA. The Short-tailed Shearwater has a breeding and foraging BIA within the EMBA and the Wedge-tailed Shearwater has a foraging BIA within the operational area and an additional breeding BIA within the EMBA.

Other Seabirds

Australasian Gannet

The Australasian Gannet has a foraging and aggregation BIA recognised within the EMBA. The species generally feeds over continental shelves or inshore waters on pelagic fish, especially pilchard, anchovies and jack mackerel, but also squid and garfish (DoE, 2015). Prey is caught mainly by plunge-diving, but it is also seen regularly attending trawlers.

Black-faced Cormorant

The Black-faced Cormorant has a foraging BIA within the LOWC EMBA only. The species is endemic to southern Australia and feeds in coastal waters (DoE, 2015). Their diet consists of a variety of fish species which are caught mainly through pursuit-diving, sometimes in flocks of up to several thousand individuals (DoE, 2015).

Little Penguin

The Little Penguin breeding and foraging BIA recognised within the EMBA. The Bass Strait is considered an important breeding site with the largest portion (60%) of the known breeding colonies in Australia (DoE, 2015). Breeding occurs in winter and spring with individuals displaying strong site fidelity, returning to the same breeding colony each year. Little Penguins feed on fish, squid and krill (DoE, 2015).

3.4 Socio-Economic Values and Sensitivities

Socio-economic activities that may occur within the operational area and EMBA include commercial fishing, oil and gas exploration and production, and recreational fishing and tourism.

3.4.1 Australian Commercial Fisheries

A number of Commonwealth and State managed fisheries have boundaries that overlap with the operational area and EMBA. Table 3-7 provides a summary description of the commercial fisheries with management areas overlapping the operational area and / or EMBA and therefore have the potential for their operations to be affected by the petroleum activity.

Table 3-7: Commonwealth and State managed fisheries within the EMBA

Fishery	Target Species	Description	Presence	
			OA	MDO EMBA
Commonwealth Managed Fisheries[1]				
Bass Strait Central Zone Scallop	Scallops (*Pecten fumatus*)	Towed dredge fishing method. Fishery managed via seasonal/area closures and total allowable catch (TAC) controls together with quota statutory fishing rights (48 permits for 2019 season and 43 permits for the 2020 season) and individual transferrable quotas. 9 vessels were active in the fishery in the 2020 season. Fishing season: typically July to 31 December	No 2020 fishing intensity data shows activity north and east of King Island	Yes
Eastern Tuna and Billfish	Albacore tuna (*Thunnus alulunga*) Bigeye tuna (*Thunnus obesus*) Yellowfin tuna (*Thunnus albacares*) Broadbill swordfish (*Xiphias gladius*) Striped marlin (*Kaijikia audux*)	Pelagic longline, minor line (such as handline, troll, rod and reel). A total of 81 longline boat Statutory Fishing Rights, and 83 minor line Statutory Fishing Rights were issued in 2020. Vessels operating on 2019 and 2020 season –37 and 35 longline and 0 minor-line. Fishing season: 12 months beginning on 1 January	No Fishery effort is concentrated along the NSW coast and southern Queensland coast No Victorian ports are used to land catches.	No
Skipjack (eastern)	Skipjack tuna (*Katsuwonus pelamis*).	Historically, over 98% of the catch was taken using purse seine catch method. Pole and line method was used for the remaining 2% of the catch. There were 17 fishing permits for the 2019-20 fishing season, but no active Australian vessels. Fishing season: not currently active	No No fishing effort in the fishery since 2008-9 fishing season (stock highly variable and Australia is at the edge of the species range)	No
Small Pelagic (western sub-area)	Jack mackerel (*Trachurus declivis, T. symmetricus, T. murphyi*) Blue mackerel (*Scomber australasicus*), Redbait (*Emmelichthys nitidus*) and	Purse seine and mid-water trawl are the main fishing methods. There were 33 Statutory Fishing Rights in the 2020-21 fishing season, with 4 purse seine and 2 mid-water trawl vessels active. Fishing season: 12 months beginning 1 May	No Fishery effort concentrated in NSW and eastern Tasmania	No

Fishery	Target Species	Description	Presence	
			OA	MDO EMBA
	Australian sardine (*Sardinops sagax*).			
Southern and Eastern Scalefish and Shark Fishery (SESSF) – CTS and Danish Seine	Blue grenadier (*Macruronus novaezelandiae*), Tiger flathead (*Platycephalus richardsoni*), Pink ling (*Genypterus blacodes*) Silver warehou (*Seriolella punctata*)	Fishing methods include otter trawl and Danish seine. There are 57 trawl licences with 30 trawl and 19 Danish seine vessels operational in the 2019/20 season. Fishing season: 12 months beginning 1 May	Unlikely (CTS) No (Danish Seine) Trawl sector is concentrated around shelf-break areas. Danish seine activity is located on the continental shelf and operate in sandy bottom environments	Unlikely (CTS) No (Danish Seine)
SESSF – Shark Gillnet and Shark Hook Sectors	Gummy shark (*Mustelus antarcticus*)	Within the Shark Gillnet and Hook sector there were 61 gillnet fishing permits and 13 hook fishing permits issued in 2019-20 season. Vessels actively fishing during the season included 35 gillnet vessels and 36 hook vessels. Fishing season: 12 months beginning 1 May	Possible (Gillnet) No (Hook) Gillnet sector heavily utilises the continental shelf. Hook sector does not fish in the Gippsland Basin	Possible (Gillnet) No (Hook)
Southern Bluefin Tuna	Southern bluefin tuna (*Thunnus maccoyii*)	The primary fishing method is purse seine in waters off South Australia with a number of fishes captured by longline vessels off the East Coast. Tuna caught in SA are then transferred to aquaculture farming pens off Port Lincoln in South Australia. In the 2019-20 fishing season, there were 82 fishing permits with 7 active purse seine vessels and 23 longline vessels. Fishing season: 12 months beginning 1 December	No Fishery effort concentrated in the Great Australian Bight (GAB) off Kangaroo Island and in southern NSW coast off the continental shelf	No
Southern Squid Jig	Gould's squid (*Nototodarus gouldi*)	Squid jigging is the fishing method used, mainly in water depths of 60 to 120 m, at night. In 2020, there were 5 active jig vessels in the Commonwealth fishery. Portland is a primary landing port. Fishing season: 12 month season beginning 1 January	No Catches are concentrated in Commonwealth waters between Portland and Robe (SA). Low fishing	Possible

Fishery	Target Species	Description	Presence	
			OA	MDO EMBA
			intensity occurs in eastern Victoria and southern NSW	
State Managed Fisheries[2]				
Victorian Rock Lobster	Predominantly southern rock lobster (*Jasus edwardsii*), along with small quantities of eastern rock lobster (*Jasus verreauxi*).	71 licences in the Western zone, permitted to use baited rock lobster pots. In 2019/20, there were 43 vessels working in the western zone (VFA, 2021). In 2019/20, 225.6 tonnes were harvested in the western zone. Fished from rocky reefs in waters up to 150 m depth, with most of the catch coming from inshore waters less than 100 m deep. Pots are generally set and retrieved each day, marked with a surface buoy. Closed seasons: females 1 June to 15 November and males 15 September to 15 November.	Yes Fishing occurs throughout the area on rocky reefs.	Yes
Victorian Giant Crab	Giant crab (*Pseudocarcinus gigas*).	Giant crabs can only be taken using commercial rock lobster pots by Western Zone lobster fishers. Since the introduction of quota management in the Giant Crab Fishery in 2001, there have been <5 dedicated fishers active in the fishery and up to 20 fishers annually reporting Giant Crab catch as by-product from Rock Lobster fishing (VFA, 2021). In 2019/20 season 9.5t was landed (VFA 2021). Fished mostly on the shelf break (150-350 m water depth).	Unlikely Although concentrated on the continental shelf, given that licence holdings are linked to southern rock lobster licences, there may be some fishing.	Unlikely
Abalone	Blacklip abalone (*Haliotis rubra*) and greenlip abalone (*Haliotis laevigata*).	The fishery consists of 71 fishery access licences of which 14 operate in the Western Zone, 34 in the Victorian Central Zone, and 23 in the Eastern Zone. Commercial fishing methods use diving equipment such as a surface air supply to the diver (hookah system) from small high speed fishing boats. Diving is normally to depths less than 20 m. Fishing season: 12 months beginning 1 April	Likely Abalone diving activity occurs close to shoreline (generally to depths of 30 m on rocky reefs) and may operate around the assets.	Likely
Wrasse	Blue-throat wrasse (*Notolabrus tetricus*) Saddled (or purple) wrasse (*Notolabrus fucicola*)	The fishery is divided into three commercial management zones; west, central and east, with licence holders able to fish in any of these zones. There are 22 licences (2021) issued for this fishery. Licences are transferrable.	Likely Wrasses are fished along the entire Victorian coast but in recent years, catches have been	Likely

Fishery	Target Species	Description	Presence	
			OA	MDO EMBA
	Rosy Wrasse (*Pseudolabrus psittaculus*) Senator Wrasse (*Pictilabrus laticlavius*) Southern Maori Wrasse (*Ophthalmolepis lineolatus*)	Fishing method is via hand line fishing (other than longline which are not permitted) and rock lobster pots if also in possession of a Rock Lobster Access Fishing Licence.	the highest off the central coast (Port Phillip Heads, Western Port, and Wilsons's Promontory) and west coast of Victoria (Portland). Catches of saddled wrasse are highest in the Western part of Victoria, which is thought to be related to a greater proportion of suitable reef habitat in this area. Wrasse can inhabit depths up to 160 m but their preferred depths are approximately 30 m.	
Scallop	Scallop (*Pecten fumatus*).	A total of 91 commercial licenses are issued each year and approximately 10-15 vessels operate within the fishery. Commercial vessels tow a single dredge that is dragged along the seabed. Dredges are deployed from the rear of the vessel and are up to 4.5 metres wide. Fishing season: 12 months beginning 1 April	No Fishery boundary extends the entire length of the Victorian coastline and out to the 20 nm point from the shoreline although mostly fished from Lakes Entrance and Welshpool.	No
Snapper	Snapper (*Pagrus auratus*).	A total of 246 ocean fishery access licences issued (SIV, 2016). A variety of commercial fishing equipment is used including long lines, haul seines, mesh nets, and hand lines.	Likely	Likely
Octopus	Pale Octopus (*Octopus pallidus*)	The fishery has established three zones; western, central and eastern octopus zones to manage commercial octopus fishing in Victoria. The western and central zones are less established and are being managed through exploratory,	No	No

Fishery	Target Species	Description	Presence	
			OA	MDO EMBA
	Maori octopus (*Macroctopus maorum*) Gloomy Octopus (*Octopus tetricus*)	temporary permits. While the Eastern Zone (East Gippsland) is operational and extends from Seaspray to the Victorian / NSW border and out to 20 nm offshore, except for marine reserves. There are 11 transferable licences issued for the eastern octopus zone. The fishery uses purpose-built unbaited traps which aim to minimise bycatch.	The eastern octopus zone, from Seaspray to the Victorian / NSW border, is authorised for commercial take of octopus. Western and central octopus zones are less established.	

[1] Commonwealth fisheries information sourced from DAWE, 2021 and AFMA,
[2] State-managed fisheries information sourced from VFA, 2021a

3.4.2 Tourism and Recreation

Recreational and tourism activities are extremely valuable foundations for the local and regional economy. Key activities include sight-seeing, surfing and fishing. However, apart from offshore recreational fishing, these are generally land-based or near-shore activities and given the operational area is located from 800 m to 3 nm (SSW) of Port Campbell, Victoria, in approximate water depths of 20 -50 m, most of these activities are not expected to overlap the operational area. Some offshore recreational fishers may utilise the operational area.

3.4.3 Commercial Shipping

The South-east Marine Region is one of the busiest shipping regions in Australia and Bass Strait is one of Australia's busiest shipping routes. The Australian Maritime Safety Authority (AMSA) indicates that there are no designated shipping lanes in the vicinity of the Minerva field, with the main shipping channel for vessels (e.g., cargo tankers) travelling between major Australian and foreign ports located south of the Minerva field, about 75 km (40 nm) south of Warrnambool.

Although a dedicated shipping lane is not present, commercial and local vessels utilise the area frequently. Ship tracking data from AMSA provides details of the shipping traffic in the area.

3.4.4 Oil and Gas Activities

Nearby production fields include the Otway Gas Field Development, operated by Beach Energy and the Casino, Henry, Netherby (CHN) gas field operated by Cooper Energy are within the EMBA.

3.4.5 Defence Activities

The Defence Force uses offshore areas for training operations including live firing, bombing practice from aircraft, air-to-air and air-to-sea or ground firing, anti-aircraft firing, firing from shore batteries or ships, remote controlled craft firing, and rocket and guided weapons firing.

Five training and practice areas are located in and around Port Phillip Bay and Western Port Bay. This is to the east of the Minerva field and within the EMBA.

Mine fields were laid in Australian waters during World War II. Post-war minefields were swept to remove mines and to make marine waters safe for maritime activities. There are three areas identified as dangerous due to unexploded ordnance (UXO), though these are located south and east of Wilson's Promontory (approximately 300 km east of the Minerva field).

4 Stakeholder Engagement

In accordance with requirements of sub-regulation 13F of the Environment Regulations, Woodside has consulted with relevant authorities, persons and organisations during the preparation of this EP.

Woodside's approach to stakeholder consultation aims to demonstrate to relevant persons that the environmental impacts and risks of an activity are being appropriately managed. Woodside is committed to ongoing engagement and consultation with stakeholders during all project stages.

Woodside has consulted with relevant stakeholders regarding this petroleum activity, including sharing information with stakeholders and responding directly to enquiries.

Stakeholders consulted specific to the activities covered in this EP commenced in May 2022, with consultation activities including:

- A review of relevant stakeholders following stakeholder identification for a recently consulted *Minerva Plug and Abandonment and Field Maintenance Environment Plan* in Commonwealth waters; and
- Minerva Pipeline Maintenance Environment Plan Environment Plan Stakeholder Information Fact Sheet distributed to relevant stakeholders in May 2022; and
- No reminder emails were sent to stakeholders requesting feedback as Woodside expects that the nature and scale of proposed activities will have limited, if any, expected impacts to stakeholders.

Woodside has considered all stakeholder feedback and assessed the merits of responses received. Woodside considers that consultation with relevant stakeholders has been adequate to inform the development of this EP. Woodside has a process for ongoing stakeholder engagement and any concerns raised by stakeholders after the EP submission will be considered and addressed.

The consultation process also provided opportunity for additional stakeholders identified during the consultation process to be contacted, with a commitment to assess any new concerns or claims as part of ongoing consultation.

Woodside has engaged with key stakeholders through the EP preparation including:

- Commonwealth and State departments and agencies;
- Local Government; and
- Commercial fishery licence holders and their representative associations within both Commonwealth and State managed fisheries that overlap the operational area.

4.1.1 Identified stakeholders

Identified stakeholders and an assessment of their relevance under the Environment Regulations for the purposes of consultation for this petroleum activity are listed in **Table 4-1**.

Table 4-1: Stakeholders engaged with for the proposed activity

Stakeholder
Commonwealth Government Department or Agency
Australian Border Force
Australian Fisheries Management Authority (AFMA)
Australian Hydrographic Office (AHO)
Australian Maritime Safety Authority (AMSA)

Department of Agriculture, Fisheries and Forestry (DAFF) (formerly Department of Agriculture, Water and the Environment) – Fisheries
Department of Agriculture, Fisheries and Forestry (DAFF) (formerly Department of Agriculture, Water and the Environment) – Biosecurity (marine pests)
Department of Agriculture, Fisheries and Forestry (DAFF) (formerly Department of Agriculture, Water and the Environment (DAWE) – Biosecurity (vessels, aircraft and personnel)
Department of Defence (DoD)
Director of National Parks (DNP)
Victorian Government Department or Agency
Department of Environment, Land, Water and Planning (DELWP)
Department of Jobs, Precincts and Regions (DJPR): Earth Resources Regulation
Department of Jobs, Precincts and Regions (DJPR): Marine Pollution
Department of Transport (DoT Victoria)
Environment Protection Authority Victoria (EPA Victoria)
Parks Victoria
Victorian Fisheries Authority (VFA)
Local Government Department or Agency
Corangamite Shire Council
Industry Representative Organisations
AMOSC
Apollo Bay Fishermen's co-op
Australian Petroleum Production & Exploration Association (APPEA)
Australian Southern Bluefin Tuna Industry Association (ASBTIA)
Bass Strait Scallop Industry Association (BSSIA)
Commonwealth Fisheries Association (CFA)
Seafood Industry Victoria (SIV)
Small Pelagic Fishery Industry Association (SPFIA)
South East Trawl Fishing Industry Association (SETFIA)
Southern Shark Industry Alliance (SSIA)
Tuna Australia
VRFish

Commonwealth Fisheries
Bass Strait Central Zone Scallop Fishery
Eastern Skipjack Tuna
Eastern Tuna and Billfish Fishery
Small Pelagic Fishery (Western sub-area)
Southern and Eastern Scalefish and Shark Fishery (SESSF) – Danish Seine and Trawl
Southern and Eastern Scalefish and Shark Fishery (SESSF) - Shark Gillnet Hook and Trap
Southern Bluefin Tuna Fishery
Southern Squid Jig Fishery
State Fisheries
Abalone Fishery
Giant Crab Fishery
Octopus Fishery
Rock Lobster Fishery
Scallop Fishery
Snapper Fishery
Wrasse Fishery
Neighbouring Operators
Beach Energy (Operations) Limited
Cooper Energy

4.1.2 Stakeholder Consultation Activities

Woodside's consultation for this EP was principally supported by the distribution to relevant stakeholders of the Minerva Pipeline Maintenance Environment Plan Stakeholder Information Fact Sheet in May 2022.

The information provided included the timing and duration of the activity, the mitigation measures for relevant impacts and risks, Woodside's policies and experience, and contact details to facilitate providing feedback to Woodside.

4.3 Ongoing Consultation

Stakeholder consultation will be ongoing, and Woodside will work with stakeholders to address any future concerns if they arise throughout the validity of this EP. Should any new stakeholders be identified, they will be added to the stakeholder database and included in all future correspondence as required.

Woodside's commitments to ongoing consultation include:

- Responding in a timely manner to all stakeholder and community contacts regarding the proposed Minerva decommissioning activities.
- Stakeholders who raise objections and claims following EP submission will be responded to directly, and should any concerns raised have not already been addressed in the EP, these will be assessed in the same manner as all risks identified by Woodside.

5 Environmental Risk Management Framework

Woodside has established a risk management governance framework with supporting processes and performance requirements that provide an overarching and consistent approach for the identification, assessment, and management of risks. Woodside policies have been formulated to comply with the intent of the Risk Management Policy and be consistent with the AS/ISO 31000-2018 Risk Management Principles and Guidance.

An integrated impact and risk assessment process was utilised to identify the most appropriate control measures to ensure each impact and risk is reduced to ALARP and an acceptable level . This process includes the incorporation of stakeholder consultation, regulatory requirements, industry good practice and environmental monitoring data on the relevant environmental impacts and risks.

5.1 Evaluation of Impacts and Risks

A formal impact and risk assessment was completed for each environmental aspect and source of risk for the petroleum activity described in Section 3 using the Environmental Impact Identification (ENVID) workshop process. The primary objective of the impact and risk assessment was to develop an understanding of the impact and risk, demonstrate its reduction to ALARP and demonstrate its acceptability to Woodside. It provided definition on the decisions made during the ENVID process, considering the detailed impact assessment for the sources of hazard, the controls chosen to reduce or prevent the impact or risk and why some controls were not chosen. This also involved consideration of the sources of risk, their positive and negative consequences, and the likelihood that those consequences may occur.

The ENVID assessment was conducted as a workshop with a range of personnel from different disciplines including Subsea and Production Engineering and HSE. Decisions made within the ENVID included:

- Confirmation of the sources of hazard identified;
- Allocation of likelihood rating for an unplanned source of hazard;
- Severity rating for all sources of hazard;
- The decision context (Type A, B or C) and a determination as to whether they are higher-order or lower-order impacts and risks;
- Identification of management controls and their acceptance through an ALARP process based upon the decision context; and
- Final acceptability of the impact or risk to Woodside using the acceptability criteria.

The outcome of the assessment process is displayed in Sections 6 and 7 using a series of summary tables, detailed impact and risk descriptions, and impact and risk conclusions. All environmental aspects and their respective sources of hazard are as follows:

- Overview of the source of risk;
- Environmental impact assessment;
- Demonstration of ALARP; and
- Demonstration of acceptability.

5.1.1 Environmental Impact and Risk Assessment

The environmental impacts were based on the environmental receptors identified in Section 0 with the impact descriptions developed in an initial screening process that identified the specific receptor that may be impacted. Further quantitative or qualitative definition of the impact was then completed to ensure an understanding of the impact (planned or unplanned) to confirm that the severity of the risk and impact was correctly assigned during the evaluation process.

6 Environmental Risk Assessment and Evaluation: Planned Activities

The purpose of this section is to address the requirements of sub-regulations 15(3) and 15(4) of the Environment Regulations by assessing and evaluating all the identified impacts and risks associated with the petroleum activity and associated control measures that will be applied to reduce the impacts and risks to an ALARP and an acceptable level.

Table 6-1 summarises the impact analysis for the aspects associated with the planned activities. A comprehensive risk and impact assessment for each of the planned activities, and subsequent control measures proposed by Woodside to reduce the impacts and risks to ALARP and acceptable levels, are detailed in the subsections.

Table 6-1: Summary of the Environmental Impact Analysis for Planned Activities

Activity		Environmental								Socio-Economic				Risk Assessment & Evaluation			
		Marine Mammals	Marine Turtles	Fish	Seabirds/ Shorebirds	Seabed	Water Quality	Marine Protected Areas	Key Ecological Features	Commercial Fisheries	Shipping Activities	Tourism / Recreation	Air Quality	Severity Factor	Likelihood Factor	Residual Risk	Acceptability
Planned Activities																	
6.1	**Physical Presence – interaction with other users**																
	Presence of project vessel during general visual inspection									x	x	x		30	N/A	-	Tolerable
	Presence of pipeline on / under seabed										x	x		10	N/A	-	Tolerable
6.2	**Project Vessel Light Emissions**																
	Artificial light from project vessel	x	x		x									10	N/A	-	Tolerable
6.3	**Project Vessel Noise Emissions**																
	Generation of underwater noise from the project vessels during normal operations	x	x	x										30	N/A	-	Tolerable
	Generation of noise from ROV used for visual inspection	x	x	x										10	N/A		Tolerable
6.4	**Project Vessel Atmospheric Emissions**																
	Vessel engines, generators and mobile and fixed plant and equipment												x	10	N/A	-	Tolerable
6.5	**Routine Project Vessel Discharges**																
	Routine planned discharge of desalination brine, cooling water, and deck drainage water to the marine environment from the project vessel						x							10	N/A	-	Tolerable

Activity		Environmental								Socio-Economic				Risk Assessment & Evaluation			
		Marine Mammals	Marine Turtles	Fish	Seabirds/ Shorebirds	Seabed	Water Quality	Marine Protected Areas	Key Ecological Features	Commercial Fisheries	Shipping Activities	Tourism / Recreation	Air Quality	Severity Factor	Likelihood Factor	Residual Risk	Acceptability
6.6	**Waste Generation**																
	Waste (hazardous and non-hazardous) generated during vessel activities													10	N/A	-	Tolerable

7 Environmental Risk Assessment and Evaluation: Unplanned Events

The purpose of this section is to address the requirements of Regulations 15(3) and 15(4) of the Environment Regulations by assessing and evaluating all the identified impacts and risks associated with the petroleum activity and associated control measures that will be applied to reduce the impacts and risks to ALARP and an acceptable level. This section presents the environmental impacts and risks associated with unplanned events of the petroleum activity.

summarises the impact and risk analysis for the aspects associated with the unplanned events. A comprehensive risk and impact assessment for each of the unplanned events, and subsequent control measures proposed by Woodside to reduce the risk and impacts to ALARP and acceptable levels, are detailed in the subsections.

Table 7-1

Table 7-1: Summary of the Unplanned Events, Aspects Potentially Affected and Risk Assessment and Evaluation

Activity		Environmental								Socio-Economic				Risk Assessment & Evaluation			
		Marine Mammals	Marine Turtles	Fish	Seabirds/ Shorebirds	Seabed	Water Quality	Marine Protected	Key Ecological Features	Commercial Fisheries	Shipping Activities	Tourism and Recreation	Air Quality	Severity Factor	Likelihood Factor	Residual Risk	Acceptability
Unplanned Events																	
7.1.4	**Hydrocarbon Release – Marine Diesel**																
	Surface release of MDO from a vessel as a result of an external impact (vessel collision) which ruptures an MDO tank	x	x	x	x		x			x	x	x		30	0.03	0.9	Tolerable
7.3	**Marine Fauna Interaction**																
	Accidental collision between project vessel and marine fauna	x	x											10	0.03	0.3	Tolerable
7.4	**Introduction of Invasive Marine Species**																
	Introduction of introduced marine species			x			x			x	x	x		100	0.03	3	Tolerable
Error! Reference source not found.	**Minor Spills and Leaks of Chemicals and Hydraulic Fluid**																
	Minor spills and leaks of chemicals and hydrocarbons on the vessel deck reaching the marine environment and from subsea equipment (such as ROVs)			x			x							10	0.1	1	Tolerable

7.6	Loss of Solid Hazardous and Non-Hazardous Wastes (including Dropped Objects)																
	Loss of waste (hazardous and non-hazardous)	x	x	x	x	x	x			x	x	x		10	0.3	3	Tolerable
	Dropped object					x	x			x				10	0.3	3	Tolerable

7.1 Worst-Case Spill Context

The following scenario was identified, and subsequently modelled, as the credible worst case spill scenario should a GVI be undertaken (**Table 7-2**). This scenario is considered highly unlikely given it is resultant of a vessel collision scenario and only a single vessel would be used during any potential GVI operation.

Table 7-2: Summary of worst-case hydrocarbon spill scenarios

Scenario	Hydrocarbon Type	Worst-case Maximum Spill Volume	Comment
Surface release of MDO from fuel tank rupture on AHTS vessel due to collision. N.B. a release scenario at the Minerva-1 well location has been used as a proxy for vessel operations in State jurisdiction.	Marine diesel oil	330 m^3 over 6 hours	Maximum credible volume based on largest fuel tank capacity on inspection vessel.

7.1.1 Oil Spill Modelling Overview

Spill modelling was carried out using SINTEF's Oil Spill Contingency and Response (OSCAR) System (Version 11.0.1). OSCAR is a system of integrated models that quantitatively assess the fate and transport of hydrocarbons in the marine environment, as well as evaluate the efficacy of response measures (Reed *et al*., 2001; Reed *et al*., 2004).

OSCAR provides an integrated hydrocarbon transport and weathering model that accounts for hydrocarbon advection, dispersion, surface spreading, entrainment, dissolution, biodegradation, emulsification, volatilisation and shoreline interaction.

Three-dimensional (3D) OSCAR modelling was undertaken in stochastic mode (total of 200 realisations per scenario) with start dates spaced approximately fortnightly over a five year period. Inputs into the model were sourced from HYCOM (regional ocean currents, temperature and salinity profiles), TPXO7.2 (tidal currents) and NCEP/NCAR (regional winds).

OSCAR enables simulation of a hydrocarbon release scenario in deterministic mode (i.e. a scenario is simulated with one start date with spatial results available at fixed time intervals over the duration of the simulation) or stochastic mode (i.e. a scenario is simulated a number of times with varying start dates, and the results are outputted spatially in a probabilistic manner).

Table 7-3 provides the details on the model input specifications for the modelled scenarios.

Table 7-3: Model input specifications

Parameter	MDO Release
Scenario description	Vessel collision resulting in complete loss of MDO from single largest tank aboard project vessel
Oil type	MDO (see Table 7-4)
Release location	Surface release
Water depth at location	Approx. 60 m
Release coordinates	-38° 42' 06.885" South 142° 57' 17.278" East
Release duration / rate	Instantaneous (6 hours)
Total release volume	330 m^3
Simulation length	Time to extend far enough past cessation of the spill such that oil

Parameter	MDO Release
	concentrations drops below stated threshold concentrations
Period analysed	Any time of year (summer & winter)

Modelling for the MDO spill included a preliminary analysis of the hydrocarbon weathering using the SINTEF Oil Weathering Model. The model predicts the weathering (i.e. mass balance partitioning) of hydrocarbons under steady-state metocean conditions. Weathering simulations were run for constant wind speeds of 1 m/s (low winds), 5 m/s (moderate winds) and 10 m/s (high winds). The simulations were based on a test case of 100 m^3 of hydrocarbon release instantaneously onto the sea surface.

7.1.2 Hydrocarbon Properties

Marine diesel is a moderate weight, moderately persistent oil in the marine environment. The International Tanker Owners Pollution Federation (ITOPF) and the Australian Maritime Safety Authority (AMSA) (2015) categorise diesel as a moderate group III hydrocarbon. For the MDO spill modelling, *Marine Diesel (IKU)* was selected from the SINTEF oil library to represent MDO. A summary of the marine diesel oil properties is provided in Table 7-4.

Table 7-4: Marine diesel oil properties

Parameter	**Marine Diesel Oil (data from SINTEF's *Marine Diesel IKU*)**
API Gravity	0.843
Wax Content (%)	0.05
Pour Point (°C)	-36
Asphaltene (%)	0.05
Specific Gravity	36.4
Viscosity (cP)	3.9 @ 20°C

7.1.3 Hydrocarbon Exposure Values

As described in **Section 3.1**, the spatial extent of the EMBA has been derived using stochastic hydrocarbon fate and transport modelling of the worst-case credible release scenario. To present this large amount of simulated data in a meaningful way and to inform the impact and risk assessment and environmental management actions, appropriate hydrocarbon exposure values were applied to each of the hydrocarbon components (refer **Table 7-5**).

The EMBA presented in **Figure 3-1** was defined using exposure thresholds values presented in Table 7-5.

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

Hydrocarbon contact below the defined thresholds may occur outside the EMBA; however, the effects of these low exposure values will be limited to temporary exceedance of water quality triggers.

Table 7-6 presents justification for the exposure thresholds used to define the EMBA. The table also details how different exposure threshold values are relevant to the impact assessment for an MDO release (**Section 7.1.4**).

Table 7-5: Summary of Exposure Thresholds Used to Define the Environment that May Be Affected

Hydrocarbon components	Units	EMBA exposure value
Surface Hydrocarbons	g/m²	1
Shoreline hydrocarbons	g/m²	10
Entrained hydrocarbons	ppb	100
Dissolved aromatic hydrocarbons	ppb	50

Table 7-6: Summary of Exposure Hydrocarbon Exposure Thresholds Applied in this Environment Plan

Threshold exposure value	Description
Surface hydrocarbons	
1 g/m²	**Low:** It is recognised that 1 g/m² represents the practical limit of observing hydrocarbon sheens in the marine environment. This exposure value is below the levels that would cause ecological impacts, but is considered relevant to approximate the area of effect to socio-economic receptors. This exposure value has been used to define the spatial extent of the EMBA from surface hydrocarbons.
10 g/m²	**Moderate:** This value is considered appropriate to assess ecological impact risk, as it is the estimate for the minimum thickness of oil that will result in harm to seabirds through ingestion from preening of contaminated feathers, or the loss of thermal protection of their feathers. This has been estimated by at 10 to 25 g/m² (Koops et al., 2004; French-McKay, 2009). Furthermore, based on literature reviews on aquatic birds and marine mammals (Engelhardt, 1983; Geraci and St. Aubin, 1988; and Jenssen, 1994), the exposure value for harmful impacts is 10 g/m². This exposure value is used to determine the risk of exposure that can cause adverse impact to turtles, seasnakes, marine mammals and seabirds (NRDAMCME, 1996). This threshold was selected as a reasonable and conservative value to apply to the risk evaluation with respect to surface hydrocarbons.
50 g/m²	**High:** This high exposure value for surface oil is above the minimum threshold observed to cause ecological effect. At this concentration surface hydrocarbons would be clearly visible on the sea surface.
Shoreline hydrocarbons	
10 g/m²	**Low:** This low exposure value defines the area for potential socio-economic impacts (for example, reduction in aesthetic value of the area). This exposure value has been used to define the spatial extent of the EMBA from shoreline hydrocarbons.
100 g/m²	**Moderate:** The concentration for exposure to hydrocarbons stranded on shorelines is derived from levels likely to cause adverse impacts to intertidal habitats and associated fauna. Studies have reported oil thicknesses of 0.1 mm (100 g/m²) as the lethal exposure values for benthic epifaunal invertebrates on intertidal habitats (rock, artificial or human-made) and in intertidal sediments (mud, silt, sand and gravel) (French-McCay et al., 2003; French-McCay et al., 2004; French-McCay, 2009). It is also the impact threshold assumed for oiling of birds (French-McCay et al., 2004). This exposure value has been used to inform the risk evaluation with respect to accumulated shoreline hydrocarbons and the threshold for shoreline response, based on possible clean-up options.

Threshold exposure value	Description
1000 g/m²	**High:** This low exposure value predicts the area likely to require intensive clean-up effort.
Entrained hydrocarbons	
10 ppb	**Low:** Total submerged hydrocarbons, also referred to as 'total water-accommodated fraction' or entrained hydrocarbons, encompass oil droplets in the water column. Much of the published scientific literature does not provide sufficient information to determine if toxicity is caused by the dissolved or the entrained hydrocarbon component, but rather the toxicity of total submerged hydrocarbons. Variation in the methodology of the water-accommodated fraction may account for much of the observed wide variation in reported threshold values, which also depend on the test organism, duration of exposure, oil type and the initial oil concentration. The 10 ppb exposure value represents the very lowest concentration and corresponds with the lowest trigger levels for total hydrocarbons in water recommended in the Australian & New Zealand Environment and Conservation Council water quality guidelines for Australia (ANZECC, 2000).
100 ppb	**Moderate:** This exposure value is considered conservative in terms of potential sub-lethal impacts to most species and lethal impacts to sensitive species based on literature for toxicity testing. Total oil toxicity acute effects of total oil as LC50 for molluscs range from 500 to 2000 ppb. A wider range of LC50 values have been reported for species of crustacea and fish from 100 to 258,000,000 ppb (Gulec et al., 1997; Gulec and Holdway, 2000) and 45 to 465,000,000 ppb (Gulec and Holdway, 2000; Barron et al., 2004) respectively. This exposure value has been used to define the spatial extent of the EMBA from total submerged hydrocarbons and used to describe environmental sensitivities within the EMBA. This exposure value has been used to inform the risk evaluation with respect to entrained hydrocarbons and used to describe environmental sensitivities within the EMBA.
Dissolved aromatic hydrocarbons	
10 ppb	**Low:** This low exposure value establishes the planning area for scientific monitoring (based on potential for exceeding water quality triggers).
50 ppb	**Moderate:** This exposure value approximates toxic effects, particularly sub-lethal effects to sensitive species (NOPSEMA, 2019). French-McCay (2002) indicates an average 96-hour LC50 of around 50 ppb could serve as an acute lethal threshold. For most marine organisms, a concentration of between 50 and 400 ppb is considered to be more appropriate for risk evaluation. This exposure value has been used to inform the risk evaluation with respect to dissolved hydrocarbons and used to describe environmental sensitivities within the EMBA.

7.1.4 Potential Impacts of Hydrocarbons

To help inform the hydrocarbon spill impact and risk assessment, a summary of potential impacts to the environmental values, sensitivities and receptors within the EMBA from exposure to hydrocarbons is provided in Table 7-7; this information is drawn upon within the hydrocarbon risk assessment for each release scenario.

Table 7-7: A summary of potential impacts to environmental values, sensitivities and receptors within the EMBA from exposure to hydrocarbons

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
Marine fauna	
Plankton (including phyto/ zooplankton, larvae, fish eggs)	The effects of hydrocarbons on plankton have been well studied in controlled laboratory and field situations. The different life stages of a species often show widely different tolerances and reactions to oil pollution (Harrison, 1999). Usually the eggs, larval and juvenile stages will be more susceptible than the adults. Surface and entrained oil could impact fish eggs and larvae due to entrainment in surface slicks. However, fish eggs and larvae are highly dispersive and are carried significant distances by ocean currents. Any impacts to fish eggs and larvae are not anticipated to significantly impact on fish populations. Post-spill studies on plankton populations are few, but those that have been done have shown either no effects or temporary minor effects (Kunhold, 1978). The prime reason put forward to explain the lack of observed effects is that many marine species produce very large numbers of eggs and larval stages to overcome natural losses (such as through predation by other animals; adverse hydrographical and climatic conditions; or failure to find a suitable habitat and adequate food). Therefore, it is unlikely that any localised losses of eggs or larvae caused by a single oil spill event in the open ocean, would have no discernible effect on the size or health of future adult populations in the area. Recently spawned gametes and larvae may be especially vulnerable to oil spill effects since they are generally positively buoyant and would be exposed to surface slicks. The potential consequences of this vulnerability, in the unlikely event of a worst-possible release event occurring, would be mitigated by the very large numbers of eggs and larvae released (as discussed above).
Fish, sharks and rays (including commercial species)	Near the sea surface, fish are likely to able to detect and avoid contact with surface slicks and as a result, fish mortalities rarely occur in open waters from floating oils (Scholz *et al*., 1992; Kennish, 1997). Pelagic fish species are therefore generally not highly susceptible to impacts from hydrocarbon spills. Demersal fish species living and feeding on or near the seabed in deeper waters are not likely to be affected by surface and entrained oil in open waters. Likewise, most reef fish are expected to occur at water depths significant enough to be unaffected by surface oil; whereas reef fish in shallow waters (<10 m) and sheltered embayments are at greatest risk from surface oil (Law *et al*., 2011), particularly if they are territorial and unlikely to leave their habitat. Potential impacts to pelagic fish species include smothering and coating of gills and epidermal areas by suspended oil droplets that could potentially lead to reduction in oxygen exchange efficiency, irritation and infection. Fish may also ingest entrained oil or contaminated food leading to physiological impacts. The toxicity of dispersed hydrocarbons to fish species has been the subject of a large number of laboratory studies. In general, fish mortalities and/or ecosystem level impacts are rarely observed following oil spills, as for example, evidenced by the lack of any shifts in species composition or abundance of coastal fishes following the Deepwater Horizon spill in the Gulf of Mexico (Fodrie and Heck, 2011). There are various possible explanations for a buffering of effects of surface oil exposure including fish mobility, avoidance behaviour and/or foraging ecology (Peterson *et al*., 1996, Edgar *et al*., 2003). Exposure to dissolved hydrocarbons from oil may delay embryo development in some fish potentially prolonging their susceptibility to mechanical damage as well as increased levels of mortality (Carls and Thedinga, 2010). While fish, sharks and rays do not generally break the sea surface, individuals may feed near the surface for short periods. The probability of prolonged exposure to a surface slick by fish, shark and ray species is low.

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
Marine mammals	Marine mammals (whales, and dolphins) come to the sea surface to breathe air. They are therefore theoretically vulnerable to exposure to oil spill impacts caused by contact with hydrocarbons at the sea surface. Whales and dolphins are smooth-skinned, hairless mammals so oil tends not to stick to their skin and since they do not rely on fur for insulation, they will not be as sensitive to the physical effects of oiling. Small doses of oil have been shown to cause acute fatal pneumonia in mammals when aspirated. Studies on effects of petroleum vapours on terrestrial mammals and seals showed (in cases of prolonged exposures and high concentrations) absorption of hydrocarbons in organs and other tissues, and damage to the brain and central nervous system. However, short-term inhalation of petroleum vapours at concentrations similar to those found in oceanic oil spills may not be necessarily detrimental either in terms of structural tissue damage or respiratory gas exchange. Ingested oil, particularly the lighter fractions, can be toxic to marine mammals. Ingested oil can remain within the gastro-intestinal tract and be absorbed into the bloodstream and thus irritate and/or destroy epithelial cells in the stomach and intestine. Dispersed oil is unlikely to cause any effect to marine mammals due to the low toxicity of dispersed oils, low period of exposure that could occur and the low dosage of oil that may be received. The way whales and dolphins consume their food may well affect the likelihood of their ingesting oil. Baleen whales (such as humpback whales), which skim the surface, are more likely to ingest oil than toothed whales, which are 'gulp feeders' (Etkin, 1997). Spilled oil may also foul the baleen fibres of baleen whales, thereby impairing food-gathering efficiency or resulting in the ingestion of oil or oil-contaminated prey. Baleen whales may therefore be vulnerable to oil if feeding. Weathered oil residues from an oil spill event may persist for long periods, causing a potential risk to baleen whales' feeding systems. It should be noted that adult humpback whales, which are seasonally present and relatively abundant in the region, are not thought to be feeding during their migration through the region. The most vulnerable whale species in the Otway region is the pygmy blue whale which is most abundant in months coinciding with the Bonney Coast Upwelling. Pygmy blue whales predominately occupy the western area of the Bonney Upwelling from November to December, and then expand south-east during January to April, though the within-season distribution trends in Bass Strait are unknown (Gill 2002; Gill et al. 2011). Blue whales are listed vulnerable, migratory and cetacean under the EPBC Act The moderate exposure value extends over known areas of blue whale and southern right whale aggregation areas, although predominantly within shallow coastal waters around Twelve Apostles Marine Park. Data capture during the Deepwater Horizon (DWH) response efforts showed that bottlenose dolphins, a species also common throughout the EMBA, were subject to adrenal gland disease and dysfunction as a result of the DWH spill (Deepwater Horizon Natural Resource Damage Assessment Trustee, 2016).
Marine reptiles	*Turtles:* Marine turtles are vulnerable to the effects of hydrocarbon spills at all life stages (eggs, post hatchlings, juveniles and adults) whilst in the water or onshore (NOAA, 2010); however, there is little documented evidence of the effect of hydrocarbons on turtles. Should turtles make contact with a spill, the impact is likely to include oiling of the body as well as irritations caused by contact with eyes, nasal and other body cavities and possibly ingestion or inhalation of toxic vapours. Post-mortem investigations on dead loggerhead turtles from the Mediterranean implicated oil as a cause of death in a number of cases (Gramentz, 1988). In these cases, tarballs were found in the mouth and gastro-intestinal tract of the turtles, suggesting ingestion of tarballs as a possible cause of death.

Receptor	**Impacts of hydrocarbon on sensitive receptors at the moderate exposure values**
	Direct contact of marine turtles with hydrocarbons and exposure from hydrocarbons may lead to the following problems: • Digestion/absorption of hydrocarbons through food contamination or direct physical contact, leading to damage to the digestive tract and other organs • Irritation of mucous membranes (such as those in the nose, throat and eyes) leading to inflammation and infection • Contamination of eggs leading to inhibition of development or developmental defects in hatchlings, either due to oil on the nesting beach or through transference from the adult turtles whilst laying the eggs • Hatchlings becoming oiled after emerging from the nests and making their way across the beach to the water. The waters of the EMBA do not represent critical habitat for the species, however, the foraging behaviour for the Leatherback Turtle was identified as known to occur within the EMBA. There are no turtle nesting beaches potentially impacted by moderate exposure values within the EMBA.
Seabirds and shorebirds	Birds exposed to hydrocarbons may suffer a range of internal and external health effects. Direct contact with hydrocarbons and exposure from hydrocarbons has the potential to cause the following: • Oiled feathers affecting the ability of the birds to fly and those birds on the sea surface may suffer from loss of buoyancy and drown or die from hypothermia; • Skin irritation or ulceration of eyes, mouth or nasal cavities; • Internal effects from poisoning or intoxication through ingestion, preening and ingestion of oil via their prey items; • Reduced reproduction ability; • Reduction in the number of eggs laid; • Decreased shell thickness; and • Disruption of the normal breeding and incubating behaviours. The surface oil component poses the greatest risk of impact to seabirds due to the amount of time they spend on or near the sea surface. Individuals are at risk of lethal or sub-lethal physical and toxic effects due to external exposure (oiling of feathers) and ingestion, especially those close to the source point where concentrations are at their highest. Even small quantities of feathers contaminated by oil can be lethal, causing hypothermia and reduced buoyancy (O'Hara and Morandin, 2010). Seabirds are less likely to be affected by entrained and dissolved hydrocarbons, except through the ingestion of contaminated prey. MDO is moderately persistent oil in the marine environment. Under low winds (1 m/s), 60% of the surface slick is predicted to remain after 120 hours (5 days). Under moderate winds (5 m/s), 40% of the initial surface slick is predicted to remain after 24 hours, decreasing further to ~10% after 48 hours and ~1% after 72 hours. With high winds (10 m/s), the surface slick is predicted to be almost entirely evaporated (~25%) and dispersed (~75%) after 12 hours. Marine Diesel has a very low tendency for emulsion formation

Receptor	**Impacts of hydrocarbon on sensitive receptors at the moderate exposure values**
	The waters of the SEMR of Victoria support large populations of seabirds. A search of the EPBC Act Protected Matters database identified a total of 70 EPBC Act listed bird species, with potential to occur or have habitat within the EMBA. Of these, a total of 34 were listed as threatened and 52 were listed as migratory bird species, some with breeding and foraging BIAs. The seabirds that most commonly occur within the moderate exposure value area in the EMBA include albatross, petrels, terns and shearwaters. Seabirds spend most of their time at sea, travelling over large distances to forage over the open ocean, returning to land during breeding only and therefore some seabirds may transit the offshore waters within the moderate exposure value area in the EMBA and come into contact with surface oil. While individual seabirds may be affected, it is not predicted that large numbers of seabirds will be impacted from surface oil as they are unlikely to be present in significant numbers due their vast distribution area. In contrast, shoreline accumulated oil poses the greatest risk of impact to shorebirds whereby they come into contact with hydrocarbons washed up onto shore where the shorebirds spend time feeding, roosting and breeding. Seabirds are also at risk when they return to land to breed. Both adults and chicks/fledglings may be impacted through contact, ingestion and/or oiling of feathers. Oiled adults may also transfer oil on to their eggs or chicks. There is the potential of bioaccumulation of toxins ingested by adults affecting embryos and the development of chicks, although this is considered to be low due to the low toxicity of the weathered oil. Indirect impacts may effects shorebirds and wading birds through contamination of foraging areas that may result in a reduction in available prey items. Shoreline accumulated oil at the moderate exposure value has the potential to impact Warrnambool Plain, the Otway Plain and the Otway Ranges regions. These coastal habitats (particularly intertidal mud flats and sandy beaches) that are important staging sites for migratory shorebirds and important breeding sites. Intertidal mud flats and sandy beaches are also important habitat for shorebirds and migratory wading birds that spend time roosting and feeding on invertebrate infauna such as polychaetes, crustaceans and gastropods.
Shoreline Habitats	
Intertidal sandy beaches/ mud flats	Sandy beaches are present along the Victorian coastline and intercept the EMBA. The following areas have known stretches of sandy beach: • Portland to Port Fairy • Port Fairy to Lady Bay (Warrnambool) coastline • Small sections of sandy beach between Warrnambool and Cape Otway • Marengo east to Anglesea Shoreline loading has the potential to cause temporary declines in infauna and epifauna populations and may have an indirect effect on feeding shorebirds, seabirds and migratory wading birds.
Intertidal rocky shores/ reefs	Epibiota that colonise intertidal rocky shores/ reef are vulnerable to oil spills. Filter feeders such as molluscs are particularly vulnerable to lethal and various sub-lethal effects from hydrocarbons in the water column. The latter include alteration in respiration rates, decreases in filter feeding activity, reduced growth rates, biochemical effects, increased predation, reproductive failure and mechanical destruction by waves due to inability to maintain hold on substrate (Connell and Miller, 1981; Ballou *et al*., 1989). The risk of significant impact to

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
	rocky shore and limestone platform biota from MDO is low due to MDO being only moderately-persistent oil with a high tendency to evaporate.
Coral reefs	Corals do not occur as a dominant habitat type within the EMBA; however their presence has been recorded around areas such as Wilsons Promontory National Park and Cape Otway. Experimental studies and field observations have found all species of corals to be sensitive to the effects of oil, although there are considerable differences in the degree of tolerance between species (Jackson *et al*., 1989). The effect of oil on corals range from short or long-term sub-lethal effects to irreversible tissue necrosis and death. The timing of an oil spill event in relation to other environmental stresses, such as ambient temperature, or reproductive stage could also have significance in that corals are likely to be more sensitive to oil spill events at times of physiological stress. The water-accommodated fractions of oil can produce lethal and sub-lethal effects in corals (Loya and Rinkevich, 1980); however documented effects such as increased mucous production, decreased growth rates, changes in feeding behaviours and expulsion of zooxanthellae (Peters *et al*., 1981; Knap *et al*., 1985) generally only occur at concentrations of water-accommodated hydrocarbons that are considerably higher than would occur in field situations.
Mangroves	Mangroves are considered to be an important component of tropical ecosystems as they provide protection for coastlines and a source of organic matter and nutrients for marine ecosystems. The mangroves in Victoria are the most southerly extent of mangroves found in the world and are located mostly along sheltered sections of the coast within inlets or bays (MESA, 2022). There is only one species of mangrove found in Victoria, the white or grey mangrove (*Avicennia marina*), which is known to occur at Western Port and Corner Inlet within the spill EMBA. The sensitivity of mangroves to oil spills has been well recorded, with extensive defoliation, and sometimes mortality, being noted following a number of oil spills. These spills have varied in size, oil type, degree of oiling and mangrove species. In general, studies have suggested that damage occurs through the smothering of lenticels (mangrove breathing pores vital for respiration) on pneumatophores or prop roots or by the loss of leaves due to chemical burning (Duke *et al*., 1999). Smothering and contamination can lead to mortality of plants, seedlings and propagules. A comprehensive review of the literature on the impacts of oil spills on mangroves was conducted by Thorhaug (1987), from which it was concluded that while defoliation of mangroves was a common occurrence, massive mortality was not always the ultimate outcome. Mangrove death is predicted whenever when more than 50% of the leaves are lost (Evans, 1985). There may also be some sub-lethal impact to mangroves due to toxicity and it is known that mangroves take up hydrocarbons from oil that contacts leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death (Wardrop *et al*., 1987).
Seagrass beds	Laboratory tests have illustrated the sensitivity of seagrasses to both surface oil and dissolved or physically dispersed hydrocarbons (Hatcher & Larkum, 1982; Baca and Getter, 1984; Wilson & Ralph, 2017). Stress response has also been demonstrated for seagrass at low hydrocarbon concentrations similar to that expected to occur in oil spill situations (Thorhaug, 1987; Baca *et al*., 1996). Potential direct impacts to seagrasses from hydrocarbons include mortality due to smothering and chemical toxicity. Indirect impacts may occur due to reduced light attenuation, which would restrict the seagrasses ability to photosynthesise, leading to reduced growth rates and reduced flowering capability. Entrained oil may also adhere to seagrass in shallower areas, inhibiting respiration. The susceptibility of seagrass to hydrocarbons will depend largely on their distribution, with communities in deeper water less likely to be

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
	affected, whereas seagrass beds in shallower waters are more likely to be affected by dispersed oil droplets or, in the case of emergent seagrasses, direct oiling. Intertidal seagrass communities would theoretically be the most susceptible because the leaves and rhizomes may both be affected. While seagrass meadows are present throughout southern and eastern Australia, the proportion of seagrass habitat within the south-eastern sector is not high compared to the rest of Australia. Known seagrass meadows within the spill EMBA include Corner Inlet, Port Phillip Bay and Western Port Bay.
Socio-economic	
Fisheries	The EMBA overlaps a number of Commonwealth and State Managed Fisheries (refer to Section 3.4.1). The potential area of moderate exposure is not widespread and the level of fishing within the actual area of moderate exposure is anticipated to be low. Exclusions zones surrounding a spill can directly impact fisheries by restricting access to fishing vessels. Commonwealth and fisheries are unlikely to be affected from an oil spill due to the water depth at which many of them operate. State pelagic fisheries may be affected by a loss of fishing effort associated with avoidance of the oil spill, or gear clean-up and associated costs. The market value/demand for fish may also be impacted due to actual or perceived tainting of catches and closure of fishing grounds could also impact operations. The significance of any decrease in market value/demand for fish may be substantial to those few individual fishery operators working in the affected areas but it is unlikely to cause any significant long-term impact to the identified managed fisheries that operate in the region.
Tourism and recreation	There is a wide variety of nature-based tourism and recreational activities including recreational fishing that occurs in the EMBA for the worst-case spill scenarios. In the event of an oil spill, there is the potential for temporary closure of all recreational activities, including diving, due to the risk to public health and safety. Similar impacts arising from the shoreline stranding of hydrocarbons will add a visual impact and potentially restricted access to shorelines.
Defence	Five training and practice areas are located in and around Port Phillip Bay and Western Port Bay. This is to the east of the Minerva field and within the EMBA, however, they are unlikely to be impacted by a hydrocarbon spill.
Shipping	The impact on shipping in the event of a worst-case discharge is likely to be limited to the potential for minor modification of shipping routes through the implementation of exclusion zones to avoid the spill. Shipping operations may be affected by spill response efforts by way of a 'Notice to Mariners' being issued to avoid the area, leading to the potential diversion from normal shipping routes.
Oil and gas activities	In the event of a large scale spill, petroleum production operations in the region would likely remain unaffected.
Indigenous	Any oil that reaches the coastline from a large scale spill has potential to impact on registered sites and indigenous heritage places along the coastline. In the unlikely event of an oil spill, shoreline accumulated oil may effect sensitive artefacts or areas, which could damage their heritage value. Furthermore, personnel accessing the area to implement response strategies have potential to damage or destroy heritage values of the area. These sensitivities will be prioritised and taken into account as part of the daily Operational SIMA within the *Minerva Field Decommissioning Oil Pollution Emergency Plan (OPEP) (00MC-BHP-N00-0002)*.

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
Maritime heritage	There are a number of shipwrecks in the EMBA. Surface hydrocarbons will have no impact on shipwrecks. Hydrocarbons in the water column pose the greatest risk of impacts shipwrecks. Microbial communities (biofilms) on structures and in the surrounding seafloor play important roles in shipwreck preservation and degradation, and in recruitment of macro-organisms to artificial reefs (Hamdan *et al*., 2018). Hydrocarbons in the water column may potentially impact those microbial and encrusting communities that may in turn affect the structural integrity of the shipwreck. This is highly unlikely given the moderately-persistent nature of MDO.
Protected areas	
World Heritage and National Heritage	There are no World Heritage or National Heritage places likely to be impacted by a MDO release from the Minerva Field.
Commonwealth and State Marine Parks	For an MDO release in Autumn-Winter surface oiling at moderate thresholds low contact probabilities were predicted at The Arches state marine park (<1%) and the Twelve Apostles state marine park (5%), with maximum time-averaged concentrations of 13 and 26 g/m^2, respectively, and minimum arrival times of 1.3 and 0.3 days, respectively For an MDO release in Autumn-Winter total submerged oil at high thresholds a moderate contact probability was predicted at the Twelve Apostles state marine park (49%), with a maximum time-averaged concentration of 1,584 ppb and a minimum arrival time of 0.2 days. A very low contact probability of 2% was also predicted at The Arches state marine park, with a maximum time averaged concentration of 283 ppb and a minimum arrival time of 0.4 days. The Apollo AMP was predicted to be contacted with low probability (3%), a maximum time-averaged concentration of 169 ppb and a minimum arrival time of 1.4 days. For an MDO release in Autumn-Winter dissolved hydrocarbons at a moderate thresholds, a moderate contact probability was predicted at the Twelve Apostles state marine park (39%), with a maximum time-averaged concentration of 648 ppb and a minimum arrival time of 0.3 days. A very low contact probability of <1% was also predicted at The Arches state marine park, with a maximum time averaged concentration of 52 ppb and a minimum arrival time of 1.3 days Similar contact exposures were predicted for Spring-Sumer months. The potential impacts to values and sensitivities of Marine Parks are described in the relevant sections of this Table.
Key ecological features	The Bonney Coast Upwelling has the potential to be contacted by total submerged hydrocarbon at low threshold values, with no contact predicted at high threshold values for a MDO release. Whilst this presents no risk to the KEF, the nutrient rich waters of Bonney Coast Upwelling promote primary productivity. The pelagic marine faunal assemblages that are attracted to the nutrient rich waters, such as whales, large pelagic fish and seabirds are at risk of impacts from entrained hydrocarbons.

7.2 Hydrocarbon Release – Marine Diesel

7.2.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Hazard	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Unplanned surface release of marine diesel oil	Surface release of MDO from a project vessel as a result of an external impact (vessel collision) which ruptures an MDO tank.	Reduction in water quality with potential for toxicity effects to marine fauna and flora (including potential mortality), oiling of offshore, nearshore and shoreline habitats (smothering). Disruption to biologically important behaviours (feeding / breeding / migration). Hypothermia due to hydrocarbon exposure. Impacts to socio-economic receptors.	30	0.03	0.9	Type A Lower Order Risk	Tolerable

7.2.2 Source of Hazard

The potential presence of an inspection vessel in the operational area presents a navigational hazard to third-party vessels. A potential collision between a project vessel with passing third-party vessels, albeit a very remote possibility, has been identified as a credible risk. A vessel collision could occur due to poor weather, human error or vessel navigation/equipment failure.

A vessel collision has the potential to result in the rupture of a vessel fuel tank and the release of marine diesel oil. A review of the potentially active commercial fisheries along with consultation undertaken during the development of this EP (Section 4), determined a low likelihood of active commercial fishing in the area, as such, there is a very low risk of a vessel collision with a commercial fishing vessel.

The AMSA Technical Guidelines for Preparing Contingency Plans for Marine and Coastal Facilities (2015) has been applied to determine the credible WCD associated with an in-field vessel collision event.

For the type of inspection vessel anticipated to undertake a potential GVI, the largest single fuel oil (FO) tank would be approx. 200 m^3. Generally, FO tanks are filled to 80% of total capacity (maintaining 20% ullage) whilst undertaking offshore operations. To allow for an appropriately conservative environmental impact and risk assessment, or for a vessel with larger-than-anticipated FO capacity to support the activity, a total potential marine diesel oil (MDO) release volume of 330 m^3 has been modelled as the WCD for a vessel collision scenario.

Industry Statistics

A review of the Annual Overview of Marine Incidents (AMSA, 2019) (covering the period from January 2016 to December 2019) indicates that 'very serious marine incidents', which may include loss of a vessel and serious pollution, accounted for a small portion (0.05%) of the overall reported marine incidents during the reporting period. Based upon this report, and reports from previous years, this would indicate a vessel collision resulting in a loss of 330 m^3 MDO would be considered a highly unlikely event.

7.2.3 Oil Spill Modelling Results

Hydrocarbon weathering behaviour

MDO is a moderate weight, moderately persistent oil in the marine environment. Under low winds (1 m/s), 60% of the surface slick is predicted to remain after 120 hours (5 days). Under moderate winds (5 m/s), 40% of the initial surface slick is predicted to remain after 24 hours, decreasing further to approximately 10% after 48 hours and ~1% after 72 hours. With high winds (10 m/s), the surface slick is predicted to be almost entirely evaporated and dispersed after 12 hours. The MDO has a very low tendency for emulsion formation, with only ~1% water contained entrained into the surface slick after 120 hours for all wind conditions assessed.

7.2.4 Environmental Impact Assessment

A loss of MDO to the marine environment would result in a localised and temporary reduction in water quality in the upper surface waters of the water column. While MDOs are generally considered to be moderately-persistent oils, many contain a small percentage by volume of hydrocarbons that are classified as persistent.

When spilt at sea, MDOs will spread and thin out quickly and more than half of the volume can be lost to evaporation. Due to their higher solubility and ease of entrainment, MDO spills can have a greater ecological impact in comparison to other floating oils slicks.

For both Winter and Summer periods, modelling predicts the maximum spatial extent of surface oiling at the moderate (10 g/m^2) and high (50 g/m^2) thresholds was reduced to within ~25 km and ~10 km of the spill site respectively. Modelling also indicate that at moderate thresholds (100g/m^2), shoreline accumulation may occur up to 100 km distance from the release site, with a maximum potential loading of 187 tonnes over a 30km length of shoreline (along the coastal region of the Warrnambool Plain).

The following environmental impact assessment is based on potential impacts and risks to the physical environment and biological and socio-economic receptors within the area affected by hydrocarbons at the moderate exposure value.

Local Fauna and Threatened and Migratory Fauna

Marine Mammals

Whales and dolphins spend a significant time at the sea surface in search of food and to breathe, as such if they are in the vicinity of the spill location, they are likely to come into contact with MDO.

At the moderate exposure level, a number of threatened and migratory mammals may be contacted with surface and water column hydrocarbons including Antarctic Minke Whale, Australian Sea Lion, Pygmy Blue Whale, Southern Right Whale, Dusky Dolphin, Fin Whale, Humpback Whale, Killer Whale, Pygmy Right Whale, and Sei Whale. Of these, the Southern Right Whale (core range, migration and resting on migration, and aggregation), and Pygmy Blue Whale (Foraging and distribution) BIAs are within the EMBA. However, given the moderate exposure area is considerably smaller, the likelihood of a whale traversing the area is greatly reduced. As they are smooth skinned, hairless mammals, MDO tends not to adhere to their skin, limiting the potential impacts of oiling.

Whales and dolphins are not predicted to be impacted by entrained/dissolved hydrocarbons in the water column since they are mobile species and not likely to be constantly exposed for extended durations that would be required to cause any major toxic effects. Given the size of the spill and expected rapid evaporation and dispersion rate, impacts to marine mammals are expected to be low.

An unplanned release of MDO is not expected to interfere with their migration activity. There is the potential for behaviour disruption to the local population and individuals that traverse the spill area. Owing to the rapid dispersion and evaporation of MDO, impacts are not predicted at the population level.

Marine Reptiles

Marine reptiles may be exposed to surface and water column hydrocarbons through direct contact resulting in eye and skin damage, ingestion, consumption of contaminated prey items and prolong inhalation of diesel vapour. Ingestion can subsequently lead to physiological effects including internal organ damage. Coasting of their body surface can cause irritation of mucous membranes in the nose through and eyes that can result in inflammation and infection.

Due to the weathering nature of MDO, a spill rapidly and thinly consequently marine reptiles are not expected to ingest significant volumes or result in persistent oiling. Most evaporation of MDO is within the first 48 hours, hence exposure timeframes to vapours is short.

There are no identified marine turtle nesting beaches predicted to be contacted by moderate thresholds of MDO. Physical contact with hydrocarbons in the water column are likely to have biological consequences to individuals only, especially given there is no identified areas critical to the survival at any turtle species that

may occur within the EMBA. Owing to the rapid dispersion and evaporation of MDO, impacts are not predicted at the population level.

Fish (including Sharks and Rays and Commercial Species)

At the moderate exposure values for hydrocarbons, a number of threatened and migratory fish species are considered at risk of impact from contact with surface and water column hydrocarbons including the white shark (which has an overlapping foraging BIA within the EMBA). There is the potential for feeding behaviour disruption to the local population and individuals that traverse the spill area should the timing of the spill coincide with timing of foraging.

Pelagic fish that spend their time in the upper water column will be at greatest risk of impact from surface and water column hydrocarbons. Pelagic fish are highly mobile and species likely to be include predatory species such as tuna, mackerel and sharks.

Fish near the sea surface are thought to be able to detect and avoid contact with surface slicks and mortalities rarely occur in the event of a hydrocarbon spill in open waters. Those fish that do come into contact with surface and water column hydrocarbons will be affected by smothering through coating of gill structure leading to suffocation or through ingestion leading to potential infection and internal organ or tissue damage.

There is the potential for feeding behaviour disruption to the local population and individuals that traverse the spill area should the timing of the spill coincide with timing of whale shark aggregations. Owing to the rapid dispersion and evaporation of MDO, impacts are not predicted at the population level.

Marine Birds

Marine birds are at risk of exposure to MDO from diving to obtain food or resting on the sea surface. Impact pathways arise from direct oiling, exposure to oil vapours, and direct or indirect ingestion of oil and contaminated food prey. Ingestion can lead to intestinal damage and reproductive effects. Oiling of feathers can affect the bird's ability to thermo-regulate (IPIECA-IOGP, 2017). Due to the weathering nature of MDO, surface oil spreads rapidly and thinly, and hence marine birds are not expected to ingest significant volumes or result in persistent heavy oiling.

While marine seabirds may be contacted by MDO in the offshore environment, migratory shorebirds are at risk of contact with moderate thresholds of MDO that accumulate on shorelines. Whilst much of the coastline of the Twelve Apostles is rocky, there are shoreline types along these stretches of potentially impacted coastline including sandy beaches and saltmarsh that would be suitable shorebird nesting and feeding habitat. Shorebirds are at risk of contact with accumulated hydrocarbons as they roost, feed and breed on shorelines, although they tend to roost and nest above the high water mark.

Of the 14 identified bird species with BIAs overlapping the wider EMBA, the most likely to be impacted as a result of moderate levels of shoreline loading would include: the Common Diving Petrel, White-faced Storm Petrel, Short-tailed Shearwater, Wedge-tailed Shearwater, Australasian Gannet, Black-faced Cormorant, and Little Penguin.

Given the limited extent of moderate shoreline exposure, and the moderately-persistent nature of MDO, impacts may occur at either an individual or population level, however they would not be considered widespread or persistent.

Benthic Habitats

Potential sensitive receptors in the vicinity of the spill area will include shallow water benthic habitats which come into contact with hydrocarbons in the water column, leading to potential impacts as described in previous Table 7-7. Further activity-specific information on the impacts and risks to these receptors is discussed below.

Shallow Water Benthic Habitats: Macroalgal Beds and Seagrass Beds

For Autumn-Winter, the maximum spatial extents dissolved hydrocarbons at the moderate (50 ppb) and high (400 ppb) thresholds were reduced to ~90 km and ~25 km, respectively and for Spring-Summer the maximum spatial extents at the moderate (50 ppb) and high (400 ppb) thresholds were reduced to ~75 km and ~50 km,

respectively. However, there is a very low probability of contact at moderate threshold at either the Twelve Apostles Marine Par or the Arches State Marine Park.

In-water hydrocarbons that reach nearshore environments have the potential to impact shallow water benthic habitats that host encrusting mollusc, sponge, bryozoan and red algae assemblages and other nearshore benthic habitats such as seagrass communities.

Macroalgae are important contributors to primary productivity and nutrient cycling. Subtidal macroalgae on reef fronts and reef edges would not be exposed to direct oiling, but may experience exposure to entrained oil or by stranded oil on shorelines that becomes remobilised and entrained in the water column due to periodical tidal and wave action exposure. The effect of hydrocarbons on macroalgae, particularly on intertidal shores, is largely dependent on the degree of direct exposure, the shoreline exposure (degree of wave and tidal action) and how much of the hydrocarbon adheres to the algae. Macroalgae on exposed shores is predicted to recover quicker than sheltered shores as a result of wind, wave and tidal driven coastal processes naturally 'flushing' hydrocarbons from the shoreline.

Potential direct impacts to seagrasses from hydrocarbons include mortality due to smothering and chemical toxicity. Indirect impacts may occur due to reduced light attenuation, which would restrict the seagrasses ability to photosynthesis, leading to reduced growth rates and reduced flowering capability. Entrained oil may also adhere to seagrass in shallower areas, inhibiting respiration. The susceptibility of seagrass to hydrocarbons will depend largely on their distribution, with communities in deeper water are less likely to be affected, whereas seagrass beds in shallower waters are more likely to be affected by entrained oil droplets. Impacts to seagrass beds may present secondary impacts to species reliant on the habitat.

Shoreline Habitats: Sandy Beaches, Saltmarshes and Rocky Shores

There is a potential for shoreline accumulation with deterministic modelling indicating the maximum accumulated shoreline mass (above 100 g/m^2) of 187 tonnes at the Warrnambool Plain over a 30km long stretch of coastline.

Whilst much of the coastline of the Twelve Apostles is rocky, there are shoreline types along these stretches of potentially impacted coastline including sandy beaches and saltmarsh.

Given the predictive modelling results, the following shoreline habitats are considered at risk:

- Saltmarshes to the north and south of Port Campbell.
- Sandy beaches of the Port Fairy to Lady Bay (Warrnambool) coastline, and small sections of sandy beach between Warrnambool and Cape Otway. Sandy beaches and intertidal sediments are important breeding/feeding/roosting areas for breeding seabirds and migratory shore birds.
- Rocky shore habitats are common along the Twelve Apostles Marine Park. These rocky shore habitats and limestone platforms provide a range of habitat niches and as such have a high biodiversity of associated fauna and flora.

Given the potential degree of shoreline loading, but the moderately-persistent nature of potentially stranded MDO, potential impacts are considered moderate to significant but are unlikely to persist.

Protected Areas

There are a number of protected areas within the broader EMBA, with most of these only having the potential to be contacted by low instantaneous thresholds of hydrocarbons rather than being exposed to moderate to high levels of oiling. Of note is the Aire River being popular for recreational activities such as fishing, picnicking, camping and sight-seeing. There are also approximately 18 archaeological sites in the area, most of which are Aboriginal shell middens.

The Twelve Apostles Marine National Park located 7 km east of Port Campbell, the marine park covers 16 km of coastline from east of Broken Head to Pebble Point and extends offshore to 5.5 km. The area is representative of the Otway Bioregion and is characterised by a submarine network of canyons, caves, arches and walls housing a variety of seaweed and sponge gardens. The underwater structures providing habitat for resident schools of reef fish as well as the greatest diversity of intertidal and sub-tidal invertebrates in Victoria.

The Arches Marine Sanctuary protects 45 ha of ocean directly south of Port Campbell. Approximately 5-25 m below the water surface is a labyrinth of limestone formations, rocky arches and canyons that have been formed over time by high-energy waves (Parks Victoria, 2016). The complex limestone structures provide a foundation for seaweeds and sponges to grow in turn providing additional habitat to support schools of reef fish, seals and a range of invertebrates such as lobster, abalone and sea urchins (Parks Victoria, 2016). The Arches Marine Sanctuary is managed in conjunction with the Twelve Apostles Marine Park under the Management Plan for Twelve Apostles Marine National Park and The Arches Marine Sanctuary.

Given the potential degree of shoreline loading, but the moderately-persistent nature of potentially stranded MDO, potential impacts are considered moderate to significant but are unlikely to persist.

Socio-Economic Receptors

There is the potential for hydrocarbons to temporarily disrupt fishing activities if surface or water column hydrocarbons move through fishing areas. Fishing grounds may be temporarily closed, which would have an impact through loss of income. Market value/ demand for fish may also be impacted due to actual or perceived tainting of catches. Potential impacts to fish stock are unlikely to be extensive volatile and moderately-persistent nature of MDO. The dissolved component of the hydrocarbon is likely to be the most toxic to commercial species, but moderate to high levels are not anticipated over a broad area and would not persist in the environment. Some mortality and sub-lethal effects may impact individuals located close to the release location; however, overall impacts are not predicted at the population level.

Offshore petroleum activities may be affected due to temporary exclusion zones that could be enforced as a safety or navigation control measure, thereby restricting vessels from operating in the area. However, impacts are predicted to be temporary.

Shipping operations are not predicted to be affected by an MDO spill. However, response activities may result in temporary diversions from normal shipping routes.

Tourism and recreation could be affected by an MDO spill, either from reductions in water quality and shoreline oiling resulting in temporary loss of access or reduction in aesthetic value of the area.

Defence activities are not predicted to be affected by an MDO spill.

Any MDO that reaches shorelines has potential to impact on registered sites and indigenous heritage places along the coastline. In the highly unlikely event of an oil spill, shoreline accumulated oil may effect sensitive artefacts or areas, which could damage their heritage value.

Based on the above assessment, an MDO release during vessel operation has the potential to impact an array of receptors. The residual risk associated with an MDO release has been assessed to be Tolerable.

7.2.5 Control Measures

The clearly defined regulatory, corporate and industry (good practice) preventative controls accepted by Woodside to manage the risks associated with vessel collision are detailed below:

Table 7-8: Vessel collision – control measures

Control Measure	Source of Requirement / Good Practice
Navigation Equipment	*Navigation Act 2012*; International Convention of the Safety of Life at Sea (SOLAS) Marine Order Part 30: Prevention of Collisions, Issue 8 Marine Order 21, Issue 8 (Safety of Navigation and Emergency Procedures) Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs)

Control Measure	Source of Requirement / Good Practice
Automatic Identification System (AIS)	*Navigation Act 2012*; International Convention of the Safety of Life at Sea (SOLAS): Regulation 19-1 of Chapter V of SOLAS.
Notice to Mariners and AUSCOAST warning	*Navigation Act 2012*; International Convention of the Safety of Life at Sea (SOLAS)
Stakeholder Communication	OPGGS(E) Regs 2021 (13F) Woodside Community Stakeholder Management Plan Woodside Community Concerns, Inquiries and Complaints Procedure
Vessel Safety Exclusion Zone	Vessel Safety Case
Training & Competency	AMSA Marine Order Part 3: Seagoing Qualifications
Additional Opportunistic Controls	
Public Information	Establish and maintain a publicly available interactive map which provides stakeholders with updated information on the offshore petroleum activities being conducted as part of the Minerva Field decommissioning program

7.2.6 Demonstration of ALARP

The potential for a vessel collision resulting in a release of MDO during the *Minerva Pipeline Maintenance activity* is considered a 'Type A' (lower order) risk based upon the Decision Context described in **Section 6.1.1** of this EP. Given the routine nature of vessel operations and the controls detailed above being consistent with both regulatory requirements and industry good practice, Woodside considers the impact has been managed to ALARP and no further detailed engineering evaluation of alternate, additional or improved controls is required. Additional opportunistic controls have also been evaluated but deemed not reasonably practicable to implement.

7.2.7 Demonstration of Acceptability

Woodside is satisfied that when the accepted controls detailed above are implemented the environmental performance outcome (EPO) of "No accidental release of chemicals or hydrocarbons to the marine environment" or "No unplanned vessel interactions (including collision)" will be met, therefore Woodside considers the impact to be managed to an acceptable level. Additionally, consideration of listed species recovery plans, conservation advice and threat abatement plans relevant to chemical discharge/oil spills, marine pollution, and habitat degradation/modification (**Table 3-5**) have informed the development of control measures.

No concerns or objections regarding the potential for vessel collision during the activity have been raised by relevant stakeholders.

8 Implementation Strategy

In accordance with Regulation 16 of the Environment Regulations, the Environment Plan must contain an implementation strategy for the petroleum activity and monitoring, recording and reporting arrangements. The implementation strategy presented in this section provides specific practices and procedures to ensure:

- All the environmental impacts and risks of the petroleum activity will be continually identified and reduced to a level that is ALARP;
- Control measures identified in the EP are effective in reducing the environmental impacts and risks of the activity to ALARP and to acceptable levels;
- That environmental performance outcomes and environmental performance standards are met;
- Arrangements are in place to respond to, and monitor, impacts of oil pollution emergencies; and
- Arrangements for on-going consultation with relevant authorities, persons and organisations are in place and maintained through the activity.

8.1 Systems, Practices and Procedures

8.1.1 Woodside HSE Management System

The Woodside Health, Safety and Environment (HSE) Management System defines the boundaries within which all activities are conducted. It provides a structured framework to set common requirements, boundaries, expectations, governance and assurance for all activities. It also supports accountabilities and responsibilities as defined in the organisational structure. The overarching objective of the Woodside Management System is to aspire to zero harm to people, communities and the environment, and achieve leading industry practice.

8.2 Training and Competency

The Woodside HSE Management System Framework establishes the foundation for continual improvement through the application of consistent requirements across all aspects of petroleum activities including the establishing and maintenance of the competencies for personnel, and provision of training to promote expected behaviours.

All personnel on contracted vessels are required to be competent and suitably trained to undertake their assigned positions. This may be in the form of ‘On the Job’ or external training. Contractors are responsible for identifying training needs and keeping records of training undertaken. Environmental awareness inductions are required to be undertaken by all offshore personnel as part of their induction to undertaking petroleum activity.

8.2.1 Contractor Management

For contractors, HSE risks in contracts are managed in accordance with the requirements outlined in Woodside HSE Management Standard. As part of the contractor management process, Woodside implements pre- and post-contract award processes and activities aimed at ensuring that contracts consistently and effectively cover the management of HSE in line with Woodside HSE-related requirements, ‘Our Values’, and the HSE Management Standard.

Whilst the Woodside HSE Management Systems apply to the manner in which Woodside execute their responsibilities under this EP, operational control of the Vessel remains the responsibility of the Vessel Contractor and shall be managed in accordance with Contractor Management Systems.

8.2.2 Marine Operations and Assurance

Systems and procedures are in place to ensure all marine operations for the activities are conducted in accordance with environmental regulatory requirements and Company marine controls, which cover management of marine operations and contracting of vessels.

The Woodside Marine Management Process comprising a Vessel Assurance Questionnaire require a number of audits be completed prior to hiring a vessel and marine operations suppliers to be audited and verified prior to engagement. This includes a search of Offshore Vessel Inspection Database (OVID) for all relevant records and certification, and/or additional audits for the following as identified in the risk assessment process:

- Marine Management Process;
- Dynamically positioned vessel review;
- Containment audit to ensure contained transport, storage and discharge of petroleum based and chemical products;
- Lifting and rigging audit;
- Invasive Marine Species (IMS) Risk Assessment; and
- Emergency response audit.

8.3 Monitoring, Auditing and Management of Non-Conformance and Review

8.3.1 Record Keeping

Compliance records will be maintained including records of emissions and discharges.

8.3.2 Auditing, Assurance, Management of Non-Conformance and Continuous Improvement

The environmental performance of Woodside activities will be reviewed in several ways in order to:

- Ensure all significant environmental aspects of the activity are covered in the EP;
- Ensure that management measures to achieve environmental performance outcomes are being implemented, reviewed and where necessary amended;
- Ensure that all environmental commitments have been met;
- Ensure that impacts and risks will be continuously identified and reduced to ALARP; and
- Identify potential non-conformances and opportunities for continuous improvement.

Woodside conducts reviews and audits of their contractors at various stages including pre-award of contract, pre-activity and during activity, in accordance with Woodside HSE Management System performance. The environmental performance of contractors to Woodside involved in activities will be reviewed through the following activities including (but not limited to):

- Inspections of Contractor HSE Management systems and procedures;
- Pre-activity audits;
- Review of reporting documentation;
- Monitoring of progress;
- Auditing and assurance program;
- Regular review of incident, audit, inspection, observation, safety meeting and daily operations reports;
- Action item tracking and closeout; and
- End of campaign reviews.

8.3.3 Management of Change

Permanent or temporary changes to organisation, equipment, plant, standards, or procedures that have a potential health, safety, integrity and/or environmental impact are assessed and subject to formal review and approval as outlined in Woodside HSE Management Standard. This standard requires the change to be justified and authorised, risk assessed to understand the potential impacts of the change, a plan to be in place that clearly specifies the timescale for the change and any control measures to be implemented and the situation to be reassessed if there is an unexpected change in circumstances. The level of management approval for each change is commensurate with the risk.

Management of changes relevant to this EP, for example timing of the activity, changes to the scope of the activity described in Section 0 of the EP will be made in accordance with Management of Change procedures outlined in the Woodside HSE Management Standard.

The Management of Change process also allows for the assessment of new information that may become available after the acceptance of the EP, such as new management plans for Australian Marine Parks, new recovery plans or conservation advice for species, and changes to the EPBC Protected Matters Search results.

The Management of Change will be assessed and subject to formal review to determine if a revision of the accepted EP in force for the maintenance activities is required to be submitted to DJPR pursuant to sub-regulation 20 of the Environment Regulations.

8.4 Reporting

8.4.1 Incident Reporting– Reportable and Recordable

Reportable Incidents

A reportable environmental incident is defined in sub-regulation 6 of the Environment Regulations as:

> *"reportable incident, in relation to an activity, means an incident relating to the activity, whether or not described in an environment plan in force for the activity, that has caused, or has the potential to cause—*
>
> *(a) moderate to catastrophic environmental consequences; and*
>
> *(b) a breach of, or non-compliance with—*
>
> *(i) the Act; or*
>
> *(ii) this Chapter; or*
>
> *(iii) the environmental performance outcomes set out in an environment plan in force for the activity".*

A reportable incident for the activity includes, but are not limited to, those that have been identified through the risk assessment process as having a severity (consequence) level of ≥3 or at a minimum:

- An uncontrolled release of hydrocarbons or environmentally hazardous chemicals of more than 80 litres to the marine environment;
- An actual or potential vessel collision;
- A breach of petroleum safety zone (PSZ) by an errant vessel;
- A confirmed or suspected introduction of an IMS to the operational area; or
- Injury or death of any marine fauna species listed as threatened or migratory under the EPBC Act.

Recordable Incidents

A recordable environmental incident is defined in sub-regulation 6 of the Environment Regulations as:

> *"recordable incident, for an activity, means a breach of an environmental performance outcome or environmental performance standard, in the environment plan that applies to the activity, that is not a reportable incident".*

In terms of the activities within the scope of this EP, a recordable incident is a breach of the performance outcome or performance standards listed in the EP.

In the event of a recordable in recordable incident, Woodside will report the occurrence to DJPR as soon as is practicable after the end of the calendar month in which it occurs; and in any case, not later than 15 days after the end of the calendar month. If no recordable incidents have occurred, a 'nil incident' report will be submitted to DJPR EER. Reports to be issued to: reports@ecodev.vic.gov.au

9 Emergency Preparedness and Response

9.1.1 Overview

Under sub-regulation 17, the implementation strategy must contain an Environmental Emergency Response Manual (EERM) and provide for the updating of the EERM. Given the Minerva project is located within both Victorian State and Commonwealth jurisdiction, and to ensure a consistent / common operating language, the EERM for this project will henceforth be referred to as the Oil Pollution Emergency Plan (OPEP). The sections below detail the implementation strategy for hydrocarbon spill emergency conditions during decommissioning activities. The section outlines the response framework in the event of a hydrocarbon spill. As part of the implementation strategy, Woodside Petroleum has developed a series of spill response documents, inclusive of an OPEP Specific arrangements are presented to ensure that the environmental impacts and risks of spill response activities will be continuously identified and reduced to ALARP.

9.1.2 Oil Spill Response Jurisdictional Arrangements

In the event of an oil spill, Control Agencies are assigned to respond to the various levels of spills. The 'Statutory Agency' and 'Control Agency' are defined as follows:

> **Jurisdictional Authority:** *the State or Commonwealth Agency assigned by legislation, administrative arrangements or within the relevant contingency plan, to control response activities to a maritime environmental emergency in their area of jurisdiction.*
>
> **Control Agency:** *is the agency with operational responsibility in accordance with the relevant contingency plan to take action to respond to an oil and/or chemical spill in the marine environment.*

Table 9-1: Statutory and lead control agencies for oil spill pollution incidents

Area	Spill Source	Jurisdictional Authority	Lead Control Agency	
			Level 1	Level 2/3
Commonwealth Waters	Offshore Petroleum Activity	NOPSEMA	Woodside	
	Vessels	AMSA	Vessel	AMSA
State Waters	Offshore Petroleum Activity	Vic DJPR	Woodside / Vic DoT (JSCC)	
	Marine Pollution Oil spills in Victorian Coastal waters up to three nautical miles	Vic DoT	Vic DoT	Vic DoT
	Wildlife affected by marine pollution	DELWP	DELWP	DELWP
Port Waters	Vessels	Port Authority	Port Authority / Vic DoT	

Note: When a wildlife response is required in State and Commonwealth waters, the Department of Environment, Land, Water and Planning (DELWP) will act as the lead agency and follow the relevant state-based legislation.

Section 3 of the Victorian State Maritime Emergencies (non-search and rescue) (MENSAR) Subplan Edition 2 details the arrangements for the management of maritime emergencies in State jurisdiction. These arrangements are not replicated within the EP but are applicable to an oil spill response in Victorian State jurisdiction. A summary of MENSAR Plan is provided in the section below.

Further detail on Victorian State oil pollution response and jurisdictional arrangements is presented within the Victorian Joint Industry and State Oil Pollution Responses Guidance Note V2 2020. These arrangements are not replicated within the EP but are applicable to an oil spill response in Victorian State jurisdiction.

9.1.3 External Emergency Response Plans

The following external plans have been used to inform the development of oil pollution emergency documentation for the proposed activity:

- NatPlan - National Plan for Maritime Environmental Emergencies (NatPlan)
  - Sets out the national arrangements, policies and principles for the management of marine oil pollution. It defines obligations the States and various industry sectors in respect of marine oil pollution prevention, preparation, response and recovery.
- AMOSPlan – Australian Industry Cooperative Spill Response Arrangements
  - Managed by AMOSC, it details the cooperative arrangements for response to oil spills by Australian oil and associated industries.
- Victorian State Emergency Management Plan (SEMP) (2021)
  - The SEMP provides for an integrated, coordinated and comprehensive approach to emergency management (EM) at the state level. The EM Act 2013 requires the SEMP to contain provisions providing for the mitigation of, response to and recovery from emergencies (before, during and after), and to specify the roles and responsibilities of agencies in relation to EM.
- Victorian SEMP Maritime Emergencies (non-search and rescue) Sub-Plan (MENSAR) (edition 2) (2021)
  - This sub-plan exists to ensure that collaboration, co-operation and resources sharing is captured and agreed to by the stakeholders and a response to a complex maritime emergency will be a shared responsibility between the agencies. The Maritime Emergencies (Non Search and

Rescue (NSR)) Subplan of the State Emergency Management Plan (SEMP) is developed in accordance with the Emergency Management Act 2013 (External link), it also serves the purposes of being the Victorian Marine Pollution Contingency Plan in accordance with the Marine (Drug, Alcohol and Pollution Control) Act 1988 (the Act) (External link).
The sub-plan is two parts:

Part A is the Maritime Emergencies (NSR) Sub-Plan:

- It provides an overview of the arrangements for managing maritime emergencies in Victoria.
- It describes the integrated approach and shared responsibility between state and commonwealth governments, agencies, businesses and communities.
- The sub-plan refers to national agreements, plans and documents, including the National Plan.

Part B is the Maritime Emergencies (NSR) Operational Plan and contains the operational details for preparing and planning for, responding to, and recovering from maritime emergencies.

The sub-plan applies to maritime emergencies (NSR) including marine pollution which results or may result in a prohibited discharge of oil, oily mixtures, undesirable or hazardous and noxious substances into state waters.

- Victorian SEMP Animal, Plant, Marine and Environmental Biosecurity Sub-Plan (2021)
  - The Animal, Plant, Marine and Environmental Biosecurity Sub-Plan ('the Plan') provides an overview of the current arrangements for the management of biosecurity emergencies (excluding human health emergencies and non-Emergency Animal Disease wildlife emergencies) in Victoria and contains information on biosecurity mitigation, preparedness, response, relief and recovery. The Department of Jobs, Precincts and Regions (DJPR) has developed this Plan consistent with national arrangements for biosecurity emergencies and with input from a range of other emergency management agencies. The Plan refers to a range of existing plans and documents but does not duplicate the information contained in these, instead providing directions to websites or other sources where the reader can obtain further information if required.
- Victorian Emergency Animal Welfare Plan (VEAWP) (Revision 2, October 2019)
  - The Victorian Emergency Animal Welfare Plan (the Plan) is intended to be a reference for all agencies, organisations, groups and individuals with responsibility for animal welfare during emergencies. It provides principles and policy for use in emergency planning, response and recovery phases. It defines the roles and responsibilities of agencies and organisations.
    The plan has the overarching objectives of:
    - Contributing to enhanced human safety and community resilience through effective planning and management of animals in emergencies; and
    - Ensuring animals are better considered and protected from suffering during and immediately following emergencies.

    The plan was developed following extensive consultation with emergency management and animal welfare stakeholders including the Victorian Emergency Animal Welfare Committee. It has been developed in line with the National Planning Principles established by the National Advisory Committee for Animals in Emergencies.

    The plan confirms that:
    - The Department of Jobs, Precincts and Regions is the primary state agency for the provision of welfare support for all animals other than wildlife in emergencies; and
    - The Department of Environment, Land, Water and Planning is the primary state agency for the provision of welfare support for wildlife in emergencies.
      https://www.wildlife.vic.gov.au/wildlife-emergencies/wildlife-emergencies
- Industry Joint Venture Plans: Various Plans developing general and assisted Oil Spill Response Capabilities
- AMSA Australian Government Coordination Arrangements for Maritime Environmental Emergencies

- Provides a framework for the coordination of Australian Governmental departments and agencies in response to a maritime environmental emergency

The OPEP interfaces with National, State and Woodside plans as shown in Figure 9-1.

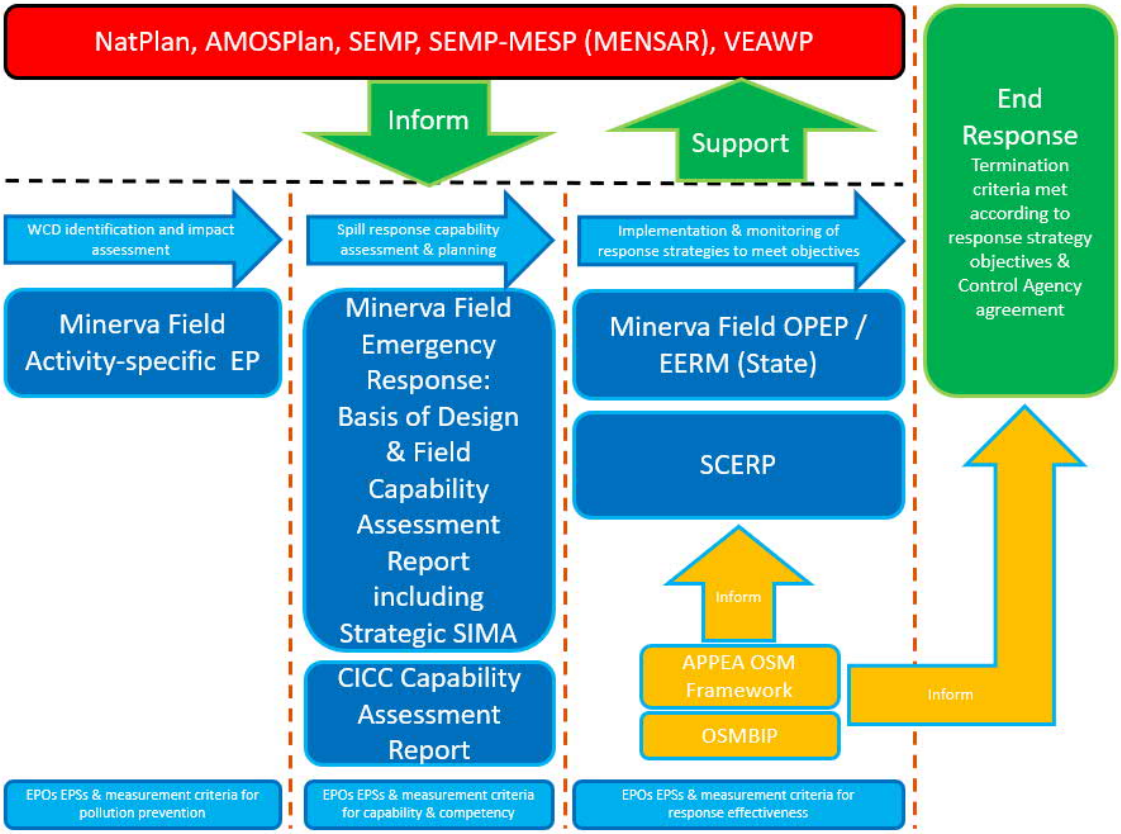

Figure 9-1: Spill response document framework for Minerva Field

9.1.4 Notifications and IMT Activation

For Level 1 incidents, the vessel contractor responds to the incident and immediately notifies the Engineering Manager.

For Level 2/3 incidents, the contractor immediately notifies the Woodside Communications Centre (WCC).

The Woodside Communications Centre (WCC) is a 24/7, central communication and coordination point for personnel and sites. Initial notification of a potential or actual incident must be made through the WCC. The activation of the CICC (and supporting functions) will be actioned by the WCC.

The CICC provides operational level incident coordination and/or incident control of response and recovery activities and is supported by Functional Support Teams (FST).

9.1.5 Applicable Response Strategies

A summary of the Response Strategies selected during the strategic SIMA process and their applicability to various spill scenarios is presented in Table 9-2

Table 9-2: Applicable response strategies for Minerva operations spill scenarios

Response Strategy	330m³ MDO Loss from Vessel Storage Tank (Level 2)
Source Control – Vessel-based	√
Monitor and Evaluate	√
Dispersant - Surface Application	×
Dispersant – Subsea Application	×
Marine Recovery	×
Shoreline Protection	√*
Mechanical Dispersion	×
In-Situ Burning	×
Shoreline Clean-up	√*
Natural Recovery	√
Environmental Monitoring	√
Oiled Wildlife Response	√
Oil Contaminated Waste Management	√

× Not effective or N/A

√ Activate Response Strategy (Refer Section 6 for Response Strategy Implementation).

* Potentially activated depending on reports/observations of Monitor and Evaluate and direction from Vic DoT.

9.1.6 Pollution Insurance

Woodside maintains liability insurance for sudden and accidental pollution. The level of coverage is commensurate with the potential nature and scale of a WCD for the activity and has been calculated in accordance with the 2018 *APPEA Method for Estimating Levels of Financial Assurance*.

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