ECSP: Installation and Wells Connection Environment Plan

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Acronyms and Abbreviations

Acronym	Definition
AAD	Australian Antarctic Division
ABN	Australian Business Number
ACN	Australian Company Number
AEL	Amplitude Energy Ltd
AEMS	Amplitude Energy Management System
AEP	Australian Energy Producers
AFFF	Aqueous Film forming Foam
AFMA	Australian Fisheries Management Authority
AGP	Athena Gas Plant
AHO	Australian Hydrographic office
AHS	Australian Hydrological Service
AHT	Anchor Handling Tug
AHTS	Anchor handling and tow support vessels
AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
ALA	Atlas of Living Australia
ALARP	As Low as Reasonably Practicable
ALs	Acceptable Levels
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
ANZG	Australian and New Zealand Guidelines
AOF	Absolute Open Flow
API	American Petroleum Institute
APSC	Australian Public Service Commission
AR6	Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report
ARS	Area Restricted Searches
ASOG	Activity Specific Operation Guideline
ASP	Athena Supply Project
ASTM	American Society for Testing and Materials
AU	Australia
AUD	Australian Dollar
AUSCOAST	Coastal Navigational Warnings
AUV	Autonomous Underwater Vehicle
AVG	Abalone Viral Ganglioneuritis
AZTECH	Aztech Well Construction Services
BHST	Bottomhole Static Temperature
BIA	Biologically Important Area
BMG	Basker-Manta-Gummy
BoM	Bureau of Meteorology
BOP	Blow-Out Preventer

Acronym	Definition
BP	Boiling Point
BRS	Bureau of Rural Sciences
BWDCM	Black Watch Distribution Centre Manifold
BWMC	Ballast Water Management Convention
CAS	Chemical Abstracts Service
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CFA	Commonwealth Fisheries association
CFCs	chlorofluorocarbons
CFSR	Climate Forecast System Reanalysis
CH4	Methane
CHARM	Chemical Hazard assessment and Risk Management
CHIRP	Compressed High-Intensity Radar Pulse
CHN	Casino-Henry-Netherby
CIA	Cumulative Impact Assessment
CM	Control Measure
CMA	Commonwealth Marine Area
CMP	Conservation Management Plan
CMS	Cooper Energy Management System
CO2	Carbon Dioxide
CoA	Commonwealth of Australia
COLREGs	Convention on the International Regulations for Preventing Collisions At Sea 1972
CP	Cathodic potential
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSV	Construction Support Vessel
CTD	Conductivity, Temperature and Depth
Cth	Commonwealth
DAFF	Department of Agriculture, Fisheries and Forestry (Cth)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cth)
DEECA	Department of Energy, Environment and Climate Action (Vic)
DGV	Default Guideline Value
DJSIR	Department of Jobs, Skills, Industries and Regions (Vic)
DLS	Dogleg Severity
DMS	Degrees-Minutes-Seconds
DOA	Department of Agriculture
DP	Dynamic Positioning
DPC	Department of Premier and Cabinet (Vic)
DSV	Dive support and survey vessels
EAC	East Australian Current
ECSP	East Coast Supply Project
ELT	Executive Leadership Team
EMAC	Eastern Maar Aboriginal Corporation
EMBA	Environment that May Be Affected

Acronym	Definition
EMP	Emergency Management Plan
EP	Environment Plan
EPBC	Environment Protection and Biodiversity Conservation Act 1999
EPO	Environment Protection Order or Environment Performance Outcome
EPS	Environment Performance Standard
ER	Emergency Response
ERP	Emergency Response Plan
ESD	Ecologically Sustainable Development
EWS	Endangered Whale Species
FCAFC	Federal Circuit and Family Court of Australia.
FLNG	Floating Liquefied Natural Gas
FM	Frequency Modulation
FPSO	Floating Production, Storage and offloading
FWRAM	Full Waveform Range-dependent Acoustic Model
GHG	Greenhouse Gases
GMP	Garbage Management Plan
GMTOAC	Gunditj Mirring Traditional Owners Aboriginal Corporation
GOMO	Guidelines for Offshore Marine Operations
GV	Guideline Value
HAZID	Hazard Identification
HAZOP	Hazard and Operability Analysis
HCTS	Habitat Critical to the Survival
HFO	Heavy Fuel Oil
HP	High Pressure
HQ	Hazard Quotient
HSE	Health, Safety and Environment
HSEC	Health, Safety, Environmental and Community
HSEQ	Health, Safety, Environment and Quality
IAPP	International Air Pollution Prevention
ICE	Inventory of Carbon and Energy
ID	Internal Diameter
ILT	Inline Tees
IM	Incident Management
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMO	International Maritime Organisation
IMP	Incident Management Plan
IMR	Inspection Maintenance & Repair
IMS	Invasive Marine Species
IMT	Incident Management Team
INJ	Injury
IOGP	International Association of Oil and Gas Producers
IOPP	International Oil Pollution Prevention

Acronym	Definition
IPA	Indigenous Protected Area
IPCC	Intergovernmental Panel on Climate Change
IPIECA	International Petroleum Industry Environmental Conservation Association
IR	Infrared
ISO	International Standards Organisation
ISPP	International Sewage Pollution Prevention
ITOPF	International Tank Owners Pollution Federation
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
JASCO	Jasco Applied Sciences
JRCC	Joint Rescue Coordination Centre
KBOS	Kinetic Blow-out Stopper
KCl	Potassium Chloride
KEF	Key Ecological Feature
LDAD	Low-density Artefact Distribution
LEL	Lower Explosive Limit
LGA	Local Government Area
LOC	Loss of Containment
LOWC	Loss of Well Control
LTD	Limited
MAE	Major Accident Event
MARPOL	International Convention for the Prevention of Pollution from Ships
MASP	Maximum Anticipated Surface Pressure
MBES	Multi-Beam Echo Sounder
MCD	Mudline Closure Device
MDO	Marine Diesel Oil
MEG	Monoethylene Glycol
MESA	Marine Education Society of Australasia
MGO	Marine Gas Oil
MMO	Marine Mammal Observer
MNES	Matters of National Environmental Significance
MNP	Marine National Park
MO	Species of Species Habitat May Occur Within Area or Marine Orders
MOC	Management of Change
MODU	Mobile offshore Drilling Unit
MOU	Mobile Offshore Unit
MPs	Marine Parks
MRU	Marine Response Unit
MS	Management System
MSS	Marine Seismic Survey
NA	Not Applicable
NCEP	National Centre for Environmental Prediction

Acronym	Definition
NDC	Nationally Determined Contribution
NEBA	Net Environmental Benefit Analysis
NERA	National Energy Resources Australia
NGER	National Greenhouse and Energy Reporting
NGOs	Non-governmental organisations
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOO	National Oceans Office
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
NORMS	Naturally Occurring Radioactive Materials
NO_X	Nitrogen Oxides
NPS4	National Parks Act Schedule 4 park or reserve
NPS6	National Parks Act Schedule 6 park or reserve
NRDA	National Resource Damage Assessment
NRE	Department of Natural Resources and Environment (Tas)
NTM	Notice to Mariners
NWS	North-west Shelf
OCNS	Offshore Chemical Notification Scheme
OECEA	Offshore Environment Chemical Environment Assessment (Database)
OGUK	Oil and Gas UK
OIM	Offshore Installation Manager
OPEP	Oil Pollution Emergency Plan
OPGGS	Offshore Petroleum and Greenhouse Gas Storage (Act 2006)
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023
OPP	Offshore Project Proposal
OSCA	Oil Spill Control Agents
OSMP	Operational and Scientific Monitoring Plan
OSPAR	Oslo/Paris convention (for the Protection of the Marine Environment of the North-East Atlantic)
OSTM	Oil Spill Trajectory Modelling
OSV	Offshore Support Vessel
OWR	Oiled Wildlife Response
OWF	Offshore Wind Farm
P&A	Plug and Abandon
PAM	Passive Acoustic Monitoring
PBW	Pygmy Blue Whale
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonic Acid
PIC	Person in Charge
PK	Peak Sound Level
PLONOR	Pose Little or No Risk to the Environment

Acronym	Definition
PMS	Planned Maintenance System
PMST	EPBC Act Protected Matters Search Tool
PNEC	Potential No Effects Concentration
POB	Persons on Board
PSZ	Petroleum Safety Zone
PTS	Permanent Threshold Shift
PTY	Proprietary Company
RAMSAR	Ramsar Convention on Wetlands
RAP	Registered Aboriginal Party (Vic)
RMR	Riserless Mud Recovery (System)
RMS	Root Mean Square
RO	Reverse Osmosis
ROV	Remotely Operated Vehicle
RPA	Response Priority Area
RTM	Response Time Model
RW	Relief Well
SBDF	Synthetic Based Drilling Fluid
SBM	Synthetic Based Mud
SBP	Sub Bottom Profiler
SCAT	Shoreline Cleanup and Assessment Technique
SCERP	Source Control Emergency Response Plan
SCR	Safety Case Revision
SDS	Safety Data Sheet
SEEMP	Ship Energy Efficiency Management Plan
SEI	Socio-economic Impact
SEL	Sound Exposure Level
SEL_{SS}	Sound Exposure Level Single Strike
SEMR	South-East Marine Region
SESSF	Southern and Eastern Scalefish and Shark Fishery
SETFIA	South East Trawl Fishing Industry association
SFRT	Subsea First Response Toolkit
SIMAP	Spill Impact Mapping Analysis Program
SIMOPS	Simultaneous Operations
SIV	Seafood Industry Victoria
SMPEP	Shipboard Marine Pollution Emergency Plan
SoE	State of the Environment
SOLAS	Safety of Life At Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SoV	Scope of Validation
SO_x	Sulphur Oxides
SPL	Sound Pressure Level
SFRT	Subsea First Response Toolkit

Acronym	Definition
SRW	Southern Right Whale
SSD	Subsea Dispersant
SSS	Side-Scan Sonar
SST	Sea Surface Temperature
SVP	Sound Velocity Profiler
TA	Tuna Australia
TD	Total Depth
TEC	Threatened Ecological Community
TPCs	Third Party Contractors
TSS	Total Suspended Solid
TSSC	Threatened Species Scientific Committee
TTS	Temporary Hearing Threshold Shift
UCH	Underwater Cultural Heritage
USBL	Ultra-short Baseline
UXO	Unexploded ordnance
VBA	Victorian Biodiversity Atlas
VFA	Victorian Fisheries Authority
VOC	Volatile Organic Compound
VSC	Vessel Safety Case
VSP	Vertical Seismic Profiling
WAN	Well Activity Notice
WBDF	Water-Based Drilling Fluid
WBM	Water Based Mud
WCD	Worst case discharge
WDCS	Whale and Dolphin Conservation Society
WOMP	Well Operations Management Plan
WTOAC	Wadawurrung Traditional Owners Aboriginal Corporation

1.0 Introduction

1.1 Activity Overview

Cooper Energy (CH) Pty Ltd and Cooper Energy (MGP) Pty Ltd propose to undertake subsea infrastructure installation and wells connection activities within Commonwealth waters of the Otway Basin, as part of the East Coast Supply Project. Cooper Energy (CH) Pty Ltd and Cooper Energy (MGP) Pty Ltd (together hereinafter referred to as Amplitude Energy or AEL) are subsidiaries of Amplitude Energy.

The proposed scope of the subsea infrastructure installation and wells connection activity (hereinafter referred to as 'the Activity') covered by this Environment Plan (EP) consists of the following activities:

- Environmental, geotechnical, geophysical, and pre- and post-lay surveys.
- Subsea infrastructure installation and connections, which includes the installation of flowline systems, umbilical control systems, testing of infrastructure, and testing and preservation activities to connect 4 development wells (Isabella (Elanora 1/ST1), Annie-2, Juliet and Nestor) to the existing CHN pipeline via already installed Inline Tees (ILTs).
- Inspection, maintenance and repair (IMR).

All planned activities will occur within the operational area described in Section 3.1.1. The operational area during installation, testing and preservation activities is defined as a 3 km corridor centred over each of the connecting flowlines from the well to connection with the CHN pipeline. The operational area encompasses a 500 m petroleum safety zone (PSZ) around each of the wells in place from when the wells are drilled and if commercially viable completed and suspended (ongoing) and a 500m safety exclusion zone that will be requested around vessels undertaking installation activities for the duration of activities.

Each activity will be conducted on a 24 hours per day, 7 days per week basis, with the Activity proposed to commence in 2027, currently targeted for October 2027 subject to vessel availability, weather and regulatory approvals.

The estimated duration for each discrete activity within this timeframe is described in Section 3.2. The activity may be undertaken as a single campaign to connect all 4 development wells or could be undertaken as separate campaigns.

Following the completion of testing and preservation activities, the installed infrastructure will be preserved until start up and subsequent steady state operations, targeted for end of Q2 2028. Start up and production operations from Annie, Isabella, Juliet and Nestor fields will be subject to future regulatory approvals and licencing and is not within the scope of this EP.

This EP identifies and evaluates credible environmental impacts and risks associated with the Activity and ongoing management of the installed and commissioned subsea infrastructure until start-up and production from the new development wells.

Refer to Section 3.0 for further details on the description of the proposed activities.

1.2 Summary

The activity summary has been prepared from material provided in this EP.

The summary consists of the following table (Table 1-1) as required by Section 35 of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (OPGGS) (Environment) Regulations 2023 (OPGGS(E)R).

Regulation 35(7)(a) of the OPGGS(E)R (2023) requires the items described in Table 1-1 be provided as a summary of the EP to NOPSEMA for public disclosure upon acceptance of the EP.

Amplitude Energy provides NOPSEMA the full EP for public disclosure.

Table 1-1: Summary of EP

Required materials from EP as per Reg 35(7)	Relevant Section of EP
The location of the activity	Section 3.1
A description of the receiving environment	Section 4.0
A description of the activity	Section 3.3.1.33.4
Details of the environmental impacts and risks of the activity	Section 6.0
A summary of the control measures for the activity	Section 10.0
A summary of the arrangements for ongoing monitoring of the titleholder's environmental performance	Section 12.15
A summary of the response arrangements in the oil pollution emergency plan	Section 12.7.2
Details of consultation already undertaken and plans for ongoing consultation	Section 11.0 & Section 12.12
Details of the titleholders nominated liaison person for the activity	Section 1.6

1.3 Background

Existing offshore facilities include the Amplitude Energy operated Casino-Henry-Netherby (CHN) development which produces gas and condensate from Production Licence Areas VIC/L24 (Casino) and VIC/L30 (Netherby and Henry). The CHN development includes 4 wells which have been producing gas for over a decade. Products from these wells are transported through a subsea pipeline to the onshore Athena Gas Plant (AGP) on Victoria's southwest coast for processing. Processed gas is directed to third-party pipelines, where it is transported domestically for use within the southern and eastern states.

The wells tied into the CHN development are:

- Casino-4 and Casino-5 (located in VIC/L24) that were installed in 2005 and have been producing since.
- Henry-2 and Netherby-1 that were drilled in 2008 and began producing in 2010.

1.3.1 Activity Approvals

To meet continued demand as existing fields decline, Amplitude Energy proposes incremental development of adjacent fields tied into the existing CHN infrastructure to backfill and maintain supply. This proposal is referred to as the East Coast Supply Project (ECSP). The ECSP is described within the ECSP Offshore Project Proposal (**ECSP OPP**) (AEL 2025) which was approved by NOPSEMA on 7 July 2025 (Cooper Energy 2025). The Activity described in this EP is a component of the ECSP.

In accordance with Regulation 56 of the OPGGS(E)R, references to the **ECSP OPP** have been made throughout this EP. Concordance with the **ECSP OPP** is addressed in Appendix 1.

In April 2025, NOPSEMA accepted the **Athena Supply Project EP** for Amplitude Energy to undertake exploration drilling of 3 wells, and in the event of discovery of commercially viable resources, the completion and suspension of the wells. The drilling of the Annie-2 development well is covered by the accepted **Annie-2 Development Drilling EP**.

The activities in this EP comprise the connecting of 4 development wells (with flowlines) to a commingling manifold or other tie-in point via flexible jumpers or rigid/flexible spools. Jumpers and spools are used to connect manifolds to flowlines and flowlines to ILTs. Existing ILTs are integrated into a skid with necessary double block and bleed valves that can be operated by a ROV. To transition from construction to operation, facilities will go through a process of testing and preservation activities prior to commissioning and startup. Testing and preservation activities will ensure components of the East Coast Project are installed, tested and function correctly.

The commissioning and start-up activities whereby hydrocarbons are introduced from the wells into the rest of the system will be incorporated into a revision of the Otway Offshore Operations EP.

1.4 Purpose

This EP identifies and assesses the environmental impacts and risks associated with the proposed activities and provides a demonstration that impacts and risks are reduced to 'As Low As Reasonably Practicable' (ALARP) and will be of an 'acceptable' level. Definitions for these terms are provided in Section 5.0. The activities proposed under this EP occur entirely within Commonwealth waters. Therefore, this EP has been prepared to satisfy the requirements of Commonwealth legislation and relevant regulations, namely:

- The Commonwealth OPGGS Act 2006 (OPGGS Act) administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).
- The Commonwealth OPGGS(E)R 2023, administered by NOPSEMA.

1.5 Scope

This EP relates to activities within exploration permit areas VIC/P44 and VIC/P76, and the production licence VIC/L24 and VIC/L30.

Activities assessed within the scope of the EP include:

- Surveys – environmental, geotechnical, geophysical, and pre- and post-lay surveys.
- Installation – of subsea infrastructure (flowline, umbilicals, pipeline crossing and other), including pre-lay works and stabilisation, and post-lay works.
- Testing and Preservation – subsea equipment testing & preservation.
- Support activities - Vessels, helicopters, divers and ROVs.
- Contingent activities – inspection, maintenance and repair (IMR).

Further details on the activities covered by the EP are provided in Section 3.0.

Activities specifically excluded from the scope of this EP are:

- Commissioning, start-up and operations of the installed subsea infrastructure following connection to the existing CHN pipeline. These will be covered under a separate EP.
- Vessels transiting to or from the operational area. These vessels are deemed operating under the Commonwealth Navigation Act 2012 and not performing petroleum activities.

- Helicopters transiting to or from respective operational areas. These aircraft are subject to the Air Navigation Act 1920 (Cth), Civil Aviation Act 1988 (Cth), and associated regulations, and not performing the petroleum activity.
- End of facility life (EOFL) decommissioning and removal of infrastructure under section 572(3) of the OPGGS Act. These activities are not scheduled to occur within the in-force period of this EP (i.e. 5 years).

1.6 Titleholder details

Amplitude Energy is the proponent for the Activity. In accordance with (OPGGS(E)R) Section 23, the details of the titleholder and liaison person are provided in Table 1-2.

Further information about Amplitude Energy is available at: **www.amplitudeenergy.com.au**.

Table 1-2: Titleholder and Liaison Person

Title Details	Titleholder Details	Liaison Person
VIC/P44	Name: Cooper Energy (CH) Pty Ltd ABN: 70 615 355 023 ACN: 615 355 023	Nathan Childs Chief Corporate Services Officer Amplitude Energy Limited Level 11, 55 Currie Street Adelaide SA 5000 Phone: (08) 8100 4900 Email: **customerservice@cooperenergy.com.au**
VIC/L24 & VIC/L30	Name: Cooper Energy (CH) Pty Ltd ABN: 70 615 355 023 ACN: 615 355 023 Name: MEPAU Otway Basin Pty Ltd ABN: 17 009 363 820 ACN: 009 363 820 Name: Mitsui E&P Australia Pty Ltd ABN: 45 108 437 529 ACN: 108 437 529	
VIC/P76	Name: Cooper Energy (MGP) Pty Ltd ABN: 66 615 355 005 ACN: 615 355 005	

2.0 Requirements

The Activity is located entirely within Commonwealth waters and therefore falls under Commonwealth jurisdiction. Activities located within Commonwealth jurisdiction must comply with two keys acts:

- OPGGS Act; and
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

In accordance with Regulation 21(4) of the OPGGS(E)R the relevant requirements that are applicable to the Activity are presented in Appendix 3. Requirements include relevant laws, legislations, codes, other approvals and conditions, standards, agreements, treaties, conventions, or practices (in whole or part) that apply to the jurisdiction that the activity takes place in. Australia is also a signatory to international conventions and agreements that oblige the Commonwealth government to prevent pollution and protect specified habitats, flora and fauna. These have also been addressed within Appendix 3 which also summarises the relevant EP sections where a legislation may prescribe or control how an activity is undertaken. In accordance with Regulation 56 of the OPGGS(E)R, references to the **ECSP OPP** have been made throughout this EP. Appendix 1 provides the concordance with the **ECSP OPP**.

3.0 Activity Description

This section provides a description of the Activity, including:

- location
- description of the activities which will occur and their timing.

3.1 Activity Location

The Activity will be undertaken in Commonwealth waters, off Victoria's coast in the Otway Basin, in existing offshore petroleum permits VIC/L24, VIC/L30, VIC/P44 and VIC/P76. Amplitude are proposing the subsea installation of flowlines and umbilical control systems, and the tie-in of 4 wells from the Annie-2, Juliet, Nestor and Isabella gas fields to the existing Casino Henry Netherby (CHN) field infrastructure (Figure 3-1).

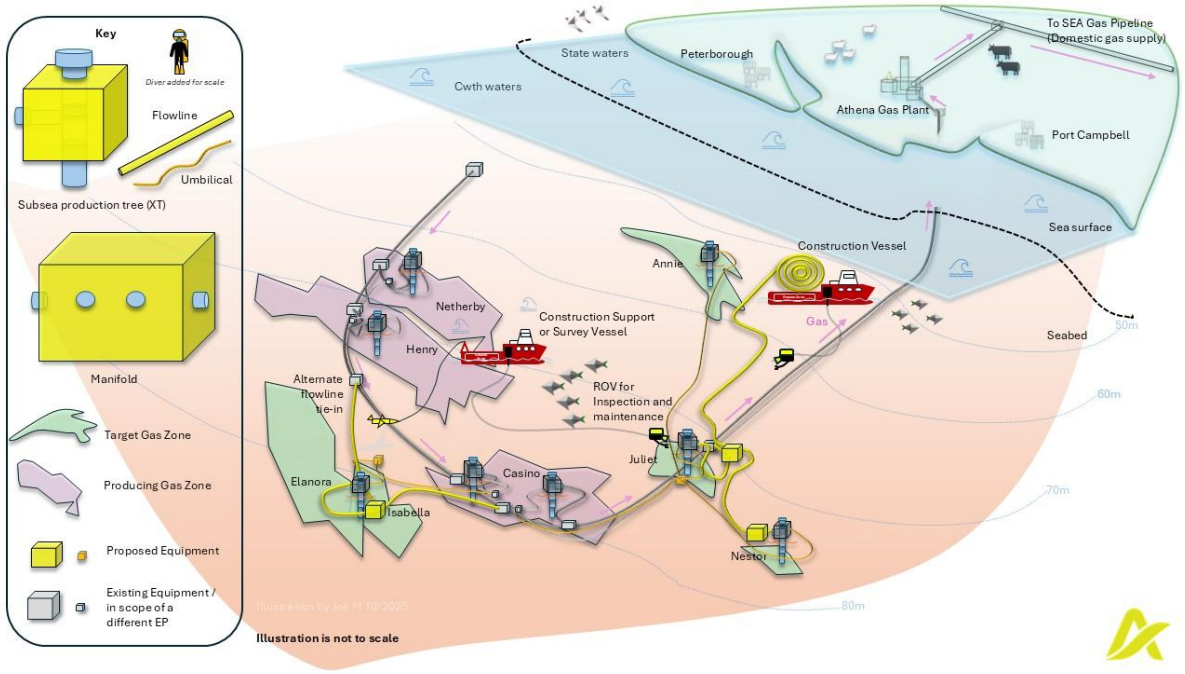


Figure 3-1: Existing Infrastructure and Proposed Activities Illustration

The approximate water depth and coordinates are provided in Table 3-1. Approximate coordinates are provided pending the completion of the wells and detailed engineering design.

Table 3-1: Approximate Coordinates of the Activity

Location	Title Area	Water Depth	Latitude	Longitude
			DMS GDA94	
Annie-2	VIC/P44	56 m	38°41'1.50" S	142°49'29.38" E
Juliet	VIC/L24	63 m	38°46'14.76" S	142°48'47.76" E
Nestor	VIC/P76	65 m	38°48'8.50" S	142°52'21.02" E
Isabella (Elanora-1/ST1)*	VIC/L24	74 m	38°47'37.65" S	142°37'46.36" E
Black Watch ILT	VIC/L24	63 m	38°46'15.14" S	142°48'37.62" E
Black Watch Distribution Centre Manifold	VIC/L24	65 m	38°46'14.90" S	142°48'40.97" E

Location	Title Area	Water Depth	Latitude	Longitude
			DMS GDA94	
Black Watch Distribution Centre UTA	VIC/L24	65 m	38°46'16.98" S	142°48'36.42" E
Elanora Distribution Centre Manifold	VIC/L24	74 m	38°47'35.90" S	142°37'46.53" E
Elanora Distribution Centre UTA	VIC/L24	74 m	38°47'37.65" S	142°37'44.50" E
Future ILT	VIC/L24	72 m	38°47'18.26" S	142°42'18.60" E
Matador ILT – alternate tie in location to Future ILT tie in	VIC/L30	70 m	38°44'46.59" S	142°38'52.08" E

** Isabella is the reservoir prospect, which is a Waarre-C reservoir. The Elanora sidetrack targets the Isabella prospect, but the well will be named Elanora-1/ST1 as it is a sidetracked well from the Elanora-1 mainbore (which is P&A'd), as the mainbore dictates the name.*

3.1.1 Operational Area and Petroleum Safety Zone

The operational area represents the outer spatial extent of the activities included within the scope of this EP (Figure 3-2). The operational area includes a 3 km corridor centred over each of the connecting flowlines from the well to connection with the CHN pipeline.

The operational area encompasses a 500 m petroleum safety zone (PSZ) around each of the wells (subject to gazettal) and a 500m safety exclusion zone that will be requested around each vessel while undertaking activities under this EP.

Project vessel and helicopter activities within the operational area are considered part of the petroleum activity. Activities outside of the operational area will be managed in accordance with applicable legislation.

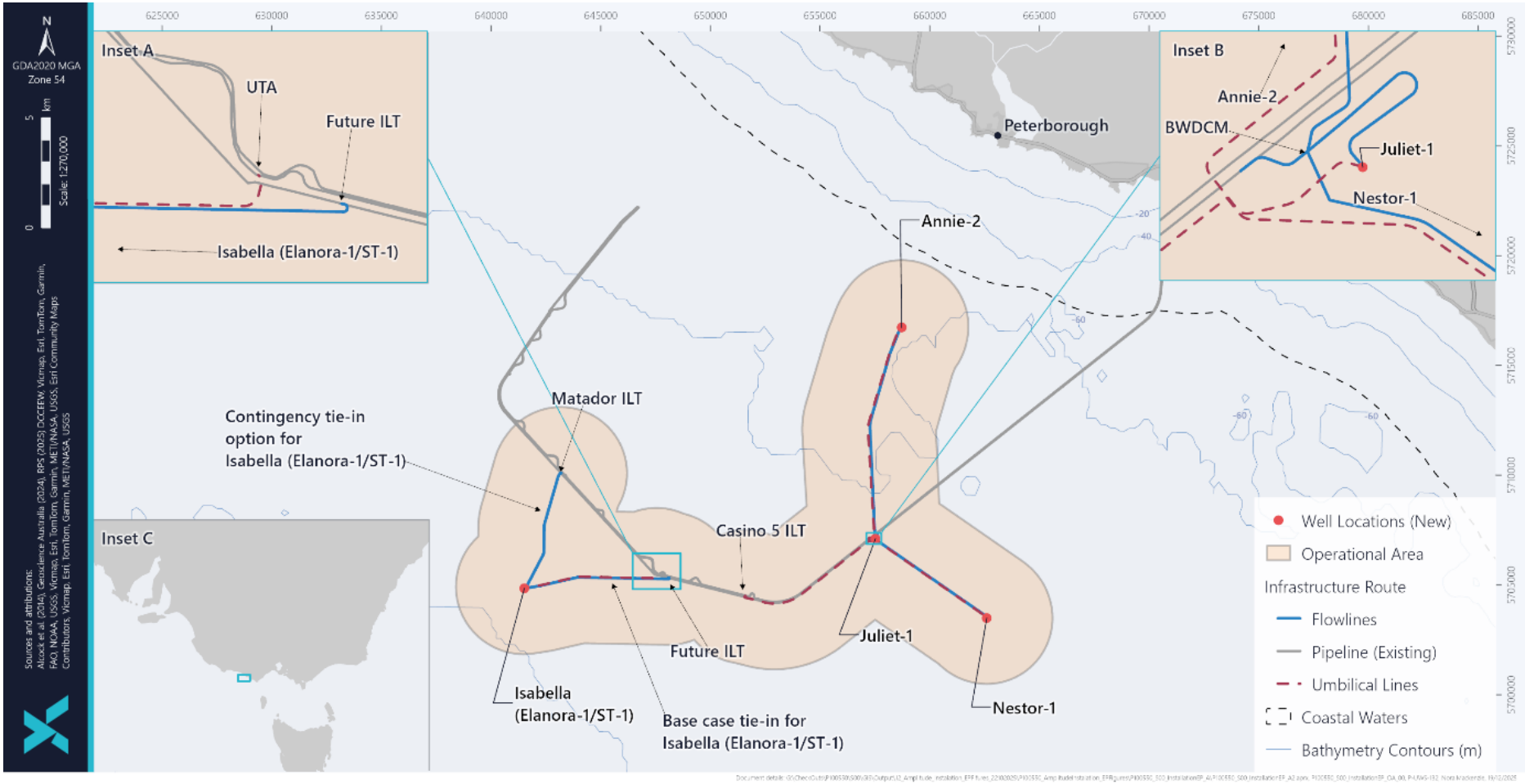


Figure 3-2: Operational Area

3.2 Activity Duration and Timing

The earliest start for any activity under this plan is Q1 2027 and a completion of the activities as late as 31 December 2030. Commissioning and startup is planned for Q2 2028.

All activities will operate on a 24 hour, 7 days per week basis.

Table 3-2 shows the estimated duration for each activity and the indicative activity schedule. The timing of each activity will vary due to factors such as vessel availability and operational windows.

Table 3-2: Indicative Activity Timing and Duration

Activity	Timing	Duration
Survey Activities (including Contingency Activities)		
Surveys including Pre- and Post-lay surveys. Contingent surveys, including Environment Surveys and Inspection, Maintenance, and Repair (IMR).	Pre-lay surveys as early as Q4 2027. Post lay surveys following completion of installation activities. Contingent surveys may occur, associated with the installation activities.	~7-21 days for each survey, depending on scope.
Installation Activities: ~120-150 days in total (assuming all 4 wells) *Note: Durations are indicative as design is ongoing and the installation contractor is still be selected. There is no confirmation on the vessel/s, install sequence and methodology.*		
Umbilical system laying (includes SUDU/UTAs and flying leads).	Planned for Q1 2028	~45 days.
Flowline system laying.		~55 days.
Installation of subsea structures.		~5 days.
Post-lay works (as-builts and stabilisation if required).		~25 days.
Testing & preservation.		~20 days. It is expected that commissioning and startup will commence approximately mid-2028, pending approvals and Athena Gas Plant readiness. Preservation of the subsea infrastructure is required until start-up with production of hydrocarbons to the gas plant.
Post-installation Activities		
Inspection and repairs, including inspection surveys.	Annual inspections until startup of production of the ECSP development wells. Contingency for repairs to subsea infrastructure in event required.	Inspections: ~7-14 days. Repairs: up to 30 days.

3.3 Description of Proposed Infrastructure

Details of the proposed infrastructure within the scope of this EP are detailed in the following sections.

3.3.1.1 Flowlines

All flexibles are 8" in diameter and will tie directly into the new subsea tree (SST) at each well.

Figure 3-2 presents the proposed flowline routes within the operational area.

The conceptual design uses a 25% increase in route length to estimate a conservative total length of flowlines to be installed, to include contingency for final route alignment during installation.

The conservative total length of flowlines to be installed for the 4 wells is ~30 km.

The new flowline systems will be tied-in to the CHN facilities via existing in-line tees (ILTs).

Proposed flowlines will not cross currently existing third-party infrastructure, however crossings over the existing CHN pipeline system will occur. The flexible flowline systems will likely require concrete stabilisation mats placed intermittently to limit movement of the flowline system under influence of the prevailing oceanographic conditions.

Table 3-3 provides the type, number and dimensions of subsea flowline system structures. All structures will be installed within the operational area.

Table 3-3: Estimate Dimensions and Footprint of Infrastructure Associated with Flowline Systems

Infrastructure	Estimated number required	Approximate dimensions (m)
End termination for flexible flowline system	4 x flexible flowline systems. Each have 2 x end terminations.	1 m x 1 m per end fitting at each end of the flowline reels. Subsea connectors will be used to connect to trees/ structures and will be elevated off the seabed. At ILTs, the connections will be flange to flange and also suspended above the seabed.

3.3.1.2 Umbilical Systems

New electrohydraulic umbilicals (EHUs) will be installed to provide hydraulic power, electric power, mono-ethylene glycol (MEG), and other chemical inhibitors from existing control systems to new SSTs. EHUs will be installed alongside the flowlines where feasible and all final umbilical routes will be within the operational area.

The total length of umbilicals is ~38 km.

The EHUs will incorporate umbilical termination assembly (UTA) / umbilical termination head (UTH) at the ends of the umbilicals. These termination units allow further distribution of the hydraulics, chemical injections and electrics to support the operation of the SSTs. Electrical Flying Leads (EFLs), and hydraulic flying leads (HFLs) may also be used in certain circumstances between the end terminations and the subsea assets. The umbilicals will be prefilled with hydraulic fluid, MEG and corrosion inhibitor as per the operating fluids used in the existing CHN system (**Otway Operations EP**).

To prevent movements induced by ocean currents, stabilisation of the umbilical system in the form of concrete mattresses and/or grout bags will be used. Provisions will be made for concrete mattresses near UTA's for stabilisation. Stabilisation/protection via grout bags may also be required around EFLs to counter the forces of currents at depth.

Table 3-4 provides the expected type, number and dimensions of subsea umbilical system structures. All structures will be installed within the proposed operational area.

Table 3-4: Estimate Dimensions and Footprint of Infrastructure Associated with Umbilical Systems

Infrastructure	Estimated number required	Approximate dimensions (m)
UTA/UTH	Each umbilical will have some form of termination. The type of termination is subject to detailed design.	Each termination could range within a dimensional envelope of 2x 2x4 m. The footprint of mudmats (base of structures) could have size up to 10 x 10 m.
Umbilicals/EFLs and HFLs	5 x infield umbilicals (including Black Watch to Casino-5, Black Watch to Juliet, Black Watch to Annie, Black Watch to Nestor, Casino-4 to Elanora). 10 x EFLs/HFLs in total UTA's/UTHs (at either end of the umbilicals)	Each EFL or HFL are circa 50 m long with diameter <150 mm.

3.3.1.3 Other Subsea Infrastructure

Other subsea infrastructure that will be installed includes:

- manifolds
- mattresses
- over-pressure protection systems.

Up to three new manifolds are proposed which will allow produced hydrocarbons from multiple wells to be commingled or provide isolations from existing production. Manifolds will incorporate an in-built foundation or require a separate foundation. It is expected that any foundation design would be a skirt or mudmat system. Foundation design and final configuration will be subject to detailed design. The proposed manifolds are:

- Black Watch Distribution Centre Manifold (BWDCM) to connect Annie-2, Juliet and Nestor via the existing Black Watch ILT.
- Additional manifold to connect the Isabella (Elanora-1/ST-1) with either the Future ILT, or as an alternate Matador ILT (in event the Future ILT is not operable).
- There could be a small manifold near the Nestor-2 tree to allow for future tie-in, this will be confirmed during detailed design.

Over-pressure protection will be achieved via tree valves or valves set within separate structures. In either case the control umbilical system will provide communications.

Currently there is no intention to hot tap into the existing CHN pipeline, however, hot tapping is included as a contingency activity as it could be undertaken depending on the final design and integrity of existing double block and bleed valve systems. A 'hot tap' is a contingency method where a flowline system is tied into a live, producing pipeline without disrupting routine operations.

Table 3-5 provides the expected type, number and dimensions of subsea infrastructure. All structures will be installed within the operational area.

Table 3-5: Estimated Dimensions and Footprint of Subsea Infrastructure

Infrastructure	Estimated number required	Approximate dimensions (m)
Manifolds	3	8 x 12 m for each manifold structure.
Mattresses	~300 (across 4 connections)	Anchormat (ANM): 6.75 x 2.5 m. Seatruck SEAMAT (SSM): 6.0 x 2.5 m.

Infrastructure	Estimated number required	Approximate dimensions (m)
		SEAMAT MMA: 3.0 x 3.0 m. Possible alternative: 6.0 m x 3.0 m.
Pressure protection system	Optionally 2 as contingency.	5 x 5 m for each structure. 10 x10 m for each mudmat.

3.4 Description of Activities

The scope of this EP covers the installation, testing and preservation of flowlines, umbilicals and other subsea infrastructure. Key activities are described in the subsections below, and include surveys, installation, testing and preservation, and support activities which will occur in the operational area.

3.4.1 Surveys

Seabed surveys have been completed to inform detailed design, route planning, equipment placement and impact assessment.

Survey activities may be required as part of installation activities, including geophysical, visual and positional surveys before, during and after equipment installation. Other survey types such as geotechnical and environment surveys are not planned but are included as a contingency activity, should they be required for the purposes of collecting information on, and managing risks related to the benthic environment, underwater heritage, debris and hazards on the seafloor.

3.4.1.1 Geophysical Surveys

Geophysical surveys are required to understand seabed relief, substrate, anomalies, potential underwater cultural heritage, and hazards on or below the seabed, and to inform the planning of subsea installation. Geophysical surveys have already been undertaken (outside of the scope of this EP), however during detailed design it may be necessary to undertake further geophysical surveys.

Table 3-2 provides indicative timing and duration for geophysical surveys.

Surveys may employ a variety of techniques including:

- Multi-beam echo sounder (MBES) - detailed measurements of bathymetry in the operational area.
- Side Scan Sonar (SSS) - detects hazards such as existing pipelines, lost shipping containers, boulders, debris, unmarked wrecks, reefs and craters. Also used to help detect possible underwater cultural heritage.
- Sub-bottom Profiler (SBP) - used to investigate the layering and thickness of the uppermost seabed sediments to check for shallow hazards and anomalies.
- Magnetometer - detects large and small metallic objects on or below the seabed (e.g., buried pipelines, petroleum wellheads, shipwreck debris and dropped objects such as un-exploded ordinance, cables, anchors, chains) that may not be identified by acoustic means.
- Sound Velocity Profiler (SVP) and Conductivity, Temperature and Depth (CTD) – used to calibrate survey equipment and environmental monitoring.

Table 3-6 summarises the technical inputs used in the impact assessments within Section 6.0.

See further discussion of the noise level exposures used in Sections 6.5 and 1.1.

Table 3-6: Impact Assessment Technical Input - Geophysical Surveys

Requirements for Impact Assessment	Technical Input
Underwater sound emissions	Impulsive and non-impulsive noise emissions; noise levels may vary with environmental conditions and operating requirements. See Sections 6.5 and 1.1 for further detail.

3.4.1.2 Geotechnical Surveys

Geotechnical surveys may be undertaken within the operational area to supplement existing survey data. Sampling locations would be pre-identified within the operational area. Seabed samples are generally <10 L of sediment and may be acquired through different types of grab or piston. Sampling equipment is deployed on a skid which would typically have a footprint of <1m^2. Approximately 20 seabed samples may be taken.

Table 3-2 provides indicative timing and duration for geotechnical surveys.

Table 3-7 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-7: Impact Assessment Technical Input - Geotechnical Surveys

Requirements for Impact Assessment	Technical Input
Seabed disturbance footprint	~ 0.000020 km^2. Refer Section 6.3 for further detail.

3.4.1.3 Pre- and Post-lay Surveys

Pre-lay surveys of the proposed flowline/umbilical/flying lead routes and structure locations may be conducted with the ROV to identify any obstacles or debris prior to installation of infrastructure. The pre-lay survey will involve visual inspection and use ultra–short baseline (USBL) acoustic positioning. USBL is used to track the underwater position of equipment by measuring the angle and distance of acoustic signals. Post lay surveys will capture the as-built locations, any anomalies or areas of interest along the product routes and structure locations.

Table 3-2 provides indicative timing and duration for pre- and post-lay surveys.

Underwater noise emissions from the USBL have been assessed within Section 6.5.

3.4.1.4 Contingency Surveys

Environment Survey

Environment surveys help to identify sensitive features of an area. Environment surveys have been undertaken for the East Coast Supply Project, but are included in this EP as a contingency, should further surveys be required, for example, due to an unexpected find of underwater cultural heritage. Environment surveys may comprise:

- Geophysical and geotechnical survey techniques described in Sections 3.4.1.1 and 3.4.1.2.
- Visual survey with towed sled, drop camera or static skid.
- Water sampling with rosette.

- Oceanographic survey with survey equipment deployed to seabed or suspended mooring.

Table 3-8 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-8: Impact Assessment Technical Input – Environment Surveys

Requirements for Impact Assessment	Technical Input
Seabed disturbance footprint	<0.00001 km^2. Refer Section 6.3 for further detail.

Inspection, Maintenance, and Repair

Inspection, maintenance and repair (IMR) work may be required within the operational area to support the Activity prior to start up.

Inspections may be conducted to proactively identify if maintenance or repair is required. Generally, a vessel will travel along the route of the subsea system with an ROV (or AUVs) and may include the use of SSS and MBES techniques.

Maintenance and repair activities may need to occur to:

- Prevent deterioration and/or failure of infrastructure.
- Maintain reliability and performance of infrastructure.

Maintenance and repair activities are typically conducted in response to inspection findings, engineering analyses, and/or external events. The activities are typically performed by ROV from a vessel or by divers from a dive support vessel. Table 3-9 summarises the technical inputs used in the impact assessments within Section 6.0.

See further discussion of the noise level exposures used in Section 6.5. The predicted frequencies included within Section 6.5 are considered appropriate for the Activity as they represent typical and widely used survey equipment model types.

Table 3-9: Impact Assessment Technical Input – IMR surveys

Requirements for Impact Assessment	Technical Input
Petroleum Safety Zone (PSZ)	500 m radius around well gazetted by NOPSEMA, PSZ is already in place ahead of the installation activity.
Underwater sound emissions	Continuous (MBES and SSS); noise levels may vary with environmental conditions and operating requirements, within defined safety parameters. See Section 1.1 for further detail.

3.4.2 Installation, Testing and Preservation

Installation, testing and preservation phases will include the installation of flowlines and other subsea infrastructure plus testing activities. The development wells will be connected to a commingling manifold or other tie-in point via flexible jumpers/flowlines. Jumpers are used to connect manifolds to flowlines and flowlines to ILTs.

Existing ILTs consist of a double block and bleed assembly which can be operated by diver or ROV. These assemblies allow safe isolations from existing production for tie-ins. The facilities will go through a process of testing and preservation prior to start-up to ensure the components are installed, tested and function correctly.

3.4.2.1 Equipment Positioning

Positioning of subsea infrastructure and ROVs during the Activity will require the use of transponders. The temporary deployment of any transponders may include skids and/or frames being deployed to the seabed which are then retrieved.

Table 3-10 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-10: Impact Assessment Technical Input – Equipment Positioning

Requirements for Impact Assessment	Technical Input
Seabed disturbance footprint	<2 m^2 for each transponder and associated frame. Refer Section 6.3 for further detail.
Underwater sound emissions	Impulsive (transponders); noise levels may vary with environmental conditions and operating requirements, within defined safety parameters. See Section 6.5 for further detail.

3.4.2.2 Pre-lay Works

Pre-lay works will primarily consist of visual surveys which may be undertaken prior to commencing flexible or umbilical installation.

If required, pre-lay works within the operational area will involve the installation of concrete mattresses and/or grout bags at pipeline crossings, in locations where pipeline spans may occur or to stabilise flowlines. No trenching or excavation is required.

If required, pre-made concrete mattresses and/or pre-filled grout bags will be deployed by crane or A-frame and will typically be guided into position on the seabed using an ROV. The footprint of grout bags on the seabed is typically confined to small areas overlapping the flowline footprint. The footprint of a grout bag depends on the required stabilisation or span rectification but is estimated to be ~0.5 m^2.

The concrete mattresses shall be formed from high strength, profiled concrete segments cast into suitable rope/webbing for the specified design life in a subsea environment. The number of concrete mattresses for stabilisation will be confirmed during the pre-lay survey. Additional mattresses, rock or grout bags may be used post-lay, to support the as-laid flowline system where it spans sections of seabed (Section 3.4.2.5).

Equipment to support accurate positioning of subsea structures and ROVs will include transponders. The temporary deployment of any transponders is likely to include skids and/or frames being deployed to the seabed which are then retrieved. This will result in a temporary disturbance of <2 m^2.

Table 3-11 summarises the technical inputs used in the impact assessments within Section 6.0.

See further discussion of the noise level exposures used in Section 6.5.

Table 3-11: Impact Assessment Technical Input – Pre-lay Works

Requirements for Impact Assessment	Technical Input
Seabed disturbance footprint	Grout bag: approximately ~0.5 m^2. Concrete mattress: 300 x mattresses, ~18 m^2 each.

Requirements for Impact Assessment	Technical Input
	Refer Section 6.3 for further detail.

3.4.2.3 Flowlines and Umbilicals

The flexible jumpers will be installed during the diving campaign and the flowlines and umbilicals during the following diverless campaign through similar methods in respect to seabed disturbance. Installation for the flexible flowline/umbilical systems will most likely occur through reels or carousel methods depending on the size and vessel storage capacity.

Due to the length of the flowline systems, the flowlines will be transported either on reels or in a carousel on an Installation Support Vessel (ISV). In the event the flexible flowline system is installed from multiple reels, the inline flange connections, called midline connections, will be made up on deck during the lay progress.

The infrastructure to be installed includes a total length of (including 25% allowance):

- ~30 km of flowline system.
- ~38 km of umbilical system.

The disturbance footprint of the flowline/umbilical system on the seabed has been conservatively estimated to be 50 m buffer on either side of the flowlines and umbilicals (100 m wide corridor) along the length of the flowline. The majority of this corridor is unlikely to be disturbed but there will be discrete areas of seabed that are disturbed within this corridor and either side of the linear infrastructure.

Table 3-12 summarises the technical inputs used in the impact assessments within Section 6.0.

See further discussion of the noise level exposures used in Section 6.5.

Table 3-12: Impact Assessment Technical Input – Flowlines and Umbilicals

Requirements for Impact Assessment	Technical Input
Seabed disturbance footprint	. Refer Section 6.3 for further detail.

3.4.2.4 Installation of Other Subsea Infrastructure

Subsea infrastructure including manifolds, skids, SUDUs/UTAs, flying leads and stabilisation will be installed to connect the new production wells to the existing CHN system (see Section 3.3 for a list of installed subsea infrastructure). As part of the new flowline system in certain circumstances a co-mingling manifold may be required. Flexible jumpers will be used to tie in the new wells at the existing ILTs.

Prior to installing subsea structures, a pre lay (seabed) survey may be conducted to confirm no existing obstacles that may hinder installation activities are within the operational area. In the unlikely event of encountering a significant obstruction, the debris/obstruction would either be cleared or potentially the subsea system will be re-routed proximal to the planned layout if required.

Generally, structures/skids will be installed directly onto the seabed; or onto foundations with skirts, which are typically steel skirted mudmats. Subsea infrastructure will be lifted off an ISV by an onboard crane and deployed subsea, with an ROV or diver guiding the structure into place using subsea transponders (as discussed in Section 3.4.2.1).

Internal cavities within the structures will be flooded with inhibited water or filled with MEG via inclusion of solid inhibitor sticks placed inside to minimise corrosion risk if required. These fluids and inhibitors are displaced to sea during subsequent activities (see Section 3.4.2.6).

Table 3-13 summarises the technical inputs used in the impact assessments within Section 6.0.

See further discussion of the noise level exposures used in Section 6.5.

Table 3-13: Impact Assessment Technical Input – Installation of Other Subsea Infrastructure

Requirements for Impact Assessment	Technical Input
Seabed disturbance footprint	Refer Section 6.3 for further detail.

3.4.2.5 Post-lay Works

Following installation, the flowlines and umbilicals will be stabilised. This involves placing high-density concrete mattresses at intervals along the flowline/umbilical system to satisfy detailed design requirements (as per Section 3.4.2.4).

In addition, small scale 20–40 kg stabilisation grout bags will be situated on jumpers and flying leads to assist with stability and general protection where required.

For the purposes of impact assessment, the disturbance footprint for post-lay works is expected to be equivalent to the estimated long-term disturbance corridor.

Table 3-14 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-14: Impact Assessment Technical Input – Post-lay Works

Requirements for Impact Assessment	Technical Input
Seabed disturbance footprint	Refer Section 6.3 for further detail.

3.4.2.6 Testing and Preservation

Following subsea infrastructure installation and wells connection, equipment is inspected and tested via the following activities, which will be subject to detailed execution planning:

- Flooding – the flowlines will be flooded with an inhibited water/MEG mix, this may be done at the manufacturing facility, prior to load out, or on the installation vessel.
- Hydrotest – inhibited water/MEG solution within the flowline is topped up to test pressure via a downline from the installation vessel. Test pressure is held between 6 to 24 hours and monitored either from the vessel or a subsea data logger via ROV. Where anomalies in pressure readings indicate a leak, this is investigated. Dye is incorporated into the flowline flooding medium to enable identification of leak points.
- Pressure testing – involves topping up the umbilicals with control fluid downline from the surface vessel. Test pressure is held for up to 24 hours and monitored from the vessel. Where anomalies in pressure readings indicate a leak, this is investigated.
- Barrier testing – inhibited water is used to prove barriers prior to tying into existing equipment, such as the valves on the ILTs.

- XT function testing - to ensure that all valves, actuators, and control systems on the XT operate correctly before commissioning and start-up, subsea discharges of water-based hydraulic fluids and subsea control fluids (<1 m^3).

One or more of these activities may be repeated where required. Once tested, depending on timing to start-up, the subsea system may be left flooded for a period before dewatering. Preservation fluids are used to preserve infrastructure before commissioning and future operations.

Once testing is complete, the following preservation activities will occur:

- Dewatering – the flowlines will be in a flooded state filled with preservation fluids (inhibited seawater/MEG). Prior to completing commissioning activities (covered under a separate EP), the subsea system is dewatered by displacing the lines with nitrogen gas. Nitrogen gas will be pumped from a surface vessel via a downline into the subsea system. The inhibited water/MEG is displaced to sea (at manifold or tie-in locations), until the system is filled with nitrogen gas. Nitrogen is an inert gas that makes up ~78% of the earth's atmosphere; it carries no risk of ignition and is non-corrosive.

Following the above steps, the system is entirely connected, tested and ready for start-up. The subsea equipment is operated by the onshore gas plant via the controls system.

Conservative volume estimates for fluids displaced to the sea from testing and preservation activities are compiled in Table 3-15.

Table 3-15: Estimated Maximum Discharge Volumes from Testing and Preservation

Discharge Type	Key Components	Volumes
Inhibited water	Seawater with chemical additives including corrosion inhibitor, oxygen scavenger, biocide and dye.	350 m^3 per well location (estimated on the longest flowline)
MEG*	MEG c/w water mix. The calculated volume is for the full length of the flexibles. Note: The finalised procedure may result in slugs being used reducing the amount to ~10% of the full volume.	400 m^3 per well location (estimated on the longest flowline).
Control fluid	Marine grade hydraulic control fluid.	100 L discharged per test.
Nitrogen gas	Nitrogen gas.	350 m^3 per well location (estimated on the longest flowline).
Water-based gel	Provide temporary, controllable barriers and protection for flowline commissioning.	100 L per use.

3.4.3 Support Activities

Support activities associated with the scope of the Activity are likely to include vessels, helicopters ROVs, and divers and are specific to each phase (Table 3-16).

Table 3-16: Support Activities for Each Phase

Support Activity		Phase					
		Surveys					Installation, Testing & Preservation
		Geophysical	Geotechnical	Pre- and Post-lay	Environment *	IMR*	
Support Vessels	Survey vessels	✓	✓	✓	✓		
	IMR vessel					✓	
	Installation vessel (ISV)						✓
	General supply vessel						✓
	Diver support vessel (DSV)						✓
	Hyperbaric Rescue Vessel (HRV)						✓
Helicopter							✓
ROV/AUV			✓	✓	✓	✓	✓
Diver							✓

*Contingency activities

3.4.3.1 Vessel Operations

Vessels will be contracted from international or Australian suppliers and will vary depending on the proposed activity, phase and vessel availability. The expected vessel types include:

- Survey vessels.
- IMR vessel* (if required).
- Installation vessel (ISV).
- General supply vessel.
- Diver support vessel (DSV).
- Hyperbaric rescue vessel (HRV).

Activities associated with these vessels include:

- conducting surveys
- installation activities
- assisting in emergency response situations
- conducting IMR activities
- resupply of main vessels

- discharge/management of:
  - sewage, greywater and food waste
  - cooling water and brine
  - deck drainage and bilge.
- vessel positioning
- support diver operations.

*Note: Typically, one vessel is hired for IMR activities. The type of vessel depends on the work scope. Minor inspection works may be undertaken using inspection class ROV from a small vessel. Maintenance and Repair works may require an ISV or DSV.

All vessels will mobilise from and demobilise to ports outside of the operational area. Crew changes for the vessels will typically be conducted by helicopter or at local ports.

Up to 3 vessels will be within the operational area at any one time to support installation activities.

Vessels will typically use thrusters or DP to maintain position but may deploy anchors to manage an emergency (e.g., engine failure).

Table 3-17 details the anticipated vessel specifications and capacities for the activity and Table 3-18 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-17: Vessel Operations, Specifications, and Capacities

Technical Specifications	
Maximum Persons on Board (POB)	Survey vessel: 20-40 ISV: 140 Support vessel: 10-20 DSV: 80-120 HRV: 10-25
Will vessels be moving within the operational area?	Yes
Will anchoring be required?	No. Anchoring only be used in an emergency situation (e.g., engine failure).
Lighting requirements	Standard navigation lighting and safe work.
Bilge requirements	Standard bilge requirements.
Cooling water and brine requirements	Standard cooling water and brine requirements.
Sewage requirements	MARPOL compliant sewage treatment system.
Hazardous waste	Yes
Ballast water discharge or exchange within territorial sea boundary?	Yes
Fuel use type	Marine Diesel Oil (MDO) or Marine Gas Oil (MGO)
Total estimated fuel consumption (daily)	5 - 50 m^3 per day for 3 x vessels.
Is refuelling at sea planned?	No
What is the largest expected MDO tank size?	600 m^3
Ancillary equipment may include	Cranes, A-Frame, ROVs, Positioning and Survey equipment.

Table 3-18: Impact Assessment Technical Input - Vessel Operations

Requirements for impact assessment	Technical input
Seabed disturbance footprint (not planned)	1,300 m^2 during emergency anchoring (accounting for deployment and some drag in heavy weather) (NERA, 2018).
Planned marine discharges from the vessels.	Discharges will be in accordance with MARPOL and AMSA discharge standards. Discharges will include sewage and grey water, cooling water, brine and treated ballast, deck drainage and bilge.
Operational light emissions from vessels	~20 km radius precautionary light buffer as per the recommendations within the National Light Pollution Guidelines for Wildlife (DCCEEW 2023a).
Underwater sound emissions (from DP system / thrusters)	Continuous; noise levels may vary with environmental conditions and operating requirements, within defined safety parameters. See scenarios outlined in Section 1.1.
Approximate GHG emissions (CO_2-e) from fuel use during vessel operations	18.1 kT CO_2-e

3.4.3.2 Helicopter Operations

Helicopters will be used during the installation activities, primarily for crew change and medevac, and occasionally equipment and material transfers. Helicopter flights are expected to occur approximately 4-8 times per week depending on the phase of the offshore activity.

Frequency will depend on the progress of the subsea installation and logistical constraints.

Table 3-19 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-19: Impact Assessment Technical Input - Helicopter Operations

Requirements for impact assessment	Technical input
Frequency of flights	Approximately 4-8 round trips per week.
Underwater sound emissions	Continuous sound emissions: Level limited to tens of metres from the source when at lower altitudes for landing/take-off (Richardson et al. 1995).
Approximate GHG emissions (CO_2-e) from fuel use from helicopter operations	0.2 kT CO_2-e

3.4.3.3 ROV Operations

Inspection and/or work-class ROVs (AUVs may also be used) will be required for IMR activities (if required). A ROV is a tethered underwater vehicle operated by a crew aboard the vessel. They are linked by either a neutrally buoyant tether, or often when working in rough conditions, deeper water or with large payloads, a load carrying umbilical cable along with a tether management system. An AUV is an untethered underwater vehicle operated in a similar manner to an ROV.

ROVs are equipped with a video camera and lights. Additional equipment may include positioning and survey equipment, and various apparatus to support installation and IMR activities. ROVs may utilise an electric control system or a closed loop hydraulic control system. ROVs will temporarily sit on the seabed as part of execution activities.

Table 3-20 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-20: Impact Assessment Technical Input - ROV/AUV Operations

Requirements for impact assessment	Technical input
Discharge volume of control fluids (during well integrity testing activities)	~10 L at the seabed.
Discharge volume of calcium wash (citric acid or equivalent) when calcium deposits are required to be cleaned from the ROV interface	50 L at the seabed.
Underwater sound emissions (from USBL)	A USBL system uses transponders to receive the acoustic signal sent out by the system's transceiver. See Section 1.1.
Seabed disturbance footprint	Typical ROV footprint is 4 m^2. Refer Section 6.3 for further detail.

3.4.3.4 Diver Operations

Diving operations will occur during installation to tie-in to the existing in-line tees on the CHN pipeline or maintenance activities (if required). A saturation DSV would be utilised to support diving and would have a diving bell to transport divers to and from the surface to the work area.

3.5 Decommissioning

Amplitude Energy acknowledges the requirement through Section 572 of the OPGGS Act and NOPSEMA Policy Section 572 Maintenance and Removal of Property (N-00500-PL1903, A720369, December 2022) for removal of all property when it is no longer in use, or to be used, and that any deviations from this position will need to be evaluated and accepted by NOPSEMA.

The Activity decommissioning strategy will be outlined and complied with as part of a future EP, as per the process detailed within the approved **ECSP OPP** (AEL 2025).

4.0 Description of the Environment

A detailed description of the environment is provided in Appendix 4 for all physical, ecological, social and cultural receptors. This section provides regulatory context, a description of the environment relevant to the Activity (and unlikely emergency scenarios), regional setting, and a summary of the key ecological and social receptors.

4.1 Regulatory Context

The OPGGS(E)R 2023 defines 'environment' as 'ecosystems and their constituent parts, natural and physical resources, the qualities and the characteristics of locations, places and areas, and the heritage value of places; and includes the social, economic and cultural features of those matters'.

In accordance with Section 21(2) of the OPGGS(E)R, this section (and associated appendices) describes the physical setting, ecological receptors, and social receptors, of the receiving environment relevant to the described activity.

A greater level of detail is provided for certain receptors, as defined by Section 21(3) of the OPGGS(E)R which states that relevant values and sensitivities may include any of the following:

- The world heritage values of a declared World Heritage property.
- The National Heritage values of a National Heritage place.
- The ecological character of a declared Ramsar wetland.
- The presence of a listed threatened species or listed threatened ecological community (TEC).
- The presence of a listed migratory species.
- Any values and sensitivities that exist in, or in relation to, part or all of:
  - A Commonwealth Marine Area (CMA); or
  - Commonwealth land.

With regards to 21(3)(d) and (e) more detail has been provided where threatened or migratory species have a spatially defined biologically important area (BIA) – as they are spatially defined areas where aggregations of individuals of a regionally significant species may display biologically important behaviours such as breeding, foraging, resting or migration (DCCEEW 2024a).

BIAs can be located anywhere within the Australian marine environment and may also be designated over terrestrial areas (i.e. turtle nesting beaches). BIAs are:

- Designed to inform decision making about actions which may impact protected species.
- Described in conservation plans for protected marine species including statutory recovery plans, wildlife conservation plans, and conservation advice documents (DCCEEW 2024a).

It is important to note that BIAs do not represent the species full range and that areas without BIAs may still support biologically important behaviours (DCCEEW 2024a).

BIAs within this document have been described and defined by using the downloadable DCCEEW BIA shapefile dataset available at this time (DCCEEW 2024a).

With regards to 21(3)(f) more detail has been provided for:

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

- Important habitat for migratory species is defined within the Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DEWHA 2013) as:
  - habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
  - habitat that is of critical importance to the species at particular life-cycle stages, and/or
  - habitat utilised by a migratory species which is at the limit of the species range, and/or
  - habitat within an area where the species is declining.

4.2 Environment that May Be Affected

The spatial extents associated with the operational area, Environment that May be Affected (EMBA), and monitoring area are used to inform the environmental context relevant to the activity and to support the impact and risk assessments (Table 4-1).

Table 4-1: Description of Operational Area, Monitoring Area and EMBA

Activity Area	Description
Operational area	The operational area is defined as a 3 km corridor centred over each of the connecting flowlines from the wells connection with the CHN pipeline. Planned seabed disturbance, operational discharges, and physical presence will occur within the operational area. The EPBC PMST report for the operational area is available in Appendix 5.
EMBA	The EMBA (Figure 4-1) is the largest spatial extent where unplanned events could have an environmental consequence on the surrounding environment. For this EP the EMBA is the combined potential spatial extent of surface and in-water hydrocarbons at concentrations above ecological impact thresholds in the unlikely event of Level 2 or 3 hydrocarbon spill to sea (see Table 6-52). The hydrocarbon exposure thresholds that define the outer limits of the EMBA are: • Surface – 10 g/m^2 • Shoreline – 100 g/m^2 • In-water (dissolved) – 50 ppb • In-water (entrained) – 100 ppb The boundary of the extent has been defined by a loss of containment (LOC) of MGO associated with unplanned vessel collision. The Annie-2 location was used for spill modelling as it was identified as the worst-case release location given the proximity of the location to shoreline and environmental sensitivities. For the purpose of describing the existing environment and conservatively undertaking the impact assessment for this unplanned event, Amplitude Energy have replicated the spill extent at the Isabella (Elanora 1/ST1) location (furthest extent of the Activity offshore) and combined the two into a single EMBA (Figure 4-1). The EMBA does not represent the predicted coverage of any one hydrocarbon spill, nor does it depict a single plume at any given point in time. Rather, the EMBA is a composite of multiple spill scenarios over a large number of theoretical scenarios with differing metocean conditions. The potential impacts and risks within the EMBA are described in Section 6.8 and are not homogenous; they vary in consequence. Generally, the potential consequences would diminish with distance from the spill source, and the probability of an impact, which is highly unlikely in the first instance, becomes less likely still, with distance from the spill source out to the edge of the EMBA.

Activity Area	Description
Extent of socio-economic impacts	The extent of potential socio-economic impact (SEI) is used to identify receptors which have the potential to be subject to visual or economic impacts associated with an accidental release of hydrocarbons. Relevant social receptors are detailed in Section 4.4.3. Social receptors are assessed based on the hydrocarbon exposure threshold that could result in a visual sheen or exceedance of water quality guidelines and are considered an indicator of possible socio-economic impacts within the marine and coastal environment. The boundary of the extent has been defined by a LOC of MGO associated with unplanned vessel collision. The Annie-2 development well location was used for spill modelling as it was identified as the worst-case release location given the proximity of the location to shoreline and environmental sensitivities. For the purpose of describing the existing environment and conservatively undertaking the impact assessment for this unplanned event Amplitude Energy have replicated the modelled spill extent (from Annie-2 well location) at the Isabella (Elanora 1/ST-1) well location (furthest extent of the Activity offshore) and combined the two into a single EMBA (refer Figure 4-1). A low threshold exposure value for visible oil types (floating and shoreline) and a moderate threshold exposure value for in-water oil types were used to define the spatial extent. • Floating (1 g/m^2) • Shoreline (10 g/m^2) • In-water: Dissolved (50 ppb) and Entrained (100 ppb). The potential socio-economic impacts of a spill are described and assessed in Section 6.8. Generally, the potential consequences would be expected to diminish with distance from the spill source, and the probability of an impact, which is highly unlikely in the first instance, is remote within the monitoring area beyond the EMBA.
Monitoring area	Hydrocarbons can be monitored to concentrations much lower than the thresholds of ecological effect. It can be important to do this in the event of a spill, even in areas that are remote from the activity, to confirm the presence / absence of hydrocarbons and concentrations relative to water quality parameters which may have socioeconomic implications. The boundary of the extent has been defined by a LOC of MGO associated with unplanned vessel collision. The Annie-2 location was used for spill modelling as it was identified as the worst-case release location given the proximity of the location to shoreline and environmental sensitivities. For the purpose of describing the existing environment and conservatively undertaking the impact assessment for this unplanned event Amplitude Energy have replicated the spill extent at the Isabella (Elanora 1/ST-1) location (furthest extent of the Activity offshore) and combined the two into a single EMBA (refer Figure 4-1). The (Low) hydrocarbon exposure thresholds that define the outer limits of the Monitoring Area are: • Surface – 1 g/m^2 • Shoreline – 10 g/m^2 • In-water (dissolved) – 10 ppb • In-water (entrained) – 10 ppb The Operational and Scientific Monitoring Plan (OSMP) for the Activity provides for monitoring of low hydrocarbon exposures and areas remote from the activity. The monitoring area is utilised in determining the geospatial extent of the existing environment relevant to the EP, and supports the identification of physical, ecological and social receptors which are described in Section 4.0.

Activity Area	Description
	Analysis of the stochastic modelling results (RPS 2025) shows the monitoring area overlaps 4 IMCRA provincial bioregions: • Western Bass Strait Shelf Transition • West Tasmania Transition • Bass Strait Shelf Province • Southeast Shelf Transition The EPBC Protected Matters Report for the monitoring area is in Appendix 5.
Aspect potential impact radii	Other aspects of the activity which may impact on the environment, including subsea noise and artificial light, involve discrete areas that may be affected. These areas are delineated in terms of a contour or potential impact radii around a source and are further described in Section 6.0, and may also be referred to as Activity EMBAs. As an example, the largest of these is the area that represents the furthest extent of observable light (above ambient) from the activities which is expected to be less than 20 km from the vessels.

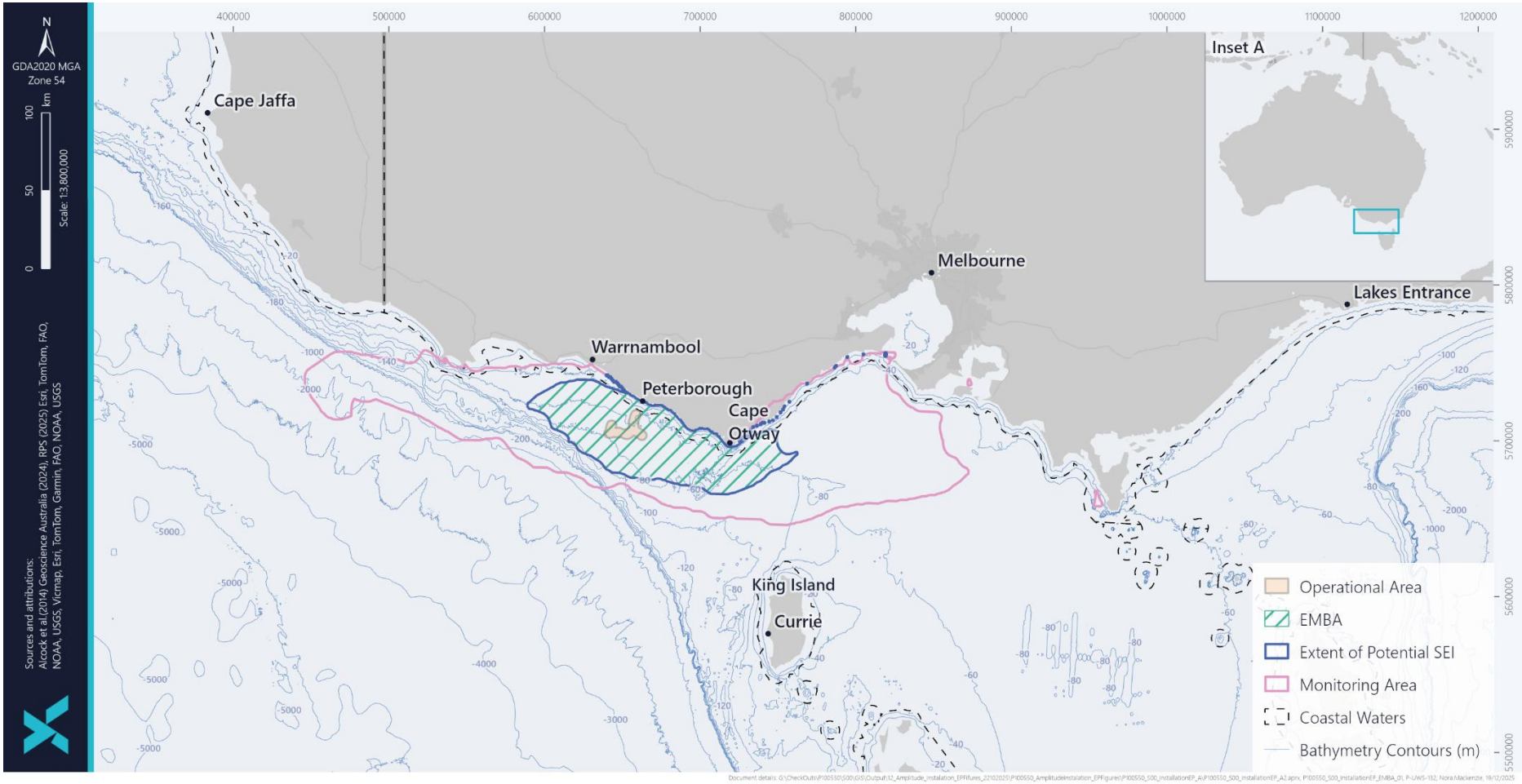


Figure 4-1: EMBA, Monitoring Area, and Extent of Possible Social Economic Impacts (SEI)

4.3 Regional Setting

The Activity is located in the Otway marine bioregion (National Oceans Office (NOO) 2002) as classified by the Interim Marine and Coastal Regionalisation for Australia (IMCRA) (Figure 4-3). This bioregion extends from Cape Otway (Vic) to Cape Jaffa (South Australia) and includes the western islands of Bass Strait.

The Otway Basin coastline and marine environment is characterised by very steep to moderate offshore gradients, high wave energy and cold temperate waters subject to upwelling events (i.e. the Bonney Upwelling) (IMCRA 1998). The water in the area is well mixed given it is a higher-energy environment exposed to frequent storms and significant waves. Water quality is expected to be good and typical of the offshore marine environment. Upwelling water is nutrient rich and corresponds with increases in the abundance of zooplankton, which attracts baleen whales and other species (including EPBC-listed species) that feed on the plankton swarms (krill). The Bonney upwelling is seasonal, occurring west of Portland, >100 km west of the Activity. Upwelling around the operational area is considered unlikely or occasional (Huang and Wang, 2019).

The seabed on the Otway shelf is comprised of exhumed limestone and is generally rocky with relief that varies substantially including some areas of flat limestone and some of crevices, gutters, pillars and overhanging shelves. Whilst there are some areas of thin overlying sediment (comprising fine-coarse grained sand and calcarenite fragments), the region is starved of terrigenous sediment (Santos 2004, Fugro 2020; 2020a).

The coastline is generally rocky, with tall cliffs and rock outcrops, some sandy beaches, inlets and settlements. Shoreline habitats of the Otway coastline provide for a range of fauna including penguin colonies, fur seal colonies and bird nesting sites.

4.3.1 Existing Environment – Operational Area

A geophysical site survey for the operational area, including Annie-2, Juliet-2, Nestor-2 and Isabella (Elanora-1/ST1) well locations, and the proposed flowline corridors to the CHN pipeline, was completed in 2025 (MMA Offshore 2025a). A summary of the survey findings for each site is included below.

Annie-2

The Annie-2 site survey recorded water depths ranging from 49.5 m to 71.0 m LAT, with most of the seabed between 54 m and 60 m. The seabed generally slopes from the north to the south across the operational area. The seabed in the north is relatively flat with small ridges and small channels having a height of 1 m, orientated NE to SW causing undulations throughout. The survey identified that the seabed drops off quickly to a relatively deep channel with several small isolated and detached features which rise quite steeply from the seabed. These features are 2 m to 3 m high. Reflectivity data indicates that soft sediments are associated with low-reflectivity areas compared to coarser materials found along ridges and scarps. Patchy reflectivity in transition zones were associated with mixed substrates (MMA Offshore 2025a).

Isabella (Elanora-1/ST1)

The Isabella (Elanora-1/ST1) site survey recorded water depths between 70.0 m and 88.4 m LAT, with most of the seabed ranging from 71 m to 80 m. Sonar data indicates variable reflectivity, with low reflectivity linked to sandy areas and high reflectivity suggesting coarse or hard sediments overlying Port Campbell Limestone. The seabed is uneven, featuring shallow ridges and depressions, and slopes gently to the southwest. Ridge-trough patterns and the deepest erosion in the southern area suggest active sediment transport driven by currents. Sub-bottom profiling shows the hard

limestone layer thinning toward the centre and reappearing with poor continuity in the northeast. Sand thickness varies, with penetration up to 20 m in some areas, though limited in harder sections of the seabed (MMA Offshore 2025a).

Juliet-1

The Juliet-1 survey shows water depths ranging from 60.0 m to 70.9 m LAT, with most of the seabed between 60.0 m and 65.5 m. Side scan sonar data identified seabed features including an asymmetric ridge-trough pattern. The seabed is interpreted as a Port Campbell Limestone outcrop covered by a thin layer of superficial sand. It displays low to high sonar reflectivity. Erosion zones were observed, especially in the northeastern part of the survey area, suggesting ongoing seabed changes due to currents, sediment transport, or geological activity. Sub-bottom profiling showed a hard seabed with a shallow geological structure sloping southwest. Sand thickness varies across the site, with sub-bottom penetration reaching up to 8 m in the southwestern section, while limited in other areas due to the hardness of the seabed (MMA Offshore 2025a).

Nestor-1

The Nestor-1 survey indicated water depths ranged between 63.6 m and 66.4 m LAT, confirming a relatively uniform seabed. The seabed is interpreted as Port Campbell Limestone outcrops overlain by thin sand layers. Nestor-1 location is characterised by a stable, low-gradient seabed with no significant geological or environmental sensitivities. The seabed assemblages were considered typical of the Otway shelf.

In June 2025 Amplitude Energy undertook a seabed and environmental survey across the Activity operational area. The environmental survey included sediment sampling, water sampling and still/ habitat imaging/ video across the operational area (MMA Offshore 2025b). Figure 4-2 shows still images from the operational area. A summary of the results is included below.

Infauna: The benthic infauna communities exhibited low diversity overall, with Malacostraca (e.g., amphipods) and Polychaeta (segmented worms) being the dominant taxa, and broadly similar assemblages across the operational area. Elanora and Nestor sites have the highest species richness and abundance. No Matters of National Environmental Significance (MNES) or protected infauna species were identified.

Epifauna: Across the operational area epifaunal communities were sparse, with sponges being the most common group. In general, across the operational area substrates consisted mainly of sand, shell grit, and rubble, with occasional rock. The survey locations had low densities of hydroids, ascidians, and soft corals. No protected or sensitive epifaunal species were observed.

No contaminants of concern were identified from the sediment and water quality sampling.

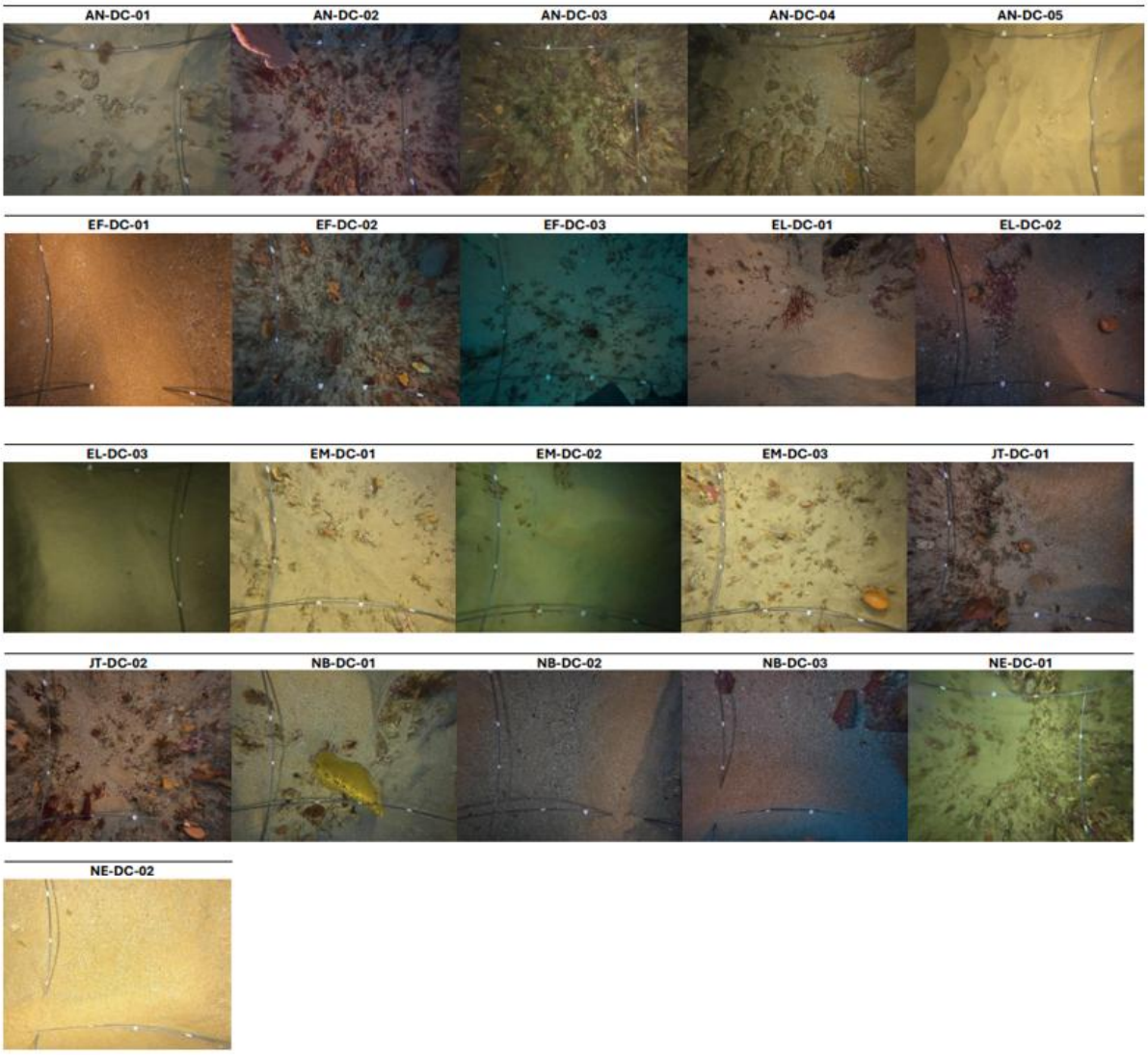


Figure 4-2: Drop Camera Images from within the Annie-2 ('AN'), Elanora ('EF' & 'EL'), Juliet ('JT') and Nestor ('NE' & 'NB') Operational Area from June 2025 (MMA Offshore 2025b)

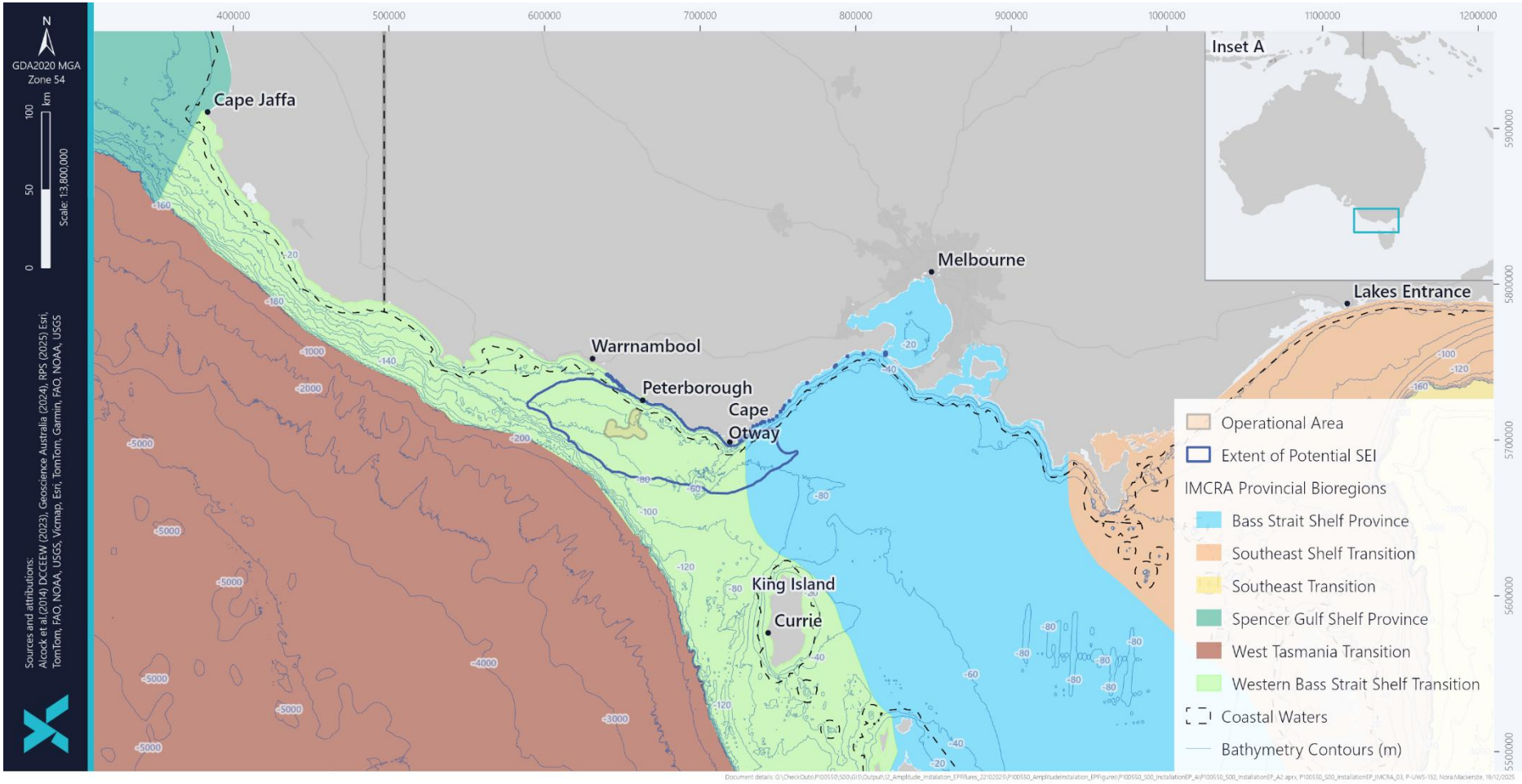


Figure 4-3: IMCRA Regions within the Monitoring Area

4.4 Physical, Biological and Social Receptors

The following tables show the presence of receptors that may occur within the operational area and monitoring area. Further descriptions and maps of these physical, ecological, social and cultural receptors are provided in the Master Description of the Environment (Appendix 4):

- physical receptors (Table 4-2)
- ecological receptors (Table 4-3)
- social receptors (Table 4-4)
- cultural receptors (Table 4-6).

Examples of values and sensitivities associated with each of the receptors (physical, ecological, social or cultural) have been included in the tables. These values and sensitivities have been identified based on:

- Possible presence of First Nations cultural heritage.
- Presence of listed threatened or migratory species or threatened ecological communities that have coastal or marine habitat identified in the EPBC Protected Matter searches (Appendix 5).
- Presence of biologically important behaviours (e.g., foraging, roosting or breeding) by fauna, including those identified in the EPBC Protected Matter searches and habitats critical to the survival of the species. (Appendix 5).
- Provision of an important link to other receptors (e.g., nursery habitat, food source).
- Provision of an important human benefit (e.g., recreation and tourism, aesthetics, commercial species, economic benefit).

There were species identified in the PMST reports that do not have coastal or marine habitats (e.g., terrestrial or freshwater species) and are not discussed further. In determining the overlap with the operational and monitoring area both the conservative PMST tool as well as referenced DCCEEW GIS data have been used.

A summary of the seasonality of the key sensitivities is provided within Table 4-7.

4.4.1 Physical Environment

Table 4-2: Description of the Physical Environment within the Operational Area and Monitoring Area

Receptor Group	Physical Environment	Physical Environment Characteristics	Values and Sensitivities	Operational Area		Monitoring Area	
Physical	Climate	Cool temperate region	N/A	✓	Present The operational area is typical of a cool temperate region with cold, wet winters and warm dry summers. The day-to-day variation in weather conditions is caused by the continual movement of the highs from west to east across the Australian continent roughly once every 10 days.	✓	Present The regional climate is dominated by sub-tropical high-pressure systems in summer and sub-polar low-pressure systems in winter. The low-pressure systems are accompanied by strong westerly winds and rain-bearing cold fronts that move from south-west to north-east across the region, producing strong winds from the west, north-west and south-west.
	Winds	• Strong westerly winds found in the Southern Hemisphere between latitudes of 40°S and 50°S • Cold fronts	N/A	✓	Present The operational area is subject to wind conditions aligned with the Bass Strait with conditions likely to align with those listed within the monitoring area. RPS (2025) acquired high-resolution wind data across their modelling domain from the National Centre for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR). Monthly wind rose distributions from 2010 to 2019 (inclusive) derived from CFSR data for selected nodes nearby each release	✓	Present The monitoring area is located within the Roaring Forties. In winter, when the subtropical ridge moves northwards over the Australian continent, cold fronts generally create sustained west to south-westerly winds and frequent rainfall in the region. In summer, frontal systems are often shallower and occur between two ridges of high pressure (HP), bringing more variable winds and rainfall.

Receptor Group	Physical Environment	Physical Environment Characteristics	Values and Sensitivities	Operational Area		Monitoring Area	
					location. The monthly average wind speeds ranging from 9.6 knots (April) to 11.7 knots (September) (RPS 2025). The wind direction varied throughout the year, with predominant southeast winds during January and February and west-northwest winds during the remaining months (RPS 2025).		
	Tides	Long, slow moving waves created by the gravitational pull of the moon	• Intertidal habitat • Fish aggregation • Fauna reproduction • Flora reproduction • Water quality • Maritime navigation	✓	Present The operational area has semi-diurnal tides with some diurnal inequities, generating tidal currents along a north-east/south-west axis, with speeds generally ranging from 0.1 to 2.5 m/s.	✓	Present The monitoring area and wider Otway region experiences semi-diurnal tides. The maximum range of spring tides in western Bass Strait is approximately 1.2 m. Sea level variation in the area can arise from storm surges and wave set up.
	Current	Directional movement of water driven by gravity, wind and water density	• Controlling climate • Food source • Flora reproduction • Water quality	✓	Present The operational area is subject to current conditions aligned with the Bass Strait with conditions likely to align with those listed within the monitoring area. Data describing the flow of ocean currents for the years 2010 to 2019 (inclusive) were obtained from HYCOM (Hybrid Coordinate Ocean Model), predicted for ocean drift	✓	Present Average current speeds in the area range between 0.15 m/s to 0.24 m/s, with maximum current speeds in a range between 0.66 m/s (Feb) to 1.10 m/s (Sept) (RPS 2024). Bottom currents can exceed 0.5 m/s in nearshore areas during storms. In the Port Campbell area, the predominant south-westerly swell

Receptor Group	Physical Environment	Physical Environment Characteristics	Values and Sensitivities	Operational Area		Monitoring Area	
					currents are produced at a horizontal spatial resolution of approximately 8.25 km (1/12th of a degree) over the region, at a frequency of every 3 hours (RPS 2025). Predicted surface current speeds near the Annie-2 well varied throughout the year with monthly maximum speeds varying from 1.05 m/s (April) to 1.57 m/s (July). The surface current direction was predominantly toward the northwest during summer and toward the southeast during winter (RPS 2025).		direction means that there are minimal longshore currents as most waves reach the shore parallel to the coast. Lateral flushing within Bass Strait results from inflows from the South Australian Current, East Australian Current (EAC) and sub-Antarctic surface waters. During winter, the South Australian current moves dense, salty warmer water eastward from the Great Australian Bight into the western margin of the Bass Strait. In winter and spring, waters within the strait are well mixed with no obvious stratification, while during summer the central regions of the strait become stratified.
	Water Quality	Level of contaminants in water, sediments or biota or to changes in the physical or chemical properties of waters and sediments relative to a natural state.	• Ecosystem health • Fishing and aquaculture • Recreation and aesthetics • Industrial water supply • Cultural and spiritual	✓	Present The operational area is expected to have water quality typical of the offshore marine environment of the Otway Basin. Characterised by high water quality with low background concentrations of trace metals and organic chemicals and an undisturbed mid-depth environment.	✓	Present The monitoring area is expected to have the water quality typical of the Bass Strait and Otway Basin which are known for a complex, high energy wave climate and strong ocean currents. Water column turbidity on the Victorian coastline is subject to high natural variability. Weather conditions in the coastal environment around Port Campbell and Port Fairy are

Receptor Group	Physical Environment	Physical Environment Characteristics	Values and Sensitivities	Operational Area		Monitoring Area	
							known to influence offshore hydrodynamic conditions and are a driver of sediment dynamics, impacting benthic and pelagic habitats and changing water column turbidity. Wave-driven sediment resuspension generates high turbidity levels within coastal zones, commonly exceeding 50 mg/L.
	Sea Water Temperature	Heat present within ocean waters	• Fauna behaviour • Fauna reproduction • Fauna distribution and aggregation • Flora community maintenance	✓	Present The monthly average sea surface temperatures ranged between 12.3°C (September) and 20.7°C (February) (RPS 2025).	✓	Present The southwest region of Victorian area has significant upwelling of colder, nutrient rich deep water during summer that can cause sea surface temperatures to decrease by 3°C compared with offshore waters.
	Sediment Quality	Level and toxicity of contaminants within sediment	• Sink of dissolved contaminants • Source of bioavailable contaminants to benthic biota	✓	Present The operational area is located within the 400 km-long Otway Shelf, which lies between 37° and 43.5°S and 139.5°E (Cape Jaffa) and 143.5°E (Cape Otway). Beyond 60 m water depth, the seabed comprises outcrops of hard substrate with very low relief and structural	✓	Present The monitoring area is expected to have sediment quality typical of the surrounding area (Figure 4-4). Beach Energy conducted an environmental survey of a neighbouring title, located 3 km from the Amplitude Energy Otway offshore facilities, from November 2019 to January 2020 (Ramboll

Receptor Group	Physical Environment	Physical Environment Characteristics	Values and Sensitivities	Operational Area		Monitoring Area	
					complexity separated by gullies of sand or fine gravel. Surveys investigating the seabed in the vicinity of the existing CHN facilities (at water depths from 60 m to 70 m) found the seabed to be characterised by sand or gravelly / rubble and hard platform substrates (Fugro 2020; 2020a) It is expected that sediment quality within the Otway offshore fields will be typical of the offshore marine environment of the Otway Basin.		2020). Six samples were taken with the sediment predominantly sand with a range of 95-97% as a proportion of each sample. There was also very little silt and a maximum of 4.7% for the clay fraction.
	Air Quality	The chemical, physical, biological and aesthetic characteristics of air.	• Ecosystem health • Human health • Fauna health	✓	Present The air quality within the operational area will reflect the characteristics of the wider area. There are expected localised and temporary decreases in air quality due to particulate matter from diesel combustion on offshore vessels including fishing and cargo vessels which transit nearby.	✓	Present Historical air quality data from Cape Grim (most reliable point of refence for this Activity, given it is representative of a large area that is unaffected by regional pollution sources (cities or industry) (CSIRO, 2017) shows a continuous increase in most GHGs since the mid-to-late 1970s with carbon dioxide levels increasing by more than 15% since 1976, and concentrations of methane and nitrous oxide (N2O) increasing by around 20% and 8% respectively since 1978. The increase in methane levels however has slowed recently and chlorofluorocarbons (CFCs) and

Receptor Group	Physical Environment	Physical Environment Characteristics	Values and Sensitivities	Operational Area		Monitoring Area	
							halons are in decline. Increases have been attributed to anthropogenic causes, for example, fossil fuel consumption and agricultural practices.
	Ambient Light	Light present within an environment	• Fauna behaviour • Fauna breeding • Fauna hunting / predation • Circadian rhythms	✓	Present Ambient light within the operational area will reflect the Otway Basin with artificial emissions associated with offshore activities including vessel activity.	✓	Present Ambient artificial light sources associated with offshore activities exist in the Otway region, including both permanent (e.g., onshore/offshore developments) and temporary (e.g., vessels, road traffic) light sources.
	Ambient Noise	Level of background sound at a given location	• Fauna behaviour • Fauna breeding • Spatial distribution	✓	Present The operational area will reflect the natural sea sounds associated with the Otway Basin in addition to the noise associated with offshore activities including vessel activities.	✓	Present Natural sea sound sources are dominated by wind noise, but also include rain noise, biological noise and the sporadic noise of earthquakes. Anthropogenic underwater sound sources in the region comprise shipping and small vessel traffic, petroleum-production and exploration-drilling activities and infrequent petroleum seismic surveys.

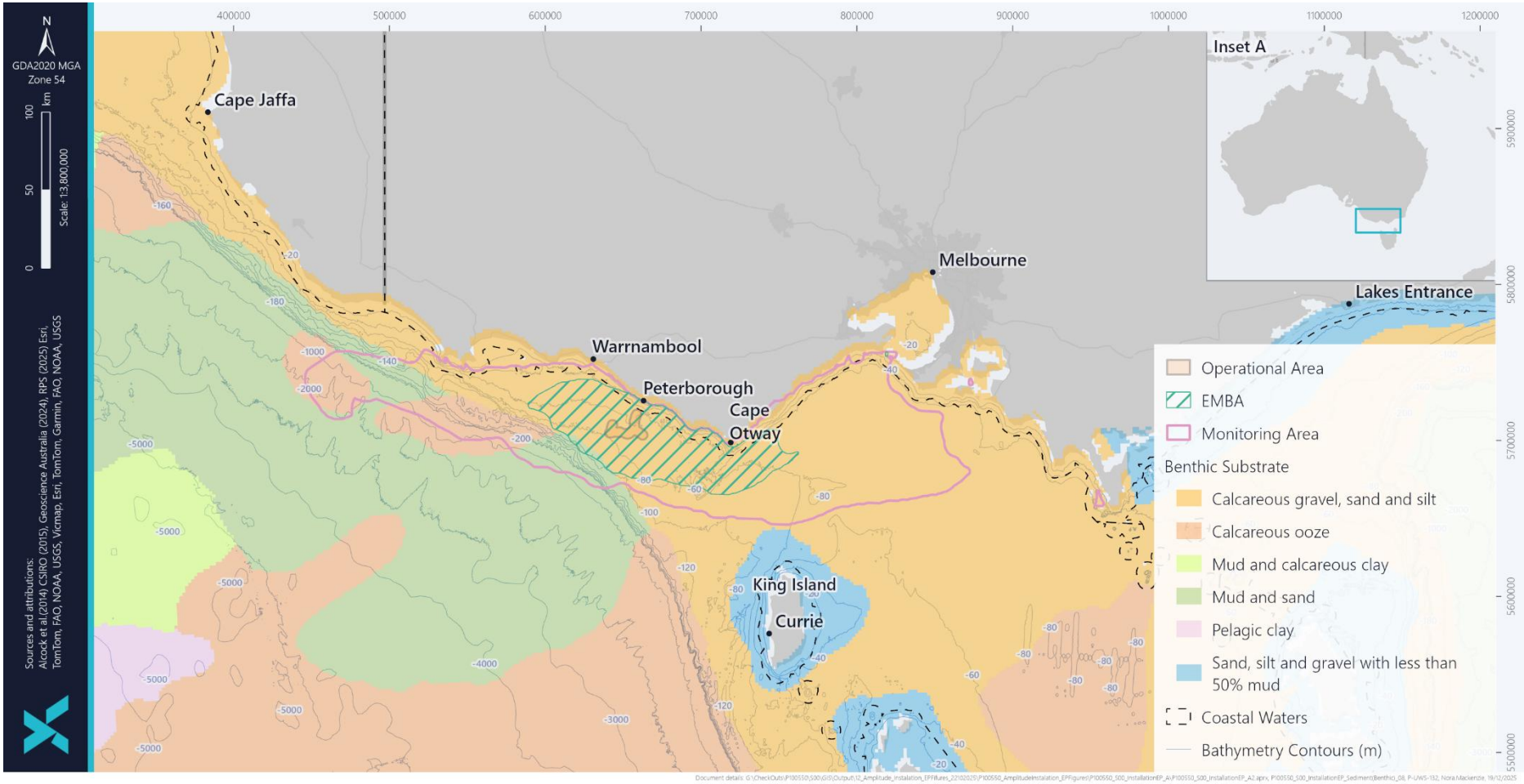


Figure 4-4: Benthic Substrate Within the Monitoring Area and EMBA

4.4.2 Ecological Receptors

Table 4-3: Presence of Ecological Receptors within the Operational Area, EMBA and Monitoring Area

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA		Monitoring area
Benthic Assemblages	Intertidal environment (0-2m)	Comprises rock platform, cliff face and sandy beach	• Foraging habitat • Nesting or Breeding habitat	-	Not present The operational area does not include the intertidal environment.	✓	Present Intertidal environment comprises a sandy cove and tidally submerged rock platforms with invertebrate colonisation.	
	Shallow environments (2-8m)	Comprises kelp reef, patchy sandy reefs and sand		-	Not present The operational area does not include the shallow environment.	✓	Present Shallow environment comprises kelp reef with hard substrate with numerous epifauna and fish associated. Tracts of open shallow reef and give way to sand characteristically devoid of significant epifauna. But with significant infauna communities.	
	Mid-depth environment (8–20m)	Comprises Ecklonia-dominated reef and sand		-	Not present The operational area does not include the mid-depth environment.	✓	Present Mid depth is relatively uniform through the region dominated by sand with intermittent reef patches.	
	Deep environment (20-70m)	Comprises sponge-dominated reef and sand.		✓	Present Much of the offshore seabed is comprised of hard platform substrates with some patches of thin overlying sand and rubble/calcarenite fragments. The patchy epifauna and presence of hard platform is consistent with the description of a KEF of the South-East bioregion, that is, shelf rocky reefs and hard substrates.	✓	Present Rocky reefs and hard grounds are located in all areas of the south-east marine region continental shelf including Bass Strait, from the sub-tidal zone shore to the continental shelf break. The continental shelf break generally occurs in 50 m to 150–220 m water depth. The shallowest depth at which the rocky reefs occur in Commonwealth waters is approximately 50 m. On the continental shelf, rocky reefs and hard grounds provide attachment sites for macroalgae and sessile invertebrates, increasing the structural diversity of shelf ecosystems. The reefs provide habitat and shelter for fish	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA		Monitoring area	
					During seabed surveys within the operational area, low densities of epifauna communities (hydroids, ascidians, and soft corals) were noted to occur on unconsolidated substrates (consisting mainly of sand, shell grit, and rubble, with occasional rock). Sponges were the most common, forming part of the patchy epifauna (MMA Offshore 2025b).		and are important for aggregations of biodiversity and enhanced productivity (DoE 2015b).		
Coastal Habitats	Rocky Shoreline	Hard and soft, rocky shores, including bedrock outcrops, platforms, low cliffs (<5 m), and scarps.	• Depending on exposure, rocky shores can be host to a diverse range of flora and fauna, including barnacles, mussels, sea anemones, sponges, sea snails, starfish and algae.	-	Not present The operational area does not include rocky shorelines.	✓	Present The following areas along the Victorian coastline have known stretches of rocky interspaced along the shore: • The section of intertidal rocky shores between south Warrnambool and Marengo	✓	Present The following areas along the Victorian coastline have known stretches of rocky interspaced along the shore: • The Cape Bridgewater to Portland coastline. • The section of coast between Warrnambool and Marengo • Interspersed areas between Marengo east to Anglesea.
	Sandy Beaches	Sandy beaches are dynamic environments,	• Sandy beaches can support a	-	Not present The operational area does not include sandy beaches.	✓	Present The following areas along the Victorian coastline have	✓	Present The following areas along the Victorian

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA		Monitoring area	
		naturally fluctuating in response to external forcing factors (e.g., waves, currents etc).	variety of infauna and provide nesting habitat to birds and turtles.				known stretches of sandy beach interspaced between: • Small sections of sandy beach between Warrnambool and Cape Otway • Marengo east to Anglesea.		coastline have known stretches of sandy beach interspaced between: • 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.
	Mangroves	Mangroves grow in intertidal mud and sand, with specially adapted aerial roots.	• Provide for gas exchange during low tide. • Important in helping stabilise coastal sediments. • Provide a nursery ground for many species of fish and crustaceans.	-	Not present The operational area does not include mangroves.	-	Not present The EMBA does not include mangroves.	✓	Present Mangroves are not a dominant habitat found within the area potentially exposed to hydrocarbons. However, a few isolated patches of mangroves can be found along the Victorian coastline. The monitoring area intersects with mangroves located near Marengo Reef/

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA		Monitoring area	
			• Provide shelter or nesting areas for seabirds.						Lorne and near Western Port Bay. There is only one species of mangrove found in Victoria, the white or grey mangrove (*Avicennia marina*) (Figure 4-5). 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, including Western Port Bay (MESA 2015). There is only one species of mangrove found in Victoria, the white or grey mangrove (*Avicennia marina*) (Figure 4-5).
	Coastal Saltmarsh	Saltmarshes are terrestrial halophytic (salt-adapted) ecosystems that mostly occur in the upper-intertidal zone	• The vegetation in these environments is essential to the stability of the saltmarsh, as they trap	-	Not present The operational area does not include coastal saltmarsh.	✓	Present Saltmarsh is found along many parts of the Victorian coast, although is most extensive in western Port Phillip Bay, northern Western Port, within the Corner Inlet-	✓	Present Saltmarsh is found along many parts of the Victorian coast, although is most extensive in western Port Phillip Bay,

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA		Monitoring area	
		and are widespread along the coast. Saltmarshes are typically dominated by dense stands of halophytic plants such as herbs, grasses and low shrubs.	and bind sediments. • Provide a habitat for a wide range of both marine and terrestrial fauna, including infauna and epifaunal invertebrates, fish and birds.				Nooramunga complex which, and behind the sand dunes of Ninety Mile Beach in Gippsland (Figure 4-5).		northern Western Port, within the Corner Inlet-Nooramunga complex which, and behind the sand dunes of Ninety Mile Beach in Gippsland (Figure 4-5).
	Seagrass	Seagrasses are marine flowering plants which generally grow in soft sediments within intertidal and shallow subtidal waters where there is sufficient light and are common in sheltered coastal areas such as bays, lees of islands and fringing coastal reefs.	• Seagrass meadows are important in stabilising seabed sediments • Provide a nursery grounds for fish and crustaceans, and a protective habitat for the juvenile fish and invertebrates species	-	Not present The operational area does not include seagrass.	✓	Present Seagrass meadows are present along the Victorian coastline (Figure 4-5).	✓	Present While seagrass meadows are present throughout southern and eastern Australia particularly in Corner Inlet, Port Phillip Bay and Western Port Bay (Victoria), the proportion of seagrass habitat within the south-eastern sector is not high compared to the rest of Australia (Kirkham 1997) (Figure 4-5).

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA		Monitoring area	
	Macroalgae	Macroalgae communities are generally found on intertidal and shallow subtidal rocky substrates and can occur throughout the Australian coast. The principal physical factors affecting the presence and growth of macroalgae include temperature, nutrients, water motion, light, salinity, substratum, sedimentation and pollution	• Macroalgal systems are an important source of food and shelter for many ocean species; including in their unattached drift or wrack forms	-	Not present It is unlikely there are any macroalgal communities given the depth of the operational area.	✓	Present Seagrass meadows are present along the Victorian coastline in depths < 45 m (Figure 4-5).	✓	Present Macroalgae assemblages vary, but *Ecklonia radiata* and *Sargassum* sp. can be found in waters up to 45 m depth (Pocklington 2011). Known areas of macroalgae communities within Victoria include Port Philip Bay (Victoria) and various localities in the Otway region including Port Campbell, Warrnambool and Port Fairy (ALA 2024).
Marine Fauna	Plankton	Phytoplankton and zooplankton	• Food Source	✓	Present Phytoplankton and zooplankton are widespread throughout oceanic environments and are expected to occur within the operational area. Populations near the operational area are expected to be highly	✓	Present Phytoplankton and zooplankton are widespread throughout oceanic environments and is expected to occur within the monitoring area with a high level of diversity. Coastal krill swarms throughout the water column of continental shelf waters primarily in summer and autumn,		

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA		Monitoring area	
					variable both spatially and temporally and are likely to comprise characteristics of tropical, southern Australian, central Bass Strait and Tasman Sea populations.		feeding on microalgae and providing an important link in the blue whale food chain. Increased abundance and productivity can occur in areas of upwelling. The seasonal Bonney Coast upwelling contributes to locally productive pelagic habitats that exhibit a range of zooplankton. Plankton distribution is dependent upon prevailing ocean currents including the East Australia Current, flows into and from Bass Strait and Southern Ocean water masses.		
	Marine Invertebrates	Benthic and pelagic invertebrate communities	• Food Source • Commercial Species	✓	Present Invertebrate species located in the vicinity of the operational area include sponges, annelids, ascidians, hydrozoans, bryozoans, molluscs, krill and crustaceans.	✓	Present A variety of marine invertebrate species may occur within the monitoring area with high diversity with patchy distribution. Invertebrate diversity is high in southern Australian waters with distribution of species patchy, with little evidence of any distinct biogeographic regions.		
	Fish	Fish, rays and sharks	• EPBC Act protected species	✓	Present 33 fish shark species are listed as having the potential to occur within the operational area on the EPBC Act PMST (26 of which are in the Syngnathidae family). <u>Vulnerable species</u>: • Australian grayling • White shark <u>Conservation Dependent species</u>: • Blue warehou • Eastern school shark <u>Migratory species</u>:	✓	Present Species present in the monitoring area are largely cool temperate species, common within the South Eastern Marine Region. 40 fish, ray and shark species are listed as having the potential to occur within the EMBA on the EPBC Act PMST (29 of which are in the Syngnathidae family). <u>Endangered</u> • Eastern dwarf galaxias	✓	Present Species present in the monitoring area are largely cool temperate species, common within the South Eastern Marine Region. 41 fish, ray and shark species are listed as having the potential to occur within the monitoring area on the EPBC Act PMST (28 of which are in the Syngnathidae family).

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
				• Grey Nurse Shark • Porbeagle • Shortfin Mako Shark • White shark <u>Marine listed species</u> • Australian Smooth Pipefish • Big-belly Seahorse • Brushtail Pipefish • Common / Weedy Seadragon • Crested Pipefish • Deepbody Pipefish • Hairy Pipefish • Halfbanded Pipefish • Javelin Pipefish • Knifesnout Pipefish • Leafy Seadragon • Longsnout Pipefish • Mother-of-pearl Pipefish • Port Phillip Pipefish • Pugnose Pipefish • Red Pipefish • Rhino Pipefish • Ringback Pipefish • Robust Pipehorse • Sawtooth Pipefish • Short-head Seahorse	• Yarra pygmy perch <u>Vulnerable</u> • Australian grayling • White shark <u>Conservation Dependant</u> • Blue warehou • Eastern school shark • Little gulper shark • Orange roughy <u>Migratory species</u>: • Grey nurse shark • Porbeagle • Shortfin mako • White shark <u>Marine Listed</u> • Australian smooth pipefish • Big-belly seahorse • Brushtail pipefish • Bullneck seahorse • Common / weedy seadragon • Crested pipefish • Deepbody pipefish • Hairy pipefish • Halfbanded pipefish • Javelin pipefish • Knifesnout pipefish	<u>Endangered</u> • Eastern dwarf galaxias • <u>Western Victorian Blackfish</u> • Yarra pygmy perch <u>Vulnerable</u> • Australian grayling • White shark <u>Conservation Dependant</u> • Blue warehou • Eastern school shark • Little gulper shark • Orange roughy <u>Migratory species</u>: • Grey nurse shark • Porbeagle • Shortfin mako • White shark <u>Marine Listed</u> • Australian Smooth Pipefish • Big-belly Seahorse • Brushtail Pipefish • Bullneck Seahorse

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
				• Spiny Pipehorse • Spotted Pipefish • Tucker's Pipefish • Upside-down Pipefish • Widebody Pipefish BIA (DCCEEW 2024a) There are no BIAs or Habitat Critical areas identified for EPBC Act listed fish within the operational area	• Leafy seadragon • Longsnout pipefish • Mollison's pipefish • Mother-of-pearl pipefish • Port phillip pipefish • Pugnose pipefish • Red pipefish • Rhino pipefish • Ringback pipefish • Robust pipehorse • Sawtooth pipefish • Short-head seahorse • Spiny pipehorse • Spotted pipefish • Trawl pipefish • Tucker's pipefish • Upside-down pipefish • Widebody pipefish BIA (DCCEEW 2024a) (Figure 4-6) • White shark (foraging)	• Common / Weedy Seadragon • Crested Pipefish • Deepbody Pipefish • Hairy Pipefish • Halfbanded Pipefish • Javelin Pipefish • Knifesnout Pipefish • Leafy Seadragon • Longsnout Pipefish • Mollison's Pipefish • Mother-of-pearl Pipefish • Port Phillip Pipefish • Pugnose Pipefish • Red Pipefish • Rhino Pipefish • Ringback Pipefish • Robust Pipehorse • Sawtooth Pipefish • Short-head Seahorse • Spiny Pipehorse • Spotted Pipefish • Trawl Pipefish • Tucker's Pipefish

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA		Monitoring area	
									• Upside-down Pipefish • Widebody Pipefish BIA (DCCEEW 2024a) (Figure 4-6) • White shark (breeding and foraging)
	Avifauna	Birds that live or frequent the coast or ocean	• EPBC Act protected species	✓	Present There are 35 threatened, migratory or listed marine species that may occur within the operational area that are protected under the EPBC Act. Critically Endangered • Curlew sandpiper • Eastern curlew • Orange-bellied parrot* Endangered • Gould's petrel • Grey-headed albatross • Northern royal albatross • Shy albatross • Southern giant-petrel Vulnerable • Antipodean albatross • Australian fairy tern • Black-browed albatross	✓	Present There are 73 EPBC Act listed bird species which inhabit coastal or marine habitats may occur within the EMBA. Of these species, 48 EPBC Act listed threatened bird species may occur within the EMBA. Noting that some species are listed both as threatened and migratory. Critically endangered • Curlew sandpiper • Eastern curlew • Orange-bellied parrot • Plains-wanderer • Regent honeyeater • Swift parrot Endangered species • Australasian Bittern • Australian Painted Snipe	✓	Present There are 103 EPBC Act listed bird species which inhabit coastal or marine habitats may occur within the monitoring area. Of these species, 56 EPBC Act listed threatened bird species may occur within the monitoring area. Noting that some species are listed both as threatened and migratory. Critically endangered • Curlew sandpiper • Eastern curlew • Orange-bellied parrot • Plains-wanderer
			• Biologically Important Areas (BIAs)	✓		✓		✓	
			• Iconic species	✓		✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
				• Blue petrel • Buller's albatross • Campbell albatross • Fairy prion (southern) • Indian Yellow-nosed albatross • Northern Buller's albatross • Northern Giant petrel • Red knot • Salvin's albatross • Sharp-tailed sandpiper • Soft-plumaged petrel • Sooty albatross • Sooty shearwater • Southern Royal albatross • Wandering albatross • White-capped albatross <u>Additional Migratory Listed Species</u> • Antipodean Albatross • Black-browed Albatross • Buller's Albatross, Pacific Albatross • Campbell Albatross, Campbell Black-browed Albatross • Common Sandpiper • Curlew Sandpiper • Eastern Curlew, Far Eastern Curlew	• Common Greenshank, Greenshank • Gang-gang Cockatoo • Gould's Petrel • Grey-headed Albatross • Northern Royal Albatross • Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit • Shy Albatross • South-eastern Hooded Robin • Southern Giant-Petrel <u>Vulnerable</u> • Antipodean albatross • Australian fairy tern • Black-browed albatross • Blue petrel • Blue-winged parrot • Brown treecreeper (south-eastern) • Buller's albatross, pacific albatross • Campbell albatross, campbell black-browed albatross • Diamond firetail	• Regent Honeyeater • Swift parrot <u>Endangered species</u> • Australasian Bittern • Australian Painted Snipe • Black-tailed Godwit • Common Greenshank, Greenshank • Gang-gang Cockatoo • Gould's Petrel, Australian Gould's Petrel • Grey-headed Albatross • Lesser Sand Plover, Mongolian Plover • Northern Royal Albatross • Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit • Shy Albatross • South-eastern Hooded Robin

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
				• Flesh-footed Shearwater, Fleshy-footed Shearwater • Fork-tailed Swift • Grey-headed Albatross • Indian Yellow-nosed Albatross • Northern Giant Petrel • Northern Royal Albatross • Osprey • Pectoral Sandpiper • Red Knot, Knot • Salvin's Albatross • Sharp-tailed Sandpiper • Shy Albatross • Sooty Albatross • Sooty Shearwater • Southern Giant-Petrel, Southern Giant Petrel • Southern Royal Albatross • Wandering Albatross • White-capped Albatross Additional Marine Listed Species • Brown Skua • Fairy Prion White-fronted TernBIA (DCCEEW 2024a)	• Eastern hooded plover, eastern hooded plover • Fairy prion (southern) • Greater sand plover, large sand plover • Grey falcon • Indian yellow-nosed albatross • Latham's snipe, japanese snipe • Little tern • Northern buller's albatross, pacific albatross • Northern giant petrel • Painted honeyeater • Red knot, knot • Salvin's albatross • Sharp-tailed sandpiper • Soft-plumaged petrel • Sooty albatross • Sooty shearwater • Southern royal albatross • Southern whiteface • Wandering albatross • White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian)	• Southern Giant-Petrel, Southern Giant Petrel Vulnerable • Antipodean Albatross • Australian Fairy Tern • Black-browed Albatross • Blue Petrel • Blue-winged Parrot • Brown Treecreeper (south-eastern) • Buller's Albatross, Pacific Albatross • Campbell Albatross, Campbell Black-browed Albatross • Diamond Firetail • Eastern Hooded Plover, Eastern Hooded Plover • Fairy Prion (southern) • Gibson's Albatross • Great Knot

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
				The operational area intersects 9 seabird foraging BIAs (Figure 4-7 to Figure 4-12): • Antipodean albatross • Black-browed albatross • Buller's albatross • Campbell albatross • Common diving-petrel • Indian Yellow-nosed albatross • Short-tailed shearwater • Shy albatross • Wandering albatross BIAs are displayed in Figure 4-7 to Figure 4-12	• White-capped albatross • White-throated needletail <u>Additional Migratory Listed Species</u> • Bar-tailed Godwit • Common Noddy • Common Sandpiper • Flesh-footed Shearwater, Fleshy-footed Shearwater • Fork-tailed Swift • Little Curlew, Little Whimbrel • Osprey • Pectoral Sandpiper • Pin-tailed Snipe • Short-tailed Shearwater • Swinhoe's Snipe Yellow Wagtail<u>Additional Marine Listed Species</u> • Black-eared Cuckoo • Black-faced Cormorant • Black-faced Monarch • Brown Skua • Cattle Egret • Fairy Prion • Hooded Plover, Hooded Dotterel	• Greater Sand Plover, Large Sand Plover • Grey Falcon • Grey Plover • Indian Yellow-nosed Albatross • Latham's Snipe, Japanese Snipe • Little Tern • Northern Buller's Albatross, Pacific Albatross • Northern Giant Petrel • Painted Honeyeater • Pilotbird • Red Knot, Knot • Ruddy Turnstone • Salvin's Albatross • Sharp-tailed Sandpiper • Soft-plumaged Petrel • Sooty Albatross • Sooty Shearwater

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
					• Little Penguin • Rainbow Bee-eater • Rufous Fantail • Satin Flycatcher • White-bellied Sea-Eagle White-fronted TernBIA (DCCEEW 2024a) (Figure 4-7 to Figure 4-12): • Antipodean Albatross (Foraging) • Australasian Gannet (Foraging) • Black-browed Albatross (Foraging) • Bullers Albatross (Foraging) • Campbell Albatross (Foraging) • Common Diving Petrel (Foraging) • Indian Yellow-nosed Albatross (Foraging) • Short-tailed Shearwater (Foraging) • Shy Albatross (Foraging likely) • Wandering Albatross (Foraging)	• Southern Royal Albatross • Southern Whiteface • Terek Sandpiper • Wandering Albatross • White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) • White-capped Albatross • White-throated Needletail Additional Migratory Listed Species • Bar-tailed Godwit • Broad-billed Sandpiper • Common Noddy • Common Sandpiper • Double-banded Plover • Flesh-footed Shearwater, Fleshy-footed Shearwater

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
					• (White-faced Storm-petrel (Foraging)	• Fork-tailed Swift • Greater Crested Tern • Grey-tailed Tattler • Little Curlew, Little Whimbrel • Marsh Sandpiper, Little Greenshank • Osprey • Pacific Golden Plover • Pectoral Sandpiper • Pin-tailed Snipe • Red-necked Phalarope • Red-necked Stint • Sanderling • Short-tailed Shearwater • Swinhoe's Snipe • Wandering Tattler • Whimbrel • Wood Sandpiper • Yellow Wagtail <u>Additional Marine Listed Species</u> • Australasian Gannet

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
						• Black-eared Cuckoo • Black-faced Cormorant • Black-faced Monarch • Brown Skua • Cape Gannet • Cattle Egret • Common Diving-Petrel • Fairy Prion • Hooded Plover, Hooded Dotterel • Kelp Gull • Little Penguin • Magpie Goose • Pacific Gull • Pied Stilt, Black-winged Stilt • Rainbow Bee-eater • Red-capped Plover • Red-necked Avocet • Rufous Fantail • Satin Flycatcher • Silver Gull • White-bellied Sea-Eagle • White-fronted Tern

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
						BIA (DCCEEW 2024a) (Figure 4-7 to Figure 4-12): • Antipodean Albatross (Foraging) • Australasian Gannet (Foraging) • Black-browed Albatross (Foraging) • Bullers Albatross (Foraging) • Campbell Albatross (Foraging) • Common Diving Petrel (Breeding, Foraging) • Indian Yellow-nosed Albatross (Foraging) • Little Penguin (Foraging) • Short-tailed Shearwater (Breeding, Foraging) • Shy Albatross (Foraging likely)

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
						• Wandering Albatross (Foraging) • (White-faced Storm-petrel (Foraging) <u>Iconic species</u> Several populations of the little penguin occur within Bass Strait, with nesting sites located on islands within Bass Strait and at various mainland shorelines. Penguin colonies known to occur in the southwest region of Victoria that are within the monitoring area include Deen Maar (Lady Julia Percy Island) (2,000 breeding pairs), Twelve Apostles-London Arch (1,000 breeding pairs), Middle Island (200 breeding pairs) and Merri Island (200 breeding pairs).

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
	Marine Reptiles	Marine Turtles	• EPBC Act Protected Species	✓ Present There are 3 EPBC Act listed marine turtle species, all of which are listed migratory, that are likely to occur within the operational area: <u>Endangered</u> • Leatherback turtle • Loggerhead turtle <u>Vulnerable</u> • Green turtle <u>BIA (DCCEEW 2024a)</u> No BIAs or Habitat Critical areas are within the operational area.	✓ Present There are 3 EPBC Act listed marine turtle species, all of which are listed migratory, that are likely to occur within the EMBA: <u>Endangered</u> • Leatherback turtle • Loggerhead turtle <u>Vulnerable</u> • Green turtle <u>BIA (DCCEEW 2024a)</u> There are no BIAs or Habitat Critical areas identified for EPBC Act listed turtles within the EMBA.	✓ Present There are 3 EPBC Act listed marine turtle species, all of which are listed migratory, that are likely to occur within the monitoring area: <u>Endangered</u> • Leatherback turtle • Loggerhead turtle <u>Vulnerable</u> • Green turtle <u>BIA (DCCEEW 2024a)</u> There are no BIAs or Habitat Critical areas identified for EPBC Act listed turtles within the monitoring area.
	Marine Mammals	Seals and Sealions (Pinnipeds)	• EPBC Act Protected Species	✓ Present There are EPBC listed 2 pinniped species (or species habitat) listed under the EPBC Act PMST as possibly occurring within the operational area. <u>Marine</u> • Australian fur-seal • New Zealand fur-seal	✓ Present There are 3 pinniped species (or species habitat) listed under the EPBC Act PMST as possibly occurring within the EMBA. <u>Endangered</u> • Australian Sea-lion <u>Marine</u> • Australian fur-seal	✓ Present There are 3 pinniped species (or species habitat) listed under the EPBC Act PMST as possibly occurring within the monitoring area. <u>Endangered</u> • Australian Sea-lion

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA		Monitoring area	
					Important colonies and breeding habitat in proximity to the operational area are displayed in Figure 4-13. <u>BIAs (DCCEEW 2024a)</u> No BIAs or biological important behaviours were identified within the operational area.		• New Zealand fur-seal <u>BIAs (DCCEEW 2024a)</u> No BIAs or biological important behaviours for EPBC listed pinnipeds were identified within the EMBA.		<u>Marine</u> • Australian Fur-seal • New Zealand fur-seal <u>BIA (DCCEEW 2024a)</u> (Figure 4-13) No BIAs or biological important behaviours for EPBC listed pinnipeds were identified within the EMBA.
		Cetaceans – whales and dolphins	• EPBC Act Protected Species	✓	Present There are 14 cetacean species are listed under the EPBC Act PMST as possibly occurring within the operational area. <u>Endangered</u> • Blue whale • Southern right whale <u>Vulnerable</u> • Fin whale • Sei whale <u>Additional Migratory Listed Species</u> • Blue Whale • Dusky Dolphin • Fin Whale • Humpback Whale	✓	Present There are 28 cetacean species are listed under the EPBC Act PMST as possibly occurring within the EMBA. Noting that some species are listed both as threatened and migratory. <u>Endangered Species</u> • Blue whale • Southern right whale <u>Vulnerable Species</u> • Fin whale • Sei whale <u>Additional Migratory Listed Species</u> • Humpback whale • Killer whale, orca	✓	Present There are 29 cetacean species are listed under the EPBC Act PMST as possibly occurring within the monitoring area. Noting that some species are listed both as threatened and migratory. <u>Endangered Species</u> • Blue whale • Southern right whale <u>Vulnerable Species</u> • Fin whale • Sei whale
			• BIA	✓		✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
				• Killer Whale, Orca • Pygmy Right Whale • Sei Whale • Southern Right Whale <u>Additional Cetacean Listed Species</u> • Blue whale • Bottlenose dolphin • Common dolphin, short-beaked common dolphin • Dusky dolphin • False killer whale • Fin whale • Humpback whale • Indian Ocean bottlenose dolphin, spotted bottlenose dolphin • Killer whale, orca • Minke whale • Pygmy right whale • Risso's dolphin, grampus • Sei whale • Southern right whale BIA (DCCEEW 2024a) (Figure 4-14) • Pygmy blue whale (Foraging (annual high use area)) • Southern right whale (Migration)	• Pygmy right whale • Sperm whale Additional Cetacean Listed Species • Andrew's Beaked Whale • Arnoux's Beaked Whale • Blainville's Beaked Whale, Dense-beaked Whale • Bottlenose Dolphin • Common Dolphin, Short-beaked Common Dolphin • Cuvier's Beaked Whale, Goose-beaked Whale • Dwarf Sperm Whale • False Killer Whale • Hector's Beaked Whale • Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin • Long-finned Pilot Whale • Minke Whale • Pygmy Sperm Whale • Risso's Dolphin, Grampus • Short-finned Pilot Whale • Southern Right Whale Dolphin • Strap-toothed Beaked Whale, Strap-toothed	Additional Migratory Listed Species • Antarctic Minke Whale, Dark-shoulder Minke Whale • Blue Whale • Dusky Dolphin • Fin Whale • Humpback Whale • Killer Whale, Orca • Pygmy Right Whale • Sei Whale • Southern Right Whale • Sperm Whale Additional Cetacean Listed Species • Andrew's Beaked Whale • Arnoux's Beaked Whale • Blainville's Beaked Whale, Dense-beaked Whale • Bottlenose Dolphin • Common Dolphin, Short-beaked Common Dolphin

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
					Whale, Layard's Beaked Whale True's Beaked WhaleBIA (DCCEEW 2024a) (Figure 4-14) • Pygmy blue whale (Foraging (annual high use area)) • Southern right whale (Migration, Reproduction) Habitat Critical The National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) identifies all reproductive BIAs are habitat critical to the survival of the species as across the species range. The EMBA intersects with this a reproduction BIA which is indicated as critical habitat (DCCEEW 2024b). Detailed existing environment descriptions of whales within the monitoring area are described in Appendix 4	• Cuvier's Beaked Whale, Goose-beaked Whale • Dwarf Sperm Whale • False Killer Whale • Gray's Beaked Whale, Scamperdown Whale • Hector's Beaked Whale • Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin • Long-finned Pilot Whale • Minke Whale • Pygmy Sperm Whale • Risso's Dolphin, Grampus • Short-finned Pilot Whale • Southern Right Whale Dolphin • Strap-toothed Beaked Whale, Strap-toothed

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	EMBA	Monitoring area
						Whale, Layard's Beaked Whale • True's Beaked Whale BIA (DCCEEW 2024a) (Figure 4-14 and Figure 4-15) • Pygmy blue whale (Foraging (annual high use area)) • Southern right whale (Migration, Reproduction) Habitat Critical The National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) identifies all reproductive BIAs are habitat critical to the survival of the species as across the species range. The monitoring area intersects with this a reproduction BIA which is indicated as critical habitat (DCCEEW 2024b). Detailed existing environment descriptions of whales

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA		Monitoring area
								within the monitoring area are described in Appendix 4
Invasive Species	Marine Pests	Established and Exotic	• Introduced marine species (IMS)	✓	Not identified Marine pests have not been identified within the operational area to date, though the potential exists for marine pests to establish through natural and anthropogenic influences.	✓	Present In the South-east Marine Region, 115 marine species are known to be introduced, and an additional 84 are considered to be possible introductions or 'cryptogenic' species. Eleven species are considered to be invasive marine species (IMS). Key known pest species in the South-East Marine Region include: • Northern pacific sea star (*Asterias amurensis*). • Fan worms (*Sabella spallanzannii* and *Euchone sp*). • Bivalves (*Crassostrea gigas* (Pacific oyster), *Corbula gibba* and *Theora fragilis*). • Crabs (*Carcinus maenas* (European shore crab) and *Pyromaiatuberculata*). • Macroalgae (*Undaria pinnatifida* (Japanese giant kelp) and Codium fragile (*ssp.tormentosoides*); and • The introduced NZ screw shell (*Maoricolpus roseus*), known to form extensive and dense beds on the sandy sea-floor in eastern Bass Strait spreading to the 80 m depth contour off eastern Victoria and NSW (Patil *et al.* 2004).	
	Marine Viruses	Infection agent found in marine environments	• Introduced virus species	✓	Present Marine viruses within the operational area are anticipated to reflect the conditions of the south-east marine region.	✓	Present *Abalone Viral Ganglioneuritis* (AVG), has been detected in southwest Victoria and was confirmed as far east as White Cliffs near Johanna, and west as far as Discovery Bay Marine Park (DAFF 2024). More recently in May 2021 wild abalone off the coast of Cape Nelson tested positive to AVG (CSIRO 2021).	

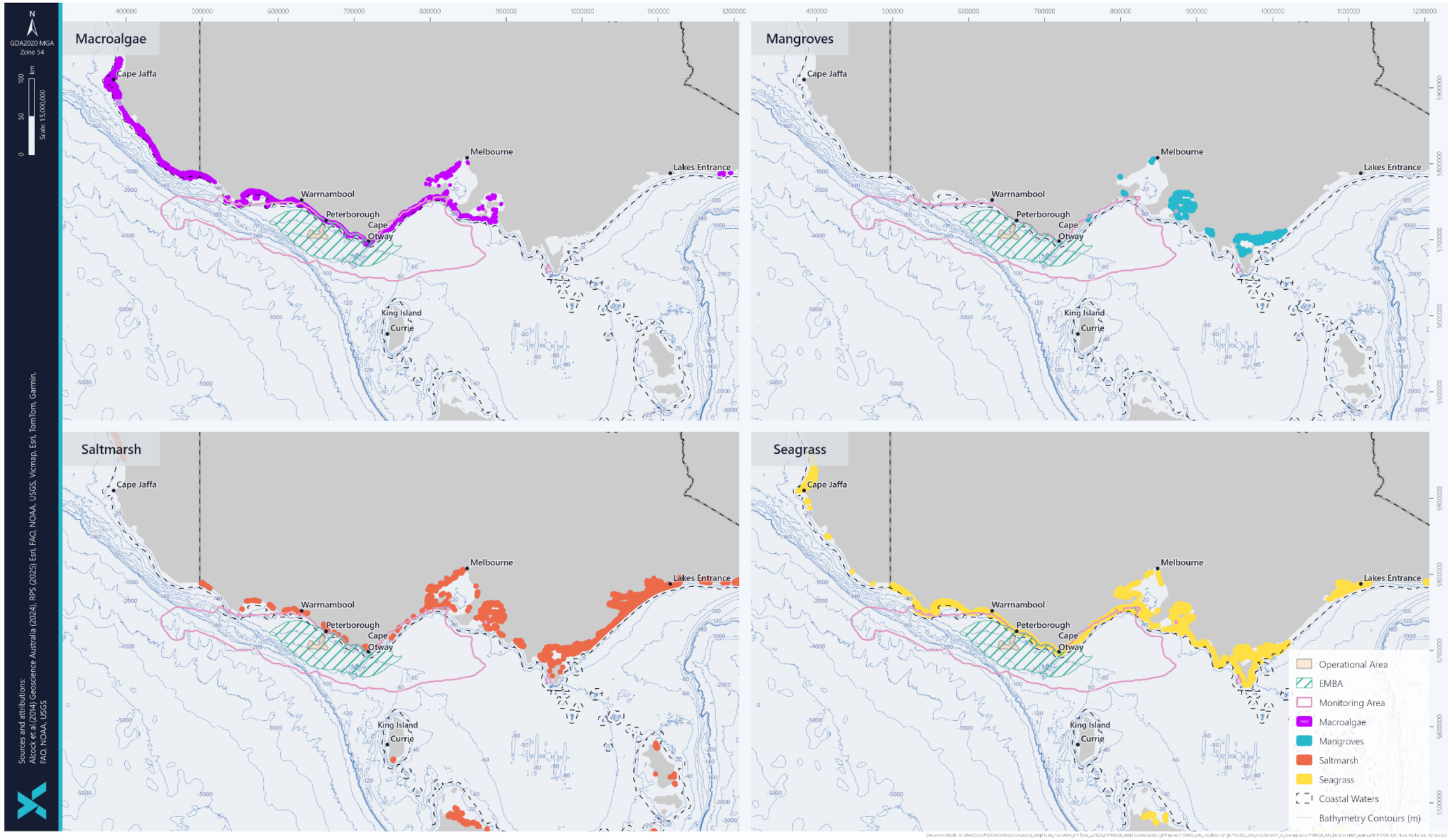


Figure 4-5: Benthic Habitats within the Monitoring Area and EMBA

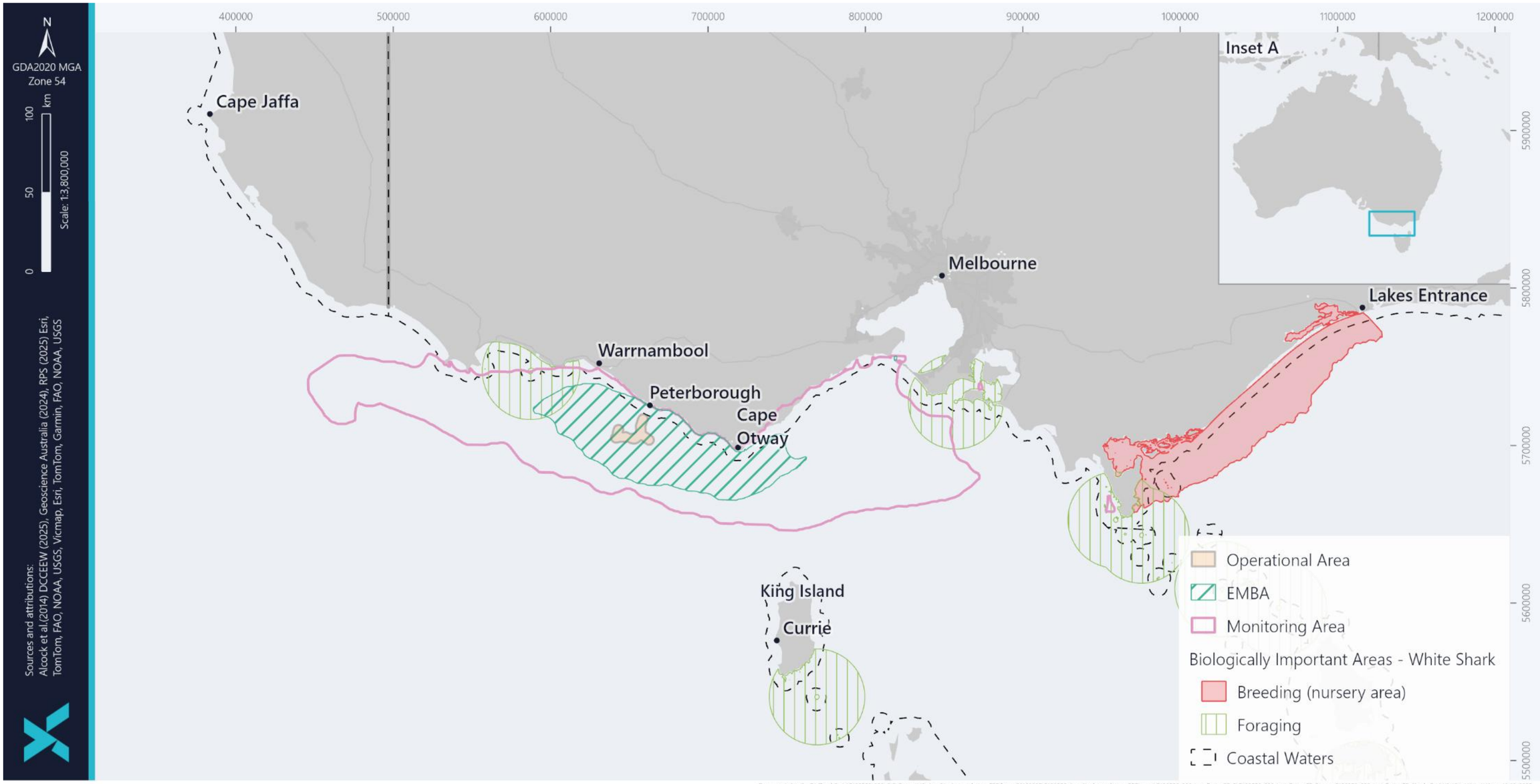


Figure 4-6: White Shark BIAs within the Monitoring Area and EMBA



Figure 4-7: Antipodean Albatross, Black-browed Albatross, Bullers Albatross and Campbell Albatross BIAs within the Monitoring Area

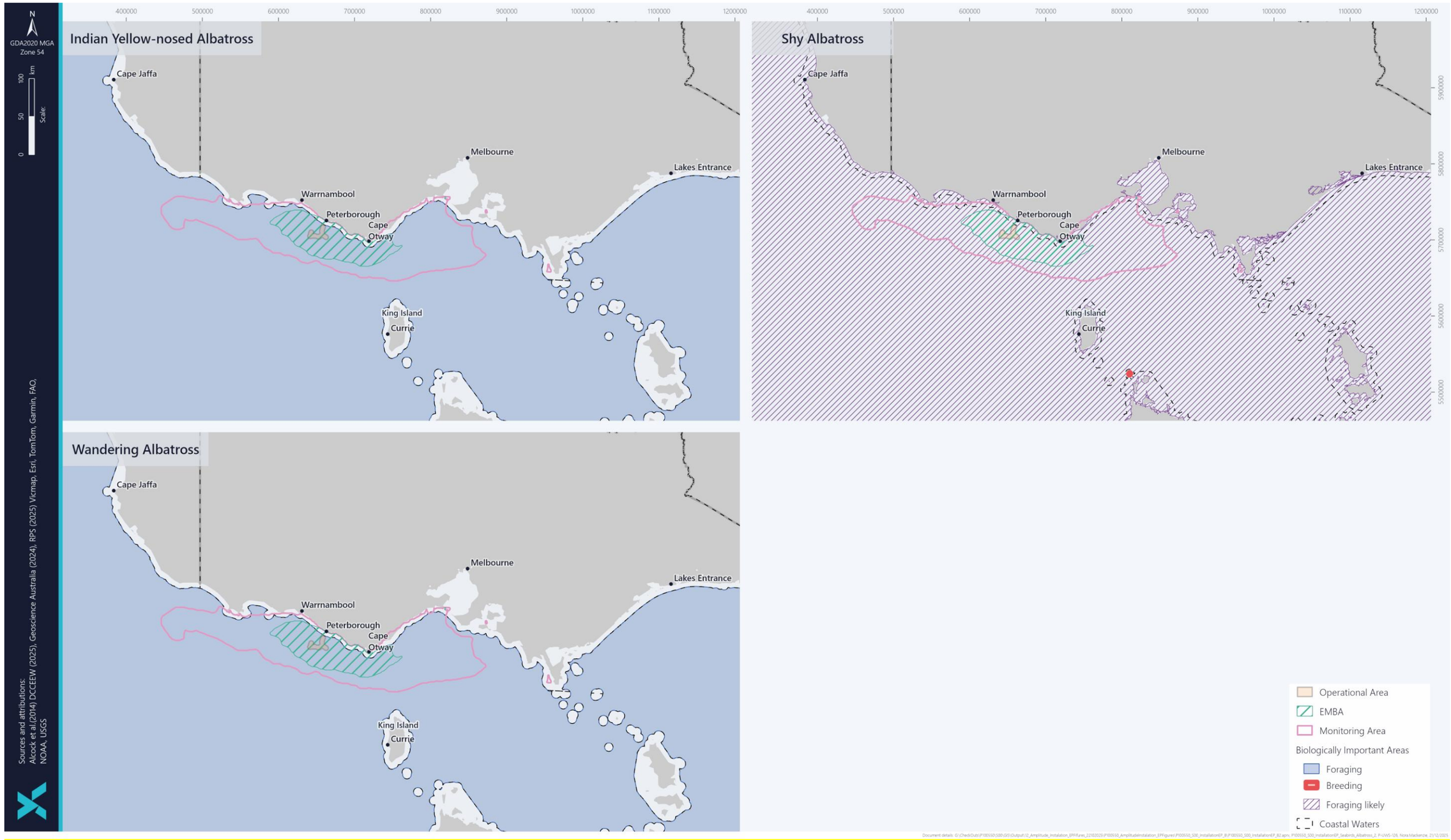


Figure 4-8: Indian Yellow-nosed Albatross, Shy Albatross and Wandering Albatross BIAs within the Monitoring Area

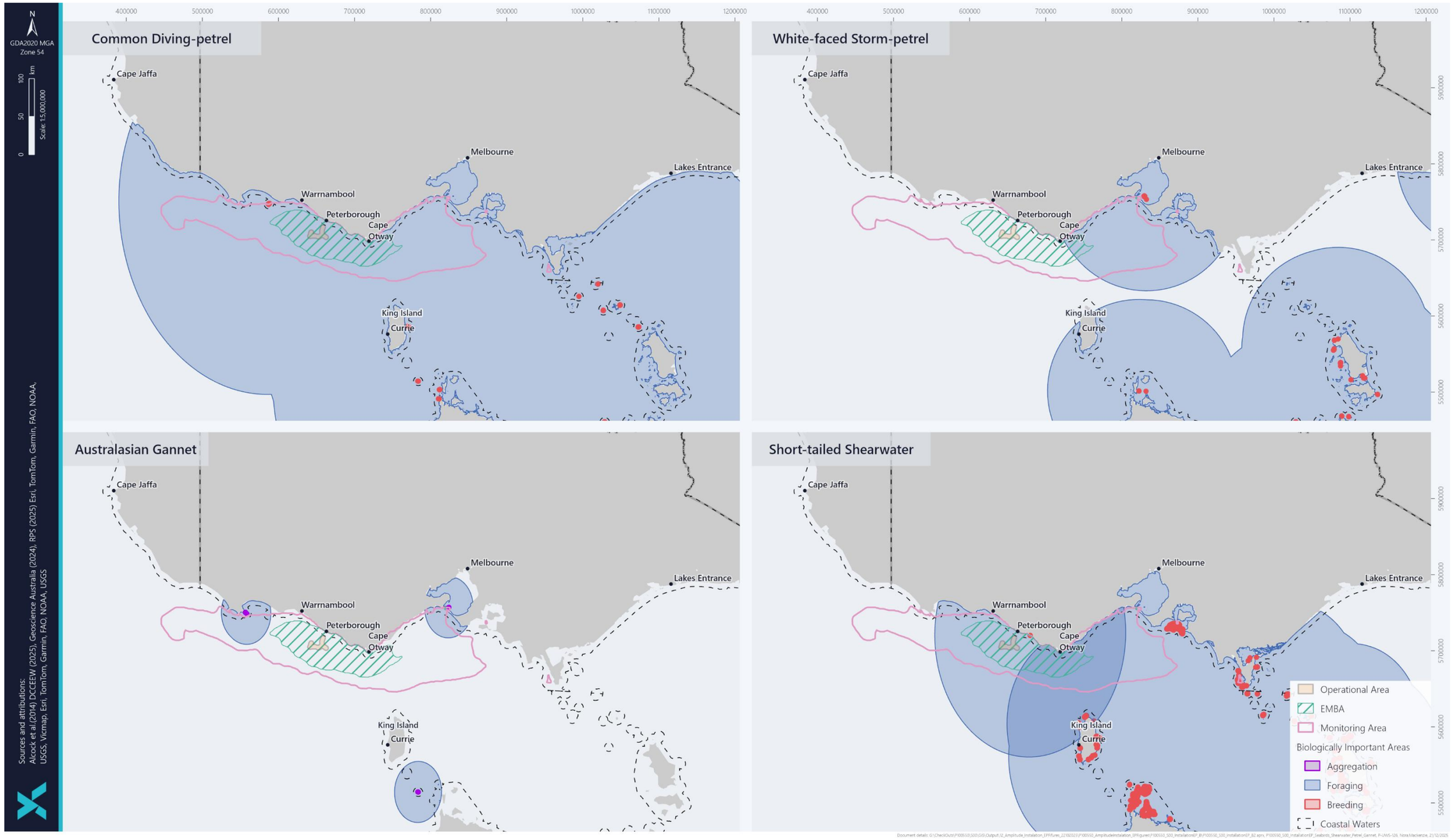


Figure 4-9: Common Diving-Petrel, White-faced Storm-petrel Flesh-footed Shearwater, Short-tailed Shearwater, Sooty Shearwater, and Wedge-tailed Shearwater BIAs within the Monitoring Area

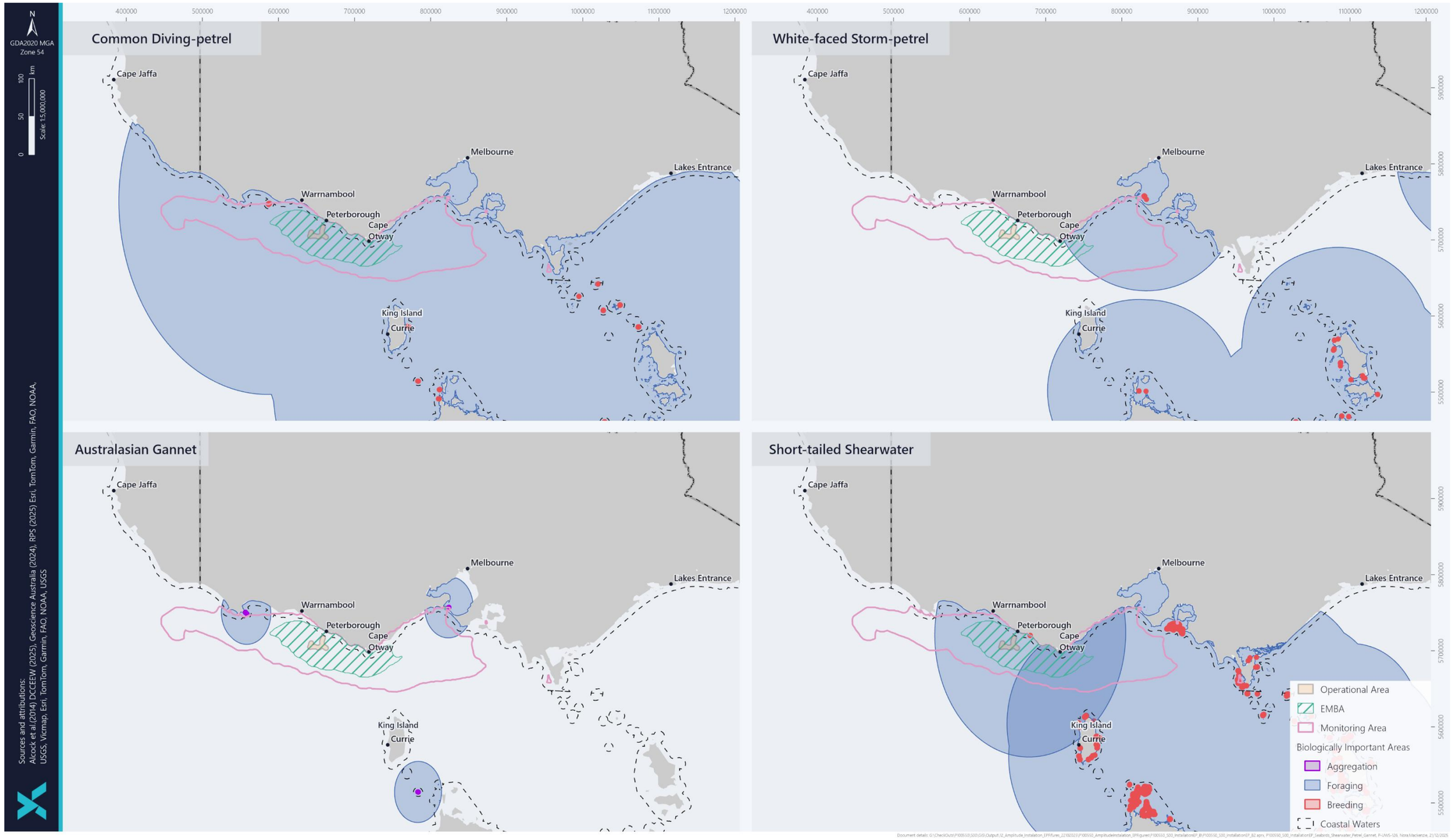


Figure 4-10: Common Diving-Petrel, White-faced Storm-petrel, Australasian Gannet and Short-tailed Shearwater BIAs within the Monitoring Area

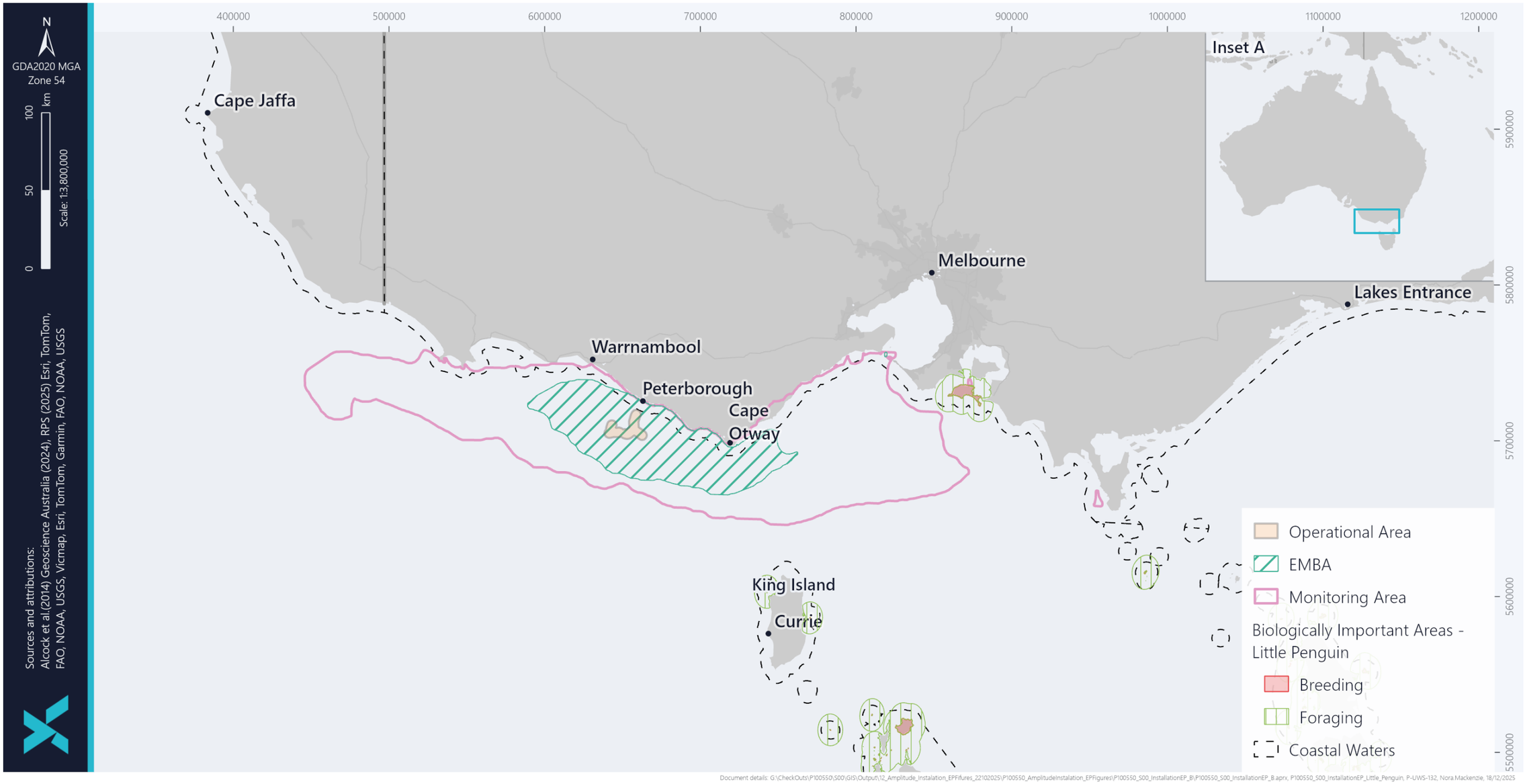


Figure 4-11: Little Penguin BIAs within the Monitoring Area

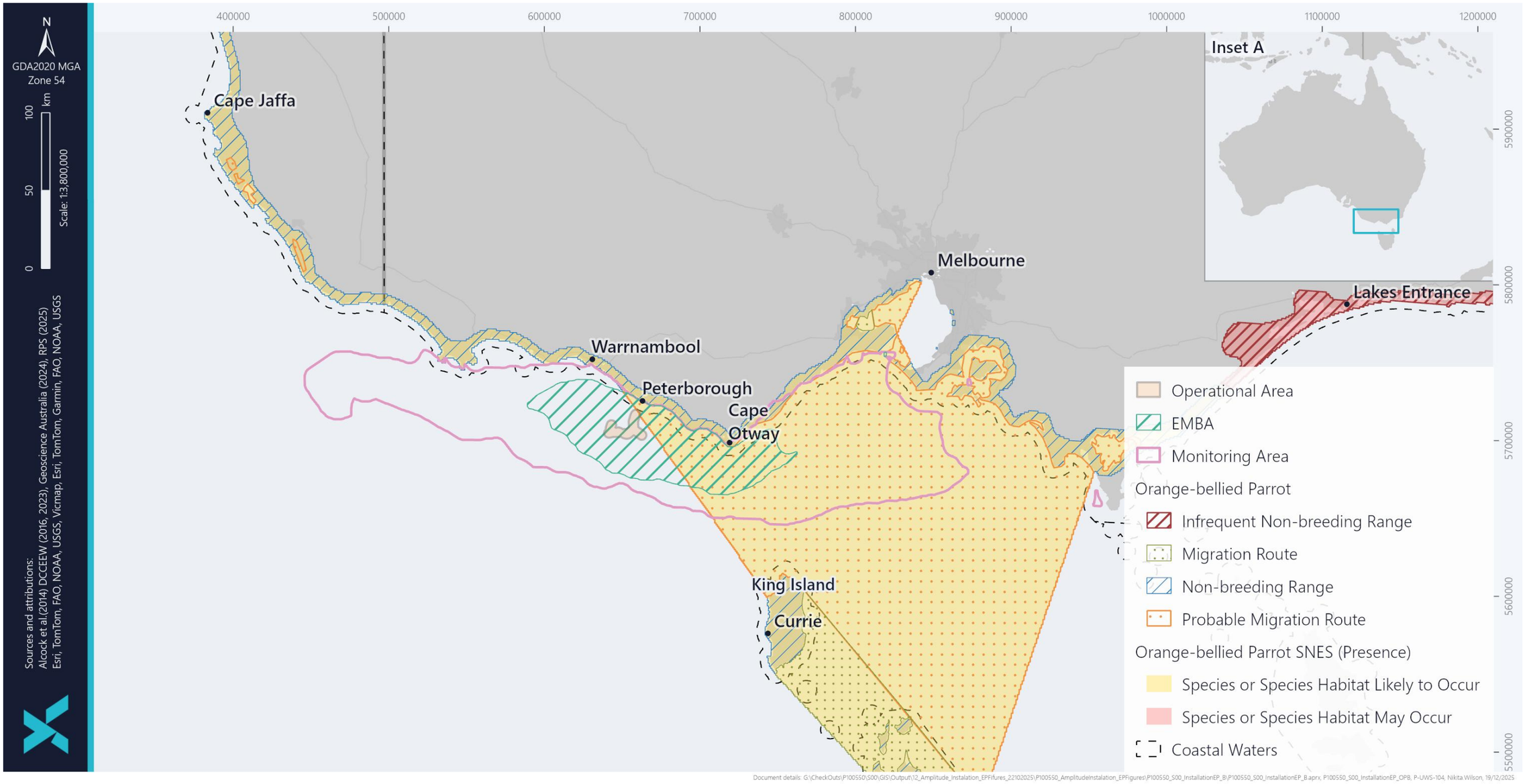


Figure 4-12: Orange-bellied Parrot Presence within the Monitoring Area and EMBA

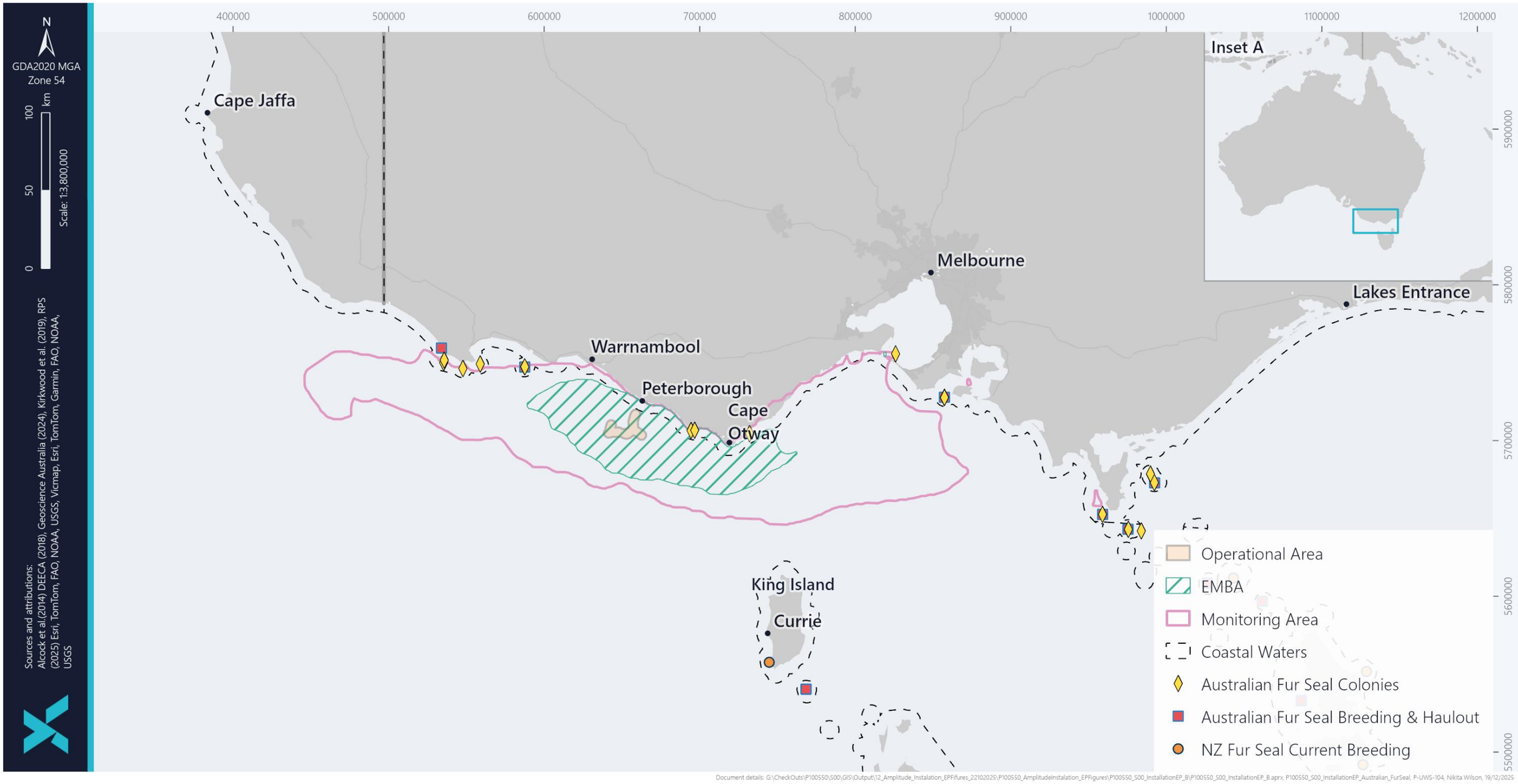


Figure 4-13: Important Australian and New Zealand (NZ) Fur-Seal Colonies, Breeding and Haulout sites within the Monitoring Area and EMBA

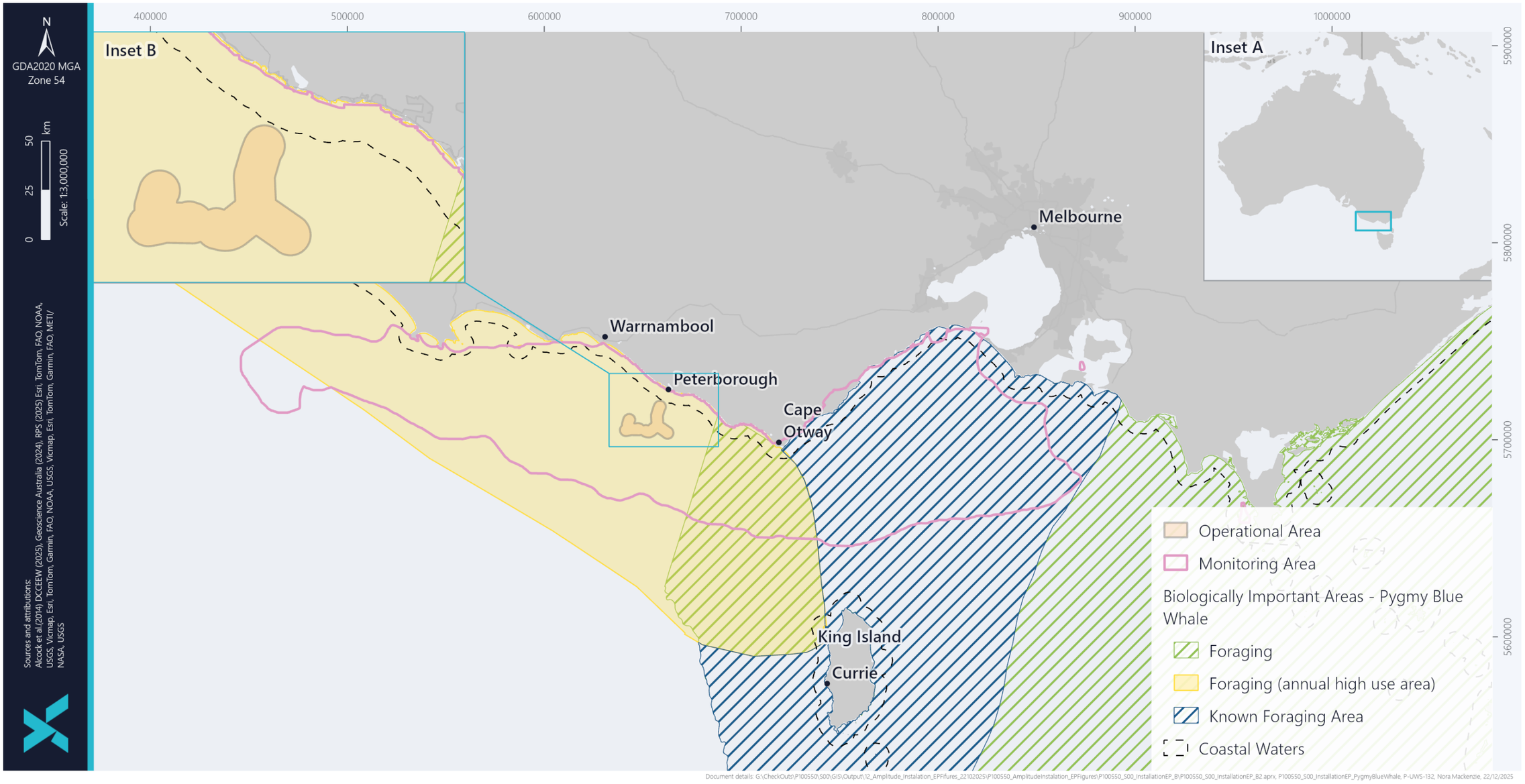


Figure 4-14: Pygmy Blue Whale BIAs within the Monitoring Area and EMBA

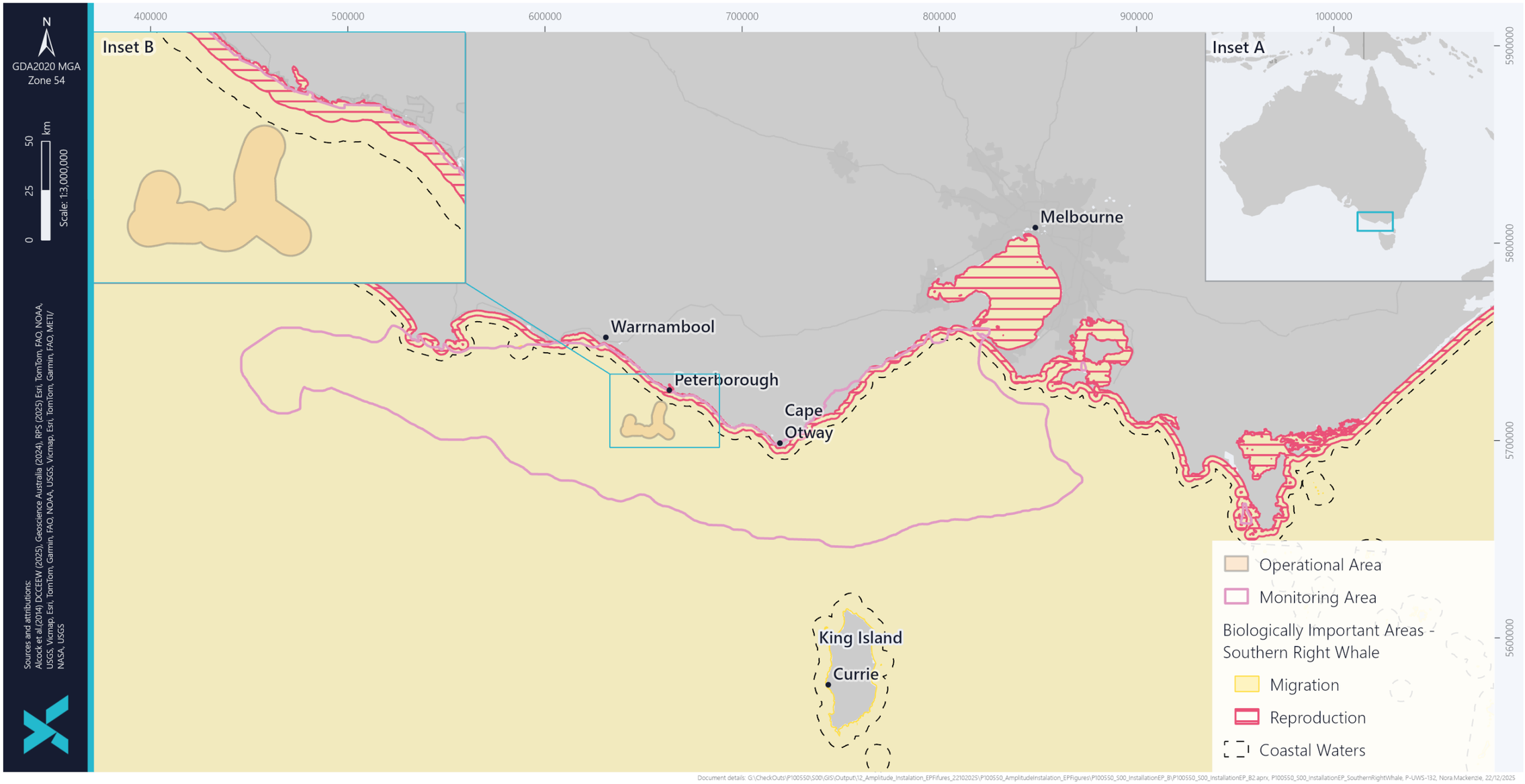


Figure 4-15: Southern Right Whale BIAs within the Monitoring Area and EMBA

4.4.3 Social Receptors

Table 4-4: Presence of Social Receptors within the Operational Area and Extent of Socio-Economic Impacts

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
Socio-ecological Systems	Commonwealth Marine Area	KEF	• High productivity (includes episodic productivity) • Aggregations of marine life • High biodiversity • High level of endemism • Unique Habitat	✓	Present The operational area does not intersect with any delineated KEFs (DCCEEW 2015b) (Figure 4-16). Rocky reefs and hard substrates occur in all areas of the South-east Marine Region continental shelf, including Bass Strait and the sub-tidal zone to the continental shelf break. The continental shelf break generally occurs in 50 m to 150–220 m water depth. The shallowest depth at which the rocky reefs occur in Commonwealth waters is approximately 50 m. The Shelf rocky reefs and hard substrates KEF are not spatially defined other than being described as located in all areas of the south-east marine region (DCCEEW 2015b).	✓	Present The extent of potential SEI intersects with one Key Ecological Feature (KEF) (DCCEEW 2015b) (Figure 4-16): • Bonney Coast Upwelling KEF Rocky reefs and hard substrates occur in all areas of the South-east Marine Region continental shelf, including Bass Strait and the sub-tidal zone to the continental shelf break. The continental shelf break generally occurs in 50 m to 150–220 m water depth. The shallowest depth at which the rocky reefs occur in Commonwealth waters is approximately 50 m. The Shelf rocky reefs and hard substrates KEF are not spatially defined other than being described as located in all areas of the south-east marine region (DCCEEW 2015b).
		Australian Marine Parks	• Aggregations of marine life • High productivity and biodiversity • Unique habitat	-	Not Present The operational area does not intersect any Australian Marine Parks (Director of National Parks 2025).	✓	Present The extent of potential SEI intersects one Australian Marine Parks (Director of National Parks 2025) (Figure 4-17): • Apollo AMP (IUCN category (VI) Multiple Use Zone).

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
	Commonwealth Area	Threatened Ecological Communities (TEC)	• Support ecosystem services • Provide habitat • Community at risk of extinction	-	Not Present The operational area does not intersect any TEC (DCCEEW 2016).	✓	Present The extent of potential SEI intersects 5 TECs. Eleven of these TECs have coastal areas (DCCEEW 2016) (Figure 4-18): • Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community (Endangered). • Giant kelp marine forests of South East Australia (Endangered). • Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Critically Endangered) • Natural Damp Grassland of the Victorian Coastal Plains (Critically Endangered) • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered)
	State Parks and Reserves	Marine Protected Areas	• Aggregations of marine life • High productivity • Biodiversity	-	Not Present The operational area does not intersect any State protected marine areas (DCCEEW 2025e).	✓	Present The extent of potential SEI intersects 5 state marine protected areas (Figure 4-19; DCCEEW 2025e) including: • Victorian Marine National Parks: – Point Addis – Port Phillip Heads – Twelve Apostles • Victorian Marine Sanctuaries:

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
							– The Arches –
		Terrestrial Protected Areas	• Aggregations of terrestrial life • High productivity • biodiversity	-	Not present The operational area does not intersect any State protected terrestrial areas (DCCEEW 2025e).	✓	Present The extent of potential SEI intersects 5 State Terrestrial Protected Areas with marine or coastal interface (DCCEEW 2025e) (Figure 4-19) including: • Victorian Conservation Parks : – Bay of Islands Coastal Park – Discovery Bay Coastal Park • Victorian National Parks: – Great Otway – Point Nepean – Port Campbell –
	Wetlands of International Importance	Ramsar wetlands (International Importance)	• Aggregation, foraging and nursery habitat for marine life	-	Not present The operational area does not intersect any Wetlands of International Importance (DCCEEW 2024q).	-	Not present The extent of potential SEI does not intersect any Wetlands of International Importance (DCCEEW 2024q).
	Wetlands of National Importance	Nationally Important Wetlands	• Aggregation, foraging and nursery habitat for marine life	-	Not present The operational area does not intersect any Nationally Important Wetlands (Figure 4-20).	-	Not present The extent of potential SEI does not intersect any Nationally Important Wetlands (Figure 4-20).
	Heritage	Underwater Heritage (wrecks and aircraft)	• Historic significance	✓	Present There is one shipwreck present within the operational area (Figure 4-21).	✓	Present There are 34 shipwrecks present within the extent of potential SEI. Wrecks

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
					• *Alfred** *The position given for the wreck has been confirmed to be a search area centrepoint; these are provided when the location of a wreck is unknown (pers comm Heritage Victoria 2024). Written records further indicate the Alfred is likely closer to Warrnambool, and not relevant to the operational area of the Activity.		closest to the operational area (Figure 4-21), include: • *Alfred* *within the operational area • *Falls of Halladale* (5.6 km from the operational area) • *Schomberg* (6 km from the operational area) • *Newfield* (6.4 km from the operational area) • *Unidentified: Massacre Bay* (5.8 km from the operational area) There are protected areas for fragile and significant historic shipwrecks in Victorian waters. No wrecks with protected Areas occur within the extent of potential SEI. *The position given for the wreck has been confirmed to be a search area centrepoint; these are provided when the location of a wreck is unknown (pers comm Heritage Victoria 2024). Written records further indicate the *Alfred* is likely closer to Warrnambool, and not relevant to the operational area of the Activity
		World Heritage Properties	• Protection of environmental and cultural heritage.	-	Not Present There are no World Heritage Properties in the operational area (DCCEEW 2025f).	-	Not Present There are no World Heritage Properties in the extent of potential SEI (DCCEEW 2025f).

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
		Commonwealth Heritage Places National Heritage Places			There are no marine or coastal places on the Commonwealth Heritage list in the operational area (DCCEEW 2025g). There are no National Heritage Places in the operational area (DCCEEW 2025h).		There are no Commonwealth Heritage places within the extent of potential SEI (DCCEEW 2025g). However, there is one historic listed Commonwealth Heritage Property less than 1 km northeast of the Extent of Potential SEI (Figure 4-22): • Fort Queenscliff There are no National Heritage places within the extent of potential SEI. However, there are 2 listed National Heritage place less than 1 km north of the extent of potential SEI (DCCEEW 2025h)(Figure 4-22): • Great Ocean Road and Scenic Environments • Point Nepean Defence and Quarantine Station Area.
Socio-economic Systems	Commercial Fisheries	Commonwealth managed	• Economic benefit • Water quality	✓	Present The operational area intersects the management areas for 6 Commonwealth-managed fisheries: • Eastern Skipjack Fishery • Eastern Tuna and Billfish Fishery • Small Pelagic (western sub-area) Fishery	✓	Present The extent of potential SEI intersects the management areas for 7 Commonwealth-managed fisheries: • Bass Strait Central Zone Scallop Fishery • Eastern Skipjack Fishery • Eastern Tuna and Billfish Fishery • Small Pelagic Fishery

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
					• Southern and Eastern Scalefish and Shark Fishery (SESSF) (including sub-sectors)* • Southern Bluefin Tuna Fishery • Southern Squid Jig Fishery* *Fishing activity has been recorded within the operational area (Figure 4-24: Victorian Managed Giant Crab Fishery, Ocean General Fishery, Ocean Wrasse Fishery and Southern Rock Lobster Fishery within the Extent of Potential Socio-Economic Impacts (SEI) Area). Possible activity around the operational area is expected for the SESS – Shark Gillnet sub-sector and likely activity in the Southern Jig Squid Fishery per comms Event ID 2025 0520 192039 1043, Appendix 7.		• Southern and Eastern Scalefish and Shark Fishery (SESSF) (including sub-sectors)* • Southern Bluefin Tuna Fishery • Southern Squid Jig Fishery* *Fishing activity has been recorded within the extent of potential SEI (Figure 4-24: Victorian Managed Giant Crab Fishery, Ocean General Fishery, Ocean Wrasse Fishery and Southern Rock Lobster Fishery within the Extent of Potential Socio-Economic Impacts (SEI) Area).
	State Managed Fisheries	State Managed – Victoria Tasmania South Australia New South Wales	Economic benefit Water quality	✓	Present Victorian fisheries are managed by DJSIR (Fisheries) and may overlap Commonwealth fisheries areas. The operational area intersects the management areas for the following 7 state-managed fisheries, including: • Abalone • Giant crab* • Ocean general (previously multi-species ocean)* • Octopus	✓	Present Victorian fisheries are managed by DJSIR (Fisheries) and may overlap Commonwealth fisheries areas. The extent of potential SEI intersects the management areas for the following 7 Victoria state-managed fisheries, including: • Abalone • Giant crab* • Inshore Trawl

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
					• Ocean scallop • Ocean wrasse* • Southern rock lobster*. *Fishing activity has been recorded within the operational area (Figure 4-24).		• Ocean general (previously multi-species ocean)* • Octopus* • Ocean scallop • Ocean wrasse* • Southern rock lobster*. *Fishing activity has been recorded within the operational area (RPS 2025). Tasmanian fisheries are managed by NRE Tas and may overlap Commonwealth fisheries areas. The extent of potential SEI intersects the management areas for the following 2 Tasmanian state-managed fisheries: • Giant crab* • Rock lobster* *Fishing activity has been recorded within the extent of potential SEI (Figure 4-24 and Figure 4-25).
	Recreational Fisheries	State-managed	• Community • Recreation • Water quality	✓	Present Recreational fishing includes boat fishing, using rod and line. Game fishing can include additional equipment such as fighting belts, gimbals and outriggers (Game Fishing Association Australia 2025a). Common offshore fish species caught by recreational and game fishers include: • Mackerel	✓	Present Recreational fishing includes rock, beach, boat and estuary fishing, using rod and line. Fishing licences are required for inland and ocean fishing. Charter fishing operations were confirmed to occur in the extent of potential SEI including from Port Campbell, Apollo Bay and Warrnambool by VRFish consultation for the ECSP OPP.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	Extent of potential SEI
				• Tuna • Groper • Shark. Most recreational fishing typically occurs in nearshore coastal waters (DAFF, 2024) (shore or inshore vessels) and within bays and estuaries. Recreational fishing activity is expected to be minimal in the operational area. Deep dropline fishing occurs in water waters deeper than those found in the operational area e.g. over 250m (AFMA 2023).	Common nearshore fish species caught by recreational fishers include: • Tiger flathead • Bream • Snapper • Australian Salmon • Lobster Fishing charter operators provide deeper water recreational fishing opportunities (such as tuna fishing). Game fishing occurs across the monitoring area from Port MacDonnell to Portland and Narooma (Game Fishing Association Australia 2025b), 15,287 recreational fishing trips left surveyed Victorian ramps in 2018 – 2019. 26% of these trips targeted Southern Bluefin Tuna. Portland accounted for 82% of the Southern Bluefin Tuna harvest. Five larger Southern Bluefin Tuna were caught from Port Campbell during this period (Institute for Marine and Antarctic Studies, University of Tasmania, 2020). Deep dropline fishing uses electric winches and heavy-duty rods. This fishing occurs within deeper waters e.g. over 250m with target species including (AFMA 2023): • Blue-eye trevalla

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
							• Pink ling • Ribaldo • Ocean perch.
	Recreation and Tourism	Victoria	• Economic benefit • Community • Recreation • Water quality	✓	Not present Key activities include sight-seeing, surfing and fishing however, these are generally land-based or near-shore activities not within the deep offshore waters of the operational area.	✓	Present Key activities include sight-seeing, surfing, diving and snorkelling and fishing however, these are generally land-based or near-shore activities and are not impacted by the proposed exploration activities. The activity is located in an area adjacent the Otway coastline, which is located on the Great Ocean Road, a popular tourist drive.
	Coastal Settlements	Victoria	• Economic benefit • Community engagement • Recreation	✓	Not present The operational area does not include coastal and onshore environments. Port Campbell is the nearest town to the operational area.	✓	Present Key activities include sight-seeing, surfing, diving and snorkelling and fishing however, these are generally land-based or near-shore activities and are not impacted by the proposed exploration activities. The activity is located in an area adjacent the Otway coastline, which is located on the Great Ocean Road, a popular tourist drive.
	Industry	Shipping	• Safe navigation	✓	Present The operational area is located at the northern extremity of areas with high traffic volumes.	✓	Present 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 (Figure 4-28).

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
					There are no designated shipping lanes in the vicinity of the operational area, however local commercial fishing vessels utilise the area (Figure 4-28).		
		Offshore Renewable Energies	• Economic benefit	-	Not present No declared areas for offshore renewable energy overlap the operational area.	✓	Present One declared area for the development of offshore renewable energy overlaps with the extent of potential SEI (Figure 4-29): • Southern Ocean, Victoria (Spinifex Offshore Wind Farm)
		Petroleum Production	• Economic benefit	✓	Present An Amplitude Energy operated gas and condensate pipeline crosses the operational area (Figure 4-30).	✓	Present A number of producing oil and gas wells occur within the extent of potential SEI. Current operators with producing fields in the Otway Basin include Beach Energy (Otway Gas Field Development) and Amplitude Energy (CHN Development). Existing petroleum infrastructure within south-east Australia is displayed in Figure 4-30.
		Petroleum Exploration	• Economic benefit	✓	Present The operational area extends across the following existing Petroleum exploration titles (Figure 4-30): • VIC/L30 • VIC/L24 • VIC-28-AA • VIC/P76	✓	Present Numerous petroleum exploration activities, including seismic surveys and exploration drilling, have been undertaken in the permits of the Otway Basin. The most recent of which was Beach Energy's Artisan-1 exploration well (VIC/P43) in 2021 and Schlumberger Otway Basin 2D Marine Seismic Survey in 2020. Beach Energy production assets

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
							including subsea facilities at Geographe and Thylacine Platform are to the southeast of the Amplitude Energy facilities, with the Thylacine export pipeline to shore running parallel. Existing petroleum infrastructure within south-east Australia is displayed in Figure 4-30.
		Defence Activities	• Protection and surveillance	-	Not present There are no defence areas within the operational area.	✓	Present Many training areas, sea dumping sites and UXO sites are located within the extent of potential SEI (Figure 4-31). A number of these are located in and around Port Phillip Bay and Western Port Bay.
		Subsea Communication Cables	• Economic benefit	-	Not present There are no subsea communication cables within the operational area.	✓	Present Three subsea communications cables are located within the extent of potential SEI (Figure 4-32): • Bass Strait-1 and Bass Strait-2 • Indigo Central • Basslink. The East Coast cable and Hawaiki Nui have a landing in Melbourne and are expected to be installed by 2025.
		Desalination Plant	• Water quality	-	Not present There are no desalination plant water intakes within the operational area.	✓	Present Victorian Desalination Project water intake is 800 m offshore at approximately 15 m below the surface off Williamson's Beach Victoria, east of

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Extent of potential SEI	
							Western Port (~228 km east of the operational area).

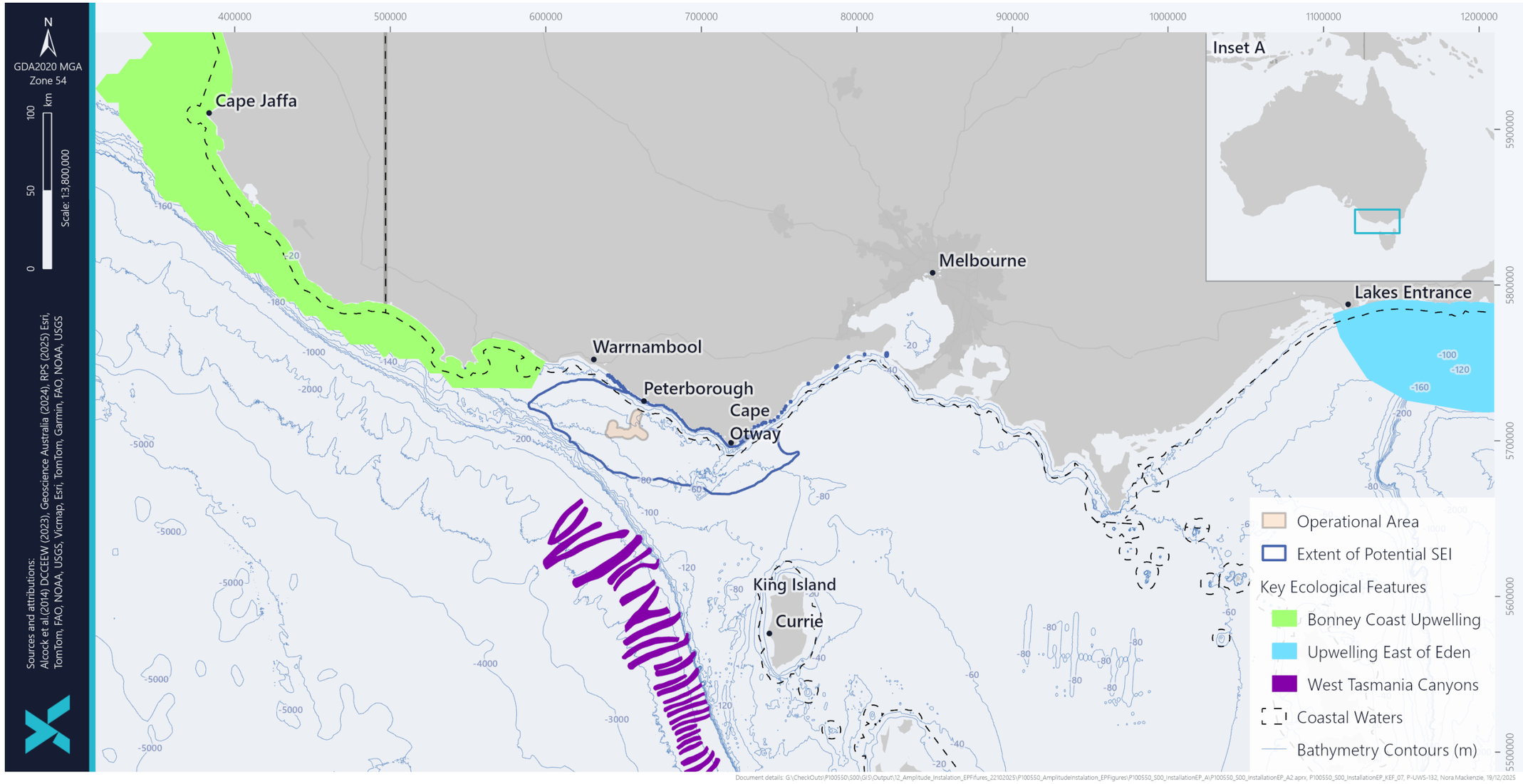


Figure 4-16: KEFs within the Extent of Potential Socio-Economic Impacts (SEI) Area

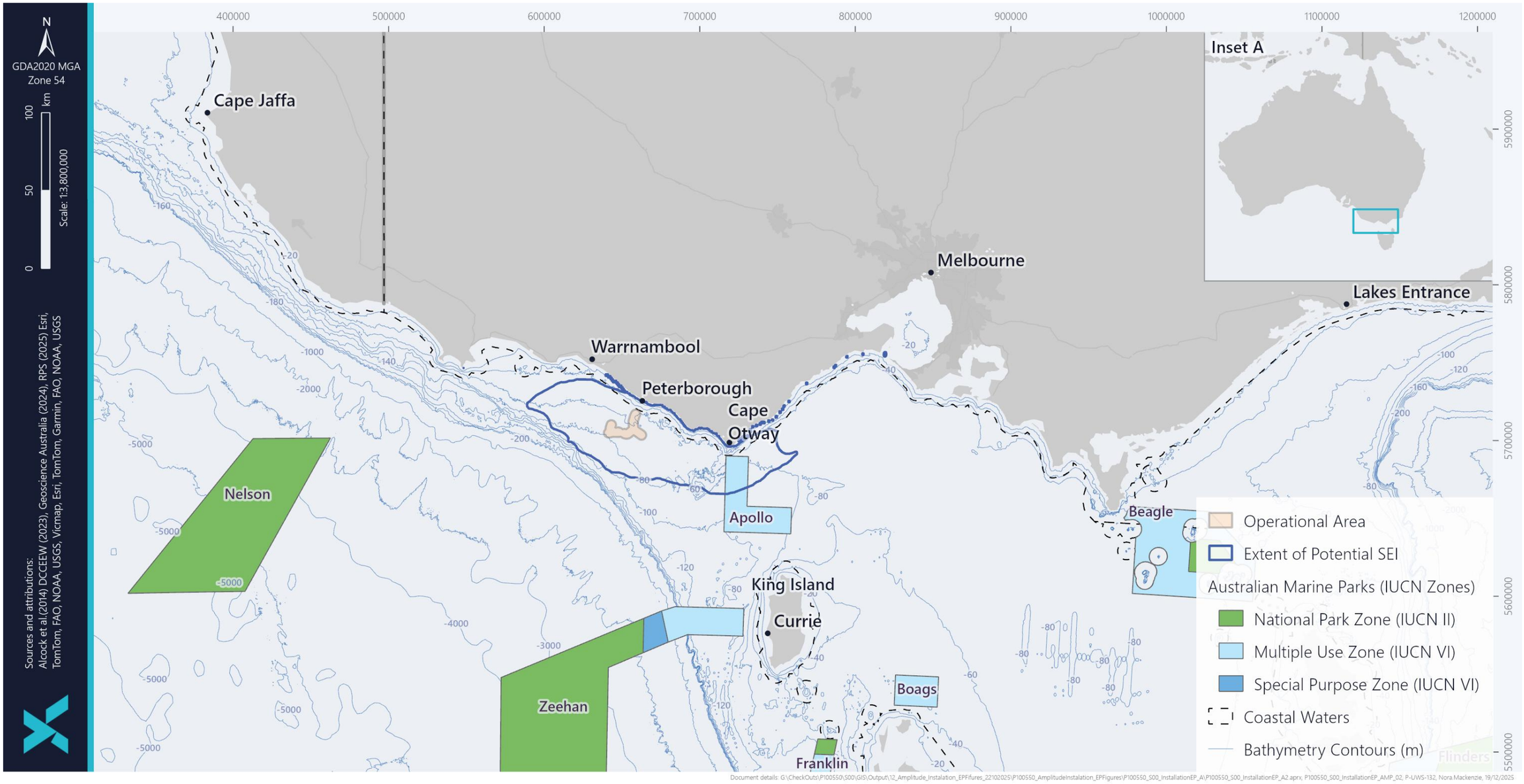


Figure 4-17: Australian Marine Parks (AMPs) within the Extent of Potential Socio-Economic Impacts (SEI) Area

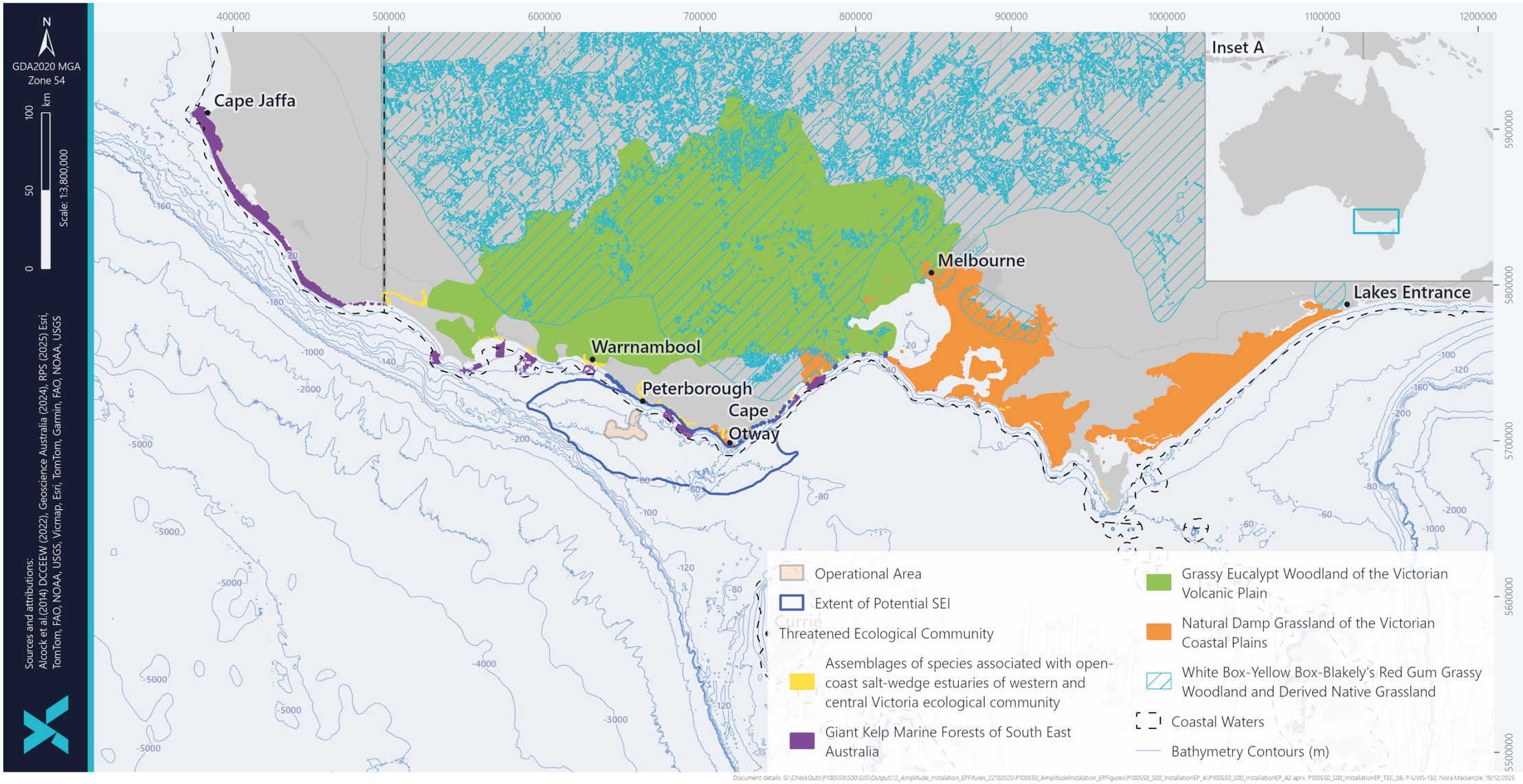


Figure 4-18: Threatened Ecological Communities (TECs) within the Extent of Potential Socio-Economic Impacts (SEI) Area

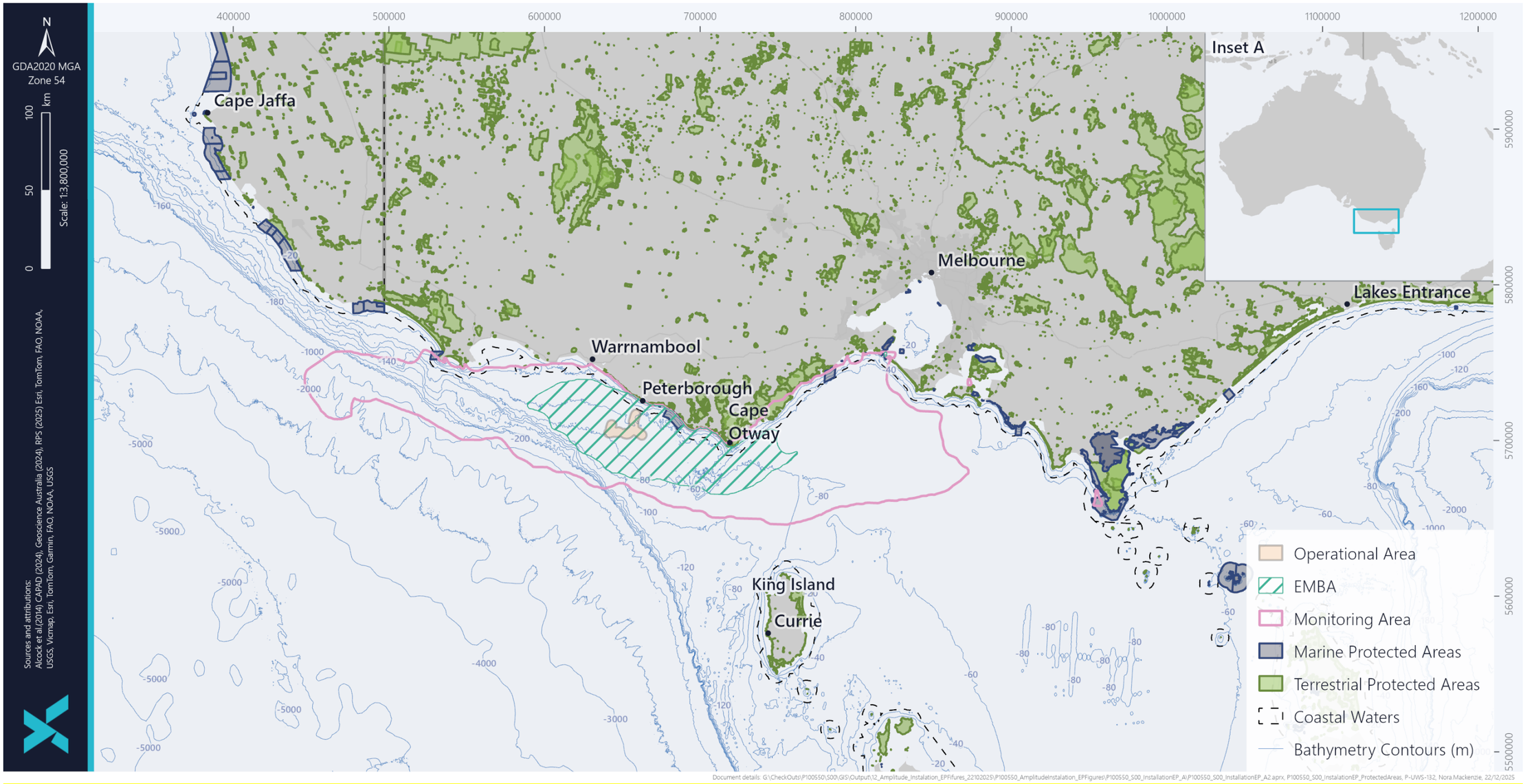


Figure 4-19: State Marine Parks and Terrestrial Protected Areas within the Extent of Potential Socio-Economic Impacts (SEI) Area

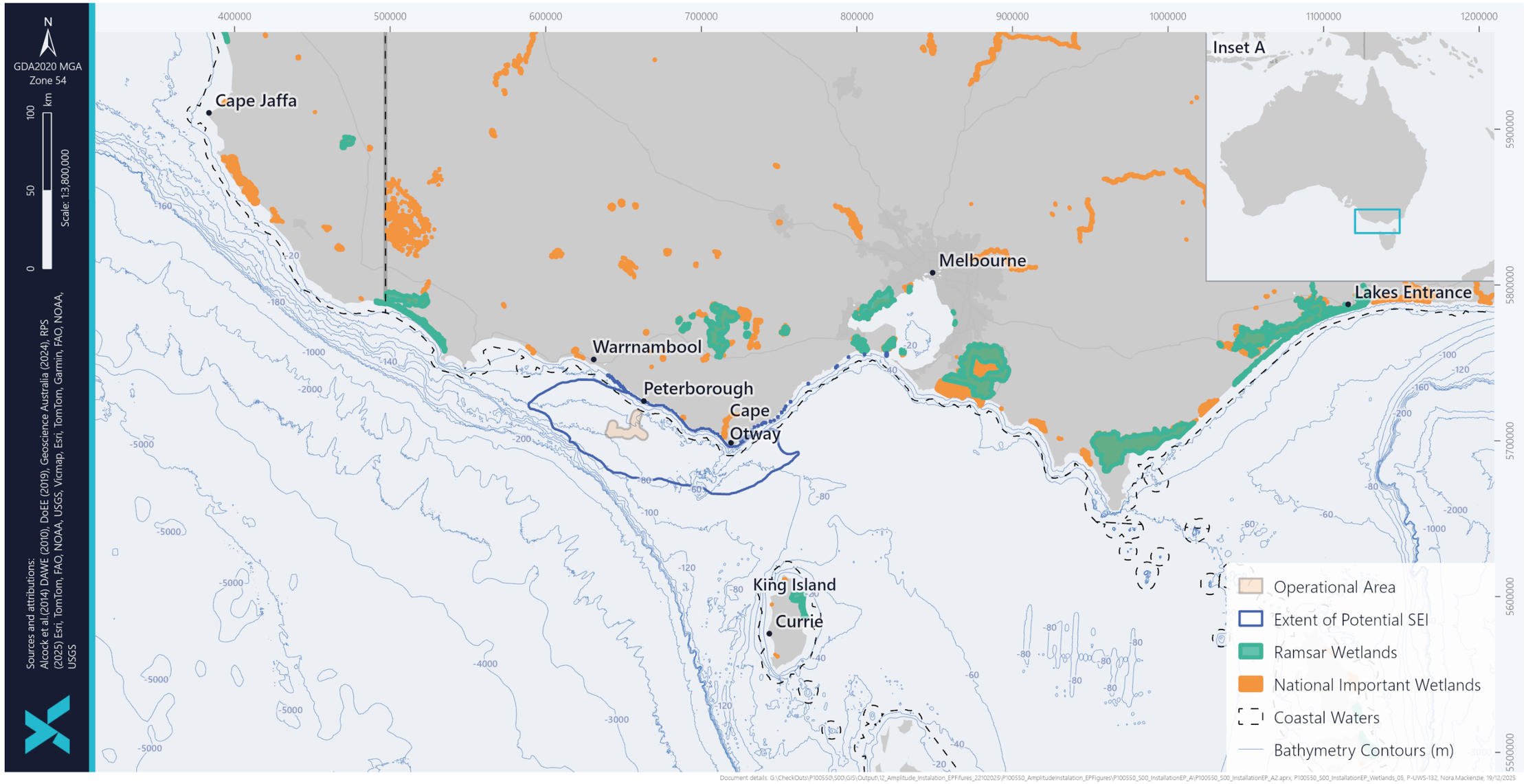


Figure 4-20: RAMSAR Wetlands and Wetlands of National Importance within the Extent of Potential Socio-Economic Impacts (SEI) Area

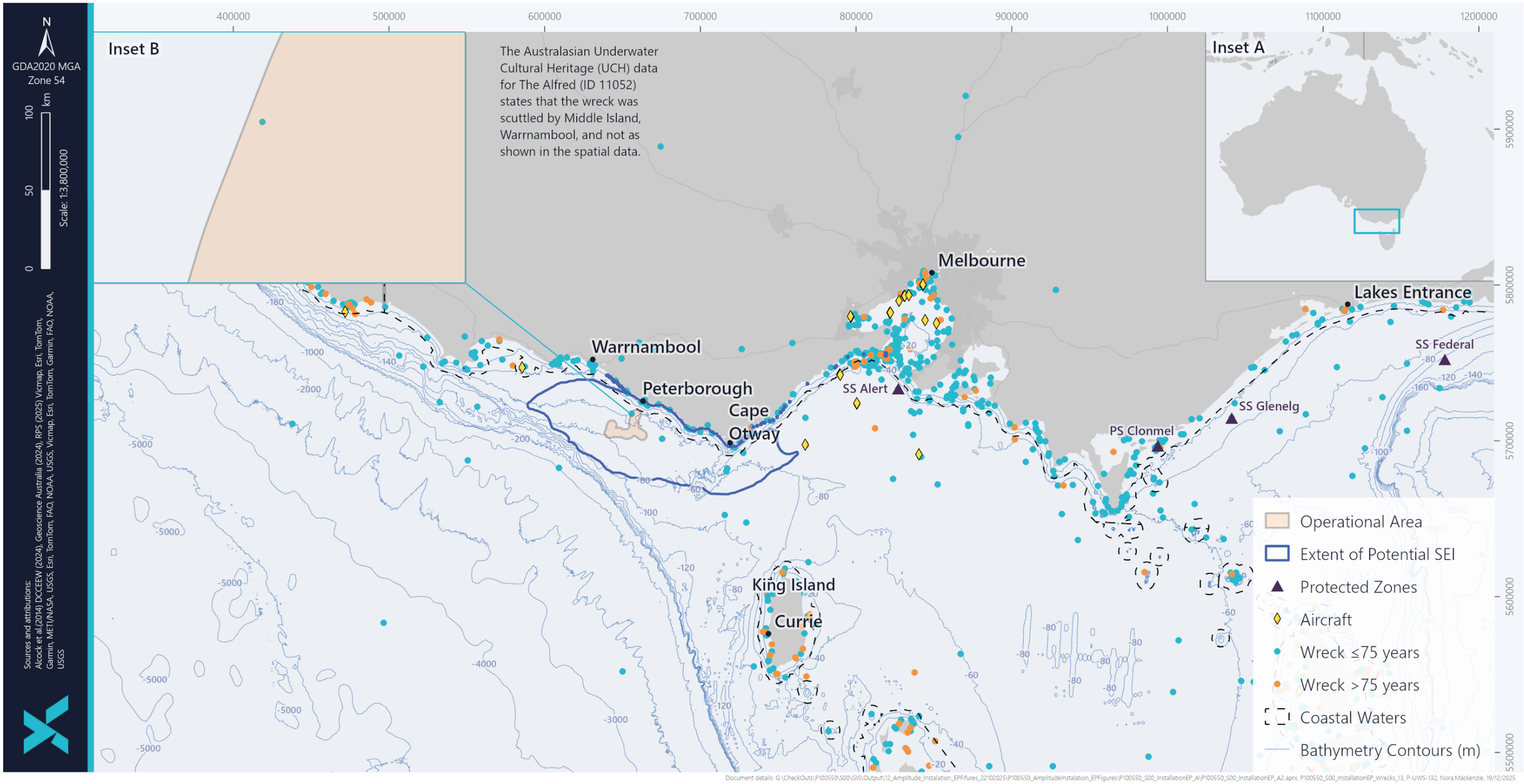
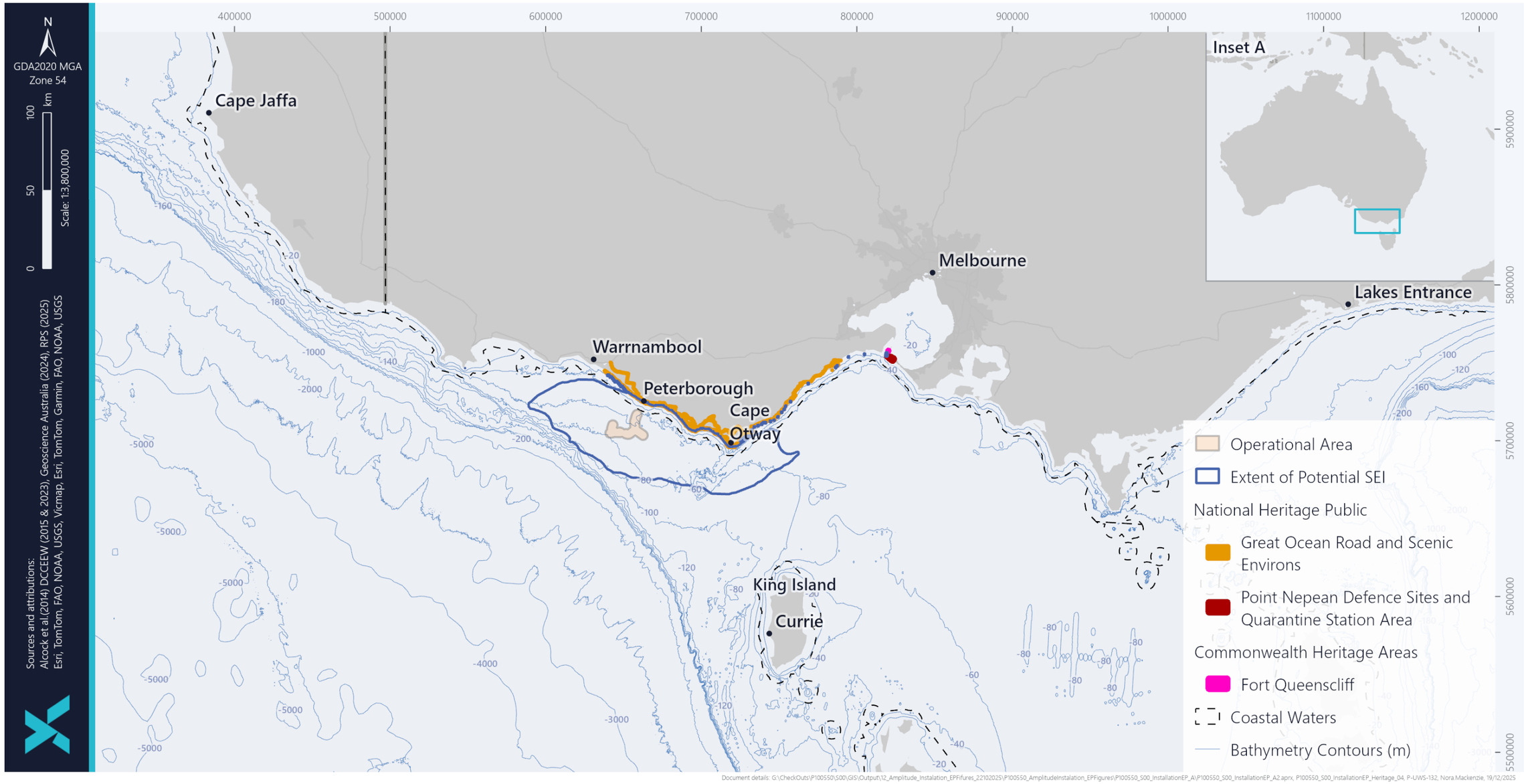


Figure 4-21: Underwater Protected Areas (Wrecks and Aircraft) within the Extent of Potential Socio-Economic Impacts (SEI) Area



Document details: G:\CheckOuts\P100550\S00\GIS\Output\12_Amplitude_Instalation_EPFifures_22102025\P100550_AmplitudeInstalation_EPFigures\P100550_S00_InstallationEP_A\P100550_S00_InstallationEP_A2.aprx, P100550_S00_InstallationEP_Heritage_04. P-UWS-132, Nora.Mackenzie, 19/12/2025

Figure 4-22: Commonwealth Heritage Areas within the Extent of Potential Socio-Economic Impacts (SEI) Area

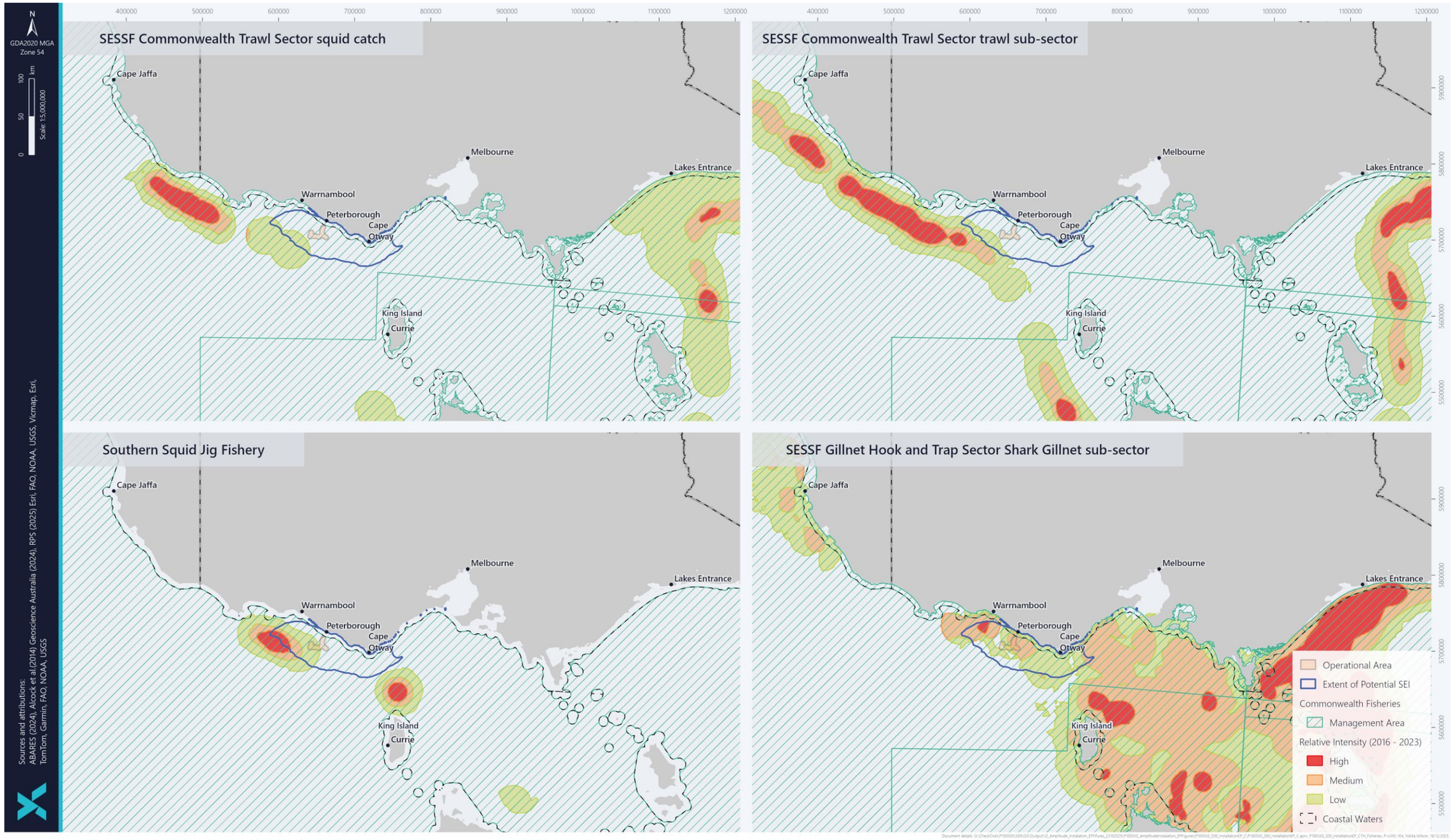


Figure 4-23: Commonwealth Managed Southern Squid Jig Fishery, and Southern and Eastern Scalefish and Shark Fishery (SESSF) (including Sub-Sectors) within the Extent of Potential Socio-Economic Impacts (SEI) Area

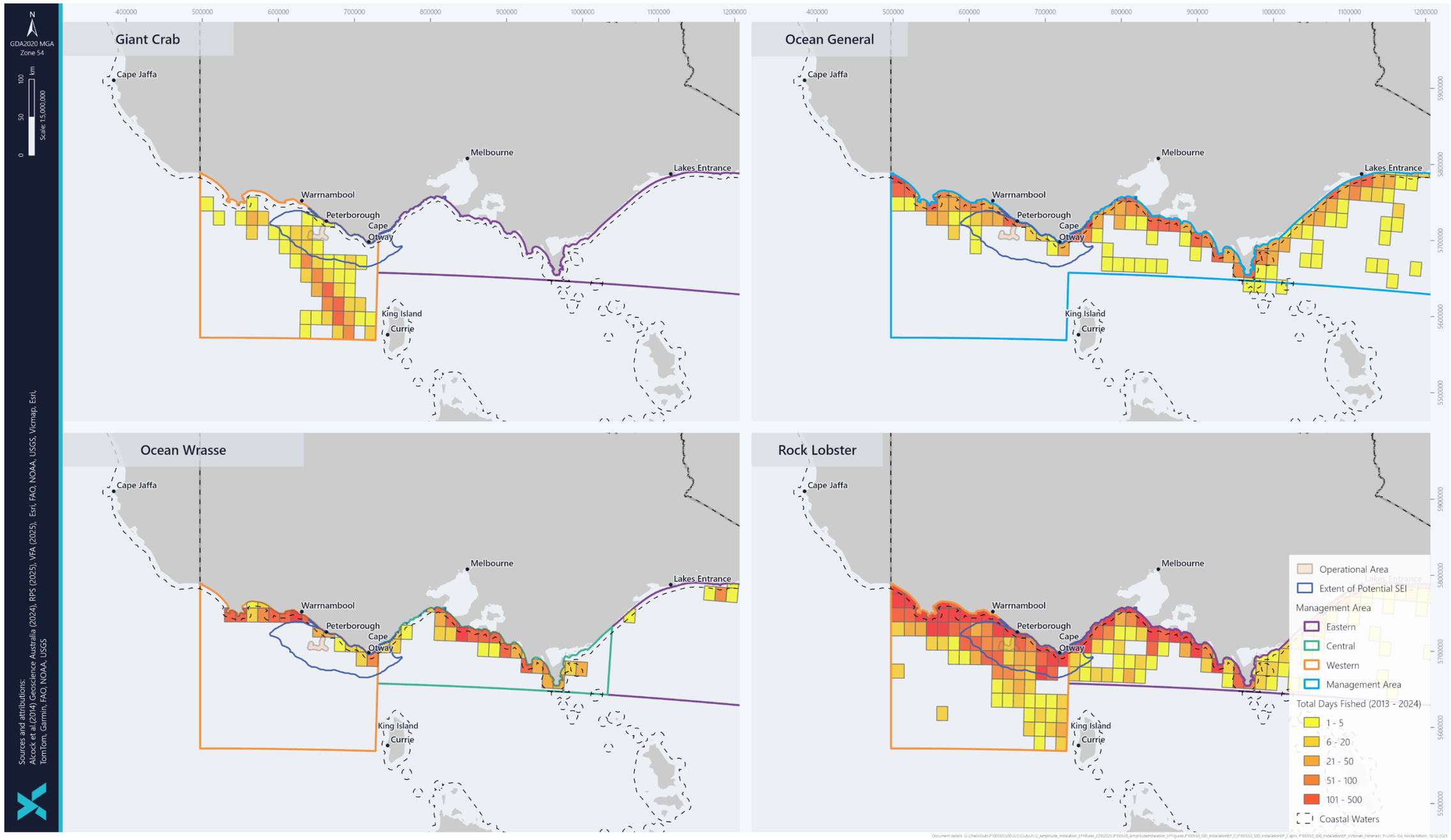


Figure 4-24: Victorian Managed Giant Crab Fishery, Ocean General Fishery, Ocean Wrasse Fishery and Southern Rock Lobster Fishery within the Extent of Potential Socio-Economic Impacts (SEI) Area

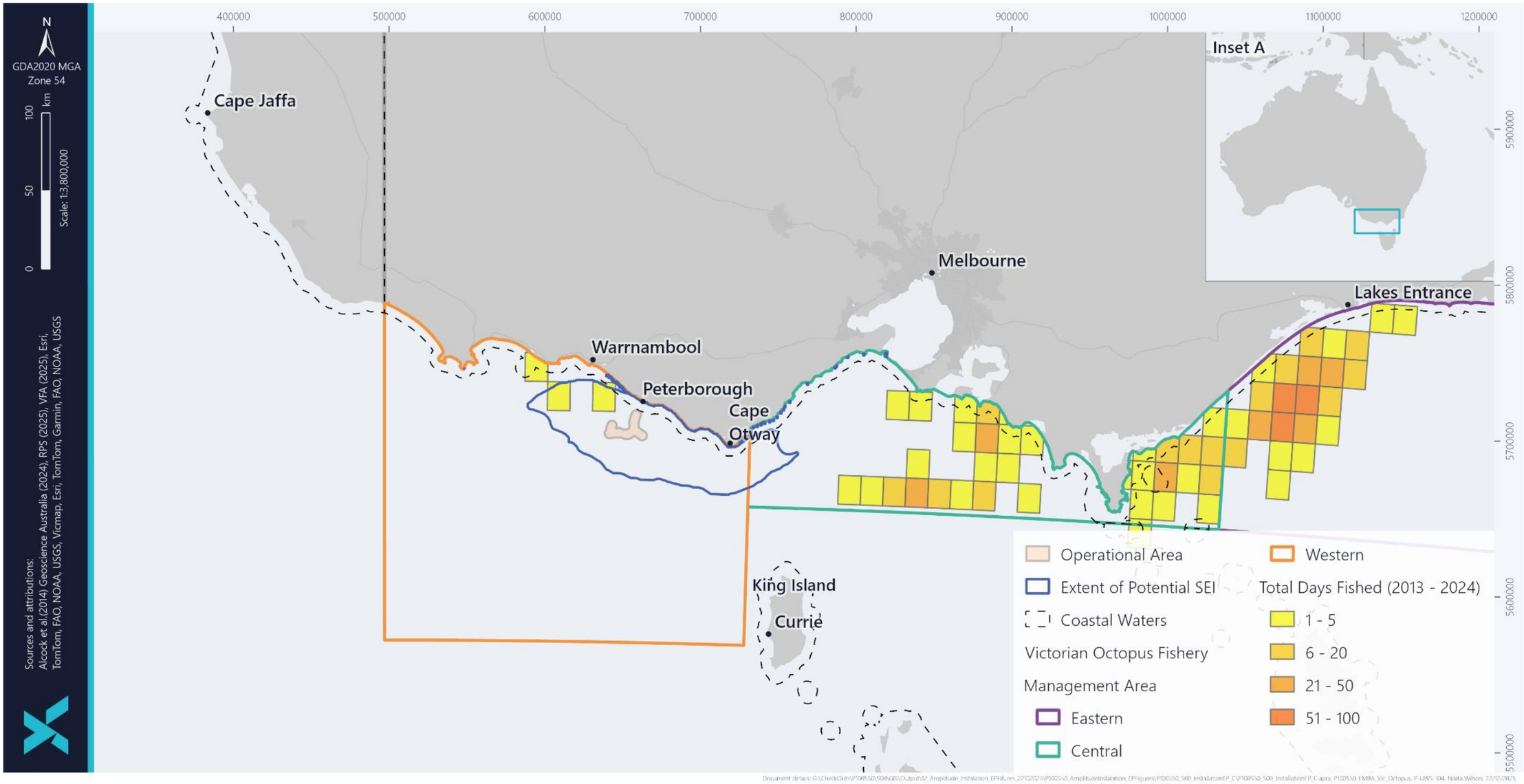


Figure 4-25: Victorian Managed Octopus Fishery within the Extent of Potential Socio-Economic Impacts (SEI) Area

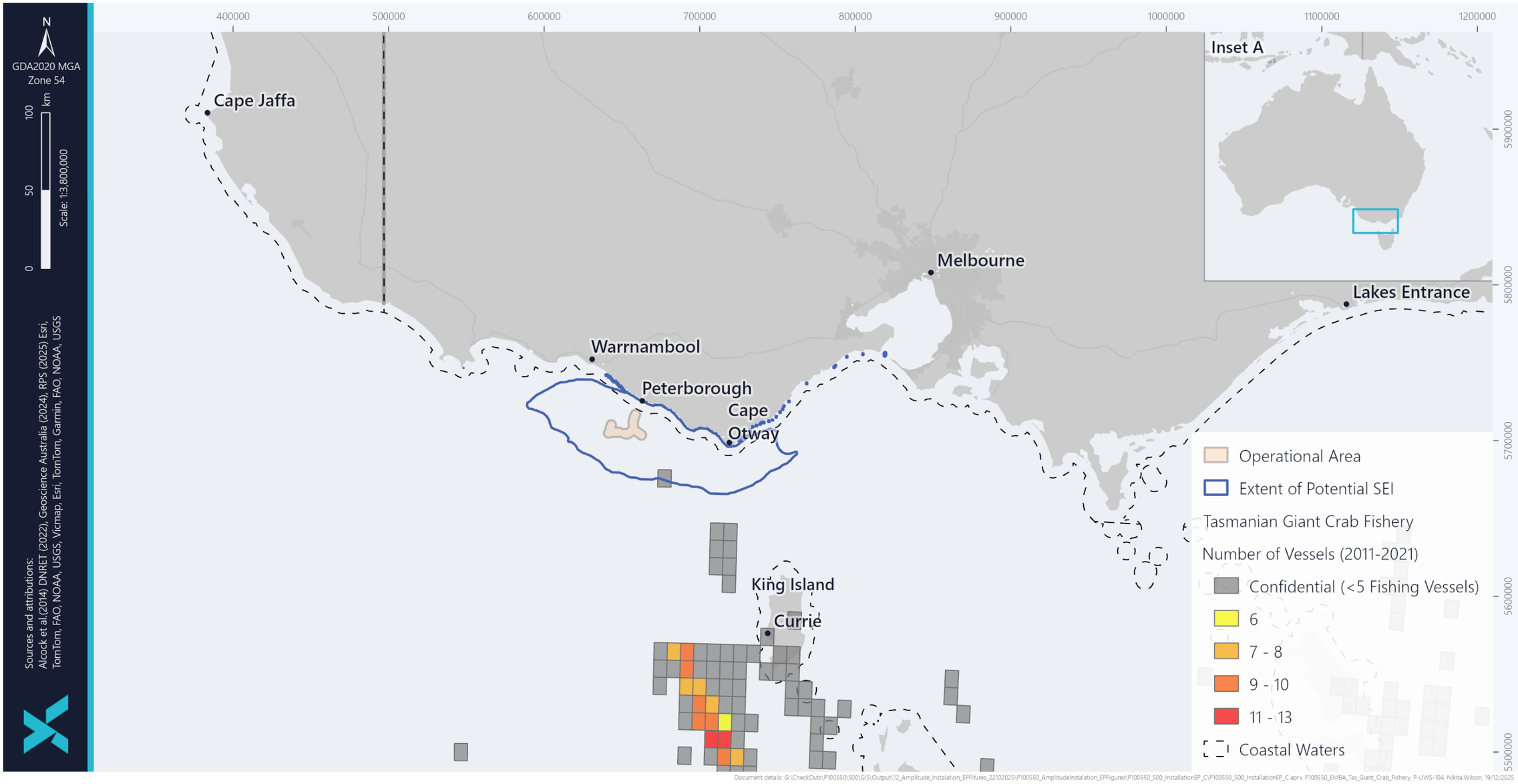


Figure 4-26: Tasmanian Managed Giant Crab Fishery within the Extent of Potential Socio-Economic Impacts (SEI) Area

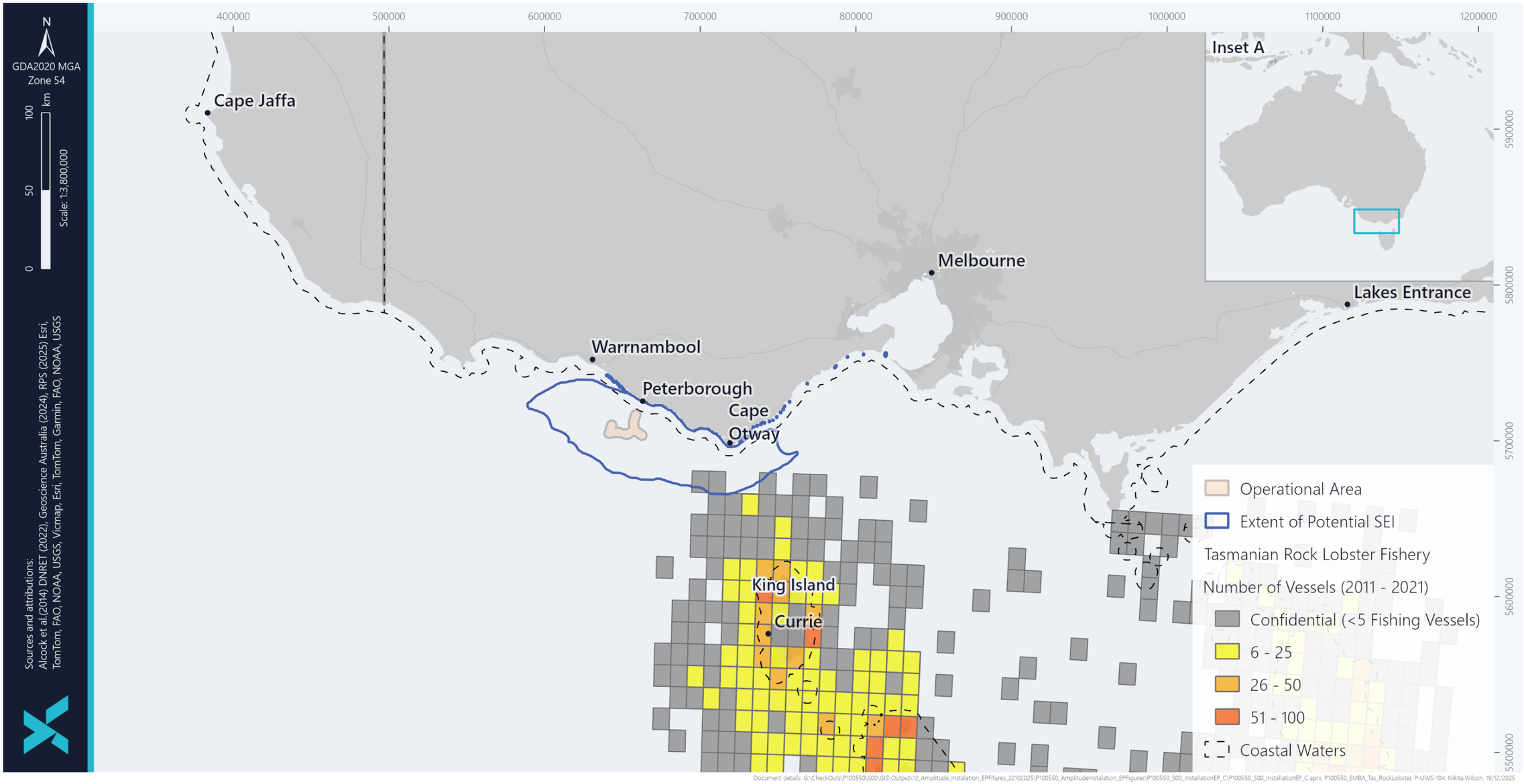


Figure 4-27: Tasmanian Managed and Southern Rock Lobster Fishery within the Extent of Potential Socio-Economic Impacts (SEI) Area

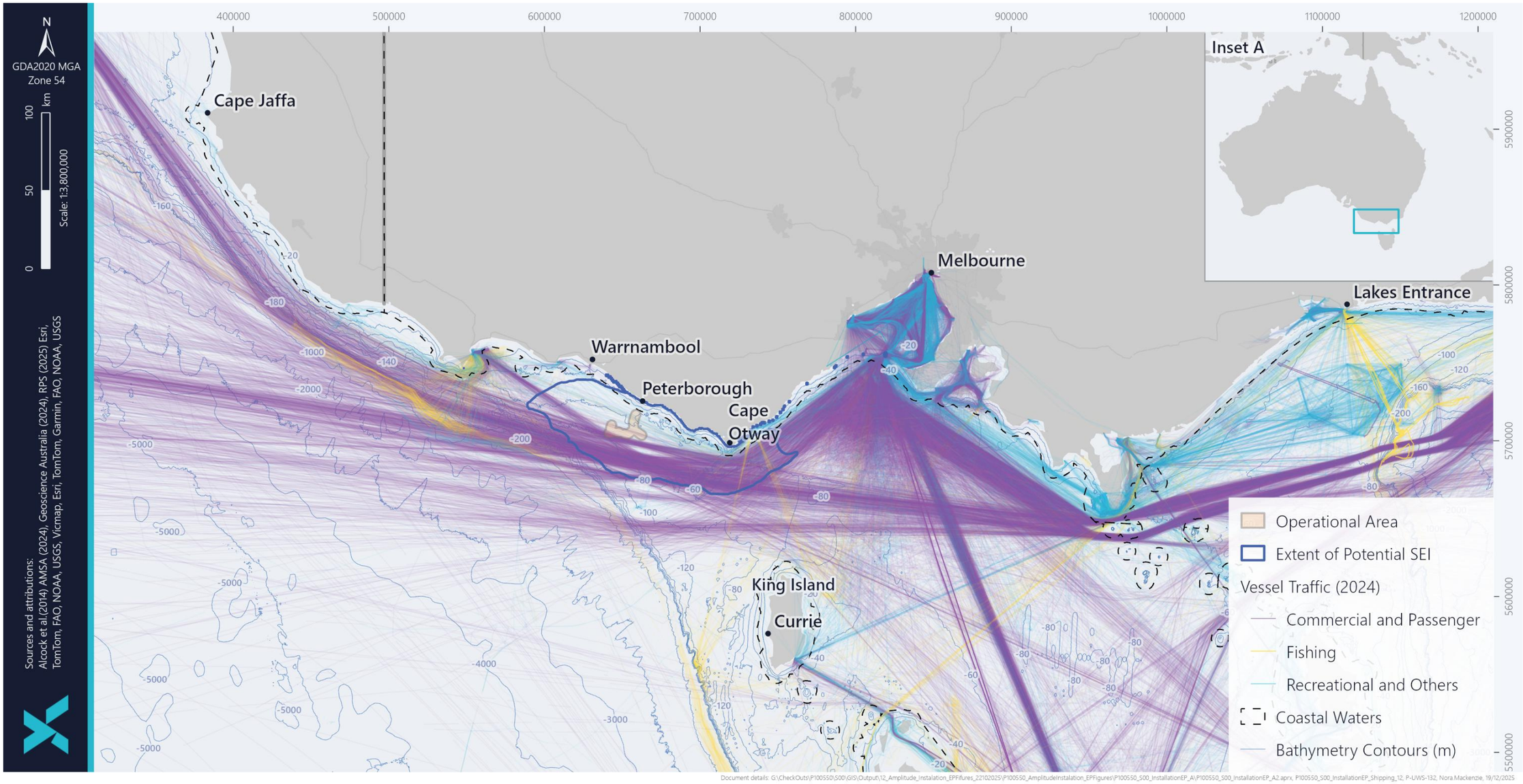


Figure 4-28: Vessel Traffic within the Extent of Potential Socio-Economic Impacts (SEI) Area

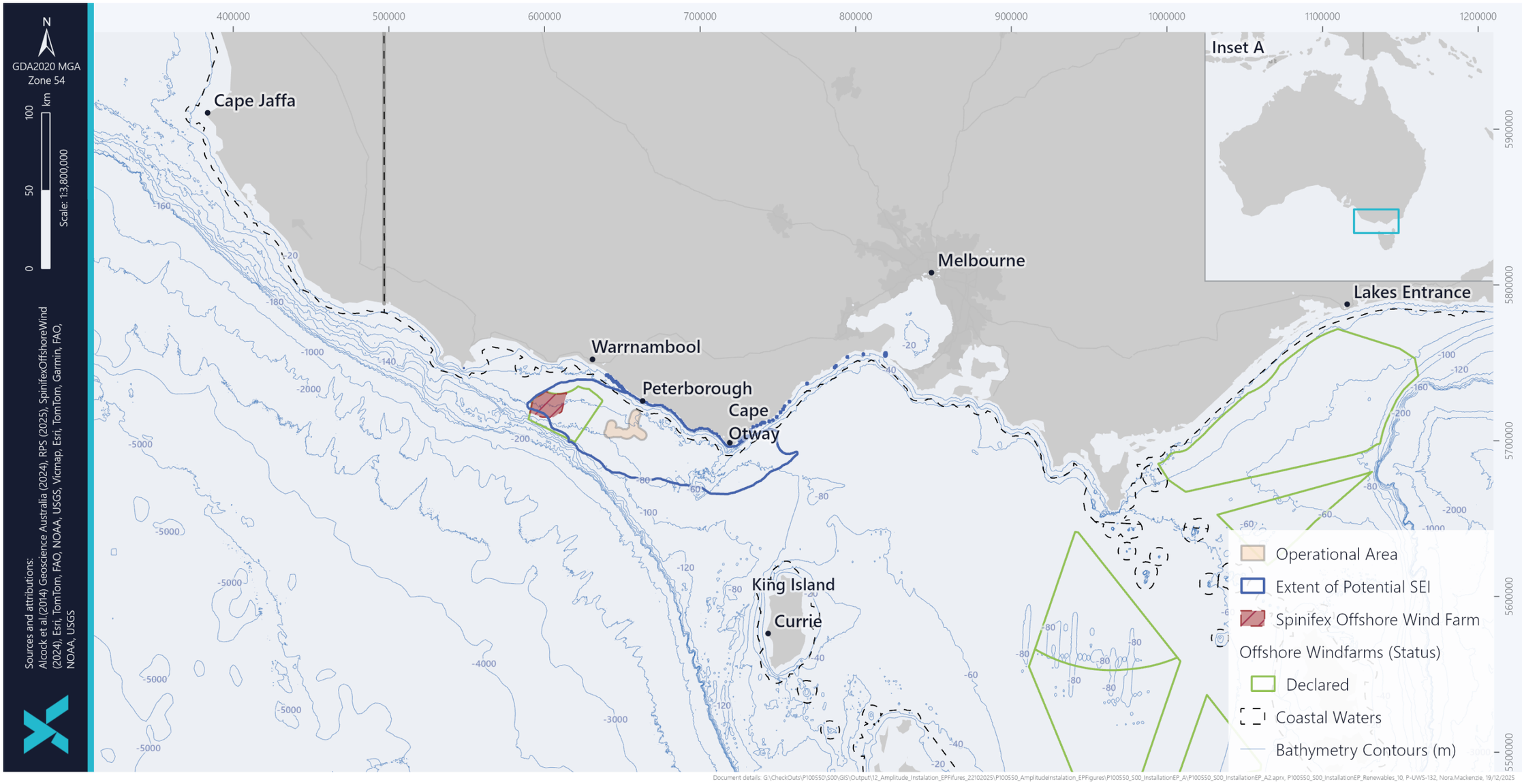


Figure 4-29: Offshore Declared Windfarms within the Extent of Potential Socio-Economic Impacts (SEI) Area

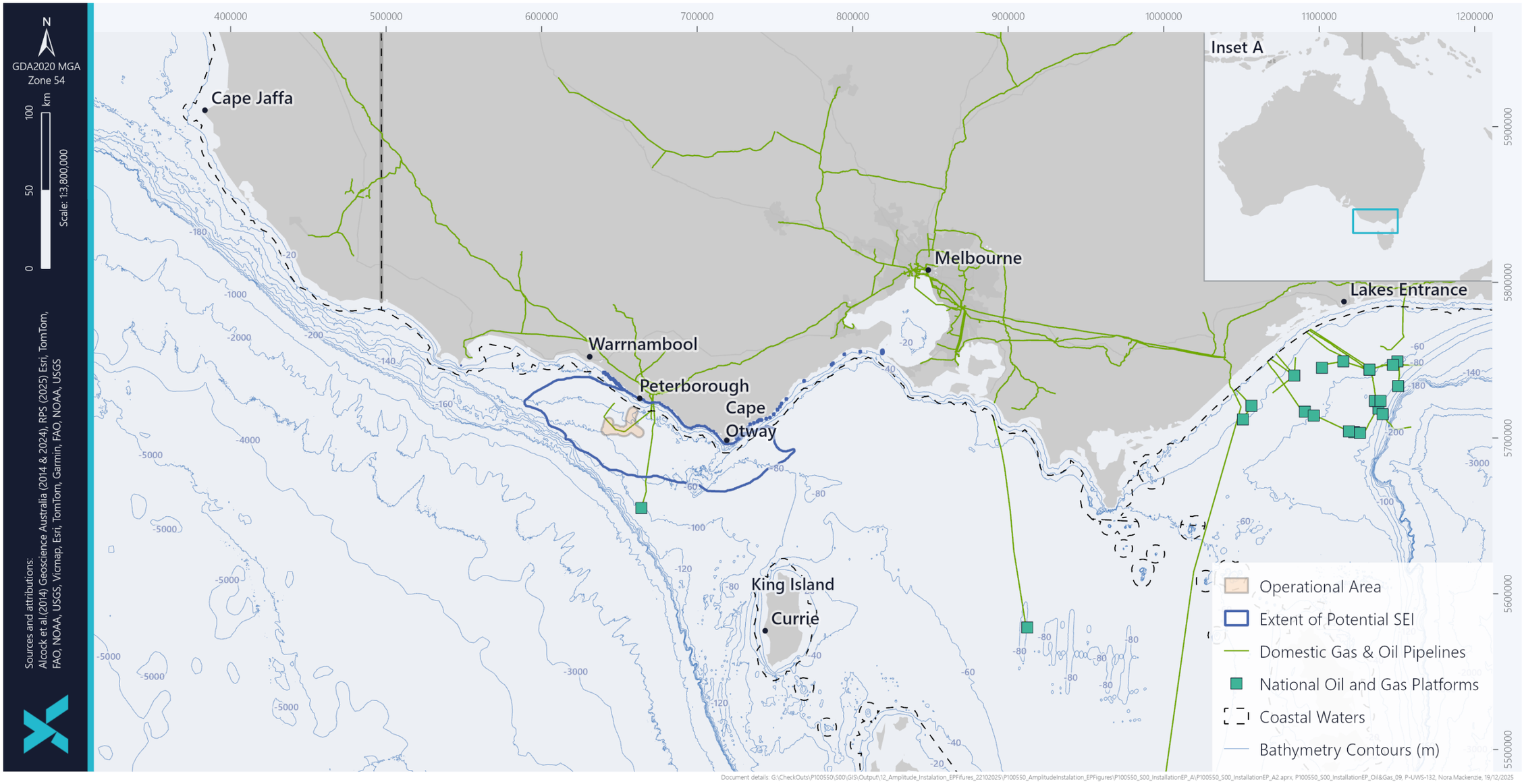


Figure 4-30: Domestic Gas and Oil Pipelines within the Extent of Potential Socio-Economic Impacts (SEI) Area

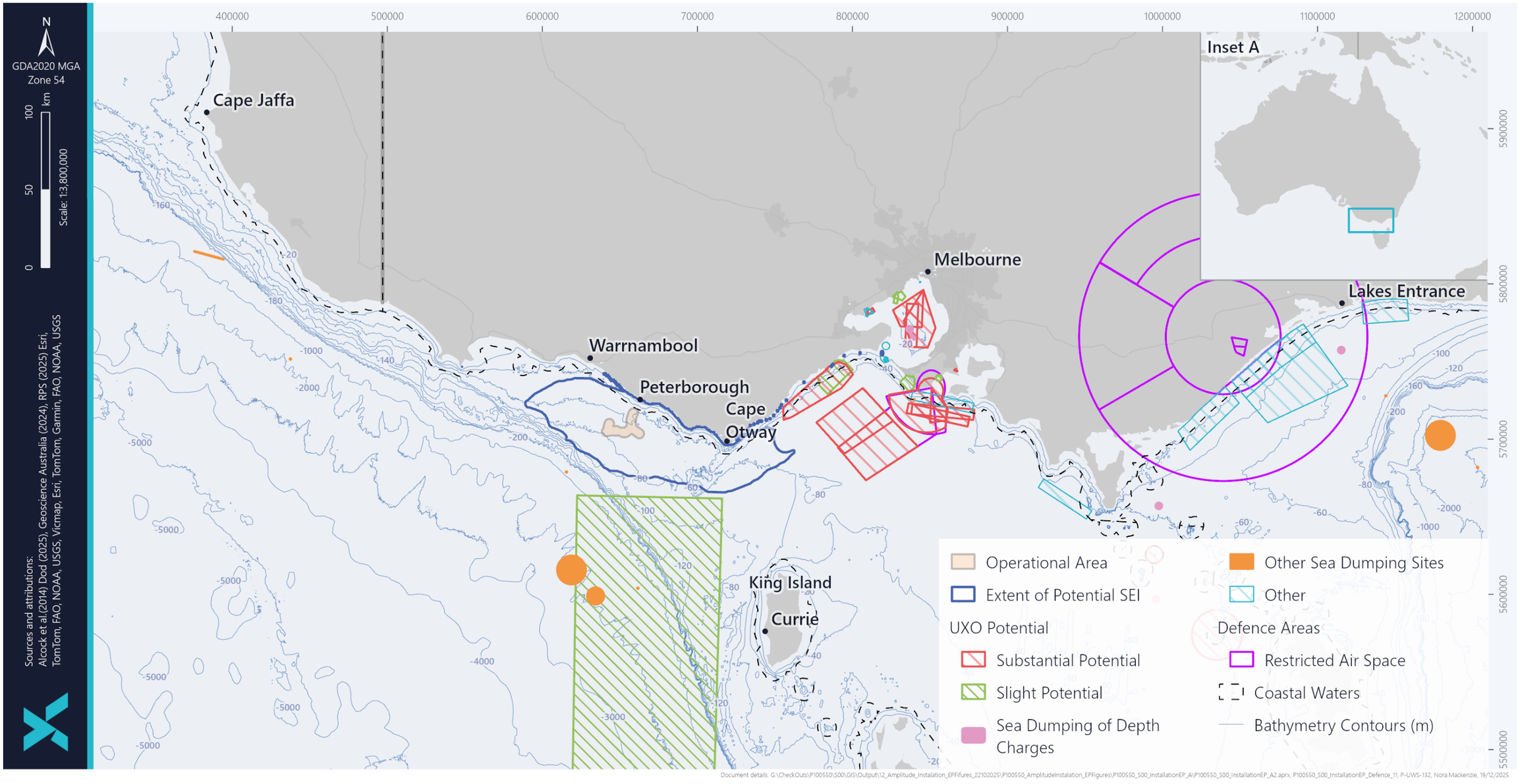


Figure 4-31: UXO Potential and Defence Areas within the Extent of Potential Socio-Economic Impacts (SEI) Area

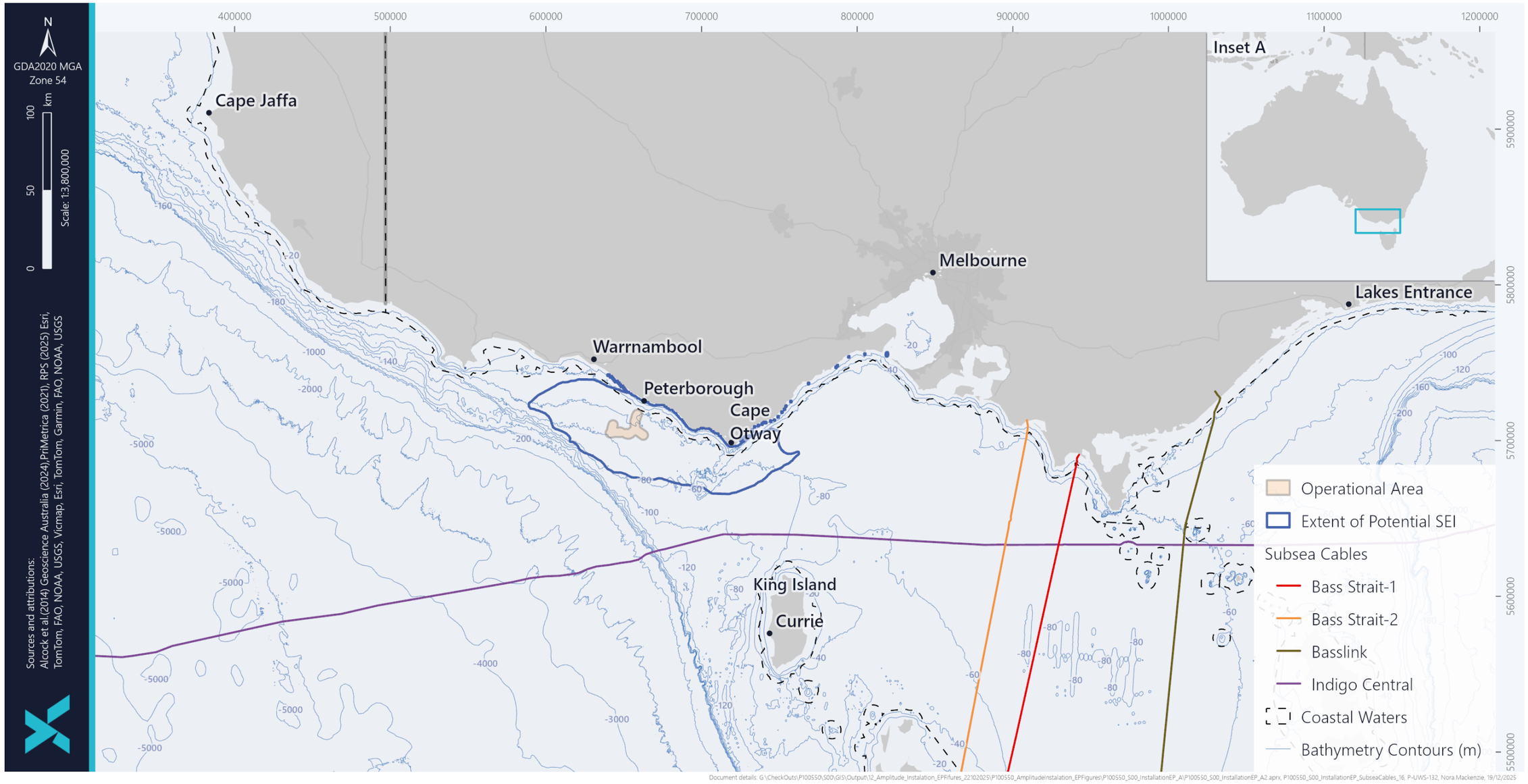


Figure 4-32: Subsea Cables within the Extent of Potential Socio-Economic Impacts (SEI) Area

4.4.4 Cultural Receptors

The cultural features of the environment may include cultural heritage sites, and values relating to First Nations people's traditional culture and customs (NOPSEMA 2024a). Guidance from the documents in Table 4-5 were used to identify tangible and intangible cultural features of the environment relating to First Nations people's heritage sites and values, as well as consultation with First Nations peoples, participation in cultural experiences and training led by Gunditjmara Guide on Gunditjmara Country.

Table 4-5: Guidance Documents used to Identify Cultural Features of the Environment Relating to First Nations People's Heritage Sites and Values

Guidance Document	Document Type	Relevance to the Otway Offshore Operations
Gunditjmara Nyamat Mirring Plan 2023 – 2033 (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023)	Gunditjmara Sea Country Plan	The Gunditjmara Sea Country Plan outlines concerns, and the changes needed to be made for Gunditjmara to fulfil responsibilities to Country. The Plan includes a framework that describes goals and priority actions to achieve those goals that were used to help define First Nations people's heritage sites and values, impacts, and demonstrate acceptability in this EP.
Eastern Maar Meerreengeeye Ngakeepoorryeeyt (Eastern Maar Aboriginal Corporation 2014)	Eastern Maar Country Plan	The Eastern Maar Country Plan includes details on cultural knowledge, values and perspectives, and ideas and priorities. The Plan defines the Eastern Maar vision for the future with identified goals and objectives that were used to help define First Nations people's heritage sites and values, impacts, and demonstrate acceptability in this EP.
Paleert Tjaara Dja Let's make Country good together 2020 – 2030 – Wadawurrung Country Plan (Wadawurrung Traditional Owners Aboriginal Corporation 2020)	Wadawurrung Country Plan	The Wadawurrung Country Plan consolidates information gathering from many Wadawurrung people including stories about Country. The Plan articulates how Wadawurrung Sea Country is cared for and managed over the next 10 years including listing values and threats to Wadawurrung values that were used to help define First Nations people's heritage sites and values, and impacts in this EP.
Gunaikurnai Whole-of-Country Plan (Gunaikurnai Land and Waters Aboriginal Corporation 2015)	Gunaikurnai Whole-of-Country Plan	The Gunaikurnai Whole-of-Country Plan provides a description of heritage, Country and threats to Country. The Plan provides a strategic framework that contains principles, strategic goals, and success measures that were used to help define First Nations people's heritage sites and values, impacts, and demonstrate acceptability in this EP.
Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) Code of Ethics for Aboriginal and Torres Strait Islander Research (AIATSIS 2020)	Methodology guide	This AIATSIS code applies to all First Nations people research including planning, collection, analysis and dissemination of information or knowledge which is about or may affect First Nations people collectively or individually.

Guidance Document	Document Type	Relevance to the Otway Offshore Operations
		This EP contains research that concerns First Nations people in the following ways: • Research about First Nations people societies, culture and/or knowledge, and policies. • Impact assessment targeted on populations of First Nations people. • New or pre-existing data relating to First Nations people is used in the description of environment and impact assessment. • Impact assessment concerns First Nations peoples' lands or waters. Through consultation, First Nations people have contributed to the research.
Australian Government Style Manual (CoA 2023)	Terminology and style guide	The Australian Government Style Manual was used to help define culturally appropriate and respectful language when writing about First Nations people. To assist in writing about potential impacts to diverse First Nations people groups, the Style Manual was used to help define respectful naming protocols, including defining the identified relevant First Nations people's heritage sites and values. For example, the term 'Dreaming' is complex and within some First Nations people groups has varied meanings. As a result, this EP refers to 'Dreaming sites' and 'connection to Country' to define dreaming stories, ceremony, song and dance and receptors which connect to traditional activities which may be connected to the term 'Dreaming'.
The Burra Charter	Terminology guide	The Burra Charter outlines the steps in planning for and managing a place of cultural significance. The Burra Charter also defines objects and places of cultural significance relevant to First Nations people's heritage sites and values.

Published Country Plans from RAPs within the extent of socio-economic impacts area describe the intrinsic links between cultural features of the environment and First Nations people's heritage sites and values (refer Table 5-5 in Appendix 4).

4.4.4.1 Native Title

Native Title is the recognition of First Nations people's rights to their traditional lands and waters, recognised by law (Native Title Act 1993). There is one Native Title claim that overlaps the extent of socio-economic impacts area (Figure 4-33):

- VC2022/002 Wadawurrung

In addition, there are 3 Native Title Determinations that overlap the extent of socio-economic impacts area (Figure 4-33):

- VCD2007/001 – Gunditjmara – Part A. Gunditj Mirring Traditional Owners Aboriginal Corporation RNTBC.

- VCD2023/001 – Eastern Maar People. Eastern Maar Aboriginal Corporation Registered Native Title Body Corporate (RNTBC)
- VCD2024/001 – Eastern Maar People (2). Eastern Maar Aboriginal Corporation Registered Native Title Body Corporate (RNTBC)

4.4.4.2 Indigenous Land Use Agreements

Indigenous Land Use Agreements (ILUAs) are voluntary agreements regarding the management of portions of land agreed upon by native title parties and others. that are overlapped by the monitoring area will be discussed below. There are 4 ILUAs that overlap the extent of socio-economic impacts area (Figure 4-34):

- VIA1999/001 – BHPP – Minerva. ILUA between BHP Petroleum Pty Ltd and the Framlingham Aboriginal Trust and the Kirrae Whurrong Native Title Group for petroleum infrastructure (pipeline) installation.
- VI2006/004 – Gunditj Mirring people and the State of Victoria ILUA between GMTOAC and the State of Victoria to grant to Gunditj Mirring Crown land of the Lake Condah Area by private treaty.
- VI2010/001 – Gunditj Mirring Non-Extinguishment Principle. ILUA between the State of Victoria and Gunditj Mirring Traditional Owners Aboriginal Corporation RNTBC.
- VI2015/002 – Gunditjmara – SEAGAS Port Campbell VIC to Torrens Island SA Pipeline. ILUA between South East Australia Gas Pty Ltd, Eastern Maar Aboriginal Corporation and GMTOAC for hydrocarbon exploration and extraction.

4.4.4.3 First Nations Cultural Features of the Environment

Table 4-6 lists the identified cultural features of the environment relating to First Nations people's heritage sites and values within the operational area and the extent of socio-economic impacts area. The cultural ties and intrinsic link between the identified cultural features and First Nations people's heritage sites and values are also described and are informed by sources mentioned above.

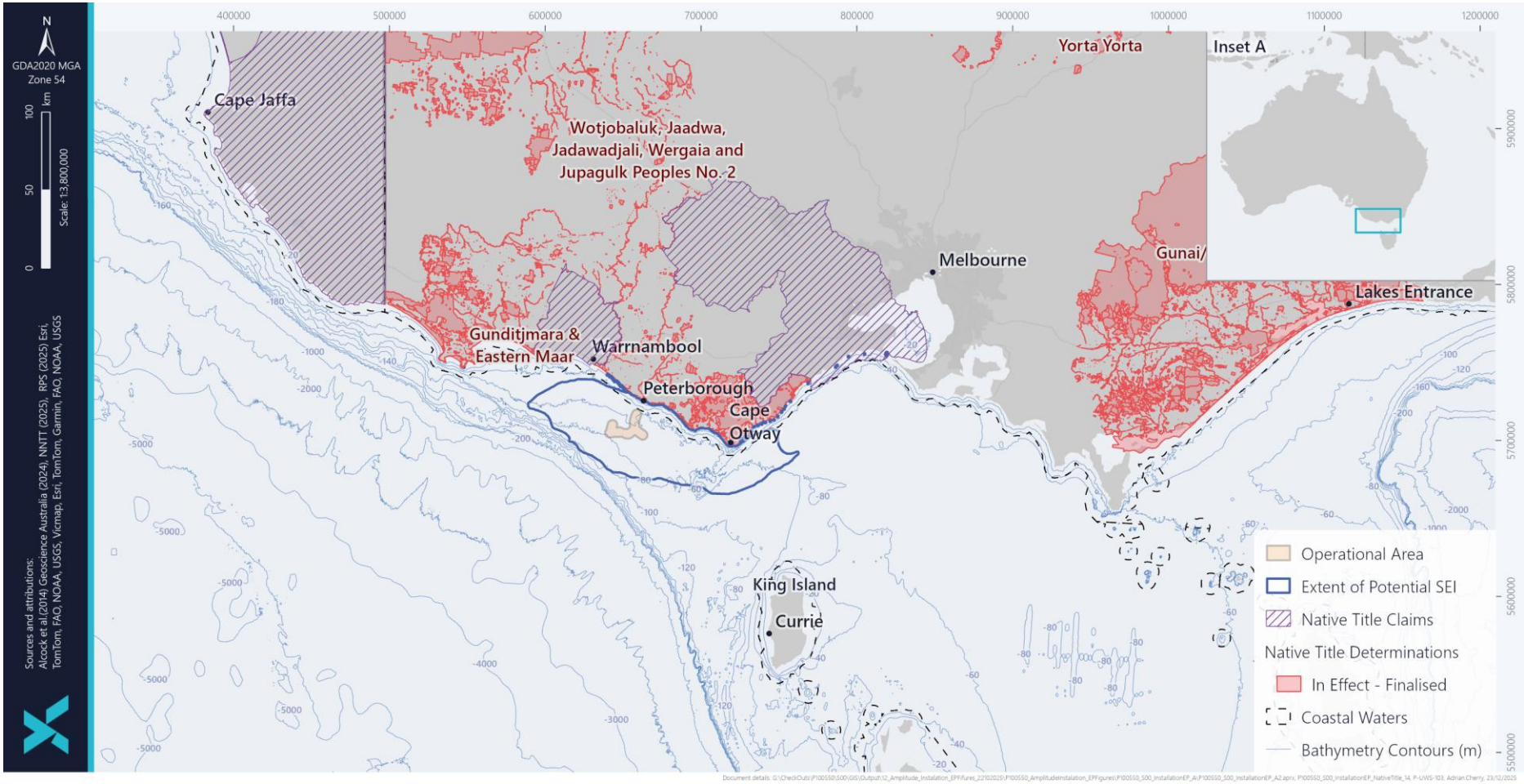


Figure 4-33: Native Title Claims and Determinations within the Potential Extent of Socio-Economic Impacts (SEI) Area

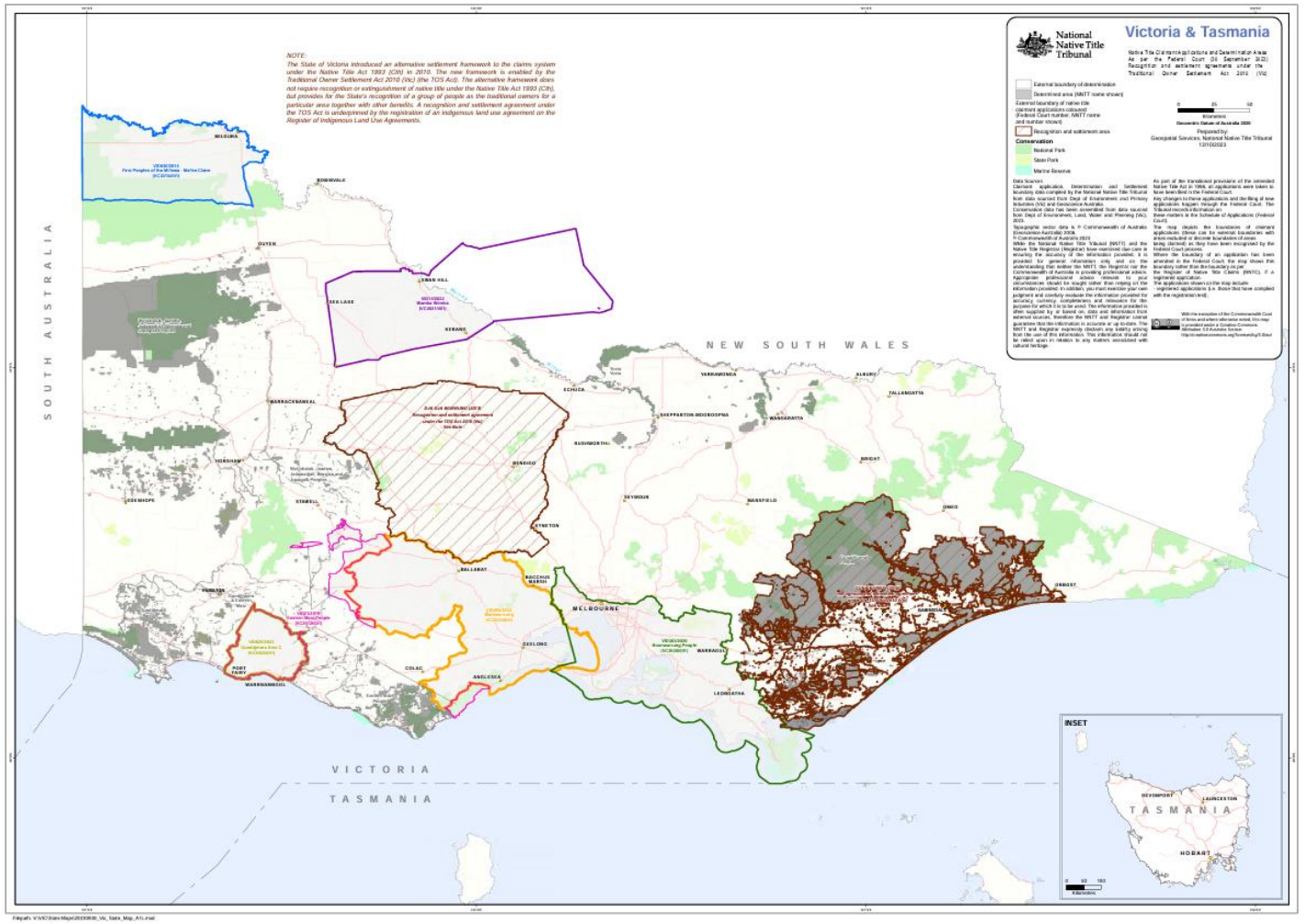


Figure 4-34: ILUAs within the State of Victoria (NNTT 2025)

Table 4-6: Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values proximal to Amplitude Energy Offshore Title Areas

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
Tangible Cultural Heritage (e.g. places, objects)						
Gunditj Mirring	Gunditjmara	Coastal/ island places and objects	Victoria-wide A search of the Victorian Aboriginal Heritage Register undertaken by Biosis identified 5,636 recorded Aboriginal places across the entire Victorian coastline (Biosis 2023). The dominant Aboriginal places located in the study area are shell middens (46.82%), artefact scatters (39.21%) and low-density artefact distribution (LDADs) (5.70%). Shell middens, artefact scatters and LDADs are considered cultural heritage objects for the purposes of this EP. Review of relevant Country Plans found 5 coastal/island places within Victoria that are considered significant locations: • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park • Wilsons Promontory • Tyrendarra lava flow. **Deen Maar** Deen Maar includes Deen Maar IPA on mainland Victora, near the town of Yambuk, and Deen Maar Island (Julia	1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 14	-	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
			Percy Island), approximately 10km off the coast of Yambuk. Deen Maar is Central to the creation of Country and has been important in burial rituals for First Nations Peoples (see below 'sacred sites' which discusses the Intangible values of Deen Maar). Dean Maar Island was formed by volcanic eruptions millions of years ago. The island comprises a grassy plateau above steep rocky shores that are exposed to the ocean. Access to Deen Maar Island requires a permit. A rabbit eradication program is currently planned for the island in a collaboration between Victoria State government, EMAC and GMTOAC (Parks Victoria 2023). There is a large fur seal colony which inhabits the rocky shore, which is identified as a culturally significant species, and little penguins, that access the island via the exposed rocky shore. The land above the shore around Yambuk on the mainland includes natural surface (rainwater collecting) wells used by First Nations Peoples, property run by first nations peoples, and wind turbines which have been developed around existing cultural features (ACMI 2010). **Tyrendarra lava flow** The Tyrendarra lava flow is related to both the tangible and intangible, in that it is both a physical thing that was			

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
			and still is used by Gunditjmara, and it is linked to stories of creation. Within the GMTOAC` Sea Country Plan, and during consultation, GMTOAC shared stories of the creation of the Tyrendarra lava flow which is associated with the World Heritage listed Budge Bim aquaculture system (GMTOAC 2023). This lava flow begins at Mt Eccles and extends across coastal plains and offshore 5-10 km to the east of Portland at Julia Reef (Builth, 2004). Recent lava flows like Tyrendarra (circa 30,000 y) are linked to stories of creation, and these landforms have been engineered by Gunditjmara for thousands of years into aquaculture systems, enabling the collection, fattening up, harvest and trade of Kooyong (short-finned eel), a culturally significant species (described further below).			
Gunditj Mirring	Gunditjmara	Submerged sites	Review of relevant Country Plans identified potential submerged sites significant to First Nations people including the ancient Land Bridge (Figure 4-35), submerged landscapes (lava flows), and underwater cultural heritage sites. Sea Country is considered to extend beyond the formally defined RAP area to include sea and submerged lands to the edge of the continental shelf which may include submerged landscapes, and extensions to landscape features such as the Tyrendarra lava flow which extends offshore; these young (circa 30,000) lava flows are connected to stories of creation.	1, 2, 3, 4, 5, 6, 9, 10	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
			The potential for lava flows within Cooper Energy's operated offshore Otway acreage was investigated by evaluating high-quality 3D seismic imagery (Cooper Energy internal review, May 2024). The review found no geological evidence of volcanic or hydrothermal flow events within the sedimentary record of the past 500,000 years within Cooper Energy's operated offshore Otway acreage. As a result, the presence of young lava flows within the operational area is not expected. The Gunaikurnai community have identified that 10,000 years ago, Victoria was connected to Tasmania by a land bridge. At this time, the marine parks and reserves around Wilsons Promontory were terrestrial habitats, inhabited by Gunaikurnai ancestors. It is estimated that rising sea levels at the end of the Ice Age (~14,000 years ago) flooded most of the Bassian Land Bridge, leaving the shallowest crossing readily passable on foot in an area east of Wilsons Promontory in Victoria and north of Hogan Island (located outside of the Otway Basin, in the Bass Strait). Based on bathymetric and topographic data of the land and seafloor of the Bass Strait, ~12,000 years ago, the Bassian Land Bridge was estimated to be completely submerged. The original surface of the Land Bridge is likely to have been eroded and removed, with any remaining artefacts likely buried beneath sediment deep below the ocean. Rising sea levels following the last glacial maximum and the known sea states of the Otway Coast (water depths and velocities) would make			

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
			preservation of any "recently" buried anthropogenic structures or sites highly unlikely.			
Intangible Cultural Heritage (e.g. meanings, associations, connections)						
Gunditj Mirring	Gunditjmara	Sea Country	RAPs have defined area boundaries which extend to coastal waters. However, Sea Country is considered to extend beyond the formally defined RAP area to include sea and submerged lands to the edge of the continental shelf (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023; Eastern Maar Aboriginal Corporation 2014; Gunaikurnai Land and Waters Aboriginal Corporation 2015). Sea Country is an intrinsic value to First Nations people. It includes parts of open ocean, beaches, land and freshwater on the coast, habitats and encompasses all living things, beliefs, values, creation spirits and cultural obligations connected to an area.	1, 2, 3, 4, 5, 6, 7, 11, 12, 15	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					
Gunditj Mirring	Gunditjmara	Creation/ Dreaming sites, songlines, sacred sites and Ancestral beings	Stories and songlines link First Nations people to ancestors, culture, and Country. Dreaming stories further reinforce the memories and songlines relating to the flooding of Country, and significant connection to Sea Country. Dreaming songlines link tribal kings such as Umbarra or King Merriman to Wallaga Lake, and Borun the pelican who created songlines and storylines as he walked through Gunaikurnai Country. Gunaikurnai creation story,	1, 2, 3, 4, 5, 6, 12, 15	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
			of Borun (the pelican) and Tuk (the musk duck), explains the connection to Country. For Gunditjmara, sites important for Dreaming include Deen Maar where Ancestors leave the earth. Deen Maar Island is believed to be the place where Punjil the creator, left this world (Framlington Aboriginal Trust and Winda Mara Aboriginal Corporation (2004), ACMI (2010). Clark (2007) describes the story of a cave on the mainland, opposite Dean Maar Island, and of a passage between the two. The Cave and Deen Maar are both spiritually and visually connected. Grass found at the mouth of the cave provided proof that a good spirit had transferred the body of a recently buried person through the cave to Deen Maar Island and conveyed their spirit to the clouds. See Coastal / Island / Places for a physical description of Deen Maar Island.			
Gunditj Mirring	Gunditjmara	Cultural obligations to care for Country Knowledge Systems Connection to Country	First Nations people may maintain strong spiritual ties to Country. Spiritual connection to Country includes how Country provides spiritual life-giving resources for species and landscapes, places where the spirits of Ancestors rest (Deen Maar) or where spirits reside including water bodies; where peace, direction and purpose originates. If First Nations peoples cannot access areas of Sea Country that they typically do access, this may affect Traditional Owners connection to Country. In the case of Deen Maar, access could be visual access or physical access.	1, 2, 3, 4, 5, 6, 11 12, 13, 14	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
			First Nations People may be culturally obligated and inherently responsible to care, protect and heal Country for present and future generations. The roles held relating to taking care of Country and knowledge holding may vary amongst individuals and within clans and family groups. Roles may include taking care of culturally significant species or habitats of significant species known to be important food resources, and culturally significant landscapes and places. First Nations peoples ecological, spiritual, traditional and cultural knowledge may be passed through the generations using cultural practices (dreaming stories, ceremony, song and dance) where knowledge holders (Elders) are the custodians of knowledge. This knowledge may include culturally significant species, and landscape features that hold dreaming and creation stories or are events and ceremonial places critical for intergenerational knowledge sharing and cultural practice. Knowledge holders have responsibility for traditions, observances, customs or beliefs associated with specific areas.			
Habitats and species						
Gunditj Mirring	Gunditjmara	Culturally significant species/ food resources:	Fish, sharks, eels, crayfish, yabbies mussels, oyster and rays may be a valued source of food and hold significance for First Nations people.	1, 2, 3, 5, 4, 6, 11, 12, 13	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
Gunaikurnai Bunurong	Gunaikurnai Bunurong	Fish, sharks, rays, eels, shellfish and crustaceans -collection from coastal and riverine environments.	GMTOAC have highlighted short-finned eels (Kooyang) as of particular significance to Gunditjmara people, who developed complex aquaculture systems to trap and store eels. The aquaculture systems were engineered from the volcanic formations associated with the Tyrendarra Lava flow to create Budj Bim. The eels which are a valued source of food, were captured, fattened up, harvested, smoked and traded, and continue to hold cultural significance for Gunditjmara. Today there are cultural tours at Budj Bim, run by Gunditjmara peoples. The short-finned eel species migrates through State waters and Commonwealth Marine Area of the Otway Region between freshwater systems in Victoria including within Gunditjmara Country, to / from spawning grounds in the Coral Sea, thousands of km to the north. Based on the observed migratory route of short-finned eels, short-finned eels in adult and glass eel forms may pass the operational area during seasonal migrations. During late summer and autumn adult eels will enter the Otway Basin and Bass Strait to commence their migration to the Coral Sea. During mid-winter to late spring, the short-finned eel in larvae and glass eel forms will enter Victorian estuaries to complete the upstream migration. Upon entering the marine environment, eels disperse widely. Individuals' migratory paths are known to diverge widely, and timing of arrival in the Coral Sea is also variable.			

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
Gunditj Mirring	Gunditjmara	Culturally significant species: Cetaceans	First Nations people around Australia may have a strong connection to whales, which has significance as totemic ancestors to some groups. Karntubul (whales) in Sea Country hold deep cultural significance to the Gunditjmara and feature in Dreaming stories, ceremony, song and dance traditions. Whale migration occurs through the operational area and extent of socio-economic impacts area. Whale migration is associated with the belief that whales are ancestors of some First Nations peoples and arrive to the coast, annually. Key whale species which may relate to a practice of 'calling in' the whales back to the coast are the southern right whale, which reproduce close to shore, and are often observable from shore, though other whales can also be observed from shore, including humpback whales. Whale beaching events may be of significance to First Nations people, as parts of deceased whales were, and can still be used as a resource. Multiple whale species have the potential to beach in the region, including, though not limited to the southern right whale, pygmy blue whale, and humpback whale.	1, 2, 3, 8, 12, 15	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Wadawurrung	Wadawurrung			1, 2, 4, 15	✓	✓

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
Gunaikurnai	Gunaikurnai	Culturally significant species: Pinnipeds	Koorn Moorn (seals) are culturally significant for Gunditjmara people. They feature in song and dance and were collected as a food resource in traditional times by Gunditjmara women along the coast. The Australian sea-lion, southern elephant seal, New-Zealand fur seal, and Australian fur seal are known to occur within the extent of socio-economic impacts area, including a large colony of Fur Seals at Deen Maar Island that haul out on the island's rocky shores.			
Gunditj Mirring	Gunditjmara	Culturally significant species: Seabirds	Different avian species hold deep connections to lore and represent spiritual emblems or totems. Magpie geese and Cape Barren geese were harvested for food from wetland habitats. Wetland habitat loss has reduced numbers of these species and harvesting is not permitted in Victoria.	1, 2, 3, 4, 5, 6, 8	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					
Gunditj Mirring	Gunditjmara	Culturally significant species: Plankton	The Bonney upwelling system is valued by Gunditjmara for the cold waters and nutrients it brings to the region, which supports plankton growth, providing a food source for culturally significant species (GMTOAC 2023). The Bonney upwelling is a large-scale oceanographic system and key ecological feature that influences the Otway coast (Section 4.4.3) the feature is active in Autumn and Summer depending on the strength and frequency of alongshore winds (Bulter et al. 2002). The area is significant as one of the largest and most predictable upwellings in south-eastern Australia, and	1	✓	✓

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
			most prominent upwelling system driven by prevailing south-easterly winds			
Gunditj Mirring	Gunditjmara	Water quality	Water, including marine and freshwater systems, may be of particular cultural significance to First Nations people as an integral part of songs, ceremonies, hunting and collecting, and other activities that bind people to their Country and each other. First Nations communities in Victoria may maintain strong connections to water and culture. Increased pollution from coastal communities, agriculture and industry, may affect water quality, impact marine species and therefore harms Country.	1, 2, 3, 4, 5, 6	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					
Gunditj Mirring	Gunditjmara	Benthic habitats	Nearshore reefs provide habitat for many culturally significant species such as macroalgal communities, fish, sharks and rays. Julia Reef is within sea country adjacent to Gunditj Mirring RAP and is an extension of the volcanic feature connected to Budj Bim. Julia Reef marks the seaward extent of the Tyrendarra lava flow, ending approximately 15 km offshore and 10-15km east of Portland (Builth, 2004). Julia Reef is a preferred fishing spot for recreational fishers (VFA 2022a).	1	-	✓
Gunditj Mirring	Gunditjmara	Intertidal communities and shorelines	Intertidal communities and shorelines include mangroves, macroalgae, seagrass, coastal saltmarsh, rocky and sandy shorelines. Intertidal reefs and sandy shorelines are important cultural heritage sites and are important for marine fauna and culturally significant marine life such as seabirds and	1, 2, 3, 4, 5, 6	-	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
			migratory shorebirds, fish, sharks, rays, eels, and pinnipeds. Sea Country for Wadawurrung people includes coastal habitats such as seagrass and saltmarsh.			
Gunditj Mirring	Gunditjmara	Marine Park/ coastal reserves / wetlands	The First Nations people residing within the extent of socio-economic impacts area may have strong cultural associations with Sea Country and may have cultural responsibilities for the waters and Marine Parks and Reserves that are located within Country. Some First Nations groups including the Gunaikurnai people have joint management over the Marine Parks and reserves within Country. Marine parks and reserves around Wilsons Promontory and Ninety Mile Beach National Park were inhabited Gunaikurnai ancestors. Marengo Reef Marine Park holds cultural significance for the Eastern Maar people. The marine park includes rocky features with high structural diversity, and provides for numerous filter-feeding organisms, such as tube worms and barnacles, and are surrounded by bull kelp. Islands within the park are known as a haul out site for fur seals. Wadawurrung Country covers the Avalon Coastal reserve.	1, 2, 3, 4, 5, 6, 11, 12	-	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

Sources:

1. Gunditj Mirring Traditional Owners Aboriginal Corporation 2023
2. Wadawurrung Traditional Owners Aboriginal Corporation 2020
3. Eastern Maar Aboriginal Corporation 2014
8. Parks Victoria 2019
9. Adeleye et al. 2021
10. Hamacher et al. 2023
11. Smyth, Egan, & Kennett 2018.

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of extent of socio-economic impacts area
4. Gunaikurnai Land and Waters Aboriginal Corporation 2015 5. Biosis 2023 6. Bunurong Land Council Aboriginal Corporation 2024 7. The University of Adelaide 2023.				12. Nunn and Reid 2016 13. DoE 2015b 14. Victorian Aboriginal Heritage Council 2021 15. Director of National Parks 2025.		

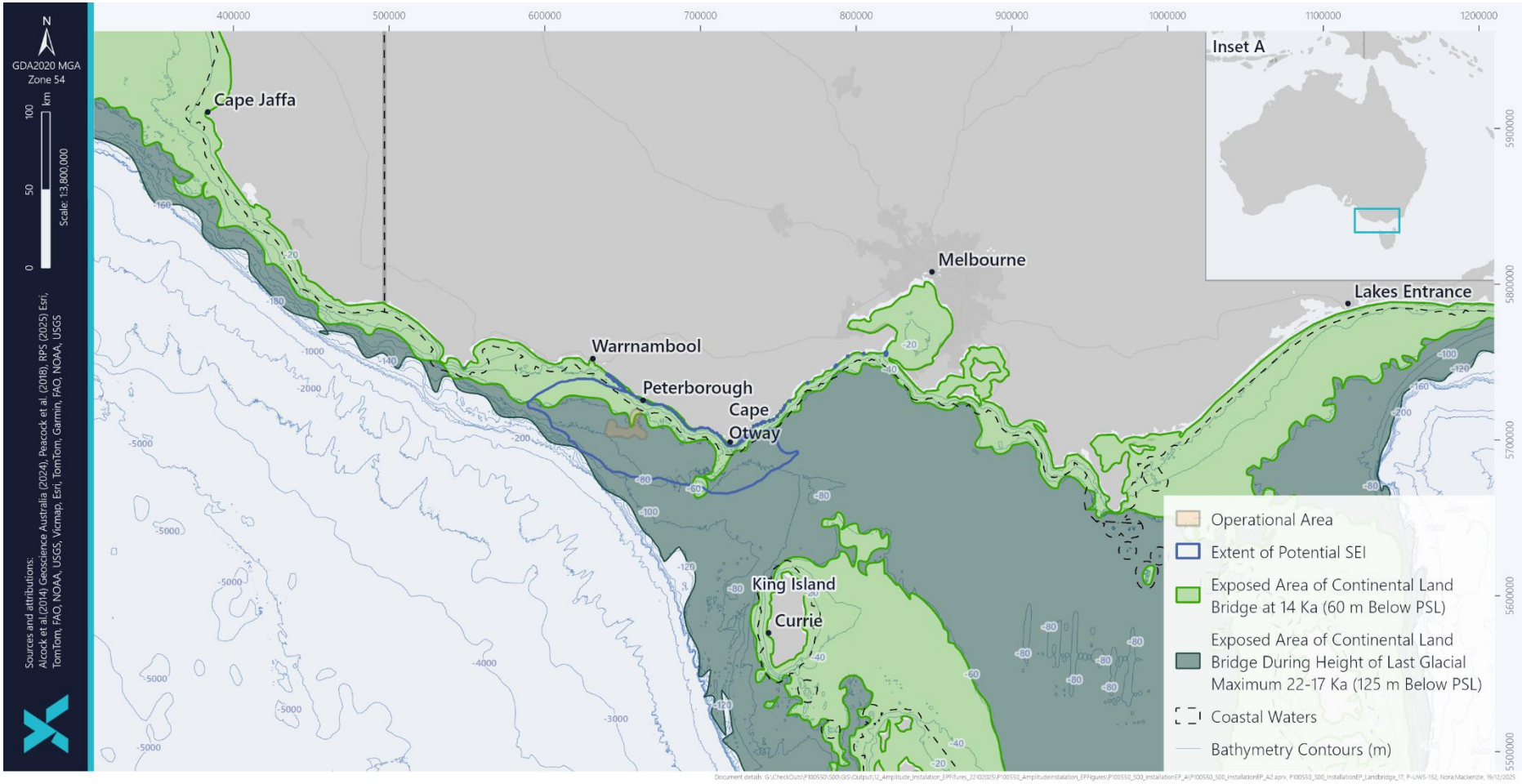


Figure 4-35: Exposed Area of Continental Bassian Land Bridge within the Extent of Socio-Economic Impacts (SEI) Area

4.4.5 Seasonality of Key Sensitivities

Table 4-7: Seasonality of Key Sensitivities within the Otway Basin

Environmental Sensitivity	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Marine Mammals												
Antarctic minke whale				Likely to occur in the austral summer								
Australian sea lion	Assumed present year-round – South-east marine region (SEMR) is a known range											
Australian fur seal (Koorn Moorn)	Present year-round – Islands of the Bass Strait are known colonies Breeding occurs during summer months (October-December)											
Pygmy blue whale		Foraging occurs during Bonney Upwelling – BIA										
Dusky dolphin	Assumed present year-round – prefers inshore habitats but may also be pelagic at times											
Fin whale	Present during the Bonney Upwelling events											
Humpback whale				Nth Migration through SEMR							Sth Migration through SEMR	
Killer whale	Assumed present year-round – frequent sightings off Vic along the continental slope and shelf											
Pygmy right whale	Uncommon / few or no records available for Vic.											
Sei whale	Sighted during the Bonney Upwelling event											
Southern right whale – migration				Species is regularly present on the Australian coast between early-April to early November								

Environmental Sensitivity	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Southern right whale – reproduction								Peak reproductive behaviours mid-July through to August				
Sperm Whale	Prefer deep offshore environments >600 m											
Marine Reptiles												
Green turtle	Occurs in limited numbers in Vic and SA											
Leatherback turtle	Foraging in the SEMR is known to occur											
Loggerhead turtle	Uncommon in southern Australia											
Fish, Sharks and Rays												
Kooyang (Short finned eel)		Adult eels begin seasonal migration to the Coral Sea.					Larvae and glass eel forms enter Victorian estuaries to complete upstream migration.					
Australian grayling		Spawning from late Summer to Winter (freshwater)				Assumed present year-round – typically occurs in freshwater but can occur in coastal seas						
White shark	Assumed present year-round with distribution and foraging BIAs identified throughout the region											
Blue warehou	Assumed present year-round											
Eastern school shark	Assumed present year-round											
Orange roughy	Assumed present year-round											
Avifauna												
Antipodean albatross	Foraging known to occur all year											
Australasian gannet							Present year-round – foraging and aggregation BIAs					Breeding occurs Oct – May
Black-browed albatross				Fledglings (Apr – May)			Present – foraging BIA			Breeding within SEMR on Macquarie Is.		
Black-faced cormorant	Assumed present year-round (endemic to southern Australia)											

Environmental Sensitivity	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Buller's albatross	Foraging BIA – however, records indicate the species is mainly present around Tas when in the SEMR (species endemic to NZ)											
Campbell albatross					Present in the non-breeding season – foraging BIA			Breeds on Campbell Island, south of NZ Aug - May				
Common diving petrel		Present year-round – foraging BIA						Breeding occurs Jul-Jan – breeding BIA				
Indian yellow-nosed albatross			Fledgling Mar-Apr			Non-breeding visitor – foraging BIA			Breeding occurs in South Africa – eggs laid in Sep-Oct			
Little penguin				Present year-round – foraging BIA					Breeding Sept – Feb			
Short-tailed shearwater (mutton bird)	Present Sep-May – foraging BIA						Migrates north for Winter			Breeding Oct – May		
Shy albatross	Assumed present year-round – foraging BIA. Breeding occurs in SEMR with eggs laid in Sept and fledglings in Apr											
Wandering albatross	Assumed present year-round – foraging BIA. Breeding occurs biennially on Macquarie Island with eggs laid in Dec and fledglings between mid-Nov and late-Feb											
White-faced storm petrel	Fledglings mid-Feb – mid-Mar Foraging BIA during breeding season				Migrates to tropical and subtropical locations in non-breeding season				Species arrive at breeding colonies late-Sept – early-Oct with egg laying occurring in early Summer. Foraging BIA during breeding season			
Avifauna – other seabirds (With no BIAs identified)	Various species – assumed present											
Avifauna – shorebirds	Various species – assumed present											

Legend	
	Peak occurrence / activity (reliable and predictable)
	Low level of occurrence/ activity (may vary from year to year), or otherwise as described above
	No occurrence

5.0 Impact and Risk Assessment

The regulations require an EP to detail the environmental impacts and risks associated with the activity, include an evaluation of all the impacts and risks appropriate to their nature and scale, and that those impacts and risks be reduced to ALARP and of an acceptable level.

This EP provides the environmental impact and risk evaluation for the described activities by adopting the Amplitude Energy Risk Management Protocol (CMS-RM-PRO-0001) and Risk Matrix and Assessment Criteria (CMS-RM-RAS-0001). This Protocol is consistent with the approach outlined in ISO 31000:2018 Risk Management - Guidelines.

Figure 5-1 provides the six-step process adopted for the evaluation of impacts and risks associated with the Activity and is integral to the Amplitude Energy risk assessment methodology.



Figure 5-1: AEMS Risk Management Protocol (six-step process)

Further details of the environmental impact and risk assessment methodology are provided in the following sections, including assessment criteria and risk ratings.

A Risk Register is 'the managed repository of key risk information maintained by each Business Area'. It is a living part of risk management that is continually reviewed and updated. In accordance with the Amplitude Energy Management System (AEMS) Risk Management Protocol, each Business Area must maintain a Risk Register and conduct risk management as an integral activity within all business processes to help manage uncertainty in achieving objectives and to aid in decision making. Section 6.0 expands on the Activity Risk Register, showing all identified risks, impacts, preventative and mitigative controls.

5.1 Definitions

In this section, Amplitude Energy has provided a list of terminology and definitions that will be meet the requirements of Section 21(5) of the OPGGS(E)R:

- **Activity**: An activity refers to a component or task within an Activity which results in one or more environmental aspects.

- **Aspect**: An environmental aspect is an element or characteristic of an activity, product, or service that interacts or can interact with the environment. Environmental aspects can cause environmental impacts or may create a risk to one or more environmental receptors.
- **Consequence**: The consequence of an impact (or risk event) is the outcome of the event on affected receptors. Consequence can be positive or negative.
- **Impact**: An environmental impact is a change to one or more environmental receptors that is caused either partly or entirely by one or more environmental aspects. An impact is something which is certain to occur. An environmental aspect can have either a direct impact on the environment or contribute only partially or indirectly to a larger environmental change. An environmental aspect may result in a change which puts one or more receptors at risk of being impacted. The relationship between environmental aspects and environmental impacts is one of cause and effect. The term 'impact' is associated with planned activities and known outcomes.
- **Likelihood**: The likelihood (or probability) of the consequence occurring. Likelihood only applies to risk and risk events.
- **Residual risk**: Residual risk is the risk remaining after additional control measures have been applied (i.e. after impact or risk treatment).
- **Risk**: An environmental risk (or risk event) is a change which could occur to one or more environmental receptors, caused either partly or entirely by one or more environmental aspects. A risk event has a degree of likelihood, as such it is not certain to occur. The term 'risk' is associated with planned and unplanned activities where the change elicited on or by a particular receptor is uncertain.
- **Risk severity**: The risk severity level is determined from the point on the risk matrix where the consequence intersects the likelihood.

5.2 Risk Management Process Steps

This section provides a detailed overview of the risk management process steps.

5.2.1 Step 1: Establish the Context

All components of the petroleum activity relevant to this scope have been identified and described in Section 3.0 of this EP.

After understanding the petroleum activity, an assessment was carried out to identify relevant aspects. The stakeholder consultation outcomes, undertaken over several years, have also contributed to aspect identification. The environmental aspects identified for this petroleum activity are detailed in Section 4.0.

5.2.2 Step 2: Risk Identification

Risk identification involved the documentation of specific risks as they relate to the context established in Step 1 (Section 5.2.1). An environmental risk assessment was undertaken to identify environmental impacts and risks associated with the petroleum activity. The assessment was attended by Activity personnel spanning operations, subsea, HSEC disciplines and may be supported by other specialists.

Cumulative impacts associated with the activity and adjacent activities were also considered. NOPSEMA provide a definition of cumulative impacts within the Environment Plan decision making guideline (NOPSEMA 2024a) as:

"In the context of offshore petroleum activities, cumulative environmental impacts are successive, additive or synergistic impacts of collectively significant activities or projects with material impacts on the environment that have the potential to accumulate over temporal and spatial scales".

As described in Section 4.40, other oil and gas titleholders are currently operating within Commonwealth waters in the Otway Basin, with additional titleholders also proposing upcoming activities. These activities have been identified and assessed in alignment with the NOPSEMA definition above. The NOPSEMA Environment Plan website was used to identify reasonably foreseeable future projects and activities through approved and under assessment published EPs. Each published EP provided an environmental baseline within the Description of the Environment reflecting the effects of previous and current activities and outlines any threats. The existing Otway offshore facilities and associated activities form part of the current baseline given their ongoing presence for a number of years.

5.2.3 Step 3: Risk Analysis

All impacts and risks identified during the assessment were analysed. Impact and risk analysis requires a level of consequence to be assessed for each impact or risk event. For each risk event, the likelihood of occurrence was determined.

Impacts and risks were evaluated using the Amplitude Energy Risk Matrix, which includes:

- A six-level likelihood table to assess the probability of risk occurrence.
- A five-level consequences table to assess the risk impact against business objectives (Table 5-1).
- A matrix of likelihood versus consequence that defines four levels of risk severity and allows a risk to be assessed and plotted.
  - The outcome of the plotted risks is termed a 'Heat Map' and provides a graphic representation of the risks, their respective severities and likelihood.
- A four-level risk severity table that defines the actions and escalation required for risks at different severity levels.

The Amplitude Energy Risk Matrix is provided in Table 5-2.

Table 5-1: Environmental Consequence Assessment Criteria

Consequence Level	Environmental Consequence Description
1	Minor local impacts or disturbances to flora/fauna, nil to negligible remedial/recovery works on land/ water systems.
2	Localised short-term impacts to species or habitats of recognized conservation value not affecting local ecosystem function; remedial/recovery work to land, or water systems over days/weeks.
3	Localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function; remedial/recovery work to land/water systems over months/year.
4	Extensive medium to long-term impact on highly valued ecosystems, species populations or habitats; remedial/recovery work to land/ water systems over 1 – 10 years.
5	Severe long-term impact on highly valued ecosystems, species, or habitats. Significant remedial/recovery work to land/water systems over decades.

The Risk Severity can be:

- **Extreme (red):** Inherent risk at this level is not within the Company's risk appetite. Activity cannot proceed until the Managing Director approves treatment plans that eliminates or reduces Health, Safety and Environment risks to ALARP and reduce risks in other categories in line with the Company's risk appetite. The Board must be informed of the risk and its treatment.
- **High (orange):** Inherent risk at this level requires the respective ELT Member to approve the treatment plans before the activity proceeds. Treatment plans are required to eliminate or reduce Health, Safety and Environment risks to ALARP and reduce risks in other categories in line with the Company's risk appetite The Managing Director and the Board must be informed of the risk and its treatment.
- **Moderate (yellow):** Inherent risks at this level may be acceptable if they are in line with the Company's risk appetite. Except for Health, Safety and Environment risks which must be eliminated or demonstrated as reduced ALARP. Appropriate Managers or Functional Leaders must approve treatment plans and risks should be reported during regular reporting.
- **Low (green):** This level of risk is broadly acceptable; however, Health, Safety and Environment risks must be eliminated or demonstrated as reduced ALARP with treatment plans approved by assigned persons. For risks in other categories, as a minimum, a review of existing control measures should occur, and the risk should be regularly monitored for deterioration.

Note: Key descriptor words relating to duration, spatial extent and magnitude from these definitions, are used within the risk management process for consideration of all elements of the environment, including ecological, physical and social receptors. These receptors are identified within the existing environment section and integrated into the risk assessment through activity-aspect interaction scoping.

Table 5-2: Amplitude Energy Qualitative Risk Matrix

Likelihood						Consequence				
Qualitative					Quantitative					
Rating	**Level**	**Probability**	**Time Period**	**Description**		**1**	**2**	**3**	**4**	**5**
A	Almost certain	> 80%	More than once a year	Expected to occur in most circumstances and/or more than once a year, or repeatedly during the activity.	$>10^{-2}$	Moderate	Moderate	High	Extreme	Extreme
B	Likely	> 50%	Every 1 – 2 years	Not certain to happen but an additional factor may result in an occurrence. Expected to occur from time to time during the activity.	$>10^{-2}$	Low	Moderate	Moderate	High	Extreme
C	Possible	> 20%	Every 4 – 5 years	Could happen when additional factors are present. Easy to postulate a scenario for the occurrence but considered doubtful. Expected to occur once during the activity.	$>10^{-3}$	Low	Moderate	Moderate	High	High
D	Unlikely	> 5%	Every 5 – 20 years	A rare combination of factors would be required for an occurrence. Conceivable and could occur at some time. Could occur during the activity.	$>10^{-4}$	Low	Low	Moderate	Moderate	High
E	Remote	< 1%	Every 20 – 100 years	A freak combination of factors would be required for an occurrence. Not expected to occur during the activity. Occur in exceptional circumstances.	$>10^{-5}$	Low	Low	Moderate	Moderate	High

Likelihood						Consequence				
Qualitative					Quantitative					
Rating	**Level**	**Probability**	**Time Period**	**Description**		**1**	**2**	**3**	**4**	**5**
F	Hypothetical	< 1%	Not in 100 years	Generally considered hypothetical or non-credible. Black Swan.	$>10^{-6}$	Low	Low	Low	Low	Moderate

5.2.4 Risk Evaluation

5.2.4.1 Identify and Evaluate Controls

Controls are any measures exercised that modify the impact or risk. Controls that act on an impact serve to reduce the consequence of the impact. Controls that act on a risk serve to reduce the likelihood of the risk occurring and are termed preventative controls. Reactive controls are those that modify the consequence once a risk event has occurred.

For the risk evaluation, all controls identified are captured for each risk.

The risk evaluation assessed each control for its effectiveness in managing the risk causes and consequences. This may be different from the effectiveness of the control to deliver its original designed purpose.

5.2.4.2 Determine ALARP Status

The ALARP status of each impact and risk was assessed based on the sufficiency of the controls already established and the opportunity for new controls to be implemented. A cross-functional team was assembled to ensure the risks and controls were assessed from different perspectives and to identify the possibility of additional controls that can reduce the risk. Where no additional realistic and feasible controls were identified for the risk, it is considered ALARP.

In alignment with NOPSEMA's ALARP guidance note (N-04300-GN0166 A138249, 1/8/2022) Amplitude Energy have adapted the approach developed by Oil and Gas UK (OGUK) (formerly UKOOA) (OGUK, 2014) for use in an environmental context to determine the assessment technique required to demonstrate that potential impacts and risks are ALARP (Figure 5-2).

Specifically, the framework considers impact consequence and several guiding factors:

- activity type
- risk and uncertainty
- stakeholder influence.

A Type A decision is made if the risk is relatively well understood, the potential impacts are low, activities are well practised, and there are no conflicts with company values, no partner interests and no significant media interests. However, if good practice is not sufficiently well defined, additional assessment may be required.

A Type B decision is made if there is greater uncertainty or complexity around the activity and/or risk, the potential impact is moderate, and there are no conflicts with company values, although there may be some partner interest, some persons may object, and it may attract local media attention. In this instance, established good practice is not considered sufficient and further assessment is required to support the decision and ensure the risk is ALARP.

A Type C decision typically involves sufficient complexity, high potential impact, uncertainty, or stakeholder influence to require a precautionary approach. In this case, relevant good practice still must be met but additional assessment is required, and the precautionary approach is applied for those controls that only have a marginal cost benefit. In accordance with the regulatory requirement to demonstrate that environmental impacts and risks are ALARP, Amplitude Energy has considered the above decision context in determining the level of assessment required. This is applied to each aspect described in Section 6.0.

The assessment techniques considered include:

- good practice
- engineering risk assessment
- precautionary approach.

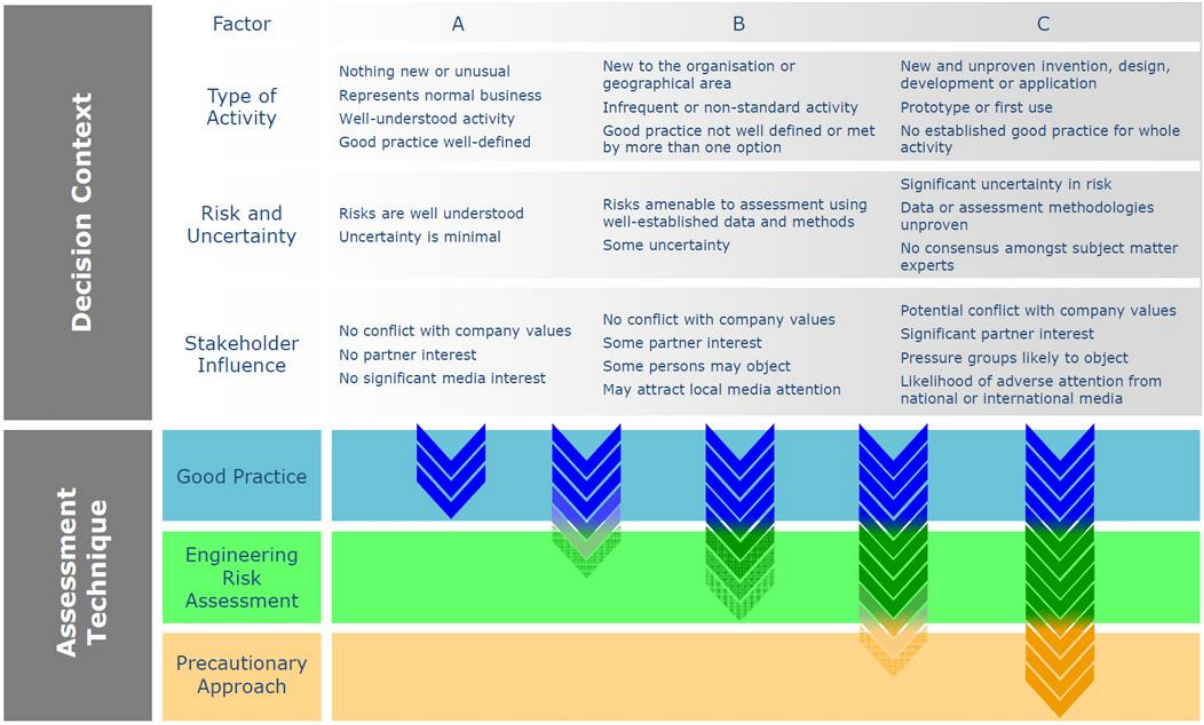


Figure 5-2: Impact and Risk Uncertainty Decision Making Framework

Good Practice

OGUK (2014) defines 'Good Practice' as the recognised risk management practices and measures that are used by competent organisations to manage well-understood hazards arising from their activities.

For this EP, sources of good practice include:

- requirements from Australian legislation and regulations
- relevant Australian policies
- relevant Australian Government guidance
- relevant industry standards
- relevant international conventions
- industry learnings and associated continuous improvement.

If the ALARP technique determines the controls to be 'Good Practice', further assessment ('Engineering Risk Assessment') is not required to identify additional controls. However, additional controls that provide a suitable environmental benefit for an insignificant cost may be identified.

Engineering Risk Assessment

All potential impacts and risks that required further assessment were subject to an 'Engineering Risk Assessment'.

Based on the various approaches recommended in OGUK (2014), Amplitude Energy considers the methodology most suited to this Activity is a comparative assessment of risks, costs, and environmental benefit. A cost–benefit analysis should show the balance between the risk benefit (or environmental benefit) and the cost of implementing the identified measure, with differentiation required such that the benefit of the risk reduction measure can be seen and the reason for the benefit understood.

Precautionary Approach

OGUK (2014) state that if the assessment, considering all available engineering and scientific evidence, is insufficient, inconclusive, or uncertain, then a precautionary approach to hazard management is needed. A precautionary approach will mean that uncertain analysis is replaced by conservative assumptions that will result in control measures being more likely to be implemented. That is, environmental considerations are expected to take precedence over economic considerations, meaning that a control measure that may reduce environmental impact is more likely to be implemented. In this decision context, the decision could have significant economic consequences to an organisation.

5.2.4.3 Evaluate the Acceptability of the Potential Impacts and Risks

The acceptability of the Activity has been demonstrated in the **OPP** as part of the ECSP, in accordance with Regulation 13 of the OPGGS(E)R. The EPOs defined in the OPP for the East Coast Supply Project provides a mechanism to demonstrate potential impacts and risks will be managed to the defined acceptable levels.

In this EP, Amplitude Energy demonstrates the defined acceptable levels in the OPP have been met by providing an acceptability evaluation against the acceptability factors listed in Table 5-3 and the following criteria:

- Using relevant OPP EPOs and control measures or their equivalents (Appendix 1).
- Using EP specific control measures (Sections 5.2.4.1 and 5.2.4.2).
- Impact and risk rankings in the EP are equal to or less than those defined in the OPP, for the EPOs to be met.
- Evaluation of internal and external context to this EP.

Table 5-3: Amplitude Energy Acceptability Evaluation

Factor	Criteria / Test
Amplitude Energy Risk Management Protocol	Is the risk severity extreme (i.e., not within the Company's risk appetite), or High (i.e., requires involvement from the Managing Director to approve the treatment plan)?
Principles of Ecologically Sustainable Development (ESD)	Is there the potential to affect biological diversity and ecological integrity? (Consequence Level 4 and 5). Do activities have the potential to result in serious or irreversible environmental damage? If yes: is there significant scientific uncertainty associated with aspect? If yes: has the precautionary principle been applied to the aspect?
Legislative and Other Requirements	Are there any good practice control measures which have not been adopted, including those identified in relevant EPBC listed species recovery plans or approved conservation advice? If not adopted, have alternate control measures been adopted that provide equal or better levels of protection?

Factor	Criteria / Test
Internal Context	Is the impact or risk provided for within AEMS Standards and Processes? If no, what additional provisions will be made?
External Content	Are there any objections and claims regarding this aspect which have not been resolved? If yes, is there anything which precludes reaching a resolution?

5.2.4.4 Principles of ESD and Precautionary Principle

The principles of ESD are considered in Table 5-4 in relation to acceptability evaluations.

Under the EPBC Act, the Minister must also take into account the precautionary principle in determining whether or not to approve the taking of an action. The precautionary principle (Section 391(2) of the EPBC Act) is that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there may be threats of serious or irreversible environmental damage.

Table 5-4: Principles of Ecologically Sustainable Development (ESD)

ESD	Principle	Relevance to Acceptability
A	Decision making processes should effectively integrate both long term and short term economic, environmental, social, and equitable considerations	The Activity is part of the ECSP; therefore, this principle is inherently met through the OPP assessment process. Specifically, through the integration of consultation feedback in the development of defined acceptable levels, impact and risk evaluations and demonstrations of acceptability. Therefore, this principal is not considered separately for each acceptability evaluation in this EP.
B	If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.	An evaluation is completed to determine if the activity will result in serious or irreversible environmental damage. Where the activity has the potential to result in serious or irreversible environmental damage, an assessment is completed to determine if there is significant uncertainty in the evaluation.
C	The principle of inter-generational equity—that the present generation should ensure that the health, diversity, and productivity of the environment is maintained or enhanced for the benefit of future generations.	Where the potential impacts and risk are determined to be serious or irreversible the precautionary principle is implemented to ensure the environment is maintained for the benefit of future generations.
D	The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.	An assessment is completed to determine if there is the potential to impact biological diversity and ecological integrity.
E	Improved valuation, pricing and incentive mechanisms should be promoted.	This principle is met through identifying the economic, social and ecological value of the existing environment (Section 4.0), and including provisions for Amplitude Energy to bear the full cost of environmental management for the life of the project to ensure environmental impacts and risks are reduced to an acceptable levels. This is reflected in all impact and risk acceptability demonstrations and environmental performance evaluations.

ESD	Principle	Relevance to Acceptability
		Amplitude Energy incorporates market-based mechanisms such as carbon pricing (Section 4.0) where applicable, sets adaptive management frameworks (such as the whale disturbance protocol (Section 6.6.5)) and is required to hold financial assurance under Section 571(2) of the *OPGGS Act* to ensure the project aligns with the 'polluter pays' principle.

5.2.5 Risk Monitoring, Review and Record

Risks, risk treatments and controls require continual monitoring and review to determine whether assumptions and decisions remain valid. The risk environment and risk continually change, and treatment plans can also alter the risk. Relevant persons (which may be internal and external to the company) need to be consulted and kept informed.

The monitoring, review and recording activities provide assurance that:

- Emerging risks are identified, and existing risks remain relevant and managed.
- Controls continue to be effective and efficient in design and operation.
- Controls required for the risk to be ALARP are effectively implemented and operating as expected.
- Risk management objectives remain appropriate and are supported by effective treatment activities.
- The process for managing risk is operating effectively and efficiently.
- Information on risk changes and treatment activities are documented.
- Relevant persons are consulted and where relevant are informed regularly of the risk management progress and performance.

Additional aspects of monitoring and review are described in the Implementation Strategy in Section 12.0 of this EP and include:

- Analysing lessons learnt from events (including near misses), changes, trends, successes and failures.
- Detecting changes in the external and internal context (e.g. new conservation plans issued).
- Chemical selection and discharge process.

6.0 Risk and Impact Evaluation

To meet the requirements of the regulations (evaluation of environmental impacts and risks, environmental performance outcomes and standards), this section evaluates the impacts and risks associated with the Petroleum Activity appropriate to the nature and scale of each impact and risk and details the control measures that are used to reduce the risks to ALARP and an Acceptable level.

Environmental Performance Outcomes (EPO), Environmental Performance Standards (EPS), and Measurement Criteria are described in Section 10.0.

6.1 Impact and Risk Scoping

Interactions between activities and aspects are shown in Table 6-1. Where no disturbance, discharges or emissions are identified in Section 3.0, then no planned interactions are shown. If no planned or unplanned aspects are identified for an activity, then no impacts or risks are identified, and it is not included in the subsequent section.

Within this section, impacts are framed as either a “lower order impact” or a “higher order impact”. Higher order impacts require a higher order of evaluation, as described in the NOPSEMA Environment Plan decision making guideline (N-04750-GL1721 A524696) (NOPSEMA 2024b).

All impacts and risks are evaluated at the lower order until one or more factors trigger the impact to be evaluated at a higher level. These factors are:

- Uncertainty or complexity in the impact or risk assessment which requires further analysis or discussion, for example where modelling is required to understand the nature and scale of an impact.
- ALARP decision context B and above (refer to Section 5.2.4).
- Residual risk severity moderate and above (refer to Section 5.2.4).
- Stakeholder concerns (refer to Section 11.0; Appendix 7).

Impacts and risks determined to be lower order (as per Section 5.2.4) are presented in Section 6.2, whilst higher order impacts and risks are evaluated in more detail in Section 6.3 onwards. The differentiation between higher and lower order impacts and risks is colour coded in Table 6-1. In some circumstances, lower order risks have been evaluated in more detail within Section 6.3 onwards, such as seabed disturbance, as the assessment process required further explanation.

All impacts that have the potential to cause cumulative impacts, such as the potential for internal concurrent activities, or cumulative impacts from adjacent external activities, have been assessed within the ECSP OPP. Refer to Section 9.0 for further details of the cumulative impact assessment process and alignment to the impact evaluation of the identified potential cumulative impacts to EPBC listed species within the ECSP OPP.

Table 6-1: Aspect-Activity Interactions

ACTIVITY	ASPECT																	
	Physical Presence		Planned Emissions				Planned Discharges						Unplanned Impacts			Accidental Release		
Lower Order Impacts and Risks – blue **Higher Order Impacts and Risks - green**	Interaction with Other Marine Users	Seabed Disturbance	Light Emissions	Underwater Sound Emissions	Atmospheric Emissions	GHG Emissions	Installation – residual grout	Testing and preservation fluids	Putrescible waste	Cooling Water and Brine	Deck Drainage and Bilge	Sewage and Grey Water	Interaction with Marine Fauna	Introduction of IMS	Waste (Hazardous and Non-hazardous)	LOC (Chemicals and Hydrocarbons)	Vessel LOC- MGO	Pipeline LOC - Condensate
Surveys																		
Geophysical				L														
Geotechnical		L												H				
Pre- and Post-lay		L		L										H				
Environment*		L		L										H				
Inspection, Maintenance and Repair (IMR)*				L														H
Installation, Testing and Preservation																		
Pre-lay Works		H		L														H
Flowlines and Umbilicals		H		L														

	ASPECT																	
Installation of Other Subsea Infrastructure		H					L											
Post-lay Works		H		L														
Testing and Preservation		H		L				L										
Support Activities																		
Vessels	L	H	L	H	L	H			L	L	L	L	L	H	L	L	H	H
Helicopter				H	L	H							L			L		
ROV /AUV		H		H										L		L		
Divers																		

*Contingent activity

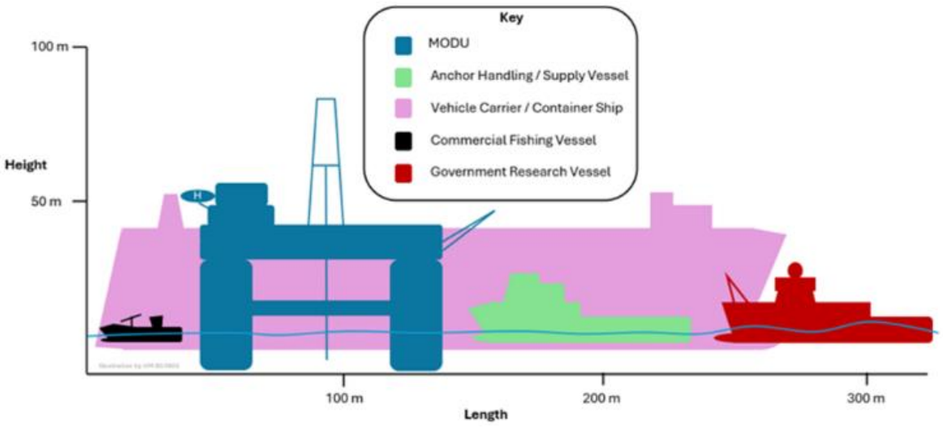
6.2 Lower Order Impact and Risk Evaluation

6.2.1 Planned Aspects

Table 6-2: Lower Order Planned Impact and Risk Evaluation

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
Physical Presence								
Physical Presence – Interaction with Other Marine User: • Vessel Operations • Installation, Testing and Preservation	Changes to the functions, interests and activities of other marine users	**Impact: Changes to the Functions, Interests and Activities of Other Marine Users** Displacement of other marine users may occur due to the presence of exclusion zones and vessel operations within the operational area. Specific to this Activity, the following zones will be established: • Exclusion/cautionary zone: – A temporary 500 m radius Safety Exclusion Zone around vessels carrying out activities within the Operational Area, will be requested via a 'Notice to Mariners'. • Petroleum Safety Zones (PSZs) are formal safety exclusion zones gazetted by NOPSEMA. A permanent (until revoked) 500 m radius PSZ will have already been established around each of the subsea wells that are to be connected during this Activity. The potential for interaction with other marine users will be greatest when the 500 m radius temporary exclusion/cautionary zone is in place during installation, testing and preservation activities. Receptors that may be impacted include: • Commercial fisheries. • Shipping and industry. • Recreational fishers and tourism. **Commercial fisheries (State and Commonwealth)** The operational area overlaps 6 Commonwealth-managed and 7 State-managed fisheries management areas, as described in Section 4.4.3. Catch-effort data indicates that the SESS-Shark Gillnet sub-sector and Southern Jig (Commonwealth fisheries) and the southern giant crab, ocean general, ocean wrasse, and rock lobster (Victorian State fisheries) are active in the vicinity of the operational area (Section 4.4.3). Fishing vessels will be required to avoid the temporary exclusion/caution zones, established during the Activity. The exclusion/cautionary zone and PSZ will occur over a small extent of the larger fishing areas available to the fisheries active at the operational area. Previous consultation for offshore activities (Cooper Energy 2019) indicates that the proposed activities and associated exclusion/caution zones would not result in objections or claims. This is also reflected in the fact that no claims or objections have been raised for the existing PSZs established for Amplitude Energy's existing Otway offshore facilities. **Shipping and industry** Shipping and industry activities in the vicinity of the operational area are described in Section 4.4.3. Ships will need to physically avoid the temporary exclusion / cautionary zones established around the installation vessel and the long-term PSZs. Activity vessel exclusion zones are temporary and will be in place for the duration of the activity. The established PSZ (500 m radius) around the subsea wells will remain. There are no designated shipping lanes in the vicinity of the operational area (AHO, 2021), although AMSA notes heavy traffic (Event ID 2025 0520 142220 7349 Appendix 7). AMSA, or other relevant persons, have not raised claims or objections to the Activity and have not previously raised claims or objections to previous Amplitude activities (Cooper Energy 2019). Vessel interactions will be managed in accordance with navigational requirements.	Level 1	A	CM01: Marine Exclusion and Caution Zones CM02: Pre-start Notifications CM03: Marine Assurance Process CM04: Fisheries Damage Protocol CM05: Ongoing Consultation	N/A	N/A	Acceptable, based on: • Impacts well understood. • Consequence is Level 1, therefore no potential to affect biological diversity and ecological integrity. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and met: – OPGGS Act – Navigation Act 2012 • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3 such as: **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). **OPP** control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		Recreation and tourism Key tourist and recreational activities are described in Section 4.4.3 and typically include land-based or near-shore activities (i.e., sight-seeing, diving, fishing including recreational, game, or charter fishing). Therefore, there is limited overlap with the operational area. The presence of exclusion/cautionary zones and PSZs may result in the exclusion of tourist and recreational marine users from the operational area. Given the distance from shore and the limited size of exclusion/cautionary zones and PSZs, impacts to tourists and recreational marine users are expected to be minimal. **Summary** Impacts have been assessed as **Level 1**, based on: • The short-term duration of the temporary exclusion/cautionary zone for vessel activities under this EP (~150 days based on undertaking the installation of flowlines in a single campaign, with shorter durations for other activities as described in Section 3.2). • The localised spatial extent of the long-term PSZs around each well, noting these exclusion zones are an accepted tool for managing risks to equipment and marine users. • The level of use of the operational area by commercial fisheries is relatively low, with no claims or objections to the existing Otway offshore facility development to date. • The operational area covers a small extent of the identified Commonwealth and State-managed fisheries management areas. • The level of use of the operational area by shipping, industry, recreation and tourism is expected to be low.						additional objections and claims were raised against this aspect.
Physical Presence – Visual • Vessel Operations	Additional vessels observable from the coast	**Impact: Additional Vessels Observable from the Coast** The physical presence of the Activity vessels has the potential to affect the view of the coastline or ocean. The Australian Heritage Database (DCCEEW 2025a) entry assessment against criterion E (aesthetic characteristics) identifies the Great Ocean Road and Scenic Environs as demonstrating outstanding scenic landscape values and a diversity of natural landscapes. The scenic environs include all views from the Great Ocean Road and Great Ocean Walk. Included within the environs and of particular significance are: • The Twelve Apostles - a distinctive and spectacular group of rock formations widely recognised by the Australian community, serving as an inspirational landscape capable of evoking strong emotional responses. • The Bay of Islands and Bay of Martyrs, while less widely known, are similar, but younger, geomorphological formations and are also important aesthetic elements of the coastline. • The coastline from Lorne to Kennett River offers among the world's most dramatic cliff and ocean scenery able to be viewed from a vehicle. Along the length of the Great Ocean Road, the pullover points and lookouts beside or nearby the road provide travellers with spectacular views of the coastline, hinterland, and Bass Strait seascape, framed only by cliffs, lighthouses and unencumbered by intrusive built structures. The Australian Heritage Database (DCCEEW 2025a) assessment against criterion G (social and cultural reasons) describes the landscape as highly valued by many Australians and has obtained iconic status. For many Australians, the Great Ocean Road is synonymous with tourism and holidays, with over 7 million visits by Australians to the Great Ocean Road region annually. Visitors are attracted to the iconic, spectacular scenery experienced on the scenic journey and the accessibility of the historic shipwrecks along the coast, which help deepen the visitor experience by interpreting themes of immigration, shipping and trade. Criterion G explains how elements of the Great Ocean Road relate to shipping and trade. The lighthouses that are landmarks along the road were established to facilitate shipping and continue to do so today. The Bass Strait has historically been, and remains an important shipping route, with vessels continually transiting the waters off the Otway coast to and from intentional ports that are critical infrastructure	Level 1	A	CM:06 Ongoing Consultation	N/A	N/A	Acceptable, based on: • Impacts well understood. • Consequence is Level 1, given the short duration that the Activity vessels are present, and limited divergence from the values of the Scenic Environs which already features commercial fishing and shipping activity. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and met: – OPGGS Act – *Navigation Act 2012* • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation.

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		including the ports of Portland, Geelong and Melbourne. Given the maritime history, and current maritime activity in the region, it is considered that observing vessels from the Great Ocean Road would not be considered unusual or detracting from the values of the Great Ocean Road. Instead, vessels are in keeping with the historical and current maritime context. It is relevant to consider the existing vessel traffic in the Otway to contextualise the Activity vessels presence. It is assumed that at least four large merchant ships would usually transit through the Otway on any given day. This is considered conservative given Victorian ports alone have over 4,000 ship visits per year (Bureau of Infrastructure and Transport Research 2023), which would put the average daily ship transits through Victorian waters at over 10. The kinds of vessels (and their approximate dimensions) that occur in the region are illustrated below (Figure 6-1), with fishing vessels and container ships being among the most common types. For the Activity, vessels will be on location for the duration of the activity, ~150 days based on undertaking the installation of flowlines in a single campaign, with shorter durations for other activities (refer Section 3.2). Once the vessels are gone, all equipment is located subsea and therefore not observable from shore, as is the case with Amplitude's current subsea gas production infrastructure.  *Figure 6-1: Common Vessel Types Offshore and their Relative (Approximate) Dimensions* **Summary** Overall, it is concluded that the Activity vessels will not encumber the view of the coastline or ocean from the Great Ocean Road. The longest estimated duration that the Activity vessels will be offshore is ~ 150 days, based on undertaking the installation of flowlines in a single campaign, with other activities having a much shorter duration (refer Section 3.2). There will be visibility of the Activity vessels offshore for a relatively short period. However, the view of these will not be in complete contrast to daily shipping already present in the region and would therefore be expected to evoke a similar level of emotional response to shipping. There will also be no ongoing visual impacts from the Activity once the Activity vessels have completed the scope. Therefore, the impact of the physical presence of the Activity vessels on the view from the Ocean Road is assessed as being of **Level 1** consequence.							Impacts are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3 such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
Emissions								
		Impact: Change in Ambient Light	Level 1	A		N/A	N/A	Acceptable, based on:

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
Emissions – Light • Vessel Operations	• Change in ambient light • Change in fauna behaviour	Ambient light is classified as light which already exists within an environment. Ambient artificial light sources in the Otway region include permanent (e.g. onshore/offshore developments) and intermittent (e.g. vessels, road traffic) sources. During the activity, sources of artificial light (Figure 6-2) will include: • Continuous lighting on Activity vessels, required for maritime safety purposes in accordance with requirements of the *Navigation Act 2012*. Once vessels have vacated the region, these additional light sources will no longer be present. There are no permanent sources of light associated with the Activity. Impacts associated with light emissions from the Activity are defined by Light Exposure Areas (i.e. the area over which light exposure may impact sensitive species): • The Light Exposure Area is defined by the National Light Pollution Guidelines for Wildlife (DCCEEW 2023a) which recommends a 20 km threshold as a precautionary limit to identify species and important habitats potentially impacted by artificial light. This distance is considered conservative and is based on observed effects of sky glow on marine turtle hatchlings demonstrated to occur at 15-18 km and seabird fledglings grounding in response to artificial light 15 km away (DCCEEW 2023a). Light emissions will result in a temporary change in ambient light within the relatively localised Light. The extent of operational light exposure is within 20 km of the Activity vessels. The longest estimated duration that the Activity vessels will be present is ~150 days, based on undertaking the installation of flowlines in a single campaign, with shorter durations for other activities. A change in ambient light has been assessed as being of **Level 1** consequence.			CM03: Marine Assurance Process CM06: Light Management Measures			• Impacts well understood. • Consequence level is Level 1, therefore no potential to affect biological diversity and ecological integrity. • Risk level to receptors a result of the change in ambient conditions is low • Activity will not result in serious or irreversible damage. • Legislative and other requirements have been identified and met, and guidelines considered: – National Light Pollution Guidelines for Wildlife (DCCEEW, 2023a) - including marine turtles, seabirds and migratory shorebirds. – EPBC Act Policy Statement 3.21— Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species. • Activity will not impact the recovery of: – Albatrosses and Giant Petrels as per the National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022). – Seabirds as per the Wildlife Conservation Plan for Seabirds – Orange-bellied Parrot as per the National Recovery Plan for the Orange-bellied Parrot (*Neophema chrysogaster*) (DELWP, 2016). – Recovery plan for marine turtles in
		Risk: Change in marine fauna - marine turtles Light emissions from the Activity vessels may result in a localised change in marine turtle behaviour. DCCEEW (2023a) identify marine turtles as being sensitive to light emissions. Light emissions can disrupt behavioural in-water dispersal behaviours of marine turtles by interfering with natural lighting and silhouettes (DCCEEW 2023a; CoA 2017a). Critical behaviours for marine turtles are generally carried out within spatial extents defined by marine turtle BIAs and habitat critical to the survival of marine turtle species. PMST reports for the 20 km Light Exposure Area can be found in The PMST report (Appendix 5) identified three marine turtle species; loggerhead turtle (endangered), leatherback turtle (endangered) and green turtle (vulnerable), that may / are likely to have a habitat within the Light Exposure Areas. There are no known BIAs or habitats critical to the survival of marine turtle species and no nesting sites or nesting behaviours identified in the area. Nevertheless, the PMST report identified that breeding behaviours are likely to occur within Light Exposure Area. Behavioural changes to marine turtles from artificial light at night are expected to be localised (20 km) and short term, with light levels returning to existing ambient levels following completion of the Activity with no remedial or recovery work required. Therefore, the consequence has been assessed as **Level 1**. The risk event could happen when additional factors are present, such that individual marine turtles are present within 20 km of vessel operations. However, as there are no BIAs or habitat critical to the survival of marine turtles within the Light Exposure Areas, the likelihood of the risk is considered to be **Unlikely (D)**, therefore the Risk severity is **Low**.	Level 1	A		Unlikely (D)	Low	
		Risk: Change in marine fauna - avifauna Light emissions may cause behavioural change to nocturnal seabirds by disrupting vision at night. The potential for disorientation from light emissions is exacerbated with an increase in proximity of nesting sites or migrating sites to artificial light sources (DCCEEW 2023a). There are 9 seabirds with foraging BIAs within the Light Exposure Area (Figure 6-3 to Figure 6-6). Given the large areas typically covered by foraging individuals, the transient nature of the species, and the temporary nature of the light from the activity; any alterations in offshore foraging behaviour would be expected to be short-term and localised, impacting individuals, and would not be expected to significantly affect foraging success of seabird populations in the region. Similarly, due to the temporary and short-term nature of any light emissions, any impacts to short-tailed shearwater breeding sites, such as disorientation of fledglings or	Level 1	A		Unlikely (D)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		deterrence of breeding birds, are not expected to impact the breeding success of the site. It is acknowledged that disorientation of fledglings may be fatal due to fallouts over ocean or groundings (Rodríguez et al. 2017; Marangoni et al. 2022). However, a single disturbance event over a short time period is unlikely to have an immediate effect on survival or breeding productivity of an individual bird. Therefore, no population level impacts are anticipated. The PMST report (Appendix 5) identified the critically endangered orange-bellied parrot (*Neophema chrysogaster*) as being known to occur within the Light Exposure Area (Figure 6-7). The only relevant risk identified in the National Recovery Plan for the orange-bellied parrot (DELWP 2016) is the threat of barriers to migration of the species which includes the presence of illuminated structures or vessels which occur within the migration route. Vessel light emissions, although not within the migration route, may result in light which is visible from within the western portion of the probable migration route near the Victorian coastline. Therefore, only a small number of individuals (if any) have the potential to be behaviourally impacted by the change to ambient light as a result of the Activity. These impacts are expected to be short-term (~150 days based on undertaking the installation of flowlines in a single campaign, with shorter durations for other activities) with levels returning to existing ambient levels following the completion of the activity. The PMST report also lists the curlew sandpiper (*Calidris ferruginea*), Eastern curlew (*Numenius madagascariensis),* and swift parrot (*Lathamus discolor*) and as being known to be present in the Light Exposure Area and listed critically endangered migratory species. There are no threats listed in the National Recovery Plan for swift parrot relating to potential disturbance or disruption to migratory pathways (DCCEEW 2024c). Similarly, conservation advice for the curlew sandpiper (TSSC 2015c), Eastern curlew (DCCEEW 2023b), also does not list any key threats associated with migration. Behavioural changes could increase the risk of birds colliding with infrastructure or vessels, entrapment, stranding, grounding or displacement from usual migration routes (DCCEEW 2023a). Collisions of birds with offshore oil and gas infrastructure has been reported in the North Sea (Hüppop *et al.* 2016). It is predicted that mortality from collision would only impact a small proportion of seabird populations (Hüppop *et al.* 2016). There is no topside infrastructure being installed for this activity. Artificial lighting will also only be present for the short durations associated with the vessels being utilised for the Activity. Therefore, any injury or mortality to seabirds as a result of a behavioural response to light emissions is not expected to cause any impacts at a population level. Given the limited presence of sensitive receptors within the Light Exposure Areas, and the temporary nature of light emissions, the impact of light emissions to marine avifauna will be **Level 1**. The risk event could happen if birds are present within the Light Exposure Areas. Given the wide foraging and migratory ranges of seabirds and shorebirds and the short duration of activities, the likelihood of the risk event is considered to be **Unlikely (D)** and the Risk severity is **Low.**						Australia 2017–2027 (CoA, 2017). – Recovery Plan for the White Shark (Carcharodon carcharias) 2013 • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
		Risk: Change in Marine Fauna - Plankton and Fish (including Eggs and Larvae) The National Light Pollution Guidelines for Wildlife (DCCEEW 2023a) also identifies plankton and fish as being sensitive to light emissions. Zooplankton (including fish eggs and larvae) migrate upwards at dusk and downwards at dawn (Nocera et al. 2020). Suppressing or attracting zooplankton to the surface may disrupt zooplankton night feedings and in turn impact the movement and food availability for larger nocturnal fish predators. For example, adult benthopelagic fish display large daily vertical migrations that match pelagic prey availability and movements of zooplankton (Afonso et al. 2014). Artificial light may also bring diurnal fish predators into competition with their nocturnal counterparts and increase predation pressure to nocturnal prey. The Light Exposure Area does not overlap any shark or fish BIAs. Exposure to navigational lighting during the Activity may disrupt rhythmic behavioural activities of individuals (Carroll and Harvey-Carroll 2023; Colefax *et al*. 2020). The increased presence of zooplankton and foraging fish at night may attract larger fish species, such as white sharks (Carroll and Harvey-Carroll 2023). Light emission modelling conducted by Xodus (2023) for ConocoPhillips Australia indicated that light emission levels that reflect twilight levels are reached within 500 m of vessels. It is anticipated that the	Level 1	A		Likely (B)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		suppression or attraction of plankton will occur within 500 m of vessel operations, which in turn impacts the movement and food availability for larger nocturnal fish predators within 500 m. Impacts, if any, would be limited to temporary behavioural changes to small numbers of plankton and fish within proximity of artificial light sources in surface waters of the operational area. Given the temporary, short-term, localised nature of light emissions, impacts would be limited to temporary behavioural changes to plankton and fish in the surface waters near the light source. Therefore, the consequence of impact of light emissions to plankton and fish (including eggs and larvae) is assessed as **Level 1**. The risk event could occur if plankton and fish are within close proximity of vessel operations. The highly variable presence of plankton and fish populations in the operational area presents a potential overlap of plankton and fish with the Light Exposure Areas. Therefore, the likelihood of the risk event is considered to be **Likely (B)** and the Risk severity is **Low**.						
		Risk: Change in Marine Fauna - Marine Invertebrates Light emissions may cause behavioural changes to marine invertebrates, such as cephalopods and lobsters. However, light emissions in the operational area have very limited potential to suppress or change the nocturnal activities of invertebrates at the seabed given the depth of water (>56 m) between the temporary light sources at sea surface and strong light attenuation in the upper 50 m of the water column (McCafferty et al. 2004). Impacts from the operational light emissions to marine invertebrates will be limited to incidental behavioural changes, such as the potential for increased attraction to the light source of mobile invertebrates, such as cephalopods, within a smaller spatial extent than the Light Exposure Area. Arrow squid is a targeted species for the Southern Squid Jig Fishery. Squid are highly attracted to artificial lights at night. This is demonstrated by the use of lights at night while jigging which is an active fishing method used by the Southern Squid Jig Fishery (AFMA 2023). Light emissions in the operational area are expected to temporarily attract squid and other cephalopods up to the sea surface towards the light source (Imbrahim and Hajisamae 1999). Behavioural changes to marine invertebrates from artificial light at night is expected to be localised and short term based on expectations that navigational/operational light emissions sources are short term and highly localised. Therefore, the consequence is assessed as **Level 1**. The scattered and patchy presence of marine invertebrate communities in the operational area presents a potential overlap of marine invertebrates with the Light Exposure Areas; therefore, it is likely the risk event will occur. The likelihood is assessed as **Likely (B)** and the Risk severity is **Low**.	Level 1	A		Likely (B)	Low	
Emissions – Atmospheric: • Vessel Operations • Helicopter Operations	Change in air quality	**Impact: Change in Ambient Air Quality** Atmospheric emissions typically include sulphur oxides (SO_X), nitrous oxides (NO_X), particulate matter (PM10 and PM2.5), and Volatile Organic Compounds (VOCs). Impacts and risks associated with the generation of GHGs such as carbon dioxide (CO_2), methane (CH4) and N_2O are evaluated in Section 6.4 Atmospheric emissions will be generated by the combustion of fuel for power generation by Activity vessels and helicopters. These emissions will be continuous from vessels systems during the activity. Helicopters will not be in field continuously over the duration of the activity. Impacts to ecological and social receptors within or beyond the operational area are not predicted, as a reduction in air quality is limited to within the immediate proximity of the release source and is temporary, as pollutants would be rapidly dispersed to the offshore airshed by prevailing winds (Tetra Tech Coffey 2024). Therefore, impacts to marine fauna and social receptors from a change in air quality are not expected and have not been evaluated further. Given the localised and temporary nature of the change in air quality, the consequence of any impacts from atmospheric emissions are assessed as **Level 1**.	Level 1	A	CM03: Marine Assurance Process CM05: Ongoing Consultation CM07: Planned Maintenance System	N/A	N/A	Acceptable, based on: • Impacts well understood. • Consequence level is Level 1, therefore no potential to affect biological diversity and ecological integrity. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and met: – *Ozone Protection and Synthetic Greenhouse Gas*

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
								Management Act 1989. – Marine Order 97 (Marine pollution prevention – air pollution) 2013. • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
Planned Discharges								
Planned Discharges – installation, testing and preservation fluids: • Installation • Testing and Preservation	Change in water quality	During installation, testing and preservation activities, operational discharges may result from pre-lay works, installation, testing and preservation, and ROV operations. Activities that may result in planned subsea discharges include: • Hydrotesting (i.e., of flowlines): 400 m^3 of a mixture of MEG and treated water (inhibited water and dye) per each flowline to test pressure via a downline from the surface vessel. • Pressure testing (i.e., of umbilicals): 100 L of hydraulic fluid (control fluid) per test to test pressure via a downline from the surface vessel. • Barrier testing (i.e., of ILT): <5 m^3 of treated water (inhibited water, including dye, corrosives, biocide, corrosion inhibitor). • Subsea XT function testing: 350 m^3 per well of treated water (inhibited water including dye, corrosives, biocide, and corrosion inhibitor). • Dewatering: 2 m^3/min of Nitrogen gas during dewatering activities, estimate of 350 m^3 per well location. • Subsea filling of grout bags: excess grout released during hose flushing: ~0.3 m^3 per bag of grout slurry.	Level 1	A	CM08: Amplitude Energy Offshore Chemical Assessment Procedure	N/A	N/A	Acceptable based on: • Impacts well understood. • Consequence level is Level 1, therefore no potential to affect biological diversity and ecological integrity. • Risk level to receptors as a result of the change in ambient conditions is low. • Activity will not result in serious or irreversible damage.

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		Impact: Change in Water Quality Planned discharges into the marine environment will result in localised and temporary changes in water quality during installation, testing and preservation and support phases. Planned discharges include mixtures of fluids with the potential to introduce concentrations of particulates, nutrients, biocides, and oils to offshore waters. It is well recognised and established through common marine and industry practice (e.g. MARPOL, OSPAR) that discrete planned discharges, with appropriate treatments in place, have limited impact within the open ocean; discharges disperse quickly over a small area, such that there are expected to be no discernible changes at a regional or systems scale. Any potential impacts for these operational discharges have been further described below. <u>MEG</u> MEG is classified internationally as posing little or no risk to the (marine) environment (PLONOR); it is effectively non-toxic in the marine environment, is readily biodegradable and has a low/no potential for bioaccumulation. MEG is readily dispersible in water and would only have a short-term, localised impact on water quality. <u>Inhibited Water</u> Inhibited water is seawater with chemical additives including corrosion inhibitor, scale inhibitor, oxygen scavenger, biocide and dye. Of these different chemical additives, biocide is typically of higher toxicity than the others, and therefore, has been selected for the impact assessment. Biocides are added to inhibited seawater to protect the inside of steel tubular equipment and are toxic when applied at pre-determined concentrations. In general, the toxicity depends on the required chemical function. Modelling for a significantly larger discharge volume of treated water (discharge of 6,000 m^3 over a period of 42.9 hours (140 m^3/hr), 2 m above the seafloor) was conducted by RPS for Beach's Otway Offshore Gas Victoria Project (Beach 2025). The modelling was conducted on Hydrosure O—3670R, a representative biocide, with impact threshold concentration value of 1 ppm (equivalent to 1 mg/L) as per the ecotoxicological studies conducted for ConocoPhillips Barossa OPP (ConocoPhillips 2018) and Shell Crux OPP (Shell 2020) as cited by RPS (Beach 2025). Concentrations below this threshold were not anticipated to result in significant environmental impacts. The results predicted biocide concentrations at the defined impact threshold to be limited to the immediate surrounds of the discharge release: 20 m and 156 m, respectively, for the 99th and 100th-percentile analysis (i.e. 99% and 100% of the time). The treated seawater was also predicted to have the same water temperature and salinity as the surrounding seawater (Beach 2025). Modelling by Beach (2025) is considered suitable for this Activity, as the environmental conditions in the Bass Strait, such as current speeds (0.08–0.11 m/s), seabed temperatures (11.5–12.7 °C), and salinity (35.3–35.4 psu), are consistent with those in the Otway Basin (RPS 2025). Biocide concentrations are expected to dilute below impact thresholds within 156 m of the discharge point. In the dynamic offshore environment of the Otway, where currents continuously disperse treated seawater, impacts are limited to the discharge duration, typically less than 24 hours. Discharges of inhibited water would dilute within the receiving seawater, then be mixed and dispersed by prevailing waves and currents to below no effect levels. Furthermore, biocides (and other chemical contaminants) in planned discharges will be selected in accordance with the Amplitude Energy Offshore Chemical Procedure to ensure ecotoxicity profiles are of an acceptable level. Given the conservative modelling assumptions, rapid biocide degradation, and the high-energy nature of the receiving waters, any water quality changes are expected to be localised and short-term. <u>Hydraulic Fluid</u> The hydraulic fluid that may be used, such as Castrol Transaqua™ HT2, are water-based-products that are readily miscible with seawater. Majority of the product (HT2) is non-toxic (99%), Readily biodegradable (>95%) and non-bioaccumulative (90%). Hydraulic fluids are designed to be dispersible and biodegradable and would rapidly dilute and dissipate in the offshore marine environment. Due to the relatively small release volumes expected, the intermittent and short duration of the discharge, and typical high energy						• Good practice controls defined and implemented. • Legislative and other requirements have been identified and are provided for: – Industrial Chemicals (*Notification and Assessment Act*) 1989 • Activity will not impact the recovery of: – Blue whale as per the Blue Whale Conservation Management Plan 2015 – 2025 (DoE 2015a) – Southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) – Marine turtles as per the Recovery Plan for Marine Turtles in Australia, 2017 – 2027 (CoA 2017a). • Amplitude Energy MSS and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence is the same as those defined in the **OPP**. No changes to internal or external context as defined in

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		environment of the receiving waters, any discharge is expected to rapidly dilute and dissipate into the marine environment. Nitrogen Nitrogen gas is an inert gas that makes up ~78% of the earth's atmosphere. It is non-corrosive and carries no risk of ignition making its environmental impact generally low. The controlled release of Nitrogen gas during dewatering may cause short-term water column disturbance and minor dissolved oxygen displacement. Some marine fauna may temporarily avoid the bubble plume, no physiological harm is expected. Any impact will be short-lived with the discharge rapidly diluting almost immediately. Grout In the event that the grout bags are filled subsea from a hose on the vessel, considered a contingent activity, excess grout may be released into the marine environment when the hose is flushed with seawater at the completion of operations. Any excess grout will be discharged as a slurry in minor volumes (~0.3 m^3 for every bag). Excess grout released would result in increased local turbidity as the plume dilutes and disperses through the water column. The grout composition comprises cement, sand, and water, and it is classified under the OSPAR PLONOR list. The grout fluidity and setting speed may be managed through adding plasticizers and or retarders, respectively. These cement additives would be subject to the Amplitude Energy Offshore Chemical Assessment Procedure (Section 12.8). Given the high energy environment of the receiving the cement particles found in the grout mixture will disperse under the action of waves and currents and will rapidly settle out in the water column. Due to the low volumes and rapid dispersion characteristics of the offshore Otway environment, any impact to receptors from changes in water quality are expected to be limited due to the localised and temporary nature of the changes to water quality. **Summary** Impacts have been assessed as **Level 1**, based on: • Water quality within the operational area is expected to be representative of the water quality found in the wider Otway Basin waters. • All chemicals, including hydraulic fluids, are selected in accordance with the Amplitude Energy Offshore Chemical Procedure to ensure ecotoxicity profiles are of an acceptable level. • As there are no continuous discharges, these discharges will briefly appear as a plume before rapidly dispersing into the receiving environment due to the nature of the release, together with the prevailing waves and currents typical of the area, resulting in any minor toxic constituents (e.g., biocide) being diluted to predict no effect levels near the discharge point • Given the high energy marine environment of the Otway Basin, discharges during operations will dissipate rapidly, any change in water quality will be localised and temporary.						the **OPP** including no additional objections and claims were raised against this aspect.
	Change in Sediment Quality	**Impact: Change in Sediment Quality** Residual grout from filling of the grout bags underwater may be released into the marine environment, where it is expected to mix with the receiving waters, and potentially settle out on the seafloor. Changes in sediment quality may include the introduction and accumulation of any contaminants in the grout (i.e., chemical additives within cement) and may result in a change in physical characteristics of seafloor sediments from subsea discharges of cement. Discharges of the nature described for this Activity have been undertaken historically in the region and have been shown to result in little to no impact on water or sediment quality. Residual grout overspill would not be expected to significantly alter the overall character of the seabed, or its ecological amenity. Any impacts to epifauna would be localised and recoverable, with no threat to EPBC Act listed threatened benthic fauna. Given that discharges will be intermittent, brief, any changes to sediment quality would be highly localised and short-term.	Level 2	A		N/A	N/A	
	Injury / mortality to marine fauna	**Risk: Injury / Mortality to Marine Fauna - Plankton**	Level 1	A	CM08: Amplitude Energy	Unlikely (D)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		Contaminants in planned discharges, such as residual biocide, released into the marine environment have the potential to toxic to sensitive species with limited mobility. Plankton, including fish eggs and larvae, are more susceptible to injury and mortality when exposed to in-water elevated turbidity levels, and toxic exposure from chemicals discharged compared to mobile species due to their inability to move away from the discharge point. The greater Bass Strait, including the Otway Basin, is known for a complex, high energy wave climate and strong ocean currents. High energy oceanographic processes in the operational area will result in rapid dispersion of the discharged plume, with concentrations of biocide expected to dissipate to negligible levels rapidly. Therefore, this rapid dispersion expected of the plume prevents long-term exposure required for the onset of injury to occur to plankton, including fish eggs and larvae. Mortality rates for plankton are naturally high, with highly variable distribution linked to seasonal variances already identified to occur within the south-east region (Section 4.4). Plankton are expected to rapidly recover once the activity ceases, as they are known to have high levels of natural mortality and a rapid replacement rate (Hook et al. 2016). Therefore, impacts from planned discharges are not expected to have discernible impacts at the population level and have been assessed as **Level 1**. **Risk: Injury / Mortality to Marine Fauna - Mobile Fish, Marine Reptiles and Marine Mammals** Residual biocide in inhibited water can be acutely toxic to sensitive benthic species, though high concentrations are typically needed to affect larger species like adult fish (Chevron 2015). For example, Hydrosure O-3670R has a 96-hour LC50 of 3.09 mg/L for marine fish and a 48-hour EC50 of 5.66 mg/L for aquatic invertebrates (Champion Technologies, 2013). Fish would need to remain near discharge points for extended periods to be lethally affected. However, biocides used are generally soluble, reactive, and degrade quickly, with minimal residual concentrations upon discharge (Black et al. 1994; Shell 2020). The short duration and dilution of discharges further limit environmental risk. Dyes, scale inhibitors, and corrosion inhibitors are typically less toxic than biocides. The intermittent and brief nature of planned discharges will preclude chronic exposure of marine organisms. To be impacted, fish, marine reptiles, and marine mammals, would need to pass directly through any discharge plume almost immediately upon release and remain within the plume for almost the entire duration of the residence time. Given the mobile nature of these species, it is not expected that they would be exposed to concentrations above impact thresholds for an extended time. As a result, mortality to adult fish, marine reptiles, and marine mammals from increased toxicity is not a credible event. As such, acute impacts may occur and would be limited to small numbers of juvenile fish, larvae, and planktonic organisms. Furthermore, the biocides routinely used in the oil and gas industry are typically consumed by microorganisms (e.g. bacteria), and do not bioaccumulate once discharged to the marine environment (Shell 2020). **Summary** The predicted level of impact, i.e. the consequence, to marine fauna as a result of planned discharges is evaluated to have a consequence of **Level 1,** with a likelihood of **Unlikely (D)** assigned, with the risk to marine fauna determined as **Low** based on: • Given the high energy marine environment, planned discharges during the Activity will rapidly dissipate and dilute. • Potential impacts to plankton are predicted to be localised and short term and are not predicted to result in discernible impacts at local, regional, or population level. • Due to the intermittent and brief presence of discharge plumes in the operational area; discharges would be expected to disperse to below no-observed-effect-concentrations (NOEC) before marine fauna could be exposed for long enough to experience toxicity impacts. • The operational area is subject to high natural variation in turbidity levels; therefore, marine fauna present within the operational area will be adapted to brief and high levels of turbidity. • All chemicals, including hydraulic fluids, are selected in accordance with the Amplitude Energy Offshore Chemical Procedure to ensure ecotoxicity profiles are of an acceptable level.			Offshore Chemical Assessment Procedure			

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
Planned Discharges – Operational (Support Activities): • Vessel Operations	Change in water quality	Vessel operations will result in the routine operational discharges to surface waters. The volumes of routine discharges are often dictated by the number of people on board the vessel. The following volumes are expected for the Activity: • Sewage and grey water: approximately < 0.45 m^3 per person/day. • Putrescible waste*: 2 kg per person/ day • Cooling water and brine**: approximately 8,400 m^3/day. • Deck drainage and bilge**: approximately 1.5 m^3/day). *No putrescible waste (i.e., food waste) will be discharged within nearshore locations as per AMSA's MARPOL requirements. ** Routine operational discharges such as cooling water, deck drainage, and bilge will be treated onboard prior to discharge, as per IMO regulations. **Impact: Change in Water Quality** Routine vessel discharges will result in localised changes to the water quality within the vicinity of the discharge point, and may result in increased temperature, chemicals, nutrients or salinity within the water column. A reduction in water quality via eutrophication may occur as a result of increased nutrient levels (e.g. ammonia, nitrite, nitrate and orthophosphate) from discharges of sewage, greywater and putrescible waste. This has the potential to cause adverse changes, such as increased growth of primary producers (i.e., phytoplankton) which can deplete oxygen in the water column and result in changes in biological processes. The discharge may also include some particulate matter resulting in increased turbidity of the receiving waters. The discharge of used cooling water may result in elevated temperatures (~2 to 5°C above ambient) and low residual chlorine concentrations into the receiving waters. This could result in the potential for thermal impacts and toxicity impacts from the chemical additives. Cooling water with low-dose chemical additives like chlorine is generally safe, as these chemicals are largely consumed during the inhibition process, leaving minimal residuals upon discharge. A study on chlorination from seawater cooling units found negligible impacts on coastal and estuarine environments, with little plume toxicity or broader ecotoxicological effects (Taylor 2006). Deck and surface drainage, including bilge water, from project vessels and the topsides will mainly comprise of wash down water, sea water spray and rainwater. However, these discharges may contain small quantities of oil, grease, metals, detergents (surfactants) and other residual chemicals present on the deck, which have the potential to cause a reduction in water quality when released into the marine environment. The bilge system of a vessel is designed to properly collect, hold, and discharge of oily water to reduce or avoid dumping hydrocarbons into the maritime environment. Before being released to sea, bilge water is treated using an oil-water separator. Contaminants or particulates within operational discharges are expected to be exposed to prevailing currents which will disperse and dilute the plume in receiving waters or be consumed by microorganisms (bacteria) (NERA, 2017; Shell, 2020). Changes to water quality from contaminants in operational discharges is expected to be short-term and localised to waters surrounding the discharge point as demonstrated by the following studies: • Modelling by Shell (2009) found that upon discharge, hydrocarbons and other chemical concentrations are rapidly diluted within less than 100 m of the discharge point, over a relatively short period of time. • Intermittently elevated nutrient levels from sewage, putrescible waste, and grey water discharges, which will either dilute in the receiving waters, settle out of the water column, chemically break down or be consumed by microorganisms (bacteria) (NERA 2017). • Monitoring of a 10 m^3 of discharged sewage found in-water concentrations was reduced to 1% of its initial concentration within 50 m of the discharge point (Woodside Energy 2014).	Level 1	A	CM03: Marine Assurance Process CM07: Planned Maintenance System CM08: Amplitude Energy Offshore Chemical Assessment Procedure (project chemicals).	N/A	N/A	Broadly Acceptable, based on: • Impacts well understood. • Consequence level is Level 1, therefore no potential to affect biological diversity and ecological integrity. • Risk level to receptors a result of the change in ambient conditions is low. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and provided for: – Protection of the Sea (*Prevention of Pollution from Ships*) Act 1983 – Section 26F (implements MARPOL Annex I). – Industrial Chemicals (*Notification and Assessment Act*) 1989 • Activity will not impact on the values and functions of the Bonney Upwelling KEF. • Activity will not impact the recovery of: – Blue whale as per the Blue Whale Conservation Management Plan 2015 – 2025 (DoE 2015a) – Southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) – Marine turtles as per the Recovery Plan for Marine Turtles in

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		• Friligos (1985) observed sewage discharge in deep ocean waters and found no appreciable differences in the inorganic nutrient levels between the outfall area and background concentrations, suggesting rapid uptake of nutrients and/or rapid dispersion in the surrounding waters. • Modelling of continuous wastewater discharges observed that the temperature of discharged water was <1°C above ambient within 100 m (horizontally) of the discharge point, and 10 m vertically (Woodside Energy, 2014). • As per MARPOL requirements, any discharge of oily water from vessels will be treated to ≤15 ppm. • Modelling on cooling water discharges was undertaken by RPS for Woodside's Torosa South-1 drilling program (RPS 2019). The modelling predicted that the elevated water temperatures, initially 3°C above ambient temperature, from the cooling water discharge would rapidly decrease once mixed within the receiving waters within 120 m of the discharge point. The near-field modelling also predicted the plume to rapidly dilute within the receiving waters within 16 m (vertically) and 42.4 m (horizontally) of the discharge point based on near-field modelling results (RPS 2019). Biocides and chemical contaminants in operational discharges are selected in accordance with the Amplitude Energy Offshore Chemical Procedure to ensure ecotoxicity profiles are of an acceptable level. Further, discharge of these wastes into the marine environment is a standard maritime practice, will be made in accordance with relevant requirements, such as Australian legislation giving effect to MARPOL 73/78, and most will undergo treatment prior to discharge. The open ocean environment in the operational area will result in the rapid mixing and dilution of vessel discharges Therefore, in combination with the low volume of discharges, it is expected that any planned operational discharges will be short-term and localised. The consequence of impacts to water quality will be **Level 1**.						Australia, 2017 – 2027 (CoA 2017a). • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
	Injury / mortality to marine fauna	**Risk: Injury / Mortality to Marine Fauna - Plankton** Contaminants in operational discharges from vessel operations have the potential to result in injury/mortality to plankton. Plankton are typically considered more vulnerable to the impacts of routine vessel discharges compared to mobile species due to their inability to move away from the discharge point. As discussed above, mortality rates for plankton are naturally high with distribution often patchy and linked to localised and seasonal productivity that produces sporadic bursts in phytoplankton and zooplankton populations (CoA 2015c). In addition, plankton are known to accumulate rapidly and are generally not found to be sensitive to the impacts of contaminants within the water column (Hook et al. 2016). Therefore, considering the naturally high mortality of plankton and the rapid replacement of the species, any impacts from short term exposure to low toxicity discharges are not expected to cause measurable levels of injury or mortality to plankton and will not result in a change in the viability of the population or ecosystem. Therefore, impacts to plankton have been assessed as **Level 1**, with a likelihood of **Remote (E)** assigned. The risk to plankton from planned operational discharges have been evaluated as **Low**. **Risk: Injury / Mortality to Marine Fauna - Mobile Fish, Marine Reptiles and Marine Mammals** Marine fauna within the operational area is likely to be transient. The intermittent and brief exposure of marine fauna to in-water operational discharges will preclude chronic exposure which leads to mortality. As a result, mortality from operational discharges is not a credible event. Fish may be temporarily attracted to food waste from vessels, but discharges are infrequent and not expected to cause long-term behavioural changes. Nutrient input from waste will be localized and short-lived. No BIAs or protected habitats for fish species were identified within the operational area. However, a variety of fish species, including commercial species may be present (see Section 4.4.2). Fish respond to elevated turbidity levels by actively avoiding the plume, which prevents chronic exposure that may lead to sub-lethal impacts relating to minor physiological stress. Observations from numerous studies have identified that adult fish can tolerate relatively high levels of turbidity and TSS for short periods (Johnson 2018). Therefore, fish in the operational area are not expected to stay within the discharge plume for a period of time that would result in sub-lethal injury to occur.	Level 1	A		Remote (E)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		A foraging BIA for the pygmy blue whale has been identified within the operational area. Marine discharges from a vessel have not been identified as a threat to the recovery of pygmy blue whales in the Conservation Management Plan for the Blue Whale (DoE 2015a). The south-east marine region, in addition to the north marine region, has the lowest water clarity and least seasonality of the six marine regions around the coast of Australia (Richardson et al. 2020). As a result, marine mammals that regularly feed here are adapted to high natural variability of in-water turbidity. Given this adaptation to temporary increases in turbidity, plumes generated by operational discharges are not expected to prevent marine mammals from returning to the operational area to feed after discharges have been completed (Johnson 2018).A migration BIA for the southern right whale overlaps with the operational area. Marine discharges from a vessel have not been identified as a threat to recovery in the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b). Since marine mammals are adapted to temporary sediment disturbances because of their oceanic existence and exposure to large storms, disturbances that generate TSS should not prevent species from returning to the area after the disturbance has passed (Tillin et al. 2011). The operational area does not overlap recognised BIAs or habitat critical for marine turtles and therefore low numbers are expected in the area. Marine turtles with the potential to be exposed to operational discharge plumes in the operational area are therefore limited to transient individuals. Minor behavioural changes may result from brief exposure to the plumes. Although, they are unlikely to lead to sub-lethal injury given the absence of habitats that encourage long-term presence of marine turtles in the operational area (Johnson 2018). It is expected that any potential minor physiological impacts from planned operational discharges to plankton, fish, marine reptiles, and marine mammals would be temporary and localised given the transient nature of marine fauna. Therefore, any impacts to megafauna would be negligible, and have been assessed as **Level 1** with a likelihood of **Remote (E)** assigned. The risk to marine fauna has been determined as **Low.**						

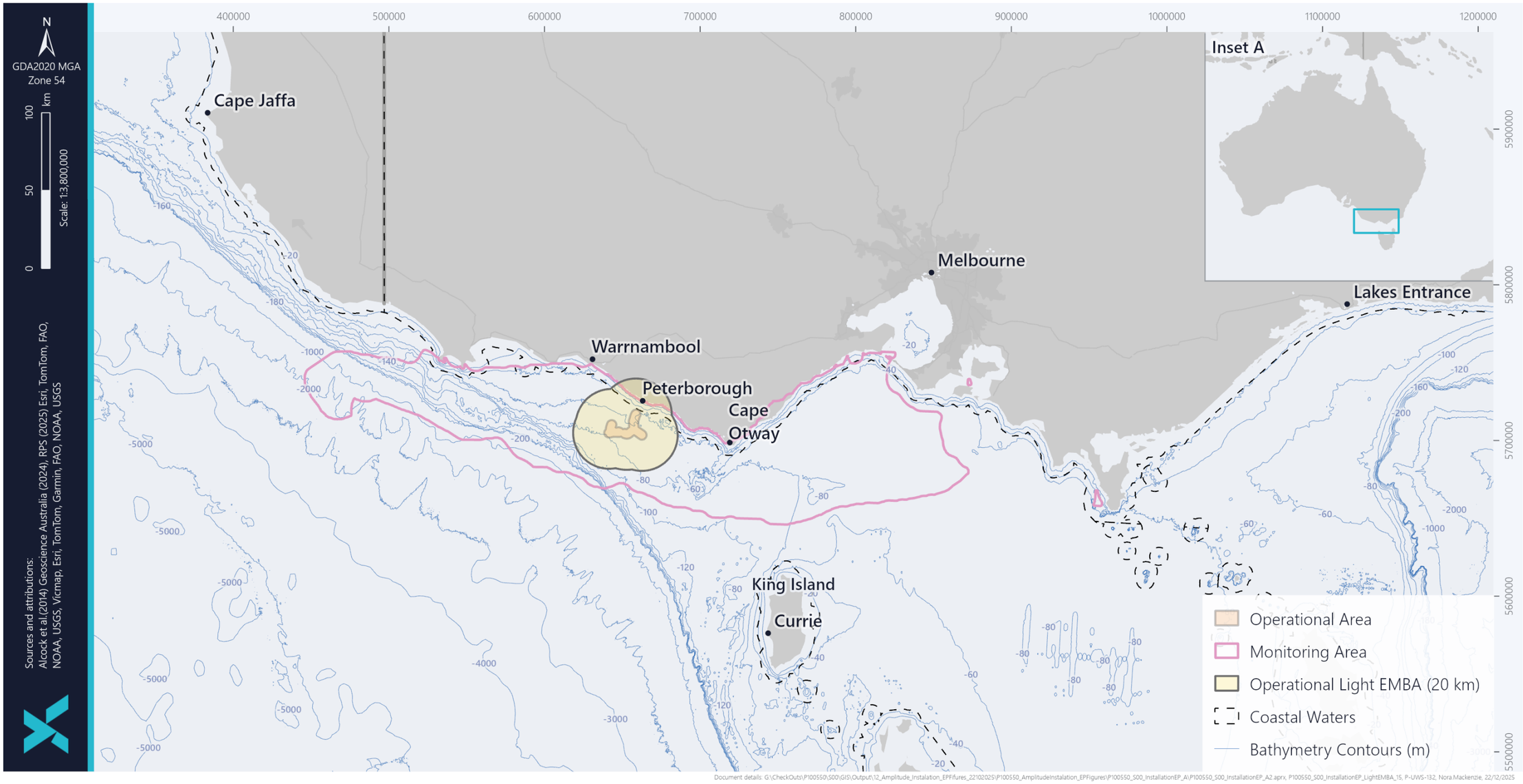


Figure 6-2: Operational Light EMBA within the Monitoring Area

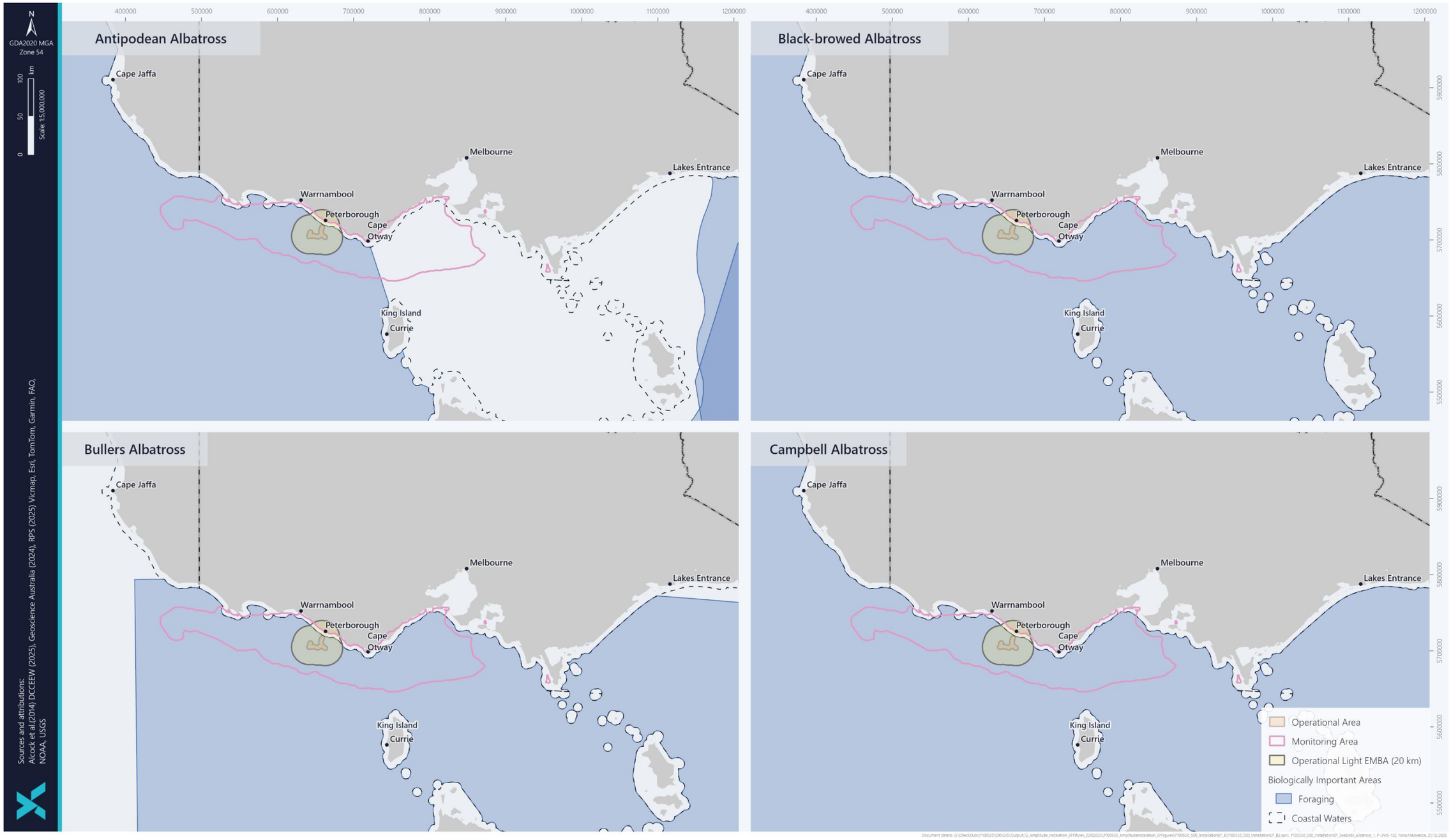


Figure 6-3: Antipodean Albatross, Black-browed Albatross, Buller's Albatross, and Campbell Albatross BIAs overlapping the Operational Light EMBA within the Monitoring Area

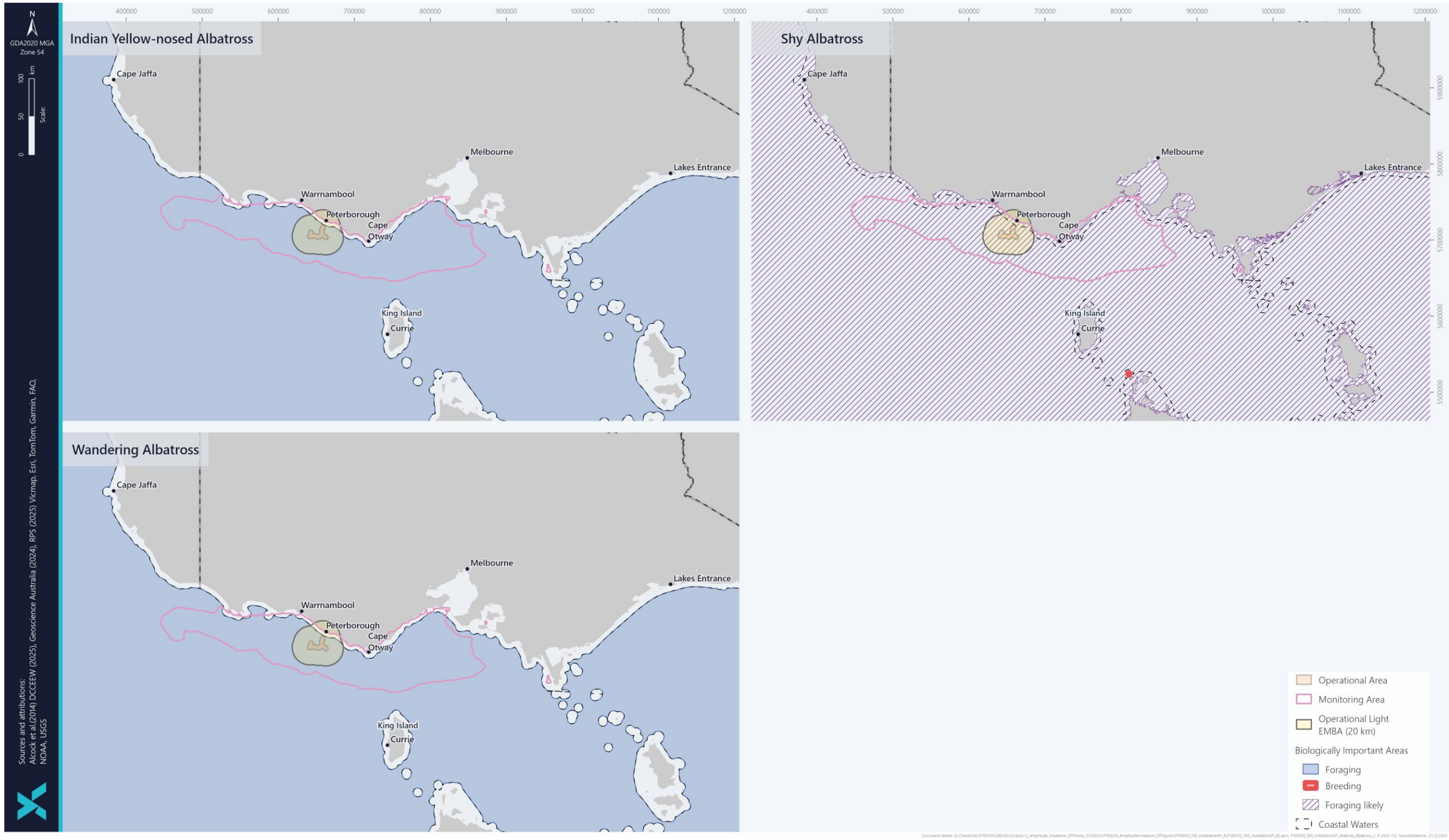


Figure 6-4: Shy Albatross, Wandering Albatross, and Indian Yellow-nosed Albatross BIAs overlapping the Operational Light EMBA within the Monitoring Area

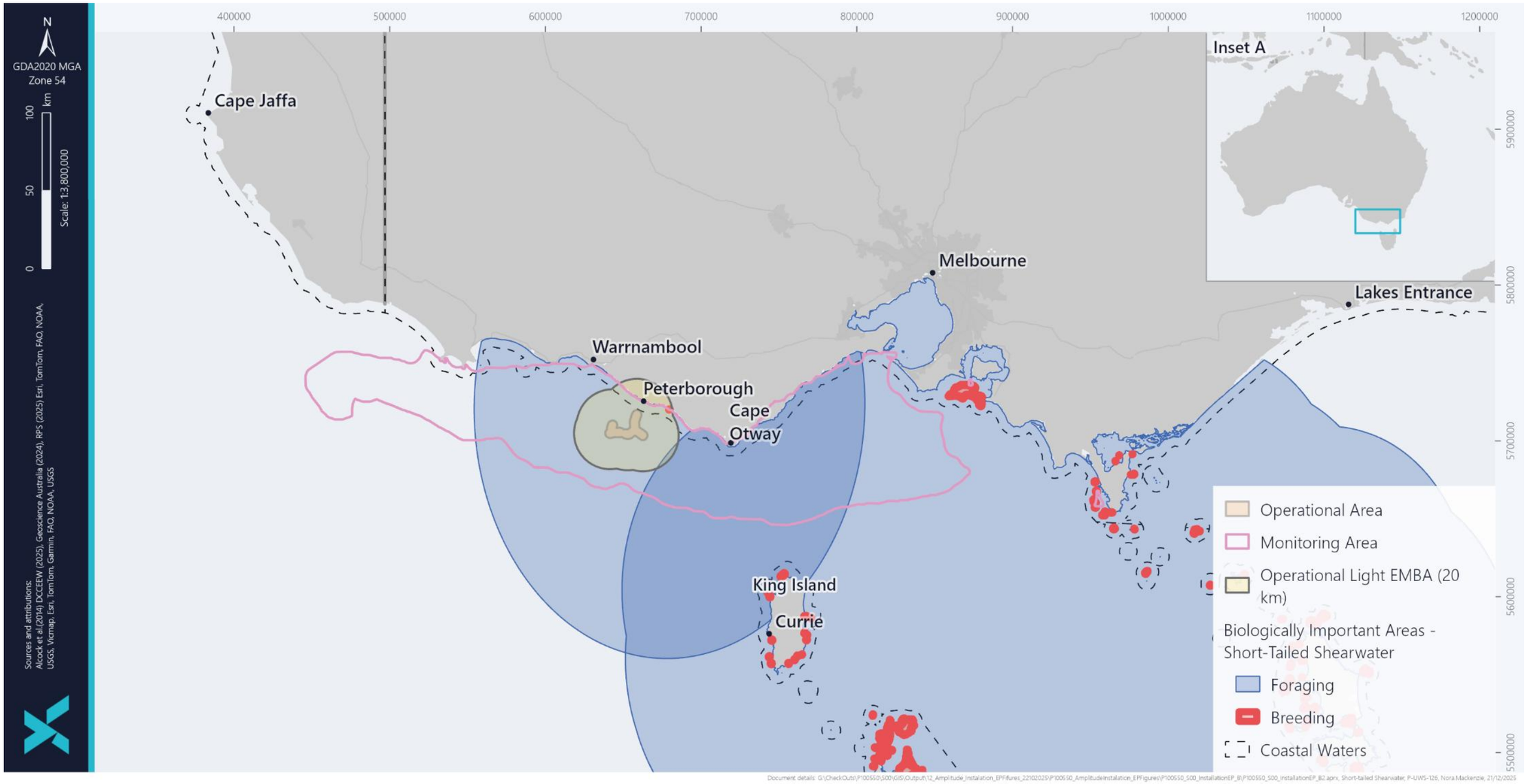


Figure 6-5: Short-tailed Shearwater BIAs overlapping the Operational Light EMBA within the Monitoring Area

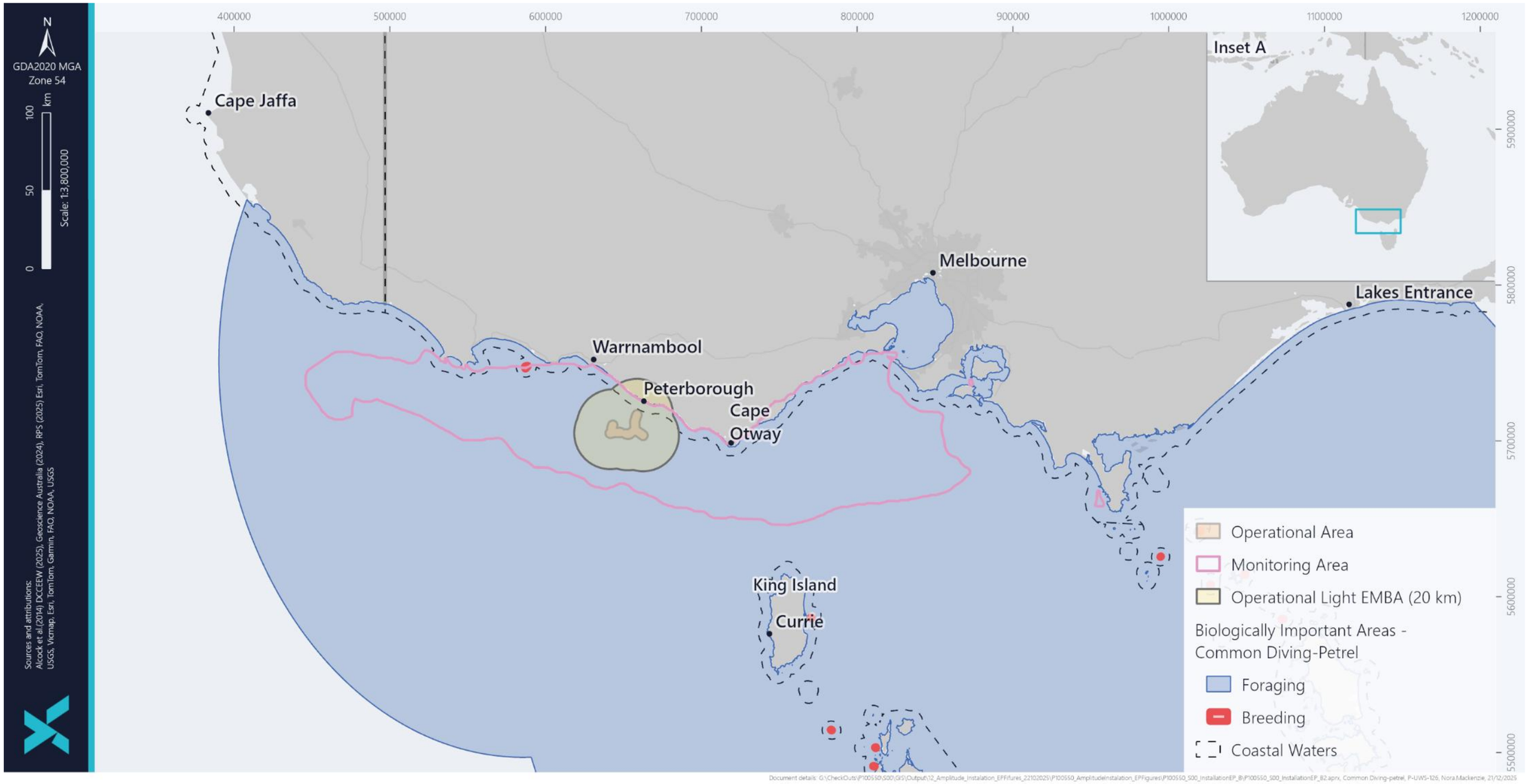


Figure 6-6: Common Diving Petrel BIAs overlapping the Operational Light EMBA within the Monitoring Area

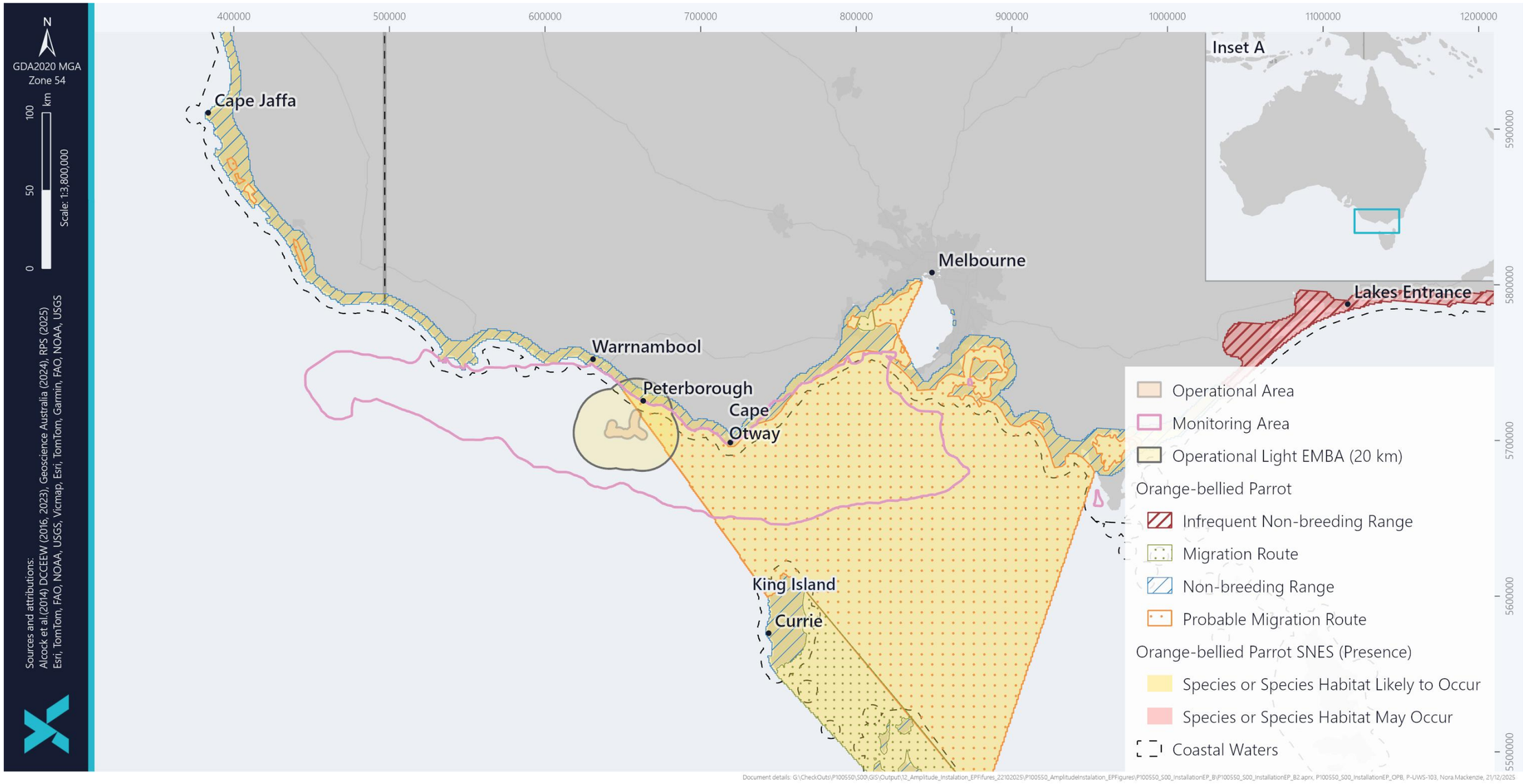


Figure 6-7: Orange-bellied Parrot presence spatial data overlapping the Operational Light EMBA within the Monitoring Area

6.2.2 Unplanned Aspects

Table 6-3: Lower Order Unplanned Impact and Risk Evaluation

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
Physical Presence								
Physical Presence – Interaction with Marine Fauna: • Vessel operations • Helicopter operations.	Injury / mortality to marine fauna	**Risk: Injury/mortality to marine fauna** Unplanned interactions with marine fauna could occur due to vessel movements within the operational area during activities. These interactions have the potential to cause injury/mortality to marine fauna. As per Section 3.2, the maximum duration of the Activity will be ~150 days based on undertaking the installation of flowlines in a single campaign, with shorter durations for other activities (refer Section 3.2). The receptors that may be impacted include: • Marine Reptiles • Marine Mammals • Fish and Sharks • Avifauna. **Marine Reptiles, Fish and Marine Mammals:** Marine turtles transiting within the operational area are at risk from vessel strike when they periodically return to the surface to breath and rest. Marine turtles spend as little as 3-6 percent of their time at the surface with routine dives that last between 15 to 20 minutes to an hour depending on environmental conditions (NOAA 2021). The Recovery Plan for Marine Turtles in Australia 2017-2027 identifies vessel disturbance as a threat to the species, although the threat is only focused on shallow coastal foraging habitats and internesting areas (CoA 2017a). There are 3 species of marine turtles that may occur within the operational area, the green turtle, loggerhead, and leatherback turtle; however, this occurrence is expected to only be of a transient nature due to the absence of suitable coastal habitat in the south-east marine region. No BIAs or habitat critical to the survival of these marine turtles occurs within the operational area or wider south-east marine region. The risk of collisions between turtles and vessels increases with vessel speed (Hazel et al. 2007). For the majority of time vessels within the operational area will be moving slowly within operational area, reducing the potential severity and likelihood of collision. Slow moving megafauna that are within the surface waters and breach often are most at risk from the interaction with vessels within the operational area. Marine mammals' surface to breathe periodically and may spend a lot of their time at or near the water's surface. This behaviour makes marine mammals, particularly large mammals such as baleen whales vulnerable to vessel strike. The International Whaling Commission (IWC) (2020) reported around 900 cases of vessel strike with cetaceans globally, inclusive of all historic records; 35 of those interactions were reported within Australian jurisdictions. Cetaceans are naturally inquisitive marine species that are often observed from offshore vessels and facilities, however, the behaviour of whales in response to the approach of a vessel can vary. Some species are curious and will approach ships that have stopped or are slow moving, although they generally do not approach, and sometimes avoid, faster-moving ships (Richardson et al. 1995). Collisions between larger vessels with reduced manoeuvrability and large, slow-moving cetaceans occur more frequently where vessel traffic is high and cetacean habitat occurs (WDCS 2006). Laist et al. (2001) identified that large vessels with reduced manoeuvrability moving in excess of 10 knots may cause fatal or severe injuries to cetaceans, with the most severe injuries caused by vessels such as tanker travelling faster than 14 knots. Vessels used during the Activity do not have the same limitations on manoeuvrability and would typically travel at economy speeds (or lower) when conducting activities within the scope of this EP, inside of the operational area.	Level 2	A	CM10: Offshore Operational Procedures CM13: Amplitude Energy Offshore Victoria Whale Disturbance Risk Management Procedure	Unlikely (D)	Low	Broadly Acceptable, based on: • Impacts well understood. • Residual risk (severity) is Low. • Consequence level is Level 2, therefore no potential to affect biological diversity and ecological integrity. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and met, and guidelines considered: – EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans – National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (CoA, 2017b) • Activity will not impact the recovery of: – Marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA, 2017a) – Blue whale per the CMP for the Blue Whale, 2015-2025 (DoE, 2015) – Southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW, 2024b) – Sei whale as per Conservation Advice for

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		Large, slow-moving fish and shark species that bask or feed at the surface are the most vulnerable to vessel collisions. Vessels moving through the operational area have the potential to collide with large fish species that may occur within the operational area. Listed threatened and migratory marine reptiles, fish and marine mammals' presence within the operational area includes: • Four threatened marine mammal species; southern right whale (Endangered), blue whale (Endangered), sei whale (Vulnerable) and fin whale (Vulnerable). • Eight migratory marine mammals; blue whale, dusky dolphin, fin whale, humpback whale, killer whale, pygmy right whale, sei whale, southern right whale • Two marine mammals with BIAs; pygmy blue whale (Foraging) and the southern right whale (Migration). • • Four threatened fish species; Australian grayling (Vulnerable), blue warehou (Conservation Dependent) and Eastern school shark (Conservation Dependent), white shark (Vulnerable). • Four migratory marine fish species; grey nurse shark, porbeagle shark, shortfin mako shark, and white shark. No BIAs have been identified within the operational area for fish or sharks. • Three migratory and threatened marine reptiles, leatherback turtle, loggerhead turtle and green turtle. No BIA's have been identified within the operational area for marine reptiles. The operational area has no threatened species presence of BIAs for pinnipeds, dugongs or dolphins. However, EPBC listed cetaceans and Australian fur-seals and New Zealand fur-seals may occur within the operational area (see Section 4.4.2). **Avifauna:** Helicopters that are arriving to, or departing from, the installation vessel have the potential to collide with avifauna and potentially result in injury / mortality. Seabirds may aggregate around the installation vessel due to night lighting, flaring, food concentrations and other visual cues, increasing the risk of a possible interaction. However, considering the short duration of the activity it is considered unlikely that individuals would habituate to the presence of the vessel. The operational area does not host a large diversity of bird species, mainly due to its offshore location and lack of features suitable for bird roosting and nesting. The absence of these features decreases the chance of high numbers of bird at potentially vulnerable stages within the operational area therefore reducing the chances of a bird strike event. It is expected that any avifauna within the operational area would be foraging, rafting or travelling through. Given the large distance typically covered by marine bird species there is a relatively small overlap between the operational area and each species range further reducing the likelihood of collision. Listed threatened and migratory bird presence within the operational area includes: • 35 threatened, migratory or listed marine bird species, 3 of which are critically endangered (eastern curlew, orange-bellied parrot and curlew sandpiper), and 5 of which are endangered (Grey-headed albatross, Southern giant-petrel, Northern royal albatross, Shy albatross and Gould's petrel) • 9 foraging BIAs; antipodean albatross, black-browed albatross, Buller's albatross, Campbell albatross, common diving-petrel, Indian yellow-nosed albatross, short-tailed shearwater, shy albatross, and wandering albatross. The Wildlife Conservation Plan on Seabirds (CoA 2020) does not identify aircraft collision as a threat, however the plan does identify that transport, such as aircraft, flying low over breeding colonies may cause excessive disturbance to breeding individuals. Amplitude has documented instances where individual birds have taken refuge on vessels, however, there has never been a physical interaction with avifauna which occurred during Amplitude activities						the Sei Whale (TSSC 2015a) – Fin whale as per Conservation Advice for the Fin Whale (TSSC 2015b) • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Risks are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the **OPP**. No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		in the region. There are no nesting or breeding sites within the operational area, that are within the vicinity of where helicopters may land and take-off from the vessel. **Summary:** Impacts have been assessed as **Level 2**, based one: • The occurrence of interaction with marine fauna, resulting in injury/mortality, is considered low, due to the relatively short time period of vessel operations within the area (~7-21 days for survey activities and ~120-150 days for installation, testing and preservation activities) • The consequence of an impact is predicted to be limited to individuals, due to the localised and short-term nature of the activity. The likelihood of the impact is considered **Unlikely (D)**, and the risk is determined as **Low**.						
Unplanned Discharges								
Unplanned Discharge – Minor Loss of Containment LOC: • Vessel operations • Helicopter operations • ROV operations • Installation	Change in water quality	Scenarios that have the potential to result in a loss of containment (LOC) include: • Spill to deck of various chemicals stored on the vessels: <5 m^3. • Equipment malfunction leading to helicopter ditching into ocean or fuel tank compromised during landing resulting in a release of fuel to sea: ~3 m^3. • Unplanned discharge from ROV being operated subsea: < 30 L of hydraulic fluid. **Risk: Change in water quality** <u>Hydrocarbons and Chemicals</u> The unplanned release of chemicals or hydrocarbons from a LOC into the marine environment has the potential to cause a localised reduction in water quality. The hydrocarbon characteristics of diesel or hydraulic fluid of being highly volatile, light and non-persistent are expected to evaporate rapidly after being released. Therefore, given any change in the water quality following a LOC is anticipated to be highly localised, within the immediate vicinity of the release and result in short-term impacts which rapidly recovers. All chemicals which are planned to be discharged are selected in accordance with the Amplitude Energy Offshore Chemical Procedure to ensure ecotoxicity profiles are of an acceptable level. Hydrocarbons or chemicals from a LOC are unlikely to result in a change in sediment quality due to the small volumes released which would quickly dilute and disperse into the water column. The potential for toxicity to marine fauna will be extremely rare as the temporary exposure will preclude toxic effects if marine fauna pass directly through a release. Given the small discharges, short-potential exposure time due to rapid dilution through metocean conditions, impacts to marine fauna are not expected and therefore have not been assessed further. Further, the energetic offshore environment in the Operational Area would be expected to quickly disperse a release of this nature, resulting in a limited exposure duration and extent to receptors within the marine environment. As such, any exposure to hydrocarbons above background levels would be limited in extent and duration, and any impact is expected to be localised and temporary with rapid recovery to ambient conditions following an accidental release. The potential impacts to water quality are therefore assessed as **Level 2** with localised, short-term impacts, not effecting local ecosystem function. This assessment considers any indirect impacts to species arising from theoretical exposure would be low level and brief given the limited exposure duration and extent due to rapid dispersion and return to ambient conditions post event. While the impact is conceivable and could occur, it would require a rare combination of factors and is therefore considered **Unlikely (D)**. As such the overall risk level is considered **Low**.	Level 2	A	CM01: Marine Exclusion and Caution Zones CM03: Marine Assurance Process CM05: Ongoing Consultation CM08: Amplitude Energy Offshore Chemical Assessment Procedure CM17: Activity Fire Fighting Foam Screening and Quarantine Standards CM18: NOPSEMA Accepted Safety Cases CM19: Oil Pollution Emergency Plan (OPEP)	Unlikely (D)	Low	Broadly Acceptable, based on: • Impacts well understood. • Residual risk (severity) is Low. • Consequence is Level 2, localised, short-term impacts, not effecting local ecosystem function. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and met: – Protection of the Sea (Prevention of Pollution from Ships) Act 1983 – Section 26F (implements MARPOL Annex I). – Navigation Act 2012 – Chapter 4 (Prevention of Pollution). – AMSA Marine Orders 91 and 94 (Marine pollution prevention – oil Marine and packaged harmful substance, respectively) – Industrial Chemicals (Notification and Assessment Act) 1989 – Convention for the Safety of Life at Sea 1974 (SOLAS) –

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
								specifically prohibition of the use or storage of firefighting foams containing perfluorooctane sulfonic acid (PFOS) in effect in 2026. • Activity will not impact the recovery of EPBC listed species. • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Risks are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
Unplanned Discharge – Loss of materials or waste overboard (Hazardous / Non-hazardous waste): • Vessel operations	• Change in habitat • Injury/mortality to marine fauna • Change in cultural value	Scenarios that have the potential for the unplanned discharge of hazardous/non-hazardous materials and waste include: • The use of small quantities of hazardous/non-hazardous materials (solids and liquids) on board the vessel. • The creation, handling and storage of wastes onboard until transference to port facilities. • The handling of large equipment during activities (i.e., infrastructure, anchors, tubulars, containers). • Rough ocean conditions may cause items may be washed off or blown off deck. Note: A pipeline LOC following a dropped object has been assessed within Section 6.8. **Risk: Injury/mortality - Avifauna, Fish, Marine Turtles and Marine Mammals:**	Level 2	A	CM03: Marine Assurance Process CM10: Offshore Operational Procedures CM15: Waste Management Practices	Unlikely (D)	Low	Broadly Acceptable, based on: • Impacts well understood. • Residual risk (severity) is Low. • Consequence level is Level 2, therefore no potential to affect biological diversity and ecological integrity.

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		Plastic debris adrift in the ocean accumulate a biofilm in a short space of time which attracts albatrosses and petrels, and consequently, seabirds are highly likely to mistake plastic particles for food and ingest them (CoA 2022). Ingestion of plastics can potentially cause impacts such as gut obstruction or reduced stomach volume, resulting in a loss of fitness and starvation (Wilcox et al. 2015). However, there is currently no evidence to suggest that ingestion or entanglement of marine debris are posing a significant threat to any Australian seabird species at the population level (CoA 2020). Potential injury/mortality to seabirds from entanglement and ingestion from a loss of materials overboard would be expected to be limited to individual foraging seabirds, with no population level effects. Marine turtles indiscriminate feeding habits make them susceptible to ingestion or entanglement of materials lost overboard, particularly plastics (Mrosovsky et al. 2009). Ingestion of debris can cause internal wounds, suffocation, prevent feeding leading to starvation and can create intestinal blockages that increase buoyance and stop a turtle from diving (CoA 2017a). The operational area does not intersect any recognised BIAs or critical habitats for marine turtles and therefore low numbers are expected in the area. Entanglement can harm or kill individual whales and can reduce the fitness of an individual by causing physical damage and restricting mobility and/or impairing breathing, swimming or feeding ability (CoA 2022). CoA (2022) reports that there have been 104 records of cetaceans in Australian waters impacted by plastic debris through entanglement or ingestion since 1998 (humpback whales being the main species impacted). The Threat Abatement Plan (CoA 2018) suggests that most marine plastic debris are associated to shipping fishery and household activities (fishing gear, balloons and plastic bags). The loss of plastic debris through entanglement is also possible during the Activity. No injury of marine fauna has been reported during Amplitude Energy Offshore Operations to date. Any impacts to cetaceans from a loss of material or waste overboard would be expected to be limited to individuals, with no population level effects. The following management plans and conservation advice identify marine debris as a threat: • National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022). • Recovery Plan for Marine Turtles in Australia (CoA 2017a). • Wildlife Conservation Plan for Seabirds (CoA 2020). • Threat Abatement Plan for the impacts of marine debris on vertebrate wildlife of Australia's coasts and oceans (CoA 2018). • Blue Whale Conservation Management Plan 2015 - 2025 (DoE 2015a). • National Recovery Plan for the Southern Right Whale (DCCEEW 2024b). • Recovery Plan for the Australian Sea Lion (Neophoca cinerea) (CoA 2013). • Conservation Advice on Dermochelys coriacea (Leatherback Turtle) (DEWHA 2008a). Waste generated on board vessels will be handled in accordance with AMSA Discharge Standards and respective vessel Garbage Management Plans (GMP); these require that particular wastes are managed so that it is not lost or discarded overboard Given this, any loss of materials overboard would be in minimal quantities. The consequence of any impacts from marine debris on marine fauna would be limited and is assessed as **Level 2**. This assessment considers any indirect impacts arising from theoretical exposure to hazardous and non-hazardous wastes. While the impact on marine fauna is conceivable and could occur, from this activity, which is short term, it is considered **Unlikely (D)** and as such the overall risk level is **Low**.			CM21: Retrieval of dropped objects were practicable			• Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and met: – Marine Order 95 – Marine pollution prevention – garbage (as appropriate to vessel class) – Protection of the Sea (Prevention of Pollution from Ships) Act 1983 - Section 26F (implements MARPOL Annex I) – Navigation Act 2012 – Chapter 4 (Prevention of Pollution). • Threat Abatement Plan for the impacts of marine debris on vertebrate wildlife of Australia's coasts and oceans (CoA 2018). • Activity will not impact the recovery of: – Albatross and Giant Petrel populations breeding and foraging as per the National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022) – Marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA 2017a). – Wildlife Conservation Plan for Seabirds (CoA 2020) – Blue whales as per Blue Whale Conservation Management Plan 2015 - 2025 (DoE 2015a) – Southern right whale as per the National
		Risk: Change in Benthic Habitat: The loss of large materials overboard during activities may result in localised and temporary disturbance to benthic habitats. The impact footprint on benthic habitats would align with the size of the object dropped overboard. Large materials with the potential to be lost overboard include anchors, tubulars, containers, etc. These items are expected to be inert and will not represent a	Level 1	A		Unlikely (D)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		contamination risk to benthic habitats. Once a dropped object has been recovered; the seabed is expected to recover naturally. Benthic assemblages in the operational area are characteristic of the shelf rocky reef and hard substrate KEF that is well represented in the wider Bass Strait region (Section 4.4). A loss of material or waste overboard occurring within the operational area has the potential to result in seabed disturbance to the KEF and impact some of the associated values, such as diversity and productivity of the hard substrate which are often colonised by sponges, sessile invertebrates, soft corals. Results from a 2020 seabed survey adjacent to the operational area observed hard ground and patchy epifauna, consistent with the description of the KEF, however no reef-type structures of high relief were observed (Fugro 2020a; 2020b). These results are supported by the seabed survey within the operational area undertaken in May and June 2025 (refer Section 4.3.1). The Activity locations will aim to avoids sensitive features such as reef structures of high relief. The operational area does not overlap AMPs, and no ecological communities listed as threatened under the EPBC Act were observed. Therefore, the risk of change in habitat from loss of materials or waste overboard would not be expected to significantly alter the overall character of the seabed, or its ecological amenity. Waste generated on board vessels will be handled in accordance with AMSA Discharge Standards and respective vessel Garbage Management Plans (GMP); these require that particular wastes are managed so that it is not lost or discarded overboard. Given this, any loss of materials overboard would be in minimal quantities. The consequence of any impacts from marine debris on benthic habitats would be limited and is assessed as **Level 1.** This assessment considers any indirect impacts arising from theoretical exposure to hazardous and non-hazardous wastes. While the impact on benthic habitats is conceivable and could occur, from this activity, which is short term, it is considered **Unlikely (D)** and as such the overall risk level is **Low**.						Recovery Plan for the Southern Right Whale (DCCEEW 2024b) – Australian sea lions as per Recovery Plan for the Australian Sea Lion (Neophoca cinerea) (CoA 2013) – Leatherback turtle as per Conservation Advice on Dermochelys coriacea (Leatherback Turtle) (DEWHA 2008a) – Recovery Plan for the White Shark (Carcharodon carcharias) (DSEWPaC 2013a) • Amplitude Energy MS and Processes have been identified. • No claims or objections raised during consultation. Risks are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1 • **OPP** control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
		Risk: Change to Cultural Heritage: The loss of materials or waste overboard may result in changes to cultural heritage, such as, the disturbance of underwater cultural heritage including shipwrecks, aircraft and other artefacts. A search of the Australasian Underwater Cultural Heritage Database found one shipwreck, Alfred (<75 years old ID 11052), located near the border of the operational area. On further investigation the position given for the wreck was confirmed to be a search area centrepoint; these are provided when the location of a wreck is unknown; there are over 300 wrecks like this offshore Victoria (pers comm Heritage Victoria 2024); written records further indicate the wreck is likely closer to Warrnambool, and not relevant to the operational area of the Activity. The Alred wreck is listed as present within the operational area. However, The position given for the wreck has been confirmed to be a search area centrepoint which is are provided when the location of a wreck is unknown (pers comm Heritage Victoria 2024). Written records further indicate the Alfred is likely closer to Warrnambool, and not relevant to the operational area of the Activity. No shipwrecks have been observed during survey or inspections within and proximal to the operational area to date. Most recent surveys and inspections were in 2020. The predicted level of impact, i.e., the consequence, of change to cultural heritage from a loss of material or waste overboard resulting in seabed disturbance is evaluated to have a consequence of **Level 1** based on: • No expected underwater cultural heritage artefacts within the operational area based on screening assessments, previous inspection and survey and stakeholder engagement. Waste generated on board vessels will be handled in accordance with AMSA Discharge Standards and respective vessel Garbage Management Plans (GMP); these require that particular wastes are managed so they are not lost or discarded overboard. Given this, loss of materials overboard such as plastics to the marine environment is not expected.						

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		This assessment considers any indirect impacts to cultural heritage arising from theoretical exposure to materials lost overboard. While the impact is conceivable and could occur, from this activity, which is relatively short term, it is considered **Unlikely (D)**. The inherent risk severity of the change to cultural heritage is considered **Low**.						

6.3 Seabed Disturbance

6.3.1 Cause of Aspect

The activities where seabed disturbance will occur as a result of the Activity are identified in Table 6-4 and described in further detail in subsections below.

Table 6-4: Activities that will Result in Seabed Disturbance

Aspect / Phase	Activity component
Surveys	Geotechnical survey (sampling)
Equipment positioning	Transponders
Installation, Testing and Preservation	Pre-lay works
	Installation of flowlines and umbilical systems
	Installation of subsea infrastructure
	Post-lay works
Support activities	Vessel operations
	ROV / AUV operations
Contingent activities	Environment Survey

6.3.2 Aspect Characterisation

Seabed disturbances can be categorised into long-term (i.e., the life of the Activity) or short-term (i.e., until the completion of the specific activity i.e., seabed sampling) disturbances depending on the activity being undertaken. Seabed disturbance will only occur within the Operational Area.

For the purposes of the impact assessment, a conservative direct disturbance termed the long-term disturbance (permanent infrastructure) corridor, has been adopted, to capture the nominal spatial extent and footprint of all installed infrastructure (i.e. flowlines and subsea structures). The footprint estimate includes any disturbance along the flowline/umbilical routes due to subsea installation. It also takes into consideration other equipment such as jumpers or spools and stabilisation materials (including those at existing CHN pipeline crossings), and loss loops.

The long-term disturbance corridor has been estimated on the basis of a 50 m buffer either side of the flowlines and umbilical systems (totalling a corridor of 100 m width) and 200 m radius around subsea structures (e.g. manifolds). Planned long-term disturbances identified in Table 6-5 will be within this disturbance corridor. Some activities may result in short term disturbances such as geotechnical sampling and temporary wet parking (if required). In the unlikely event that equipment must be stored temporarily on the seabed due to storm or emergency events and retrieved within the duration of the campaign.

Table 6-5 summarises the seabed disturbance extents estimated for the Activity.

Table 6-5: Seabed Disturbance Estimated Spatial Extent

Aspect	Activity Component	Parameters	Estimated Disturbance Spatial Extent	Total Estimated Disturbance Spatial Extent
Long-term				

Aspect	Activity Component	Parameters	Estimated Disturbance Spatial Extent	Total Estimated Disturbance Spatial Extent
Installation	Installation of flowline and umbilical systems, including activities and subsea infrastructure occurring along these systems.	Total route length (including 25% allowance): • Flowlines: 30.29 km • Umbilicals: 38.14 km.	• Extent of disturbance corridor: Flowlines: 3.01 km^2 • Umbilicals: 3.81 km^2 Estimated on the basis of a 50 m buffer either side of the flowlines and umbilical systems (totalling a corridor of 100 m width)..	Total: 6.82 km^2
	Installation of other subsea infrastructure.	• Manifolds: – 3 x manifolds – 8 x 12 m each: 96 m^2.	• 0.126 km^2 per well and manifold location. Estimated on the basis of a disturbance area of a 200 m radius around the manifold structures.	Total: ~0.38 km^2
		• Mattresses: – ~300 x mattresses – ~18 m^2 per item: 0.0054 km^2. • Grout bags: 0.5 m^2 per bag Contingency: • Over-pressure protection systems: – 5 x 5 m for each structure: 25 m^2 – 15 x 15 m for each mudmat: 225 m^2 • Hot-tap tie-structures: <25 m^3	• Total: <0.006 km^2	Planned disturbance to be within either the disturbance corridor of 100 m for flowline and umbilical systems or the 200 m radius around the manifold structures.
Short-term				
Geotechnical survey	Seabed sampling	• ~20 samples • Sampling equipment is deployed on a skid which would typically have a footprint of <1m^2	• Total: <20 m^2 (<0.00002 km^2)	Planned disturbance to be within the disturbance corridor of 100 m for flowline and umbilical systems.

Aspect	Activity Component	Parameters	Estimated Disturbance Spatial Extent	Total Estimated Disturbance Spatial Extent
Installation	Positioning	<2 m^2 for each transponder and associated frame.	Total: <0.000008 km^2	Planned disturbance to be within the disturbance corridor of 100 m for flowline and umbilical systems.
Support activities	Vessel operations	A maximum of 3 x vessels will be within the operational area at any one time whilst the Activity is being undertaken. Vessels will typically use thrusters or DP to maintain position, but in an emergency situation, anchoring may be required A vessel anchored within water depths greater than 70 m (deeper than the operational area) with a single anchor could result in a total disturbance area of up to 1,300 m^2 (NERA 2018).	Estimated spatial extent per vessel: • 1,300 m^2 (0.0013 km^2)	Total: 3,900 m^2 (0.0039 km^2)
	ROV/AUV operations	Typical ROV footprint is 4 m^2.	Total: <10 m^2 Based on a conservative estimate.	< 10 m^2 (<0.00001 km^2)
Contingent activities	Wet parking of equipment (e.g. during severe weather events)	Maximum footprint: • ~50 m x 50 m = 2,500 m^2 Any equipment that requires contingent wet parking will be retrieved within the duration of the campaign.	2,500 m^2 (0.0025 km^2)	Total: 2,500 m^2(0.0025 km^2)
	Environment Surveys	An environmental survey is not a planned activity. However, should an unexpected find be encountered, an environmental survey including seabed sampling will be conducted. • Up to 10 x grab samples for an unexpected find may be required as a contingent activity. • 0.1 - 0.2 m^2 per sample.	<10 m^2 (<0.00001 km^2)	Total: <10 m^2 (<0.00001 km^2)
			Total	~7.2 km^2

6.3.3 Predicted Environmental Impacts and Risks

Seabed disturbance from the Activity can result in direct and indirect impacts.

Potential impacts from seabed disturbance are:

- change in benthic habitat
- disturbance to benthic assemblages.
- Potential risks associated with seabed disturbance are:
- injury / mortality to marine fauna
- change to cultural heritage.

Seabed disturbance will only occur within the operational area. Receptors which may be directly affected include the benthic habitat, benthic assemblages, and marine invertebrates and fish. Indirect effects are possible to commercial fisheries, conservation values of protected areas and First Nations cultural values and sensitivities. Impacts and risks to First Nations cultural heritage are assessed in Section 7.2.

6.3.4 Impact and Risk Evaluation

6.3.4.1 Impact: Change in Benthic Habitat

Inherent Consequence Evaluation

As described in Section 4.0, benthic habitats in the operational area are characteristic of a seabed comprised of hard substrate and reef with patches of sand or gravel / rubble. These substrates are well represented in the wider Bass Strait, particularly in the Otway Region. Benthic assemblages have been observed during subsea habitat surveys and facility inspections within and proximal to the operational area (Fugro 2020; 2020a; MMA Offshore 2025a; 2025b). The most recent surveys within the operational area identified unconsolidated substrates (mainly of sand, shell grit, and rubble, with occasional rock) supporting low densities of epifauna communities. Sponges were the most common, followed by hydroids, ascidians, and soft corals (MMA Offshore 2025b). No ecological communities listed as threatened under the EPBC Act were identified and the operational area does not overlap AMPs.

Within the operational area, ~7.2 km^2 of the seabed has the potential to be disturbed by the subsea installation of infrastructure on the seabed. .

In the event that wet storage/parking of equipment is required during the Activity (i.e., in the event of bad weather conditions), the estimated extent will be within the operational area and highly localised (<10 m^2).Secondary impacts from scouring may occur. Scouring is a natural feature on the Otway shelf whereby currents erode sediments around hard calcareous sediments (Fugro 2020a; 2020b; MMA Offshore 2025a). Installation of subsea infrastructure will introduce the presence of hard features on the seabed which may encourage scouring processes in areas immediately surrounding seabed infrastructure installed for the Activity.

The operational area occurs in the southeast marine region, where the shelf rocky reefs KEF occurs. These are areas of rocky reefs and hard substrates along the continental shelf which provide unique seafloor habitat for diverse assemblages of species (Section 4.4.2). Activities occurring within the operational area may result in seabed disturbance to the KEF and impact some of the associated values, such as diversity and productivity of the hard substrate which are often colonised by sponges, sessile invertebrates, soft corals. Previous Fugro (2020a; 2020b) surveys observed hard ground and patchy epifauna throughout most video transects, consistent with the description of the KEF, however no reef-type structures of high relief were observed. These findings were also supported by recent seabed surveys undertaken in 2025 within the Activity operational area (MMA

Offshore 2025a) (Section 4.3.1). Therefore, seabed disturbance is not anticipated to significantly impact the overall marine ecosystem integrity or functioning of the KEF.

Certain benthic species, such as sponges, can undergo a variety in reproductive techniques (i.e., both sexually and asexually), enabling them to be effective colonisers of hard marine surfaces (Butler 2002). Their recovery is further supported by strong seabed currents that aid in the redistribution of larvae and fragments. Once established, sponges are efficient competitors, using asexual reproduction and chemical deterrents to retain living space and ward off predators and other species (Butler 2002). As a result, benthic assemblages are expected to recolonise disturbed areas and recover to baseline conditions following both the installation and removal of subsea infrastructure, often establishing on the structures themselves.

During Stages I and II of the CHN development, subsea surveys of the flowlines and umbilicals revealed that sponges, bryozoans, and hydrozoans had colonised both the installed infrastructure and areas affected by installation activities. Recovery of benthic habitats has been shown to occur within months (e.g., Morrisey et al. 2018), with Dernie et al. (2003) demonstrating that the full recovery of soft sediment assemblages from physical disturbance could take between 64 and 208 days depending on disturbance intensity. As such, based on the nature and scale of the planned activities and the expected seabed characteristics, areas of seabed disturbed by the Activity are expected to recolonise quickly and impacts from seabed disturbance are not expected to cause long-lasting changes to benthic habitats.

The predicted level of impact, i.e., the consequence, as a result of a change in benthic habitat from seabed disturbance is evaluated to have a consequence of **Level 2** based on:

- Shelf rocky reefs KEF is present within the south east marine region with multiple examples in the Otway (Section 4.4.2).
- The operational area includes areas of hard substrate.
- The operational area does not overlap AMPs.
- Benthic assemblages in the operational area have a scattered distribution, and do not contain threatened listed ecological communities or critical habitats.
- A seabed survey will be undertaken to inform the planning of subsea infrastructure installation considering seabed relief, substrate and hazards.
- The total estimated area of impact is predicted to be relatively small (~7.2 km^2) compared to the extent and distribution of the benthic habitats and associated fauna identified within the operational area and wider region.
- Seabed disturbance is anticipated to be localised and recoverable following infrastructure installation and not impact ecosystem functioning of benthic habitats.

6.3.4.2 Impact: Disturbance to Benthic Assemblages

Inherent Consequence Evaluation

Activities related to surveys, subsea installation and support operations for the Activity will result in changes to water quality from the suspension and redeposition of sediments. Changes in water quality have the potential to impact benthic assemblages, including benthic invertebrate communities, characteristic of the broader region.

Suspended sediments during the Activity are expected to redistribute over time due to the surrounding geomorphology and hydrodynamics and thus would not be expected to significantly alter the overall character of the seabed. The impact to benthic and demersal communities from

suspension of sediments is expected to be minimal given the open-ocean environment in which the hydrodynamics are expected to disperse or dilute suspended sediment quickly following disturbance. The substrates present within the area where seabed disturbance is predicted are considered to be primarily mobile due to recent surveys within the operational area demonstrating evidence of active sediment transport (MMA Offshore 2025a) and previous surveys adjacent to the operational area recording sand waves and localised burial of equipment (Fugro 2020; 2020a).

Sessile invertebrates are particularly vulnerable to sedimentation because they are generally unable to reorientate themselves to mitigate a build-up of particulates. However, some sessile taxa such as sponges, and bivalves can filter out or physically remove particulates (Roberts et al. 2006; Pineda et al. 2016). Sediment-burrowing infauna and surface epifauna invertebrates (particularly filter feeders) which inhabit the seabed directly around subsea infrastructure locations are expected to be most impacted by seabed disturbance. Although, Kukert (1991) found that approximately 50% of the macrofauna on the bathyal sea floor were able to burrow back to the surface through 4-10 cm of rapidly deposited sediment. The sensitivity of such infauna and epibenthic communities to changes in water quality are expected to be low given their resilience to natural stressors including storm events and associated episodic increases in particulate load. Any disturbance to benthic assemblages from the Activity is expected to be localised and short-term.

The predicted level of impact, i.e., the consequence, to benthic assemblages from changes to water quality is evaluated to have a consequence of **Level 2** based on:

- No threatened benthic species, assemblages or ecological communities were identified within the operational area.
- The area of impact is in a deep, open-water environment in which the hydrodynamics allow disturbed soft sediments to disperse and become diluted relatively quickly therefore any decrease in water quality is expected to be localised and temporary, and similar in nature to natural variability in turbidity.

6.3.4.3 Risk: Injury / Mortality to Marine Fauna

Inherent Consequence Evaluation

Benthic assemblages and invertebrates

Seabed disturbance during the Activity has the potential to result in the direct loss of benthic assemblages and invertebrate communities within the predicted seabed disturbance spatial extent.

Benthic assemblages and invertebrates in the operational area may include low densities of epifauna such as hydroids, ascidians, soft corals, and sponges (MMA Offshore 2025b), molluscs such as the arrow squid (Kailola et al. 1993) and crustaceans such as rock lobsters (Section 4.4.2). The presence of these invertebrate communities is representative of what is expected throughout the Otway Basin.

Injury / mortality to benthic and demersal invertebrate communities from seabed disturbance is expected to be localised given the limited extent of the footprints associated with the Activity. Benthic and demersal invertebrate communities within the predicted disturbance spatial extent are highly represented throughout the region. Disturbed areas are expected to recover through natural dispersion and settlement of planktonic phase invertebrates and asexual regrowth of organisms such as sponges.

Mobile invertebrates, including some molluscs and crustaceans, are generally less vulnerable to seabed disturbance activities given the ability to move away (Fraser et al. 2017). However, sediment burrowing infauna and surface epifauna invertebrates (particularly filter feeders) which inhabit the

seabed directly around subsea infrastructure locations are expected to be most impacted by seabed disturbance activities. As a result, direct loss of infauna and epifauna within the planned disturbance area is expected.

Dernie et al. (2003) conducted a large-scale study that investigated the recovery of marine benthic communities in a variety of soft sediment types (i.e., clean sand, silty sand, muddy-sand and mud) following a physical disturbance. Low intensity activities (i.e., bait digging and hand-raking) up to high intensity activities (i.e., trawling and suction-dredging) were performed in within the experiment to generate physical disturbance. The study showed that full recovery of soft sediment assemblages from physical disturbance could take between 64 days for low intensity disturbances, and up to 208 days for higher intensity disturbances (Dernie et al. 2003). In-field inspections around existing CHN facilities, during Stage I & II of the CHN development, confirm recovery of benthic assemblages, with colonisation of installed equipment and surrounding seabed. Therefore, the loss of infauna and epibenthic communities is expected to be recoverable whereby surrounding infauna and epibenthic communities will recolonise impacted areas and likely to colonise on the surface of equipment installed, as observed during in-field inspections (Cooper Energy 2022).

Taking into account the above, injury / mortality to benthic assemblages and benthic invertebrate communities from seabed disturbance is expected to be short term / recoverable based on observations of natural regrowth and recovery around existing facilities.

The predicted level of impact, i.e., the consequence, to benthic assemblages and invertebrate communities from seabed disturbance is evaluated to have a consequence of **Level 2** based on:

- Shelf rocky reefs KEF is present within the south-east marine region with multiple examples in the Otway (see Section 4.4.3 and Section 6.3.4.1). The operational area includes areas of hard substrate.
- Invertebrate communities in the operational area are representative of what is expected throughout the Otway Basin.
- No threatened benthic species, assemblages or ecological communities were identified within the operational area
- The planned seabed disturbance area is subject to localised and short-term changes to benthic habitats with no long-term effects to habitat, population characteristics or productivity.

Fish (including sharks and rays)

Seabed disturbance during the Activity has the potential to impact fish and subsequently commercial fisheries. Impacts are limited to sessile fish species that do not have the ability to avoid seabed disturbance activities, therefore resulting in injury and death.

Sessile and slow-moving fish species, such as pipefish, pipehorses, seadragons, and seahorses, are particularly vulnerable to habitat modification due to their limited mobility, making them susceptible to physical smothering, burial, and displacement from seabed disturbance (Kuiter 2000). The seabed within and surrounding the operational area primarily consists of hard substrate interspersed with patches of sand and rubble and does not include seagrass or macroalgal habitats typically associated with these species (Fugro 2020; 2020a). However, according to the PMST report, 26 fish species, comprising only pipefish, pipehorses, seadragons, and seahorses, may occur in the area (Appendix 5 -). Some species, such as the big-belly seahorse (*Hippocampus abdominalis*), have been recorded at depths of up to 104 m, often attached to sponges and colonial hydroids (DoE 2024). Disturbance from the Activity may initially impact these organisms, the footprint of direct seabed disturbance is small. Additionally, the placement of equipment on the seafloor introduces hard substrate and complexity of the seabed, providing surfaces for site attachment. Within days, and then over the subsequent years, marine growth begins to establish on these structures, adding to the surrounding

seabed habitat (McLean et al. 2022). While individuals may be injured or temporarily displaced, such impacts are expected to be localised and short-term and not expected to significantly affect the viability of these fish populations. Recovery around the installed structures is expected to occur over time.

Four threatened fish and shark species that may be present in the operational area including Australian grayling, blue warehou , eastern school shark, and white shark . Migratory species that may be present within the operational area include white shark, grey nurse shark and mackerel porbeagle. There are no BIAs or Habitat Critical areas for these species intersected by the operational area. All of these species are highly mobile and are expected to move away and avoid injury during seabed disturbance activities.

Two Victorian State commercially fished benthic invertebrate species are present within the operational area, the giant crab and southern rock lobster, and could be susceptible to indirect impacts from seabed disturbance. This also includes any reef-associated fish that are caught in lobster pots as by-catch and harvested, particularly those with high site fidelity, such as the bluethroat wrasse (Edgar et al. 2004). Commonwealth commercial fish species that may occur within the operational area include elephantfish, gummy shark, sawshark and school shark. These commercial fish and shark species are not known to exhibit site fidelity and are anticipated to be transient through the operational area. Therefore, impacts are predicted to be limited to temporary and localised avoidance behaviours during seabed disturbance activities. Lobster, crab and reef-associated fish species are mobile species and generally considered less vulnerable to seabed disturbance compared to sessile taxa as they are able to move to areas with less sediment accumulation or by more efficiently physically removing particles (Fraser et al. 2017). Seabed disturbance within the operational area is not expected to result in a change in the viability of the population of commercially important fish species.

Fishing records indicate possible activity of 2 Commonwealth and 4 Victorian State fisheries in the vicinity of the operational area (Section 4.4.3).

Any impact from the seabed disturbance during the Activity are anticipated to be highly localised and limited to within the established temporary and long-term exclusion zones established for the Activity. As discussed previously, the extent of these exclusion zones is insignificant in comparison to the larger area of available fishing grounds for the relevant fisheries (Figure 4-22 to Figure 4-27). Therefore, impacts to commercial fisheries from seabed disturbance are not expected to occur.

The predicted level of impact, i.e., the consequence, to fish from seabed disturbance is evaluated to have a consequence of **Level 1** based on:

- Potential impacts to fish, including sessile species are expected to be limited to temporary and localised avoidance behaviours.
- Potential impacts to commercial fish species are expected to be limited to temporary and localised avoidance behaviours.
- Due to the area of seabed which may be disturbed (~7.2 km^2) within the wider extent of fish distribution ranges and available fishing grounds, impacts to commercially important species are expected to be localised and insignificant at a population level.

Inherent Likelihood

Benthic assemblages adjacent to the operational area have been observed during surveys and inspections of existing Otway offshore facilities. The surveys observed modified (around infrastructure) and unmodified marine environments with scattered areas of hard ground supporting patchy areas of abundant epibiota, typically bryozoans, gorgonian, cnidarians and sponges (Fugro 2020; 2020a). The scattered and patchy presence of benthic and demersal

invertebrate communities indicate a potential overlap of communities with the planned disturbance area through the life of the Activity.

The inherent likelihood of a **Level 2** consequence occurring is therefore rated as **Likely (B)**.

Inherent Risk Severity

The inherent risk severity of injury / mortality to benthic assemblages, invertebrate communities and fish species is considered **Moderate**.

6.3.4.4 Risk: Change to Cultural Heritage

Inherent Consequence Evaluation

Seabed disturbance may result in changes to cultural heritage such as:

- Disturbance of underwater cultural heritage including shipwrecks, aircraft and other artefacts.

A search of the Australasian Underwater Cultural Heritage Database found one shipwreck, Alfred (<75 years old ID 11052), located near the border of the operational area. On further investigation and consultation with Heritage Victoria, the position given for the wreck was confirmed to be a search area centrepoint; these are provided when the location of a wreck is unknown. There are over 300 wrecks like this offshore Victoria (pers comm Heritage Victoria 2024); written records further indicate the Alfred is likely closer to Warrnambool, and not relevant to the operational area of the Activity.

No shipwrecks have been observed during survey or inspections within and proximal to the operational area. Consultation with Heritage Victoria indicated that the risk of the Activity impacting cultural heritage was low, given the footprints involved. Landscape scale impacts (submerged landscapes) were also not expected given the limited seabed footprints involved (pers comm Heritage Victoria 2024); these impacts will be limited to the operational area.

Some of the area now offshore was a terrestrial landscape during previous glacial maxima periods out to approximately the 95 m isobath of the present day (De Decker et al. 2020). It is likely that it was inhabited by First Nations peoples and there may be features or artefacts of cultural heritage value in the offshore environment (pers comm DPC 2024). The high energy nature of the ocean within the Otway region has eroded the seabed over the millennia since its inundation; this reduces the likelihood of finding cultural heritage artefacts in the area, though does not discount the possibility, and though features may have eroded over time, they remain features of a cultural landscape.

The Tyrendarra lava flow associated with the significant Budj Bim aquaculture system (Section 7.2) is identified as a landscape feature of particular cultural significance; its historical and current values have been specifically identified as of importance during consultation, and in review of First Nations' Country Plans. Tyrendarra is a newer volcanic province outcrop (~30K years old) located near Portland, and extends from Mount Eccles into the offshore environment, to Julia Reef. Amplitude Energy geologists investigated whether these kind of landscape features may occur within the operational area for the activity. Analysis of shallow geology and volcanic features within the region, including review of 3D seismic data, indicates there are no newer volcanic complexes within the operational area (Figure 6-8).

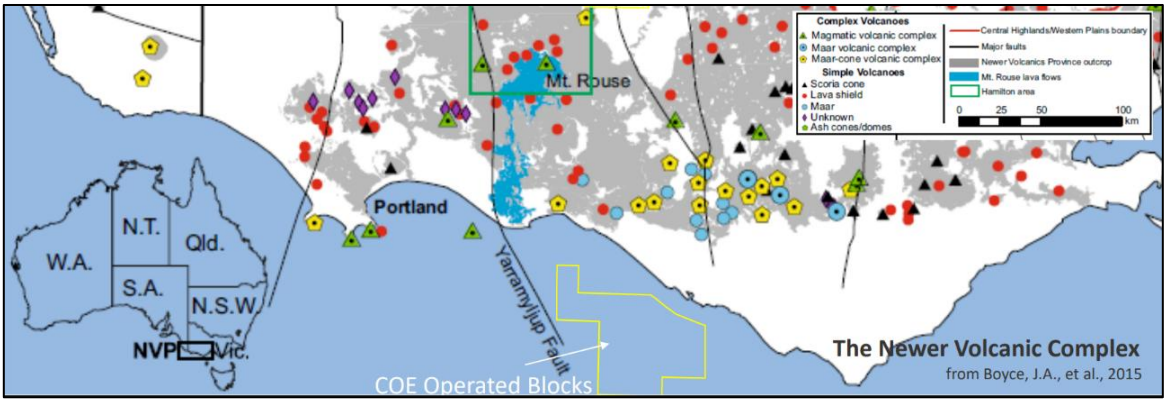


Figure 6-8: Newer Volcanic Complexes in the Otway Region (Boyce 2015)

There is potential for unknown underwater cultural heritage to be disturbed from activities that may cause seabed disturbance. However, the predicted level of impact, i.e., the consequence, of change to cultural heritage from seabed disturbance is evaluated to have a consequence of **Level 1** given the absence of heritage to date, and that any disturbance to cultural heritage (if it were unexpectedly found) is regulated, to avoid damage.

Inherent Likelihood

No known underwater cultural heritage such as shipwrecks, aircraft, and other artefacts occur within the operational area however the potential remains. This region was once a terrestrial landscape and is likely to have been inhabited; therefore, there may be features with heritage value. Seabed disturbance from the Activity is not expected to result in damage to UCH. However, in exceptional circumstances there is a remote chance of change to unknown underwater cultural heritage within the planned disturbance area.

As a result, the inherent likelihood of a **Level 1** consequence occurring is rated **Remote (E)**.

Inherent Risk Severity

The inherent risk severity of change to cultural heritage is considered **Low**.

Given the risk of damage to UCH cannot be eliminated at this stage of planning, additional control measures have been designed into the EP, to be implemented before the activity commences, and during the activities. These measures provide assurance that UCH will be protected as required by the UCH Act 2018

6.3.5 Control Measures, ALARP, and Acceptability Assessment

Table 6-26 provides a summary of the control measures and ALARP and acceptability assessment relevant to seabed disturbance.

Table 6-6: Seabed Disturbance ALARP, Control Measures and Acceptability Assessment

Seabed Disturbance	
ALARP Decision Context and Justification	**ALARP Decision Context: Type A** Impacts from seabed disturbance are well understood. The total estimated area of impact is predicted to be relatively small (~7.2 km^2) compared to the extent and distribution of the benthic habitats and associated fauna identified within the operational area and wider region (Fugro 2020; 2020a). Activities are well practised, and there are no conflicts with company values, no partner interests, and no significant media interests.

Seabed Disturbance	
	Given this, Amplitude Energy applies ALARP Decision Context A.
Control Measure	**Source and Description of Control**
CM10: Offshore Operational Procedures	Seabed surveys will be undertaken prior to finalising position and location of subsea infrastructure, and prior to installation activities. Subsea installation procedures will ensure: • Seabed disturbance is limited to the planned disturbance areas defined in this EP and limited to within the operational area. • Seabed relief and sensitive seabed features are considered. The seabed survey for the operational area was undertaken in May & June 2025 (refer Section 4.3.1).
CM23: Underwater Cultural Heritage Disturbance Risk Management Measures	Amplitude Energy Cultural Heritage Disturbance Risk Management Measures acknowledge legislative requirements and establishes the methods by which potential disturbance to cultural heritage is identified including via screening, consultation, and expert advice as required. The management measures are applicable to the offshore Activity to ensure impacts and risks throughout the Activity remain within acceptable levels and are managed to ALARP. In accordance with advice from Heritage Victoria and DPC during Activity consultation, and in line with the UCH Guidelines (DCCEEW 2024d), prior to commencement of subsea installation activities a suitably qualified and experienced cultural heritage team will review geophysical data gathered during seabed surveys for underwater cultural heritage so that it is avoided by the subsequent installation activities with a suitable buffer. The team will include a marine archaeologist and will also have familiarity with first Nations cultural landscapes and experience in identifying landscape features from geophysical data. Any subsequent management advice (e.g. exclusion zones) will be provided to Heritage Victoria and accounted for within Activity installation procedures. If cultural heritage is identified, it will be mapped, along with suitable buffer and its location integrated into Activity inductions and procedures to ensure it is avoided during the Activity.
Additional Control Measures Considered	
Choose location of footprint to minimise impact to 'sensitive benthic habitat' / or emergency features	Reject May reduce impact to sensitive species and areas in the operational area. However, rocky reef is widespread throughout the operational area, and therefore not able to be avoided. There are constraints in regard to where the subsea infrastructure can be positioned. For example, the flowlines will tie into the existing CHN pipeline at already installed ILTs, and the flowline routes will consider seabed topography to minimise freespan sections and minimise footprint by taking the most direct route (i.e., shortest distance) from the well to the tie in location.
Seabed Survey	Adopt (CM12: Seabed Survey) Seabed survey will be undertaken prior finalising location of subsea infrastructure, and prior to installation activities.
Impact and Risk Summary	
Residual Impact Consequence	**Level 2** - Localised short-term impacts to benthic habitat with no remedial actions or recovery required.
Residual Risk Consequence	**Level 2** - Localised short-term impacts to benthic habitat with no remedial actions or recovery required.

Seabed Disturbance	
Likelihood	Due to the nature and scale of the proposed activities, and considering the proposed controls, the likelihood of impacts to cultural heritage due to seabed disturbance is assessed as: • **Remote (E) -** A freak combination of factors would be required for occurrence. Not expected to occur during the activity. Occur in exceptional circumstances. In regard to the likelihood that benthic habitats will be impacted by seabed disturbance associated with the localised placement of equipment and materials is assessed as: • **Likely (B) -** Not certain to happen but an additional factor may result in an occurrence. Expected to occur from time to time during the activity.
Residual Risk	Moderate
Demonstration of Acceptability	
Principles of ESD	Seabed disturbance is evaluated as having Level 2 risk consequence which is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Legislative requirement: Section 572 of the OPGGS Act details the requirements for removal of property will be met for the Activity.
Internal Content	Relevant management system processes adopted to implement and manage hazards include: • Risk Management (MS03) • External Affairs, Investor Relations, Community and Stakeholder Management (MS05) • Operations Management (MS07) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11). Activities will be undertaken in accordance with the Implementation Strategy (Section 12.0)
External Context	Activity will be undertaken in a manner consistent with relevant legislation, industry standards and guidelines, offshore practices and benchmarking. The activity is not predicted to result in impacts to species that would be inconsistent with recovery plans or conservation advice.
Other requirements	No feedback from stakeholders has been received that would inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures for seabed disturbance.
Demonstration of meeting the defined acceptable levels in the OPP	Section 8.8.6 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with seabed disturbance. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed above. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for seabed disturbance: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1).

Seabed Disturbance	
	• OPP control measures and EP control measures are equivalent (refer Appendix 1 , Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	Acceptable Amplitude Energy has determined that impacts and risks related to seabed disturbance are acceptable, based on: • The planned management of impacts and risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advice, and significant impact guidelines for MNES. • No claims or objections were raised during consultation that would inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures. To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: • EPO3: The selection of the location for subsea infrastructure and associated planned impacts will: – Avoid areas of high relief outcrops, reefs, and sponge beds, where practicable. – Not disturb underwater heritage as defined under the Underwater Cultural Heritage Act 2018. • EPO5: Undertake Seabed Surveys to inform the selection of the location for subsea infrastructure and associated planned impacts, including potential changes to seabed quality. • EPO6: Seabed disturbance limited to the planned disturbance areas defined in this OPP and limited to within the Operational Area • EPO7: Impacts to commercially targeted species will be limited to temporary [1] and localised[1] change in fauna behaviours. • EPO8: Undertake Ongoing Engagement with relevant First Nations groups to ensure identified tangible and intangible cultural heritage and potential risks to cultural heritage values remains current and its protection is provided for within EPs for the activity. • EPO20: No impact to underwater cultural heritage.

6.4 GHG Emissions

[1] Temporary and localised change in fauna behaviours for commercially targeted species limited to activity durations and seabed disturbance footprint defined in Section 6.3.

6.4.1 Cause of Aspect

Direct GHG emissions that will be generated as a result of the Activity are identified in Table 6-7 and described in further detail in subsections below. GHGs are emitted to the atmosphere when hydrocarbons are burned, flared or vented. The types of GHG emissions that will be generated during the activities, and that account for the vast majority of GHG emissions generated by the activities, include carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4).

Table 6-7: Activities that will Generate GHG Emissions

Aspect / Phase	Activity component
Support activities	Vessel operations
	Helicopter operations

6.4.2 Aspect characterisation

6.4.2.1 Support Activities

Vessels use diesel or gas to generate power for operations. Vessels will be used for several activities such as surveys, vessel positioning, pre-lay work, installation, testing and preservation operations, and support activities. Vessels will be present in the operational area for all activities. The maximum number of vessels in the operational area at a time is expected during installation activities and is expected to be up to 3 vessels.

Vessels will likely use marine gas oil (MGO) or marine diesel oil (MDO) instead of heavy fuel oil (HFO). Emissions calculations are based on MDO to provide a conservative estimate. Vessels may also be a source of fugitive emissions with the presence of fuel storage tanks on board. That is considered immaterial, and it is not included in the GHG inventory.

Helicopters will be used during the activities, primarily for crew change and medevac, and occasionally equipment and material transfers. Helicopter flights are expected to occur 4-8 times a week, dependent on the progress of the Activity, logistical constraints, and stage of the activity. Helicopters use aviation fuel.

6.4.2.2 GHG Modelling

Scoping

GHG emissions are described as direct or indirect and relate to emissions that occur as a direct result of the Activity. Figure 6-9 describes the emissions estimation, monitoring and reporting workflow applied to the activities provided for under this EP.

The sources of emissions factors and estimation methods are also described within Figure 6-9.

Direct GHG Emissions

Direct GHG emissions are created as a direct result of the activities within Commonwealth jurisdiction, for all phases (surveys, installation, testing and preservation) and support activities. These emissions originate from the use of support activities – vessels within Commonwealth waters.

The direct emissions do not equate to scope 1 emissions (i.e., emissions under operational control of the organisation) under the *National Greenhouse and Energy Reporting Act 2007* (Cth), as the direct emissions in this inventory include relevant Support Operations both within and outside of Amplitude Energy's operational control.

To estimate emissions, a range of information sources are used:

- Fuel consumption rates are based on vessel spec sheets and historical consumption rates.

Emissions were estimated using methods and emission factors from the National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008 (NGER Determination) (as updated in 2025).

Indirect GHG Emissions

Indirect emissions associated with the Activity include emissions resulting from the materials (only major contributors - the embodied carbon of cement and steel have been included) and others (including helicopters, flights, car travel and trucking).

Embedded emissions associated with materials were estimated based on the expected quantity of materials consumed during the Activity and emission factors sourced from the Inventory of Carbon and Energy (ICE Database) (Circular Ecology 2023).

Emissions associated with transportation of materials and people were estimated based on the travel distance and expected number of trips. Emission factors for each fuel type were sourced from the NGER (Measurement) Determination 2008 as updated in 2025.

No production of hydrocarbons is proposed as part of this EP. Therefore, there are no indirect emissions associated with the gas processing at the onshore Athena Gas Plant or with the transport or end use of hydrocarbons.

Total GHG Emissions

Table 6-8 summarises the total direct and indirect GHG emissions for the Activity. The direct emissions for the Activity are estimated to be 18.0 kt CO_2-e over the Activity life, and the indirect emissions attributed to the materials, helicopter, and trucking, are estimated to be 20.1 kt CO_2-e.

NB: GHG emissions from waste are predicted to be immaterial and therefore have not been included in the GHG estimate.

Table 6-8: Total GHG emissions for the Activity

Emissions Source	**Emissions Scope**	**kT CO_2-e**
Vessels	Direct	18.0
Materials[1]	Indirect	17.8
Others (transport of people and materials)	Indirect	2.3
Total[2]	Direct and Indirect	38.1

Note:

[1]***Accounted for the embodied carbon in the required*** *flowlines, umbilicals, subsea stabilisation, and fluids.*

[2]*The emissions calculated for the Activity are expected to be within the range +/- 30%, excluding any substantial changes to emission factors.*

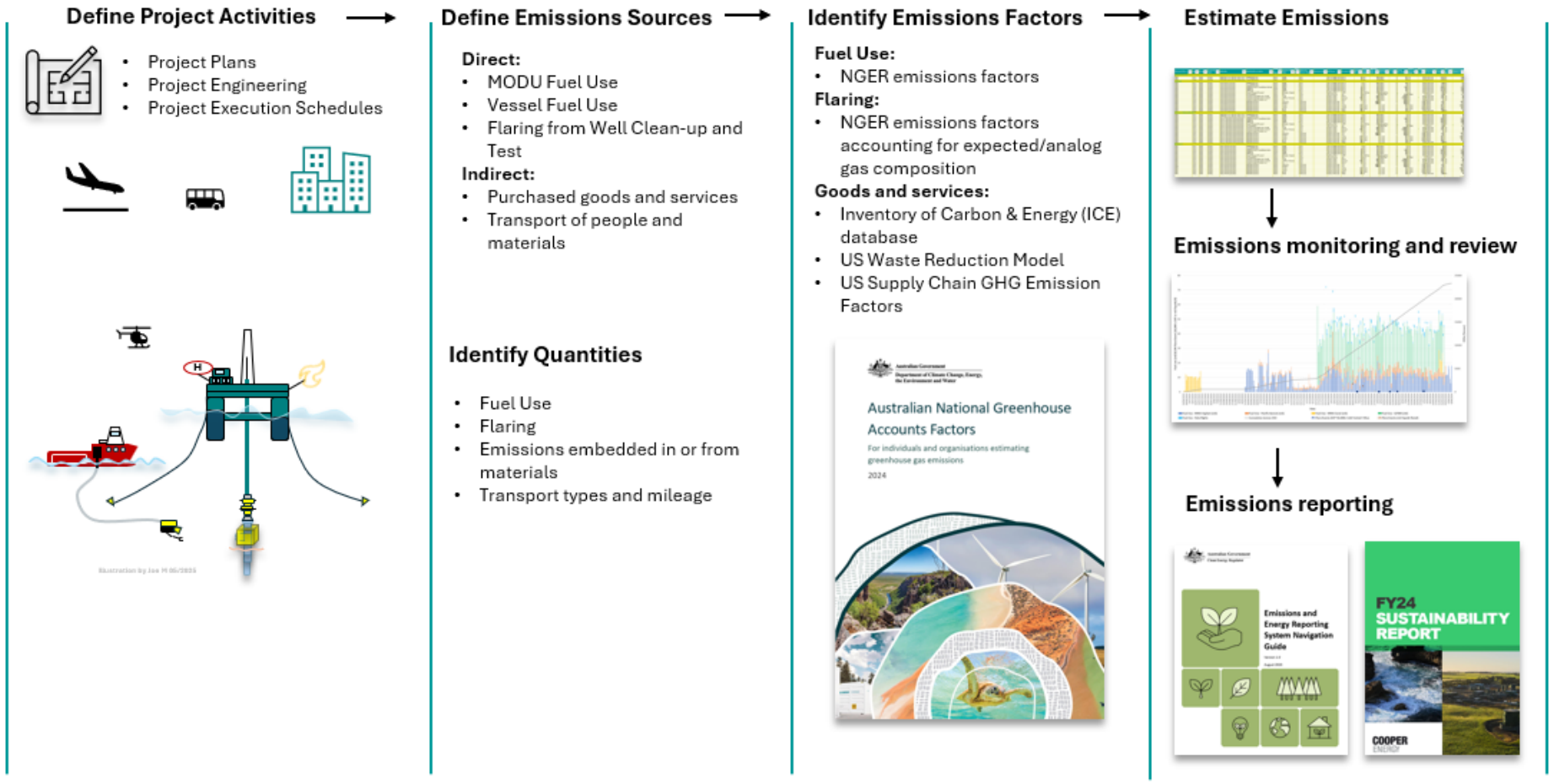


Figure 6-9: Emissions Estimation, Monitoring and Reporting Workflow Example

6.4.3 Predicted Environmental Impacts and Risks

The predicted environmental impacts from GHG emissions are:

- increase in GHG emissions

Potential risk:

- change in climate systems
- change in ecosystem
- change in socio-economic factors.

6.4.4 Impact and Risk Evaluation

6.4.4.1 Impact: Increase in GHG Emissions

GHGs absorb longwave radiation reflected from the earth's surface thereby trapping heat within the earth's atmosphere and contributing to the greenhouse effect. While the emissions from the Activity add to the GHG load in the atmosphere resulting in global warming potential, they are small on a state and national scale.

Following the updated Nationally Determined Contribution (NDC) in June 2022, Australia committed to reduce GHG emissions to 43% below 2005 levels by 2030 and reaffirmed its target to achieve net zero emissions by 2050. These targets are legislated under the *Climate Change Act 2022* (Cth).

Based on forecasting conducted by the DCCEEW in 2024, the Commonwealth Government has forecasted the annual carbon budget including a scenario called 'with additional measures' that includes policies and measures in place at the time of publication. This includes the Safeguard Mechanism reforms and the 82% renewable energy target in Australia's electricity grid by 2030 (DCCEEW 2024e).

Carbon budgets under current policy settings can be developed for Australia with the following approach:

- For Australian carbon budget: by summing the annual projected emissions of the 'with additional measures' scenario up to 2030 (DCCEEW 2024e).
- For the duration of the activity (2027-2030 [HOLD – to confirm]), the total direct and indirect GHG emissions from the Activity are estimated to be approximately 0.002% of the Australian carbon budget for the duration of the Activity.

The predicted level of impact, i.e., the consequence, of GHG emissions as a result of the Activity is evaluated to be **Level 1**, based on:

- The low levels of contribution to the Australian carbon budget (0.002%).
- Amplitude Energy having a robust emissions reduction process to monitor and address legislative requirements, and enable a systematic process to identify, assess and implement GHG emissions reduction opportunities, meaning the Activity's direct emissions will continue to be aligned with Australia's GHG emissions commitments.
- From FY26 the Australian Sustainability Reporting Standards (ASRS) AASB S2 Climate-related Disclosures (AASB S2) become mandatory. AASB S2 provides equivalent or higher level of assurance to Climate Active's certification over climate strategy and greenhouse gas emission management.

6.4.4.2 Risk: Change in Climate Systems

The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) Working Group I was released in August 2021. The IPCC states with high confidence that many extreme heat events and global surface temperature rise would not have occurred without human influence and could be irreversible for several decades to millennia (IPCC 2021).

This is reiterated in the AR6 Synthesis Report released in March 2023, "[H]uman activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850-1900 in 2011-2020. Global greenhouse gas emissions have continued to increase over 2010-2019, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and between individuals (high confidence). Human-caused climate change is already affecting many weather and climate extremes in every region across the globe" (IPCC 2023).

According the AR6 Synthesis Report, heat extremes (including heatwaves) have become more frequent and more intense across most land regions since the 1950s while cold extremes have become less frequent and less severe. Marine heatwaves have approximately doubled in frequency since the 1980s. The frequency and intensity of heavy precipitation events have increased since the 1950s over most land areas for which observational data are sufficient for trend analysis. It is likely that the global proportion of major (Category 3–5) tropical cyclone occurrence has increased over the last four decades (IPCC 2023).

The State of the Climate 2024 (BoM and CSIRO 2024) reported that Australia's climate warmed by an average of 1.51 ± 0.23°C between 1910 and 2023[2], reflecting global warming trends. This warming trend has been accompanied by a shift towards drier conditions in southern Australia and wetter conditions in northern Australia. Additionally, the frequency and/or intensity of some extreme weather events, including heat waves and short-term heavy rainfall events are also anticipated to increase with potential consequences to human health and impacts on biodiversity and ecosystems. Conversely, a downward trend in the number of tropical cyclones has been observed since 1982 (BoM and CSIRO 2024). Average sea surface temperature in the Australian region has warmed by 1.08°C since 1900, with nine of the 10 warmest years on record occurring since 2010, associated with longer and more frequent marine heatwaves (BoM and CSIRO 2024). A warming ocean affects the global ocean and atmospheric circulation, the cryosphere, global and regional sea levels, and causes losses in dissolved oxygen, impacts on marine ecosystems (BoM and CSIRO 2024), including changes to species abundance, community structure and increased frequency and intensity of thermally induced coral bleaching events (CSIRO 2017).

The predicted level of impact, i.e., the consequence, of an impact on climate systems from an increase in GHG emissions as a result of the Activity is evaluated to have a consequence of **Level 1**, based on:

- The low levels of contribution to Australian carbon budget (0.002%).
- Amplitude Energy having a robust emissions reduction process to monitor and address legislative requirements, and enable a systematic process to identify, assess and implement GHG emissions reduction opportunities across the business, meaning the Activity direct emissions will continue to be aligned with Australia's GHG emissions commitments.

[2] It is important to note that this 1.5°C warming above 1910 temperatures does not necessarily reflect that the 1.5°C threshold of the Paris Agreement has been exceeded. The IPCC AR6 Report defines that an exceedance of this threshold should be in relation to a 20-year temperature average.

- From FY26 the Australian Sustainability Reporting Standards (ASRS) AASB S2 Climate-related Disclosures (AASB S2) become mandatory. AASB S2 provides equivalent or higher level of assurance to Climate Active's certification over climate strategy and greenhouse gas emission management.

6.4.4.3 Risk: Change in Ecosystem Dynamics

Ecosystems that are particularly susceptible to adverse effects of climate change include alpine habitats, coral reefs, wetlands and coastal ecosystems, polar communities, tropical forests, temperate forests and arid and semi-arid environments (DoEE 2019). In Australia, this includes coral reefs, alpine regions, rainforests, arid and semi-arid environments, mangroves, grasslands, temperate forests and sclerophyll forests. Future climate change (increased temperature and decreased, but more variable rainfall) has the potential to have a range of impacts on ecological factors and threaten biodiversity in the Australian Mediterranean ecosystem (CSIRO 2017).

Redistribution and reorganisation of natural systems, driven by climate change is a major threat to biodiversity (Chapman et al. 2020). A report by Australia's Biodiversity and Climate Change Advisory Group summarises the potential impacts of climate change to marine and terrestrial species, habitats, and ecosystems across Australia (Steffen et al. 2009). The impacts to taxa are outlined in Table 6-10 and the impacts to ecosystems in Table 6-11.

Extensive modelling and monitoring studies over the last twenty years provide considerable evidence that climate change is already affecting and will continue to affect species globally (Hoegh-Guldberg et al. 2018) however, these impacts are likely to be highly species-dependent and spatially variable. The most frequently observed and cited ecological responses to climate change include species distributions shifting towards the poles, upwards in elevation and shifts in phenology (Dunlop et al. 2012). Climate change may not only change species distributions but also life-history traits such as migration patterns, reproductive seasonality and sex-ratios (Table 6-9).

Impacts of climate change such as altering temperature, rainfall patterns and fire regimes are likely to lead to changes in vegetation structures across terrestrial ecosystems within Australia (Table 6-11; Dunlop et al. 2012). Increases in fire regimes will impact Australian ecosystems altering composition structure, habitat heterogeneity and ecosystem processes. Changes in climate variability, as well as averages, could also be important drivers of altered species interactions, both native and invasive species (Dunlop et al. 2012). Climate change could result in significant ecosystem shifts, as well as alterations to species ranges and abundances within those ecosystems (Hoegh-Guldberg et al. 2018).

The IPCC Special Report describes impacts of warming above pre-industrial levels to key receptor groups including terrestrial ecosystems, mangroves, warm-water corals, unique and threatened systems, and arctic regions (Hoegh-Guldberg et al. 2018). These receptor groups show varying sensitivity to warming conditions, with a range of responses shown at 1°C warming; from corals suffering moderate impacts, to mangroves not showing any detectable impacts that can be attributed to climate change (Hoegh-Guldberg et al. 2018). Once warming reaching 1.5°C, all receptor groups show impacts attributable to climate change with severity ranging from moderate impacts that are detectable and attributable to climate change (mangroves), to impacts that are severe and widespread (warm-water corals) (Hoegh-Guldberg et al. 2018). At the point where global temperature rise, due to climate change, reaches 2°C, increasing numbers of receptor groups suffer impacts which are high to very high, and likely to be irreversible (terrestrial ecosystems, warm-water corals, unique and threatened systems, and arctic regions) (Hoegh-Guldberg et al. 2018).

The State of the Environment (SoE) report is produced every five years by the Australian Government as a comprehensive review on the state of the Australian environment. The most recent report was released in July 2022 (DCCEEW 2021). The SoE concluded that climate change and

extreme weather events were impacting the Australian environment and especially impacting various taxa (DCCEEW 2021). In many cases, the impacts of climate change on biodiversity are exacerbated by other pressures such as land clearing and invasive species, but in some cases, impacts can be unequivocally attributed to climate change. A summary of the SoE impacts from climate change is provided in Table 6-12.

Terrestrial Ecosystems

All terrestrial ecosystems are likely to be impacted by a changing climate (Table 6-10, Steffen et al. 2009, Hughes 2011, Dunlop et al. 2012, Hoegh-Guldberg et. al. 2018). The predicted impact of climate change on these ecosystems is highly variable, both between ecosystems and within individual ecosystems (Dunlop et al. 2012). Below is a summary of potential climate change impacts to two key terrestrial ecosystems – tropical rainforests and alpine/montane areas, where other terrestrial ecosystems can be found summarised in Table 6-10.

Tropical Rainforest

Projections of future climate change in the wet tropics of Australia under different scenarios are outlined by McInnes (2015). It is likely that temperatures in the wet tropics will become hotter and potentially fire and cyclones will be more intense. Consequently, there is an increased probability of fires penetrating into rainforest vegetation resulting in a shift from fire-sensitive vegetation to communities dominated by fire-tolerant species; and changing rainforest disturbance regime as cyclones become more intense (Hughes 2011, Steffen et al. 2009). Changes in the timing of seasons (i.e., extended summers) could cause change in the seasonal response of plants, and alterations to species ranges and abundances (Hoegh-Guldberg et al. 2018).

Alpine/Montane Areas

Alpine systems are generally considered to be among the most vulnerable to future climate change (Hughes 2003). The extent of true alpine habitat in Australia is very small (0.15% of Australian land surface) with limited high-altitude refuge (Hughes 2003). Australian alpine regions are home to a variety of alpine vertebrates who rely on snow cover for their survival. There is evidence of a reduction in populations of dusky antechinus, broad-toothed rats, and the mountain pygmy possum. The first two species are active under the snow throughout the winter season and are therefore subject to increased predation by foxes when snow is reduced (Hughes 2003).

Marine Ecosystems

Average sea surface temperature in the Australian region has warmed by 1.05°C since 1900, with eight of the 10 warmest years on record occurring since 2010 (BoM and CSIRO 2022). A warming ocean affects the global ocean and atmospheric circulation, the cryosphere, global and regional sea levels, and causes losses in dissolved oxygen, impacts on marine ecosystems (BoM and CSIRO 2022), including changes to species abundance, community structure and increased frequency and intensity of thermally induced coral bleaching events (CSIRO 2017).

Oceanic warming has also served to alter ocean currents around Australia. In response to both ocean warming and stratospheric ozone depletion, the East Australian Current has increased in strength by about 20% between 1978 and 2005 (Cai and Cowan 2006). Sea surface temperatures are projected to continue to increase, with estimates of warming in the Southern Tasman Sea of between 0.6°C to 0.9°C and between 0.3°C to 0.6°C elsewhere along the Australian coast by 2030 (Church et al. 2006).

Global mean sea level increased by 0.20 m between 1901 and 2018. The average rate of sea level rise was 1.3 mm/year between 1901 and 1971, increasing to 1.9 mm/year between 1971 and 2006, and further increasing to 3.7 mm/ year between 2006 and 2018. Human influence was very likely the main driver of these increases since at least 1971 (IPCC 2023).

Global mean sea level is predicted to rise between 0.18 m and 0.23 m by 2050, and between 0.38 m and 0.77 m by 2100 (IPCC 2021). This global mean sea level rise is primarily caused by thermal expansion and mass loss from glaciers and ice sheets, with minor contributions from changes in land-water storage. Global mean sea level will continue to increase for centuries to millennia due to continuing deep ocean warming and ice sheet melt, and sea levels will remain elevated for thousands of years, at rates dependent on future emissions (IPCC 2023). This will lead to some coastal inundation affecting mangroves, salt marshes and coastal freshwater wetlands. Furthermore, as CO_2 is gradually absorbed by oceans and fresh water, the water becomes more acidic, which increases the solubility of calcium carbonate, the principal component of the skeletal material in aquatic organisms (Steffen et al. 2009).

Below is a summary of potential climate change impacts to two key marine ecosystems - mangroves and coral reefs, other marine ecosystems are summarised in Table 6-10.

Mangroves

Mangrove ecosystems in Australia will face higher temperatures, increased evaporation rates and warmer oceans (McInnes 2015) as well as an associated sea level rise (Hoegh-Guldberg et al., 2018). Modelling indicates an increased likelihood of future severe and extended droughts across parts of Northern Australia (Dai 2013). Consequently, mangrove ecosystems may increase their southern range as a result of warmer temperatures.

However, higher temperatures and evaporation rates, and extended droughts could lead to die-offs in Northern Australia and a change in mangrove distribution and abundance (Duke et al. 2017). Mangrove systems should cope with rising sea levels by accumulating more peat or mud which will give them the opportunity to adjust to a rising sea level (Field 1995).

Coral Reefs

Climate change has emerged as a threat to coral reefs, with temperatures of just 1°C above the long-term summer maximum for an area over 4-6 weeks being enough to cause mass coral bleaching and mortality (Baker et al., 2008, Hughes et al. 2018, Spalding and Brown 2015). Coral mortality or die off following coral bleaching events can stretch across thousands of square kilometres of ocean (Gilmour et al. 2016, Hoegh-Guldberg 1999, Hughes et al. 2018). The impacts associated with a warming ocean, coupled with increasing acidification, are expected to undermine the ability of tropical coral reefs to provide habitat for fish and invertebrates, which together provide a range of ecosystem services such as food, livelihoods and coastal protection (Hoegh-Guldberg et al., 2018). Coral reefs are projected to decline by 70–90% as a result of 1.5°C of global warming (IPCC 2023).

Table 6-9: Overview of Impacts of Climate change to the Future Vulnerability of Particular Taxa (modified after Steffen et al., 2009)

Taxa	Potential Vulnerability
Mammals	Narrow-ranged endemics susceptible to rapid climate change in-situ; changes in competition between grazing macropods in tropical savannas mediated by changes in fire regimes and water availability; herbivores affected by decreasing nutritional quality of foliage as a result of CO_2 fertilisation.
Avifauna	Changes in phenology of migration and egg-laying; increased competition of resident species; breeding of waterbirds susceptible to reduction; top predators vulnerable to changes in food supply; rising sea levels affecting avifauna that nest on sandy and muddy shores, saltmarshes, intertidal zones, coastal wetlands, and low-lying islands; saltwater intrusion into freshwater wetlands affecting breeding habitat.
Reptiles	Warming temperatures may alter sex ratios of species with environmental sex determination to cope with warming in-situ.

Taxa	Potential Vulnerability
Amphibians	Frogs may be the most at-risk terrestrial taxa. Amphibians may experience altered interactions between; pathogens, predators, and fires.
Fish	Freshwater species vulnerable to reduction in water flows and water quality; limited capacity for freshwater species to migrate to new waterways; all species susceptible to flow-on effects of warming on the phytoplankton base of food webs.
Invertebrates	Expected to be more responsive than vertebrates due to short generation times, high reproduction rates and sensitivity to climatic variables.
Plants	Climate change may impact various functional dynamics of plants due to changes in; increasing CO_2, fires, plant phenology and specific environmental characteristics.

Table 6-10: Projected Impacts of CO2 Rise and Climate Change on Australian Ecosystems (modified after Steffen et al. 2009)

Key Component of Environmental Change	Projected Impacts of Ecosystems
Coral Reefs	
CO_2 increases leading to increased ocean acidity	Reduction in ability of calcifying organisms, such as corals, to build and maintain skeletons.
Sea surface temperature increases, leading to coral bleaching	If frequency of bleaching events exceeds recovery time, reefs will be maintained in an early successional state or be replaced by communities dominated by macroalgae.
Oceanic Systems (including planktonic systems, fisheries, sea mounts and offshore islands)	
Ocean warming	Many marine organisms are highly sensitive to small changes in average temperature (1-2°C), leading to effects on growth rates, survival, dispersal, reproduction and susceptibility to disease.
Changed circulation patterns, including increase in temperature stratification and decrease in mixing depth, and strengthening of the East Australia Current (EAC)	Distribution and productivity of marine ecosystems is heavily influenced by the timing and location of oceanic currents; currents transfer the reproductive phase of many organisms. Climate change may suppress upwelling in some areas and increase it in others, leading to shifts in location and extent of productivity zones.
Changes in ocean chemistry	Increasing CO_2 in the atmosphere is leading to increased ocean acidity and a concomitant decrease in the availability of carbonate ions.
Estuaries and Coastal Fringe (including benthic, mangrove, saltmarsh, rocky shore, and seagrass communities)	
Sea level rise	Landward movement of some species as inundation provides suitable habitat, changes to upstream freshwater habitats will have flow-on effects to species.
Increase in water temperature	Impacts on phytoplankton production will affect secondary production in benthic communities.
Savannas and Grasslands	
Elevated CO_2	Shifts in competitive relationships between woody and grass species due to differential responses.
Increased rainfall in north and northwest regions	Increased plant growth will lead to higher fuel loads, in turn leading to fires that are more intense, frequent and occur over larger areas.
Tropical Rainforests	

Key Component of Environmental Change	Projected Impacts of Ecosystems
Potential increases in frequency and intensity of fires	Increased probability of fires penetrating into rainforest vegetation resulting in shift from fire-sensitive vegetation to communities dominated by fire-tolerant species.
Warming and changes in rainfall patterns	Potential increases in productivity in areas where rainfall is not limiting; reduced forest cover associated with soil drying projected for some Australian forests.
Inland Waterways and Wetlands	
Reduction in precipitation, increased frequency and intensity of drought	Reduced river flows and changes in seasonality of flows.
Changes in water quality, including changes in nutrient flows, sediment, oxygen and CO_2 concentration	May affect eutrophication levels, incidence of blue-green algal outbreaks.
Sea level rise	Saltwater intrusion into low-lying floodplains, freshwater swamps and groundwater; replacement of existing riparian vegetation by mangroves.
Arid and Semi-arid Regions	
Increasing CO_2 coupled with drying in some regions	Interaction between CO_2 and water supply critical, as 90% of the variance in primary production can be accounted for by annual precipitation.
Shifts in seasonality of intensity of rainfall events	Any enhanced runoff redistribution will intensify vegetation patterning and erosion cell mosaic structure in degraded areas. Changes in rainfall variability and amount will also impact on fire frequency. Dryland salinity could be affected by changes in the timing and intensity of rainfall.
Warming and drying, leading to increased frequency and intensity of fires	Reduction in patches of fire-sensitive mulga in spinifex grasslands potentially leading to landscape-wide dominance of spinifex.
Alpine and Montane Areas	
Reduction in snow cover depth and duration	Potential loss of species dependent on adequate snow cover for hibernation and protection from predators; increased establishment of plant species at higher elevations as snowpack is reduced.

Table 6-11: Summary of SoE Report Conclusions on Climate Change Impacts

Taxa	Potential Vulnerability
Mammals	Terrestrial mammals are subject to ongoing population declines due to climate change and changes within habitats
Avifauna	There is strong evidence of population declines in threatened avifauna species, waterbirds and migratory birds. Various extensive and persistent impacts contribute to declines, including climate change (particularly drought) and extreme events, habitat degradation, and invasive predators.
Reptiles	Reptile species in all areas of Australia have an increasing risk of extinction. Risk of extinction was recognised as primarily related to ongoing pressure from invasive predators, but compounded by pressure from habitat modification, climate change (particularly drought) and disease. Half of Australian freshwater turtle species are in drastic population decline due to climate change.
Amphibians	Droughts and fires are increasing pressures within habitats that impact amphibian species.

Taxa	Potential Vulnerability
	The number of known threatened amphibian species, including those that are Critically Endangered in Australia, is increasing. Drought and fire are recognised as increasing pressures contributing to this decline.
Fish	Freshwater fish throughout Australia have more than a 50% risk of extinction in the next 20 years due to climate change and changes within freshwater habitats.
Invertebrates	Most threatened invertebrates are suffering from largescale habitat degradation and loss of biodiversity. Changes in regional temperature, humidity and rainfall impact their distribution, development and reproduction.
Plants	Habitat destruction is the leading cause of vulnerability within plant species. However, changes in temperature, rainfall and fire regimes are contributing threats to plant species. Alpine ecosystems and biodiversity in Australia are particularly vulnerable to climate change that affects snow depth and the spatial and temporal extent of snow, which have all declined since the late 1950s.

The predicted level of impact, i.e., the consequence, of an impact on ecosystems from an increase in GHG emissions as a result of the Activity is evaluated to have a consequence of **Level 1**, based on:

- The low levels of contribution to the Australian carbon budget (0.002%).
- Given the minor contribution to carbon budgets, the indirect emissions are not a substantial cause of the physical effects of climate change on MNES. Therefore, these physical effects are not considered impacts, as per s527E of the EPBC Act.
- Amplitude Energy having a robust emissions reduction process to monitor and address legislative requirements, and enable a systematic process to identify, assess and implement GHG emissions reduction opportunities across the business, meaning the projects direct emissions will continue to be aligned with Australia's GHG emissions commitments.
- From FY26 the Australian Sustainability Reporting Standards (ASRS) AASB S2 Climate-related Disclosures (AASB S2) become mandatory. AASB S2 provides equivalent or higher level of assurance to Climate Active's certification over climate strategy and greenhouse gas emission management.

6.4.4.4 Risk: Change in Socio-economic Factors

Changes to climate can result in an impact to social receptors that have values which include the ecological receptors previously discussed. This includes KEFs and AMPs. Climate change also impacts on the functions, interests or activities of other users which rely on ecological values, including commercial and recreational fisheries and tourism.

The social receptors that may be impacted in the region of this activity are discussed in Section 4.4.3.

The predicted level of impact, i.e., the consequence, of an impact on socio-economic factors from an increase in GHG emissions as a result of the Activity is evaluated to have a consequence of **Level 1**, based on:

- The low levels of contribution to the Australian carbon budget (0.002%).
- Given the minor contribution to carbon budgets, the indirect emissions are not a substantial cause of the physical effects of climate change on MNES. Therefore, these physical effects are not considered impacts, as per s527E of the EPBC Act.

- Amplitude Energy having a robust emissions reduction process to monitor and address legislative requirements, and enable a systematic process to identify, assess and implement GHG emissions reduction opportunities across the business, meaning the projects direct emissions will continue to be aligned with Australia's GHG emissions commitments.
- From FY26 the Australian Sustainability Reporting Standards (ASRS) AASB S2 Climate-related Disclosures (AASB S2) become mandatory. AASB S2 provides equivalent or higher level of assurance to Climate Active's certification over climate strategy and greenhouse gas emission management.

6.4.5 Control Measures, ALARP, and Acceptability Assessment

Table 6-12 provides a summary of the control measures and ALARP and acceptability assessment relevant to GHG emissions.

Table 6-12: GHG Emissions ALARP, Control Measures and Acceptability Assessment

GHG Emissions	
ALARP Decision Context and Justification	ALARP Decision Context: **Type A** Impacts from GHG emissions are well understood. The potential impacts associated with Amplitude Energy Development Activities are assessed as Low. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no significant partner or media interests. The climate is influenced by the concentration of GHG emissions in the atmosphere. Amplitude Energy has a detailed understanding of its emissions profile. Given this, Amplitude Energy applies ALARP Decision Context A.
Control Measure	Source and Description of Control
CM03: Marine Assurance Process	Vessels will comply with Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution (appropriate to vessel class) for emissions from combustion of fuel including: • Hold a valid International Air Pollution Prevention (IAPP) certificate and have a current international energy efficiency certificate. • Have a Ship Energy Efficiency Management Plan (SEEMP) as per MARPOL 73/78 Annex VI.
CM07: Planned Maintenance System	Power generation on vessels will be operated in accordance with manufacturer's instructions and ongoing maintenance to ensure efficient operation, and thereby GHG emissions reduced to ALARP.
Additional Control Measures Considered	
Use alternative fuels	Reject Potential to reduce the emissions associated with the combustion of fossil fuels, however, no other alternative fuel sources are currently commercially viable for larger vessels or helicopters. The cost to transition to alternatives fuels is grossly disproportionate to the benefits gained.
Use of non-hydrocarbon powered vessels	Reject Currently it would not be commercially viable to implement this measure for the activities discussed in this EP as vessels that do not use hydrocarbon are not common in Australian waters. To bring vessels into Australia to support activities is an increased cost. The overall reduction in emissions (and therefore benefit) from bringing vessel into Australia is relatively small.
Impact and Risk Summary	

GHG Emissions	
Residual Impact Consequence	**Level 1** - Localised short-term impacts to receptors with no remedial actions or recovery required.
Residual Risk Consequence	**Level 1** - Localised short-term impacts to receptors with no remedial actions or recovery required.
Likelihood	**Possible (C)** - Could happen when additional factors are present. Easy to postulate a scenario for the occurrence but considered doubtful
Residual Risk	Low
Demonstration of Acceptability	
Principles of ESD	GHG emissions is evaluated as having Level 1 risk consequence which is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Legislation and other requirements considered as relevant control measures include: • *Climate Change Act 2022* (Cth) • *National Greenhouse and Energy Reporting Act 2007* (Cth) • Paris Agreement
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05) Activities will be undertaken in accordance with the Implementation Strategy (Section 12.0).
External Context	Activity will be undertaken in a manner consistent with relevant legislation, industry standards and guidelines, offshore practices and benchmarking. The activity is not predicted to result in impacts to species that would be inconsistent with recovery plans or conservation advice.
Other Requirements	No objections or claims have been raised related to these impacts during consultation.
Demonstration of meeting the defined acceptable levels in the OPP	Section 8.5.6 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with GHG emissions. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed above. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for GHG emissions: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP.

GHG Emissions	
	• No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	Acceptable Amplitude Energy has determined that impacts and risks related to GHG emissions are acceptable, based on: • The planned management of impacts and risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advice, and significant impact guidelines for MNES. • No claims or objections were raised during consultation that would inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures. To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: • EPO10: Manage direct and indirect GHG emissions from the Activity consistent with Australia's international GHG emissions commitments, as outlined in the *Climate Change Act 2022* (Cth). Emissions are to be determined based on the NGER scheme and managed by the Safeguard Mechanism.

6.5 Underwater Sound Emissions – Impulsive

6.5.1 Cause of Aspect

Sources of impulsive underwater sound emissions that will occur as a result of the Activity are identified in Table 6-13 and described in further detail in subsections below. The introduction of impulsive underwater sound emissions may temporarily elevate ambient underwater sound levels in the marine environment.

Table 6-13: Activities that will Generate Impulsive Underwater Sound Emissions

Aspect / Phase	Activity component
Survey	Geophysical surveys (SBP and USBL) Geotechnical surveys (USBL)
Installation, Testing and Preservation	Positioning - USBL
Support activities	Positioning – USBL for ROV / AUV operations

6.5.2 Aspect Characterisation

6.5.2.1 Survey

Geophysical surveys utilise techniques which use acoustics that direct short, pulsed sound towards the seabed, such as MBES, SSS, USBL, and SBP (see Section 3.4.1.2 for further details). Geophysical surveys can be classified as impulsive or non-impulsive sound, depending on the characteristics of the sound. NMFS (2024) classify short duration sounds with high peak sound pressure and fast rise-time as impulsive. Accordingly, Koessler and Quijano (2025) classify SBP and USBL as impulsive sounds (see Appendix 6). Conversely, MBES and SSS produces sounds that do not typically have a high sound pressure and rapid rise time and are therefore classified as non-impulsive and are assessed in Section 1.1.

As described in Section 3.0, USBL positioning systems are used to determine the positioning of equipment and vessels, using high frequency-short-range acoustic signals, produced by a small battery-operated beacon. The USBL system sends/receives and interprets signals in real time to establish precise locations of equipment and vessels. Austin *et al*. (2012) calculated the distances to SPL isopleths for a typical USBL system in open water and found the distance to 160 dB re 1 µPa (SPL) to be 36 m, and thus incidental to, and lower than underwater noise from other project impulsive and continuous noise sources. USBL is operated at a lower frequency range than MBES and SSS and is within the hearing range of most cetaceans and pinnipeds (which ranges from 7 Hz to 36 kHz for low-frequency cetaceans up to 200 Hz to 165 kHz for high frequency cetaceans and between 60 Hz to 68 kHz for otariid pinnipeds in water; NMFS, 2024).

SBP is a common survey technique and generates sound across a frequency range that overlaps the hearing range of potential receptors from low frequency cetaceans (baleen whales) to high frequency cetaceans (dolphins). SBP has comparable impulsive source levels to other survey techniques included within the EP.

Table 6-14 details the source properties of SBP and USBL survey equipment (see Appendix 6 for further details).

Considering the source levels and lower frequency range of SBP compared to USBL (Table 6-14); SBP is expected to have a higher potential to propagate through the open ocean. Therefore, SBP has been used as the basis of the impact assessment and detailed evaluation.

Table 6-14: Positioning and Survey Equipment Source Frequencies and Sound Levels (Koessler and Quijano, 2025)

Emission Source	Typical Equipment Model	Sound Frequency Range	Source Sound Level
SBP	CHIRP – EdgeTech 424, EdgeTech 512, Knudsen 3202	3.3–12.4 kHz	SPL: 178-209 dB re 1 µPa @ 1 m SELSS: 154-172.6 dB re 1 µPa2s m^2 PK: 184-214 dB re 1 µPa @ 1 m
	Boomer - Applied Acoustics S-Boom	200-6,200 Hz	SPL: 205 dB re 1 µPa @ 1 m SELSS: 172 dB re 1 µPa2s m^2 PK: 211 dB re 1 µPa @ 1 m
USBL	USBL: Sonardyne Ranger	18–36 kHz	SPL: 204 re 1 µPa @ 1m SELSS: 173 re 1 µPa m^2 PK: 209 dB re 1 µPa @ 1 m

Note: SEL_{SS} is per-pulse SEL (i.e., not an accumulated value).

6.5.2.2 Installation, Testing and Preservation

Transponders may be used during the Activity to assist with the positioning of the infrastructure and equipment (see Section 3.4.2 for further details). When required, transponders will introduce localised and temporary impulsive sound into the marine environment. General positioning will emit one chirp every 5 seconds (estimated to be required for 4 hours at a time) and precise positioning will emit one chirp every second (estimated to be required for 2 hours at a time). The chirps are short in duration between 3 and 40 milliseconds. Transponders will not emit any sound when on standby.

A USBL system uses transponders to receive the acoustic signal sent out by the system's transceiver. As such, the sound source levels of a USBL assessed in Section 6.5.2.1 are considered a suitable analogue for a transponder that will be used during the positioning activities of the Activity. Austin et al. (2012) calculated the distances to SPL isopleths for a typical USBL system in open water and found the distance to 160 dB re 1 µPa (SPL) to be 36 m, and thus incidental to, and lower than underwater noise from other project impulsive and continuous noise sources.

6.5.2.3 Support Activities

As described above, USBL positioning systems use high frequency-short-range acoustic signals. These may be attached to ROVs, deployed by ROVs to subsea equipment and the seabed. The sound source levels of a USBL are detailed in Section 6.5.2.1.

6.5.3 Underwater Sound Modelling

Amplitude Energy commissioned JASCO (Koessler and Quijano 2025) to conduct a review of publicly available and in-house confidential information to estimate the effects ranges of a range of survey equipment, including MBES, SSS, SBP (transducer (CHIRP) and boomer types), and USBL. For the avoidance of doubt, this work did not involve site and source-specific modelling. Instead, a spherical spreading loss model was utilised to model sound propagation, using equipment specifications obtained from available literature and manufacturer's catalogues (see Table 6-14). The methodology for the spherical spreading loss model follows the NOAA (2019) Interim Recommendation for Sound Source Level and Propagation Analysis for High Resolution Geophysical (HRG) Sources. Further details are provided in Appendix 6 (Koessler and Quijano, 2025).

6.5.3.1 Noise Effect Criteria

The spherical spreading loss model has been used to estimate at which horizontal distance noise effect thresholds are exceeded for different species groups. Different species groups perceive and respond to sound differently, and so a variety of exposure criteria for the different types of impacts and species groups are considered. The following noise effect thresholds (Table 6-15), based on current best available science, have been used in the impact and risk assessment:

- Peak pressure levels (PK) and frequency-weighted accumulated sound exposure levels (SEL24h) from the US National Oceanic and Atmospheric Administration (NOAA) Technical Guidance (NMFS 2018, and NMFS 2024) and Southall *et al.* (2019) for the onset of Auditory Injury (AUD INJ) and Temporary Threshold Shift (TTS) in marine mammals.
- Marine mammal behavioural threshold (Level B harassment[3]) based on the current NOAA (NMFS 2024) criterion for marine mammals of 160 dB re 1 µPa (SPL) for impulsive sound sources.
- Peak pressure levels (PK) and frequency-weighted accumulated sound exposure levels (SEL_{24h}) from Accomando *et al*. (2025) for the onset of AUD INJ and TTS in marine turtles.
- Marine turtle behavioural response threshold of 166 dB re 1 µPa (SPL) (CoA, 2017) as applied by the US NMFS, along with a sound level associated with behavioural disturbance threshold of 175 dB re 1 µPa (SPL) (McCauley *et al.*, 2000).
- Sound exposure guidelines for fish, fish eggs and larvae, including quantitative criteria for mortality and potential mortal injury, recoverable injury and TTS and qualitative risk criteria for masking and behavioural effects (Popper *et al.,* 2014). Quantitative criteria are only available for mortality and potential mortal injury for fish eggs and fish larvae.

NOAA has recently published updated guidance for exposure thresholds for the onset of AUD INJ and TTS for marine mammals within the Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0): Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts (NMFS 2024). The updated thresholds now consider both the weighting function shape and the weighted threshold value. These new thresholds present a more conservative frequency-weighted accumulated sound exposure levels compared to those previously used, those suggested by Southall *et al.* (2019).

It is expected that marine invertebrates cannot detect sound pressure and instead are able to detect sound via particle motion. There are no noise effect criteria available for marine invertebrates due to the lack of empirical evidence on the potential effects of sound on these species. Existing studies identified that a PK-PK sound level exceeding 202 dB re 1 µPa could result in effects on crustaceans (Payne *et al.,* 2008). However, to be impacted, marine invertebrates would need to be in very close proximity to survey equipment, which is unlikely to occur, given that hull mounted survey equipment may be several tens of metres from the seabed (Koessler and Quijano, 2025). Therefore, injury, impairment or behavioural impacts to marine invertebrates are considered unlikely to result from the impulsive underwater sound emissions of the activity. As such, there is considered to be no credible impact to marine invertebrates and this species group has been not considered further.

[3] NOAA (2005) defines Level B harassment as “acts that have the potential to disturb (but not injure) a marine mammal or marine mammal stock in the wind by disrupting behavioural patterns including, but not limited to, migration, breathing, nursing, breeding, feeding or sheltering.”

Table 6-15: Noise Effect Criteria for Impulsive Sound

Receptor	Behavioural	Impairment			Injury	
		Masking	Temporary threshold shift*	Recoverable injury	Permanent threshold shift / AUD INJ	Mortality or potential mortal injury
Low-frequency cetaceans	SPL: 160 dB re 1 µPa	N/A	SEL_{24h}: 168 dB re 1 μPa^2s PK: 216 dB re 1 µPa	N/A	SEL_{24h}: 183 dB re 1 μPa^2s PK: 222 dB re 1 µPa	N/A
High-frequency cetaceans	SPL: 160 dB re 1 µPa	N/A	SEL_{24h}: 178 dB re 1 μPa^2s PK: 224 dB re 1 µPa	N/A	SEL_{24h}: 193 dB re 1 μPa^2s PK: 230 dB re 1 µPa	N/A
Very high frequency cetaceans	SPL: 160 dB re 1 µPa	N/A	SEL24h: 144 dB re 1 μPa^2s PK: 196 dB re 1 µPa	N/A	SEL24h: 159 dB re 1 μPa^2s PK: 202 dB re 1 µPa	N/A
Otariid seals	SPL: 160 dB re 1 µPa	N/A	SEL_{24h}: 170 dB re 1 μPa^2s PK: 224 dB re 1 µPa	N/A	SEL_{24h}: 185 dB re 1 μPa^2s PK: 230 dB re 1 µPa	N/A
Turtles	SPL: 166 dB re 1 µPa SPL: 175 dB re 1 µPa	N/A	SEL_{24h}: 169 dB re 1 μPa^2s PK: 224 dB re 1 µPa	N/A	SEL_{24h}: 184 dB re 1 μPa^2s PK: 230 dB re 1 µPa	N/A
Fish (no swim bladder)	(N) High (I) Moderate (F) Low	(N) Low (I) Low (F) Low	SEL_{24h}: >>186 dB re 1 μPa^2s	SEL_{24h}: >216 dB re 1 μPa^2s PK: >213 dB re 1 µPa	N/A	SEL_{24h}: >219 dB re 1 μPa^2s PK: >213 dB re 1 µPa
Fish (swim bladder not involved in hearing)	(N) High (I) Moderate (F) Low	(N) Low (I) Low (F) Low	SEL_{24h}: >>186 dB re 1 μPa^2s	SEL_{24h}: 203 dB re 1 μPa^2s	N/A	SEL_{24h}: 210 dB re 1 μPa^2s PK: >207 dB re 1 µPa

Receptor	Behavioural	Impairment			Injury	
		Masking	Temporary threshold shift*	Recoverable injury	Permanent threshold shift / AUD INJ	Mortality or potential mortal injury
				PK: >207 dB re 1 µPa		
Fish (swim bladder	(N) High (I) High (F) Moderate	(N) Low (I) Low (F) Moderate	SEL_{24h}: 186 dB re 1 μPa^2s	SEL_{24h}: 203 dB re 1 μPa^2s PK: >207 dB re 1 µPa	N/A	SEL_{24h}: 207 dB re 1 μPa^2s PK: >207 dB re 1 µPa
Fish eggs and fish larvae (also relevant to plankton)	(N) Moderate (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low	N/A	SEL_{24h}: >210 dB re 1 μPa^2s PK: >207 dB re 1 µPa

*The NMFS 2024 does not include criteria for TTS to cetaceans for impulsive sounds (non-explosive), so criteria from Southall *et al*. 2019 has been used in line with Koessler and Quijano (2025) (Appendix 6).

6.5.4 Predicted Environmental Impacts and Risks

Potential impacts from impulsive noise emissions are:

- change in ambient sound

Potential risk:

- change in fauna behaviour, including:
  - marine mammals
  - marine turtles
  - fish including eggs and larvae.
- auditory impairment (masking, TTS, recoverable injury), or auditory injuries (mortality or potential mortal injuries, PTS) to marine fauna, including:
  - marine mammals
  - marine turtles
  - fish including eggs and larvae.

Indirect effects are possible to conservation values of protected areas and First Nations cultural values and sensitivities. Impacts and risks to First Nations cultural heritage are assessed in Section 7.2.

Socio-economic impacts on commercial fisheries have not been evaluated further, as there are no discernible impacts to behaviour and distribution expected at the population level given the limited nature and scale of activities and associated impulsive underwater sound emissions.

6.5.5 Impact and Risk Evaluation

6.5.5.1 Impact: Change in Ambient Sound

Inherent Consequence Evaluation

Ambient underwater sound is the level of sound which exists in the environment without the presence of the activity. Ambient underwater sound levels in the operational area are expected to range between 110 and 161 dB re 1 µPa. The ambient levels are inferred from passive acoustic monitoring, commissioned by Origin, conducted 5 km offshore from the coastline east of Warrnambool (Duncan *et al.* 2013).

Koessler and Quijano (2025) (Appendix 6) did not model the increase in ambient sound levels associated with the operation of SBP, as this study was focussed on estimating the distance at which noise effect criteria for marine mammals and turtles could be exceeded. Previous underwater sound modelling predicted increased levels of underwater sound up to 110 dB re 1 µPa would extend 3.37 km from a boomer type SBP sound source in the Otway Basin at 66 m depth (Welch *et al.,* 2023).

Given that impulsive sound sources of the Activity are related to activities that are intermittent, of a short-term duration and highly localised (change above an SPL of 110 dB re 1 µPa approximately 3.37 km from the SBP sound source), the consequence of this impact has been evaluated as **Level 1**, as underwater sound will return to existing ambient levels following completion of the activity with no remedial or recovery work required.

6.5.5.2 Risk: Change in Fauna Behaviour – Marine Mammals

Inherent Consequence Evaluation

Impulsive sound emissions may cause behavioural changes to marine mammals depending on the frequency and sound levels received. The behavioural thresholds for otariids and cetaceans include:

- 160 dB re 1 µPa (SPL) for impulsive sounds (SBP and USBL).

Underwater sound modelling (Koessler and Quijano 2025; Appendix 6) predicted the impulsive behavioural threshold for all marine mammals (cetaceans and otariid seals) was exceeded at maximum distances of:

- 8-281 m from a transducer-type SBP sound source (depending on the specifications).
- 178 m from a boomer-type SBP sound source.

This indicates that impulsive underwater sound emissions from the Activity have the potential to cause behavioural changes to marine mammals. Behavioural thresholds for USBL were only exceeded up to 151 m from the USBL sound source (Koessler and Quijano 2025). Geophysical sound sources may be utilised throughout the operational area. Only a small part of the operational area may be exposed to noise at levels above behavioural disturbance thresholds, within 281 m of the sound source for otariids and cetaceans. This is expected to last for only a short duration of the campaign (refer to Section 3.2). Therefore, the impact will be temporary and localised. As noted above, underwater sound will return to existing ambient levels following completion of the Activity with no remedial or recovery work required.

The operational area is used as a conservative behavioural EMBA for otariids and cetaceans exposed to impulsive sounds. Table 6-16 provides details on the presence of otariids and low frequency cetaceans within the impulsive sound behavioural EMBA, the potential behavioural changes that may occur and the resulting inherent consequence level for each species.

A comprehensive review of potential behavioural responses of marine mammals to impulsive noise, such as that resulting from SBP activity, is provided in Erbe *et al*. (2025), which was reviewed to identify potential species-specific behavioural changes. The judgement on potential presence within the impulsive sound behavioural EMBA (may occur vs likely to occur) is based on the overlap of BIAs and also available sightings data for the region, including but not limited to:

- Gill *et al*. (2015) - 123 aerial surveys between 2002 and 2013 from western Bass Strait to eastern Great Australian Bight.
- Origin (2018) – aerial surveys between June 2012 – March 2013 in the Otway Basin.
- Watson *et al.* (2021) – coastal southern right whale sightings between 1993 and 2018 in south-eastern Australia (east of the South Australia / Victorian Border).

Inherent Likelihood

The likelihood of behavioural changes to cetaceans and otariids depends on the sound source used, the potential presence of animals within the impulsive sound behavioural EMBA, and the relative sensitivity of different species and individuals to noise. SBP operating frequencies overlap the hearing frequencies of all marine mammal hearing groups (NMFS, 2024). This overlap could potentially cause behavioural changes.

For the risk event of behavioural changes to marine mammals to occur, the following combination of factors are required:

- Impulsive underwater sound emissions (i.e., from SBP operations).

- Marine mammals (cetaceans and Otariids) present within 281 m of the sound source.

Considering the relatively small numbers, potential behaviours and movements of marine mammals in the offshore area overlapping the activity, the likelihood of the impact occurring is considered to be small, with large, marine mammals unlikely to be present within the very small radius (maximum of 281 m) of the sound source when in use.

Table 6-16 includes details on the frequency of recorded sightings of EPBC listed marine mammals (where available) in the Otway Basin to infer presence within the impulsive sound behavioural EMBA. Based on the limited spatial extent of the impulsive sound behavioural EMBA, the likelihood of behavioural change is generally considered to be low, as this would require individuals to be within 281 m of the sound source when it is in operation. The inherent likelihood levels for each species has been informed by available sightings data to understand the presence within the impulsive sound behavioural EMBA (see Table 6-17) is judged as follows:

- Pinnipeds (otariids):
  - Australian fur seal – Unlikely (D)
  - New Zealand fur seal – Unlikely (D).
- Very high frequency cetaceans:
  - pygmy/dwarf sperm whale – Remote (E)
  - true porpoise – Remote (E).
- High frequency cetaceans:
  - dolphins – Unlikely (D)
  - toothed whales – Unlikely (D).
- Low frequency cetaceans:
  - minke whale – Remote (E)
  - sei whale – Remote (E)
  - pygmy blue whale – Unlikely (D)
  - fin whale – Unlikely (D)
  - pygmy right whale – Remote (E)
  - southern right whale – Unlikely (D)
  - humpback whale – Remote (E).

Table 6-16: Inherent Consequence Levels - Impulsive Sound - Behavioural Changes to Marine Mammals

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Pinnipeds (otariids)				
Australian fur-seal **New Zealand fur seal** EPBC Act: • Marine (all)	May occur as per PMST report, however, are considered known to occur based on occurrence records available for the Otway (ALA 2024) and sightings by marine mammal observers during offshore campaigns (e.g. Seiche Environmental 2020). No BIAs overlap.	California sea lions exposed to mid frequency sonar demonstrated increased time spent submerged and increased respiration rates with no habituation observed over repeated exposure (Houser *et al*., 2013).	Localized and short-term potential impacts or disturbances to fauna. Not expected to result in population level impacts.	Level 1
Very high-frequency cetaceans				
Pygmy/dwarf sperm whale **True porpoise** EPBC Act: • Cetacean • Migratory	None identified in PMST report and therefore low likelihood of presence. No BIAs overlapped.	Harbour porpoise demonstrated behavioural changes including avoidance, changes in swimming speed and respiration and increased leaping behaviour when exposed to low and mid-frequency sonar sweeps (Kastelein *et al.* 2012; Erbe *et al*. 2015).	Minor local (small, variable, temporary behavioural changes within 281 m from the source) impacts or disturbances to species of recognised conservation value (nationally threatened). There are no population level impacts anticipated.	Level 2
High-frequency cetaceans				
Dolphins (Bottlenose, common, dusky, Indian Ocean, Risso's) **Toothed whales** (killer, false killer) EPBC Act: • Cetacean	May or likely to occur. No BIAs overlapped.	When exposed to mid-frequency acoustic sonar sources at 122 dB re 1 µPa, behavioural changes of bottlenose dolphin (change in movement patterns, increasing vocalisations) have been observed (Henderson *et al.* 2014). Nevertheless, other studies demonstrated that bottlenose dolphin remained in areas exposed to mid-frequency sonar and that habituation	Localized and short-term potential impacts or disturbances to fauna. Not expected to result in population level impacts.	Level 1

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
• Migratory.		occurred following repetitive exposures (Baird *et al*., 2014; Houser *et al*., 2013). Changes in killer whale behaviour have also been observed (vocalisations, diving patterns and movements) when exposed to a ramp-up of sonar up to 214 1 µPa m over 30 minutes (Miller *et al*., 2012)		
Low-frequency cetaceans				
Minke whale - EPBC Act: • Cetacean.	May occur. No BIAs overlapped. Gill *et al.* (2015) - one sighting of an individual minke whale (2002-2013). No confirmed sightings during Amplitude Energy Offshore Campaigns in the Otway.	Change in diving, avoidance or ceasing/reducing calls (Durbach *et al*. 2021; Kvadsheim *et al*. 2017).	The consequence is considered minor and local (small, variable, temporary behavioural changes within 281 m of the source) impacts or disturbances to fauna. There are no population level impacts anticipated.	Level 1
Sei whale - EPBC Act: • Vulnerable • Cetacean • Migratory	Likely to occur. No BIAs overlapped. Gill *et al*. (2015) - 12 sightings of 14 individual sei and like sei whales (2002-2013). No confirmed sightings during Amplitude Energy Offshore Campaigns in the Otway.	Movement away from impulsive source and call cessation/ modification inferred from studies of other baleen cetaceans.	Localized and short-term potential impacts or disturbances to species of recognized conservation value (nationally threatened). Not expected to result in population level impacts.	Level 2
Pygmy blue whale - EPBC Act: • Endangered • Cetacean • Migratory	Known to occur. Foraging BIA overlapped. During January to June, pygmy blue whales migrate through the operational area. Origin (2018) – sightings of 120 individuals in the Otway Basin (2012-2013). Approximately 221 observation records of pygmy blue whales were identified off the	Cessation of deep feeding (deep feeding at water depths of 75 to 175 m), increased swimming speed and directed travel away from the sound source (from 160 to 210 dB re 1 µPa RMS) (Goldbogen *et al*. 2013). Responses are highly variable depending on initial behavioural state and environmental conditions (Erbe *et al.* 2025).	Localized and short-term potential impacts or disturbances to species of recognized conservation value (nationally threatened) within BIAs. The risk of stopping blue whale individuals from deep feeding (wells are in water depths ranging from 56 – 74 m) is not expected to result in population level impacts.	Level 2

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
	coast of Victoria between 2000 and 2024 (Atlas of Living Australia 2025). One sighting of suspected blue whale in Q1 2025 during Amplitude Energy Offshore Campaign.	When exposed to seismic sparker (30–450 Hz) at 131 dB re 1 µPa pk-pk and 114 dB re 1 μPa^2s, blue whales demonstrate decreased call rates (di Iorio and Clark, 2010).		
Fin whale - EPBC Act: • Vulnerable • Cetacean • Migratory	Likely to occur. No BIAs overlapped. Gill *et al.* (2015) - 7 sightings of 8 individual fin and like fin whales (2002-2013). No confirmed sightings during Amplitude Energy Offshore Campaigns in the Otway	Modify song characteristics under increased background noise conditions, and temporary displacement (Castellote *et al*. 2012). When exposed to mid-frequency sonar, only 5 of 15 fine whales demonstrated behavioural responses (Southall *et al.* 2023).	Localized and short-term potential impacts or disturbances to species of recognized conservation value (nationally threatened). Not expected to result in population level impacts.	Level 2
Pygmy right whale EPBC Act: • Cetacean • Migratory	May occur. No BIAs overlapped. Gill *et al.* (2015) - 1 sighting of 100 individual pygmy right whales (2002-2013).	Movement away from impulsive source and call cessation/ modification inferred from studies of other baleen cetaceans.	Localized and short-term potential impacts or disturbances to fauna. Not expected to result in population level impacts.	Level 1
Southern right whale EPBC Act: • Endangered • Cetacean • Migratory	Known to occur. Migration BIA overlapped. During May-June and September-October southern right whales pass through the operational area to move to and from coastal aggregation areas. Watson *et al.* (2021) - 375 individual southern right whales (including 48 breeding females) were identified in south-eastern Australia (east of the SA/Victorian border) (1993-2018). Some historical sightings during Amplitude Energy offshore campaigns in the Otway (refer to Section 4.0.	Behavioural changes inferred from related species (North Atlantic right whale), that immediately stopped foraging (abandoned foraging dive prematurely) and quickly approached the surface when exposed to amplitude modulated signals with a maximum source level of 173 dB re 1 µPa at 1 m (Nowacek *et al.* 2004; Matthews and Parks 2021). Changes to vocalisations including call cessation/ modification is inferred from studies of other baleen cetaceans.	Localized and short-term potential impacts or disturbances to species of recognized conservation value (nationally threatened) within BIA. The risk of behavioural change to migrating southern right whale individuals within highly localized area is not expected to result in population level impacts. Logans beach is ~37 km from the operational area; no overlap with behavioural disturbance contours is predicted.	Level 2

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Humpback whale - EPBC Act: • Cetacean • Migratory	Likely to occur. No BIAs overlapped. Gill *et al*. (2015) - 10 sightings of 18 individual humpback whales (2002 – 2013). Multiple sightings of humpback whales in Q2 2025 during Amplitude Energy Offshore Campaign.	When exposed to an active seismic array, behavioural changes, including to movement patterns, dive/respiratory parameters and rates of breaching were small, variable and temporary (Dunlop *et al*. 2017). Behavioural changes to humpback whales from exposure to lower impulsive sound source levels from geophysical surveys may also result in small, variable, temporary behavioural changes. Humpback whales were more likely to demonstrate a behavioural response to seismic arrays at >130 dB 1 μPa^2s, however, some whales did not change behaviour at the highest source levels of 160–170 dB re 1 μPa^2s (Dunlop *et al.* 2018).	Localized and short-term potential impacts or disturbances to fauna. Not expected to result in population level impacts.	Level 1

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to marine mammals from impulsive sound emissions is considered **Low** (Table 6-17).

Table 6-17: Inherent Risk Severity – Impulsive Sound – Behavioural Changes to Marine Mammals

Marine Mammals	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
Low-frequency cetaceans			
Minke whale	1	E	Low
Sei whale	2	E	Low
Pygmy blue whale	2	D	Low
Fin whale	2	D	Low
Pygmy right whale	1	E	Low
Southern right whale	2	D	Low
Humpback whale	1	E	Low
High-frequency cetaceans			
Dolphins (Risso's, dusky, common, Indian Ocean bottlenose, bottlenose) Toothed whales (killer, false killer)	1	D	Low
Very-high frequency cetaceans			
Pygmy/dwarf sperm whale, true porpoises	1	E	Low
Pinnipeds (otariids)			
New Zealand fur-seal Australian fur-seal	1	D	Low

6.5.5.3 Risk: Auditory Impairment or Injury – Marine Mammals

Inherent Consequence Evaluation

Auditory injury is defined by DCCEEW as both permanent and temporary hearing impairment and any other form of physical harm arising from anthropogenic sources of underwater noise (DAWE, 2021). Permanent and temporary hearing impairment for the purposes of this evaluation is the onset of AUD INJ and TTS, respectively. AUD INJ and TTS thresholds defined by Southall *et al.* (2019) and NMFS (2024) have been used to determine the range in which the onset of auditory injury will occur to marine mammals from exposure to impulsive sound (Table 6-15).

Underwater sound modelling was conducted for transducer and boomer-type SBP and USBL, using the equipment specifications and source levels outlined in Table 6-14, with further details in Appendix 7. The results of the underwater sound modelling are detailed in Table 6-18.

Table 6-18: Impulsive Sound - Maximum Distance to AUD INJ and TTS thresholds for Marine Mammals (Koessler and Quijano 2025; Appendix 7)

Marine Mammal Hearing Group	Threshold SEL24h, dB re 1 µPa² s	Maximum Distance (km)	Relevant Source Equipment
AUD INJ (including PTS)			
Low-frequency cetaceans	183	0.07	USBL* USBL (Sonardyne Ranger)
High-frequency cetaceans	193	0.09	USBL*USBL (Sonardyne Ranger)
Very High-frequency cetaceans	159	2.40	USBL*USBL (Sonardyne Ranger)
Otariid seals	185	0.14	USBL*USBL (Sonardyne Ranger)
TTS			
Low-frequency cetaceans	168	1.74	SBP (Transducer (CHIRP) type: Knudsen 3202)
High-frequency cetaceans	178	0.47	USBL*USBL (Sonardyne Ranger)
Very High-frequency cetaceans	144	7.74	SBP (Transducer (CHIRP) type: Knudsen 3202)
Otariid seals	170	1.09	SBP (Transducer (CHIRP) type: Knudsen 3202)

* Assumes USBL is operating from a non-moving vessel continuously over 24 hours.

Results of this study predicted the onset of AUD INJ and TTS for all cetacean hearing groups from the operation of SBP (transducer (CHIRP) type) and USBL, based on SEL24h thresholds. The PK thresholds for AUD INJ and TTS were only exceeded for very high frequency cetaceans at distances out to 4 m and 8 m, respectively (refer to Appendix 6).

The maximum distance where the potential onset of auditory impairment and injury may occur is 7.74 km (for very-high cetaceans from the operation of the transducer (CHIRP) type SBP) and <2 km for all other hearing groups of cetaceans and Otariids (Table 6-18). This is referred to as the impulsive sound auditory impairment and injury EMBA for marine mammals.

The impact ranges presented in Table 6-18 significantly exceed those previously reported in literature by McPherson and Wood (2017) due to the inclusion of the high-power Knudsen 3202 equipment which is operated at a source level of 209 dB re 1 µPa @ 1 m. For instance, the modelled impact ranges for the EdgeTech 424 and 512 are considerably less (up to 3 m AUD INJ and 97 m for TTS, only being exceeded for very high-frequency cetaceans) (see Appendix 6). The frequency ranges and source levels modelled, represent a worst-case scenario by using conservative assumptions on a range of equipment specifications (see Appendix 6). The injury ranges are thus likely to fall within the spectrum of those defined by the model outputs, thereby reducing the impact ranges associated with the use of SBP and USBL.

The horizontal impact ranges are based on SEL24h thresholds, meaning that animals would need to remain within close proximity to the sound source over a period of 24 hours for AUD INJ and TTS impacts to occur. SEL24h is a cumulative metric representing the total noise exposure over 24 hours. It assumes continuous exposure at a fixed point, providing a worst-case scenario. Realistically,

cetaceans are mobile and would not remain in an injury inducing ensonified area for 24 hours (i.e. within 7.74 km for very high frequency cetaceans and within 0.74 to 1.74 km for all other hearing groups from a SBP sound source and within 470 m for high-frequency cetaceans). SBP will be deployed from a moving vessel.

The underwater sound modelling modelled SEL24h at a fixed distance off a straight survey line (using a vessel speed at 3.5 knots over a 20 km straight line survey track). The movement of the vessel reduces the probability that a marine mammal would remain in close proximity to operational SBP for a sustained period of time. Conversely, USBL may be deployed from a stationary vessel or when a vessel is moving slowly. For this reason, Koessler and Quijano (2025) modelled SEL24h from USBL assuming a non-moving vessel. SEL24h is a cumulative metric representing the total noise exposure over 24 hours. It assumes continuous exposure at a fixed point, providing a worst-case scenario. Realistically, cetaceans are mobile and would not remain in an injury inducing ensonified area for 24 hours (i.e., within 7.74 km for very high frequency cetaceans and 0.74 to 1.74 km for all other hearing groups from a SBP sound source, andwithin 470 m of a USBL sound source for high-frequency cetaceans).

In addition to modelling the continuous operation of USBL over a 24-hour period, Koessler and Quijano (2025) also modelled underwater sound emissions for USBL operating for a total of 1 hour within a 24 hour period. Under the assumption of 1 hour of USBL ensonification within a 24 hour period, AUD INJ ranges reduce to 820 m for very high frequency cetaceans, 20 m for high frequency cetaceans and 14 m for low frequency cetaceans. TTS ranges reduce to 2.57 km for very high-frequency cetaceans, 107 m for high frequency cetaceans and 79 m for low frequency cetaceans.

Review of the EPBC listed marine mammal species (or species habitat) that may occur within the operational area (Table 4-3) indicates no presence of any very high-frequency cetaceans such as true porpoises, river dolphins, pygmy/dwarf sperm whales or some oceanic dolphins that are associated with the greatest impact range at 7.74 km (Southall *et al.* 2019). Oceanic dolphins traveling through the area might experience brief exposure, however this exposure is not expected to not cause injury, noting the mobile nature of this species. For other hearing groups, the impact ranges are considerably smaller, at a maximum of 1.74 km for low-frequency cetaceans associated with conservative assumptions for the underwater sound modelling of the Knudsen 3202 transducer-type SBP and 470 m for high-frequency cetaceans, associated with the operation of USBL.

Table 6-19: Inherent Consequence Levels – Impulsive Sound – Auditory Impairment or Injury to Marine Mammals

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential Auditory Impairment or Injury	Description of Potential Consequence	Inherent Consequence
Pinnipeds				
New Zealand fur-seal **Australian fur-seal** EPBC Act: • Marine (all)	May occur as per PMST report, however, are considered known to occur based on occurrence records available for the Otway (ALA, 2024) and sightings by marine mammal observers during offshore campaigns (e.g. Seiche Environmental 2020). No BIAs overlap.	For the onset of TTS and AUD INJ to occur, pinnipeds need to remain in-water within 1.09 km and 140 m of the impulsive sound sources for 24-hours, respectively (Table 6-18). Seals have been observed to dive and stay submerged for up to two hours (Bli, 2018). Seals will then surface from dives for oxygen recovery. The longer the dive the longer the surface recovery time required (Blix 2018). It is not credible for seals to remain in-water for 24-hours for the onset of TTS and AUD INJ to occur based on the limited dive duration.	Not credible	Not applicable
Very high-frequency cetaceans				
Pygmy / dwarf sperm whale **True porpoise** EPBC Act: • Cetacean • Migratory.	None identified in PMST report and therefore low likelihood of presence. No BIAs overlapped.	For the onset of TTS and AUD INJ to occur, very high-frequency cetaceans need to remain within 7.74 km and 2.4 km of impulsive sound sources for 24-hours, respectively (Table 6-18). Taking the low likelihood that very high frequency cetaceans will be present within 7.74 km and 2.4 km of impulsive sound sources for 24-hours, the onset of TTS and AUD INJ is not credible.	Not credible	Not applicable
High-frequency cetaceans				
Dolphins (Bottlenose, common, dusky, Indian Ocean, Risso's) **Toothed whales** (killer, false killer)	May or likely to occur. No BIAs overlapped.	For the onset of TTS and AUD INJ to occur, high-frequency cetaceans need to remain within 470 m and 94 m of continuous sound sources for 24-hours, respectively (Table 6-18). It is not credible for high-frequency cetaceans to remain within 470 m and 94 m of impulsive sound sources for 24-hours for the onset of TTS and AUD INJ to occur given the absence of BIAs in the operational area.	Not credible	Not applicable

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential Auditory Impairment or Injury	Description of Potential Consequence	Inherent Consequence
EPBC Act: • Cetacean • Migratory.				
Low-frequency cetaceans				
Minke whale - EPBC Act: • Cetacean.	May or likely to occur. No BIAs overlapped.	For the onset of TTS and AUD INJ to occur, low-frequency cetaceans need to remain within 1.74 km and 60 m of impulsive sound sources for 24-hours, respectively (Table 6-18). The operational area does not support habitats that encourage sedentary behaviours given the absence of BIAs in the operational area. Therefore, it is not credible for minke, sei, fin, humpback whales to remain within 1,742 and 68 m of continuous sound sources for 24-hours for the onset of TTS and AUD INJ.	Not credible	Not applicable
Sei whale - EPBC Act: • Vulnerable • Cetacean • Migratory			Not credible	Not applicable
Fin whale - EPBC Act: • Vulnerable • Cetacean • Migratory.			Not credible	Not applicable
Humpback whale - EPBC Act: • Cetacean • Migratory.			Not credible	Not applicable
Pygmy blue whale - EPBC Act: • Endangered • Cetacean	Known to occur. Foraging BIA overlapped. During January to June, blue whales migrate through the operational area.	Despite the overlap with foraging BIA, it is not credible for blue whales to remain within 1.74 m and 68 m of impulsive sound sources for 24-hours for the onset of TTS and AUD INJ to occur based on:	Not credible	Not applicable

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential Auditory Impairment or Injury	Description of Potential Consequence	Inherent Consequence
• Migratory.		A type of foraging behaviour (observed in tagged blue whales) involving area restricted searches (ARS) was reported by Bailey *et al*. (2009). The area that the ARS occurred over ranged from 10 km up to 360 km in radius. Owen *et al*. (2016) also reported on ARS occurring across an area of 220 km^2 for a satellite tagged blue whale on the west coast of Australia. The maximum activity TTS contours cover a range of 1.74 km. Therefore, if ARS were to occur it could be expected to extend well beyond any activity TTS contour and preclude the onset of TTS. If whales were to interrupt their foraging within the TTS zone to feed on a discrete patch of krill for >24 hours, the movement of plankton (and therefore krill) with the currents would move the feeding zone passively through the TTS zone before TTS onset. Minimum average currents in the operational area are around 0.15 m/s in May (RPS 2019). A discrete patch of krill moving with the plankton (and therefore the current) would move at 540 m/h, moving through the TTS zone well before TTS onset. Blue whales have been recorded swimming at mean speeds of 2.8 km/hr +/- 2.2 km/hr whilst migrating and foraging (Owen Jenner and Jenner, 2016) or faster (Möller *et al.* 2020). Sears and Perrin (2017) suggest blue whales most commonly swim at speeds of 3–6 km/hr but they can attain travel speeds of 7–20 km/hr. Accounting for swimming speeds across this range, a whale would be expected to move through any TTS zone associated with the Activity well before TTS onset. Recent activities within the Otway have overlapped pygmy blue whale foraging periods and blue whales were observed during the activity. Reported behaviours were in line with published information on foraging behaviours and movements, that is, blue whales were not stationary for extended periods of time, or significantly restricted in their range, and were never considered		

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential Auditory Impairment or Injury	Description of Potential Consequence	Inherent Consequence
		to be at risk of TTS (MMO observation data, pers comms Beach Energy 2022).		
Southern right whale - EPBC Act: • Endangered • Cetacean • Migratory.	Known to occur. Migration BIA overlapped. During May-June and September-October southern right whales pass through the operational area to move to and from coastal reproduction areas.	It is not considered credible for southern right whales to remain within 1.74 km and 68 m of impulsive sound sources for 24-hours for the onset of TTS and AUD INJ to occur based on: TTS and AUD INJ values do not incorporate animal movement (necessary for migration) which prevent southern right whales reaching the range required for auditory impairment and injury to occur. Southern right whales are highly mobile species and are known to move throughout the region. Connecting range movements will prevent southern right whales to remain within the range for over 24-hours required for auditory impairment and injury to occur. The longest movements are undertaken by non-calving whales, though calving whales have also been recorded at locations up to 700 km apart within a single season (DCCEEW 2024b). The operational area and TTS/ AUD INJ contours of the activity overlap the migration BIA but do not overlap the preferred calving/nursing habitat for southern right whales (<10 m water depth and within 1 km of shore). There is no evidence of high-site fidelity for southern right whales within the operational area, or within the TTS or AUD INJ radii of the activity. As a result, southern right whales that may occur in the vicinity of the activity, are expected to be highly mobile and pass through the area before auditory impairment / injury can manifest.	Not credible	Not applicable

Inherent Likelihood

Details in Table 6-19 suggest that the presence of marine mammals for extended (≥ 24 hour) periods, and consistently within close proximity to impulsive sound sources, is not plausible. Therefore, the risk is not considered credible.

Inherent Risk Severity
Not applicable due to the risk not being credible.

6.5.5.4 Risk: Change in Fauna Behaviour – Marine Turtles

Inherent Consequence Evaluation

Impulsive sound emissions may cause behavioural changes to turtles depending on the frequency and sound levels received, such that:

- Impulsive sound levels greater than 166 dB re 1 µPa (SPL) is the behavioural response threshold for turtles (McCauley *et al*. 2000), along with a sound level associated with behavioural disturbance threshold of 175 re 1 µPa (SPL).

Underwater sound modelling (Koessler and Quijano 2025; Appendix 6) predicted the impulsive behavioural thresholds for marine turtles to be exceeded at maximum distances of:

- 4-141 m for behavioural response threshold and 1-50 m for behavioural disturbance threshold, both from transducer-type SBP sound source (depending on the specifications).
- 89 m for behavioural response threshold and 32 m for behavioural disturbance threshold for a boomer-type SBP sound source.

This indicates that impulsive underwater sound emissions from the Activity have the potential to cause behavioural changes to marine turtles. Behavioural thresholds were only exceeded up to 78 m for behavioural response and 28 m for behavioural disturbance from the USBL source (Koessler and Quijano 2025).

Geophysical sound sources may be utilised throughout the operational area. However, only a small part of the operational area may be exposed to noise at levels above behavioural response/disturbance thresholds for marine turtles. This is consistent with the relative risk criteria from Popper *et al.* (2014) that suggest that behavioural changes (e.g., avoidance, diving) would only be expected for individuals near the source (high risk of behavioural impacts within tens of metres of source and moderate risk of behavioural impacts within hundreds of metres of the source) (McPherson and Koessler 2021).

The operational area is used as a conservative behavioural EMBA for marine turtles exposed to impulsive sounds. Table 6-20 provides details on the presence of EPBC listed turtles within the impulsive sound behavioural EMBA, potential behavioural changes that may occur and the resulting inherent consequence level for each turtle species.

Table 6-20: Inherent Consequence Levels - Impulsive Sound - Behavioural Changes to Marine Turtles

Marine Turtles (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Loggerhead turtle - EPBC Act: • Endangered	• Likely to occur. • No BIAs overlapped.	Interrupted basking behaviour and diving in response to sound generated during airgun	• Localized and short-term potential impacts or disturbances to species of recognized	Level 1

Marine Turtles (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
• Marine • Migratory		operations (DeRuiter and Doukara 2012).	conservation value (nationally threatened). • As there are no BIA's for the species within the temperate south east region, only small numbers (if any) expected. No population level impacts expected.	
Green turtle - EPBC Act: • Vulnerable • Marine • Migratory	• May occur. • No BIAs overlapped.	Increased swimming speed and erratic behaviour when exposed to sound generated by pile driving, airguns, and sonar (Papale *et al*. 2020).		Level 1
Leatherback turtle - EPBC Act: • Endangered • Marine • Migratory	• Likely to occur. • No BIAs overlapped.	Increased swimming speeds, diving and erratic behaviour inferred from studies of other turtle species.		Level 1

Inherent Likelihood

The likelihood of behavioural changes to turtles depends on the impulsive sound source used and the potential presence of turtles within the impulsive sound behavioural EMBA, as well as the relative sensitivity of different species and individuals to noise. Sea turtles are most susceptible to frequencies of <1 kHz and therefore only SBP operating frequencies overlap hearing frequencies of turtles (McPherson and Koessler, 2021). This overlap could potentially mask turtle hearing causing behavioural changes.

For the risk event of behavioural changes to turtles to occur, the following combination of factors are required:

- Impulsive underwater sound emissions (i.e., from SBP operations).
- Marine turtles present within 141 m of the SBP sound source.

The Atlas of Living Australia (Atlas of Living Australia, 2025) and the Victoria Biodiversity Atlas (VBA) was reviewed to understand the potential likelihood of marine turtle presence within the operational area (ALA 2025; Victorian DELWP 2025). No observations or occurrences of loggerhead turtles, green turtles or leatherback turtles were recorded within the impulsive sound behavioural EMBA. Therefore, the likelihood for all species is judged to be **Remove (E)**.

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to marine turtles from impulsive sound emissions is considered **Low** (Table 6-21).

Table 6-21: Inherent Risk Severity - Impulsive Sound - Behavioural Change to Marine turtles

Species	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
Loggerhead turtle	1	E	Low
Green turtle	1	E	Low
Leatherback turtle	1	E	Low

6.5.5.5 Risk: Auditory Impairment or Injury – Marine turtles

Inherent Consequence Evaluation

Results of underwater sound modelling of SBP and USBL activities did not predict the potential onset of auditory injury to marine turtles (Koessler and Quijano, 2025; Appendix 6). Therefore, this risk is not evaluated further.

Inherent Likelihood

Not applicable due to the risk not being credible.

Inherent Risk Severity

Not applicable due to the risk not being credible.

6.5.5.6 Risk: Change in Fauna Behaviour - Fish

Inherent Consequence Evaluation

Sound pressure changes may be detected by fish with a swim bladder, as the gas within the swim bladder changes as a result of changing sound pressure. If the swim bladder is near the ear or connected to the hearing system, the hearing sensitivity is even greater (Popper *et al*. 2014). Fish without a swim bladder cannot detect sound pressure. However, most fish species are expected to be able to detect particle motion. The most relevant criteria for considering potential impacts on fish and shellfish are considered to be those provided in the Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al*. 2014). Fish species are grouped into hearing sensitivity categories defined by a number of factors such as their hearing anatomy, particle motion detection, the use of sound during navigation or mating and the presence or absence of a swim bladder:

- Fish with no swim bladder that are sensitive to particle motion and therefore only to a narrow band of frequencies (e.g. cartilaginous fish).
- Fishes with swim bladders that do not appear to play a role in hearing (e.g. Scombridae). Therefore, they are only sensitive to particle motion and only show sensitivity to a narrow band of frequencies.
- Fishes with swim bladders involved in hearing. These species are sensitive to both particle motion and sound pressure. The swim bladder may be close to but not intimately connect to the ear (e.g. eels) or mechanically linked to the ear (e.g. Clupeidae), with the latter representing fish of the greatest hearing sensitivity.
- Eggs and larvae.

The risk of behavioural changes to most fish, including eggs and larvae, from impulsive sound emissions is generally high within tens of metres of the source based on the qualitative guidelines by Popper *et al.* (2014), reducing to moderate within hundreds of metres from the source. The risk of behavioural change remains high for fish with swim bladder involved within hundreds of metres of

the source (Popper *et al.* 2014). However, these guidelines are derived for seismic arrays, likely of a greater source level than SBP, and therefore, it is considered that any behavioural responses will likely be limited to within tens of metres from the source, and therefore the use of the operational area as the impulsive sound behavioural EMBA is considered appropriate.

The underwater sound will only be elevated in the vicinity of the SBP a short duration of the survey campaign (refer to Section 3.2). The impact will be temporary and localised and recovery from any behavioural change caused by the temporary elevation of underwater sound is expected once the survey activities are complete.

Table 6-22 provides details on the presence of fish species that are EPBC Act listed, or which have been identified as culturally significant through consultation, within the impulsive sound behavioural EMBA, potential behavioural changes that may occur and the resulting inherent consequence level for each fish species. A comprehensive overview of the potential impact of seismic on fish is described in Carroll *et al.* (2017) and has been reviewed to identify potential behavioural changes, noting SBP and USBL typically involves lower source levels compared with seismic surveys. It should also be noted that behavioural responses to elevated underwater sound varies greatly between species, and data is lacking for some species groups (e.g. elasmobranchs). Furthermore, most data is derived from caged studies which are not representative of open conditions (Carroll *et al.* 2017).

Table 6-22: Inherent Consequence Levels - Impulsive Sound - Behavioural Changes to Fish

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
White shark - EPBC Act: • **Vulnerable** • **Migratory**	Known to occur. No BIAs overlapped. Seasonal presence in southern Australia during early summer.	No significant difference in behaviour when exposed to artificial irregularly pulsed sound (Chapius *et al.,* 2019).	Unlikely to result in significant behavioural change to species of recognised conservation value (nationally threatened).	Level 1
Eastern school shark - EPBC Act: • **Conservation dependant**	May occur. No BIAs overlapped.	Inferred behavioural changes based on coastal sharks displaying less inquisitive behaviours when exposed to irregularly pulsed sound (Chapius *et al*., 2019).	Highly localised and short-term potential impacts to species of recognised conservation value (nationally threatened), recovery expected.	Level 1
Grey nurse shark - EPBC Act: • **Migratory** • **Critically Endangered**	May occur. No BIAs overlapped.		Highly localised and short-term potential impacts to species of recognised conservation value (nationally threatened), recovery expected.	Level 1
Porbeagle / mackerel shark - EPBC Act: • **Migratory**	Likely to occur. No BIAs overlapped.		Highly localised and short-term potential impacts to species of recognised conservation value (migratory), recovery expected.	Level 1
Australian grayling - EPBC Act: • **Vulnerable**	May occur. No BIAs overlapped.	Inferred behavioural changes based on coastal pelagic fish schools dispersing or changing depth when exposed to sonar/echosounder (Hawkins *et al*. 2014). Slotte *et al.* (2004) observed no significant change in horizontal distribution to pelagic fish, however, a vertical movement of mesopelagic fish to deeper waters was observed.	Highly localised and short-term potential impacts to species of recognised conservation value (nationally threatened), recovery expected.	Level 1
Blue warehou - EPBC Act: • Conservation dependent	Known to occur. No BIAs overlapped.		Highly localised and short-term potential impacts to species of recognised conservation value (nationally threatened), recovery expected.	Level 1
Pipefish, pipehorse, seadragon and seahorse species -	May occur. No BIAs overlapped.		Highly localised and short-term potential impacts, recovery expected.	Level 1

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
EPBC Act: • Marine				
Short-finned eels - • Not listed under the EPBC Act. • Culturally significant to First Nations people (Koster *et al*. 2021)	Seasonal presence in the Otway Basin and Bass Strait during spawning migration i.e. downstream migration of adult eels during late summer and autumn. Upstream migration of larvae and glass eels, where glass eels enter estuaries during mid-winter to late spring (VFA 2017).	Behavioural avoidance (increased swimming, speed and movements away from the source) observed in some European eel and river lamprey (Deleau *et al.* 2019).	Highly localised and short-term potential impacts to a culturally important species, recovery expected.	Level 1

Inherent Likelihood

For the risk event of behavioural changes to fish to occur, the following combination of factors are required:

- Impulsive underwater sound emissions (i.e. SBP and USBL operations).
- Fish species present within 281 m of the impulsive sound source.

Table 6-22 provides details on the presence of EPBC listed fish in the Otway Basin to infer presence within the impulsive sound behavioural EMBA. Based on available data, the inherent likelihood level is judged as follows:

- white shark – Possible (C)
- eastern school shark – Remote (E)
- grey nurse shark – Remote (E)
- porbeagle / mackerel shark – Unlikely (D)
- Australian grayling – Remote (E)
- blue warehou – Possible (C)
- pipefish, pipehorse, seadragon and seahorse species – Unlikely (D)
- short-finned eels - Possible (C).

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to fish including eggs and larvae from impulsive sound emissions is **Low** (Table 6-23).

Table 6-23: Inherent Risk Severity - Impulsive Sound - Behavioural Changes to Fish

Fish	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
White shark	1	C	Low
School shark	1	E	Low
Shortfin mako	1	D	Low
Grey nurse sark	1	E	Low
Mackerel shark	1	D	Low
Australian grayling	1	E	Low
Blue warehou	1	C	Low
Pipefish, pipehorse, seadragon and seahorse species	1	E	Low
Short-finned eels	1	C	Low

6.5.5.7 Risk: Auditory Impairment or Injury - Fish

Inherent Consequence Evaluation

Underwater noise modelling results for SBP and USBL activities predicted the potential onset of auditory impairment or injury to fish, including eggs and larvae (Koessler and Quijano 2025; Appendix 6).

Underwater sound modelling was conducted for transducer and boomer-type SBP and USBL, using the equipment specifications and source levels outlined in Table 6-14, with further details in Appendix 7. The results of the underwater sound modelling are detailed in Table 6-24.

Table 6-24: Impulsive sound - Maximum Distance to Mortality or Potential Mortal Injury, Recoverable Injury, and TTS Thresholds for Fish (Koessler and Quijano 2025; Appendix 7)

Threshold Type	Threshold SEL24h, dB re 1 µPa^2 s	Maximum Distance (km)	Relevant Source Equipment
Mortality or potential mortal Injury	207	0.021	USBL*USBL (Sonardyne Ranger)
Recoverable Injury	203	0.033	USBL*USBL (Sonardyne Ranger)
TTS	186	0.218	USBL*USBL (Sonardyne Ranger)

There have been no studies to date that have shown mortality to fish species from exposure to impulsive sound. Studies have shown prolonged or extreme high-intensity, low-frequency sound i.e., seismic surveys) has the potential lead to physical damage such as threshold shifts in hearing or barotraumatic ruptures (Carroll et al. 2017). Furthermore, studies investigating the impacts of exposure to impulsive sounds on fish have shown mixed results. For instance, despite some evidence of physiological damage to sensory hair cells, other studies identified no evidence of physiological damage following short or prolonged exposure to seismic surveys (Carroll et al., 2017). Hearing sensitivity is species-specific and it is not considered appropriate to extrapolate findings to other species Carroll *et al*. (2017). Based on the results of the modelling, and that SBP and USBL will not result in prolonged or extreme exposure to fish, it is highly unlikely that auditory impairment or injury impacts to fish would occur.

There are no fish BIAs overlapped by the operational area (Section 4.4.2), therefore, significant nursery, spawning or feeding grounds for fish species of conservation importance will not be impacted. The impact ranges described in Table 6-24 are based on fish to remain within the ensonified area (i.e. 218 m of the source) for 24 hours, which is highly unlikely to occur. Therefore, it is not considered credible that fish would remain within 218 m of the USBL or SBP sound source for 24 hours and no population level effects are expected. This conclusion applies to all fish species, including EPBC Act listed species or those that have been identified as culturally significant through consultation. **Inherent Likelihood**

For the risk event of auditory impairment or injury to fish to occur, the following combination of factors are required:

- Impulsive underwater sound emissions (i.e. SBP and USBL operations).
- Fish species present within 218 m of the impulsive sound source.

Most fish species are highly mobile and able to avoid ensonified areas. Given the operational area does not overlap any fish BIAs; is it not plausible that fish will remain within close proximity to impulsive sound sources for extended (≥ 24 hour) periods. Therefore, the risk is not considered credible.

Inherent Risk Severity

Not applicable due to the risk not being credible.

6.5.6 Control Measures, ALARP, and Acceptability Assessment

Table 6-25 provides a summary of the control measures and ALARP and acceptability assessment relevant to impulsive sound emissions. A detailed assessment has been undertaken and, as part of Amplitude Energy's relevant persons engagement for previous projects and impacts, Amplitude Energy has sought advice from Australian Antarctic Division (AAD) on measures implemented or considered by the AAD for voyages into sensitive areas.

Table 6-25: Underwater Sound Emissions – Impulsive ALARP, Control Measures and Acceptability Assessment

Underwater Sound Emissions - Impulsive	
ALARP Decision Context and Justification	**ALARP Decision Context: Type A** Impacts from impulsive sound emissions are well understood; there will always be some uncertainty around the reaction of individual animals, and hence the assessment of impacts and risks has been conservative, from the selection of disturbance criteria, modelling assumptions, and evaluation of potential consequence and likelihood. Activities are well practised, and there are no conflicts with company values, no partner interests, and no significant media interests. Because the potential impacts to marine fauna of conservation value are evaluated as **Level 2**, Amplitude Energy believes **ALARP Decision Context A** should apply to marine fauna with the exception of pygmy blue whales and southern right whales. **ALARP Decision Context: Type B** **ALARP decision context B** has been applied in relation to pygmy blue whales and southern right whales because there is a residual (low) risk in relation to behavioural disturbance and auditory impairment and injury to these species within a BIA. The conservation management and national recovery plans for these species considers indicate that at certain times of year and for certain activities, additional mitigation actions and an adaptive management plan may be required in keeping with a precautionary approach. Further controls to manage residual risks have been considered and several additional controls have been adopted. The adopted controls ensure the project environmental outcomes can be met and are not inconsistent with the objectives and relevant actions of species recovery plans.
Control Measure	**Source and Description of Control**
CM07: Planned Maintenance System	Power generation and propulsion systems on vessels will be operated in accordance with manufacturer's instructions and ongoing maintenance to ensure efficient operation. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from impulsive sound.*
CM10: Offshore Operational Procedures	At a minimum, vessel operators shall adhere to the distances and vessel management practices of EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans describes strategies to ensure whales and dolphins are not harmed during offshore interactions with vessels and helicopters. Vessels adhere to the distances and vessel management practices of EPBC Regulations (Part 8) with increased caution zone of 500 m between whales and project vessels. *Risk event addressed: Change in fauna behaviour*
CM11: Campaign Risk Review	Risk reviews are standard practice for offshore campaigns. The Amplitude Energy Environmental Protocol describes how environmental impact and risk management, including risk assessments, is undertaken for activities including offshore campaigns.

Underwater Sound Emissions - Impulsive	
	As part of campaign planning a risk review will be undertaken to re-assess campaign environmental impacts and risks to ensure ALARP and acceptability criteria are met. The assessment of environmental impacts and risks will focus on aspect: subsea noise, and risks to endangered whale species, specifically pygmy blue whales, and southern right whales. The review framework is described in Section 12.10 and considers: • Model activity scenarios where additional details may have become available. • Integrate into modelling the latest relevant sound exposure thresholds. • Assess any new or updated information to determine if the rationale for previously discounted controls remains reasonable, or if additional measures are required to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. • Potential for cumulative impacts due to concurrent and sequential vessel activities with other projects and titleholders. The review may be undertaken at different stages of the campaign planning, prior to a campaign activity commencing to assess any new or updated information to avoid or reduce overlap with endangered whales, where practicable, and to determine if additional controls are required to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from impulsive sound.*
CM13: Offshore Victoria Whale Disturbance Risk Management Procedure	The impact and risk assessment has shown the potential for interaction between whales and the Activity, with some uncertainty around the likelihood of impacts. This uncertainty is addressed through the implementation of actions and adaptive management measures which fall within the Offshore Victoria Whale Disturbance Risk Management Procedure (Section 12.10). The Offshore Victoria Whale Disturbance Risk Management Procedure provides details on level of whale observation effort, triggers for actions and the actions to be taken to avoid injuring whales and avoid behavioural disturbance to endangered whale species (blue whales and southern right whales), reduce the risk of displacement of a foraging blue whale, and minimise the risk of disturbance to a southern right whale in a migration and/or reproduction area (EPO13). The Offshore Victoria Whale Disturbance Risk Management Procedure details requirements of the Activity which are addressed and summarised in Section 12.10. The requirements have been developed to account for the largest noise contours that may be produced throughout the duration of the activity. As such, the requirements are based on the distances predicted from the modelling of continuous noise emissions (see Section 6.6.5) and are therefore considered conservative and appropriate for activities which produce impulsive noise emissions. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from impulsive sound.*
Additional Control Measures Considered	
Titleholder Collaboration	Adopt (CM09: Titleholder Collaboration) Amplitude Energy will share sightings data including behavioural observations with other Titleholders in the Otway region and local research organisations to help inform each other's programs of work and respective risk reviews. This data can be

Underwater Sound Emissions - Impulsive	
	used by appropriate parties for population and behavioural research and to inform management of impacts and risks from their own project activities.
Impact and Risk Summary	
Residual Impact Consequence	Change in ambient sound from impulsive sound: **Level 1** – Minor local impacts or disturbances to ambient sound, nil to negligible remedial / recovery works required.
Residual Risk Consequence	**Level 2** – Localised short-term impacts to species or habitats of recognised conservation value not affecting local ecosystem function; remedial, recovery work to land, or water systems over days / weeks.
Likelihood	Due to the nature and scale of the proposed activities, and considering the proposed controls, the likelihood of behavioural changes due to underwater sound emissions is assessed as: • **Possible (C)** - Conceivable and could occur at some time. Could occur during the activity although a rare combination of factors would be required for the occurrence.
Residual Risk	Behavioural change, auditory impairment or auditory injury from impulsive sound: Low.
Demonstration of Acceptability	
Principles of ESD	Underwater impulsive sound emissions are evaluated as having up to **Level 2** consequence which is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Impulsive sound emissions will be managed in accordance with legislative requirements. Sound emissions will: • Not impact on the recovery of marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA 2017a). • Be managed such that any pygmy blue whale continues to utilise the area without injury and is not displaced from a foraging area in accordance with DAWE (2021a) guidance on key terms, where the action is needed to achieve the objective of the blue whale CMP (DoE 2015a). • Not impact the recovery of the blue whale as per the CMP for the Blue Whale (DoE 2015a). • Not prevent southern right whales utilising a migration BIA or HCTS, or cause auditory impairment (DCCEEW 2024b). • Be managed such that the risk of behavioural disturbance to southern right whales within BIA's and Habitats Critical to Survival (HCTS) is minimised (DCCEEW 2024b) • Not impact the recovery of the southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b). • Not impact the recovery of the white shark as per the Recovery Plan for the White Shark (DSEWPaC 2013a). Actions from the CMP for the Blue Whale (DoE 2015a) applicable to the activity in relation to assessing and addressing anthropogenic sound have been addressed as per: • Assessing the effect of anthropogenic sound on pygmy blue whale behaviour. Section 6.5.5 assesses the effects of anthropogenic noise from the activity on blue whale behaviour.

Underwater Sound Emissions - Impulsive	
	• Be managed such that any pygmy blue whale continues to utilise the area without injury and is not displaced from a foraging area. Mitigation measures will be implemented to reduce the risk of displacement occurring during operations where modelling indicates that behavioural disturbance within a foraging area may occur (DAWE 2021). Actions from the Southern Right Whale Recovery Plan (DCCEEW 2024b) applicable to the Activity in relation to addressing anthropogenic noise have been provided for. The specific actions, and how they are addressed are summarised within the acceptability assessment in Section 6.5.5.
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11) Activities will be undertaken in accordance with the Implementation Strategy (Section 12.0).
External Context	Activity will be undertaken in a manner consistent with relevant legislation, industry standards and guidelines, offshore practices and benchmarking. The activity is not predicted to result in impacts to species that would be inconsistent with recovery plans or conservation advice.
Other requirements	No objections or claims have been received during consultation regarding underwater sound emissions. Amplitude Energy has previously sought advice from the AAD in relation to the management of impacts from noise. The consultation outcomes are presented within the BMG Closure Project Phase I EP (NOPSEMA ID: 6825) and are not repeated here. Suggestions provided by the AAD have been re-evaluated within the ALARP assessment process below in the context of the Activity.
Demonstration of meeting the defined acceptable levels in the OPP	Section 8.1.6 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with underwater sound emissions – impulsive. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed above. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for underwater sound emissions – impulsive: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	**Acceptable** Amplitude Energy has determined that impacts and risks related to continuous sound emissions are acceptable, based on: • The planned management of impacts and risks integrates Amplitude Energy internal requirements, including relevant management system processes.

Underwater Sound Emissions - Impulsive	
	• The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advice, and significant impact guidelines for MNES. No relevant feedback from has been received from stakeholders to inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures for this Activity. To manage impacts to receptors to or below the defined acceptable levels the following EPOs (equivalent to OPP EPOs as detailed in Appendix 1) have been applied: • EPO11: Impacts to marine fauna from underwater anthropogenic noise emissions will be limited to temporary* behavioural change localised** to the noise source. *Not exceeding the duration of the activity (described in Section 3.2) **Not exceeding the noise EMBA defined for the activity (described in Sections 6.5 and 1.1). • EPO12: No death or injury[5] to EPBC Act listed threatened, migratory or cetacean species. • EPO13: Project related underwater noise within biologically important areas and habitat critical to the survival of relevant species will be managed through the implementation of Amplitude Energy Offshore Victoria Whale Disturbance Risk Management Process, such that: – Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area. – Southern right whales are not prevented from utilising biologically important areas[4] or habitat critical to the survival of a species or cause auditory impairment. – The risk of behavioural disturbance to southern right whales will be limited to temporary behavioural disturbance of individuals. • EPO17: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable.

[4] Biologically important behaviours such as reproduction, feeding, migration and resting (DCCEEW 2024a).

6.6 Underwater Sound Emissions – Continuous

6.6.1 Cause of Aspect

The source of continuous underwater sound emissions that will occur as a result of the Activity are identified in Table 6-26 and described in further detail in subsections below. The introduction of continuous underwater sound emissions may temporarily elevate ambient underwater sound levels in the marine environment.

Table 6-26: Activities that will Generate Continuous Underwater Sound Emissions

Aspect / Phase	Activity component
Survey activities	Geophysical surveys (MBES and SSS)
Support activities	Vessel operations
	Helicopter operations
	ROV / AUV operations
Contingent activities	IMR (MBES and SSS)

6.6.2 Aspect Characterisation

Vessel activities and some survey activities (MBES and SSS) are the main contributors of sound emissions. Underwater sound from vessels is described and modelled within Connell and Koessler (2025) (Appendix 6) and used within the impact evaluation. The underwater sound from ROV/AUV operations and MBES and SSS are modelled within Koessler and Quijano (2025) (Appendix 6).

6.6.2.1 Survey Activities

MBES and SSS are classified as continuous non-impulsive sounds (see Section 6.5.2.1 and Appendix 6). Koessler and Quijano (2025) classify non-impulsive sounds as continuous if the repetition rate is equal to or above 10 Hz or intermittent if the repetition rate is less than 10 Hz. The specifications of typical MBES and SSS equipment are detailed in Table 6-27.

MBES is used to obtain detailed 3-dimensional (3D) maps of the seafloor and to gather data on water depths over the surveyed area. The equipment is most commonly mounted on survey vessels and measures water depth by recording the two-way travel time of a high frequency pulse emitted by a transducer. The beams produce a fanned arc composed of individual beams (also known as a swathe). MBES is typically operated at frequencies above 200 kHz (Table 6-14) and is therefore outside the hearing range of most cetaceans and pinnipeds and will only impact marine fauna capable of hearing higher frequencies.

SSS is used to generate an accurate image of the seabed, which may include 3D imagery to map seabed features. The equipment is typically towed or mounted to an ROV. An acoustic beam is used to obtain an accurate image of a narrow area of seabed to either side of the instrument by measuring the amplitude of back-scattered return signals. Like MBES, this equipment is also typically operated at a high frequency range and therefore will likely only impact marine fauna capable of hearing higher frequencies.

Koessler and Quijano (2025) identify that MBES and SSS may be operating at frequencies of 100 kHz and therefore within the hearing range of high and very high cetaceans (150 Hz-160 kHz and 200 Hz - 165 kHz, respectively). MBES and SSS are outside of the hearing range of low-frequency cetaceans, otariids, fish and sea turtles, and therefore impacts to these marine fauna from the operation of MBES and SSS are not considered further.

Table 6-27: Positioning and Survey Equipment Source Frequencies and Sound Levels (Koessler and Quijano, 2025)

Emission Source	Typical Equipment Model	Sound Frequency Range	Repetition rate	Source Sound Level*	Intermittent or continuous?
MBES	Reson Seabat 7111, Reson Seabat T20P	100-300 kHz	20–50 Hz	SPL: 218-224 dB re 1 µPa @ 1 m SELss: 195-197 dB re 1 $\mu Pa^2 s$ m^2 PK: 225-228 dB re 1 µPa @ 1 m	Repetition rate exceeds 10 Hz, and therefore sound is classified as continuous non-impulsive.
SSS	EdgeTech 4200	100–400 kHz	10 Hz	SPL: 201-205 dB re 1 µPa @ 1 m SEL_{SS}: 176-179 dB re 1 $\mu Pa^2 s$ m^2 PK: 206-210 dB re 1 µPa @ 1 m	Repetition rate exceeds 10 Hz, and therefore sound is classified as continuous non-impulsive.

Note: SELSS is per-pulse SEL (i.e., not an accumulated value).

6.6.2.2 Support Activities

Support activities will generate sound emissions during the Activity, including:

- Vessels generate continuous sound from propellor cavitation, thrusters, hydrodynamic flow around the hull, and operation of machinery and equipment. Sound from vessels operating during installation and survey activities has been assessed to determine the cumulative impact of multiple continuous sound sources in close proximity. The scenarios that generate continuous sound during vessel activities are evaluated within Section 6.6.3.
- Helicopter activities will introduce continuous sound emissions due to the noise from the blade rotation. Richardson *et al.* (1995) reported helicopter sound (for Bell 214 type) being audible in air for four minutes before it passed over receivers, but only detectable underwater for 38 seconds at 3 m depth and for 11 seconds at 18 m depth for the same flight path. This would be a brief daily occurrence. Noise levels for typical helicopters used for offshore transfers (Eurocopter Super Puma AS332) at 150 m separation distance has been measured at a maximum of 90.6 dB (Woodside 2014). Similar to flaring, the majority of the sound is not expected to transfer from air to water, and the portion that does, would attenuate to ambient levels within a very short distance (within metres) and therefore expected to have no additive effect on the activity behavioural EMBAs.

ROVs are likely to be operated close to large vessels and the propulsion noise is likely to make only a small contribution to the sound field compared with large vessels. If the ROV is operated in deep water, it may need to be considered as a separate source at close range, but the overall horizontal ranges to effect due to the vessel are likely to remain unchanged (Koessler and Quijano, 2025). Therefore, the operation of the ROV (or AUV) is not considered further as any effect range will be contained within the range modelled for vessels.

6.6.3 Underwater Sound Modelling

Amplitude Energy commissioned JASCO to undertake a modelling study of continuous underwater sound levels associated with the Activity to define relevant continuous sound EMBAs for impact and risk evaluation (Connell and Koessler 2025; Appendix 6, Koessler and Quijano 2025; Appendix 6).

Results of the studies define the spatial extent of potential acoustic impact to ambient sound and the spatial extent of potential impact thresholds to marine mammals, turtles and fish including eggs and larvae. The predicted spatial extent for the onset of relevant impact thresholds is detailed in the following subsections.

The Isabella (Elanora-1/ST1) well location has been selected as the modelling location for the activities occurring between Isabella (Elanora-1/ST1) and the CHN pipeline. Modelling conducted at the Annie-2 well location has been utilised for activities occurring between Annie-2, Juliet and Nestor and the CHN pipeline (Connell and Koessler 2025), as Annie-2 is anticipated to have comparable seabed geology and noise contours, given the similar water depths and proximity to the shoreline compared to Isabella (Elanora-1/ST1); the furthest location modelled from the shoreline (see Figure 3-1). Based on the comparable seabed geology and location, the modelling conducted at Annie-2 is expected to provide a more suitable modelling analogue for Juliet and Nestor activities for the below assessment.

The vessels used during the Activity will be selected as a part of a tender process as planning progresses, and therefore, the specifications are not known. The selected vessels and associated sound source levels are expected to be analogous to those considered by Connell and Koessler (2025). The modelling of AHTS, at Annie-2 and Isabella (Elanora-1/ST1), is considered representative (albeit conservative) for the survey vessels that will be utilised during the Activity.

Table 6-28 contains the modelled continuous sound scenarios relevant to the vessel operations associated with the Activity. An additional scenario (Scenario 2: mooring operations) which was modelled for the ESCP OPP has been included as a representative scenario to account for concurrent vessel presence within the operational area during the Activity.

The equipment specifications for the underwater sound modelling for MBES and SSS are detailed in Table 6-27.

Table 6-28: Description of Scenarios Modelled for Continuous Sound (Connell and Koessler, 2025)

Scenario	Description	Number of continuous sound sources per scenario	Locations
1	Pre-lay activities represented by a single AHTS pre-laying anchors for drilling operations.	1x AHTS under DP	Annie-2 Isabella (Elanora-1/ST1)
2*	Mooring operations* represented by an idle moored semi-submersible vessel (no noise), and three anchor handling vessels (one on bridle).	X 1 AHTS on bridle X2 AHTS	Annie-2 Isabella (Elanora-1/ST1)
6	Installation of an EHU represented by an ISV pipelaying.	1x ISV pipelaying	Between Annie-2 and Casino-5 well sites
7	Installation of other subsea infrastructure represented by a single DSV.	1x DSV stationary under DP	Annie-2
* Mooring operations are not planned for the Activity. This scenario has been included as representative scenario where three vessels are present within the operational area simultaneously.			

6.6.3.1 Noise Effect Criteria

Different species groups perceive and respond to sound differently; therefore, a variety of exposure criteria are considered for the different types of impacts and species groups. The noise effect thresholds used in the sound modelling (Connell and Koessler, 2025; Koessler and Quijano, 2025) for the impact and risk assessment represent best available science:

- Frequency-weighted accumulated sound exposure levels (SEL24h) from the NOAA Technical Guidance (NMFS, 2024) and Southall *et al*. (2019) for the onset of auditory injury which includes AUD INJ and TTS in marine mammals from non-impulsive noise sources.
- Un-weighted SPL for behavioural threshold for marine mammals of 120 dB re 1 µPa from non-impulsive sound sources, based on NOAA Technical Guidance (NMFS 2024).
- Frequency-weighted accumulated sound exposure levels (SEL24h) from Accomando et al. (2025) for the onset of AUD INJ (198 dB re 1 μPa^2s) and TTS (178 dB re 1 μPa^2s) in marine turtles.
- Sound exposure guidelines for fish, fish eggs, and larvae (Popper *et al*. 2014) which includes quantitative criteria for TTS and recoverable injury and qualitative risk criteria for mortality and potential mortal injury, masking and behavioural effects.

6.6.4 Predicted Environmental Impacts and Risks

Potential impacts of continuous underwater sound emissions from the Activity are:

- change in ambient sound.

Potential risks from a change in ambient sound are:

- change in fauna behaviour, including:
  - marine mammals
  - marine turtles
  - fish
- auditory impairment (masking, temporary threshold shift (TTS), recoverable injury) or auditory injuries (mortality or potential mortal injuries, PTS to marine fauna), including:
  - marine mammals
  - marine turtles
  - fish (including eggs and larvae).

Indirect effects may occur to conservation values of protected areas and First Nations cultural values and sensitivities. Impacts and risks to First Nations cultural heritage are assessed in Section 7.2.

Socio-economic impacts on commercial fisheries have not been evaluated further, as there are no discernible impacts to behaviour and distribution expected at the population level given the limited nature and scale of activities and associated continuous underwater sound emissions.

6.6.5 Impact and Risk Evaluation

6.6.5.1 Impact: Change in Ambient Sound

Ambient underwater sound levels in the operational area are expected to range between 110 and 161 dB re 1 µPa (Duncan *et al.* 2013). Underwater sound modelling (Connell and Koessler, 2025)

predicted increased levels of underwater sound from vessel presence from 110 and 160 dB re 1 µPa would extend:

- 81.3 km to 0.06 km from Scenario 2: Mooring operations from three AHTS vessels (at Isabella (Elanora-1/ST1)).

As described in Section 6.5.5.1, Koessler and Quijano (2025) did not model the increase in ambient sound levels associated with the operation of geophysical survey activities, including MBES and SSS that are classified as continuous sound. Nevertheless, previous underwater noise modelling predicted a change in ambient sound levels up to 110 dB re 1 µPa from SBP up to 3.37 km from the sound source (Welch *et al.* 2023; Section 6.5.5.1). Any change in ambient sound from MBES and SSS is anticipated to extend out to a similar distance to SBP and be within the maximum 81.3 km radius predicted for Scenario 2 at Isabella (Elanora-1/ST1).

As per Section 3.2, the Activity is anticipated to take a maximum of 150 days, during which time vessels will be present intermittently within the operational area, with survey activities taking a shorter duration(Section 3.2). The consequence of a short-term change in ambient sound within (up to) 81.3 km of the activities has been evaluated as **Level 1**, as underwater sound will return to existing ambient levels following completion of the activity with no remedial or recovery work.

6.6.5.2 Risk: Change in Fauna Behaviour – Marine Mammals

Inherent Consequence Evaluation

Continuous sound emissions from the Activity may cause behavioural changes to marine mammals depending on the frequency and sound levels received.

Continuous sound levels greater than 120 dB re 1 µPa (SPL) has been adopted as a conservative behavioural change threshold for marine mammals (including otariid seals, low-frequency cetaceans, high-frequency cetaceans and very high-frequency cetaceans) (NMFS, 2024).

The 120 dB re 1 µPa threshold was derived based on studies examining behavioural responses to drilling and dredging (NOAA 2018), referring to Malme *et al.* (1983), Malme *et al.* (1984), and Malme *et al.* (1986), which were considered in Southall *et al.* (2007). Malme et al. (1986) found that playback of drillship noise did not produce clear evidence of disturbance or avoidance for levels below 110 dB re 1 µPa (SPL), possible avoidance occurred for exposure levels approaching 119 dB re 1 µPa. Malme *et al*. (1984) determined that measurable reactions usually consisted of rather subtle short-term changes in speed and/or heading of the whale(s) under observation. It has been shown that both received level and proximity of the sound source is a contributing factor in eliciting behavioural reactions in humpback whales (Dunlop *et al*. 2017, Dunlop 2019).

Table 6-29 outlines the maximum distance to the behavioural response threshold for marine mammals predicted by the underwater sound modelling. See Appendix 6 for further details of the modelling report (Connell and Koessler 2025; Koessler and Quijano 2025).

A 21.7 km radius around the operational area defines the furthest behavioural EMBA for marine mammals exposed to continuous sounds, associated with the presence of three vessels in the deeper waters of the Isabella (Elanora-1/ST1) location. Notably, this radius is reduced to 7.87 km at the Annie-2 location, including Juliet-2 and Nestor-2 locations (with Annie-2 used as an analogue).

The continuous sound behavioural EMBA for pre-lay survey activities (which may occur prior to installation, testing and preservation activities) ranged from a 0.44 km radius at the Annie-2 location (Table 6-29), and Juliet and Nestor locations (with Annie-2 used as an analogue) up to a 0.75 km radius at Elanora (Connell and Koessler 2025).

This difference in noise contours between the sites is due to the fact that the seabed geology found at Annie-2, of well-cemented calcarenite caprock over a semi-cemented calcarenite, lacks the thin top layer of coarse sand overlaying this calcarenite structure found at the Isabella (Elanora-1/ST1) location. The geoacoustic profiles modelled in (Connell and Koessler 2025; Appendix 6) demonstrates how there is less attenuation associated with calcarenite alone compared to coarse carbonate sand. Furthermore, seabed geology closer to the continental shelf has been shown to become more reflective, with a down sloping bathymetry resulting in extended sounds ranges to thresholds in the offshore direction, compared to near shore locations away from the shelf edge.

Table 6-29: Continuous Sound - Maximum Distance to the Behavioural Threshold for Marine Mammals (Koessler and Quijano 2025; Appendix 7)

Marine Mammal Hearing Group	**Threshold SPL (Lp; dB re 1 µPa)**	**Location**	**Maximum distance (km)**	**Relevant scenario/s or activities (Connell and Koessler 2025)**
Behavioural				
Marine mammals	120	Annie-2	0.44	Scenario 1: Pre-lay activities
		Isabella (Elanora-1/ST1)	0.75	Scenario 1: Pre-lay activities
		Annie-2	7.87	Scenario 2: Mooring operations – 3 x AHTS
		Isabella (Elanora-1/ST1)	21.7	Scenario 2: Mooring operations – 3 x AHTS

Table 6-30 provides details on the presence of marine mammals that are EPBC listed. Though there is a range of incidental impacts associated with vessel noise, including attraction, avoidance, and changes to vocalisation, the assessment below focuses on the potential behavioural changes that may occur; this informs the inherent consequence level attributed below. Where a EPBC listed species or species group requires a detailed discussion to justify inherent consequence evaluation, this discussion is provided in the section below. This has been included for low frequency cetaceans. Potential presence within the continuous sound behavioural EMBA is determined by the PMST report, overlap of BIAs and available sighting data for the region, including but not limited to:

- Gill *et al*. (2015) - 123 aerial surveys between 2002 and 2013 from western Bass Strait to eastern Great Australian Bight.
- Origin (2018) – aerial surveys between June 2012 – March 2013 in the Otway Basin.
- Watson *et al.* (2021) – coastal southern right whale sightings between 1993 and 2018 in south-eastern Australia (east of the South Australia / Victoria border).

Table 6-30: Inherent Consequence Levels - Continuous Sound - Behavioural Changes to Marine Mammals

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Pinnipeds				
Australian sea-lion EPBC Act: • **Endangered** • Marine **Australian fur-seal** **New Zealand fur-seal** EPBC Act: • Marine (all)	May occur as per PMST report (Continuous Behaviour EMBA), however, are considered known to occur based on occurrence records available for the Otway (ALA 2024) and sightings by marine mammal observers during offshore campaigns (e.g. Seiche Environmental 2020). No BIAs overlap.	Pinnipeds are frequently observed offshore and around vessels; marine mammal observers recorded sightings of hundreds of seals in close proximity to vessels over the course of the BMG Closure Project – Phase 1 in offshore Gippsland during 2024. Marine mammal observers for the project reported behaviours including foraging, milling and swimming (BMG / Gippsland MMO Sightings Sheet – Kennedy, 2024).	Minor local (small, variable, temporary behavioural changes within the extent of the behavioural EMBA) impacts or disturbances to fauna. There are no population level impacts anticipated.	Level 1
Very high-frequency cetaceans				
Sperm whale/ pygmy/dwarf sperm whale **True porpoise** EPBC Act: • Cetacean • Migratory.	May occur No BIAs overlapped.	Section 6.5.5.2 describes the potential consequences of behavioural responses associated with an exceedance of the behavioural response threshold from geophysical survey activities. Marine Mammal Observers observed the presence of dolphins in proximity to the vessel whilst on DP during the BMG Phase 1 decommissioning (located within the Gippsland basin >200 km east of this activity). Minor diverse behavioural changes (avoidance, no response, and attraction) to very high-frequency cetaceans are expected.	Minor local (small, variable, temporary behavioural changes within the extent of the behavioural EMBA) impacts or disturbances to species of recognised conservation value (nationally threatened). There are no population level impacts anticipated.	Level 2
High-frequency cetaceans				
Dolphins (Bottlenose, common, dusky, Indian	May or likely to occur. No BIAs overlapped.	Section 6.5.5.2 describes the potential consequences of behavioural responses associated	Minor local (small, variable, temporary behavioural changes within ~8-22 km)	Level 1

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Ocean, Risso's, southern right) **Toothed whales** (Andrew's beaked, Arnoux's beaked, Blainville's beaked, Cuvier's beaked, Hector's beaked, strap-toothed beaked, True's beaked, long-finned pilot whale, killer, false killer) EPBC Act: • Cetacean • Migratory.		with an exceedance of the behavioural response threshold from geophysical survey activities. Dolphins are frequently observed offshore and around vessels; hundreds of sightings of dolphins were recorded in close proximity to vessels on DP over the course of the BMG Closure Project – Phase 1 in offshore Gippsland during 2024. Marine mammal observers for the project reported behaviours including foraging, milling and swimming. Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur (BMG/Gippsland MMO Sightings Sheet – Kennedy 2024).	impacts or disturbances to fauna. There are no population level impacts anticipated.	
Low-frequency cetaceans				
Minke whale - EPBC Act: • Cetacean.	Likely to occur. No BIAs overlapped.	Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur.	Minor local (small, variable, temporary behavioural changes within ~8-22 km) impacts or disturbances to fauna. There are no population level impacts anticipated.	Level 1
Sei whale - EPBC Act: • Vulnerable • Cetacean • Migratory	Likely to occur. No BIAs overlapped. Between 2002 and 2013, 123 aerial surveys recorded 12 sighting of sei whales (Gill *et al.* 2015).	Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur.	Minor local (small, variable, temporary behavioural changes within ~8-22 km) impacts or disturbances to species of recognised conservation value (nationally threatened). There are no population level impacts anticipated. See further discussion below.	Level 2

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Pygmy blue whale - EPBC Act: • Endangered • Cetacean • Migratory.	Known to occur. Foraging BIA overlapped. During January to June, pygmy blue whales migrate through the operational area.	Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur. Change to blue whale song due to presence of ships increasing background noise levels (Melcon *et al,* 2012). Vocalisations of blue whales will continue in the presence of vessels, however changes in call level and rate are expected (McKenna 2011). Inferred modification of foraging efficiency because of effects on prey behaviour and masking.	The risk of changing blue whale individuals foraging behaviour is not expected to result in population level impacts. There is a limited spatial area (within ~8-22 km from the source) that will be potentially impacting this species of recognised conservation value (nationally threatened). The area of impact is slight compared to the total area available for foraging. There are no barriers or potential stressors introduced by the activity which would be expected to have a discernible effect on prey or predator distribution given the natural broad scale and dynamic distribution of both prey and predator. Overall opportunities for foraging would not therefore be expected to be discernible from inherent variability. The potential impacts to individuals are therefore assessed as localised and short-term impacts to species of recognized conservation value not affecting local ecosystem function. See further discussion below.	Level 2
Fin whale - EPBC Act: • Vulnerable • Cetacean • Migratory.	Likely to occur. No BIAs overlapped.	Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur. Modify song characteristics under increased background noise conditions, and temporary displacement (Castellote *et al.* 2012).	Minor local (small, variable, temporary behavioural changes within ~8-22 km from the source) impacts or disturbances to species of recognised conservation value (nationally threatened). There are no population level impacts anticipated. See further discussion below.	Level 2

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Pygmy right whale - EPBC Act: • Cetacean • Migratory.	May occur. No BIAs overlapped.	Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur.	Minor local (small, variable, temporary behavioural changes within ~8-22 km from the source) impacts or disturbances to fauna. There are no population level impacts anticipated.	Level 1
Southern right whale - EPBC Act: • Endangered • Cetacean • Migratory.	Known to occur. Migration and reproduction BIA overlapped. During May-June and September-October southern right whales pass through the operational area to move to and from coastal reproduction areas.	Potential increase in stress levels and vocal adaptation in response to increased background noise from shipping, inferred from studies of right whales in the northern hemisphere (Parks *et al.*, 2010; Rolland *et al.,* 2012). Note lactating southern right whales females with calves on calving grounds in Australia produce infrequent vocalisations that are low amplitude and, inferred as a strategy to decrease the risk of acoustically alerting predators (e.g. killer whales) of their presence (DCCEEW 2024b). Disturbance to resting southern right whales nearshore (within preferred calving/resting habitat) has been reported as being triggered by close encounters with humans, including surfers (DCCEEW 2024b) with mother and calf subsequently travelling 20 km within a few hours. As subsea noise generated by surfers is likely to be negligible, this may illustrate disturbance triggers could be both audible and/or visual (i.e. something observed as approaching which results in a threat response). Within Portland Harbour, which resides the Otway region, within the designated reproduction BIA for southern right whales and is an active hub for large international merchant ships, there are recurring	Minor local (small, variable, temporary behavioural changes within ~8-22 km from the source) to a species of recognized conservation value (nationally threatened). There are no population level impacts anticipated. The risk of southern right whale individuals avoiding the operational area is not expected to result in population level impacts because of the limited spatial area compared to the total migration and reproduction BIAs overlapped by the behavioural EMBA. See further discussion below.	Level 2

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
		sightings during the migration and reproduction seasons (ALA 2024). Noise generated by shipping activities is comparable to the noise generated by vessels likely to be used for the Activity.		
Humpback whale - EPBC Act: • Cetacean • Migratory.	Likely to occur. No BIAs overlapped.	Short-term behavioural impacts include alterations of dive patterns, swim speeds, swim orientation, group cohesiveness, behavioural state and changes in acoustic behaviour (Sprogis *et al*. 2020; Arranz *et al*. 2021). Marine Mammal Observers were offshore throughout Amplitude Energy's recent BMG subsea wells decommissioning campaign in 2023/24. These activities were completed in the Gippsland basin, offshore Victoria, and are of similar nature to this Activity's well construction activities. MMO's reported whales near to and approaching vessels whilst on DP, no indications of disturbance were observed.	Minor local (small, variable, temporary behavioural changes within ~22 km from the source). Impacts are not expected to result in population level effects.	Level 1

Low-frequency Cetaceans

Low-frequency cetaceans include baleen whales such as sei whale, fin whale, southern right whale and blue whale. Potential presence within the behavioural EMBA and biologically important behaviours for listed threatened low-frequency cetaceans are summarised in Table 6-31.

Table 6-31: Low-frequency Cetacean Presence and Biological Important Behaviours

Species	Biologically Important Behaviours	Duration of seasonal presence (including shoulder and peak periods)											
		J	F	M	A	M	J	J	A	S	O	N	D
Pygmy blue whale	Foraging BIA		P	P									
Southern right whale	Migration BIA				S						S		
	Reproduction BIA							P	P				
Sei whale	N/A												
Fin whale	N/A												

S – expected shoulder periods; P – Peak period

1. Blue Whale

A foraging BIA (annual high use) for the pygmy blue whale has been identified within the area where the behavioural criteria is reached (Figure 6-11). Several studies have demonstrated the presence of suitable foraging along the continental shelf between South Australia and Tasmania, with highly suitable habitat identified near the Bonney Coast (Ferreira *et al.* 2024). Pygmy blue whales typically occur in this region from November through June, with foraging activities typically peaking in February and March. This period often coincides with offshore activities in the region due to seasonally calmer weather conditions although other factors such as allocation of equipment can also influence the scheduling of activities.

Pygmy blue whale dive times are typically 5-10 minutes for dive depths of 100-200 m, and 20-35 minutes in for dive depths of 300-500 m (Ferreira et al. 2024, Owen et al. 2016, Gill et al. 2011). Foraging and feeding patterns for pygmy blue whales depend on various factors, such as krill distribution and density within the area. These patterns influence the duration that individuals may remain within an area and potentially influence the number of individuals that may be present during foraging activities in the Otway (Andrews 2023, Rennie et al. 2008, Morrice 2014).

Blue whale foraging patterns are influenced by factors including krill distribution and density. There are three main types of search identified in the literature:

- Broad scale search. Generally whales are on the move between regions in search of food. Krill density is low.
- Mesoscale search. Within a region where whales expect krill. Krill density is increasing.
- Area restricted search (ARS). This can be within a small area. Krill density is high and the whales are staying in and around the patches of krill to feed on them.

As search patterns move from broad to restricted, it is reasoned that the frequency of sightings will increase if those search patterns overlap the activity observation area, as illustrated in Figure 6-10.

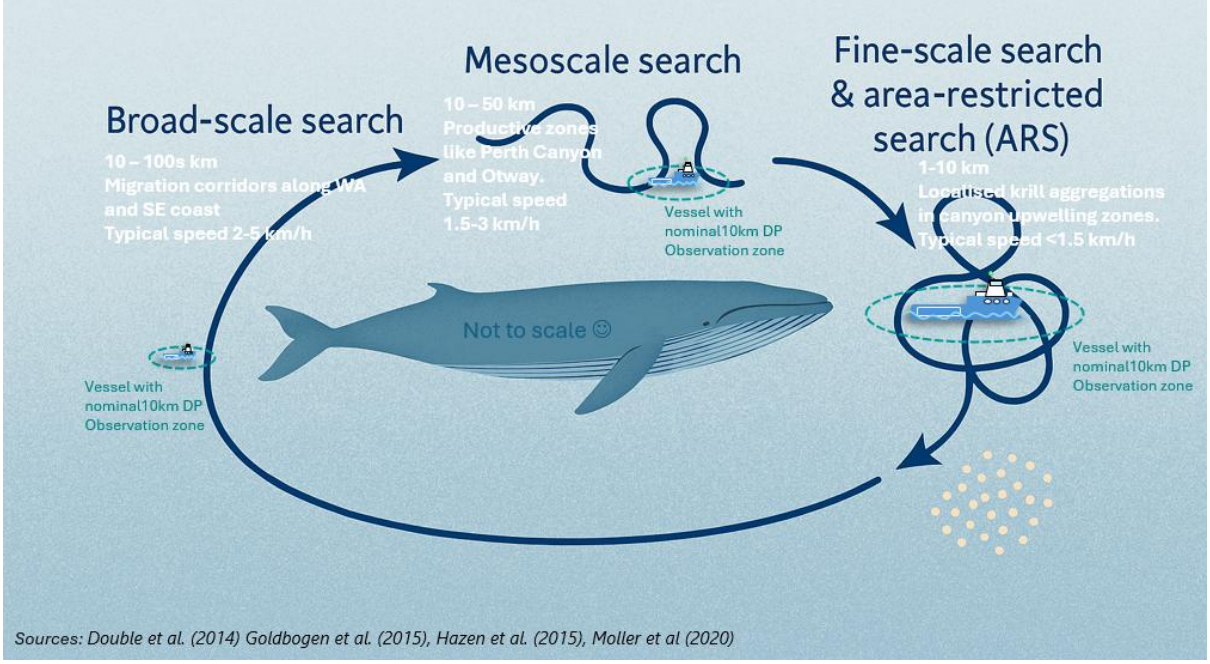


Figure 6-10: Illustrative Example of Blue Whale Foraging Behaviour

The conservation management plan (CMP) for the blue whale provides for both subspecies of blue whales i.e., the Antarctic blue whale and the pygmy blue whale (DoE 2015a). The CMP includes several objectives and actions, with the ultimate objective being recovery of blue whale populations recovery to a level where they can be removed from the Threatened species list. Action A.2.3 of the CMP details that 'anthropogenic noise in BIAs will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area'.

Following the hierarchy of controls, where practicable, the risk will be eliminated. However, it is considered that the CMP and guidance on key terms rationalises that risk elimination is not practicable for all vessel activities in the Otway region, such as shipping, ferries, research vessels and industry vessels, most of which would have the potential to displace a whale based on typical vessel sound source levels. The guidance on key terms therefore refers to risk reduction, rather than elimination.

The CMP identifies shipping noise and industrial noise as threats including impacts from masking, injury and displacement and classifies both threats as a minor consequence, where:

- Minor consequence is defined as – 'individuals are affected but no effect at population level'.

The CMP details that, given the behavioural impacts of noise on pygmy blue whales are largely unknown, a precautionary approach has been taken regarding assignment of possible consequences, hence even Minor consequences to individuals are considered a precautionary assessment in the CMP.

Given no population-level effects are predicted from shipping and industry noise, it follows that Action A.2.3 may not be needed to achieve the CMP objective which is ultimately aimed at population recovery: 'to minimise anthropogenic threats to allow for their conservation status to improve so that they can be removed from the EPBC Act threatened species list'. Though shipping and industry have been present offshore south-east Australia (and within blue whale BIAs) for decades, estimates indicate blue whale populations are recovering (e.g. Branch et al. 2004, Balcazar et al. 2015, McCauley et al. 2018), albeit at a slower rate compared to other species such as the humpback whale (Noad et al. 2011, TSSC 2022).

The potential consequence of behavioural impacts on blue whales has been rated as **Level 2**, based on:

- The conservative approach used in the sound modelling and use of the furthest distances to impact criteria.
- The CMP details that shipping and industrial noise are classed as a minor consequence: individuals are affected but no effect at a population level (DoE 2015a).
- The CMP details that "It is the high intensity signals with high peak pressures received at very short range that can cause acute impacts such as injury and death" (DoE 2015a). Activities which generate continuous sound emissions, such as vessel operations, do not have high intensity signals. Therefore, it is unlikely that they would cause injury or death to foraging blue whales.
- The area of potential impact from the Activity is a relatively small portion of the high-density foraging BIA, which has a total area of 35,627 km^2 (Figure 6-11); hence any displacement from a very localised area around a vessel would not be expected to impact on a whale's overall foraging success in the region. Consistent with the CMP assessment of industry and vessel noise, no population-level effects are predicted.
- The Offshore Victoria Whale Disturbance Risk Management Procedure for the activity (Section 12.10) will be followed during vessel DP operations; thus, control measures will be implemented to reduce the risk of behavioural impacts and ensure activities are consistent with the blue whale CMP.
- Upwelling and productivity in the region have been shown to be episodic, and of relatively low frequency in the vicinity of the Activity (Figure 6-12). As such, any behavioural disturbances resulting from continuous underwater sound is not expected to significantly impact the foraging success of any individual.

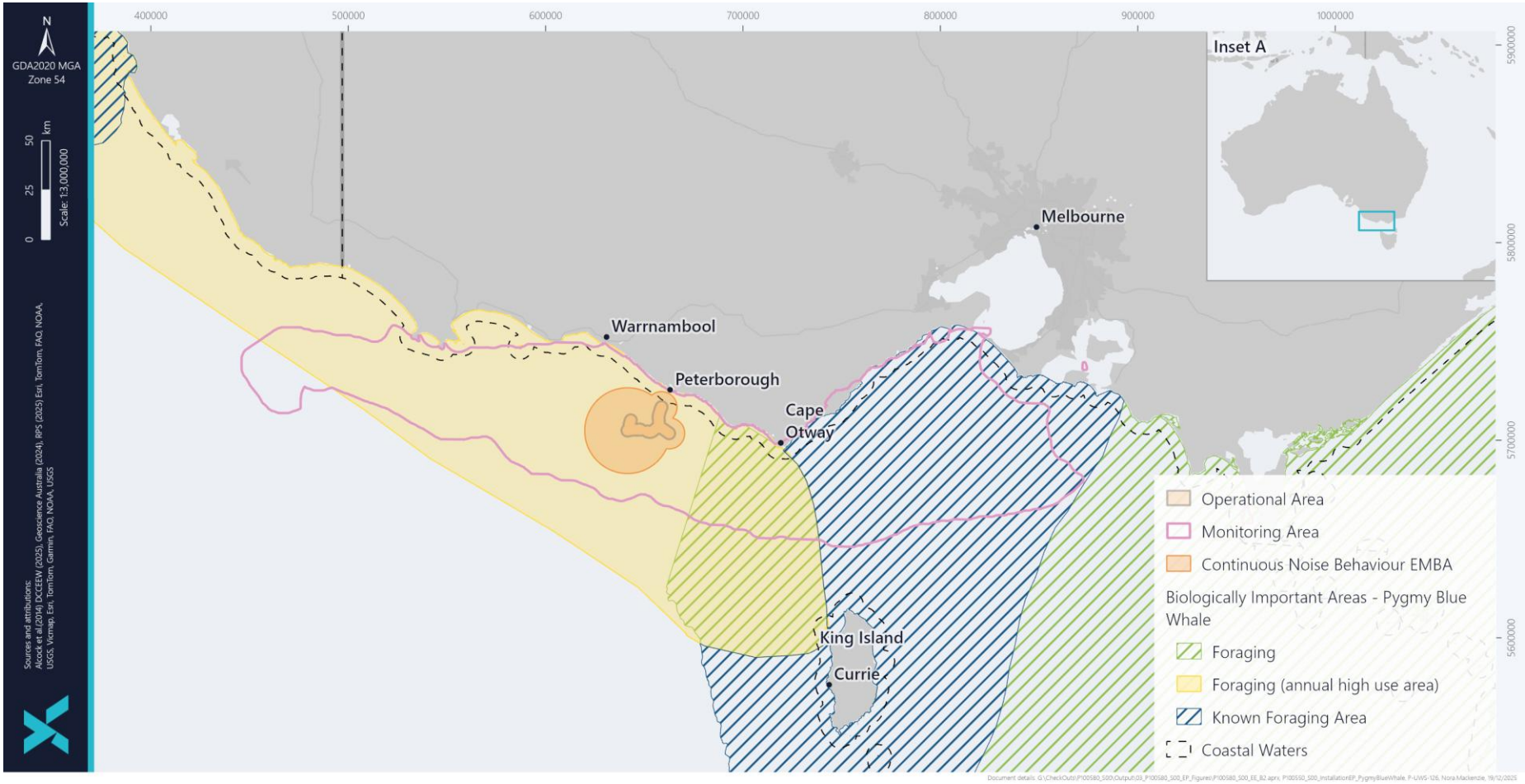


Figure 6-11: Pygmy Blue Whale BIAs and Noise EMBAs

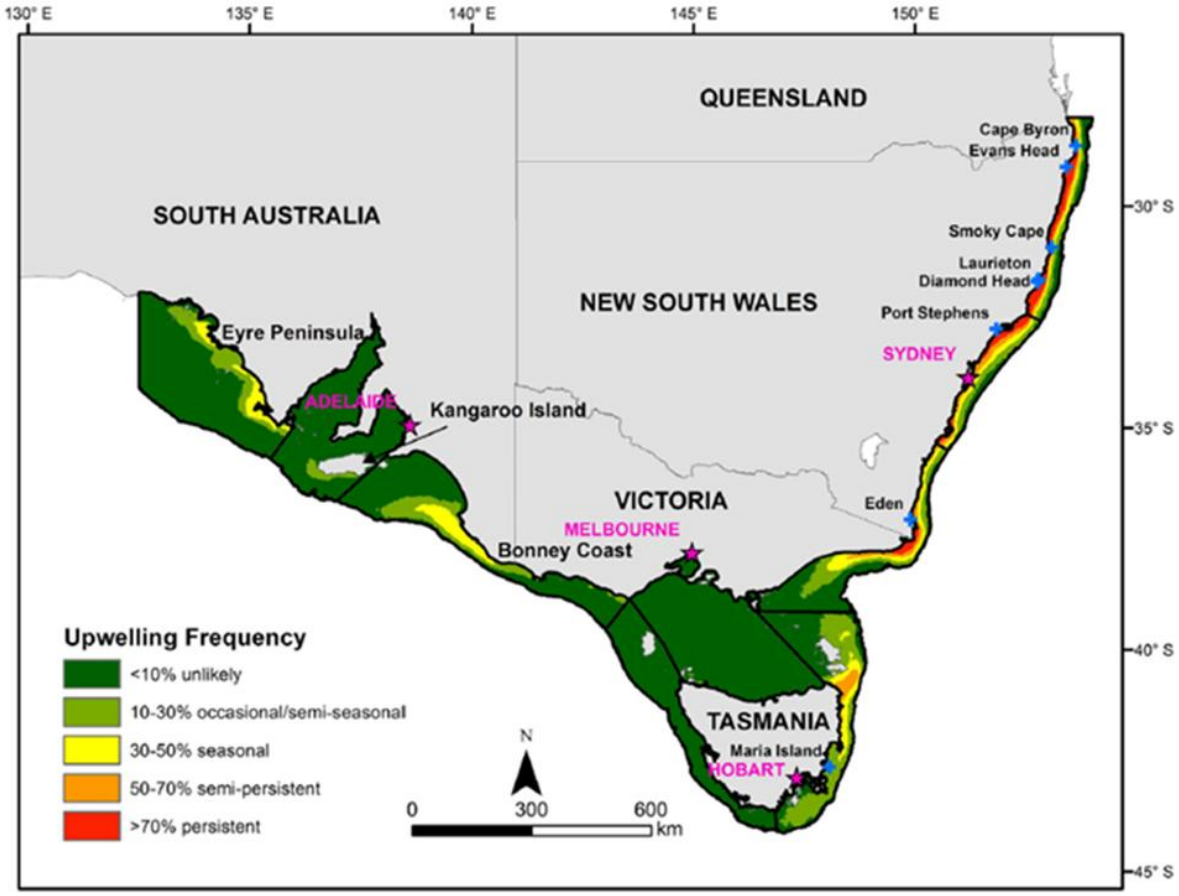


Figure 6-12: Upwelling Frequency in the Bass Strait (Huang and Wang 2019)

2. Southern Right Whale

Southern right whales migrate annually, spending winters in nursery areas in lower latitudes and summers in feeding grounds in higher latitudes. In Australia, southern right whales predominantly aggregate in coastal water reproductive areas, where they calve and nurse their young from May to October. The peak period of abundance typically occurs in late July and August (DCCEEW 2024b). During this time, southern right whales show preference to waters with less than 10 m depth (DSEWPaC 2012a, Charlton & Ward *et al.* 2019) and approximately 1 km from shore (DCCEEW 2024b). Females accompanied by a calf generally occupy the calving ground for 2 to 3 months between June and September (with a peak in July to August), whereas unaccompanied whales (males and females without a calf) are more variable in their occupancy of coastal areas throughout the reproductive season (Charlton et al. 2019). Breeding aggregations of southern right whales occur over a wide range across the entire Southern Australian coast, including areas adjacent to high vessel activity such as the Port of Portland and Port Phillip Bay.

Southern right whale movements change with the type of behaviours being undertaken, and within the Otway, there are BIA's which indicate where these different types of behaviour are likely to occur. Figure 6-13 Illustrates the types of behaviours and movement patterns that may be undertaken by southern right whales within the different biologically important areas shown. If whales are calving or resting (which typically occurs close to shore), then it is reasoned that they are more likely to be seen and could be observed at greater frequency. Dive times whilst calving, nursing and resting are short (generally < 10 minutes), which also increases the chances of being observed whilst in the reproduction BIA.

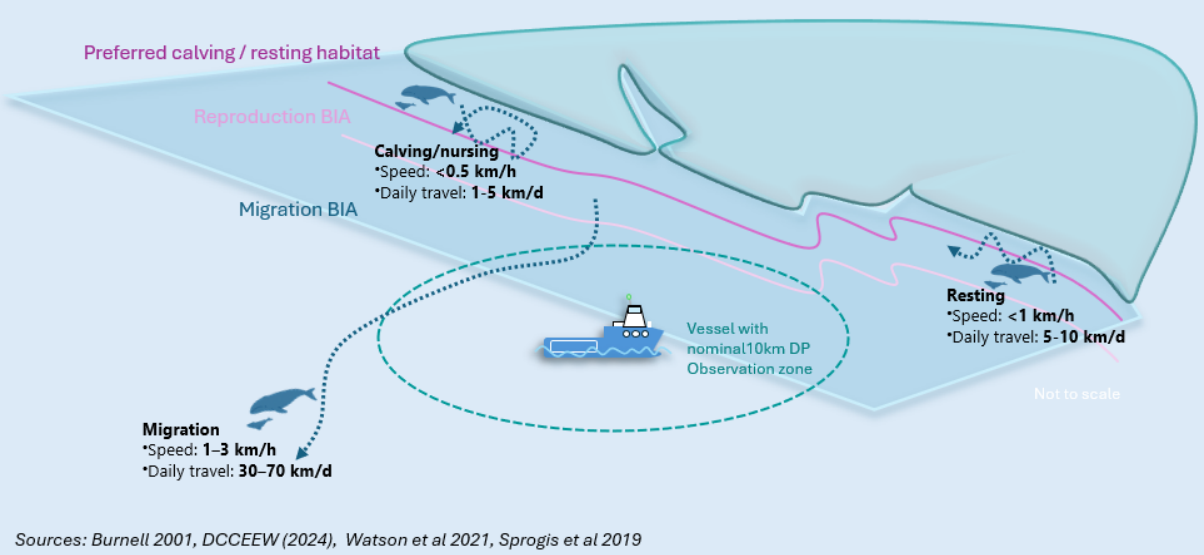


Figure 6-13: Illustrative example of Southern Right Whale Movement Patterns in the Otway

Individuals within the reproduction BIA, that are calving, nursing and resting, may be more vulnerable to disturbance from noise generated by vessels. When calving, nursing or resting the southern right whales will typically remain within the preferred calving or resting habitat (i.e., within 1 km from shore). Migration of southern right whales can occur between offshore feeding areas and the reproductive BIA along the shallow coastal waters (Bannister et al. 2015, Burnell 2001, Carrol et. al. 2020, Charlton et al. 2019).

The recently released National Recovery Plan for the southern right whale identifies a reproduction BIA in Victorian waters off Warrnambool, within the region between Portland to Port Campbell (DCCEEW 2024b), to the east of the operational area. This area is listed as habitat critical to the survival of the southern right whale (Section 4.4.2).

The total number of southern right whale individuals identified in south-eastern Australia in a single whale-watching season increased from 3 individuals in 1993 to 368 individuals in 2017 (Stamation et al. 2020). Between 1993 and 2017, a total of 37 individual female southern right whales with calves were identified. Of these, 20 were identified west of Warrnambool, with 14 individual breeding females sighted at Logans Beach, (Stamation et al. 2020). A further 21 individual females were sighted east of Warrnambool: 5 in the Great Ocean Road area, 3 near Wilson's Promontory, 10 off Flinders Island and the east coast of Tasmania, and 3 in New South Wales (Stamation et al. 2020).

The south-eastern population of southern right whales currently has only one established calving ground located at Logans Beach at Warrnambool in south-west Victoria (Watson et al. 2021). At least 93 calves were born at Logans Beach between 1980 and 2018 (Watson et al. 2021), however, there has been no increase in the average number of calves born annually at Logans Beach over the last 3 decades (Stamation *et al*. 2020). Southern right whales have long lifespans with relatively late maturation and long calving intervals (Charlton 2017), therefore a significant increase in the number of calves born at Logans Beach is not expected until 2028 based on a theoretical model (Stamation et al. 2020). There are also records of female and calf pairs using bays outside Logan Beach, along the Victorian, Tasmanian and southern NSW coastline from May to September (Stamation *et al.* 2020).

The behavioural EMBA overlaps a reproduction BIA for southern right whale (Figure 6-14). However, the behavioural EMBA does not overlap or block off entry to preferred habitat of breeding females, (sheltered bays and nearshore waters along the coastline) as the EMBA does not extend to within 2 km of the coast. The EMBA would not be sufficiently large enough to restrict movement into or out

of the reproductive BIA or preferred habitats within the BIA. Therefore, continuous underwater sound emissions from the Activity are not expected to impact individuals undertaking reproduction or present a barrier to movement for southern right whale into the reproductive BIA. Further indication that noise from vessels is less likely to restrict movements of southern right whales in this region comes from anecdotal evidence and citizen sightings around the nearby Port of Portland; this is an active shipping Port inside the Southern Right Whale Reproductive BIA, with regular sightings of southern right whales within port limits (Glenelg Shire 2025, AU News 2025). To manage interactions between whales and shipping, the Victorian Government has established caution zones under the State regulatory regime; the caution zones applied to the Activity under this EP are equivalent.

Typical dive durations of southern right whales are 5-20 minutes on migration and 2-6 minutes when undertaking reproductive behaviours (Best and Schell 1996, Mate et al. 2011, Parks et al. 2019.The Activity is within the migration BIA, which encompasses the majority of the ocean off the southern coast of Australia (Figure 6-14). Noise from vessels could elicit a behavioural response, such as avoidance. This could increase the energy requirements of whales at a time when their energy budgets are reduced. The Activity is not of the nature or scale that could present a barrier to migration, and the sound from Activity vessels would not be expected to significantly alter overall migration distances which can be multiple thousands of km's during the reproduction season (Watson *et al*. 2021).

The extent and duration of impacts will vary based on the activities being undertaken. The National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) identifies shipping noise and industrial noise both as a minor consequence for the south-east population, where:

- Minor consequence is defined as – 'individuals are affected but no effect at population level'.

The National Recovery Plan for the Southern Right Whale also details that, given the behavioural impacts of noise on southern right whales are largely unknown, a precautionary approach has been taken regarding assignment of possible consequences.

Southern right whales are considered to be particularly vulnerable to disturbance whilst nursing and resting (DCCEEW 2024b). Preferred habitat for these behaviours is in waters with depths less than 10 m and less than 1 km from shore. The Activity is situated entirely within the southern right whale migration BIA. As a result, the majority of the behavioural EMBA overlaps this BIA (Figure 6-14).

Only installation activities with three vessels that occur at Annie-2 location have the potential to result in a behavioural threshold contour overlap with the reproduction BIA. This scenario would occur in event there is an installation vessel and dive vessel within proximity of Annie-2 well location, as well as the presence of a support vessel. This is not planned for, however can not be ruled out in event there are operational requirements, so has been included for in the impact assessment.

The overlap will only encroach a maximum of 1.4 km from the BIA's seaward boundary (Figure 6-14). Crucially, this localised and short-term overlap does not overlap or encroach on the area preferred by breeding southern right whales, which is understood to be within 1 km of the shore, in <10 m water, and in sheltered embayment's within Reproduction BIA (Figure 6-14), DCCEEW 2024b) and avoids the well-established calving and nursing area of Logans beach. Logans Beach is the only designated vessel exclusion area for southern right whales in Victoria, who's coastline is entirely encompassed by the southern right whale reproductive BIA, and includes several major Ports for shipping, and coastal towns that support marine industries.

The risk of potential change in southern right whale behaviours is related to whales outside of the preferred calving habitat that would be moving from one location to another, and not breeding or calving females that prefer shallow sheltered waters. It is expected that southern right whale activity within the areas overlapped by the activity behavioural noise EMBA (which is beyond 1 km from the

shore, >10 m water depth and outside of embayment's) will be moving through the area to preferred habitats. The received noise level within the southern right whale reproduction BIA is below the behavioural threshold level except for the localised overlap area located outside of the area preferred by breeding and calving southern right whales. The localised nature of the behavioural EMBA is not expected to present a barrier to movements or migration, nor significantly alter migration distances from avoidance, for the highly mobile migratory southern right whales which travel thousands of kilometres between habitats (Watson et al. 2021). It is possible that migrating individuals may avoid the operational area where received noise levels are at their loudest, though frequent observations of southern right whales inside the active Port of Portland indicate that individuals may react differently, and may not necessarily avoid vessel noise.

It is expected that southern right whale activity within this overlap area would be limited to individuals migrating to the preferred aggregation area for reproductive purposes and may include individuals undertaking behaviours (specifically mating, calving, and nursing) (Sprogis et al. 2023). The localised nature of the behavioural EMBA precludes it from acting as a barrier for the reproductive BIA or preventing any individuals from utilising the reproduction BIA. The potential change in behaviours within the reproduction BIA is expected to be limited to individual SRWs that may be moving to preferred breeding sites such as Logans Beach.

Southern right whales are a highly mobile migratory species which travel thousands of kilometres between habitats used for essential life functions. As such, in the unlikely event that southern right whales are present nearby during the Activity, individuals may avoid the area where the behavioural disturbance criteria are reached. Given their mobility, this is unlikely to prevent their movements through the migration BIA or to/from the reproduction BIA including coastal aggregation areas.

The potential consequence of behavioural impacts on southern right whales has been rated as **Level 2**, based on:

- The conservative approach taken in the sound modelling and use of the furthest distances to impact criteria.
- The National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) identifies shipping noise and industrial noise as threats classed as minor consequence: individuals are affected but no effect at a population level.
- The Offshore Victoria Whale Disturbance Risk Management Procedure for the activity (Section 12.10) will be followed during vessel operations; control measures will be implemented to reduce the risk of behavioural impacts and ensure activities are consistent with the southern right whale National Recovery Plan. The procedure requires consideration of avoidance of Habitat Critical to the Survival of southern right whales during peak sensitive seasons at the activity planning stage, and the implementation of control measures to avoid disturbance.
- The largest area of potential impact (behavioural disturbance) from the activity is a small percentage of the migration BIA and will not preclude access to or from the reproductive BIA for the southern right whale (Figure 6-14). Disturbance would be limited to a very localised area around the Activity and would not be expected to prevent migration to or from reproduction BIAs.

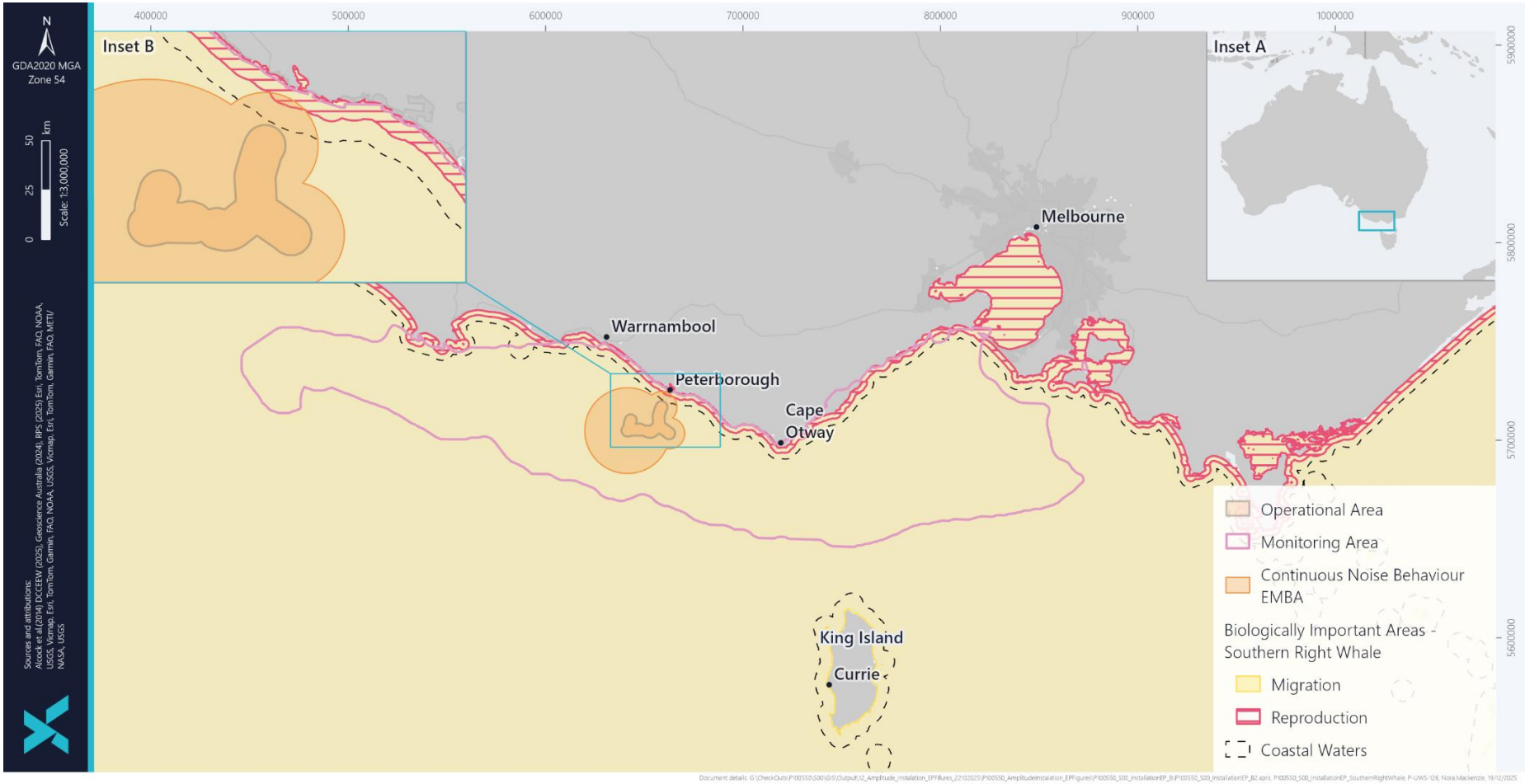


Figure 6-14: Southern Right Whale BIAs and Noise EMBAs

- Southern right whales are a highly mobile migratory species that travel thousands of kilometres between habitats used for essential life functions (DCCEEW 2024b). Within the migration BIA, whales are highly dispersed and may reach and exit the coastline (reproduction BIA) along different trajectories through this area from one breeding cycle to another. Along the Australian coast, individual southern right whales use widely separated coastal areas (200–1,500 km apart) within a season, indicating substantial coast-wide movement. The longest movements are undertaken by non-calving whales, though calving whales have also been recorded at locations up to 700 km apart within a single season (DCCEEW 2024b).

3. **Other Low-frequency Cetaceans**

The EPBC PMST report identified the presence of several other low-frequency cetacean species within the areas that may be impacted by sound, including the sei whale and fin whale (both EPBC-listed vulnerable and migratory).

Sei whales are primarily found in deep water oceanic habitats and are thought to complete long annual seasonal migrations from subpolar summer feeding grounds to lower latitude winter breeding grounds (TSSC, 2015a). In Australian waters, sei whales have been infrequently recorded off Tasmania, New South Wales, Queensland, the Great Australian Bight, Northern Territory and Western Australia. The conservation advice for sei whales assesses the threat of anthropogenic noise and acoustic disturbance as minor, with the extent over which the threat may operate as moderate-large (TSSC, 2015a). No specific management action for managing underwater sound emissions is defined in the conservation advice.

Fin whales are generally thought to undertake long annual migrations from higher latitude summer feeding grounds to lower latitude winter breeding grounds; however, the full extent of their distribution in Australian waters is uncertain (TSSC, 2015b). The conservation advice for sei whales assesses the threat of anthropogenic noise and acoustic disturbance as minor, with the extent over which the threat may operate as moderate-large (TSSC, 2015a). No specific management action for managing underwater sound emissions is defined in the conservation advice.

Given the relatively short duration of activities and localised extent of potential behavioural changes, the consequence of this risk has been evaluated as **Level 2,** as underwater sound may result in localised, short-term impacts to species of conservation value while not affecting local ecosystem function.

Inherent Likelihood

The likelihood of behavioural changes to marine mammals depends on the continuous sound source and the potential presence of low-frequency cetaceans within the behavioural EMBA. For the risk event of behavioural changes to marine mammals to occur, the following combination of factors are required:

- Activity sound source (vessel-based activities).
- Marine mammals present within 21.7 km of the continuous sound source produced when three vessels are present during the Activity at the Isabella (Elanora-1/ST1) location.
- Marine mammals present within 7.87 km of the continuous sound source produced when three vessels are present during the Activity at Annie-2, Juliet and Nestor locations.
- Marine mammals present within 0.44 km (Annie-2, Juliet and Nestor locations) to 0.75 km (Isabella (Elanora-1/ST1) of the continuous sound source produced during pre- lay survey activities (in the event they occur prior to other activities).

Table 6-32 details the frequency of recorded sightings of EPBC-listed marine mammals in the Otway Basin to infer presence within the behavioural EMBA, description of likelihood and the resulting inherent likelihood level for each marine mammal species.

Table 6-32: Inherent Likelihood Levels - Continuous Sound - Behavioural Changes to Marine Mammals

Marine Mammals (EPBC Act Listing)	Description of Likelihood	Inherent Likelihood
Pinnipeds		
Australian sea-lion EPBC Act: • Endangered **New Zealand fur-seal** **Australian fur-seal** EPBC Act: • Marine (All)	The Australian sea lion and fur seals may occur within the behavioural EMBA; however behavioural changes are unlikely. Amplitude Energy Marine Mammal Observers made hundreds of observations of fur seals proximal to vessels on DP during the BMG Phase 1 wells decommissioning campaign (2023/24). Minor behavioural changes (ranging from avoidance, no response, and attraction) to pinnipeds could occur. The risk event is considered unlikely though conceivable and could occur at some time during the Activity.	Unlikely (D)
Very high frequency cetaceans		
Sperm whale/ pygmy / dwarf sperm whale **True porpoise** EPBC Act: • Cetacean • Migratory.	A freak combination of factors would be required for very high-frequency cetaceans to be present within the behavioural EMBA during activities generating continuous sound emissions and for noise from the Activity to have a discernible effect. Any individuals proximal to the activities may or may not alter behaviour.	Remote (E)
High frequency cetaceans		
Dolphins (Bottlenose, common, dusky, Indian Ocean, Risso's, southern right) **Toothed whales** (Andrew's beaked, Arnoux's beaked, Blainville's beaked, Cuvier's beaked, Hector's beaked, strap-toothed beaked, True's beaked, long-finned pilot whale, killer, false killer) - EPBC Act: • Cetacean • Migratory.	High-frequency cetaceans may or are likely to occur (depending on the species) within the behavioural EMBA; however behavioural changes are unlikely. Amplitude Energy Marine Mammal Observers made hundreds of observations of dolphins including, common and bottlenose dolphins, and pilot whales proximal to vessels on DP during the BMG Phase 1 wells decommissioning campaign (2023/24). Minor behavioural changes (ranging from avoidance, no response, and attraction) to high-frequency cetaceans could occur. The risk event is considered conceivable and could occur at some time during the Activity.	Unlikely (D)
Low frequency cetaceans		
Minke whale - EPBC Act: • Cetacean.	A rare combination of factors would be required for a minke whale to be present within the behavioural EMBA during activities generating continuous sound emissions, and for noise from the Activity to have a discernible effect. Any individuals proximal to the activities may or may not alter behaviour.	Remote (E)

Marine Mammals (EPBC Act Listing)	Description of Likelihood	Inherent Likelihood
	Behavioural changes to minke whales are not expected to occur from Activity continuous underwater sound emissions.	
Sei whale - EPBC Act: • Vulnerable • Cetacean • Migratory	A rare combination of factors would be required for a sei whale to be present within the behavioural EMBA during activities generating continuous sound emissions and for noise from the Activity to have a discernible effect. Any individuals proximal to the activities may or may not alter behaviour. The risk event is considered conceivable and could occur at some time during the Activity but is unlikely.	Unlikely (D)
Pygmy blue whale - EPBC Act: • Endangered • Cetacean • Migratory.	The risk event could occur under specific circumstances such that a blue whale is present within the behavioural EMBA during activities generating continuous sound emissions. Pygmy blue whales are known to occur within the behavioural EMBA; any individuals proximal to the activities may or may not alter behaviour. Therefore, the risk event is conservatively considered to be possible.	Possible (C)
Fin whale - EPBC Act: • Vulnerable • Cetacean • Migratory.	A rare combination of factors would be required for a fin whale to be present within the behavioural EMBA during activities generating continuous sound emissions and for noise from the Activity to have a discernible effect. Any individuals proximal to the activities may or may not alter behaviour. The risk event is considered conceivable and could occur at some time during the Activity but is unlikely.	Unlikely (D)
Pygmy right whale EPBC Act: • Cetacean • Migratory	A freak combination of factors would be required for a pygmy right whale to be present within the behavioural EMBA during activities generating continuous sound emissions, and for noise from the Activity to have a discernible effect. Any individuals proximal to the activities may or may not alter behaviour. Behavioural changes to pygmy right whales are not expected to occur from Activity continuous underwater sound emissions.	Remote (E)
Southern right whale - EPBC Act: • Endangered • Cetacean • Migratory.	The risk event could occur under specific circumstances such that a southern right whale is present within the behavioural EMBA during activities generating continuous sound emissions. Southern right whales are known to occur within the behavioural EMBA; any individuals proximal to the activities may or may not alter behaviour. Therefore, the risk event is conservatively considered to be possible.	Possible (C)
Humpback whale - EPBC Act: • Cetacean • Migratory.	The risk event could occur under specific circumstances such that a humpback whale is present within the behavioural EMBA during activities generating continuous sound emissions. Humpback whales are likely to occur within the behavioural EMBA; any individuals proximal to the activities may or may not alter behaviour. Therefore, the risk event is conservatively considered to be possible.	Possible (C)

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to marine mammals from continuous sound emissions is considered **Moderate**. Table 6-33 lists the inherent risk severity for each marine mammal species.

Table 6-33:Inherent Risk Severity – Continuous Sound – Behavioural Changes to Marine Mammals

Marine Mammals	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
Pinnipeds			
Australian sea-lion New Zealand fur-seal Australian fur-seal	1	D	**Low**
Very high-frequency cetaceans			
Sperm whale / pygmy/dwarf sperm whale, true porpoises	2	E	**Low**
High-frequency cetaceans			
Dolphins (Bottlenose, common, dusky, Indian Ocean, Risso's, southern right) Toothed whales (Andrew's beaked, Arnoux's beaked, Blainville's beaked, Cuvier's beaked, Hector's beaked, strap-toothed beaked, True's beaked, long-finned pilot whale, killer, false killer)	1	D	**Low**
Low-frequency cetaceans			
Minke whale	1	E	**Low**
Sei whale	2	D	**Low**
Pygmy blue whale	2	C	**Moderate**
Fin whale	2	D	**Low**
Pygmy right whale	1	E	**Low**
Southern right whale	2	C	**Moderate**
Humpback whale	1	C	**Low**

6.6.5.3 Risk: Auditory Impairment or Injury – Marine Mammals

Inherent Consequence Evaluation

Auditory impairment and injury include both permanent and temporary hearing impairment (AUD INJ and TTS) and any other form of physical harm arising from anthropogenic sources of underwater noise (DAWE, 2021).

Depending on the sound levels received, continuous sound emissions may cause auditory impairment or injury to marine mammals:

- Auditory impairment, such as auditory temporary threshold shift (TTS) -- an animal's hearing threshold is elevated and recoverable over time.
- Auditory injury, such as auditory PTS – an animal's hearing threshold is elevated and never recovers.

Underwater sound modelling predicted the distances that continuous TTS and AUD INJ thresholds for marine mammals were reached (Connell and Koessler, 2025; Koessler and Quijano, 2025). TTS

and AUD INJ thresholds for marine mammals are based on a cumulative metric that assumes a receptor is consistently exposed to a defined sound exposure level for a 24-hour period (SEL24h). Distances predicted for the onset of TTS and AUD INJ thresholds (SEL24h) (Connell and Koessler, 2025; Koessler and Quijano, 2025) infer that the continuous underwater sound emissions from the Activity have the potential to cause:

- Potential TTS within marine mammals within a maximum range of ~3.6 km for activities occurring at locations closest to shore (Annie-2, Juliet, and Nestor) and up to ~7.5 km for activities at locations furthest from shore (Isabella (Elanora-1/ST1)).
- Potential AUD INJ within marine mammals within a maximum range of ~ 400 m for locations closer to shore (Annie-2, Juliet and Nestor) up to ~ 500 m for the location further offshore (Isabella (Elanora-1/ST1)).

Thresholds for both TTS and AUD INJ were not reached for any hearing groups of marine mammals for pre-lay survey activities (Connell and Koessler 2025).

Table 6-34 summarises the continuous TTS and AUD INJ thresholds for marine mammals and the predicted maximum distances that will be reached by continuous sound from the Activity (Connell and Koessler, 2025; Koessler and Quijano, 2025).

Table 6-34: Continuous Sound - Maximum Distance to TTS and AUD INJ Thresholds for Marine Mammals (Koessler and Quijano 2025; Appendix 7)

Marine Mammal Hearing Group	**Threshold SEL_{24h}, dB re 1 $\mu Pa^2 s$**	**Maximum distance (km)**	**Relevant scenario/s or activities (Connell and Koessler, 2025; Koessler and Quijano, 2025)**
TTS			
Low-frequency cetaceans	177	7.54	Scenario 2: Mooring operations at Elanor-1 well site – 3x AHTS
High-frequency cetaceans	181	0.66	Scenario 2: Mooring operations at Elanor-1 well site – 3x AHTS
Very high-frequency cetaceans	161	0.81	Scenario 2: Mooring operations at Elanor-1 well site – 3X AHTS
Otariid seals	179	0.56	Scenario 2: Mooring operations at Elanor-1 well site – 3x AHTS
AUD INJ			
Low-frequency cetaceans	197	0.5	Scenario 2: Mooring operations at Elanor-1 well site – 3x AHTS
High-frequency cetaceans	201	0.04	Scenario 2: Mooring operations at Elanor-1 well site – 3x AHTS
Very high-frequency cetaceans	181	0.12	MBES survey
Otariid seals	199	0.03	Scenario 2: Mooring operations at Elanor-1 well site – 3x AHTS

The maximum distance where the potential onset of auditory impairment and injury may occur is 7.54 km, which is referred to as the potential auditory impairment and injury EMBA for marine mammals.

Table 6-35 provides details on the presence of EPBC-listed marine mammals within the auditory impairment/injury EMBA, the potential impairment or injury that may occur and the resulting inherent consequence level for each marine mammal species.

Details in Table 6-35 suggest that the presence of marine mammals for extended (≥ 24 hour) periods, and consistently within close proximity to continuous sound sources, is not plausible.

Inherent Likelihood

Not applicable due to the risk not being credible.

Inherent Risk Severity

Not applicable due to the risk not being credible.

Table 6-35: Inherent Consequence Levels – Continuous Sound – Auditory Impairment or Injury to Marine Mammals

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential auditory impairment or injury	Description of Potential Consequence	Inherent Consequence
Pinnipeds				
Australian sea-lion EPBC Act: • Endangered • Marine **New Zealand fur-seal** **Australian fur-seal** EPBC Act: • Marine (all)	May occur as per PMST report, however, are considered known to occur based on occurrence records available for the Otway (ALA, 2024) and sightings by marine mammal observers during offshore campaigns (e.g. Seiche Environmental 2020). No BIAs overlap.	For the onset of TTS and AUD INJ to occur, pinnipeds need to remain in-water within 560 m and 3 m of the continuous sound sources for 24-hours, respectively (Table 6-34). Seals have been observed to dive and stay submerged for up to two hours (Blix 2018). Seals will then surface from dives for oxygen recovery. The longer the dive the longer the surface recovery time required (Blix, 2018). It is not credible for seals to remain in-water for 24-hours for the onset of TTS and AUD INJ to occur based on the limited dive duration.	Not credible	Not applicable
Very high-frequency cetaceans				
Pygmy / dwarf sperm whale **True porpoise** EPBC Act: • Cetacean • Migratory.	None identified in PMST report and therefore low likelihood of presence. No BIAs overlapped.	For the onset of TTS and AUD INJ to occur, very high-frequency cetaceans need to remain within 810 m and 120 m of continuous sound sources for 24-hours, respectively (Table 6-34). It is not credible for very high-frequency cetaceans to remain within 810 m and 120 m of continuous sound sources for 24-hours for the onset of TTS and AUD INJ to occur given the absence of BIAs in the operational area.	Not credible	Not applicable
High-frequency cetaceans				
Dolphins (Bottlenose, common, ducky, Indian Ocean, Risso's)	May or likely to occur. No BIAs overlapped.	For the onset of TTS and AUD INJ to occur, high-frequency cetaceans need to remain within 660 m and 4 m of continuous sound sources for 24-hours, respectively (Table 6-34). It is not credible for high-frequency cetaceans to remain within 660 m and 4 m of continuous sound sources for 24-hours for the onset of TTS and AUD INJ to occur given the absence of BIAs in the operational area.	Not credible	Not applicable

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential auditory impairment or injury	Description of Potential Consequence	Inherent Consequence
Toothed whales (killer, false killer) EPBC Act: • Cetacean • Migratory.		Amplitude Energy have observed during the BMG decommissioning campaign, dolphins approach DP vessels whilst undertaking foraging behaviours. However, observations indicate that groups and individuals transit quickly through the area, and do not remain in the area long enough for TTS and AUD INJ to occur.		
Low-frequency cetaceans				
Minke whale - EPBC Act: • Cetacean.	May or likely to occur. No BIAs overlapped.	For the onset of TTS and AUD INJ to occur, low-frequency cetaceans need to remain within 7.54 km and 500 m of continuous sound sources for 24-hours, respectively (Table 6-34). TTS and AUD INJ values do not incorporate animal movement within the region. Given no BIAs were identified for these species within the EMBA, and therefore, the operational area does not support habitats that encourage sedentary behaviours, any individuals present would be merely transiting through the area, with movements that would likely preclude reaching the range required for auditory impairment and injury to occur. Previous studies which tracked humpback whales recorded average swimming speeds to range from 2.5 – 4.0 km/h, with some individuals swimming rapidly up to 15.6 km/h (Noad and Cato 2007). Therefore, it is not credible for minke, sei, fin, humpback whales to remain within 7.54 km and 500 m of continuous sound sources for 24-hours for the onset of TTS and AUD INJ. During recent DP vessel activities in Gippsland, there were hundreds of observations of whales (mainly humpback whales); whales were often observed in close range to vessels on DP. All whales were moving through the region, and at no point were whales observed to be nearing TTS or AUD INJ exposure times.	Not credible	Not applicable
Sei whale - EPBC Act: • Vulnerable • Cetacean • Migratory			Not credible	Not applicable
Fin whale - EPBC Act: • Vulnerable • Cetacean • Migratory.			Not credible	Not applicable
Humpback whale - EPBC Act: • Cetacean • Migratory.			Not credible	Not applicable
Pygmy right whale EPBC Act: • Cetacean				

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential auditory impairment or injury	Description of Potential Consequence	Inherent Consequence
• **Migratory.**				
Pygmy blue whale - EPBC Act: • Endangered • Cetacean • Migratory.	Known to occur. Foraging BIA overlapped. During January to June, blue whales migrate through the operational area.	Despite the overlap with foraging BIA, it is not credible for blue whales to remain within 7.54 km and 500 m of continuous sound sources for 24-hours for the onset of TTS and AUD INJ to occur based on: A type of foraging behaviour (observed in tagged blue whales) involving area restricted searches (ARS) was reported by Bailey *et al*. (2009). The area that the ARS occurred over ranged from 10 km up to 360 km in radius. Owen *et al*. (2016) also reported on ARS occurring across an area of 220 km^2 for a satellite tagged blue whale on the west coast of Australia. The maximum Activity TTS contours cover an area of <56 km^2. Therefore, if ARS were to occur it could be expected to extend well beyond any Activity TTS contour and preclude the onset of TTS. If whales were to interrupt their foraging within the TTS zone to feed on a discrete patch of krill for >24 hours, the movement of plankton (and therefore krill) with the currents would move the feeding zone passively through the TTS zone before TTS onset. Minimum average currents in the operational area are around 0.15 m/s in May (RPS 2019). A discrete patch of krill moving with the plankton (and therefore the current) would move at 540 m/h, moving through the TTS zone well before TTS onset. Blue whales have been recorded swimming at mean speeds of 2.8 km/hr +/- 2.2 km/hr whilst migrating and foraging (Owen, Jenner and Jenner, 2016) or faster (Möller *et al.* 2020). Sears and Perrin (2017) suggest blue whales most commonly swim at speeds of 3–6 km/hr but they can attain travel speeds of 7–20 km/hr. Accounting for swimming speeds across this range, a whale would be expected to move through any TTS zone associated with the Activity well before TTS onset. Recent activities within the Otway have overlapped pygmy blue whale foraging periods and blue whales were observed during the activity. Reported behaviours were in line with published information on foraging behaviours and movements, that is, blue whales were not stationary for extended periods of time, or significantly restricted in their range, and were	Not credible	Not applicable

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential auditory impairment or injury	Description of Potential Consequence	Inherent Consequence
		never considered to be at risk of TTS (MMO observation data, pers comms Beach Energy 2022).		
Southern right whale - EPBC Act: • Endangered • Cetacean • Migratory.	Known to occur. Migration BIA overlapped. During May-June and September-October southern right whales pass through the operational area to move to and from coastal reproduction areas.	It is not considered credible for southern right whales to remain within 7.54 and 500 m of continuous sound sources for 24-hours for the onset of TTS and AUD INJ to occur based on: TTS and AUD INJ values do not incorporate animal movement (necessary for migration) which prevent southern right whales reaching the range required for auditory impairment and injury to occur. Southern right whales are highly mobile species and are known to move throughout the region. Connecting range movements will prevent southern right whales to remain within the range for over 24-hours required for auditory impairment and injury to occur. The longest movements are undertaken by non-calving whales, though calving whales have also been recorded at locations up to 700 km apart within a single season (DCCEEW 2024b). The operational area and low-frequency cetacean TTS/ AUD INJ contours of the activity overlap the migration BIA but do not overlap the reproduction BIA and the preferred calving/nursing habitat for southern right whales (<10 m water depth and within 1 km of shore) (see SEL24h contour maps in Appendix 6). There is no evidence of high-site fidelity for southern right whales within the operational area, or within the TTS or AUD INJ radii of the activity. As a result, southern right whales that may occur in the vicinity of the activity, are expected to be highly mobile and pass through the area before auditory impairment / injury can manifest.	Not credible	Not applicable

6.6.5.4 Risk: Change in Fauna Behaviour – Marine Turtles

Inherent Consequence Evaluation

Continuous sound emissions may cause behavioural changes to marine turtles depending on the distance between individual turtles and a continuous sound source. The MBES and SSS frequencies exceed the hearing range of sea turtles and therefore this sound source will not result in a change to sea turtle behaviour (Koessler and Quijano, 2025).

Relative risk criteria proposed by Popper *et al*. (2014) suggests that continuous sound sources have a high chance of causing behavioural change to turtles within the near vicinity of a source (tens of metres), and a moderate chance within the intermediate vicinity of a source (hundreds of metres). The relative risk reduces to a low chance of behavioural change within the far (thousands of metres) vicinity of a sound source (Popper *et al.,* 2014). As such, continuous underwater sound emissions from the Activity have the potential to cause behavioural changes to marine turtles.

The operational area is used as a conservative behavioural EMBA for marine turtles exposed to continuous sounds. Table 6-36 provides details on the presence of EPBC-listed marine turtles within the operational area, potential behavioural changes that may occur and the resulting inherent consequence level for each marine turtle species.

Table 6-36: Inherent Consequence Levels - Continuous Sound - Behavioural Changes to Marine Turtles

Marine Turtles (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Loggerhead turtle - EPBC Act: • Endangered • Marine • Migratory.	• Likely to occur. • No BIAs overlapped.	Increase swimming speeds, and induce diving inferred from studies of other turtle species.	Despite the conservation status of the loggerhead turtle, because of the insignificance of behavioural change to marine turtles, the consequence is considered minor and local (small, variable, temporary behavioural changes within tens of metres of the source) impacts or disturbances to fauna.	Level 1
Green turtle - EPBC Act: • Vulnerable • Marine • Migratory.	• May occur. • No BIAs overlapped.	Observed green turtles increase swim speed and induce diving from approaching vessels travelling at speeds less than 4 m/s in open waters (Hazel *et al*. 2007).	Despite the conservation status of the green turtle, because of the insignificance of behavioural change to marine turtles, the consequence is considered minor and local (small, variable, temporary behavioural changes within tens of metres of the source)	Level 1

Marine Turtles (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
			impacts or disturbances to fauna.	
Leatherback turtle - EPBC Act: • Endangered • Marine • Migratory.	• Likely to occur. • No BIAs overlapped.	Increase swimming speeds, and induce diving inferred from studies of other turtle species.	Despite the conservation status of the leatherback turtle, because of the insignificance of behavioural change to marine turtles, the consequence is considered minor and local (small, variable, temporary behavioural changes within tens of metres of the source) impacts or disturbances to fauna.	Level 1

Inherent Likelihood

The likelihood of behavioural changes to marine turtles depends on the temporal overlap of the potential presence of marine turtles whilst continuous sound sources are in the operational area, and the sensitivity of different species and individuals to noise.

A high likelihood of behavioural changes to marine turtles requires the following combination of factors:

- Support activities (vessel noise).
- Marine turtles present within tens of metres of continuous sound source.

The Atlas of Living Australia (Atlas of Living Australia) and the Victoria Biodiversity Atlas (VBA) was reviewed to understand the potential likelihood of marine turtle presence within the operational area (ALA 2025; Victorian DELWP 2025). No observations or occurrences of loggerhead turtles, green turtles or leatherback turtles were recorded within the behavioural EMBA. Therefore, the likelihood for all species is considered to be **Remote (E)**.

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to marine turtles from continuous sound emissions is considered to be **Low** (Table 6-37).

Table 6-37: Inherent Risk Severity - Continuous Sound - Behavioural Change to Marine turtles

Species	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
Loggerhead turtle	1	E	**Low**
Green turtle	1	E	**Low**
Leatherback turtle	1	E	**Low**

6.6.5.5 Risk: Auditory Impairment or Injury – Marine Turtles

Inherent Consequence Evaluation

Depending on the sound levels received, continuous sound emissions may cause auditory impairment or injury to marine turtles from the onset of TTS and AUD INJ, respectively.

Underwater sound modelling (Connell and Koessler 2025; Koessler and Quijano, 2025) predicted the continuous TTS and AUD INJ thresholds for turtles was reached within distances listed in Table 6-38.

TTS and AUD INJ thresholds for marine turtles are based on SEL_{24h} which assumes a turtle is consistently exposed to threshold levels for a 24-hour period. Distances predicted by the sound modelling (Connell and Koessler 2025) for the onset of TTS and AUD INJ thresholds (SEL_{24h}) are listed in Table 6-38.

Table 6-38 infers the continuous underwater sound emissions from the Activity have the potential to cause:

- Potential TTS to marine turtles within 3.53 km
- Potential AUD INJ to marine turtles within 0.31 km.

The EMBA for marine turtles exposed to continuous sounds is relatively small (3.53 km radius from the noise source that can operate throughout the operational area).

Table 6-38: Continuous Sound – Maximum Distance to TTS and AUD INJ Threshold for Marine Turtles (Koessler and Quijano 2025; Appendix 7)

Threshold Type	Threshold Weighted SEL_{24h} (dB re 1 μPa^2 s)	Maximum distance (km)	Relevant scenario/s
TTS	178	3.53	Scenario 2: Mooring operations at Elanor-1 well site – 3x AHTS
AUD INJ	198	0.31	Scenario 2: Mooring operations at Elanor-1 well site – 3x AHTS

Given the absence of BIAs in the operational area, it is not considered credible for individual marine turtles to remain within 3.53 km and 31 m of continuous sound sources for 24-hours. As such, the onset of TTS and AUD INJ to marine turtles as a result of the Activity is not anticipated. Any marine turtles observed in the operational area would be expected to be transiting through since the operational area does not support habitats which encourage sedentary behaviours.

Therefore, auditory impairments or injuries to marine turtles as a result of continuous sound emissions from the Activity is not evaluated further.

Inherent Likelihood

Not applicable due to the risk not being credible.

Inherent Risk Severity

Not applicable due to the risk not being credible.

6.6.5.6 Risk: Change in Fauna Behaviour – Fish

Inherent Consequence Evaluation

Sound pressure changes may be detected by fish with a swim bladder, as the gas within the swim bladder changes as a result of changing sound pressure. The MBES and SSS frequencies exceed the hearing range of fish and therefore this sound source will not result in a change to fish behaviour (Koessler and Quijano, 2025).

If the swim bladder is near the ear or connected to the hearing system, the hearing sensitivity is greater (Popper *et al.* 2014). Fish without a swim bladder cannot detect sound pressure. However, most fish species are expected to be able to detect particle motion. The most relevant criteria for considering potential impacts on fish and shellfish are considered to be those provided in the Sound Exposure Guidelines for Fishes and Sea Turtles (Popper et al. 2014). Fish species are grouped into hearing sensitivity categories defined by a number of factors such as their hearing anatomy, particle motion detection, the use of sound during navigation or mating and the presence or absence of a swim bladder:

- Fish with no swim bladder that are sensitive to particle motion and therefore only to a narrow band of frequencies (e.g. cartilaginous fish).
- Fish with swim bladders that do not appear to play a role in hearing (e.g. Scombridae). Therefore, they are only sensitive to particle motion and only show sensitivity to a narrow band of frequencies.
- Fish with swim bladders involved in hearing. These species are sensitive to both particle motion and sound pressure. The swim bladder may be close to but not intimately connected to the ear (e.g. eels) or mechanically linked to the ear (e.g. Clupeidae), with the latter representing fish of the greatest hearing sensitivity.
- Eggs and larvae.

Continuous sound emissions may cause behavioural changes to fish including eggs and larvae depending on the distance between fish and a continuous sound source. Relative risk criteria proposed by Popper et al. (2014) suggest a moderate risk of behavioural change to fish with no swim bladders, or those with bladders not involved in hearing, or to fish eggs or larvae, within the near (tens of metres) and intermediate (hundreds of metres) vicinity of a continuous sound source. Fish with swim bladders involved in hearing have a high risk of behavioural change within the near vicinity (tens of metres), and a moderate chance within the intermediate vicinity (hundreds of metres) from a continuous sound source (Popper *et al*. 2014).

There is risk of change in fish behaviour within hundreds of metres of vessels operating within the operational area. As a conservative approach to identify fish BIAs and habitats, the operational area is used as a conservative behavioural EMBA for fish including eggs and larvae exposed to continuous sound.

Table 6-39 provides details on the presence of fish species that are EPBC-listed and have First Nations cultural significance within the behavioural EMBA, potential behavioural changes that may occur and the resulting inherent consequence level for each species.

Table 6-39: Inherent Consequence Levels - Continuous Sound - Behavioural Changes to Fish

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
White shark - EPBC Act: • Vulnerable • Migratory.	Known to occur. No BIAs overlapped. Seasonal presence in southern Australia during early summer.	No detectable relationship between vessel activity and shark residency for any species. This observation suggests habituation of sharks to high levels of vessel activity (Rider et al. 2021). Anthropogenic underwater sounds may trigger investigative or aversive behaviour in some species of shark (Chapuis et al. 2019). No significant behavioural change to sharks from continuous sound is anticipated.	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to species of recognised conservation value (nationally threatened). There are no population level impacts anticipated.	Level 1
Eastern school shark - EPBC Act: • Critically endangered**.**	May occur. No BIAs overlapped.	No detectable relationship between vessel activity and shark residency for any species. This observation infers habituation of sharks to high levels of vessel activity (Rider et al. 2021). No significant behavioural change to sharks from continuous sound is anticipated.	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to species of recognised conservation value (nationally threatened). There are no population level impacts anticipated.	Level 1
Shortfin mako EPBC Act: • Migratory.	Likely to occur. No BIAs overlapped.	No detectable relationship between vessel activity and shark residency for any species. Anthropogenic underwater sounds may trigger investigative or aversive behaviour in some species of shark (Chapuis *et al*. 2019). No significant behavioural change to	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna. There are no population level impacts anticipated.	Level 1

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
		sharks from continuous sound is anticipated.		
Grey nurse shark (East Coast Population) EPBC Act: • Migratory. •	May occur. No BIAs overlapped.	No detectable relationship between vessel activity and shark residency for any species. This observation infers habituation of sharks to high levels of vessel activity (Rider et al. 2021). No significant behavioural change to sharks from continuous sound is anticipated.	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to species of recognised conservation value (nationally threatened). There are no population level impacts anticipated.	Level 1
Porbeagle / mackerel shark - EPBC Act: • Migratory.	Likely to occur. No BIAs overlapped.	No detectable relationship between vessel activity and shark residency for any species. This observation infers habituation of sharks to high levels of vessel activity (Rider et al. 2021). No significant behavioural change to sharks from continuous sound is anticipated.	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna. There are no population level impacts anticipated.	Level 1
Australian grayling - EPBC Act: • Vulnerable.	May occur. No BIAs overlapped.	Vessel noise can change fish behaviour (e.g. induce avoidance, alter swimming speed and direction, and alter schooling behaviour) (Popper *et al*. 2014).	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to species of recognised conservation value (nationally threatened). There are no population level impacts anticipated.	Level 1
Blue warehou - EPBC Act:	Known to occur. No BIAs overlapped.	Vessel noise can change fish behaviour (e.g. induce avoidance, alter swimming speed	Minor local (small, variable, temporary behavioural changes within tens of metres	Level 1

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
• Conservation dependent		and direction, and alter schooling behaviour) (Popper et al. 2014).	of the continuous sound source) impacts or disturbances to fauna.	
Pipefish, pipehorse, seadragon and seahorse species - EPBC Act: • Marine.	May occur. No BIAs overlapped.	Vessel noise can change fish behaviour (e.g. induce avoidance, alter swimming speed and direction, and alter schooling behaviour) (Popper et al. 2014).	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to species of recognised conservation value (nationally threatened). There are no population level impacts anticipated.	Level 1
Short-finned eels - • Not listed under the EPBC Act. • Culturally significant to First Nations people (Koster et al. 2021)	Seasonal presence in the Otway Basin and Bass Strait during spawning migration i.e. downstream migration of adult eels during late summer and autumn. Upstream migration of larvae and glass eels, where glass eels enter estuaries during mid-winter to late spring (VFA 2022b).	A recent study of Anguillid eels demonstrated that acoustic stimuli induced behavioural avoidance (increased swimming, speed and movements away from the source) in some European eel and river lamprey under experimental conditions where swimming space was severely restricted (Deleau *et al*. 2019).	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna.	Level 1

Inherent Likelihood

The likelihood of behavioural changes to fish including eggs and larvae depends on the temporal overlap of the potential presence of fish with continuous sound sources in the operational area.

For a moderate chance of the risk event of behavioural changes to fish to occur, the following combination of factors are required:

- Support vessel based activities (vessel noise).
- Fish present within tens of metres of continuous sound source.

Table 6-40 provides details on the frequency of recorded sighting of EPBC-listed fish in the Otway Basin to infer presence within the behavioural EMBA, description of likelihood and the resulting inherent likelihood level for each fish species.

Table 6-40: Inherent Likelihood Levels - Continuous Sound - Behavioural Changes to Fish

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Description of Likelihood	Description of Potential Consequence
White shark - EPBC Act: • Vulnerable • Migratory.	Known to occur. No BIAs overlapped. Seasonal presence in southern Australia during early summer.	The risk event could occur if a white shark is present within the behavioural EMBA during vessel-based activities. White sharks are known to occur within the behavioural EMBA; therefore, the risk event is considered to be possible.	Possible (C)
Eastern school shark - EPBC Act: • Critically endangered.	May occur. No BIAs overlapped.	A freak combination of factors would be required for a school shark to be present within the behavioural EMBA during vessel-based activities. Behavioural changes to school sharks are not expected to occur from Activity continuous underwater sound emissions.	Remote (E)
Shortfin mako EPBC Act listed • Migratory	Likely to occur. No BIAs overlapped.	A rare combination of factors would be required for a shortfin mako to be present within the behavioural EMBA during vessel-based activities. The risk event is considered possible but unlikely to occur during the Activity.	Unlikely (D)
Grey nurse shark - EPBC Act: • Migratory.	May occur. No BIAs overlapped.	A rare combination of factors would be required for a grey nurse shark to be present within the behavioural EMBA vessel-based activities. The risk event is considered possible but unlikely to occur during the Activity.	Unlikely (D)
Porbeagle / mackerel shark - EPBC Act: • Migratory.	Likely to occur. No BIAs overlapped.	A rare combination of factors would be required for a mackerel shark to be present within the behavioural EMBA during vessel-based activities. The risk event is considered possible but unlikely to occur during the Activity.	Unlikely (D)
Australian grayling - EPBC Act: • Vulnerable.	May occur. No BIAs overlapped.	A freak combination of factors would be required for an Australian grayling to be present within the behavioural EMBA during vessel-based activities. Behavioural changes to the Australian grayling are not expected to occur from the Activity continuous underwater sound emissions.	Remote (E)
Blue warehou - EPBC Act: • Conservation dependant	Known to occur. No BIAs overlapped.	The risk event could occur when additional factors are present, such that a blue warehou is present within the behavioural EMBA during vessel-based activities. Blue warehou are known to occur within the behavioural EMBA; therefore, the occurrence of a change in behaviour is possible but considered doubtful.	Possible (C)
Pipefish, pipehorse, seadragon and seahorse species - EPBC Act:	May occur. No BIAs overlapped.	A freak combination of factors would be required for Syngnathidae to be present within the behavioural EMBA during activities generating continuous sound. Behavioural changes to Syngnathidae are not expected to occur from the Activity.	Remote (E)

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Description of Likelihood	Description of Potential Consequence
• Marine.			
Short-finned eels • Not listed under the EPBC Act. • Culturally significant to First Nations people (Koster et al. 2021)	Seasonal presence in the Otway Basin and Bass Strait during spawning migration i.e. downstream migration of adult eels during late summer and autumn. Upstream migration of larvae and glass eels, where glass eels enter estuaries during mid-winter to late spring (VFA 2022b).	The risk event could occur when additional factors are present, such that short-finned eels as adults during downstream spawning migration or as larvae / glass eels during upstream spawning migration is present within the behavioural EMBA during vessel-based activities. Short-finned eels are known to occur in the region and disperse widely in the ocean. Some individual eels may enter the behavioural EMBA; therefore, the occurrence of a change in behaviour is possible but considered doubtful.	Possible (C)

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to fish including eggs and larvae from continuous sound emissions is **Low**.

Table 6-41 lists the inherent risk severity for each EPBC Act listed fish.

Table 6-41: Inherent Risk Severity – Continuous Sound - Behavioural Changes to Fish

Fish	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
White shark	1	C	**Low**
Eastern school shark	1	E	**Low**
Grey nurse shark	1	D	**Low**
Porbeagle / mackerel shark	1	D	**Low**
Australian grayling	1	E	**Low**
Blue warehou	1	C	**Low**
Pipefish, pipehorse, seadragon and seahorse species	1	E	**Low**
Short-finned eels	1	C	**Low**

6.6.5.7 Risk: Auditory Impairment or Injury – Fish

Inherent Consequence Evaluation

Depending on the sound levels received, continuous sound emissions may cause auditory impairment or injury to fish including eggs and larvae from the onset of TTS and recoverable injury, respectively.

Underwater sound modelling predicted the continuous TTS and recoverable injury thresholds for fish including eggs and larvae was reached within distances listed in Table 6-42 (Popper *et al*., 2014; Connell and Koessler, 2025).

TTS threshold for fish is based on SEL_{12h} which assumes a fish is consistently exposed to threshold levels for a 12-hour period. Recoverable injury thresholds for fish are based on SEL_{48h} which assumes a fish is consistently exposed to threshold levels for a 48-hour period. Distances predicted for the onset of TTS and recoverable injury thresholds listed in Table 6-42 suggest the Activity continuous underwater sound emissions have the potential to cause:

- Potential TTS to fish within 12 m.

A 12 m buffer around the operational area defines the impairment and injury EMBA for fish exposed to continuous sounds. There was no exceedance of the 48 h threshold for recoverable injury for fish.

Table 6-42:Continuous Sound – Maximum Distance to TTS and Recoverable Injury Thresholds for Fish (Koessler and Quijano 2025; Appendix 7)

Threshold Type	Threshold SPL (Lp; dB re 1 µPa)	Maximum distance (km)	Relevant scenario/s
TTS	158 for 12 hours	0.12	Scenario 2: Mooring operations at Elanor-1 well site – 3x AHTS
Recoverable injury	170 for 48 hours	-	N/A (not reached)

It is not considered credible for fish to remain within 12 m of continuous sound sources for 12 hours for the onset of TTS. The impairment and injury EMBA of 12 m does not support habitats that encourage site fidelity for fish including eggs and larvae.

As described in Section 6.5.5, sharks are considered to be habituated to relatively high levels of continuous sound and fish are expected to avoid continuous sound sources in the operational area. Fish that avoid continuous sound sources in the operational area further prevents individuals from remaining within the range required for auditory impairment or injury to occur.

As such, auditory impairments or injuries to fish from Activity continuous sound emissions is not evaluated further.

Inherent Likelihood

Not applicable due to the risk not being credible.

Inherent Risk Severity

Not applicable due to the risk not being credible.

6.6.6 Control Measures, ALARP, and Acceptability Assessment

Table 6-43 provides a summary of the control measures and ALARP and acceptability assessment relevant to continuous sound emissions. A detailed assessment has been undertaken and, as part of Amplitude Energy's relevant persons engagement for previous projects and impacts, Amplitude Energy has sought advice from Australian Antarctic Division (AAD) on measures implemented or considered by the AAD for voyages into sensitive areas.

Table 6-43 provides an extended ALARP assessment.

Table 6-43: Underwater Sound Emissions – Continuous ALARP, Control Measures and Acceptability Assessment

Underwater Sound Emissions - Continuous	
ALARP Decision Context and Justification	**ALARP Decision Context: Type A** Impacts from continuous sound emissions are well understood, however, there will always be some uncertainty regarding the reaction of individual animals. Thus, the assessment of impacts and risks has been conservative including the selection of disturbance criteria, modelling assumptions, and evaluation of potential consequence and likelihood. Activities are well practised, and there are no conflicts with company values, no partner interests, and no significant media interests. Because the potential impacts to marine fauna of conservation value are evaluated as **Level 2**, Amplitude Energy believes ALARP Decision Context A should apply to marine fauna with the exception of pygmy blue whales and southern right whales. **ALARP Decision Context: Type B** ALARP decision context B has been applied in relation to pygmy blue whales and southern right whales because there is a residual (moderate) risk in relation to behavioural disturbance to these species within a BIA. The conservation management and national recovery plans for these species indicate that at certain times of year and for certain activities, additional mitigation actions and an adaptive management plan may be required to maintain a precautionary approach. Further controls to manage residual risks have been considered and several additional controls have been adopted. The adopted controls ensure the Activity environmental outcomes can be met and are not inconsistent with the objectives and relevant actions of species recovery plans.
Control Measure	**Source and Description of Control**
CM07: Planned Maintenance System	Power generation and propulsion systems on vessels will be operated in accordance with manufacturer's instructions and ongoing maintenance to ensure efficient operation. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from continuous sound.*
CM10: Offshore Operational Procedures	At a minimum, vessel operators shall adhere to the distances and vessel management practices of EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans describes strategies to ensure whales and dolphins are not harmed during offshore interactions with vessels and helicopters. Vessels adhere to the distances and vessel management practices of EPBC Regulations (Part 8) with increased caution zone of 500 m between whales and Activity vessels. *Risk event addressed: Change in fauna behaviour*
CM11: Campaign Risk Review	Risk reviews are standard practice for offshore campaigns. The Amplitude Energy Environmental Protocol describes how environmental impact and risk management, including risk assessments, is undertaken for activities including offshore campaigns. As part of pre-campaign planning a risk review will be undertaken to re-assess campaign environmental impacts and risks to ensure ALARP and acceptability criteria are met. The assessment of environmental impacts and risks will focus on aspect: subsea noise, and risks to endangered whale species, specifically pygmy blue whales and southern right whales. The review framework is described in Section 10.0 and considers: • Model activity scenarios where additional details may have become available • Integrate into modelling the latest relevant sound exposure thresholds

Underwater Sound Emissions - Continuous	
	• Assess any new or updated information to determine if the rationale for previously discounted controls remains reasonable, or if additional measures are required to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level The review may be undertaken at different stages of the campaign planning, prior to a campaign activity commencing to assess any new or updated information to avoid or reduce overlap with endangered whales, where practicable, and to determine if additional controls are required to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from continuous sound.*
CM13: Offshore Victoria Whale Disturbance Risk Management Procedure	The impact and risk assessment has shown the potential for interaction between whales and the Activity, with some uncertainty around the likelihood of impacts. This uncertainty is addressed through the implementation of actions and adaptive management measures detailed in the Offshore Victoria Whale Disturbance Risk Management Procedure (Section 12.0). The Offshore Victoria Whale Disturbance Risk Management Procedure provides details on level of whale observation effort, triggers for actions and the actions to be taken to avoid injuring whales and avoid behavioural disturbance to endangered whale species (pygmy blue whales and southern right whales), reduce the risk of displacement of a foraging pygmy blue whale, and minimise the risk of disturbance to a southern right whale in a migration and/or reproduction area (EPO13). The Offshore Victoria Whale Disturbance Risk Management Procedure details requirements of the Activity which are addressed and summarised in Section 10.0 and Section 12.0. The requirements have been developed to account for the largest noise contours that may be produced throughout the duration of the activity. As such, the requirements are based on the distances predicted from the modelling of continuous noise emissions (see Section 6.6.5) and are therefore considered conservative and appropriate for activities which produce impulsive noise emissions. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from continuous sound.*
Additional Control Measures Considered	
Titleholder Collaboration	Adopt (CM09: Titleholder Collaboration) Amplitude Energy will share sightings data including behavioural observations with other Titleholders in the Otway region and local research organisations to help inform each other's programs of work and respective risk reviews. This data can be used by appropriate parties for population and behavioural research and to inform management of impacts and risks from their own Activity activities.
Impact and Risk Summary	
Residual Impact Consequence	Change in ambient sound from continuous sound: **Level 1** – Minor local impacts or disturbances to flora/fauna, nil to negligible remedial / recovery works on land/water systems.
Residual Risk Consequence	**Level 2** – Localised short-term impacts to species or habitats of recognised conservation value not affecting local ecosystem function; remedial, recovery work to land, or water systems over days / weeks.
Likelihood	Due to the nature and scale of the proposed activities, and considering the proposed control, the likelihood of behavioural changes due to continuous underwater sound emissions is assessed as:

Underwater Sound Emissions - Continuous	
	• **Possible (C)** - Conceivable and could occur at some time. Could occur during the activity although a rare combination of factors would be required for the occurrence.
Residual Risk	Behavioural change, auditory impairment or auditory injury from continuous sound: **Moderate**.
Demonstration of Acceptability	
Principles of ESD	Continuous underwater sound emissions are evaluated as having Level 2 consequence which is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Noise emissions will be managed in accordance with legislative requirements. Noise emissions will: • Not impact on the recovery of marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA 2017a). • Be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area in accordance with DCCEEW guidance on key terms (DAWE 2021), where the action is needed to achieve the objective of the blue whale CMP (DoE 2015a). • Not impact the recovery of the blue whale as per the CMP for the Blue Whale (DoE 2015a). • Not prevent southern right whales utilising a migration BIA or HCTS, or cause auditory impairment (DCCEEW 2024b). • Be managed such that the risk of behavioural disturbance to southern right whales within BIA's and HCTS is minimised (DCCEEW, 2024b). • Not impact the recovery of the southern right whale as per the National Recovery Plan for the southern Right Whale (DCCEEW, 2024b). • Not impact the recovery of the white shark as per the Recovery Plan for the White Shark (DSEWPaC, 2013a). Actions from the CMP for the Blue Whale (DoE, 2015a) applicable to the activity in relation to assessing and addressing anthropogenic noise have been addressed as per: • Assessing the effect of anthropogenic noise on blue whale behaviour. • Be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area. Mitigation measures will be implemented to reduce the risk of displacement occurring during operations where modelling indicates that behavioural disturbance within a Foraging Area may occur (DAWE, 2021). Actions from the National Recovery Plan for the southern right whale (*Eubalaena australis)* (DCCEEW, 2024b) applicable to the activity in relation to assessing and addressing anthropogenic sound emissions have been addressed as per: • Assessing the effect of anthropogenic noise on southern right whale behaviour. • Anthropogenic noise in BIAs and habitat critical to the survival of the Southern right whale will be managed such that any southern right whale continues to utilise the area without auditory impairment and is not displaced from these areas.

Underwater Sound Emissions - Continuous	
	• Sections 6.5 and 1.1 demonstrates that national policies (e.g. EPBC Regulations (Part 8) and Victorian (Marine Mammals) Regulations) were identified and included. • Sections 6.5 and 1.1 demonstrate that the activity can be conducted in a manner that is not inconsistent with the National Recovery Plan, the risk of behavioural disturbance is minimised to ALARP and ensures that the activity will not result in injury of southern right whale.
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11) Activities will be undertaken in accordance with the Implementation Strategy (Section 12.0).
External Context	Activity will be undertaken in a manner consistent with relevant legislation, industry standards and guidelines, offshore practices and benchmarking. The activity is not predicted to result in impacts to species that would be inconsistent with recovery plans or conservation advice.
Other requirements	No objections or claims have been received during consultation regarding underwater sound emissions.
Demonstration of meeting the defined acceptable levels in the OPP	Section 8.2.6 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with underwater sound emissions – continuous. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed below. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for underwater sound emissions – continuous: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1). • OPP control measures and EP control measures are equivalent (Section 5.2.4.1 and 5.2.4.2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	**Acceptable** Amplitude Energy has determined that impacts and risks related to continuous sound emissions are acceptable, based on: • The planned management of impacts and risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advices, and significant impact guidelines for MNES*.

Underwater Sound Emissions - Continuous	
	• Relevant historical feedback from relevant persons (Australian Antarctic Division) for activities of similar nature and scale to the Project has been used to inform mitigation measures. • No other relevant feedback from stakeholders has been received that would inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures. To manage impacts to receptors to acceptable levels, the following EPOs (equivalent to OPP EPOs as detailed in Appendix 1) have been applied: **EPO11**: Impacts to marine fauna from underwater anthropogenic noise emissions will be limited to temporary* behavioural change localised** to the noise source. **Not exceeding the duration of the activity component (i.e. vessel campaign) (described in Section 3.2).* ***Not exceeding the noise EMBA defined for the activity (described in Section 6.6.5).* **EPO12**: No death or injury[5] to EPBC Act listed threatened, migratory or cetacean species. **EPO13**: Project related underwater noise within biologically important areas[5] and habitat critical to the survival of relevant species will be managed through the implementation of Cooper Energy Offshore Victoria Whale Disturbance Risk Management Process, such that: • Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area. • Southern right whales are not prevented from utilising biologically important areas[6] or habitat critical to the survival of a species or cause auditory impairment. • The risk of behavioural disturbance to southern right whales will be limited to temporary behavioural disturbance of individuals. **EPO17**: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable.

[5] Injury to cetaceans as defined as either auditory impairment (TTS) (DAWE 2021) or auditory injury (AUD INJ) i.e. Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (Houser 2021; Finneran 2024). Auditory injury may or may not result in a permanent threshold shift (PTS).

[6] Biologically important behaviours such as reproduction, feeding, migration and resting (DCCEEW, 2023).

Table 6-44: Underwater Sound Emissions – Continuous - extended ALARP Assessment

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
Eliminate Activity	AUD INJ, TTS and behavioural disturbance of whales from vessel noise. Rated as Level 2 consequence and Low risk in relation to these project activities.	By not undertaking the activity, sound sources would be eliminated.	N/A	N/A	N/A	Reject. Rationale: Given that DCCEEW assesses the potential impacts of shipping and industrial noise as 'minor' i.e., 'individuals are affected but no affect at population level' the potential environmental benefits of not undertaking the activity in relation to noise generation are also considered minor. Amplitude Energy does not consider this control as feasible.
Eliminate use of DP vessels during defined periods when blue whales are more likely to occur.	As above.	By avoiding periods when blue whales are more likely to occur, impacts to species of conservation significance during times when they may be in the region and undertaking biologically important behaviours can be eliminated (for the species of concern).	This type of control is not typical of entire BIAs such as blue whale foraging areas, which encompass the entire south east coastline. No offshore industry in the region limits vessel activity to being outside either pygmy blue whale or southern right whale season within the broader species BIAs. It would be impossible for multiple existing marine industries to operate in offshore south east Australia if avoidance of the blue whale foraging season was adopted as a control measure.	Eliminating the use of DP vessels during blue whale seasons would preclude the activity entirely because of the many variables that will influence the activity schedule. Limits schedule flexibility so as to make it impossible to operate.	This has the same or near same effect as eliminating the activity. Due to the scale of effort and investment associated with the activity, the risk introduced of having to delay the activity due to blue whale season is not considered tolerable. Such a restriction would make operating impracticable and would not be compatible with the safe and efficient operation of the Activity.	Reject. Rationale: Option not feasible. In this region, blue whales may occur over much of the summer months and into autumn. High-cost risk in the case of delays whereby the well had to be deferred.
Eliminate use of DP vessels during defined periods when southern right whales are more likely to occur.	As above.	By avoiding periods southern right whales are more likely to occur, impacts to species of conservation significance during times when they may be in the region and undertaking biologically important behaviours can be eliminated (for the species of concern).	There are examples of this type of control being applied in well defined, discrete areas, for example, the exclusion of vessels from Logans Beach, Warrnambool (June-Oct) which is an established nursery for southern right whales in the south east, away from major ports and existing built environment. This type of control is not typical of entire BIAs such as or southern right whale BIAs or HCTS, which encompass the entire south east coastline including major Ports. No offshore industry in the region limits vessel activity to being outside southern right whale season within the broader species BIAs. It would be impossible for multiple existing marine industries to operate in offshore south east Australia if avoidance of either blue whale or southern right whale seasons were adopted as a control measure.	Eliminating the use of DP vessels during southern right whale seasons would preclude the activity entirely because of the many variables that will influence the activity schedule. Limits schedule flexibility to make it impossible to operate.	This has the same or near same effect as eliminating the activity. Such a restriction would make operating impracticable and would not be compatible with the safe and efficient operation of the Activity.	Reject. Rationale: Option not feasible. In this region, southern right whales occur over winter. Would in practice carry a high risk of failing, and high-cost risk in the case of delays whereby the well had to be deferred.
Anchoring of vessels to hold position rather than use DP	As above.	By anchoring vessels, sound emissions related to vessel DP would be reduced.	This is not feasible as the support vessels are required to move during the activities (i.e., not operate from a static position). Vessels need to be able to maintain position to within a small margin of error, close to offshore facilities and other vessels; anchoring would not allow for this.	Not considered feasible.	N/A	Reject. Rationale: Option not feasible. Vessels need to be able to hold position and maintain a consistent

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
						pace and anchoring would restrict this. Would increase seabed disturbance.
Limit power to thrusters of DP vessels to reduce underwater sound contours	As above.	Limiting thruster power could reduce impacts from subsea underwater sound. Limiting thruster power is possible where activities can be first made safe. This action would not be immediate but should reduce the risk of displacement if whales are foraging or transiting in the vicinity.	Not typically applied to vessels as thruster power is determined by safety limits and operational requirements. Thruster levels are optimised to operating modes and conditions but can be reduced if safe to do so.	Considered feasible if safe to reduce thruster power.	N/A	Implement. Rationale: Thruster power can be reduced if safe to do so. Integrated into CM13: Offshore Victoria Whale Disturbance Risk Management Procedure.
DP vessel underwater sound reduction in design (DNV Silent notation)	As above.	Vessel design can reduce underwater sound.	Relevant persons feedback: Australian Antarctic Division (AAD) advised their new state of the art survey/ice breaker vessel Nuyina which will operate in the Antarctic has been designed to reduce underwater sound and vibration. The vessel has been assigned DNV Silent R notation equivalence at 8 kn electric propulsion for science acoustic work. Currently not typical for industry. A review of industry vessels operating inside and outside of Australian waters has not identified any vessels assigned the DNV Silent notation.	Given the current absence of industry vessels with silent notation, this measure is not considered to be feasible for the project.	N/A	Reject. Rationale: Option not feasible.
Implement safe shut-down points	As above.	Shutting down vessel DP could reduce impacts from subsea underwater sound. Shutting down vessel DP is possible where activities can be first made safe. This action would not be immediate but should reduce the risk of displacement if whales are foraging (PBW) or transiting (SRW) in the vicinity.	Not typically applied to DP vessels. Typically applied to activities that generate impulsive underwater sound such as piling and seismic survey.	Cost associated with shutting down DP, requiring suspension of Cargo or mooring Ops. Potential cost >$4M.	Retrieval of subsea equipment (e.g. ROV) required prior to DP shutdown. Increased frequency of handling through the splash zone and on deck increases personnel H/S risk exposure. This is considered manageable through existing systems for control of work. Good reliability at project operational level.	Implement. Rationale: reduces risk of displacement of whales. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea noise. Integrated into CM13: Offshore Victoria Whale Disturbance Risk Management Procedure.
Deploy bubble curtains around vessels.	As above.	Increased confidence no foraging blue whales or southern right whales in the vicinity which could be injured or displaced.	Bubble curtains were raised as an idea during project ALARP workshops and also by the AAD during consultation. No known examples of bubble curtains being used as mitigation for DP vessels.	Not considered feasible	Discussions with technology providers indicates the deployment of bubble curtains offshore in environments like the Otway presents a number of challenges, including: Providing oil-free air to the seabed would require a large quantity of large diesel-run air compressors. At least one additional dedicated DP support vessel	Reject. Option not feasible.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
					would likely be required for these compressors. Currents – Bubble curtains are drastically impacted by currents. Current speeds and directional shifts with wind and tide, which in the dynamic environment of the Otway would result in bubble curtains being distorted and ineffective by the time bubbles rise from the seabed to surface. Alternate options such as the deployment of hoses on close to thruster locations or offset on buoys present SIMOPS and safety risks including congestion of the vessel safety zone and potential interference with/from thrusters and moorings. As a result, the use of bubble curtains is not considered effective, feasible or practicable.	
Opportunistic monitoring from project vessel crew and helicopter crew. Crew observers are inducted into Monitoring and Communications Protocols including requirement to report all sightings to vessel master. Trained crew to continue observations during MMO rest breaks.	As above.	Increased confidence no foraging blue whales or southern right whales in the vicinity which could be injured or displaced.	Yes. Opportunistic monitoring is typically integrated into offshore industry operations including from vessels and helicopters (where used for crew changes). Crew are typically engaged to support MMO and are experienced in keeping watch offshore.	Costs associated with inducting crew accounted for in planning.	No introduced risks. Good reliability at the project operational level.	Implement. Rationale: supports reducing risk of displacement. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions. Integrated into CM13: Offshore Victoria Whale Disturbance Risk Management Procedure.
A dedicated MMO on each vessel used throughout the activity.	As above.	Increased confidence of no southern right whales or foraging blue whales in the vicinity which could be injured or displaced. Higher confidence in identifying whales and whale behaviour compared to opportunistic monitoring alone.	Yes. This has been applied to vessels in this region where important behaviours (known foraging blue whale BIA and southern right whale migration BIA) are known to occur. Feedback from Beach Energy was that dedicated MMOs on each support vessel was seen effective. This is also Amplitude Energy's experience during offshore decommissioning activities in the Gippsland offshore Basin in 2023 and 2024. In addition, having a dedicated MMO on each vessel means that pre-activity start, and ongoing observations can be conducted within the full Activity Action Zone (see CM13: Amplitude Energy Offshore Whale Disturbance Risk Management	Additional cost of MMO mob/demob and time offshore accounted for in planning.	No introduced risks. Good reliability at the project operational level.	Implement for vessels only. Rationale: supports reducing risk of displacement. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary

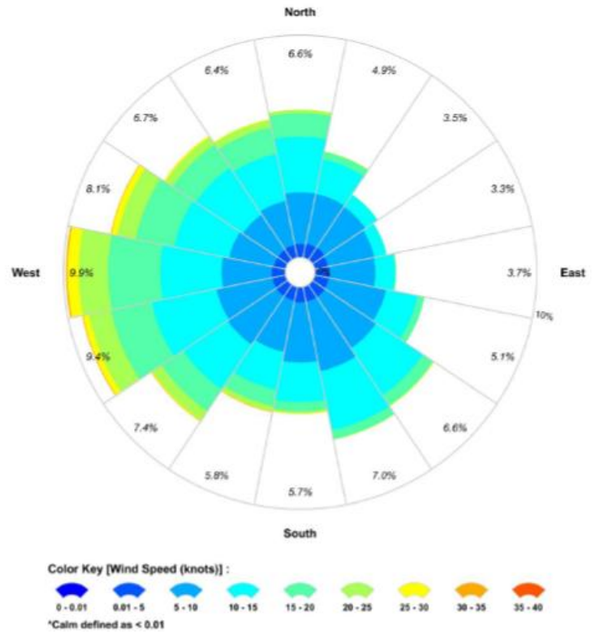
Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
			Procedure) for activities where observations are limited. Having a dedicated MMO on each vessel is more effective than having an additional dedicated MMO on the same vessel. AAD advised in relation to rock blasting activities (wharf construction) in the Antarctic, dedicated MMOs were used.			operational subsea underwater sound emissions. Integrated into CM13: Offshore Victoria Whale Disturbance Risk Management Procedure.
Additional dedicated MMO when daylight hours extend beyond 12-hours a day.	As above.	Increased confidence no southern right whales or foraging blue whales in the vicinity which could be displaced. Higher confidence in identifying whales and whale behaviour compared to opportunistic monitoring alone. Risks would remain Low.	This has been applied to vessels in this region where important behaviours (known foraging blue whale BIA and southern right whale migration BIA) are known to occur to manage fatigue issues for long duration activities during periods daylight hours are >12 hour. Crew member (e.g. Officer of the Watch) will receive training from the MMO in whale observation and distance estimation to assist the MMO during daylight hours.	Additional cost of MMO mob/demob and time offshore not accounted for in planning. Potential for limited bed space on vessels. Time to train vessel crew in whale ID and distance estimation.	Marginal bed space on smaller vessel may drive the selection of a larger (and potentially noisier) vessel. MMOs have good reliability at the project operational level. Crew / Officers of the Watch are experienced in working and watch keeping at sea.	Implement for vessels Rationale: supports reducing risk of displacement. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions. Integrated into CM13: Offshore Victoria Whale Disturbance Risk Management Procedure.
Vessel onboarding process includes consideration of relative nature/scale of potential subsea noise impacts.	As above.	Provides opportunity to influence reduction in subsea noise associated with the activity.	There are examples of vessels being designed to minimise noise (e.g., Australian Antarctic Research vessel) but typically vessels are selected based on capability for the work scope.	Cost associated with time for vessel evaluations.	No introduced risks.	Implement Rationale: supports reducing risk of displacement. Costs are not considered to be grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions. Integrated into CM11: Campaign Risk Review.
No DP operations at night time or during low visibility periods in event blue or southern right whales are sighted preceding night time or low visibility periods.	As above.	Increased confidence no foraging blue whales or southern right whales in the vicinity during night time or during low visibility periods which could be injured or displaced. Risks would remain Low.	As described above limiting activities to daylight operations has not been previously applied under other environment plans (EPs) in this region; it is not operationally possible. Including criteria to suspend DP operations (if safe to do so) based on endangered whale sightings ahead of night time or low visibility periods has been included in other EPs. Avoiding DP activities at night has the potential to reduce the risk of behavioural disturbance to southern right whales or blue whales that may be in the observation zone, however, it is not operationally possible to complete the activity without operations at night, so the control measures and performance standards need to balance risk to each species with operational needs. Blue whales forage and feed in patterns over differing extents depending on factors including krill distribution and density. If multiple blue whales are observed over several hours, this could be an indication that whales may be undertaking area restricted searches (ARS) or mesoscale searches. Observing only one or two whales over several hours is less likely to be an indication of an ARS but may indicate broad scale search over larger areas and less likely restricted to the	Limiting DP operations during night time or low visibility periods will result in additional costs.	Additional risks having vessels on standby waiting for daylight hours to undertake observations and recommence the activity.	Implement Rationale: supports reducing risk of displacement. Costs are not considered disproportionate given the benefit that the control measure may provide during peak southern right whale reproductive /migration periods and blue whale foraging periods where whales could be present, and the risk reduction associated with

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
			activity observation zone but rather passing through and therefore at negligible risk of disturbance. There are no specific precedents for controls to manage the risk vessel-related behavioural disturbance across these types of behaviours. Considering the search patterns and typical speeds for blue whales it is reasoned that if there are 3 sightings of blue whales within the 3-hour period ahead of sunset, then this provides an indication that either an ARS or mesoscale search pattern may be overlapping the operational area, and therefore cause to suspend DP operations to avoid possible behavioural disturbance. The activity operational area is within a migration BIA for Southern right whales. Southern right whales observed within the portion of the activity observation zone that overlaps the migration BIA are therefore considered to be migrating regardless of the number of whales sighted and frequency of sightings. Migration occurs from/to offshore feeding areas to/from reproductive BIA at the coast (refer Figure 6-14). It is within the reproduction BIA that whales would be calving, nursing and resting, and may be more vulnerable to disturbance from noise generated by vessels. If any southern right whale is observed in the area of overlap between the activity observation zone and the reproductive BIA, but is not observed leaving the zone before sunset, then this is cause to suspend DP operations to avoid possible behavioural disturbance to the whale overnight. The 3-sightings in 3-hours measure is also still applied, because this level of sightings may indicate that a southern right whale (potentially with calf), is resting in the general area, and slowly moving back and forth from the area of overlap between the DP observation zone and reproductive BIA. The measures above are designed with the specific whale behaviours in mind, and are considered to be conservative and precautionary. There are multiple ports and vessel traffic within southern right whale reproductive BIA's with no such controls in place. Further to the above control measures EPS17.6 requires that DP Operations are suspended (if safe to do so) before any whale is observed within the Activity DP TTS zone continuously for 20 hours (ie less than the conservatively adopted 24 hours over which the TTS levels have been modelled and based on). If a whale is observed within 30 minutes of sunrise in the TTS zone it should be assumed that the whale was present throughout the preceding night period unless there is clear evidence to the contrary. This situation is hypothetical and the measure is highly precautionary given the conservatism applied to the modelling of accumulated sound exposure levels which assumes no movement of the whale.			undertaking observation in the period (up to 3 hours) ahead of night time or during low visibility periods, and ceasing DP operations if they are sighted.
Drone surveillance from vessel	As above.	May provide slight increase in visibility beyond nominal MMO viewing platform height for the duration of drone flight. This could provide slight increased confidence no foraging blue whales in the vicinity which could be injured or displaced. Risks would remain Low.	Not for this activity type. Some examples of drone use nearshore and offshore particularly for scientific study, though weather sensitive, and not for sustained periods.	Additional cost of drone hire/purchase and pilot for the duration of the campaign estimated circa $60K.	Dropped object risks. Risks of loss of equipment. Not considered reliable at the operational level for this activity.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk, whilst adding cost and additional operational HSEC risks. The costs/risks are grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
						underwater sound emissions.
Monitor oceanographic precursors (early warning system)	As above.	There are oceanographic and biological precursors such as SST, eddies and primary production which may provide an indication of increased secondary production (including krill), which may then be conducive to successful foraging (e.g. Murphy et al. 2017). The benefit of this early warning system is dependent on reliability of these precursors as indicators of blue whale foraging; currently, reliability is likely to be low, which could lead to many false positives. Risks would remain Low.	Not typically applied in offshore industries. Primary productivity measurements are not an accurate pre-cursor to feeding activity. There can be a significant lag between peaks in Chl-A levels and peaks in krill presence. Other factors determine presence of foraging marine mammals aside from prey levels.	Administrative costs of monitoring and interpreting environmental precursors estimated circa $50K.	Reliability is likely to be low, which could lead to many false positives with significant cost and schedule impact to the project.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions.
Satellite imagery	As above.	Satellite imagery can be used to gather oceanographic and biological information to support the understanding of presence of marine mammals in the area. Risks would remain Low.	Not typically applied in offshore industries. Sourcing and interrogating satellite imagery is possible, however at the operational level is not considered reliable.	Administrative costs of monitoring and interpreting satellite images.	Reliability is likely to be low with limited additional benefit relative to accepted controls.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions.
Infra-red/night vision systems	As above.	Infra-red (IR) and night vision systems could enhance the ability of MMOs to visually detect the presence of foraging whales. Risks would remain Low.	Infra-red systems are not available as a real-time monitoring tool for operations and have the following limitations: Poor performance of the system in sea states greater than Beaufort Sea State 4 (due to the inability to adequately stabilise the camera) (Verfuss et al. 2018). Conditions such as fog, drizzle, rain limit detections to be made using IR (Verfuss et al. 2018). Detection range for large baleen whales is 1 to 3 km. Trials of night-time detection technologies have been completed by operators in the Otway during 2025 concluded that the technology was not yet suitable for offshore campaigns (pers comms. Otway Rig Consortium 2025).	Additional cost of IR tech hire/purchase and operators for the duration of the campaign estimated circa $100K plus additional MMO's on each vessel to manage night-time observations (~400K).	Reliability is likely to be low with limited additional benefit relative to accepted controls.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
						achieved in relation to temporary operational subsea underwater sound emissions.
Passive Acoustic Monitoring (PAM)	As above.	PAM can be used to detect marine mammal calls, and support sightings made by MMO. Feedback from AAD indicated PAM was utilised during rock blasting activities in the Antarctic to verify subsea noise levels; if noise levels were higher than anticipated then explosive charges could be reduced.	Not typical for offshore vessel activities. Likely to be some interference from vessel noise at close range.	Additional cost of PAM tech hire / purchase and operators for the duration of the campaign estimated circa $100K.	Reliability considered lower than direct observations, with limited additional benefit relative to accepted controls.	Reject. Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions.
Campaign risk review in advance of campaign to ensure control measures continue to reduce impacts and risks to ALARP	As above.	Increased confidence the rationale for control measure selection and rejection are still valid, and that impacts and risks remain ALARP.	Yes – reflects intent of Amplitude Energy Risk Management (including change management) Processes. Including a minimum timeframe in advance of the campaign allows for further information (e.g. recent baseline information) to be considered in the risk review.	Cost of risk review accounted for as part of project planning.	None.	Implement. The Pre-Activity Risk Review Process includes provision for completing the risk review prior to the campaign commencing. Note – the timing of different risk review elements may differ, for example re-modelling (if required, may be long lead), whereas reconsideration of some control measures and additional would typically be reconsidered as part of the activity HAZID which may be completed ~1-6 months prior to mobilisation depending on the complexity of the Activity. Integrated into CM11: Campaign Risk Review.
Extend the Marine Mammal Observer and Activity modification provisions beyond peak foraging/migration	As above.	Increased confidence in no southern right whales or foraging blue whales in the vicinity which could be disturbed by noise from the activity.	Not typical for offshore vessel activities. Maritime Vessels typically rely on Vessel Crew to observe for whales. Crew / Officers of the Watch are experienced in working and watch keeping at sea (AMSA 2023).	Additional costs associated with mobilising MMO and/ or inducting Crew to implement the risk management provisions.	Marginal bed space on smaller vessel may drive the selection of a larger (and potentially noisier) vessel. MMOs have good reliability	Implement. The Offshore Victoria Whale Disturbance Risk Management Procedure (CM13) will monitor DP Observation Zones (and

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
seasons, to include shoulder season.					at the project operational level.	apply response actions) throughout the entire activity.
Collaboration with nearby titleholders to identify activity overlap and align approaches with whale disturbance risk management.	As above	Consistent implementation of control measures. Increased opportunities to improve outcomes across the Otway Basin activities.	Yes – considered good practice to share relevant learnings.	Cost of time to facilitate and partake in meetings / communications and implement associated actions.	None	Implement. Amplitude Energy participates in relevant communications with other Titleholders in the Otway, providing opportunity to discuss cumulative impacts and their management. Integrated into CM09: Titleholder Collaboration and CM14: Other Detection Technologies.
Dedicated broad scale vessel survey in the 7-days prior to the installation activities.	As above	May provide increased confidence of no foraging blue whales or southern right whales in the vicinity which could be injured or displaced. However in relation to this sub-activity the potential increase in confidence (presence/absence blue whale or southern right whale) is considered marginal given a 30-minute pre-watch of the DP observation zone will be completed before MODU mooring to provide real-time assessment of the potential of foraging blue whales and southern right whales within the area.	It is recognised good practice to minimise noise in the marine environment however a requirement for pre-activity marine mammal surveys are not typically applied to behavioural disturbance contours associated with vessels. Vessels in the region including the large shipping fleet, which may be as noisy as activity vessels, would not be expected to complete marine mammal surveys prior to turning on vessel thrusters and moving through either blue whale or southern right whale BIAs or HCTS. The 30-minute pre-watch and nighttime pre-watch criteria by dedicated MMOs of the campaign vessels will provide broad coverage of the behavioural EMBA, and far exceed typical controls applied by vessels in the region.	Cost of mobilising a vessel to the operational area, hiring a fit for purpose vessel to complete the survey. Estimated cost is >$100K in equipment, materials, people, per day.	HSE risks associated with vessel work can be managed via existing control of work. Risk to project schedule if the schedule window is not suitable for vessel survey, or if vessel becomes unavailable. Estimated cost risk is $2M associated with possible schedule delays.	Reject The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk noting the existing 30-minute pre-watch of the DP observation zone will be completed, whilst adding significant cost and additional operational HSEC and schedule risks.
Broad scale vessel survey daily or weekly, or targeted before installation activities.	As above	May provide increased confidence of no foraging blue whales or southern right whales in the vicinity which could be injured or displaced.	It is recognised good practice to minimise noise in the marine environment however a requirement for pre-activity marine mammal surveys are not typically applied to behavioural disturbance contours associated with vessels. Vessels in the region including the large shipping fleet, which may be as noisy as activity vessels, would not be expected to complete marine mammal surveys prior to turning on vessel thrusters and moving through either blue whale or southern right whale BIAs or HCTS. The 30-minute pre-watch and nighttime pre-watch criteria by dedicated MMOs of the campaign vessels will provide broad coverage of the behavioural EMBA, and far exceed typical controls applied by vessels in the region.	Cost of mobilising a vessel to the Operational Area, hiring a fit for purpose vessel to complete the survey. Estimated cost is >$100K in equipment, materials, people, per day. This equates to an extra $3 Million over the course of a 60-day campaign (if done every 2 days).	HSE risks associated with vessel work can be managed via existing control of work. Risk to project schedule if the schedule window is not suitable for vessel survey, or if vessel becomes unavailable. Estimated cost risk is $2M associated with possible schedule delays.	Reject The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk noting the existing 30-minute pre-watch of the DP observation zone will be completed, whilst adding significant cost and additional operational HSEC and schedule risks.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
Dedicated daily or weekly aerial surveys during activities or targeted before installation activities at Annie-2 location.	As above	May provide increased confidence of no foraging blue whales or southern right whales in the vicinity which could be injured or displaced. Lower probability of detection over smaller areas compared to other survey methods (e.g. vessel-based surveys).	Not typically applied to resupply activities. Aerial survey typically applied to activities that generate impulsive noise such as seismic survey. Could be considered good practice under the right weather conditions. There is a lower probability of detection over smaller areas compared to other survey methods (e.g. vessel-based surveys) (DECCEW, 2024). Detection probability is reduced when wind is >10 knots or with glare from the sun (DECCEW, 2024). Within the offshore Otway; whilst periods of low wind do occur, they are inherently unpredictable and generally occur for <~25% of the year for the Annie location (wind rose shown below). This is unlike other regions in Australia where there is higher confidence in wind regimes from season to season.  The image below is indicative of a typical day in the Bass Strait in the Gippsland, which is less exposed to the south-westerly wind regime than the Otway. Wind in this image is over 10-knots showing cetacean activity captured from support vessel with MMO on board.	Aerial surveys throughout installation activities could introduce significant cost and risk to the activities. Significant delays to the activity schedule in the event that the aerial survey is delayed due to waiting for safe weather windows for the flight. Potential costs >$10M (mainly associated with risk of weather delays)	HSE risks associated with aerial survey can be managed via existing control of work, though still introduce a high occupational health and safety risk relative to other observation techniques (DCCEEW 2024). Getting an aerial survey off the ground and back safe is weather dependent; weather in the Otway Basin is changeable, hence introduces an additional variable to project schedule risk. Depending on weather systems, suitable conditions for aerial survey may only occur a few times a month, and potentially all in the same week.	Reject The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk noting the existing 30-minute pre-watch of the DP observation zone will be completed, whilst adding significant cost and additional operational HSEC and schedule risks.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
			 Photo by MMO Claudia Hartmeier for Cooper Energy BMG Decommissioning Project Phase 1 2023-2024. Gippsland region offshore Victoria. Image below showing abnormally still ocean offshore Bass Strait in the Gippsland; Humpback whale and calf approaching support vessel (MMO on board).  Photo by MMO Bec Hall for Cooper Energy BMG Decommissioning Project Phase 1 2023-2024. Gippsland region offshore Victoria. Images below showing blue whale and pilot whales as captured by camera from aerial survey in the Gippsland Region. The minimum specifications for this survey were wind speed had to be <10 knots, and cloud base altitude had to be above 800m.			

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
			 Photo by Fathom Pacific during aerial survey for Cooper Energy 2022/2023. Gippsland region offshore Victoria.  Photo by Fathom Pacific during aerial survey for Cooper Energy 2022/2023. Gippsland region offshore Victoria.			
The use of land or based observation platforms, or vessel-based survey to observe for southern right whales within the area of overlap between activity behavioural EMBA and the southern right whale reproduction BIA during installation activities.	As above	Will increase confidence that no southern right whales are within the area of overlap between the behavioural EMBA and the reproduction BIA.	Not typical for offshore vessel activities. Maritime Vessels typically rely on Vessel Crew to observe for whales in close proximity to vessels only, including within southern right whale reproductive BIA. Crew/Officers of the Watch are experienced in working and watch keeping at sea (AMSA 2023). The viewing platform onshore (based on Halladale Point) is ~10m height above sea level, at this height the visible horizon is ~11km away, and detection of southern right whales within the Reproductive BIA which extends ~3km from shore, should be possible, though may not be possible across the entire section of overlap between activity behavioural EMBA and the southern right whale reproduction BIA.	Additional costs associated with mobilising MMO to shoreside viewing point and establishing communications within the MMO network.	HSE risks associated with mobilising an MMO to cliffside lookout point in variable weather conditions. May not be safe in storm conditions, which are more likely in winter. Visual detection is theoretically possible but requires confirmation through implementation. For a single	Seasonal implementation. Use of land-based or vessel-based observations to sight cetaceans within the southern right whales reproduction BIA during installation activities at Annie-2 will be implemented for activities where the behavioural noise EMBA for the

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
					shore-side survey the costs are expected to be <$10K. The reliability of this measure is expected to be low-moderate. An alternate observation method will be vessel-based survey over the area of overlap between the activity behavioural EMBA and southern right whale reproduction area, which is a well-established practice, and cost of adopting this for one-off activity is not prohibitive, assuming a project vessel could be diverted to complete the survey.	activity overlaps the southern reproduction BIA during the southern right whale season (including shoulder seasons). The survey (at least 1 hour observation) is to be conducted the day of, or the day prior-to the commencement of MODU hook-up or mooring, and resupply sub-activities. DP operations will not commence if a southern right whale is within the area the behavioural noise contours are predicted to overlap the reproduction BIA, Integrated into CM17: Offshore Victoria Whale Disturbance Risk Management Procedure and EPS 17.2.

6.7 Introduction, Establishment and Spread of IMS

6.7.1 Cause of Aspect

Invasive marine species (IMS) include marine plants or animals that have been introduced into a region beyond their natural range. IMS can survive, reproduce and establish founder populations which may predate on or outcompete native species. Species of concern are those that are not native and are able to spread by human mediated or natural means. The activities that may cause an unplanned introduction of IMS due to the Activity are identified in Table 6-45 and described in further detail in subsections below.

Table 6-45: Activities that may result in the Introduction of IMS

Aspect / Phase	Activity component
Surveys	Geotechnical surveys
	Pre- and post-lay surveys
Support activities	Vessel operations
	ROV operations

The survival and invasive capabilities of IMS once introduced depend on certain environmental factors, such as water temperature, depth, salinity, nutrient levels, habitat type and competition. Successful IMS invasion requires the following circumstances:

- Colonisation and establishment of the IMS on a vector (e.g. vessel hull) in a donor region (e.g. home port).
- Survival of the IMS on the vector during the voyage from the donor to the recipient region (e.g. operational area).
- Colonisation (e.g. dislodgement or reproduction) of the IMS in the recipient region, followed by successful establishment of a viable new local population.

Various natural and anthropogenic events establish pathways for IMS translocation and introduction around Australia. In relation to the Activity facilities and activities, the introduction, establishment and spread of IMS could occur through several different pathways and risk events, as described in Table 6-46.

Table 6-46: Pathways for the Introduction, Establishment and Spread of IMS

Pathway to Introduction	Means of Establishment	Mechanisms of Spreading
IMS is transferred into the field, becomes established and spreads.		
IMS within biofouling on vessels dislodged to the seabed. IMS within biofouling on equipment that is routinely submerged in water, and which is dislodged to the seabed.	Suitable habitat and conditions available for IMS in field.	Once established may spread by itself if conditions are suitable. In field equipment may provide connectivity allowing spread across infrastructure. Other anthropogenic influence (e.g. fishing) could spread established IMS within and outside of the field.
IMS is transferred between vessels, establishes on vessels and is spread to other areas (e.g. ports).		

Pathway to Introduction	Means of Establishment	Mechanisms of Spreading
Discharge of ballast water containing IMS.	Suitable habitat and conditions available for IMS on vessels and within ballast and seawater systems.	IMS spreads between ports and other facilities via vessels acting as a vector.
IMS is transferred out of the field, becomes established at locations inside or outside the region and spreads.		
Already established populations of IMS within the offshore field via natural or anthropogenic influences are recovered with equipment and dislodged whilst being transferred to shore.	Suitable habitat and conditions available for IMS at shoreside facilities.	Once established may spread by itself if conditions are suitable. May become established on structures at ports, and from there spread to vessels which then become a vector for the spread of IMS.

6.7.2 Aspect Characterisation

6.7.2.1 IMS Already Established in the Region

A variety of IMS have become established within ports around Australia. Even within the same region, different ports may host a mix of established IMS (Australian Government 2019). Ports are often suitable for establishment of IMS because they are regularly exposed to IMS from many different vessels that may lay-up for long periods of time. Ports also typically have shallow areas and hard structures which provide suitable substrate for establishment. IMS can be translocated from a port in either vessel ballast or as biofouling, as described in the sections below.

Table 6-47 details the marine pests of greatest concern for the relevant domestic locations for the Activity, compared with the IMS potentially occurring in Australian waters. Whilst the number of IMS potentially occurring within Australian waters is extensive, the list below is compiled from the known IMS listings on the Australian Government Marine Pest website (Australian Government 2019), IMS of most concern on the Victorian Parks website (Parks Victoria 2025) and advice from State Government Biosecurity dept.

Table 6-47: High-Risk Marine Species of Concern to Australia (Australian Government, 2019; Parks Victoria, 2025)

Scientific Name	Common Name	Key Ports in the Region (✓ = confirmed IMS; w = keep watch for) (Australian Government, 2025)	
		Portland (Otway)	Melbourne / Geelong (Port Phillip Bay)
Invasive Marine Species (not known to be established in Australia)			
Balanus improvises	Barnacle	-	-
Caprella mutica	Japanese skeleton shrimp	-	-
Caulerpa taxifolia (exotic strains only)	Green macroalga	-	-
Charybdis japonica	Lady crab, Asian paddle crab	-	-

Scientific Name	Common Name	Key Ports in the Region (✓ = confirmed IMS; w = keep watch for) (Australian Government, 2025)	
		Portland (Otway)	Melbourne / Geelong (Port Phillip Bay)
Corbula (Potamocorbula) amurensis	Asian clam, brackish-water corbula	w	w
*Crassostrea gigas**	Pacific Oyster	-	-
Crepidula fornicate	American slipper limpet	w	w
Didemnum perlucidum	White colonial sea squirt	-	-
Ensis directus	Jack-knife clam	-	-
Eriocheir sinensis	Chinese mitten crab	w	w
Hemigrapsus takanoi/penicillatus	Brush-clawed shore crab	-	-
Marenzelleria spp. (invasive species, marine/estuarine incursions)	Red gilled mudworm	-	-
Mnemiopsis leidyi	Comb jelly	-	-
Mya arenaria and japonica	Soft shell clam	w	w
Mytella strigata	Charru mussel	w	w
Mytilopsis sallei	Black striped false mussel	w	w
Neogobius melanostomus (marine/estuarine incursions)	Round goby	-	-
Perna canaliculus	New Zealand green-lipped mussel	-	-
Perna perna	Brown mussel	-	-
Perna viridis	Asian green mussel	w	w
Rapana venosa (syn. Rapana thomasiana)	Rapa whelk	w	w
Rhithropanopeus harisii	Harris' mud crab	-	-
Sargassum muticum	Asian seaweed	-	-
Siganus rivulatus	Marbled spinefoot, rabbit fish	-	-
Spartina anglica and Spartina x townsendii sp	Cord Grass	-	-
Urosalpinx cinerea	Atlantic oyster drill	-	-

Scientific Name	Common Name	Key Ports in the Region (✓ = confirmed IMS; w = keep watch for) (Australian Government, 2025)	
		Portland (Otway)	Melbourne / Geelong (Port Phillip Bay)
Established in Australia			
*Asterias amurensis**	Northern Pacific sea star	-	✓
Arcuatula senhousia	Asian bag mussel, Asian date mussel	✓	✓
*Carcinus maenas**	European green crab	-	✓
Codium fragile spp. Tomentosodies	Green macroalga	-	-
Didemnum vexillum	Carpet sea squirt	-	-
Grateloupia turuturu	Red macroalga	-	-
Hemigrapsus sanguineus	Asian shore crab	w	✓
*Maoricolpus roseus**	New Zealand screwshell	-	-
*Sabella spallanzanii**	European fan worm	✓	✓
*Undaria pinnatifida**	Wakame	-	✓
Varicorbula gibba	European clam	-	-
Caulerpa taxifolia	Aquarium caulerpa	-	-
Holoplankton high-risk species			
Alexandrium monilatum, Dinophysis norvegica and *Pfiesteria piscicda*	Toxic dinoflagellate species	-	-
Chaetoceros concavicornis and *Chaetoceros convolutes*	Centric diatom species	-	-
Pseudo-nitzschia seriata	Pennate diatom	-	-
* Most concerning IMS in Victoria (Parks Victoria, 2025).			

6.7.2.2 IMS Associated with Vessels and Activity Equipment

Ballast Water

Ballast water maintains stability of ships at sea to provide safe operating conditions. Water is pumped into the ballast tanks of ships from the surrounding environment and is subsequently released when the ships weight needs to be lightened. This transfer of water, which may contain bacteria, microbes, small invertebrates, eggs, cysts and larvae may result in the introduction and spread of IMS, if these species can survive and establish (IMO 2025a).

Vessels are required to manage ballast water to minimise the risk of IMS introduction and spread, in accordance with the International Maritime Organisation (IMO) Ballast Water Convention (IMO 2017), the Australian Ballast Water Management Requirements (DAWE 2020) and the Biosecurity

Act 2015. The obligations of vessels operating in Australian waters includes the development of a valid ballast water management plan and the use of approved ballast water management systems. Since the Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF) (and predecessors) introduction of mandatory ballast water regulations, where ballast water must be exchanged outside territorial sea (12 nm off the Australian coast, including islands), risk of IMS from international shipping has been greatly reduced.

Biofouling

Biofouling occurs through the accumulation of microorganisms, plants, algae or other organisms on submerged structures, including the underwater surfaces of ships (e.g. propellers, anchors and hulls) (IMO 2025b). Installed infrastructure may also provide marine organisms, including IMS, with a substrate to attach to.

Biofouling is one of the main vectors for the introduction and spread of IMS and Department of Agriculture and Water Resources (DAWR) (2018) suggest that biofouling has been responsible for more IMS introductions than ballast water. DAFF provide guidelines for the management of IMS from biofouling (DAFF 2009) and have now also specified requirements for vessels of international origin to manage biofouling risk (DAFF 2023).

The vessels and equipment may be sourced internationally and domestically. Vessels will transit between the operational area and domestic ports. IMS on the vessels can be dislodged to the seabed and establish if conditions and habitats are suitable. Anthropogenic influences (e.g., vessel transit, fishing) could spread IMS within and outside of the field. There may be periods where the vessels work in close proximity, where there may be potential for IMS to translocate from equipment, or from one vessel to another if vessels are not managed appropriately, for example, through ballast exchange or dislodged biofouling.

6.7.3 Predicted Environmental Impacts and Risks

The potential impacts and risk events associated with IMS introduction (assuming their survival, colonisation and spread) could result in a change in ecosystem dynamics which may include:

- change in ecosystem dynamics.
- change to the functions, interests, or activities of other marine users.

The introduction of IMS could occur within the operational area. Receptors which may be directly affected include marine invertebrates and benthic habitats. Indirect effects are possible to commercial fisheries, conservation values of protected areas and First Nations cultural values and sensitivities. Impacts and risks to First Nations cultural heritage are assessed in Chapter 7.2.

6.7.4 Impact and Risk Evaluation

6.7.4.1 Risk: Change in Ecosystem Dynamics

Inherent Consequence Evaluation

Due to the complexity of ecosystems, there is a high degree of uncertainty in predicting how an introduced species may interact with a new environment. The level of invasiveness and ultimate impact of the species will be dependent on the conditions of the new environment being favourable for that species. Not all introduced species will survive and establish in a new environment.

The benthic habitats at the operational area are characterised by unconsolidated substrates consisted mainly of sand, shell grit, and rubble, with occasional rock, typical of the broader Otway region. Therefore, limited areas of rocky substrate exist which provide habitat for diverse

assemblages of species. Any IMS introduced into the operational area have the potential to become established on the seabed, impacting the benthic habitats and species present.

If IMS survive and establish, they may change ecosystem dynamics by altering predator-prey interactions, out-competing native species for resources, segregating habitat, spreading viruses or toxic chemicals, altering water quality, and disturbing, injuring or killing vital ecosystem organisms (ecosystem engineers and keystone species). Higher trophic levels may also be impacted by the introduction of IMS. Marine mammals and birds foraging offshore can be indirectly affected by any changes in prey associated with IMS, possibly reducing food availability.

If IMS were transferred between the vessels within the operational area, spread of IMS is possible to areas beyond the operational area. Ports and other offshore industry could potentially be exposed through both ballast and biofouling, impacting benthic habitats, marine fauna and coastal and offshore socio-economic receptors beyond the operational area.

IMS may be difficult and costly to eradicate from areas once established (Hewitt et al. 2002). If the introduction is captured early, eradication may be effective but is likely to be expensive, disruptive and, depending on the method of eradication, harmful to other local marine life.

IMS introduction and establishment is evaluated to have a consequence **Level 4**, based on:

- Species in the operational area of conservation value.
- Ability of introduced IMS to impact areas beyond the operational area.
- Difficulty to eradicate IMS once established and potential long-term effects.

6.7.4.2 Risk: Change to the Functions, Interests, or Activities of Other Users

Inherent Consequence Evaluation

IMS may also impact socio economic receptors through a reduction in ecological values. Primary impacts include direct damage to vessels, equipment and infrastructure, leading to a reduction in efficiency, productivity and profit. IMS can deplete fishing grounds and aquaculture stock, with between 10% and 40% of Australia's fishing industry being potentially vulnerable to marine pest incursion.

For example, the introduction of the Northern Pacific Sea star in Victorian and Tasmanian waters was linked to a decline in scallop fisheries (Dommisse and Hough 2004). As described in Section 4.4.3, 13 managed fisheries (6 Commonwealth and 7 Victorian State managed) were identified within the operational area, of which 6 have recorded fishing efforts. Furthermore, tourism operators may utilise the operational area for a number of activities such as fishing charters which commonly target bluefin tuna, gummy, school and mako sharks and reef species such as snapper.

As above, IMS introduction and establishment is evaluated to have a consequence **Level 4**, based on:

- Species in the operational area of conservation value.
- Ability of introduced IMS to impact areas beyond the operational area.
- Difficulty to eradicate IMS once established and potential long-term effects.

Inherent Likelihood

Highly disturbed nearshore environments (such as marinas) are more susceptible to IMS establishment than open-water environments (Paulay et al. 2002). Successful IMS establishment is dependent upon suitable substrate and habitat availability, such as rocky and hard benthic habitat or subsea infrastructure. The probability of successful IMS establishment and spread decreases in well-mixed, deep ocean waters away from coastal habitats (Geiling 2014). Although the operational area

is expected to have some hard benthic habitat, it is in an open-water environment with water depths greater than 50 m and thus is not expected to be conducive to the translocation and survival of IMS from vessels or the equipment to the seabed.

Any IMS introduced to the operational area would be expected to remain fragmented and isolated, and only within the vicinity of the infrastructure (i.e. it would not be able to propagate to nearshore environments).

In summary, the chances of successful colonisation inside the operational area are considered small given:

- The operational area occurs outside of coastal waters where the risk of IMS establishment is considered greatest (BRS 2007).
- The Australian Government Bureau of Resource Sciences (BRS) established that the relative risk of IMS incursion decreases with distance from the coast. The modelling estimates: 33% chance of establishment at 3 nm, 8% chance at 12 nm and 2% chance at 24 nm based on a 50 m depth contour. The operational area is in approximately 56 - 74 m water depth and is located offshore.
- Practices for minimising the risk of IMS spread are well established within the marine industry and there are clear requirements set by the DAFF.
- Amplitude have established communications with Victorian Government Biosecurity specialists who provide advice on species of interest and requirements as they evolve.
- The operational area will not have any long-term platforms, FPSO or moored vessels, with the vessels being in the operational area temporarily; as vessels will be moving relatively frequently, the risk of attachment of IMS and colonisation of the facilities is reduced compared to a permanent or semi-permanent vessel presence.
- There have been no IMS introductions from Amplitudes previous activities or other activities in the vicinity.

The likelihood of IMS becoming established within the operational area as a result of the activities is therefore considered **Remote (E)**.

The spread of IMS from the operational to areas elsewhere via translocation of IMS between vessels is also considered here. Several factors reduce the chance of IMS translocating between vessels:

- The offshore environment within the Otway region is highly dispersive, and vessels will be frequently moving; these conditions are not typically conducive to the establishment of marine organisms onto a new surface.
- There are several international and national management measures which already manage the potential introduction of IMS.

The likelihood of the transfer of IMS between vessels within the operational area, which may then become established elsewhere as a result of the activities, is considered **Remote (E)**.

Inherent Risk Severity

The inherent risk severity of the introduction, establishment and spread of IMS is considered **Moderate**.

6.7.5 Control Measures, ALARP, and Acceptability Assessment

Table 6-48 provides a summary of the control measures and ALARP and acceptability assessment relevant to the introduction, establishment and spread of IMS.

Table 6-48: Introduction, Establishment and Spread of IMS ALARP, Control Measures and Acceptability Assessment

Introduction, Establishment and Spread of IMS	
ALARP Decision Context and Justification	**ALARP Decision Context: Type B** The introduction, establishment and spread of IMS has been assigned a Level 4 consequence; the likelihood of this consequence occurring is considered Remote. The causes resulting in an introduction of IMS from a planned release of ballast water or biofouling are well understood and effectively managed by international and national requirements and industry guidance. Amplitude and their offshore service partners are experienced in industry requirements and their operational implementation through their existing ongoing operations. No objections or concerns were raised during consultation regarding this activity or its potential impacts and risks.
Control Measure	**Source and Description of Control**
CM16: Amplitude IMS Risk Management Protocol	The National biofouling management guidelines for the petroleum production and exploration industry (DAFF 2009) recommend a biofouling risk assessment is undertaken for vessels and, where necessary, conducting in water inspection, cleaning and antifouling renewal. These guidelines should also be read in conjunction with the Anti-fouling and In-water Cleaning Guidelines (DoA 2015)[7]. In line with these recommendations Amplitude Energy uses an IMS Risk Assessment to evaluate IMS risks. Prior to and during operations the Amplitude IMS Risk Management Protocol will be implemented for all vessels and submersible equipment and will consider all regions visited by the facilities (international and domestic). The Amplitude IMS Risk Management Protocol has been prepared to align with: • Advice from the Victorian Government Marine Biosecurity Section. • National biofouling management guidelines for the petroleum production and exploration industry (DAFF 2009). • Australia Biofouling Management Requirements (DAFF 2023). • Guidelines for the control and management of a ships' biofouling to minimise the transfer of invasive aquatic species (IMO Biofouling Guidelines; IMO 2023). • Reducing marine pest biosecurity risks through good practice management Information paper (NOPSEMA 2020). Further information on the Amplitude IMS Risk Management Protocol is provided within Section 12.9.
Impact and Risk Summary	
Residual Impact Consequence	N/A
Residual Risk Consequence	**Level 4:** Extensive medium to long-term impact on highly valued ecosystems, species populations or habitats.
Likelihood	**Remote (E)**: A combination of factors would be required for an occurrence. Not expected to occur during the activity. Occur in exceptional circumstances.
Residual Risk	**Moderate**

[7] Draft Australian Anti-Fouling and In-Water Cleaning Guidelines were published in 2024 (**https://www.waterquality.gov.au/anz-guidelines/resources/guidance**).

Introduction, Establishment and Spread of IMS	
Demonstration of Acceptability	
Principles of ESD	Introduction, establishment and spread of IMS is evaluated as having Level 4 consequence which has the potential to result in serious or irreversible environmental damage. With the established processes in place, there is little residual uncertainty associated with this aspect. The activities and impact pathways are well known, regulated and managed. It is not considered that there is significant scientific uncertainty associated with this aspect. Therefore, the precautionary principle has not been applied beyond the precautionary measures already integrated into the IMS protocol.
Legislative and Conventions	The control measures proposed to manage this risk are meet the following requirements: • *Biosecurity Act 2015 (Cth)* - Chapter 5, Part 3 (Management of discharge of ballast water) & Chapter 4 (Managing biosecurity risks). • International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004 (the BWMC). • *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006*. • AMSA Marine Order 98: Marine Pollution Prevention - Anti-fouling Systems. • *Environment Protection Act 1970 (Vic)*. • Environment Protection (Ships Ballast Water) Regulations 2006. • Australian Ballast Water Management Requirements (DAFF 2020). • Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (IMO 2023). • National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (DAFF 2009). • Australia Biofouling Management Requirements (DAFF 2023).
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03). • Health Safety and Environment Management (MS09). • Supply Chain and Procurement Management (MS11). Activities will be undertaken in accordance with the Implementation Strategy (Section 12.0).
External Context	Activity will be undertaken in a manner consistent with relevant legislation, industry standards and guidelines, offshore practices and benchmarking. The activity is not predicted to result in impacts to species that would be inconsistent with recovery plans or conservation advice. No objections or claims have been received during consultation regarding IMS.
Demonstration of meeting the defined acceptable levels in the OPP	Section 9.4.6 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with introduction, establishment and spread of IMS. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed above. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for introduction, establishment and spread of IMS:

Introduction, Establishment and Spread of IMS	
	• OPP EPOs and EP EPOs are equivalent (refer Appendix 1**,** Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1 , Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	**Acceptable** Amplitude has determined that impacts and risks related to the introduction, establishment and spread of IMS are acceptable, based on: • The planned management of impacts and risks integrates Amplitude internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advice, and significant impact guidelines for MNES. • No feedback from relevant persons has been received that would inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures other than DEECA (Event ID 2025 0811 081516 6215; Appendix 7) regarding the presence of *Undaria pinnatifida in the Port of Portland.* To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: • EPO18: No introduction, establishment or spread of invasive marine species.

6.8 Accidental Hydrocarbon Release

6.8.1 Cause of Aspect

Hydrocarbons may be accidentally released into the marine environment as a result of the Activity as identified in Table 6-49 and described below.

Table 6-49: Activities that may result in an Accidental Release of Hydrocarbons

Aspect / Phase	Activity component
Installation, Testing and Preservation	Installation activities
Support activities	Vessel operations

This section addresses the high order (most severe or worst-case) spill scenarios. Minor loss of containment (LOC) from subsea infrastructure is assessed in Table 6-3. These scenarios could result in a small extent of impact, which have been captured within the EMBA and monitoring area defined and assessed within this EP.

6.8.2 Aspect Characterisation

Amplitude Energy have identified two worst-case, spill scenarios that may occur during the Activity:

- A subsea pipeline leak of gas and condensate (approximately 50m^3) over several minutes as a result of a pipeline/ flowline rupture.
- An instantaneous release of 600 m^3 of MGO over 3 hours as a result of a vessel collision rupturing a vessel fuel tank and causing a LOC.

Amplitude Energy commissioned RPS to conduct stochastic modelling and deterministic analysis (RPS 2025) based on the worst-case credible spill scenario (Table 6-50) for this Activity. Given the expected volumes of the two identified credible scenarios (Section 6.8.2); the MGO spill was identified as the worst-case credible scenario.

In comparing the Monitoring EMBA for the 600m^3 MGO spill (refer Figure 4-1) and the subsurface release of 10,563m^3 (much greater volume than a subsea pipeline release of 50m^3) of condensate from a loss of well control event (refer Figure 4-1 of the **Otway Offshore Operations Environment Plan**), it can be seen that the EMBA for each spill are similar in spatial extent, further validating that the 600m^3 MGO spill associated with a vessel collision is the worst case scenario for this Activity, given the subsea pipeline rupture release for this activity is much smaller than 10,563m^3 presented in the **Otway Offshore Operations Environment Plan** as the worst case scenario, and what drives the EMBA.

6.8.2.1 Installation, Testing and Preservation

During installation activities (e.g., heavy lifting or installation of subsea infrastructure), a heavy object (i.e. hydraulic tool, drill collar, or crane load) may be accidentally dropped overboard from a vessel operating within the operational area this could result in a pipeline rupture (of either the existing Casino Henry Netherby Pipeline, or the smaller connecting flowlines), releasing gas and condensate over several minutes as system shuts in and pipeline pressure falls to ambient.

The worst case volume would be from a rupture of the larger Casino Henry Netherby pipeline. The Casino Henry Netherby Pipeline contains primarily gas, with approximately 100m^3 condensate distributed along the entire length of the flowline system. With a single rupture point in the pipeline system, a conservative estimate 50m^3 condensate release as the system shuts in. This worst case

scenario is described and assessed in Section 6.7 of the accepted Otway Offshore Operations Environment Plan (**Otway Offshore Operations Environment Plan**). In accordance with Regulation 56 of the OPGGS(E)R, in relation to this loss of containment event, please refer to the accepted **Otway Offshore Operations Environment Plan**). The accepted EP is publicly available on the NOPSEMA website (Cooper Energy 2024).

6.8.2.2 Support Activities

Support activities during the Activity will include vessel operations for surveys, installation activities, IMR, diver operations and supply runs. It is considered credible that an unplanned release of MGO into the marine environment could occur as a result of hull damage or a fuel tank rupture following a vessel collision between the support vessel and another, or the support vessel and a third-party vessel. Vessel collisions typically occur due to:

- navigational error or loss of position
- mechanical failure
- extreme weather events.

Vessel grounding has not been assessed as a credible risk as there are no emergent features within the operational area.

Amplitude Energy assessed the worst-case credible spill scenario that could result from a vessel collision. As vessels have not yet been contracted, a nominal fuel tank volume was used based on a typical installation vessel. This approach aligns with AMSA's guideline for indicative maximum credible spill volumes for other, non-oil tanker, vessel collision (AMSA 2015).

6.8.3 Quantitative Hydrocarbon Spill Modelling for MGO release

The spill modelling used to inform the subsurface release of 50m^3 of condensate is described in Section 6.7.2.1 of the **Otway Offshore Operations Environment Plan**. Amplitude Energy commissioned RPS to conduct stochastic modelling and deterministic analysis (RPS 2025) based on the worst-case credible spill scenario (Table 6-50) for this Activity. Given the expected volumes of the two identified credible scenarios (Section 6.8.2); the MGO spill was identified as the worst-case credible scenario.

A spill of 600 m^3 of MGO was determined to be an appropriate and conservative volume for this Activity as the larger fuel tanks on board industry vessels tend to be within range of this volume. It is acknowledged that vessel fuels tanks may be smaller or larger, however, this volume is considered sufficient for this stage of planning. Also noting in the event of a fuel tank rupture, the rate of release of the overall hydrocarbon inventory on a vessel may vary, however is unlikely to be instantaneous and over a short period of time such as 3 hours.

The spill modelling was performed using an advanced three-dimensional trajectory and fates model, Spill Impact Mapping Analysis Program (SIMAP). The SIMAP model calculates the transport, spreading, entrainment and evaporation of spilled hydrocarbons over time, based on the prevailing wind and current conditions, and the physical and chemical properties.

The SIMAP system, the methods and analysis presented herein use modelling algorithms which have been anonymously peer reviewed and published in international journals. Further, RPS warrants that this work meets and exceeds the ASTM Standard F2067-13 "Standard Practice for Development and Use of Oil Spill Models".

The SIMAP model can track hydrocarbons to levels lower than are biologically significant or visible to the naked eye. Therefore, reporting thresholds have been specified (based on the scientific

literature) to account for “exposure” on the sea surface and “contact” to shorelines at meaningful levels.

Table 6-50: Spill Modelling Parameters for the Vessel LOC Scenario

Parameter	Spill Scenario
Location	Annie-2
Maximum credible spill volume	600 m^3
Number of randomly selected spill start times	100
Model period	Annual
Hydrocarbon type	MGO
Release type / depth (m)	Surface
Release duration	3 hours
Simulation length	30 days
Surface hydrocarbon concentration thresholds (g/m^2)*	1 (low); 10 (moderate); 50 (high)
Shoreline hydrocarbon accumulation thresholds (g/m^2)*	10 (low); 100 (moderate); 1,000 (high)
Dissolved hydrocarbon concentrations (ppb)*	10 (low); 50 (moderate); 400 (high)
Entrained hydrocarbon concentrations (ppb)*	10 (low); 100 (high)

* See for hydrocarbon threshold rationale.

6.8.3.1 Hydrocarbon Thresholds

Hydrocarbon spill events have the potential to expose ecological and social receptors to different hydrocarbon expressions and concentrations. Hydrocarbon expressions include:

- surface
- shoreline
- in-water.

The concentration thresholds used in the impact assessment for the different exposure types (surface, in-water, shoreline) are described in Table 6-51. These impact thresholds and exposure pathways are then applied at a receptor level for use in the consequence evaluations. These thresholds align with the NOPSEMA environmental bulletin ‘Oil Spill modelling’ (NOPSEMA 2019).

Table 6-51: Hydrocarbon Impact Thresholds

Exposure Level	Impact Threshold	Justification
Surface Hydrocarbon		
Low	1 g/m^2	Approximates range of socioeconomic effects and establishes planning area for scientific monitoring.
Moderate	10 g/m^2	Approximates lower limit for harmful exposures to birds and marine mammals.
High	50 g/m^2	Approximates surface oil slick and informs response planning.
Shoreline Hydrocarbon		
Low	10 g/m^2	Predicts potential for some socio-economic impact.
Moderate	100 g/m^2	Loading predicts area likely to require clean-up effort.

Exposure Level	Impact Threshold	Justification
High	>1000 g/m^2	Loading predicts area likely to require intensive clean-up effort.
In-water – Dissolved Hydrocarbon		
Low	10 ppb	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers.
Moderate	50 ppb	Approximates potential toxic effects, particularly sublethal effects to sensitive species.
High	400 ppb	Approximates toxic effects including lethal effects to sensitive species.
In-water – Entrained Hydrocarbon		
Low	10 ppb	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers.
High	100 ppb	As appropriate given oil characteristics for informing risk evaluation.

6.8.3.2 Hydrocarbon Characteristics

The MGO selected for modelling is a light-persistent hydrocarbon (classified as Group II by the International Tankers Owners Pollution Federation (ITOPF 2014), with a low dynamic viscosity and low pour point (Table 6-52). The hydrocarbon has low (5%) residual component (i.e., the component that tends not to evaporate and that may persist in the marine environment) (Table 6-52).

Table 6-52: Physical Characteristics of Condensate and MGO

Type	**API**	**Pour Point (°C)**	**Density kg/m^3)**	**Viscosity cP**	**Non-persistent**			**Persistent**
					Volatiles (BP < 180°C)	Semi-volatiles (180°C < BP < 265°C)	Low Volatiles (265°C < BP < 380°C)	Residuals (BP > 380°C)
MGO	37.6	-14	829.1 at 25°C	4 at 25°C	6.0%	34.6%	54.4%	5.0%
Annie-1	41	-30*	820 at 16°C	1.063 at 20°C*	8%	46.5%	28%	17.5%

The condensate modelled for the subsurface release of condensate was based on Annie-1 condensate; a light persistent hydrocarbon (classified as Group II (ITOPF 2014), with a low dynamic viscosity and low pour point. The condensate comprises of a significant portion of volatiles and semi- to low-volatiles (82.5% total) with 17.5% residual components. This means the condensate will evaporate readily when on the water surface, with the persistent components to remain on the water surface over time (Table 6-52). A few specific physical characteristics were not available for Annie-1 Therefore, this information was supplemented from the Minerva condensate assay, found in a nearby reservoir and considered an appropriate analogue for this information.

6.8.3.3 Weathering and Fate

The weathering and fate of the condensate is described in Section 6.8.3.3 of the **Otway Offshore Operations Environment Plan** for the subsurface release of condensate.

A series of model weathering tests were conducted to illustrate the potential behaviour of the MGO when exposed to idealised and representative environmental conditions.

The mass balance for the MGO under constant 5 knot winds show that 39.3% of the oil will evaporate within 24 hours (Figure 6-15). Under calm conditions, the majority of the remaining oil on the water surface will weather at a slower rate as it is comprised of low volatile, longer-chain compounds.

Under variable-wind conditions, where winds are of greater strength on average, entrainment of MGO into the water column is shown to increase (Figure 6-16). Approximately 24 hours after the spill, 78.1% of the mass is shown to have entrained and a further 17.4% is shown to have evaporated, leaving only a small proportion of the oil floating on the water surface (<1%).

The increased level of entrainment during variable-winds results in a higher percentage of decay at an approximate rate of ~2.7% per day, compared to 0.2% per day during constant winds.

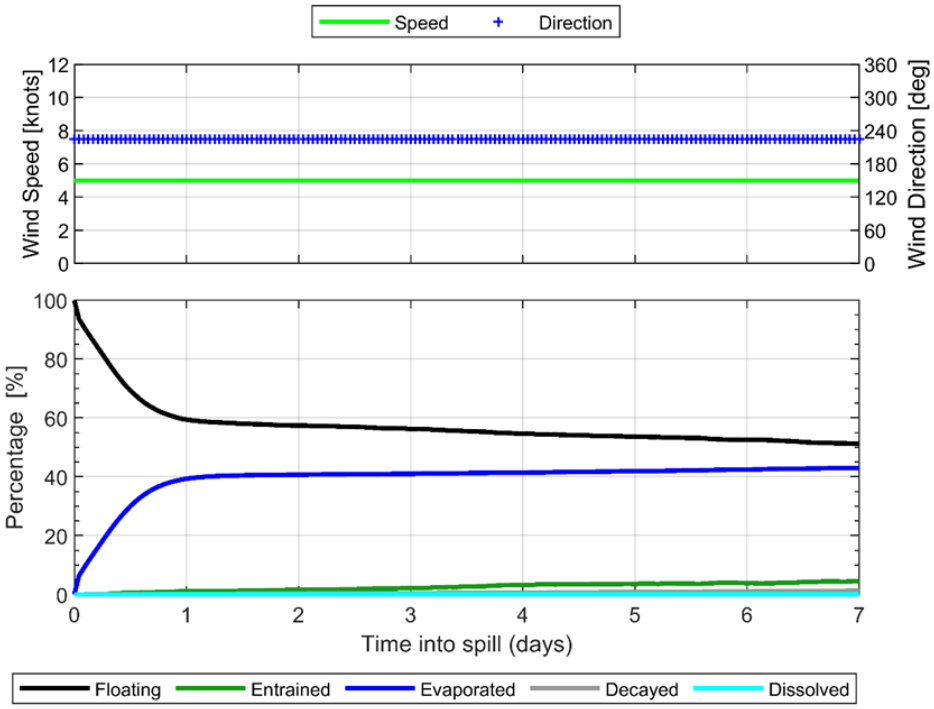


Figure 6-15: Proportional Mass Balance Plot Representing the Weathering of MGO Spilled onto the Water Surface over 1 hour and Subject to a Constant 5 knots Wind Speed at 15 °C Water Temperature (RPS 2025).

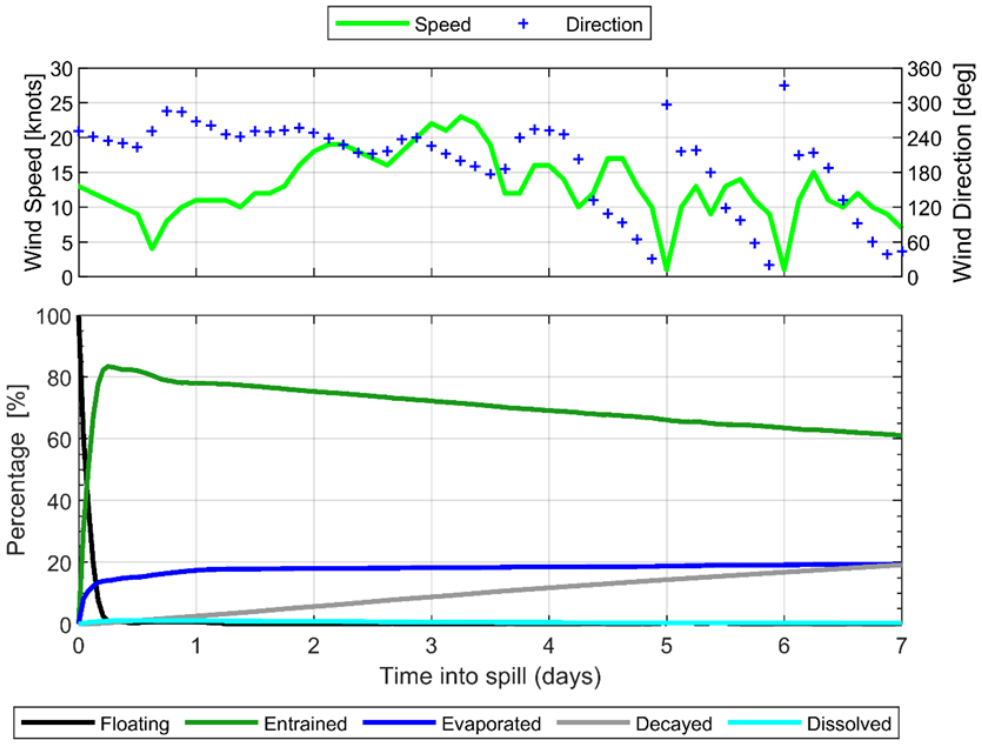


Figure 6-16: Proportional Mass Balance Plot Representing the Weathering of MGO Spilled onto the Water Surface over 1 hour and Subject to a Variable Wind Speeds (1-23 knots) at 15 °C Water Temperature (RPS 2025).

6.8.3.4 Modelling Results

The modelling results for a subsurface loss of containment of condensate are included in Section 6.8.3.4 of the **Otway Offshore Operations Environment Plan**. The scenario presented in the of the **Otway Offshore Operations Environment Plan** is a much larger volume from a loss of well control event (10,563 m^3) when compared to the pipeline rupture (50 m^3) so is very conservative.

Stochastic Analysis

Table 6-53 provides a summary of the results from the stochastic modelling for Vessel LOC (MGO) during the activity (RPS 2025).

Table 6-53: Stochastic Modelling Output Summary for Vessel LOC - MGO

Exposure Values	Summary of worst-case predicted exposure
Surface Hydrocarbon	
Low (1 g/m^2)	Floating hydrocarbon at this level is expected to be visually detectable but not have ecological impacts. • The maximum distance for floating hydrocarbon exposure from the source was predicted to be 31.8 km. • Would intersect with BIAs for cetacean and seabird species. • Would intersect with the South-east Marine Reserve and The Arches Marine Sanctuary.
Moderate (10 g/m^2)	Floating hydrocarbon at this level has the potential to cause ecological impacts.

Exposure Values	Summary of worst-case predicted exposure
	• The maximum distance for floating hydrocarbon exposure from the source was predicted to be 23.1 km. • Would intersect with BIAs for cetacean and seabird species.
High (50 g/m^2)	Surface hydrocarbon at this level is likely to cause ecological impacts. • The maximum distance for floating hydrocarbon exposure from the source was predicted to be 16.1 km. • Would intersect with BIAs for cetacean and seabird species.
Shoreline Hydrocarbon	
Low (10 g/m^2)	Shoreline hydrocarbon at this level is expected to be visually detectable but not have ecological impacts. • The highest probability of hydrocarbon accumulation was 52% at Corangamite • The minimum time to shore was predicted within 18.5 hours (Corangamite). • The maximum total volume of hydrocarbons ashore was 64.5 m^3 (Bay of Islands and Moyne). • The maximum length of hydrocarbon ashore across all shorelines was 38.05 km.
Moderate (100 g/m^2)	Shoreline hydrocarbon at this level has the potential to cause ecological impacts. • The highest probability of shoreline accumulation was 13% at Corangamite. • The minimum time to shore was predicted within 20.5 hours (Corangamite). • The maximum total volume of hydrocarbons ashore was 63.1 m^3 (Bay of Islands and Moyne). • The maximum length of hydrocarbon ashore across all shorelines was 9.75 km.
High (1000 g/m^2)	Shoreline hydrocarbon at this level is likely to cause ecological impacts. • The highest probability of shoreline accumulation was 2% at Bay of Islands and Moyne. • The minimum time to shore was predicted within 1 day 3 hours (Corangamite and Port Campbell). • The maximum total volume of hydrocarbons ashore was 30.1 m^3 (Corangamite and Port Campbell). • The maximum length of hydrocarbon ashore across all shorelines was 1.8 km.
In-water – Dissolved Hydrocarbon	
Low (10 ppb)	Dissolved hydrocarbon at this level is not expected to have ecological impacts. • The maximum distance dissolved hydrocarbons were recorded from the release location was ~17 km. • The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 7 hours. • The only receptor that is located outside the release location to be contacted by dissolved hydrocarbons at this threshold was Corangamite (4%). • Would intersect with BIAs for cetacean and seabird species. • Would intersect with Victorian (4% probability) State Waters.
Moderate (50 ppb)	Dissolved hydrocarbon at this level has the potential to cause ecological impacts. • The maximum distance dissolved hydrocarbons were recorded from the release location was ~6 km. • No receptors located outside the release location was predicted to be contacted at this threshold. • Would intersect with BIAs for cetacean and seabird species.

Exposure Values	Summary of worst-case predicted exposure
	• No contact was predicted for State Waters.
High (400 ppb)	No exposure at this threshold was predicted.
In-water – Entrained Hydrocarbon	
Low (10 ppb)	Entrained hydrocarbon at this level is not expected to have ecological impacts. • The maximum distance entrained hydrocarbons were recorded from the release location was ~303 km. • The minimum time to entrained hydrocarbon exposure at any given receptor(s) was 2.3 hours. • The worst-case scenario probabilities of intersect with the following conservation values and sensitivities: – Great Ocean Road and Scenic Environs NHPH (85%) – Twelve Apostles MNP (84%) – Braveness Rock (81%) – Apollo AMP (61%) – The Arches MS (39%) – Bonney Coast Upwelling KEF (7%) • Shorelines were also predicted to be contact at this threshold, such as Corangamite (88%), Colac Otway (84%), Moonlight Head (83%), Port Campbell (77%) Apollo Bay (44%), Moyne (46%), and the Mornington Peninsula (26%). • Would intersect with BIAs for cetacean, seabirds and shark species. • Would intersect with Victorian (98% probability) State Waters.
High (100 ppb)	Entrained hydrocarbon at this level has the potential to cause ecological impacts. • The maximum distance entrained hydrocarbons were recorded from the release location was ~165 km. • The minimum time to entrained hydrocarbon exposure at any given receptor(s) was 3.3 hours. • The worst-case scenario probabilities of intersect with the following conservation values and sensitivities: – Twelve Apostles MNP (52%) – Braveness Rock RSB (22%) – Great Ocean Road and Scenic Environs NHPH (15%) – The Arches MS (6%) – Apollo AMP (3%) • Shorelines were also predicted to be contact at this threshold, such as Corangamite (53%), Colac Otway (30%), Moonlight Head (38%), Port Campbell (33%) and Cape Otway West (30%). • Would intersect with BIAs for cetacean, seabirds and shark species. • Would intersect with Victorian (83% probability) State Waters.

Deterministic Analysis

Deterministic analysis was used to assess the impact of the individual simulations considered to have the greatest impact on the environment. The scenarios were selected and presented based on a variety of criteria detailed in Table 6-54.

Table 6-54: Summary of Deterministic Modelling Outcomes for the Spill Scenarios

Deterministic Analyses Criteria	**Vessel LOC - MGO**
The largest swept area for surface oil above 10 g/m^2	The maximum volume on the sea surface at the visible hydrocarbon threshold (10 g/m^2) was 241.2 m^3.
The largest swept area for surface oil above 50 g/m^2	The maximum volume on the sea surface at the visible hydrocarbon threshold (50 g/m^2) was 43.1 m^3.
The greatest total volume of oil ashore above 100g/m^2	The largest total volume of oil exposure ashore was 63.1 m^3, with the peak occurring within 2 days.
The longest length of shoreline with oil accumulation above 100 g/m^2	The maximum length of actionable shoreline hydrocarbon (100 g/m^2) was 9.8 km.
Largest area of entrained hydrocarbon exposure above 100 ppb	The maximum concentration of entrained hydrocarbon exposure in the water column at the response hydrocarbon threshold (100 ppb) was approximately 1,100 ppb.
Largest area of dissolved hydrocarbon exposure above 50 ppb	The maximum concentration of entrained hydrocarbon exposure in the water column at the response hydrocarbon threshold (100 ppb) was approximately 393 ppb.

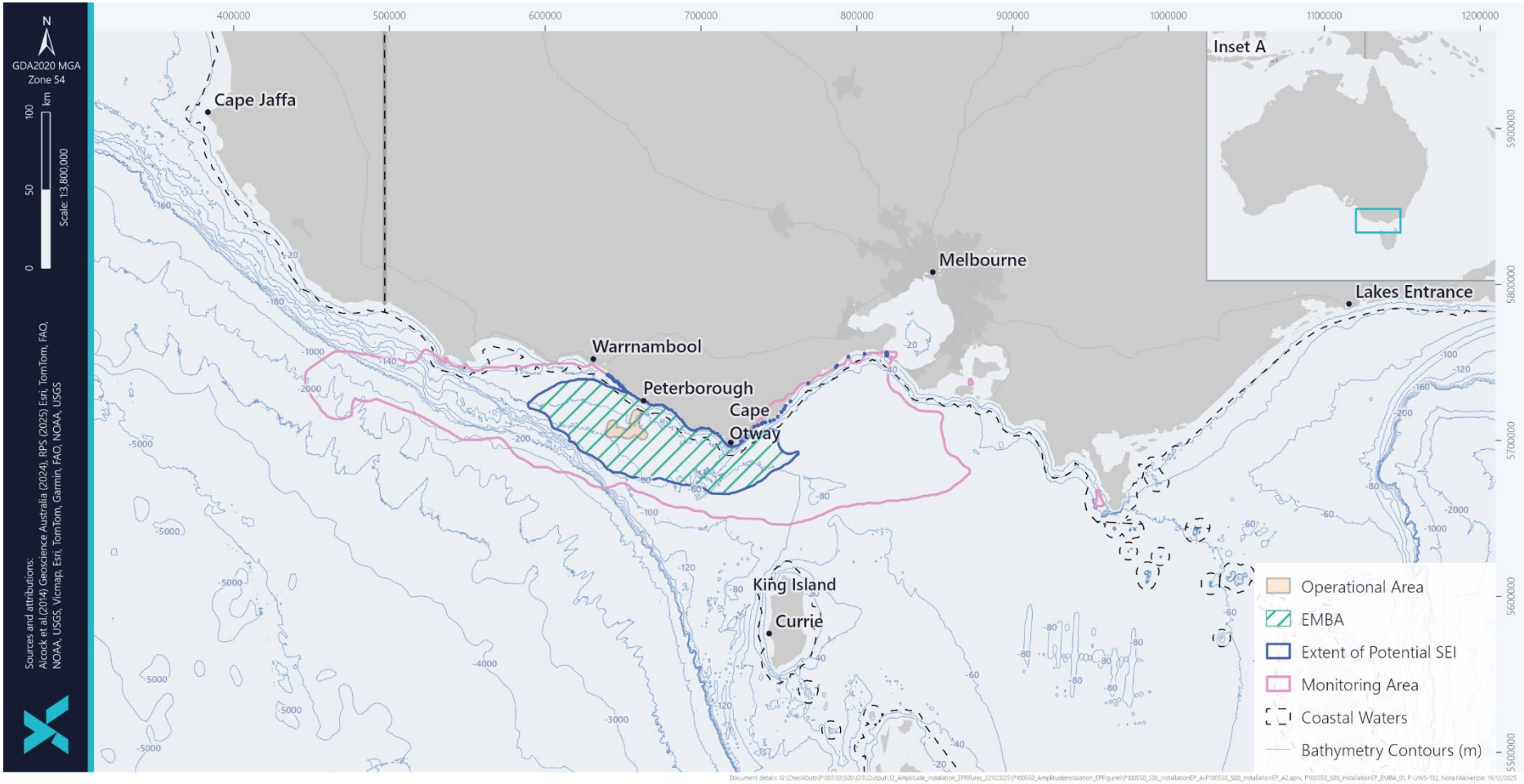


Figure 6-17: EMBA, Monitoring Area and Extent of Potential Socio-Economic Impacts (SEI) Area for the Vessel LOC - MGO Spill Scenario
(Note: spill modelling modelled from MGO Loss of containment at Annie-2 location has been replicated over Isabella (Elanora-1/ST1) and merged)

6.8.4 Predicted Environmental Impacts and Risks

Potential impacts from an accidental release of hydrocarbons are:

- change in water quality.

Potential risk:

- change in habitat
- impact to marine fauna:
  - change in fauna behaviour
  - injury / mortality to fauna
- change in ecosystem dynamics
- change to the functions, interests or activities of other users.
- Impacts and risks to cultural heritage are assessed in Section 7.2.

6.8.5 Impact and Risk Evaluation

6.8.5.1 Impact: Change in Water Quality

Inherent Consequence Evaluation

An accidental release of hydrocarbons into the marine environment will result in a change in water quality. Both condensate and MDO are both classified as a light non-persistent hydrocarbon (Group II), containing a high proportion of volatile components and only a small proportion of non-volatile (persistent) components.

MGO is classified as a light non-persistent hydrocarbon (Group II), containing a high proportion of volatile components and only a small proportion of non-volatile (persistent) components.

Based on the spill modelling report for MGO, approximately 39.3 – 78.1% is anticipated to evaporate from the water surface within the first 24 hours. MGO has a strong tendency to entrain within the upper water column, leaving a small proportion remaining on the water surface. Approximately <1% is residual and will remain to decay slowly over time (RPS 2025).

Regarding the condensate spill based on the modelling results from a loss of well control event (much larger spill volume than that of a pipeline rupture), approximately 52.4 - 70.1% is anticipated to evaporate from the water surface within the first 24 hours. The condensate has a strong tendency to entrain within the upper water column, leaving a small proportion remaining on the water surface. Approximately 17.5% is residual and will remain to decay slowly over time (RPS 2024).

High proportions of entrained hydrocarbons reduce the proportion being evaporated; however, it also increases the rates of hydrocarbon decay when mixed in the water column. Entrained hydrocarbon will often remain in the upper water column until conditions are calm then will float to the surface and reform as a slick. A change in water quality is expected to be short-term based on the weathering behaviour described above.

Given the nature of the MGO and condensate hydrocarbons, the forecasted weathering processes, and the offshore metocean conditions, the area of exposure following a spill event is anticipated to be localised and short-term. The water quality of the area exposed to hydrocarbons is expected to return to pre-spill conditions relatively rapidly. Long-term adverse impacts to the water quality are not anticipated. Matters relating to potentially impacted receptors from a change in water quality within the exposed area are discussed for the specific receptors below.

Therefore, the predicted level of impact, i.e., the consequence of a change in water quality from an accidental release of hydrocarbons is evaluated as **Level 2**.

6.8.5.2 Risk: Change in Habitat

Inherent Consequence Evaluation

Impacts to ecological receptors, such as habitats, are assessed based on the hydrocarbon exposure thresholds that have been identified to potentially cause harmful impacts in ecological receptors. The potential extent of these thresholds is determined boundary of the ecological EMBA for the modelled worst case scenario MDO spill (Figure 6-17).

The thresholds that apply to the outer extent of potential ecological impacts are:

- surface (moderate)
- shoreline (moderate)
- in water – dissolved (moderate)
- in water – entrained (high).

Potential impacts to habitats associated with either the MDO or the condensate spill are assessed in Table 6-55. The impacts from the condensate spill are based on the larger loss of well control event as described in the **Otway Offshore Operations Environment Plan**, noting the subsea pipeline rupture is a much smaller volume, and thereby will have a smaller EMBA.

The EPBC Protected Matters Report for the EMBA (MGO) are in Appendix 5.

Table 6-55: Consequence Evaluation for Hydrocarbon Exposure – Ecological Receptors - Habitats

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Seagrass</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="2">Condensate</td><td>MGO</td></tr>
<tr><td colspan="2">Seagrass meadows are predicted to be exposed to in-water hydrocarbons.
Hydrocarbon exposure in nearshore and intertidal areas is predicted to occur only at low thresholds for dissolved hydrocarbons, which is not expected to have ecological impacts (RPS 2024).
Exposure to entrained hydrocarbons at the high threshold level are only predicted within Victoria State Waters, not within Tasmania, South Australian or NSW State waters.</td><td>The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure, the EMBA associated with this scenario.
Seagrasses are predicted to be exposed to in-water hydrocarbons.
In-water hydrocarbon exposure in nearshore, intertidal, and subtidal areas is predicted to occur at only at low thresholds for dissolved hydrocarbons, which is not expected to have ecological impacts (RPS 2025).
Potential exposure to entrained hydrocarbons at the high threshold level are predicted within Victoria State Waters. In-water hydrocarbon exposure in nearshore, intertidal, and subtidal areas is predicted to occur at the high thresholds for entrained hydrocarbons at Colac Otway, Corangamite, Mornington Peninsula Moyne.</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Given seagrass communities are typically found in nearshore shallow coastal waters, exposure to surface (floating) hydrocarbons is not expected.</td><td>Seagrass meadows, within intertidal or shallow nearshore waters have the potential to be exposed to in-water exposure (entrained and dissolved) only predicted to occur within the upper 0–10 m of the water column.
Seagrass meadows are important in stabilising seabed sediments, and providing nursery grounds for fish and crustaceans, and a protective habitat for the juvenile fish and invertebrates species (Huisman 2000; Kirkham 1997).</td><td>Given seagrass communities are typically found in nearshore shallow coastal waters, exposure to shoreline hydrocarbons is not expected.</td></tr>
</table>

Impact and Risk Evaluation		
	Seagrass ecosystems exposed to hydrocarbons can result in direct mortality from smothering. Petroleum fractions may also be absorbed into the seagrass tissues, which can then lower the organism's tolerance to other stressors and reduce growth rates (Zieman et al. 1984).	
Summary: Given the restricted range of exposure (shallow nearshore and intertidal waters only) and the predicted lower concentrations of hydrocarbons expected to be in these waters, any impact to seagrass is not expected to result in long-term or irreversible damage. Consequently, the potential consequence to seagrass is considered to be **Level 2**, as they may result in localised short-term impacts to habitats of recognised conservation value but not affecting local ecosystem functioning.		
Macroalgae		
Exposure Evaluation		
Macroalgae are predicted to be exposed to in-water hydrocarbons. In-water exposure (entrained and dissolved) is only predicted to occur within the upper 0–10 m of the water column; therefore, benthic habitats, such as macroalgae, within intertidal or shallow nearshore waters has the potential to be exposed. In-water hydrocarbon exposure in nearshore, intertidal, and subtidal areas is predicted to only occur at low thresholds for dissolved hydrocarbons, which is not expected to have ecological impacts (RPS 2024). Some sites (such as Colac Otway, Corangamite and Moyne) are predicted to be exposed to high thresholds of entrained (RPS 2024). Exposure to entrained hydrocarbons at the high threshold level are only predicted within Victoria State Waters, not within Tasmania, South Australian or NSW State waters.	The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure, the EMBA associated with this scenario. Macroalgae are predicted to be exposed to in-water hydrocarbons. In-water exposure (entrained and dissolved) is only predicted to occur within the upper 0–10 m of the water column; therefore, benthic habitats, such as macroalgae, within intertidal or shallow nearshore waters has the potential to be exposed. In-water hydrocarbon exposure in nearshore, intertidal, and subtidal areas is predicted to occur at only at low thresholds for dissolved hydrocarbons, which is not expected to have ecological impacts (RPS 2025). Potential exposure to entrained hydrocarbons at the high threshold level are predicted within Victoria State Waters. In-water hydrocarbon exposure in nearshore, intertidal, and subtidal areas is predicted to occur at the high thresholds for entrained hydrocarbons at Colac Otway, Corangamite, Mornington Peninsula Moyne.
Consequence Evaluation		

Impact and Risk Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Given macroalgae are typically found within the water column attached to benthic substrate, exposure to surface (floating) hydrocarbons is not expected.	In-water exposure (entrained and dissolved) is only predicted to occur within the upper 0–10 m of the water column; therefore, macroalgae within intertidal or shallow nearshore waters has the potential to be exposed. Macroalgal systems are an important source of food and shelter for many ocean species; including in unattached drift or wrack forms (McClatchie et al. 2006). The physical effects of smothering, fouling and asphyxiation has been documented from oil contamination in macroalgae. Reported toxic responses to hydrocarbons have included a variety of physiological changes to enzyme systems, photosynthesis, respiration, and nucleic acid synthesis (Lewis and Pryor 2013). A review of field studies conducted after spill events by Connell et al. (1981) indicated a high degree of variability in the level of impact, but in all instances, the algae appeared to be able to recover rapidly from even very heavy hydrocarbon exposure.	Given macroalgae are typically found within the water column attached to benthic substrate, exposure to shoreline hydrocarbons is not expected.
Summary: Given the restricted range of exposure (shallow nearshore and intertidal waters only) and the predicted lower concentrations of hydrocarbons expected to be in these waters, any impact to macroalgae is not expected to result in long-term or irreversible damage. Consequently, the potential consequence to macroalgae are considered to be **Level 2**, as they may result in localised short-term impacts to habitats of recognised conservation value, but not affecting local ecosystem functioning.		
Benthic Habitat		
Exposure Evaluation		
Condensate	**MGO**	

<table>
<tr><th colspan="3">Impact and Risk Evaluation</th></tr>
<tr><td colspan="2">Benthic assemblages, such as soft corals and sponges, may be present within the area exposed to in-water hydrocarbons at relevant exposure thresholds following a subsea pipeline rupture LOC event.

Corals are not identified as a dominant habitat type within the area predicted to be exposed to hydrocarbons at relevant exposure thresholds. Soft corals are typically present in deeper waters throughout the continental shelf, slope and off-slope regions, to well below the limit of light penetration. Sponges are more common in the region, occurring in patchy distribution on hard substrates over a range of depths but are more dominant in deeper waters.

See Section 4.4.3 for a description of the benthic types found within the wider Monitoring area.</td><td>The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure, the EMBA associated with this scenario.

Benthic assemblages, such as soft corals and sponges, may be present within the area exposed to in-water hydrocarbons at relevant exposure thresholds following a LOC of MGO.

Corals are not identified as a dominant habitat type within the area predicted to be exposed to hydrocarbons at relevant exposure thresholds. Soft corals are typically present in deeper waters throughout the continental shelf, slope and off-slope regions, to well below the limit of light penetration. Sponges are more common in the region, occurring in patchy distribution on hard substrates over a range of depths but are more dominant in deeper waters.

See Section 4.4.3 for a description of the benthic types found within the wider Monitoring area.

The MGO modelling predicted exposure at moderate (50 ppb) thresholds of dissolved, and high thresholds of entrained (100 ppb) (RPS 2025).</td></tr>
<tr><th colspan="3">Consequence Evaluation</th></tr>
<tr><th>Surface Exposure</th><th>In-water Exposure</th><th>Shoreline Exposure</th></tr>
<tr><td>Given these assemblages are benthic, exposure to surface (floating) hydrocarbons is not expected.</td><td>Exposure of entrained hydrocarbons to shallow subtidal corals has the potential to result in lethal or sublethal toxic effects, resulting in acute impacts or death at moderate to high exposure thresholds (Shigenaka 2011). Contact with corals may lead to reduced growth rates, tissue decomposition, and poor resistance and mortality of sections of reef (NOAA 2010).

Exposure to hydrocarbons has been found to impact metamorphosis and attachment of sponge larvae, however, only at high concentrations of over 10,000 ppb (Negri et al. 2016). Given in-water exposure concentrations</td><td>Given these assemblages are benthic, exposure to shoreline hydrocarbons is not expected.</td></tr>
</table>

Impact and Risk Evaluation		
	are not anticipated at this level, impacts to sponges are not anticipated. In-water exposure (dissolved or entrained) at relevant exposure thresholds is only predicted to occur within the upper 0–10 m of the water column, therefore, soft corals and sponges found in water depths below 10 m are not anticipated to be impacted by in-water hydrocarbon exposure.	
Summary: Given the lack of coral reef formations, and the sporadic cover of sponges and hard or soft corals in mixed nearshore reef communities along the Victorian coast, any impacts that may occur are anticipated to be limited to isolated corals and sponges. Consequently, the potential consequence to soft corals and sponges are considered to be **Level 1**, as they could be expected to result in localised, short-term impacts.		
Rocky Shoreline		
Exposure Evaluation		
Condensate		**MGO**
Rocky shorelines are found along the Victorian coastline, particularly between Warrnambool and Cape Otway (Section 4.4.2) and may be present within the area exposed to shoreline hydrocarbons at relevant exposure thresholds following a condensate LOC event. The modelling of the larger loss of well control event, predicted rapid evaporation during the first 24 hours following the release of condensate and depending on the weather conditions (i.e., wind speeds) the remainder of the condensate is predicted to readily entrain into the water column (more entrainment under higher wind speeds) (RPS 2024). Given the hydrocarbon characteristics of the condensate, being a volatile and light non-persistent hydrocarbon with approximately 17.5% residual, including 10% wax content, majority of the volatile ends will evaporate rapidly (RPS 2024). Therefore, in the unlikely event that hydrocarbons were to reach shorelines predicted below		The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure, the EMBA associated with this scenario. Rocky shorelines are found along the Victoria coastline, particularly between Warrnambool and Marengo (see Section 4.4.2) and may be present within the area exposed to shoreline hydrocarbons at relevant exposure thresholds following a LOC of MGO. The modelling predicted the maximum probability of shoreline loading at or above the moderate exposure was 21% with shoreline contact at this threshold anticipated within 20.5 hours for the modelled scenario. The worst-case maximum total volume of hydrocarbon ashore above the moderate threshold was predicted as 63.1 m^3 (RPS 2025). Given the hydrocarbon characteristics of the MGO, being a volatile and light-persistent hydrocarbon with approximately 5% residual, majority of the volatile

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="2">relevant thresholds, hydrocarbon sheens would not be expected, instead isolated patches of highly weathered waxy flakes may occur.</td><td>ends will evaporate. In favourable evaporation conditions, modelling predicted evaporation of about 39.3% of the hydrocarbon mass within the first 24 hours (RPS 2025).</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Given this receptor is located on the shoreline, exposure to surface (floating) hydrocarbons is not expected.</td><td>Given this receptor is located on the shoreline, exposure to in-water hydrocarbons is not expected.</td><td>The sensitivity of a rocky shoreline to oiling is dependent on a number of factors including its topography and composition, position, exposure to oceanic waves and currents. Exposed rocky shorelines have been shown to be less sensitive than sheltered rocky shorelines.

Rocky shorelines provide habitats for invertebrates and can also be utilised by some pinniped (haul-out sites) and bird species (noting that foraging and breeding/nesting typically occurs above high tide line).

The impact of oil on any organism depends on the toxicity, viscosity and amount of oil, on the sensitivity of the organism and the length of time it is in contact with the oil. Even where immediate damage to rocky shores from oil spills has been considerable, it is unusual for this to result in long-term damage and the communities have often recovered within 2 or 3 years (IPIECA 1995).

Due to the tidal action and constant wave washing on this type of shoreline rapid weathering of any hydrocarbons in the intertidal area is expected, and the minimal remaining oil weathers, the residual components of the oil will resolidify to waxy particles, decreasing the risk of exposures, making it unlikely that toxicity or smothering effects to exposed fauna will occur on this type of shoreline.</td></tr>
<tr><td colspan="3">Summary:
Due to the volatile nature of the hydrocarbons (MGO and condensate) as a light-persistent hydrocarbon, hydrocarbons accumulating on certain shorelines, such as rocky shorelines, may easily by washed off in the presence of tidal and/or wave action. However, rocky shorelines provide habitats to a diverse range of fauna and flora which may be impacted by exposure to hydrocarbons. Consequently, the potential impacts and risks to rocky shorelines from an unplanned hydrocarbon release event are assessed to be Level 3 based on the potential for localised, medium-term impacts.</td></tr>
</table>

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Sandy Shoreline</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="2">Condensate</td><td>MGO</td></tr>
<tr><td colspan="2">Sandy shorelines are present along the Victoria coastline (Section 4.4.2) where hydrocarbons may contact in the unlikely event that they are released into the marine environment.

The condensate comprises a significant portion of volatiles and semi to low volatiles (82.5% total) with 17.5% residual components, which means it will evaporate readily when on the water surface, with the persistent components to remain on the water surface over time.

Given the hydrocarbon characteristics of the condensate, being a volatile and Group II non-persistent hydrocarbon, the majority of the volatile ends will evaporate rapidly (RPS 2024). Therefore, in the unlikely event that hydrocarbons were to reach the Victoria shoreline at relevant thresholds, hydrocarbon sheens would not be expected, instead isolated patches of highly weathered waxy flakes would be expected.</td><td>Sandy shorelines are present along the Victoria coastline (Section 4.4.2) where hydrocarbons may contact in the unlikely event that they are released into the marine environment.

The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA associated with this scenario.

The maximum length of shoreline impacted at the moderate threshold was 9.7 km, at Moyne. The minimum time before shoreline accumulation ranged from 20.5 hours to 4 days 17 hours for the moderate threshold, with a peak volume of 63.1 m^3 predicted ashore (RPS 2025). The MGO comprises a significant portion of volatiles and semi to low volatiles (95% total) with 5% residual components, which means it will evaporate readily when on the water surface, with the persistent components to remain on the water surface over time.

Given the hydrocarbon characteristics of the MGO, being a volatile and Group II light-persistent hydrocarbon, the majority of the volatile ends will evaporate rapidly (RPS 2025). Therefore, in the unlikely event that hydrocarbons were to reach the Victoria shoreline at relevant thresholds, hydrocarbon sheens would not be expected, instead isolated patches of highly weathered waxy flakes would be expected.</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Given this receptor is located on the shoreline, exposure to surface (floating) hydrocarbons is not expected.</td><td>Given this receptor is located on the shoreline, exposure to in-water hydrocarbons is not expected.</td><td>Sandy beaches are considered to have a low sensitivity to hydrocarbon exposure. Sandy beaches provide habitat for a diverse assemblage (although not always abundant) of infauna (including nematodes, copepods and polychaetes); and macroinvertebrates (e.g. crustaceans).</td></tr>
</table>

Impact and Risk Evaluation		
		In the event of shoreline contact, a sandy beach may allow oil to percolate through the sand, thus increasing its ability to hold more oil ashore over tidal cycles and various wave actions than an equivalent area of water; hence oil can increase in thickness onshore over time. Given the low viscosity of this residue, it is likely to permeate into sand areas. The tides and constant wave washing are expected to lead to rapid weathering of any hydrocarbons in the intertidal area and it is unlikely that toxicity or smothering effects to exposed fauna will occur on this type of shoreline. The modelling predicted rapid evaporation during the first 24 hours of the hydrocarbon release and depending on the weather conditions (i.e., wind speeds) the remainder of the hydrocarbon is predicted to readily entrain into the water column (more entrainment under higher wind speeds) (see Section 6.8.3.4). Therefore, as the volatile components of the hydrocarbon evaporates and the remaining oil weathers, the residual components of the oil will resolidify to waxy particles, and the risk of exposure decreases.
Summary: Due to the highly volatile nature of the hydrocarbons as a light-persistent hydrocarbon, hydrocarbons accumulating on certain shorelines, such as sandy shorelines, may easily by washed off in the presence of tidal and/or wave action. Consequently, the potential impacts and risks to sandy beaches from an unplanned hydrocarbon release event are assessed to be **Level 2** based on the potential for localised, short-term impacts.		
Mangroves		
Exposure Evaluation		
Condensate	**MGO**	
Mangroves are not a dominant habitat found within the area potentially exposed to hydrocarbons. However, a few isolated patches of mangroves can be found along the Victorian coastline, predominantly with inlets or bays including Western Port Bay and Corner Inlet (Section 4.4.2). These mangroves have the potential to be exposed to hydrocarbons.	The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA associated with this scenario. Mangroves are not a dominant habitat found within the area potentially exposed to hydrocarbons. However, a few isolated patches of mangroves can be found along the Victorian coastline, predominantly with inlets or bays including Western	

Impact and Risk Evaluation		
	Port Bay and Corner Inlet (Section 4.4.2). These mangroves have the potential to be exposed to hydrocarbons.	
Consequence Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Mangroves are considered to have a high sensitivity to hydrocarbon exposure. Mangroves can be killed by heavy or viscous oil, or emulsification, that covers the trees' breathing pores thereby asphyxiating the subsurface roots, which depend on the pores for oxygen. Mangroves can also take up in-water hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death (Wardrop et al. 1987).	The change in toxicity levels within the marine environment can penetrate the root surfaces, via the respiratory capabilities of the roots, poisoning the plant. Acute impacts to mangroves can be observed within weeks of exposure, whereas chronic impacts may day months to years to detect.	Mangroves are considered to have a high sensitivity to hydrocarbon exposure. Hydrocarbon can enter mangrove forests when the tide is high and be deposited on the aerial roots and sediment surface as the tide recedes (IPIECA 1993; NOAA 2014). Physical smothering of aerial roots by hydrocarbons can block the trees' breathing pores used for oxygen intake and result in the asphyxiation of sub-surface roots (IPIECA 1993). Heavy or viscous oil, or emulsification, can kill mangroves via this process. However, heavy oil coating is unlikely due to the highly volatile nature of the hydrocarbon. As the volatile components evaporate and the remaining oil weathers, the residual components of the oil will resolidify to waxy particles, and the risk of exposure decreases. Given the non-persistent nature of the hydrocarbon there is expected to be minimal impact from smothering of aerial roots or seedlings. However, if the residual oil does melt, some impact to the root systems and seedlings may occur.
Summary: There are only a few isolated mangroves communities that may be exposed to hydrocarbons. Given the non-viscous nature of the hydrocarbons, impacts are expected to be limited to the volatile component of the hydrocarbon, however given their sensitivity to hydrocarbons, the potential consequence to mangroves is assessed to conservatively based on the potential for localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function. Consequently, the potential impacts and risks to mangroves from an accidental hydrocarbon released is assessed to be **Level 3**.		
Coastal Saltmarsh		
Exposure Evaluation		
Condensate	**MGO**	

<table>
<tr><th colspan="3">Impact and Risk Evaluation</th></tr>
<tr><td colspan="2">Communities of saltmarsh are predicted to be within the area potentially exposed to hydrocarbons ashore; and is present within some estuaries and inlet/riverine systems along the Victorian coastline. Some of the saltmarsh habitat along this coast will be representative of the Subtropical and Temperate Saltmarsh TEC (see Section 4.4.2 for further details).</td><td>The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA associated with this scenario.

Communities of saltmarsh are predicted to be within the area potentially exposed to hydrocarbons ashore; and is present within some estuaries and inlet/riverine systems along the Victorian coastline. Some of the saltmarsh habitat along this coast will be representative of the Subtropical and Temperate Saltmarsh TEC (see Section 4.4.2 for further details).

Modelling of the MGO spill scenario predicted shoreline hydrocarbon exposure at, or above the moderate threshold predominantly between Peterborough and the west of Cape Otway along the Victorian coastline. Shoreline contact at this threshold was anticipated within 1 day at Moyne. Shoreline hydrocarbon exposure at, or above, the high threshold was also predicted at Corangamite and Moyne (RPS 2025).</td></tr>
<tr><th colspan="3">Consequence Evaluation</th></tr>
<tr><th>Surface Exposure</th><th>In-water Exposure</th><th>Shoreline Exposure</th></tr>
<tr><td>Given this receptor is located on the shoreline, exposure to surface (floating) hydrocarbons is not expected.</td><td>Given this receptor is located on the shoreline, exposure to in-water hydrocarbons is not expected.</td><td>Saltmarsh is considered to have a high sensitivity to hydrocarbon exposure.

Oil can enter saltmarsh systems during the tidal cycles if the estuary/inlet is open to the ocean. Similar to mangroves, this can lead to a patchy distribution of the oil and its effects, because different places within the inlets are at different tidal heights.

Oil (in liquid form) will readily adhere to the marshes, coating the stems from tidal height to sediment surface. Heavy oil coating is unlikely due to the highly volatile nature of the hydrocarbon. As the volatile components evaporate and the minimal remaining oil weathers, the residual components of the oil will resolidify to waxy particles, and the risk of exposure decreases.

Evidence from case histories and experiments shows that the damage resulting from oiling, and recovery times of oiled marsh vegetation, are very variable. In areas of light to moderate oiling</td></tr>
</table>

Impact and Risk Evaluation		
		where oil is mainly on perennial vegetation with little penetration of sediment, the shoots of the plants may be killed but recovery can take place from the underground systems. Good recovery commonly occurs within one to two years (IPIECA 1994). However, when oil penetrates the soil and the initial mortality of the vegetation is extensive, recovery to reference conditions may take 3–4 years (Hester and Mendelssohn 2000).
Summary: The potential consequence to saltmarsh is assessed to be **Level 3** based on the potential for localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.		

Inherent Likelihood

Due to the nature of this activity, the multiple control measures that will be in place, and based on previous occurrences, the impact is considered conceivable and could occur, however, it would require a rare combination of factors. Therefore, the inherent likelihood of an accidental release of hydrocarbons (either MGO or condensate) causing Level 3 consequences to habitats is considered **Unlikely (D)**.

Inherent Risk Severity

The inherent risk severity of an accidental release of hydrocarbons causing impacts to habitats is considered **Moderate**. Table 6-56: lists the inherent risk severity for each habitat type.

Table 6-56: Inherent Risk Severity – Hydrocarbon (MGO/ Condensate) Exposure – Ecological Receptors – Habitats

Receptor	Inherent Consequence Level	Inherent Likelihood Level	Inherent Severity
Seagrass	2	D	**Low**
Macroalgae	2	D	**Low**
Benthic Habitat	1	D	**Low**
Rocky Shoreline	3	D	**Moderate**
Sandy Shoreline	2	D	**Low**
Mangroves	3	D	**Moderate**
Coastal Saltmarsh	3	D	**Moderate**

6.8.5.3 Risk: Impact to Marine Fauna

Inherent Consequence Evaluation

Impacts to ecological receptors, such as marine fauna, are assessed based on the hydrocarbon exposure thresholds that have been identified to potentially cause harmful impacts in ecological receptors. The potential extent of these thresholds is determined boundary of the ecological EMBA for the modelled worst case scenario MDO spill (Figure 6-17).

The thresholds that apply to the outer extent of potential ecological impacts are:

- surface (moderate)
- shoreline (moderate)
- in water – dissolved (moderate)
- in water – entrained (high).

Potential impacts to marine fauna are assessed in Table 6-57.

The EPBC Protected Matters Report for the EMBA (MGO) are in Appendix 5.

Table 6-57: Consequence Evaluation for Hydrocarbon Exposure – Ecological Receptors – Marine Fauna

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Plankton</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="2">Condensate</td><td>MGO</td></tr>
<tr><td colspan="2">Plankton is found in nearshore and open waters in the water column.
Plankton population distributions are expected to be highly variable both spatially and temporally and are likely to comprise characteristics of tropical, southern Australian, central Bass Strait and Tasman Sea populations (see Section 4.4.2).
Plankton populations may be present within the area potentially exposed to hydrocarbons in the EMBA.
Exposure in nearshore and open water areas is predicted to only occur at low thresholds for dissolved hydrocarbons, which is not expected to have ecological impacts (RPS 2024). Some sites (such as Colac Otway, Corangamite and Moyne) are predicted to be exposed to high thresholds of entrained for the worst-case scenario modelled (RPS 2024).</td><td>Plankton is found in nearshore and open waters in the water column.
Plankton population distributions are expected to be highly variable both spatially and temporally and are likely to comprise characteristics of tropical, southern Australian, central Bass Strait and Tasman Sea populations (see Section 4.4.2).
Plankton populations may be present within the area potentially exposed to hydrocarbons in the EMBA.
The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA associated with this scenario.
Modelling of the MGO spill scenario predicted moderate exposure thresholds of surface hydrocarbons up to 23.1 km (west-northwest) of the release location. Exposure in nearshore and open water areas is predicted to occur at moderate thresholds of dissolved with some sites (such as Colac Otway, Corangamite, Mornington Peninsula and Moyne) predicted to be exposed to high thresholds of entrained (RPS 2025).</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>These organisms migrate vertically through the water column to feed in surface waters at night (NRDA 2012). As they move close to the sea surface it is possible that they may be exposed to surface hydrocarbons, however, the potential impacts from in-water exposure (dissolved or entrained) will be greater.</td><td>Impacts, including injury and mortality, to planktonic species may occur due to a change in water quality following an unplanned hydrocarbon release. Plankton are widely dispersed throughout the water column, although exposure is predicted to occur within the 0-10 m water depth, where plankton are most abundant.
Relatively low concentrations of hydrocarbon are toxic to both plankton (including zooplankton and ichthyoplankton</td><td>Given plankton are only found within the water column, exposure to shoreline hydrocarbons is not expected.</td></tr>
</table>

Impact and Risk Evaluation		
The presence of surface hydrocarbons may result in a reduction of light penetrating the water column, which may again affect the rate of photosynthesis, particularly in instances where there is prolonged presence of surface hydrocarbons over an extensive area. A reduction in the rate of photosynthesis may inhibit growth, depending on the concentration range. For example, photosynthesis is stimulated by low concentrations of oil in the water column (10-30 ppb) but becomes progressively inhibited above 50 ppb. Conversely, photosynthesis can be stimulated below 100 ppb for exposure to weathered oil (Volkman et al. 1994).	(fish eggs and larvae)). Plankton risk exposure through ingestion, inhalation and dermal contact with in-water hydrocarbons. Effects will be greatest in the area close to the spill source where hydrocarbon concentrations are likely to be highest. Highly volatile hydrocarbons generally have higher toxicity levels when initially released due to the presence of the volatile components (Di Toro et al. 2007), however, with rapid weathering expected, this toxicity decreases. Furthermore, the actual area of exposure is expected to be extremely localised and temporary due to the influence of waves, currents and weathering processes. Reproduction by survivors or migration from unaffected areas is likely to rapidly replenish losses (Volkman et al. 1994). Oil spill field observations show minimal or transient effects on plankton (Volkman et al. 1994). Once background water quality is re-established, plankton has been shown to take weeks to months to recover (ITOPF 2011b), allowing for seasonal influences on the assemblage characteristics, therefore long-term impacts are not anticipated. Due to the hydrocarbon characteristics, expected weathering and fate, the relatively quick recovery times of plankton, unplanned releases of hydrocarbons are not expected to have a substantial adverse effect on plankton life cycle and spatial distribution and therefore unlikely to affect populations at the regional scale or affect local ecosystem functioning.	
Summary: Any impact is expected to be localised and temporary, meaning that a hydrocarbon spill in any one location is unlikely to have long-lasting impacts on plankton populations at a regional level. Once background water quality is re-established, plankton has been shown to take weeks to months to recover. Consequently, the potential impacts to plankton are considered to be **Level 2** as they could be expected to result in localised short-term impacts, but not affecting local ecosystem functioning.		

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Benthic Invertebrates</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="2">Condensate</td><td>MGO</td></tr>
<tr><td colspan="2">Marine invertebrates identified within the region, including commercially important species, may be impacted by in-water exposure of hydrocarbon expected to occur within the upper 0–10 m of the water column and shallow coastal areas of the EMBA (condensate LOWC).
Invertebrates that live in intertidal zones include crustaceans, molluscs and infauna. These can be present in a wide range of habitats including sandy beaches and rocky shores.</td><td>The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA associated with this scenario.
Marine invertebrates identified within the region, including commercially important species, may be impacted by in-water exposure of MGO expected to occur within the upper 0–10 m of the water column and shallow coastal areas of the EMBA.
Invertebrates that live in intertidal zones include crustaceans, molluscs and infauna. These can be present in a wide range of habitats including sandy beaches and rocky shores. Exposure to hydrocarbons for invertebrates is typically via direct contact and smothering but can also occur via ingestion.
Modelling of the MGO spill scenario predicted exposure in nearshore and intertidal areas is predicted to occur at low thresholds of dissolved and entrained, moderate thresholds of dissolved, with some sites predicted to be exposed to high thresholds of entrained. The maximum dissolved and entrained hydrocarbon concentration for the MGO spill scenario at any given receptor(s) to be 75 ppb and 14,372 ppb, respectively (RPS 2025).</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Given invertebrates are only found within the shallow nearshore waters, exposure to surface (floating) hydrocarbons is not expected.</td><td>Entrained and dissolved hydrocarbons can have negative impacts on marine invertebrates and associated larval forms. Impacts to some adult species (e.g. crustaceans) is reduced as a result of the presence of an exoskeleton, while others with no exoskeleton and larval forms may be more prone to impacts.</td><td>Inshore and intertidal benthic species may be exposed to hydrocarbons accumulating on the shoreline. Benthic communities associated with inshore reefs would be exposed to very low-level hydrocarbons.
The predicted area of shoreline contact is mixed sand/shore platform. Residues deposited on these</td></tr>
</table>

Impact and Risk Evaluation		
	Acute or chronic exposure through contact and/or ingestion can result in toxicological risks. For some taxa, the presence of an exoskeleton (e.g. crustaceans) reduces the impact of hydrocarbon absorption through the surface membrane. Invertebrates with no exoskeleton and larval forms may be more prone to impacts. Sessile invertebrates could be exposed to varying levels of condensate; exposure timeframes would be expected to be short given the propensity of condensate to rapidly evaporate and disperse. Localised impacts to larval stages may occur which could impact on population recruitment that year. Filter-feeding benthic invertebrates such as sponges, bryozoans, abalone and hydroids may be exposed to sub-lethal impacts, however, population level impacts are considered unlikely. Exposure to hydrocarbons has been found to impact metamorphosis and attachment of sponge larvae, however, only at high concentrations of over 10,000 ppb (Negri et al. 2016). Given in-water exposure concentrations are not anticipated at this level, impacts to sponges are not anticipated. Tissue taint may occur and remain for several months in some species (e.g. lobster, abalone) however, this will be localised and low level with recovery expected. Tainting of recreation or commercial species is considered unlikely to occur, however if it did it is expected to be localised, low level and recoverable.	areas are rapidly remobilised due to wave and tidal action, so any accumulation is likely to be short-term and temporary. Exposure to hydrocarbons for invertebrates is typically via direct contact and smothering but can also occur via ingestion. At 100 g/m^2, resident fauna such as worms, molluscs and crustaceans may suffer lethal impacts if hydrocarbons penetrate into sediments. On this basis, impacts to near-shore benthic and shoreline assemblages are considered to be limited, localised, and if impacts occur, areas will be rapidly recolonised by adjacent species.
Summary: Due to the characteristics of the hydrocarbons and the well-mixed nature of the waters, coating of benthic assemblages and prolonged exposure to hydrocarbons is considered highly unlikely. At this threshold, there may be ecological impacts to benthic assemblages stranded on the shoreline. However, wave action at the shoreline will rapidly disperse and weather the hydrocarbons naturally. Consequently, the potential impacts to invertebrates are considered to be **Level 2** as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.		

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Fish and Sharks</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="2">Condensate</td><td>MGO</td></tr>
<tr><td colspan="2">Several fish species may be present within the EMBA. Species present in the EMBA are largely cool temperate species, common within the South Eastern Marine Region.
BIAs identified within the EMBA at the relevant thresholds are:
• Foraging BIA for the white shark (only entrained exposure predicted with 1% probability at the high threshold) (RPS 2025).
See Section 4.4.2 for details of all EPBC-listed species within the wider Monitoring Area.</td><td>The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA associated with this scenario.
Several fish species may be present within the EMBA. Species present in the EMBA are largely cool temperate species, common within the South Eastern Marine Region.
BIAs identified within the EMBA at the relevant thresholds are:
• Foraging BIA for the white shark (only entrained exposure predicted with 1% probability at the high threshold) (RPS 2025).
See Section 4.4.2 for details of all EPBC-listed species within the wider Monitoring Area.</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Since fish and sharks do not generally break the sea surface, the impacts of surface hydrocarbons to fish and shark species are unlikely to occur. Near the sea surface, fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al. 1994).</td><td>Fish may be exposed to hydrocarbon droplets through a variety of pathways, including direct dermal contact with diffusion across their gills (Hook et al., 2016); ingestion of contaminated prey; and inhalation (e.g. elevated dissolved contaminant concentrations in water passing over the gills). Pelagic fish species are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters. Adult fish kills reported after oil spills, occur mainly to shallow water, near-shore benthic species (Volkman et al. 1994).
Fish are most vulnerable to hydrocarbons during their embryonic, larval and juvenile life stages. Embryos and larvae may sustain mechanical damage to feeding and breathing</td><td>Given fish and sharks are found within nearshore and offshore waters, exposure to shoreline hydrocarbons is not expected.</td></tr>
</table>

Impact and Risk Evaluation		
	apparatus from contact with oil droplets, and genetic damage, physical deformities and altered developmental timing from hydrocarbons in water (Fodrie and Heck 2011). There may also be chronic effects to fish exposed to hydrocarbons in early life stages, such as disruption of predator avoidance behaviour (Hjermann et al. 2007). Eggs and larvae exposed to weathered concentrations of hydrocarbons in water for a prolonged period of time have been shown to be immunosuppressed (Hjermann et al. 2007). There is a known foraging BIA for the white shark in the area exposed to in-water hydrocarbons (RPS 2025). Pelagic species including white sharks, are generally highly mobile, with wide-spread distribution ranges. Therefore, these species are not likely to be severely impacted by a spill which has relatively limited spatial extent. Furthermore, long-term damage is not expected as the dissolved/entrained hydrocarbons within the water column beyond the immediate vicinity of the release are not predicted to be of sufficient concentrations over a large enough area to cause harm (ITOPF 2011a).	
Summary: There is a known foraging BIA for the white shark in the area exposed to in-water hydrocarbons, albeit modelling only predicted 1% probability of exposure at the high threshold. Pelagic free-swimming fish and shark species are generally highly mobile, with wide-spread distribution ranges, and therefore, are unlikely to suffer long-term damage from oil spill exposure because dissolved/entrained hydrocarbons in the water column beyond the immediate vicinity of the release are not expected to be of sufficient concentrations over a large enough area to cause harm (ITOPF 2011a). Furthermore, potential impacts on fish eggs and larvae entrained in the upper water column are not expected to be significant given the temporary period of water quality impairment, and the limited geographical extent of the spill. As egg/larvae dispersal is extensive in the upper layers of the water column and it is expected that current induced drift will rapidly replace any affected populations. Potential impacts are assessed as **Level 2** as they could be expected to be localised and short-term impacts to species of recognised conservation value, but not affecting local ecosystem functioning.		

Impact and Risk Evaluation	
Avifauna	
Exposure Evaluation	
Condensate	**MGO**
Several threatened, migratory and/or listed marine avifauna species may be present within the EMBA. These species have the potential to be resting, feeding or nesting within the area predicted to be exposed to hydrocarbons found on the surface, in-water and/or ashore.	The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA associated with this scenario. Several threatened, migratory and/or listed marine avifauna species may be present within the EMBA. These species have the potential to be resting, feeding or nesting within the area predicted to be exposed to hydrocarbons found on the surface, in-water and/or ashore. Several foraging BIAs for several albatross, shearwater, petrel and gannet species were identified within EMBA, these included: • Antipodean albatross • Australasian gannet • Black-browed albatross • Buller's albatross • Campbell albatross • Common diving-petrel • Indian, yellow-nosed albatross • Short-tailed shearwater • Shy albatross • Wandering albatross • White-faced storm-petrel Modelling of the MGO spill scenario predicted moderate exposure thresholds of surface hydrocarbons up to 23.1 km (west-northwest) of the release location and 100% probability of floating oil exposure at moderate exposure thresholds for all avifauna foraging BIAs (RPS 2025).

Impact and Risk Evaluation		
	No breeding or migration BIAs were identified within the EMBA at relevant exposure thresholds. See 4.4.2 for further details of these species listed above, and all other EPBC listed species within the wider Monitoring Area.	
Consequence Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Avifauna have the potential to be rafting, resting, diving and feeding within the area predicted to be contacted by surface hydrocarbons; diving or foraging within in-water hydrocarbons; and foraging and nesting within shoreline exposure. Direct contact with hydrocarbons is likely to foul plumage, which may result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impaired waterproofing (ITOPF 2011a). A loss of water-proofing results increased heat loss, subsequently resulting in an increased metabolism of food reserves in the body, which may lead to emaciation (DSEWPaC 2011a). A bird suffering from cold, exhaustion and a loss of buoyancy (resulting from fouling of plumage) may dehydrate, drown or starve (ITOPF 2011a; DSEWPaC 2011a; AMSA 2013). Physical smothering may also result in impaired navigation and flight performance (Hook et al. 2016). Inhalation or direct ingestion from preening of oiled feathers may result in internal tissue irritation in their lungs and stomachs (ITOPF 2011a). This has the potential to result in mortality depending on the amount consumed.	Seabirds could be impacted by in-water hydrocarbon exposure directly (i.e., whilst diving through the water column foraging) or indirectly (i.e. by consuming hydrocarbon-tainted fish, resulting in sub-lethal or toxic impacts). Impacts to prey (i.e. pelagic fish) following a hydrocarbon release may disrupt and limit food supply both for the maintenance of adults and the provisioning of young. Penguins may be especially vulnerable to oil because they spend a high portion of their time in the water and readily lose insulation and buoyancy if their feathers are oiled. Previous spills have recorded large death tolls of penguins, however these have all been spill of heavy fuel all, such as the Iron Baron vessel spill, of 325 tonnes of bunker fuel in Tasmania in 1995, is estimated to have resulted in the death of up to 20,000 penguins (Hook et al. 2016). However, the presence of birds within in-water hydrocarbons at moderate exposure levels is expected to be limited, due to the transitory nature of most foraging individuals and the absence of offshore aggregation areas in the area. There are foraging BIAs for a number of bird species in the area exposed to in-water hydrocarbons (RPS 2025). However, the foraging BIAs are typical over relatively extensive areas, therefore, impacts are not anticipated at a population level	Shoreline species may suffer both direct oiling and potential displacement from foraging and nesting sites. Acute or chronic toxicity impacts (death or long-term poor health) to small numbers of birds is possible, however this is not considered significant at a population level. Direct impacts to habitats at breeding sites may occur, subsequently contaminating nests (Clark 1984). Oiled fauna may track oil into their nests, which may then have subsequent impacts on any eggs present. Given the volatility of the exposed oil, any impact to nests is expected to occur to individuals and not considered to pose a long-term risk at population level. Impacts to bird species are not anticipated to be long-term or affect population functioning due to the widespread areas available for foraging, the transitory nature of foraging birds, the absence of offshore aggregation areas in the area, and the weathering properties of the condensate.

Impact and Risk Evaluation		
	due to the localised and temporary exposure of moderate levels of surface hydrocarbons.	
Summary: Acute or chronic toxicity impacts (death or long-term poor health) to seabirds is possible. However, the presence of birds within areas exposed to moderate threshold levels is expected to be limited, due to the transitory nature of foraging individuals, and given the absence of offshore aggregation areas in the area. Therefore, impacts to these species are not anticipated to be long-term or affect population functioning due to the widespread areas available for foraging and breeding, the transitory nature of foraging birds, the absence of offshore aggregation areas in the area, and the weathering properties of the hydrocarbons. Consequently, the potential impacts and risks to avifauna are considered to be **Level 3** as they could be expected to result in localised, medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.		
Marine Reptiles		
Exposure Evaluation		
Condensate	**MGO**	
There may be marine turtles in the area predicted to be exposed to hydrocarbons at relevant exposure levels. Marine turtles may be exposed when transiting through the in-water hydrocarbons, surfacing to breathe within the surface slick, or nesting on oiled shorelines. Three EPBC listed species have the potential to be present within the EMBA, these include: • Leather back turtle • Loggerhead turtle • Green turtle However, there are no BIAs or habitat critical areas to the survival of the species within the EMBA.	The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA associated with this scenario. There may be marine turtles in the area predicted to be exposed to hydrocarbons at relevant exposure levels. Marine turtles may be exposed when transiting through the in-water hydrocarbons, surfacing to breathe within the surface slick, or nesting on oiled shorelines. Three EPBC listed species have the potential to be present within the EMBA, these include: • Leather back turtle • Loggerhead turtle • Green turtle However, there are no BIAs or habitat critical areas to the survival of the species within the EMBA.	
Consequence Evaluation		

Impact and Risk Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Hydrocarbons can be ingested as marine turtles make large, rapid inhalations before they dive which may result in inhalation of toxic vapours from hydrocarbons in surface waters which may cause harm to the internal organs of turtles. This can lead to respiratory irritation, inflammation, emphysema or pneumonia (NOAA 2010).	Entrained hydrocarbons within the water column can adhere to body surfaces (Gagnon and Rawson 2011) and can enter cavities such as the eyes, nostrils, or mouth. This can cause an elevated susceptibility to infections (NOAA 2010). Historically, very few marine turtles have been identified to be impacted following previously hydrocarbon spill, despite occurring in areas where they are known to be relatively abundant (Short 2011). However, oiling has been shown to have the potential to cause mortality depending on the size of the individual and the extent of oiling (DWH Natural Resource Damage Assessment Trustees, 2016). Following the Macondo spill in the Gulf of Mexico, a large number of marine turtles were found dead, however a significant number was found alive and oiled, which were later successfully released. Indicating that oiling does not necessarily lead to mortality (NOAA 2013). The number of marine turtles that may be exposed to hydrocarbons during a hydrocarbon release is expected to be low due to the localised and temporary presence of hydrocarbons at moderate exposure levels, the low number of turtles foraging or migrating through Otway Basin in general. The potential impact would be limited to individual transiting marine turtles, with population impacts not anticipated.	Marine turtles may experience oiling impacts on nesting beaches when they come ashore to lay their eggs. There is potential for contamination of turtle eggs to result in toxic impacts to developing embryos. Turtle hatchlings are expected to be more vulnerable to smothering as they emerge from the nests and make their way over the intertidal area to the open water (AMSA 2015). Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects including impaired movement and bodily functions (Shigenaka 2011). Hatchlings sticky with oily residues may also have more difficulty crawling and swimming, rendering them more vulnerable to predation. The absence of BIAs or habitat critical to the survival of the species within this area indicates that the number of turtles impacted by a shoreline exposure is low. The potential impact would be limited to individual transiting marine turtles, with population impacts not anticipated.
Summary: Marine pollution is listed as a threat to marine turtle in the Recovery Plan for Marine Turtles in Australia, 2017 – 2027, particularly in relation to shoreline oiling of nesting beaches.		

Impact and Risk Evaluation		
The number of marine turtles that may be exposed to hydrocarbons during a LOC event is expected to be low due to the localised and temporary presence of hydrocarbons at moderate exposure levels, the low number of turtles foraging or migrating through Otway Basin in general, and the absence of BIAs or habitat critical to the survival of the species within this area. The potential impact would be limited to individual transiting marine turtles, with population impacts not anticipated. Consequently, the potential impacts and risks to marine reptiles are considered to be **Level 2** as localised short-term impacts to species of recognised conservation value, but not affecting local ecosystem functioning.		
Pinnipeds		
Exposure Evaluation		
Condensate	**MGO**	
There may be pinnipeds within the area predicted to affected by hydrocarbons. Pinnipeds that may be present within the EMBA such as the Australian sea-lion, and Australian fur-seal and New Zealand fur-seal, have the potential to be impacted by surface hydrocarbons when surfacing to breathe, in-water hydrocarbons when transiting through the area, and shoreline accumulated hydrocarbons that occur at haul-out sites along the coastline.	The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA associated with this scenario. There may be pinnipeds within the area predicted to affected by hydrocarbons. Pinnipeds that may be present within the EMBA such as the Australian sea-lion, and Australian fur-seal and New Zealand fur-seal, have the potential to be impacted by surface hydrocarbons when surfacing to breathe, in-water hydrocarbons when transiting through the area, and shoreline accumulated hydrocarbons that occur at haul-out sites along the coastline. However, there are no BIAs or biological important behaviours identified within the EMBA at relevant exposure thresholds.	
Consequence Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Exposure to surface hydrocarbons at, or above the moderate threshold can cause skin and eye irritations and disruptions to thermal regulation due to covering of insulating fur. Hook et al. (2016) reports that seals appear not to be very sensitive to contact with oil, but instead to the toxic impacts from the inhalation of volatile components.	Pinnipeds may be impacted by in-water hydrocarbon exposure as they have high site fidelity to established colonies and haul-out areas. This is corroborated by Geraci and St. Aubins (1988) who recorded seals, sea- lions and fur-seals swimming in oil slicks during a number of documented spills. Indicating that they are less likely to practice avoidance behaviours in the event of a hydrocarbon release. However,	Pinnipeds hauling out on exposed shores could be exposed by direct contact of oil with skin/body. Individual adults may also be impacted by oil while transiting through the nearshore environments at haul-out sites that may be impacted from the spill event. Although, direct oiling is possible, it is expected to have a limited

Impact and Risk Evaluation		
ITOPF (2011a) demonstrates that species that rely on fur to regulate their body temperature (such as fur-seals) are most vulnerable to oil, as the animals may die from hypothermia or overheating, depending on the season, if the fur becomes matted with oil. Heavy oil coating and tar deposits on fur-seals may also result in reduced swimming ability and lack of mobility out of the water. Heavy coating is not expected given the volatile components of the hydrocarbon will evaporate, and the minimal remaining oil will weather. The residual component of the oil is expected to resolidify to waxy particles, decreasing the risk of exposure.	there are no BIAs or biologically important behaviour for pinnipeds within the area predicted to be exposed to released hydrocarbon. Hydrocarbons in the water column or consumption of prey affected by the oil may cause sub-lethal impacts to pinnipeds, however given the localised nature of the spill, and the rapid loss of the volatile components of the MDO in choppy and windy seas (such as that of the EMBA), impacts are expected to be temporary and localised.	window for occurring due to rapid weathering of condensate. However, there are no BIAs or biologically important behaviours for pinnipeds within the area predicted to be exposed to released hydrocarbon.
Summary: Conservation Listing Advice for the *Neophoca cinerea* (Australian sea-lion) (TSSC 2020) identifies oil spills as a potential threat to habitat. However, activities within this EP will be consistent with the conservation and management priorities outlined in this advice. Given both hydrocarbons are considered light hydrocarbons that rapidly evaporates, the number of pinnipeds exposed is expected to be low, with population impacts not anticipated, due to the localised and temporary presence of hydrocarbons at moderate exposure levels and the absence of BIAs and biologically important behaviours the area. The potential impacts to pinnipeds from a shoreline hydrocarbon exposure event are considered to be **Level 3,** as the impacts could be expected to result in localised, medium-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.		
Cetaceans		
Exposure Evaluation		
Condensate	**MGO**	
Several threatened, migratory and/or listed marine cetacean species have the potential to be migrating or foraging within the EMBA. Cetaceans may come into contact with hydrocarbons when transiting through or foraging within the exposed area. The following BIAs are within the EMBA exposed to hydrocarbons at moderate exposure levels:	The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA associated with this scenario. Several threatened, migratory and/or listed marine cetacean species have the potential to be migrating or foraging within the EMBA. Cetaceans may come into	

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="2">• Pygmy blue whale foraging BIA
• Southern right whale migration and reproduction BIAs.
In-water hydrocarbons are mostly predicted to occur at low thresholds of dissolved (up to 50%) and entrained up to (100%), with high probabilities of high thresholds of entrained (up to 100%) (RPS 2024).</td><td>contact with hydrocarbons when transiting through or foraging within the exposed area.
The following BIAs are within the EMBA exposed to hydrocarbons at moderate exposure levels:
• Pygmy blue whale foraging BIA
• Southern right whale migration and reproduction BIAs.
Surface hydrocarbons are anticipated to extend for a maximum of ~31.8 km, ~23.1 km and ~16.1 km at the low, moderate and high thresholds, respectively, in the worst-case scenario modelled (RPS 2025). Therefore, potential exposure to moderate levels of surface hydrocarbons is expected to be limited to transient individuals given the localised moderate exposure area (<23.1 km from the release site).
In-water hydrocarbons are mostly predicted to occur at low thresholds of dissolved (up to 76%) with low probabilities of moderate thresholds of dissolved (10%), and most sites with high thresholds of entrained hydrocarbon exposure (up to 100%) for the MGO scenario modelled (RPS 2025).</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>If whales are foraging at the time of the spill, potential exposure to moderate levels of surface hydrocarbons is expected to be limited to transient individuals given the localised moderate exposure area.
As cetaceans’ surface to breathe the inhalation of hydrocarbon droplets, vapours and fumes at the surface is a distinct possibility (Helm et al. 2014). Inhalation of surface hydrocarbons could damage mucous membranes, damage airways, or even cause death. Furthermore, ingestion of contaminated prey could cause toxic impacts. The risk is greatest near</td><td>Several cetacean species may be exposed to moderate dissolved or high entrained exposure (in the upper 0 -10 m of the water column) which thresholds in the water column following a hydrocarbon release.
In-water hydrocarbons are mostly predicted to occur at low thresholds of dissolved (100%) and high thresholds of entrained (up to 100%), as well as low probabilities of moderate thresholds of dissolved.
Cetacean exposure to entrained hydrocarbons can result in physical coating as well as ingestion (Geraci and St Aubin, 1988). Such impacts are associated with ‘fresh’</td><td>Given cetaceans are pelagic species, exposure to shoreline hydrocarbons is not expected.</td></tr>
</table>

Impact and Risk Evaluation		
the source of a fresh spill because volatile toxic vapours disperse relatively quickly (Helm et al. 2014). Direct surface oil contact with hydrocarbons is considered to have little deleterious effect on cetaceans, and any effect is likely to be minor and temporary. The skin is an effective barrier to toxicity (Geraci & St Aubin 1988). Hydrocarbons tend to adhere to rough surfaces, hair, or calluses of animals. Cetaceans have mostly smooth skin, with limited rough surfaces, so contact with hydrocarbons by cetaceans is expected to cause only minor hydrocarbon adherence. Studies have shown that hydrocarbon are not expected to accumulate in or around the eyes, mouth, blow hole, or other potentially sensitive external areas (Helm et al. 2014). Insulation is provided by a layer of blubber rather than hair or fur, so it is unlikely oil would compromise the thermoregulatory system of cetaceans. Individual southern right whales found within the reproduction BIA may have a higher likelihood of exposure to hydrocarbons compared to the transient individuals found exposed within the migration BIA. However, only 9% probability that surface hydrocarbons would contact the reproduction BIA were predicted. Given, the hydrocarbon is a light and non-persistent one; and the BIA being relatively far from the release site, indicates that majority of the hydrocarbon volume will have undergone weathering, as predicted within Section 6.8.3.4.	hydrocarbons, the risk of impact declines rapidly as the condensate weathers. Geraci and St Aubin (1988) found little evidence of cetacean mortality from hydrocarbon spills; however, some behaviour disturbance (including avoidance of the area) may occur. While this reduces the potential for physiological impacts from contact with hydrocarbons, active avoidance of an area may disrupt behaviours such as migration, or displace individuals from important habitat, such as foraging, resting or breeding. However, the strong attraction to specific areas for breeding or feeding may override any tendency for cetaceans to avoid the noxious presence of hydrocarbons. Individual southern right whales found within the reproduction BIA may have a higher likelihood of exposure to hydrocarbons compared to the transient individuals found exposed within the migration BIA. Given, the hydrocarbon is a light and non-persistent one; and the BIA being relatively far from the release site, indicates that majority of the hydrocarbon volume will have undergone weathering, as predicted within Section 6.8.3.4. The potential for environmental impacts would be limited to a relatively short period following the release and would need to coincide with a migration event to result in exposure to a large number of individuals. However, such exposure is not anticipated to result in long-term impacts to population viability.	

Impact and Risk Evaluation		
Physical contact by individual whales of hydrocarbon is unlikely to lead to any long-term impacts. Given the mobility of whales, only a small proportion of the population would surface in the affected areas, resulting in short-term and localised consequences, with no long-term population viability effect.		
Summary: As highly mobile animals, in general it is very unlikely that cetaceans will be constantly exposed to concentrations of hydrocarbons in the water column for continuous durations that would lead to chronic toxicity effects. The National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) details that oil spills have the potential to have the greatest impact on southern right whales within or near reproduction BIAs, when there are larger concentrations of whales engaged in breeding activities over sustained periods of time (i.e., weeks to months) and where oil may accumulate. It is acknowledged that low and moderate exposure levels of surface hydrocarbons may occur within the southern right whale reproduction BIA. However, given the MGO is considered a light hydrocarbon that rapidly evaporates, the number of cetaceans exposed within the reproduction BIA by the time the hydrocarbon is present is expected to be low, with population impacts not anticipated, is unlikely to lead to long-term impacts or result in viable long-term population effects. The potential consequence to cetaceans is assessed as **Level 3** based on the potential for localised, medium-term impacts to species of recognised conservation value but not affecting local ecosystem functioning.		

Inherent Likelihood

Due to the nature of this activity, the multiple control measures that will be in place, and based on previous occurrences, the impact is considered conceivable and could occur, however, it would require a rare combination of factors. Therefore, the inherent likelihood of an accidental release of hydrocarbons causing Level 3 consequences to habitats is considered **Unlikely (D)**.

Inherent Risk Severity

The inherent risk severity of an accidental release of hydrocarbons causing impacts to marine fauna is considered **Moderate**. Table 6-58 lists the inherent risk severity for each receptor type.

Table 6-58: Inherent Risk Severity – Hydrocarbon Exposure – Ecological Receptors – Marine Fauna

Receptor	Inherent Consequence Level	Inherent Likelihood Level	Inherent Severity
Plankton	2	D	**Low**
Benthic invertebrates	2	D	**Low**
Fish and sharks	2	D	**Low**
Avifauna	3	D	**Moderate**
Marine reptiles	2	D	**Low**
Pinnipeds	3	D	**Moderate**
Cetaceans	3	D	**Moderate**

6.8.5.4 Risk: Change in Ecosystem Dynamics

Inherent Consequence Evaluation

Impacts to social receptors, such as sensitive ecosystems, are assessed based on the hydrocarbon exposure threshold that could result in a visual sheen or exceedance of water quality guidelines and are considered an indicator of possible Socio-Economic impacts (SEI) within the marine and coastal environment. The potential extent of these thresholds is determined by modelling (Figure 6-17).

Exposure concentrations are not uniform to the outer extent of these thresholds. Concentrations would typically be lower, and the chance of exposure more remote beyond the ecological EMBA.

The thresholds that apply to the outer extent of potential visual/water quality impacts are:

- surface (low)
- shoreline (low)
- in water – dissolved (moderate)
- in water – entrained (high).

Potential impacts to social receptors are assessed in Table 6-59.

The EPBC Protected Matters Reports relevant to the hydrocarbon spill thresholds are in Appendix 5.

Note: no wetlands were predicted to be contacted at the relevant thresholds, and therefore, have not been assessed below.

Table 6-59: Consequence Evaluation for Hydrocarbon Exposure – Social Receptors – Natural Systems

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Australian Marine Parks (AMPs)</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="3">The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation for both MGO and condensate is based on the worst-case area of exposure; the EMBA associated with this scenario.
Modelling of the MGO spill scenario predicted one AMP to be within the range of hydrocarbon exposures relevant to socio-economic impacts, including:
• Apollo AMP (Multiple Use Zone (IUCN VI)).
MGO spill modelling indicates that 61% of the Apollo AMP may be exposed to hydrocarbons only at relevant in-water (entrained) thresholds (RPS 2025).
See Section 4.4.3 for the major conservation values of this AMP.</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>The modelling did not predict contact by surface hydrocarbons for Apollo AMP, at or above the low threshold. However, values identified with the AMP may have the potential to be impacted by surface hydrocarbons at the relevant thresholds outside of the AMP.
Seabirds are the value which has been identified for this AMP that may be impacted by surface hydrocarbons by rafting, resting, diving or feeding within the surface slick. Impact to seabirds from direct or indirect exposure to surface hydrocarbons may cause a subsequent negative impact to the value of the AMP, however any impact is expected to be limited to a small number of individuals, with no impacts to regional populations.</td><td>The exposure of entrained hydrocarbons will be greatest within the upper 0-10 m of the water column and areas close to the spill source. The Apollo AMP is located within waters 80-120 m, respectively; therefore, conservation values within the AMP, such as ecosystems, habitats and sea-floor features are not predicted to be impacted.
The Apollo AMP is important foraging areas for seabirds. There is a low probability that seabirds will be exclusively feeding within the area exposed to hydrocarbons given their extensive foraging grounds. Therefore, there is a chance that foraging seabirds will experience sub-lethal impacts from consuming contaminated prey, however, impacts will be limited to individuals and are not expected to cause impacts at a population-level.</td><td>Given the AMP is located in Commonwealth waters, exposure to shoreline hydrocarbons is not expected.</td></tr>
</table>

Impact and Risk Evaluation		
	The Apollo AMP also provides important migratory pathways for cetaceans (i.e. humpback, blue, fin, and sei whales). However, as cetaceans are highly mobile pelagic species, they are unlikely to be exposed to discrete patches of hydrocarbons for long.	

Summary:
The potential consequence to Australian Marine Parks from exposure are assessed as **Level 3** based on the potential for localised, medium-term impacts to habitats or species of recognised conservation value or to local ecosystem functioning.

Refer also to:

- Ecological Receptors - Marine fauna

State Marine Parks and Reserves

Exposure Evaluation

The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation for both MGO and condensate is based on the worst-case area of exposure; the EMBA associated with this scenario.

The modelling of the MGO spill scenario identified 3 State Protected Areas that may be present within the extent of hydrocarbon exposures at socio-economic thresholds for shoreline accumulation. These include:

- The Arches Marine Sanctuary
- Twelve Apostle Marine National Park
- Port Phillip Heads Marine National Park

The Arches Marine Sanctuary was the only State Protected Area that was identified to also be exposed to in-water (high threshold) and surface (low threshold) hydrocarbons.

MGO spill modelling indicates that 1% and 6% of the of the Arches Marine Sanctuary may be exposed to hydrocarbons at relevant in-water entrained thresholds, respectively (RPS 2025).

Given the hydrocarbon characteristics of the condensate, being a volatile and light non-persistent hydrocarbon with approximately 17.5% residual, including 10% wax content, majority of the volatile ends will evaporate rapidly (RPS 2024). Therefore, in the unlikely event that hydrocarbons were to reach shorelines predicted below relevant thresholds, hydrocarbon sheens would not be expected, instead isolated patches of highly weathered waxy flakes may occur.

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure

Impact and Risk Evaluation		
The values identified within the identified State marine protected areas that have the potential to be exposed to surface hydrocarbons at, or above, the low threshold. Impacts to the values of the marine park (i.e. seabirds) may cause subsequent negative impacts to the value of the marine park. Furthermore, visible surface hydrocarbons (i.e. a rainbow sheen) may have the potential to reduce the visual amenity of the area, also impacting the value. However, given the nature of the hydrocarbon, being light non-persistent hydrocarbon, it is expected to remain in waxy flake-like state; and in most cases surface oiling is not expected to the visible from shore.	The exposure of entrained hydrocarbons will be greatest within the upper 0-10 m of the water column and areas close to the spill source. Therefore, conservation values within these state parks and reserves, such as benthic and pelagic species, ecosystems, habitats and sea-floor features are not predicted to be exposed to in-water hydrocarbons and therefore not predicted to be impacted.	Visible shoreline hydrocarbons have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities within the identified protected areas. Given the non-persistent nature of the hydrocarbon, waves and tidal action are anticipated to continue the weathering process in the event that shoreline contact occurs. Any residual components of the oil will resolidify to waxy particles, decreasing the risk of exposure and potential for heavy coating of the shorelines. Majority of the coastlines that may be exposed to shoreline hydrocarbon accumulation are relatively unpopulated. Therefore, given the nature of the hydrocarbon, anticipated weathering processes, impacts are not anticipated to be long-term.
Summary: The potential consequence to State parks and reserves from exposure are assessed as **Level 3** based on the potential for localised medium-term impacts to habitats or species of recognised conservation value or to local ecosystem functioning. Refer also to: • Ecological Receptors - Marine fauna.		
Key Ecological Features (KEFs)		
Exposure Evaluation		
The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation for both MGO and condensate is based on the worst-case area of exposure; the EMBA associated with this scenario. Shelf Rocky Reefs are not a spatially defined KEF but is known to be well represented within the southeast marine region, on the continental shelf. The shelf rocky reefs KEF in particular supports a variety of benthic communities, such as coral, sponges and benthic communities, along the continental shelf within the temperate east marine region (see Section 4.4.3).		

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Modelling predicted exposure of shoreline hydrocarbons at, or above, the low exposure levels to overlap the Bonney Coast Upwelling KEF (Figure 4-16). However, given the Bonney Coast Upwelling is KEF is associated within unique seafloor features, and offshore productivity and biodiversity (Section 4.4.3) exposure to shoreline hydrocarbons is not expected to result in any impact to the values of the KEF. As such, this has not been assessed further.
See Section 4.4.3 for further details on these KEFs.</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Given the values identified for the KEF that may be exposed to hydrocarbons are pelagic or benthic, exposure to surface (floating) hydrocarbons is not expected.</td><td>The values identified within the KEF have the potential to be exposed to entrained hydrocarbons at, or above, the low threshold.
However, the exposure of entrained hydrocarbons will be greatest within the upper 0-10 m of the water column and areas close to the spill source. Therefore, the spill is unlikely to intersect with majority of the values of the KEF which are concentrated within the water column >10 m deep or along the seafloor at varying water depths.
Hydrocarbon exposure to the key receptors of the KEF (e.g. benthic habitats and communities) may cause a subsequent negative impact to the value of the KEF, however is expected to be limited to a small portion of receptors, with no impacts to regional populations.
Furthermore, given light non-persistent nature of the hydrocarbon, any impacts to KEF are expected to be localised and short-term.</td><td>Given the identified KEF is located in offshore waters, exposure to shoreline hydrocarbons is not expected.</td></tr>
<tr><td colspan="3">Summary:
The potential consequence to KEFs is assessed as Level 3 based on the potential for localised, medium-term impacts to habitats or species of recognised conservation value or to local ecosystem functioning.
Refer also to:
• Ecological Receptors - Marine fauna.</td></tr>
</table>

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Threatened Environmental Communities (TECs)</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="3">The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation for both MGO and condensate is based on the worst-case area of exposure; the EMBA associated with this scenario.
Modelling of the MGO spill scenario predicted exposure from shoreline hydrocarbons at, or above low exposure levels, to overlap 5 TECs, these include:
• Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community (Endangered)
• Giant Kelp Marine Forests of South East Australia (Endangered)
• Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Critically Endangered)
• Natural Damp Grassland of the Victorian Coastal Plains (Critically Endangered)
• White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered)
Values associated with these TECs (see Section 4.4.3) are listed as critically endangered, endangered or vulnerable, and can be sensitive to hydrocarbon exposure.</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Given the identified TECs are all located onshore or in coastal intertidal waters, exposure to surface (floating) hydrocarbons is not expected.</td><td>Given the identified TECs are all located onshore or in coastal intertidal waters, exposure to in-water hydrocarbons is not expected.</td><td>TECs have the potential to be exposed to shoreline hydrocarbons at, or above, the low threshold. Any hydrocarbon exposure to the key receptors of the TECs may cause a subsequent negative impact to the value of the TECs, However, potential impacts to socio-economic receptors (tourism, cultural and/or other social values associated with the TECs) are more likely to occur as a result of a reduction in the visual amenity, rather than ecological impacts of hydrocarbon exposure at low threshold.
Shoreline hydrocarbons often become concentrated as it strands ashore. However, most of the oil is concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA, 1995). The majority of the TECs are located above the</td></tr>
</table>

Impact and Risk Evaluation		
		high tide mark, therefore, impacts are not anticipated to occur. Furthermore, given light non-persistent nature of the hydrocarbon, any impacts to TECs are expected to be localised and short-term.
Summary: Given the rapid weathering and non-persistent nature of the MGO, the potential consequence to TECs is assessed as **Level 2** based on the potential for localised short-term impacts to species of recognised conservation value not affecting local ecosystem function.		
Heritage Places		
Exposure Evaluation		
The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation for both MGO and condensate is based on the worst-case area of exposure; the EMBA associated with this scenario. Modelling of the MGO spill scenario predicted 34 shipwrecks to be present within the extent of hydrocarbon exposures at socio-economic thresholds (Section 4.4.3; RPS 2025).No World, National or Commonwealth Heritage Places were identified as having the potential to be exposed to hydrocarbon exposures at socio-economic thresholds within the potential exposure area for MGO LOC (Section 4.4.3; RPS 2025).		
Consequence Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Identified offshore heritage places are located on benthic substrate, and therefore exposure to surface (floating) hydrocarbons is not expected.	Historical shipwrecks (Section 4.4.3) have the potential to be impacted by in-water hydrocarbons above the high threshold, despite there being limited information on the effect of oil spills on historic shipwrecks. Laboratory studies conducted with 5 mg/l (5000 ppb) of crude oil have shown that crude oil and potentially chemical dispersant could impact the biodiversity and metabolic function of microbial biofilms colonising metal-hulled shipwrecks (Salerno et al. 2018). This could have downstream effects on corrosion rates of	These heritage places have the potential to be exposed to shoreline hydrocarbons at, or above, the low threshold. Visible shoreline hydrocarbons may have the potential to reduce the visual amenity of the area, subsequently impacting the value of the heritage areas. Any impact to the environmental values of the areas (i.e. the environment of the Great Ocean Road) may affect ecological values of the heritage areas. See Section 8.0 for further assessment of changes to First Nations cultural heritage values and sensitivities.

Impact and Risk Evaluation		
	metal hulls, potentially impacting their longevity in the marine environment.	However, the modelling predicted rapid evaporation during the first 24 hours following the hydrocarbon release, depending on the weather conditions (i.e. wind speeds). Given the non-persistent nature of the hydrocarbon, waves and tidal action are anticipated to continue the weathering process in the event that shoreline contact occurs.
Summary: Given the rapid weathering and non-persistent nature of the MGO, the potential consequence to heritage places is assessed as **Level 2** based on the potential for localised short-term impacts. Refer also to: • Ecological Receptors - Benthic Habitats • Ecological Receptors - Marine Fauna • Social Receptors – Human Systems (Recreation and Tourism) • Section 6.8.5.5: Changes to First Nations Cultural Heritage Values and Sensitivities.		

Inherent Likelihood

Due to the nature of this activity, the multiple control measures that will be in place, and based on previous occurrences, the impact is considered conceivable and could occur, however, it would require a rare combination of factors. Therefore, the inherent likelihood of an accidental release of hydrocarbons causing Level 3 consequences to habitats is considered **Unlikely (D)**.

Inherent Risk Severity

The inherent risk severity of an accidental release of hydrocarbons causing impacts to social receptors is considered **Moderate**. Table 6-60 lists the inherent risk severity for each receptor type.

Table 6-60: Inherent Risk Severity – Hydrocarbon Exposure – Social Receptors – Natural Systems

Receptor	Inherent Consequence Level	Inherent Likelihood Level	Inherent Severity
AMPs	3	D	**Moderate**
State Parks and Reserves	3	D	**Moderate**
Wetlands	3	D	**Moderate**
KEFs	3	D	**Moderate**
TECs	2	D	**Low**
Heritage Places	2	D	**Low**

6.8.5.5 Risk: Change to the Functions, Interests, or Activities of Other Users

Inherent Consequence Evaluation

Impacts to social receptors, such as other marine users, are assessed based on the hydrocarbon exposure threshold that could result in a visual sheen or exceedance of water quality guidelines and are considered an indicator of possible Socio-Economic (SE) impacts within the marine and coastal environment. The potential extent of these thresholds is determined by modelling (Figure 6-17).

Exposure concentrations are not uniform to the outer extent of these thresholds. Concentrations would typically be lower, and the chance of exposure more remote beyond the ecological EMBA.

The thresholds that apply to the outer extent of potential visual/water quality impacts are:

- surface (low)
- shoreline (low)
- in water – dissolved (moderate)
- in water – entrained (high).

Potential impacts to social receptors are assessed in Table 6-61.

The EPBC Protected Matters Reports relevant to the hydrocarbon spill thresholds are in Appendix 5

Table 6-61: Consequence Evaluation for Hydrocarbon Exposure – Social Receptors – Human Systems

Impact and Risk Evaluation		
Coastal Settlements		
Exposure Evaluation		
Several local government areas along the Victorian coastline are identified as having the potential to be exposed to hydrocarbons at low threshold; predominantly between Warrnambool and east of Cape Otway, where there is also potential for increased concentrations of hydrocarbons at levels that could have ecological impacts. The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation for both MGO and condensate is based on the worst-case area of exposure; the EMBA associated with this scenario. The MGO scenario modelled predicted shoreline exposure could occur at the low threshold at 7 local government areas (RPS 2025), including: • Colac Otway • Corangamite • Glenelg • Greater Geelong • Moyne • Surf Coast • Warrnambool The stretch of coastlines where the outer extent of hydrocarbons could reach at the low shoreline exposure threshold have low coastal development and settlement. Within the range of potential ecological impacts, indicative of more severe socio-economic impacts, are areas where there is relatively high development, including Port Campbell and Warrnambool.		
Consequence Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Given these coastal settlements occur on the shoreline, exposure to surface (floating) hydrocarbons is not expected.	Given these coastal settlements occur on the shoreline, exposure to in-water hydrocarbons is not expected.	Visible hydrocarbons have the potential to reduce the visual amenity of the area for coastal settlements. Coastal settlements are within the area potentially exposed to hydrocarbons ashore; however, the stretch of coast to be exposed is not densely populated.

Impact and Risk Evaluation		
		Noting that these events will be temporary, so duration of exposure is also limited. Most of the hydrocarbons will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA 1995) and expected to be visible.
Summary: Given its rapid weathering and potential for tidal flushing and rapid degradation, the potential consequence to coastal settlements is assessed as **Level 2** based on the potential for localised short-term impacts.		
Recreation and Tourism		
Exposure Evaluation		
The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation for both MGO and condensate is based on the worst-case area of exposure; the EMBA associated with this scenario. The Victorian coast and marine region provide a diverse range of land-based and near-shore tourism opportunities, including surfing, fishing, sight-seeing, diving and snorkelling (Section 4.4.3). Modelling of the MGO spill scenario predicted shoreline hydrocarbon exposure at, or above the low (10 g/m^2) threshold predominantly between Warrnambool and east of Apollo Bay along the Victorian coastline (RPS 2025). Surface hydrocarbon exposure at, or above the low threshold (1 g/m^2) was only predicted for offshore and nearshore waters, along the Peterborough to Princetown coast sections. Modelling of the MGO spill scenario predicted low exposure thresholds of surface hydrocarbons up to 31.8 km (west-northwest) of the release location. In general, recreational and tourism activities are generally restricted to shallow coastal waters and shorelines.		
Consequence Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Visible surface hydrocarbons (i.e. a rainbow sheen) on the surface have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. However, given the nature of the condensate, being light non-persistent hydrocarbon, it is expected to remain in waxy flake-like state; and in most cases	In-water exposure to entrained condensate could overlap and may result in a negative impact to recreation and tourism activities. Tourism and recreation activities can be indirectly exposed to impacts from in-water hydrocarbons, as the activities are often linked to the presence of	Visible hydrocarbons stranded on shorelines have the potential to reduce the aesthetic value for tourism and discourage recreational activities that may be operating within the area. Precautionary exclusion from shorelines may be implemented by local governments until water quality monitoring verifies the absence of residual

Impact and Risk Evaluation		
surface oiling is not expected to the visible from shore.	ecological features, such as marine fauna (e.g. whale watching, recreational fishing). Any impact to receptors that provide nature-based tourism features (e.g. whales) may cause a subsequent negative impact to recreation and tourism activities.	hydrocarbons. This could cause disruption to some recreational and tourism activities within that area. Given the nature of the condensate, being light non-persistent hydrocarbon, it is expected to remain in waxy flake-like state; and in most cases surface oiling is not expected to the visible from shore. On shorelines, the wave and tidal action, together with predicted weathering, indicates that hydrocarbons along shorelines will continually wash off the substrates, and be readily flushed into the water, leading to further weathering.
Summary: Given MGO rapid weathering and potential for tidal flushing and rapid degradation, the potential consequence to recreational and tourism is assessed as **Level 2** based on the potential for localised short-term impacts. Refer also to: • Ecological Receptors - Habitats Ecological Receptors - Marine Fauna.		
Commercial Fisheries		
Exposure Evaluation		
The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation for both MGO and condensate is based on the worst-case area of exposure; the EMBA associated with this scenario. Several commercial and state fisheries have the potential to be exposure to hydrocarbons at socio-economic impact thresholds. These include: • 7 Commercial Fisheries, including: – Bass Strait Central Zone Scallop Fishery – Eastern Skipjack Fishery – Eastern Tuna and Billfish Fishery – Small Pelagic Fishery – Southern and Eastern Scalefish and Shark Fishery (SESSF) (including sub-sectors) – Southern Bluefin Tuna Fishery		

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">– Southern Squid Jig Fishery.
• 7 Victorian State Fisheries
• 2 Tasmanian State Fisheries
For Tasmania, no shoreline exposure is predicted at low thresholds (shoreline) or in-water hydrocarbons (RPS 2025).</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Visible surface hydrocarbons (i.e. a rainbow sheen) may have the potential to affect public perception of the industry, potentially causing a negative economic impact.
Physical displacement of commercial fishers has the potential to occur due to the establishment of exclusion zones during a spill response. However, due to the nature of the condensate, being a light non-persistent hydrocarbon, with high anticipated evaporation and entrainment rates, exclusion zones are not expected to be long-term and are unlikely to result in significant impacts.</td><td>In-water exposure to entrained hydrocarbons may result in a reduction in commercially targeted marine species, resulting in impacts to commercial fishing and aquaculture. Actual or potential contamination of seafood can affect commercial and recreational fishing and can impact seafood markets long after any actual risk to seafood from a spill has subsided (NOAA 2002) which can have economic impacts to the industry.
In-water exposure is limited to the upper 0 – 10 m of the water column, and not within the deeper areas of the water column where rock lobster and giant crab species are found.
Due to the sensitivity, a small number of juvenile fish, larvae, and planktonic organisms, could be impacted, however impacts are not expected to affect population viability or recruitment.</td><td>Given commercial fisheries are all located in offshore wasters and no shoreline exposure is predicted at Tasmania or King Island (where a kelp fishery is located), exposure to shoreline hydrocarbons is not expected.</td></tr>
<tr><td colspan="3">Summary:
In-water exposure is limited to the upper 0 – 10 m of the water column, and not within the deeper areas of the water column where rock lobster and giant crab species are found. Any acute impacts are expected to be limited to individuals and not expected to cause impacts at a population level. The potential consequence to commercial fisheries is assessed as Level 2 based on the potential for localised, short-term impacts.
Refer also to:
• Ecological Receptors -Marine Fauna</td></tr>
</table>

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Other Offshore Industry</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="3">The MGO spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation for both MGO and condensate is based on the worst-case area of exposure; the EMBA associated with this scenario.
Other offshore industry, such as shipping, petroleum exploration and production, other offshore infrastructure and defence activities, could be exposed to hydrocarbons according to modelling of the MGO spill scenario.
The South-east Marine Region in general is one of the busiest shipping regions in Australia, which encompasses the Otway Basin.
A number of producing oil and gas wells occur within the Monitoring Area. Current operators with producing fields in the Otway Basin include Beach Energy (Otway Gas Field Development) and Amplitude Energy (CHN Development).
Numerous other petroleum exploration activities, including seismic surveys and exploration drilling, have been undertaken in the permits of the Otway Basin.
Many training areas, sea dumping sites and UXO sites have the potential to be exposed to low levels of hydrocarbons. A number of these sites are located in and around Port Phillip Bay and Western Port Bay.</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Physical displacement of other offshore industry may occur due to the establishment of exclusion zones during the spill response. This has the potential to cause negative economic impact.
However, due to the light non-persistent nature of the hydrocarbon, with high anticipated evaporation and entrainment rates, exclusion zones are not expected to be long-term and are unlikely to result in significant impacts.</td><td>Given these industries are all located in offshore waters which utilise the sea surface vicinity, exposure to in-water hydrocarbons is not expected.</td><td>Given industries are all located in offshore waters, exposure to shoreline hydrocarbons is not expected.</td></tr>
<tr><td colspan="3">Summary:
The potential consequence to other offshore industry is assessed as Level 2 based on the potential for localised, short-term impacts.</td></tr>
</table>

Inherent Likelihood

Due to the nature of this activity, the multiple control measures that will be in place, and based on previous occurrences, the impact is considered conceivable and could occur, however, it would require a rare combination of factors. Therefore, the inherent likelihood of an accidental release of hydrocarbons causing Level 2 consequences to habitats is considered **Unlikely (D)**.

Inherent Risk Severity

The inherent risk severity of an accidental release of hydrocarbons causing impacts to social receptors is considered **Low**. Table 6-62 lists the inherent risk severity for each receptor type.

Table 6-62: Inherent Risk Severity – Hydrocarbon Exposure – Social Receptors – Human Systems

Receptor	Inherent Consequence Level	Inherent Likelihood Level	Inherent Severity
Coastal Settlements	2	D	**Low**
Recreation and Tourism	2	D	**Low**
Commercial Fisheries	2	D	**Low**
Other Offshore Industry	2	D	**Low**

6.8.6 Control Measures, ALARP, and Acceptability Assessment

Table 6-63 provides a summary of the control measures and ALARP and acceptability assessment relevant to worst case release scenarios.

Table 6-63: Accidental Hydrocarbon Release ALARP, Control Measures and Acceptability Assessment

Accidental hydrocarbon release	
ALARP Decision Context and Justification	ALARP Decision Context: Type B The activities proposed that could lead to a Vessel LOC and a pipeline LOC event are not new and have been undertaken by Amplitude Energy in the time since they become titleholder and operator. The wells are operated per the regulatory accepted WOMP and integrity management plan. The risks associated with Vessel LOC and pipeline LOC are well understood; given the spatial and temporal scale of a worst-case discharge, and the sensitivities in the region, a worst-case scenario has the potential to result in Level 3 consequences. Consequently, Amplitude Energy believes that ALARP Decision Context B should be applied. However, from the outset of the planning phase, due to inherent complexity and some uncertainty associated with this aspect for this Activity, Context C has also been applied, and is reflected in: • The conservative assumptions used to characterise worst -case discharge scenarios for the Vessel LOC. • Detailed assessment of potential impacts and risks. • Detailed assessment of control measures and selection of contingency measures in line with a precautionary approach. • Preparation of detailed response plans.
Control Measure	**Source and Description of Control**
Preventative	

Accidental hydrocarbon release	
CM01: Marine exclusion and caution zones	Exclusion zones are frequently installed over petroleum wells, structures and equipment established via Notice to Mariners around vessels undertaking petroleum activities. Temporary exclusion or caution zones are applied around vessels where they may be restricted in their manoeuvrability.
CM02: Pre-start Notifications	Under the Navigation Act 2014 (Cth), the AHS are responsible for maintaining and disseminating hydrographic and other nautical information and nautical publications including: • Notices to Mariners • AUSCOAST warnings. Relevant details will be provided to the Joint Rescue Coordination Centre (JRCC) to enable AUSCOAST warnings to be disseminated.
CM03: Marine Assurance Process	Marine Assurance Process ensures that maintenance systems are in place ensure that safety-critical equipment is maintained in accordance with manufacturer specifications to enable optimal performance.
	The vessels will adhere to navigational safety requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • AMSA MO 21: Safety and emergency arrangements gives effect to SOLAS regulations dealing with life-saving appliances and arrangements, safety of navigation and special measures to enhance maritime safety. • AMSA MO 27 - Safety of Navigation and Radio Equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards • AMSA MO 30 - Prevention of collisions requires that onboard navigation, radar equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards. • AMSA MO 70 - Seafarer certification meets the requirements for qualifications and training.
	In accordance with MARPOL Annex I and AMSA MO 91 [Marine Pollution Prevention – oil], a Shipboard Marine Pollution Emergency Plan (SMPEP) or Shipboard Oil Pollution Emergency Plan (SOPEP) (according to class) is required to be To prepare for a spill event, the SMPEP/SOPEP details: • Response equipment available to control a spill event. • Review cycle to ensure that the SMPEP/SOPEP is kept up to date. • Testing requirements, including the frequency and nature of these tests. In the event of a spill, the SMPEP/SOPEP details: • Reporting requirements and a list of authorities to be contacted. Activities to be undertaken to control the discharge of hydrocarbon.
CM05: Ongoing Consultation	Notifications for any on-water activities and ongoing consultations undertaken per Section 11.0 - Consultation.
CM11: Campaign Risk Review (modelling)	Spill modelling undertaken for the loss of MGO to inform this EP and the spill response planning including OPEP and OSMP.
Response	
CM19: Oil Pollution Emergency Plan (OPEP)	Under the Regulations, the petroleum activity must have an accepted Oil Pollution Emergency Plan (OPEP) in place before the activity commences. In the event of a LOC, the OPEP will be implemented. The Offshore Victoria OPEP has been developed and provides for emergency response for scenarios described under this EP.

Accidental hydrocarbon release	
	By committing to implement this EP, Amplitude Energy acknowledges that any response will be implemented in accordance with the requirements described within the OPEP.
CM20: Operational and Scientific Monitoring Plan	Amplitude Energy's OSMP details the arrangements and capability in place for: • Operational monitoring of a hydrocarbon spill to inform response activities. • Scientific monitoring of environmental impacts of the spill and response activities. Operational monitoring will allow adequate information to be provided to aid decision making to ensure response activities are timely, safe, and appropriate. Scientific monitoring will identify if potential longer-term remediation activities may be required and potential breaches of protected places management objectives, specifically those of Australian Marine Parks.
Impact and Risk Summary	
Residual Impact Consequence	N/A
Residual Risk Consequence	**Level 3**: Localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function; remedial/recovery work to land/water systems over months/year.
Likelihood	Based upon AMSA Annual Report 2023-24 (serious incident reports) (AMSA 2024), a LOC of MGO from a vessel is considered: • **Unlikely (D)** – As a rare combination of factors would be required for an occurrence; the event is conceivable and could occur at some time; and could occur during the Activity.
Residual Risk	**Moderate**
Demonstration of Acceptability	
Principles of ESD	The potential impact associated with this aspect is limited to a localised medium-term impact to species or habitats of recognized conservation value or to local ecosystem function; remedial, recovery work to land/water systems over months/year. The activities were evaluated as having the potential to result in a Level 3 consequence thus is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Legislation and other requirements considered relevant control measures include: • AMSA Marine Order 3 [Seagoing qualifications] • AMSA Marine Order 30 [Prevention of collisions] • AMSAs Marine Order 91 [Marine Pollution Prevention – oil] • OPGGS(E)R – Amplitude Energy Victorian OPEP (VIC-EPER-EMP-0001) • OPGGS(E)R- Amplitude Energy OSMP (VIC-ER-EMP-0002) • Navigation Act 2014 – Notifications.
Internal Content	The environmental controls proposed reflects Amplitude Energy's HSEC Policy commitment to take all reasonably practicable steps to protect the health and safety of workers, contractors, partners, and communities, and ensuring its business is conducted in an environmentally responsible manner. Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Technical Management (MS08)

Accidental hydrocarbon release	
	• Health Safety and Environment Management (MS09) • Incident and Crisis Management (MS10) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05).
External Context	Suggestions from State emergency agencies have been adopted unless otherwise discussed and agreed. Amplitude Energy retains contact details of First Nations organisations to be contacted in the event of a spill, noting traditional owners may alternatively be engaged by the State Control Agency.
Demonstration of meeting the defined acceptable levels in the OPP	Sections 9.5.7 and 9.6.7 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with accidental hydrocarbon release. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed above. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for accidental hydrocarbon release: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	Acceptable Amplitude Energy has determined that the risks related to an accidental hydrocarbon release are acceptable, based on: • The planned management of risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advices, and significant impact guidelines for MNES. • Feedback has been received from relevant persons that has informed the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures. To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: **EPO16**: No unplanned release of chemicals or hydrocarbons to the marine environment **EPO17**: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable.

7.0 Oil Spill Response

7.1 Oil Spill Response Strategies

This section represents the risk assessment for oil spill response options.

Amplitude Energy has developed a regional Offshore Victoria OPEP (VIC-ER-EMP-0001) which contains further detail of the response strategies that would be implemented in the event of a hydrocarbon spill and the relevant control measures.

7.1.1 Response Option Selection

Spill response strategies are triggered in the event of a hydrocarbon spill. Not all response options and tactics are appropriate for every oil spill. Different oil types, spill locations, and volumes require different response options and tactics, or a combination of response options and tactics, to form an effective response strategy.

A Net Environmental Benefit Analysis (NEBA) is the process of considering advantages and disadvantages of different spill response options (including no response) to arrive at a spill response decision resulting in the lowest overall environmental and social impacts. NEBA is undertaken at a strategic level to identify pre-determined recommended response strategies, and an operational NEBA is undertaken throughout the emergency response. The process requires the identification of sensitive environmental receptors and the prioritisation of those receptors for protection so that the strategic objectives of the response can be established.

Table 7-1 provides an assessment of the available oil spill response options, their suitability to the potential spill scenarios and their recommended adoption for the identified events.

7.1.2 Response Priority Areas

To support the identification of priority response areas, shoreline sensitivity analysis and mapping was undertaken guided by IPIECA principles and informed by the regional description of the environment and understanding of receptor presence in the region. The Response Priority Areas (RPAs) are detailed in the OPEP.

7.1.3 Pre-spill Net Environmental Benefit Assessment

Each of the RPAs used location specific information to refine the receptor presence and include a priority ranking based upon the sensitivity criteria detailed in the OPEP.

An assessment of the effective spill response strategies and the net benefit they offer, specific to the sensitivities located within each of the RPAs is also provided in the OPEP.

Table 7-1 provides an assessment of the available oil spill response options, their suitability to MGO and condensate, and their recommended adoption for the loss of containment scenario’s relevant to this EP.

Table 7-1: Suitability of Response Options for MGO and LOC Condensate Spills

Response Strategy	Description	MGO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
Source Control	Limit flow of hydrocarbons to environment.	Achieved by vessel SOPEP / SMPEP.	✓	✓	Achieved by Facility Emergency Shutdown (ESD) system and operator response procedures.	✓	✓
Monitor & Evaluate	To maintain situational awareness, all monitor and evaluate options suitable: • direct observation – aerial or marine • vector calculations • Oil Spill Trajectory Modelling (OSTM) • satellite tracking buoys.	Modelling identifies that for MGO spills under favourable conditions, approximately 83.1% of the oil mass should have entrained and a further 11.4% will evaporate within the first 24 hours. Leaving only a small proportion floating on the water surface (1.3%) (Section 6.8.3.4). Aerial surveillance is considered more effective than vessel surveillance to inform spill response and identify if oil has contacted shoreline or wildlife. Vessel surveillance limited in effectiveness in determining spread of oil. Manual calculation based upon weather conditions will be used at the time to provide guidance to aerial observations. Oil Spill trajectory modelling utilised to forecast impact areas. Deployment of oil spill monitoring buoys at the time of vessel incident will assist in understanding the local current regime during the spill event (refer to Section 7.2.3 for risk and ALARP assessment).	✓	✓	Monitor and evaluate is considered a primary response strategy for most spill incidents. Modelling identifies that the condensate comprises a significant portion of volatiles (99.2% total) with very little residual components (99.2% total) with very little residual components (<1%). This means the condensate will evaporate readily when on the water surface, with limited persistent components to remain on the water surface over time. Slow leaks from the subsea pipeline/ flowlines are unlikely to create a surface sheen and if present, are expected to be within 1.5 km of the spill location. To maintain situational awareness, all monitor and evaluate techniques will be considered at the time of the incident. Techniques deemed suitable as per the operational NEBA will be deployed to understand the possible impacts (refer to Section 7.2.3 for risk and ALARP assessment).	✓	✓

Response Strategy	Description	MGO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
Dispersant Application	Breakdown surface spill & draw droplets into upper layers of water column. Increases biodegradation and weathering and provides benefit to sea-surface /air breathing animals.	MGO, only has a small persistent fraction, due to the fact that the hydrocarbon will spreads rapidly to thin layers and evaporate or entrain. There is insufficient time to respond while suitable surface thicknesses are present. Dispersant application can result in punch-through where dispersant passes into the water column without breaking oil layer down if surface layers are too thin. Application can contribute to water quality degradation through chemical application without removing surface oil. Considered not to add sufficient benefits.	X	X	Otway condensates have low levels of persistent hydrocarbon and will weather rapidly. Given the low viscosity of this liquid any surface oils will spread rapidly to thin layers, as reflected in predictive modelling, and are not suited to dispersant application due to potential “punch-through” (refer to MGO assessment). Application can contribute to water quality degradation through chemical application without removing surface oil. Considered not to add sufficient benefits.	X	X
Contain & Recover	Booms and skimmers to contain surface oil where there is a potential threat to environmental sensitivities.	Response relies on calm sea conditions, thicknesses >10 µm to collect and adequate deployment timeframes. MGO spreads and disperses rapidly to below recoverable thicknesses. The prevailing meteorological conditions in the Otway would also likely preclude containment and recovery techniques. In general, method only recovers approximately 10-15% of total spill residue, creates significant levels of waste, requires significant effort and suitable weather conditions (calm) to be deployed. Weather conditions limit deployment in the Otway offshore environment.	X	X	As per MGO assessment, surface oils will not be present in suitable thicknesses to make contain and recover a viable response option given the low viscosity of the condensate hydrocarbons. In general, method only recovers approximately 10-15% of total spill residue, creates significant levels of waste, requires significant effort and suitable weather conditions (calm) to be deployed. Weather conditions limit deployment in the Otway offshore environment.	X	X

Response Strategy	Description	MGO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
Protect & Deflect	Booms and skimmers deployed to protect environmental sensitivities.	MGO has a low component of persistent components that have the potential to reach shorelines. Effective response strategies to protect open estuaries that have environmental sensitivities (aquatic vegetation, recreational users) may be beneficial. For example, booming or sand berms may offer some net benefit to estuarine environments which are open to the sea. Stochastic modelling indicated that Port Campbell may be contacted by hydrocarbons at low thresholds within 1 day in the event of a LOC from a vessel. Success of protection and deflection techniques at this location will be influenced by the prevailing and generally dynamic conditions at the time of the spill. Protection and deflection techniques will be considered if shoreline contact is predicted at sensitive receptors (refer to Section 7.4 for risk and ALARP assessment).	✓	✓	Stochastic modelling of a pipeline LOC scenario was not undertaken, as the anticipated release volume is considered minimal. The Offshore Victoria OPEP includes for a larger subsea LOC associated with a loss of well control event from the Annie-2 well. Given the expected weathering and natural dispersion processes, it is not anticipated that hydrocarbon concentrations would reach actionable thresholds for shoreline response strategies to be effective.	N/A	N/A
Shoreline Clean-up	Where shoreline impact is predicted, shoreline clean-up assessment technique (SCAT) assessment is	Shoreline contact by MGO may occur at low, moderate and high levels from an MGO spill (generally less than 100 g/m^2). Much of the shoreline affected by condensate residues is rock platform or sandy beach stretches with backing cliffs. Shoreline clean-up may hazardous and	✓	✓	Stochastic modelling of a pipeline LOC scenario was not undertaken, as the anticipated release volume is considered minimal. The Offshore Victoria OPEP includes for a larger subsea LOC associated with a loss of well control event from the Annie-2	N/A	N/A

Response Strategy	Description	MGO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
	initiated. If SCAT and Net Environmental Benefit Assessment (NEBA) assess clean-up is of net benefit, initiate clean-up. Shoreline clean-up is a last response strategy due to the potential environmental impact; heavy resource requirements; health and safety concerns to responders; logistical complexities and waste management considerations	due to the nature of the shoreline habitat remediates rapidly. Access to these areas is limited along the Otway coastline. MGO residue reaching accessible sand shorelines is likely to infiltrate sand where it will be susceptible to remobilisation by wave action (reworking) until naturally degraded. Due to the light nature of the product and its dispersion in the environment prior to reaching shorelines it is possible that there would be insufficient quantities for manual clean-up. MGO does not discolour shoreline as much as other hydrocarbon types. Manual collection techniques likely to have limited effectiveness. Use of sediment reworking is possible. However, the potential for shoreline assessment and clean-up will be considered as part of the NEBA in the event of a spill incident. Response strategy offers net benefit to shoreline species which are sensitive to oil spill residues (e.g., birds) (refer to Section 7.5 for risk and ALARP assessment).			well. Given the expected weathering and natural dispersion processes, it is not anticipated that hydrocarbon concentrations would reach actionable thresholds for shoreline response strategies to be effective.		
Oiled Wildlife Response (OWR)	Consists of capture, cleaning and rehabilitation of oiled wildlife. May include	Given limited size and rapid spreading of the MGO spill, large scale wildlife response is not predicted. However, there is the potential that individual birds could become oiled in the vicinity of the spill.	✓	✓	Given the nature of the Otway condensate and its rapid spreading to thin layers and limited volumes of residue washed ashore, it is predicted there will be limited	✓	✓

Response Strategy	Description	MGO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
	hazing or pre-spill captive management. In Victoria, this is managed by DEECA.	OWR may offer net benefits for both seabirds and shorebirds within the surface oil and shoreline residue zones >100 g/m^2 which result from the MGO spill. OWR is both a viable and prudent response option for this spill type (refer Section 7.6 for risk and ALARP assessment).			impacts to species sensitive to oil residues such as birds. However, OWR may offer net benefits to seabirds which come into contact and area affected by these minor residues. OWR is both a viable and prudent response option for this spill type (refer Section 7.6 for risk and ALARP assessment).		

7.2 Source Control

7.2.1 Cause of Aspect

The activities associated with source control that have the potential to impact marine environment are identified in Table 7-2 and described in subsections below.

Table 7-2: Source Control Activities that may Impact the Environment

Aspect / Phase	Activity component
Source Control	ROV operations
	Vessel operations

7.2.2 Aspect Characterisation

7.2.2.1 Vessel LOC

Source control arrangements for significant vessel spills resulting from fuel tank perforation includes:

- closing water-tight doors
- checking bulkheads
- determining whether vessel separation will increase spillage
- isolating penetrated tanks
- tank lightering etc.

Source control relies upon the activation of the vessels SOPEP / SMPEP (or equivalent).

7.2.2.2 Pipeline LOC

Source control arrangements for spills resulting from pipeline a release includes:

- Initiation of the pipeline ESD system.
- Surface controlled subsurface safety valve.
- Individual well shutdown via Master Control System (if required).

Source control relies upon the activation of the Facility ESD system which is a part of the Facility Safety Case.

7.2.3 Predicted Environmental Impacts and Risks

The potential impacts of source control operations include:

- change in fauna behaviour
- injury / mortality to marine fauna.

The techniques for source control activities, such as vessel and ROV operations, including their presence within the field and operational discharges and emissions, are expected to be similar to the impacts and risks already assessed within Section 6.0 of this EP. As such, these impacts have not been evaluated further within this section.

7.3 Monitor and Evaluate

7.3.1 Cause of Aspect

The activities associated with monitor and evaluate that have the potential to impact marine environment are identified in Table and described in subsections below.

Table 7-3: Monitor and Evaluate Activities that may Impact the Environment

Aspect / Phase	Activity component
Monitor and Evaluate	Vessel operations
	Aircraft operations

7.3.2 Aspect Characterisation

Several methods can be used for monitor and evaluate, including:

- vessel and aerial observations
- satellite tracking drifter buoys
- Oil Spill Trajectory Modelling (OSTM).
- weathering predictions
- vector analysis.

See the regional Offshore Victoria OPEP (VIC-ER-EMP-0001) for further details for each technique.

7.3.3 Predicted Environmental Impacts and Risks

The potential impacts of vessel and aircraft operations include:

- change in fauna behaviour
- injury / mortality to marine fauna.

The techniques for monitor and evaluate response are not expected to create any additional impacts on the environment that have not already been assessed within Section 6.0 of this EP for helicopter and vessel activities that will be undertaken during the Activity.

Due to the nature and scale of these activities, the evaluation undertaken in Section 6.0 is considered appropriate for any aerial or marine surveillance that will be required for monitor and evaluate spill response activities. Thus, these impacts have not been considered further.

7.4 Protection and Deflection

7.4.1 Cause of Aspect

The activities associated with shoreline assessment and clean-up that have the potential to impact marine environment are identified in Table and described in subsections below.

Table 7-4: Protection and Deflection Activities that may Impact the Environment

Aspect / Phase	Activity component
Protection and Deflection	Shoreline access – personnel and equipment
	Boom deployment

7.4.2 Aspect Characterisation

In the event of a spill incident with a risk to shoreline receptors, protection and deflection techniques may be implemented to identified shoreline 'protection priorities' typically located in sensitive and accessible locations.

Shoreline protection and deflection strategies include:

- Nearshore boom deployment to deflect hydrocarbons to other areas for recovery or towards an area where there will be reduced impact (compared to more sensitive sites).
- Skimming operations to recover any collected free-floating hydrocarbons.
- Sand berms (i.e. ridge of sand) can also be created across inlet openings to form a physical barrier to separate hydrocarbons from sensitive resources.

Booming and skimming operations are dependent on current, wave and wind conditions.

See the regional Offshore Victoria OPEP (VIC-ER-EMP-0001) for further details for each technique.

7.4.3 Predicted Environmental Impacts and Risks

The techniques for protection and deflection will predominantly not create any additional impacts on the environment that have not already been assessed within Section 6.0 of this EP for vessel operations that will be undertaken during The Activity.

The anchoring / attachment of the nearshore boom within the nearshore water and on the shoreline, including shoreline response workers deployed to the shorelines may have an additional impact that has not been previously assessed.

The potential impacts of these activities are:

- change in habitat
- change to the functions, interests, or activities of other marine users.

7.4.4 Impact and Risk Evaluation

7.4.4.1 Risk Event: Change in Habitat

Inherent Consequence Evaluation

Shoreline response activities, such as techniques that used during protection and deflection, have the potential to impact shallow coastal areas or benthic habitats where sensitive habitats and aggregations of wildlife may be present.

The potential impacts vary, depending on the method used and the nearshore and / or shoreline habitat. A loss of vegetation may occur where equipment cannot be mobilised using existing tracks. The use of vessels and the anchoring of nearshore booms within nearshore environments has the potential to disturb sensitive near-shore estuarine habitats, such seagrass and mangrove and shoreline habitats, such as sandy beaches.

Based upon the nature of the spill events associated with this EP, and the limited area of shoreline that would likely be exposed to hydrocarbons above impact / response thresholds, impacts are likely to be highly localised around the response infrastructure. These impacts would likely result in localised medium-term impacts to species or habitats with recover over months to a year.

As such, the consequence has been ranked as a **Level 3**.

Inherent Likelihood

Given the low likelihood of a spill event occurring, and modelling scenarios which indicate shoreline exposure has a relatively low probability of occurring, this consequence is considered to have a **Remote (E)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.4.4.2 Changes to Functions, Interest, or Activities of Other Marine Users

Inherent Consequence Evaluation

Shoreline response activities, such as strategies that used during protection and deflection, have the potential to cause in temporary beach closures impacting other marine users within the area. Recreational activities (such as swimming, walking, fishing, boating) in affected areas will be excluded until access is again granted by local authorities or until spill operations cease. Closure of a certain area or attraction, resulting in economic losses to the business are likely to eventuate.

As described in Section 6.8, MGO and condensate are both light non-persistent hydrocarbons, which weather rapidly. Therefore, clean-up operations are expected to take days to weeks following source control incident. As such, these impacts would likely result in localised short term impacts social receptors. As such the consequence has been ranked as a Level 2.

Inherent Likelihood

Given the low likelihood of the spill events occurring, and modelling scenarios which indicate shoreline exposure has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.5 Shoreline Assessment and Clean-up

7.5.1 Cause of Aspect

The activities associated with shoreline assessment and clean-up that have the potential to impact marine environment are identified in Table and described in subsections below.

Table 7-5: Shoreline Assessment and Clean-up Activities that may Impact the Environment

Aspect / Phase	Activity component
Shoreline Assessment and Clean-up	Shoreline access – personnel and equipment
	Shoreline clean-up
	Waste collection and disposal

7.5.2 Aspect Characterisation

Shoreline clean-up involves monitoring shorelines and/or the removal of hydrocarbons that have accumulated on the shorelines. In general shoreline clean-up tactics include:

- shoreline assessment

- shoreline clean-up:
  - manual removal (i.e., use of shovels, rakes, sieves)
  - mechanical clean-up (i.e. use of machinery
  - vacuum systems
  - low and high pressure washing / flushing
  - surf washing
  - sorbents.

See the regional Offshore Victoria OPEP (VIC-ER-EMP-0001) for further details for each technique.

7.5.3 Predicted Environmental Impacts and Risks

The potential impacts of these activities are:

- change in habitat
- change in fauna behaviours
- change to the functions, interests, or activities of other marine users.

7.5.4 Impact and Risk Evaluation

7.5.4.1 Risk: Change to Habitats

Inherent Consequence Evaluation

The potential impacts of shoreline response activities will vary, depending on the nature and scale of the spill incident, the method used, and the nearshore/shoreline habitat impacted.

As condensate and MGO are both light, non-persistent hydrocarbons, they will weather rapidly once released to the marine environment. Only a small fraction comprising persistent residuals will remain. Under low energy conditions, the residual components may form a thin liquid sheer on the coast and may persist in the environment; this may allow them to be physically removed.

The shorelines within the EMBA, particularly those close to the activity location and at higher probability of exposure, are predominantly rocky shore platforms backed by sheer rocky cliffs interspersed with sandy beaches. Rock platforms and cliffs/headlands are low sensitivity habitats and often inaccessible. Natural recovery methods are most effective, safe and feasible for these habitat types. For exposed rocky shores or exposed wave-cut platforms any oil residue deposited is rapidly removed from exposed faces and clean-up is usually not required (NOAA 2013). Shoreline clean-up typically is only considered for sandy beaches that may be affected by hydrocarbon residues. As with all spill response activities, this strategy will only occur if a net benefit has been established via the completion of a NEBA.

Based upon the low viscosity, it is possible that MGO and condensate will infiltrate porous shorelines (such as sandy beaches) where it washes onshore rapidly and has not significantly weathered. Consequently, mechanical recovery may be required upon completion of a NEBA, which may result in the excavation of shorelines. If not done correctly, any excavation of hydrocarbon contaminated materials along the coast could exacerbate beach erosion to a point where its recovery longer term recovery.

Based upon the potential for localised medium-term impacts to shoreline habitats, the consequence has been ranked as **Level 3**.

Inherent Likelihood

Given the low likelihood of the spill events occurring, and modelling scenarios which indicate shoreline exposure has a low probability of occurring, this consequence is considered to have a **Remote (E)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.5.4.2 Risk: Change in Fauna Behaviours

Inherent Consequence Evaluation

The use and movement of vehicles, equipment and personnel during shoreline response activities can directly disturb marine fauna including important or sensitive habitats, such as nests of turtles and birds and bird roosting areas. Shoreline clean-up may require strategies which physically remove of substrates, or cause erosion by responder access, could directly impact marine fauna and their habitats. Furthermore, the noise disturbance created by shoreline clean-up activities could potentially disturb the feeding, breeding, nesting or resting activities of resident and migratory fauna species that may be present (such as shorebirds and seabirds).

On the basis that these disturbances could cause medium term impacts to local populations of shorebirds and seabirds, the consequence has been ranked as **Level 3**.

Inherent Likelihood

Given the low likelihood of the spill events occurring, and modelling scenarios which indicate shoreline exposure has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.5.4.3 Risk: Changes to the Functions, Interests, or Activities of Other Marine Users

Inherent Consequence Evaluation

The presence of hydrocarbons on shorelines, and the associated clean-up operations, depending on location, may lead to temporary beach closures. Any recreational activities present in affected areas (such as swimming, walking, fishing, boating) will be excluded until access is again granted by local authorities.

Closure of a certain area or attraction, resulting in economic losses to the business are likely to eventuate. The shorelines within the EMBA, particularly those close to the activity location and at higher probability of exposure, are predominantly isolated, unpopulated, and remote rocky shore platforms backed by sheer rocky cliffs.

The presence of shoreline clean-up operations along a shoreline has the potential to reduce the visual amenity of known heritage sites along the coastline, subsequently potentially impacting the value of the site to First Nations people.

As described in Section 6.8, MGO and condensate are both light non-persistent hydrocarbons, which weather rapidly. As such, these impacts would likely result in localised short term impacts social receptors. As such the consequence has been ranked as a **Level 2**.

Inherent Likelihood

Given the low likelihood of the spill events occurring, and modelling scenarios which indicate shoreline exposure has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.6 Oiled Wildlife Response

7.6.1 Cause of Aspect

The activities associated with oiled wildlife (OWR) have the potential to impact marine environment are identified in Table and described in subsections below.

Table 7-6: Oiled Wildlife Response Activities that may Impact the Environment

Aspect / Phase	Activity component
Oiled Wildlife Response	Secondary OWR activities (disturbance)
	Tertiary OWR activity (handling / treatment)

7.6.2 Aspect Characterisation

OWR has the potential to cause impacts to marine fauna. Activities associated with the response that can cause impacts to marine fauna include:

- primary response:
  - Spill response strategies to prevent exposure of hydrocarbons to wildlife.
- secondary response:
  - Hazing (i.e., deterrence of wildlife away from the hydrocarbon spill).
  - Pre-emptive capture (i.e., isolation and / or capture and relocation of wildlife away from contaminated areas to unaffected areas).
- Tertiary response:
  - capturing
  - cleaning
  - rehabilitation
  - transportation
  - stabilisation for release.

See the regional Offshore Victoria OPEP (VIC-ER-EMP-0001) for further details for each technique.

7.6.3 Predicted Environmental Impacts and Risks

The potential risk associated with oiled wildlife response are:

- disturbance / injury / mortality to marine fauna.

7.6.4 Impact and Risk Evaluation

7.6.4.1 Risk: Disturbance / Injury / Mortality to Marine Fauna

Inherent Consequence Evaluation

OWR activities have the potential to disrupt marine fauna.

Activities such as hazing involves the use of visual, auditory or sensory deterrents to keep healthy marine fauna away from the hydrocarbon spill. This can lead to disturbance of marine fauna away from known congregation, resting, feeding, breeding or nesting areas which may have a short- or long-term impact on the survival of that group if cannot access preferred resources. This can lead to disturbance of marine fauna, such as the separation of groups or adults/juveniles, collisions with marine fauna, inadvertent movement of animals into the oiled area, or scattering of oiled animals

Pre-emptive capture involves the capture and relocation of marine fauna before they become oiled. Potential impacts include relocation to inappropriate areas that will not support the animal's requirements (e.g. habitat, food sources).

Inappropriate capturing and incorrect handling of marine fauna by untrained personnel may cause distress, injury and death to the individual. To prevent this, only State Control Agency authorised oiled wildlife responders will approach and handle fauna. This will eliminate any handling impacts to fauna from untrained personnel and reduce the potential for distress, injury or death of a species.

Due to the potential for localised short-term impacts to species / habitats of recognised conservation value but not affecting local ecosystem functioning, the potential impacts form this activity have been identified as **Level 2**.

Inherent Likelihood

Given the low likelihood of a spill event occurring, and modelling scenarios which indicate shoreline exposure has a relatively low probability of occurring, this consequence is considered to have a **Remote (E)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.7 Control Measures, ALARP, and Acceptability Assessment

Table provides a summary of the control measures and ALARP and acceptability assessment relevant to spill response strategies.

Additional source control ALARP considerations are included in Table .

Table 7-7: Spill Response ALARP, Control Measures and Acceptability Assessment

Spill response strategies	
ALARP Decision Context and Justification	**ALARP Decision Context: Type A** The spill response measures described in this plan are standard practice for marine oil spills. There is a good understanding of potential impacts and risks from the response techniques, and the control measures required to manage them. There is little uncertainty associated with the potential environmental impacts and risks, evaluated as Level 3 due to the small disturbance footprint expected with the response techniques.

Spill response strategies	
	No objections or concerns were raised during consultation regarding this activity or its potential impacts and risks. As such, Amplitude Energy considers ALARP Decision Context A should apply.
Control Measure	**Source and Description of Control**
CM08: Amplitude Energy Offshore Chemical Assessment Procedure	All planned chemical discharges shall be assessed and deemed acceptable before discharge, in accordance with Amplitude Energy's Offshore Environment Chemical Assessment Process.
CM19: OPEP	Emergency spill response capability is maintained in accordance with the OPEP. Emergency response activities will be implemented in accordance with the OPEP.
CM20: OSMP	Operational and scientific monitoring will be implemented in accordance with the OSMP.
Impact and Risk Summary	
Residual Impact Consequence	N/A
Residual Risk Consequence	**Level 2** - Localised short-term impacts to species or habitats of recognised conservation value not affecting local ecosystem function; remedial, recovery work to land, or water systems over days/weeks.
Likelihood	The likelihood of impacts from response activities have been assessed as: • **Unlikely (D) -** A rare combination of factors would be required for an occurrence. Conceivable and could occur at some time. Could occur during the activity.
Residual Risk	Low
Demonstration of Acceptability	
Principles of ESD	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity. The activities do not have the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Legislation and other requirements considered as relevant control measures include: • OPGGS Act • EPBC Act 1999 and EPBC Regulations 2000 • Emergency Management Act 2013 (Victoria) • Wildlife Act 1975 (Victoria) • NOPSEMA/AMSA Australian Dispersant Selection Process Explanatory Note. If required for response activities - Amplitude Energy anticipates using dispersants listed on the National Plan OSCA register. • NOPSEMA Oil Pollution Risk Management Paper, including the following guidance: – An evaluation of the impacts and risks should be provided and demonstrate that they will be reduced to ALARP and be of an acceptable level.

Spill response strategies	
	• Oil Spill Response Technical Guidelines: The adopted controls have been guided by the following technical guides: – Wildlife Response Preparedness (IPIECA 2014). – State Maritime Emergencies (non-search and rescue) Subplan (State of Victoria, Department of Transport, 2021). • OPGGS(E)R 2009 – Amplitude Energy Offshore Vic OPEP, OSMP.
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Incident and Crisis Management (MS10) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05) • Operations Management (MS07)
External Context	Suggestions from State emergency agencies have been adopted unless otherwise discussed and agreed. During consultation on this and other recent environment plans it was confirmed that First Nations peoples should be involved in any spill clean-up response on their Country; and should be contacted to provide advice on cultural matters in the event of a spill encroaching on shorelines. This was reiterated in our webinar, a recording of which is on our website, and re-affirmed during consultation with GLaWAC (Event ID 2025 0828 141512 7349). Amplitude Energy retains contact details of First Nations organisations to be contacted in the event of a spill, noting Traditional Owners may alternatively be engaged by the State Control Agency. This has become standard in our emergency response planning. No concerns have been raised to date during consultation regarding impacts and risks from chemical discharges during planned activities, nor have any stakeholders raised any questions or concerns in relation to the use of dispersants for operational purposes during spill response. As such, Amplitude Energy considers that there is broad acceptance of the impacts associated with the activity.
Demonstration of meeting the defined acceptable levels in the OPP	Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for oil spill response: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1, Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1, Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	**Acceptable**

Spill response strategies	
	Amplitude Energy has determined that impacts and risks related to dispersant application response are acceptable, based on: • The planned management of impacts and risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advices, and significant impact guidelines for MNES. • No feedback has been received from relevant persons that has informed the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: • EPO16: No unplanned release of chemicals or hydrocarbons to the marine environment.

8.0 First Nations Cultural Heritage Values and Sensitivities

This section evaluates the potential for Activity activities to affect cultural heritage and the continuation of cultural practices. In doing so, this section:

Identifies the potential impacts to environment receptors that are, or are linked to, cultural features of the environment that could be affected by Activity aspects (Section 8.1; Figure 8-1).

Summarises the outcomes of the impact and risk assessments (from Section 6.0) for environment receptors that are also cultural features, or are linked to cultural features of the environment, to characterise the relevant Activity aspects (Section 8.2).

Evaluates to what degree the cultural features of the environment, and their value to first nations cultural practices and heritage, could be degraded considering the nature and scale of impacts / risk to relevant environment receptors (Section 8.3).

Environmental Performance Outcomes (EPO's) have been developed for this Activity that are specific to First Nations peoples cultural heritage (Section 8.4). These EPOs are designed to be equal to or better than the acceptable levels of impact and risk: No impact to underwater cultural heritage

Further, there are measures evaluated and adopted following research, training and consultation, to ensure acceptable levels are not exceeded and that impacts and risks are managed to ALARP.

The section has been written with consideration to N-04750-GN1344 A339814 (NOPSEMA 2024a) and First Nations vocabulary: using culturally appropriate language and terminology (APSC 2022), First Nations people's Country Plans[8], Consultation with First Nations peoples, participation in cultural experiences, and training led by Gunditjmara people on Gunditjmara Country.

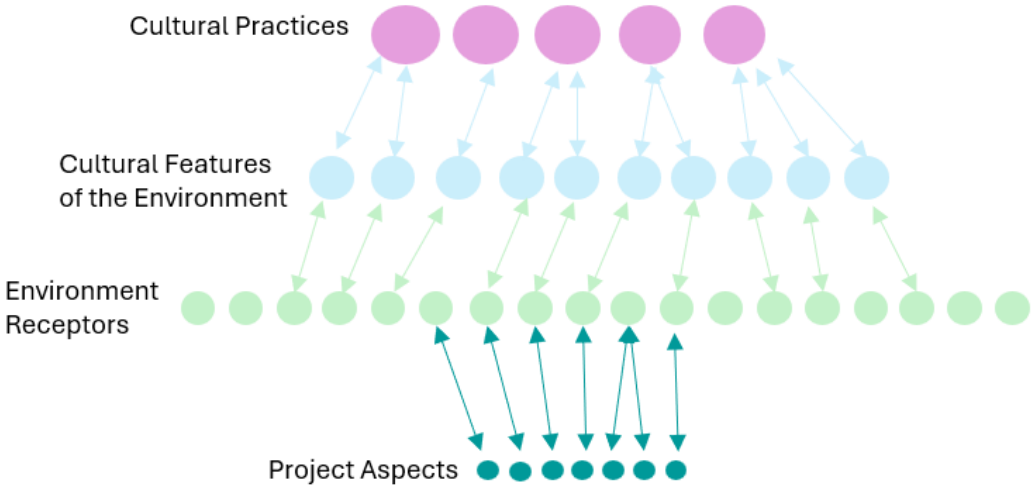


Figure 8-1: Receptors, and links to Cultural Features and Practices

[8] Gunditj Mirring Traditional Owners Aboriginal Corporation 2023; Wadawurrung Traditional Owners Aboriginal Corporation, 2020; Gunaikurnai Whole-of-Country Plan (Gunaikurnai Land and Waters Aboriginal Corporation 2015); Eastern Maar Aboriginal Corporation, 2014.

8.1 Summary of Potential Impacts to Cultural Features

Table 8-1 describes how relevant aspects of the Activity could impact tangible and intangible cultural features. Importantly, this is not a description of predicted impacts, but of the mechanisms by which an Activity aspect could affect a tangible or intangible cultural feature and its value for to First Nations people. Within In this section, environment receptors, that are also cultural features, that were identified through consultation for Amplitude Energy activities in the Otway, including Otway Operations (Otway Offshore Operations Environment Plan) and the Athena Supply Project (Athena Supply Project) as having particular value to First Nations peoples, have been considered. These cultural features include the Bonney upwelling, Deen Maar, eel migration, and whale migration.

Table 8-1: Potential impacts to cultural features

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
Tangible Cultural Heritage			
Coastal/island places and objects	• Victorian coastline • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park • Wilsons Promontory and associated flooded Land Bridge • Tyrendarra lava flow	• Accidental Hydrocarbon Release • Spill Response	Shoreline hydrocarbon exposure has the potential to change the cultural heritage value of the site (Section 6.8) if sites are not accessible to First Nations people to be able to practice culture, or if sites are perceived to have been degraded by tainting with hydrocarbons. Section 6.8 identifies there is only low risk of minor local impacts to coastal/islands places and objects from hydrocarbon exposure in the event of unplanned discharge and accidental hydrocarbon release events. Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to, cultural features and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices.
Submerged sites	• Tyrendarra lava flow (Julia reef) • Wilsons Promontory and associated flooded land bridge	Accidental Hydrocarbon Release	Seabed disturbance (Section 6.3) has the potential to change the cultural heritage value of submerged landscapes if that disturbance is widespread and within those landscapes that feature within cultural practices, traditions and customs. There are no potential impacts to the seabed from the activity which have more than a localised footprint (within the operational area), and therefore there will be no landscape scale impacts, or effects on the submerged elements of the Tyrendarra lava flow which is >50 km from the operational area. Table 8-2 identifies there is only low risk of minor local impacts to environment receptors that are linked to submerged sites from hydrocarbon exposure (in the event of unplanned discharge and accidental hydrocarbon release events). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices.
Intangible Cultural Heritage			
Sea Country	State and Commonwealth waters, including the	All Aspects	First Nations cultural heritage values associated with Sea Country, including culturally significant ecosystems and species, are considered based on their ecological values, food sources, and/or

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
	Commonwealth marine environment, and habitats and species therein.		culturally significant totemic values. The First Nations people's values associated with culturally significant marine ecosystems and species have the potential to be disrupted if there are impacts to ecosystem functioning and integrity or species population. Table 8-2 summarises potential impacts and risks to environment receptors that are linked to Sea Country are mostly limited to localised and short-term impacts (Level 1 or 2 consequences), with no impacts at species population levels. The introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response is a risk of up to Moderate severity (consequence Level 4 and 3 (respectively)). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices.
Creation/ Dreaming sites, Songlines, sacred sites and Ancestral beings	• Victorian coastline • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park • Wilsons Promontory and associated flooded land bridge • Tyrendarra lava flow • Whales	Multiple Aspects (see Section 8.2)	Protection of whales is essential to Gunditjmara spiritual and physical well-being. Section 8.2 summarises potential impacts and risks environmental receptors that are linked to Creation/ Dreaming sites, Songlines, sacred sites and Ancestral beings are mostly limited to localised, short-term and recoverable impacts (Level 1 or 2 consequences). However, the introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response have a risk of up to Moderate severity (consequence Level 4 and 3 (respectively)). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to, cultural features and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, traditions and customs.
Cultural obligations to care for Country, Knowledge systems, and	State and Commonwealth waters, including the Commonwealth marine environment, and habitats and species therein.	All Aspects	The potential disruption to the cultural ties to and responsibility to care for Sea Country is linked by potential impacts to the environment and the exclusion of First Nations people from Country or decision-making processes. Potential change to knowledge on cultural heritage values will occur when the value is displaced, depleted or there is significant reduction in population of the value. If the value doesn't exist within the local area of Country, knowledge systems of that value will be disrupted or lost.

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
Connection to Country			Limitation on access, for safety reasons, can also affect the ability of First Nations peoples to practice their cultural obligations, traditions and customs, foster knowledge systems, and maintain connection to particular elements of country. Table 8-2 summarises potential impacts and risks to environment receptors that are linked to cultural features. These impacts and risks are mostly limited to localised and short-term impacts (Level 1 or 2 consequences), with no impacts at the population level. The introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response carries a risk of up to Moderate severity for some environmental receptors that are also cultural features, including culturally significant species and places (Deen Maar). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to tangible and intangible cultural features and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, customs and traditions.
Ecosystems and Species			
Culturally significant species and food resources	Food resources (current and historical): • Fish, sharks, rays, eels (Kooyang), shellfish, crustaceans, whales, seals, Seabirds - collection from coastal and riverine environments • Plankton (basis of the food chain that provides for culturally significant species) Connection to ancestors: • Whales	Multiple Aspects (see Section 8.2)	Food resources: The potential change to food resources can occur when the resource is depleted (such as a reduction in population of a species) or displaced. The ability for First Nations people to continue to collect marine species (as a food resource) has the potential to change if impacts and risks to the resource species results in a reduction in population or change movements and distribution that lowers their occurrence within Sea Country of a group of First Nations peoples. Connection to Ancestors: Impacts to culturally significant species at a population level has the potential to erode the ability for First Nations people ability to care for culturally significant species, and to continue cultural practices, traditions and customs that involve those species. Table 8-2 summarises potential impacts and risks to environment receptors, that include culturally significant species linked to resources, and those linked to ancestors (and associated obligations to care for those species as part of caring for Sea Country). The levels of impact are mostly limited to localised and short-term impacts (Level 1 or 2 consequences), with no impacts at the population level. The (unplanned) introduction, establishment and spread of IMS and

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
			accidental hydrocarbon release have a risk of up to Moderate severity (consequence Level 4 and 3 (respectively)). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices.
Culturally significant species	Plankton associated with the productivity of Bonney Upwelling (Key Ecological Feature)	Multiple Aspects (see Section 8.2)	In relation to the physical occurrence and characteristics of the Bonney Upwelling, Butler et al. (2004) identify climate change as a possible influence on its strength or frequency, though was not of serious concern. Table 6-12 identifies GHG emissions associated with the activity as having a Level 1 Consequence, in the context of being equivalent to a small proportion of national GHG budgets that are linked to NDCs under the Paris Agreement to limit the effects of global warming. Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, customs, and traditions.
Water quality	State and Commonwealth waters, including the Commonwealth marine environment, and habitats and species therein.	Multiple Aspects (see Section 8.2)	Impacts to water quality from hydrocarbon exposure (Section 6.8), seabed disturbance (Section 6.3), and discharges (Section 6.2.1 and 1.1.1) result in potential physical/tangible change to cultural heritage value of oceans and waterways. Table 8-2 summarises potential impacts and risks to water quality are mostly limited to localised, short-term and recoverable impacts (Level 1 consequences or low risk severity). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, traditions, and customs.
Nearshore benthic habitats	Seabed in State Waters, including the habitats and species therein.	• Accidental Hydrocarbon Release	Change to benthic habitats occurring at a widespread level, such as the introduction, establishment and spread of IMS (Section 6.7), has the potential to change the cultural heritage values of benthic ecosystems in coastal environment that provide habitat for culturally significant species, and resources for First Nations people. Table 8-2 summarises potential impacts and risks to benthic habitats from the activity; these are limited to localised and short-term impacts (Level 1 consequence) within the operational area.

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
		• Introduction and establishment of IMS	However, the introduction, establishment and spread of IMS has a risk of up to Moderate severity (Level 4 consequence), with impacts having the potential to extend beyond the operational area. Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, traditions, and customs.
Intertidal communities and shorelines	Victorian State waters and shorelines: • Mangroves, macroalgae, seagrass, coastal saltmarsh, rocky and sandy shorelines.	• Accidental Hydrocarbon Release • Introduction and establishment of IMS • Spill Response	Shoreline hydrocarbon exposure (Section 6.8) and spill response activities (Section 6.8) resulting in potential physical/tangible change to cultural heritage value of intertidal communities and shorelines. Table 8-2 summarises potential impacts and risks to intertidal communities and shorelines are mostly limited to localised and short-term impacts (Level 1 consequence). However, the introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response is a risk of up to Moderate severity (consequence Level 4 and 3 (respectively)). Section 8.3 considers the level of impacts and risks to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, traditions, and customs.
Marine Park/ coastal reserves / wetlands	Wilsons Promontory, Ninety Mile Beach, Marengo Reef	• Accidental Hydrocarbon Release • Introduction and establishment of IMS • Spill Response	Hydrocarbon exposure (Section 6.8) resulting in potential physical/tangible change to cultural heritage value of Marine Parks, coastal reserves and wetland habitats that sustain culturally significant species. Table 8-2 summarises potential impacts and risks to marine parks/coastal reserves/wetlands are mostly limited to localised and short-term impacts (Level 1 consequence). However, the introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response is a risk of up to Moderate severity (consequence Level 4 and 3 (respectively)). Section 8.3 considers the level of impacts and risks to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, traditions, and customs.

8.2 Activity Aspect Interactions with Cultural Features

Offshore development within or adjacent to Sea Country has the potential to impact cultural features of the environment. Table 8-2 above identifies the potential interactions between the particular aspects of this Activity and relevant Cultural Features of the environment identified through consultation, review of County Plans, on Country training, listening, and desktop research. Within Table 8-2, for each interaction the level of impact or risk is identified for the environment component that is intrinsically linked to, is part of, or is also a cultural feature.

The evaluation for each relevant environment component is detailed within Sections 6.0 and 0. The predicted impacts to these receptors are typically localised and / or generally short-term. The risk events associated with the activity typically have a higher consequence and could result in more extensive, and longer-term impacts to environment receptors. The most severe risk events being a major loss of hydrocarbon containment, and establishment and spread of IMS. These risk events are Unlikely, or Remote, and there are established effective measures in place to prevent their occurrence.

Considering the level of impact or risk from activity aspects assists determining the spatial and temporal extent of the potential disturbance to, or degradation of, the associated cultural feature.

For further details on the intrinsic links between cultural features of the environment and First Nations people's heritage site and values refer to Section 4.4.

Table 8-2: Potential Interaction between Activity Planned and Unplanned Aspects and Cultural Features of the Environment relating to First Nations People Cultural Heritage Sites and Values

Cultural feature of the environment relating to First Nations people's heritage sites and values	Environmental receptor where the cultural feature may exist	Planned Emissions - Light	Planned Emissions - Atmospheric	Planned Discharges – Installation, Testing and Preservation fluids	Planned Discharges – Operational	Unplanned Physical Presence – Interaction with Marine Fauna	Unplanned Discharge – Minor LOC	Unplanned Discharge – Hazardous / Non-hazardous waste	Seabed Disturbance	GHG Emissions	Underwater Sound Emissions – Impulsive	Underwater Sound Emissions – Continuous	Introduction, Establishment and Spread of IMS	Accidental Hydrocarbon Release	Oil Spill Response
Tangible Cultural Heritage															
Coastal/ island places and objects, and submerged sites	• Victorian coastline • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park • Wilsons Promontory and associated flooded Land Bridge • Tyrendarra lava flow													✓ Low inherent risk severity to heritage places Section 6.8.5	✓ Low risk severity associated with restricted access Section 7.0
Intangible Cultural Heritage															
Sea Country	All physical and ecological receptors (Sections 4.4.1 and 4.4.2)	✓ Consequence Level 1 - temporary and localised change in marine fauna behaviour Section 6.2.1	✓ Consequence Level 1 - temporary and localised change in air quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to water quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Low inherent risk severity to marine fauna Section 1.1.1	✓ Low inherent risk to water and sediment quality Section 1.1.1	✓ Low inherent risk to water and sediment quality Section 1.1.1	✓ Consequence Level 1 – minor local impacts to physical substrate Section 6.3.4.4	✓ Consequence Level 1 – minor contribution to carbon budget Section 6.4.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.5	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats, avifauna, pinnipeds and cetaceans.	✓ Moderate inherent risk severity to shoreline habitats Section 7.0
Creation/ Dreaming sites, Songlines, sacred sites and Ancestral beings	• Culturally significant species • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park			✓ Consequence Level 1 – minor local impacts to water quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Low inherent risk severity to marine fauna Section 6.2.1		✓ Low inherent risk to water and sediment quality Section 6.2.2		✓ Consequence Level 1 – minor contribution to carbon budget Section 6.4.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.5	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats, avifauna, pinnipeds and cetaceans. Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats Section 7.0

Cultural feature of the environment relating to First Nations people's heritage sites and values	Environmental receptor where the cultural feature may exist	Planned Emissions - Light	Planned Emissions - Atmospheric	Planned Discharges – Installation, Testing and Preservation fluids	Planned Discharges – Operational	Unplanned Physical Presence – Interaction with Marine Fauna	Unplanned Discharge – Minor LOC	Unplanned Discharge – Hazardous / Non-hazardous waste	Seabed Disturbance	GHG Emissions	Underwater Sound Emissions – Impulsive	Underwater Sound Emissions – Continuous	Introduction, Establishment and Spread of IMS	Accidental Hydrocarbon Release	Oil Spill Response
Cultural obligations to care for Country	All physical and ecological receptors (Sections 4.4.1 and 4.4.2)	✓ Consequence Level 1 - temporary and localised change in marine fauna behaviour Section 6.2.1	✓ Consequence Level 1 - temporary and localised change in air quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to water quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Low inherent risk severity to marine fauna Section 6.2.1	✓ Low inherent risk to water and sediment quality Section 6.2.2	✓ Low inherent risk to water and sediment quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to physical substrate Section 6.3.4.4	✓ Consequence Level 1 – minor contribution to carbon budget. Section 6.4.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.5	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats, avifauna, pinnipeds and cetaceans. Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats Section 7.0
Knowledge systems	• Culturally significant species • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park • Wilsons Promontory and associated flooded Land Bridge • Tyrendarra lava flow			✓ Consequence Level 1 – minor local impacts to water quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Low inherent risk severity to marine fauna Section 6.2.2				✓ Consequence Level 1 – minor contribution to carbon budget Section 6.4.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.5	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats, avifauna, pinnipeds and cetaceans. Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats Section 7.0
Connection to Country	All physical and ecological receptors (Section 4.4.1 and 4.4.2)	✓ Consequence Level 1 - temporary and localised change in marine fauna behaviour Section 6.2.1	✓ Consequence Level 1 - temporary and localised change in air quality. Section 6.2.1	✓ Consequence Level 1 – minor local impacts to water quality. Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna. Section 6.2.1	✓ Low inherent risk severity to marine fauna. Section 6.2.2	✓ Low inherent risk to water and sediment quality. Section 6.2.2	✓ Low inherent risk severity to cultural heritage sites. Section 6.2.2	✓ Consequence Level 1 – minor local impacts to physical substrate. Section 6.3.4.4	✓ Consequence Level 1 – minor impact to freshwater rivers and wetlands. Section 6.4.4	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.5	✓ Moderate inherent risk severity from IMS. Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats, avifauna, pinnipeds and cetaceans. Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats. Section 7.0
Ecosystems and Species															
Culturally significant species and	Fish, sharks, rays, eels (Kooyang), shellfish, and crustaceans from							✓ Low inherent risk to		✓ Consequence Level 1 – minor impact			✓ Moderate inherent risk	✓ Moderate inherent risk severity to	✓ Moderate inherent risk

Cultural feature of the environment relating to First Nations people's heritage sites and values	Environmental receptor where the cultural feature may exist	Planned Emissions - Light	Planned Emissions - Atmospheric	Planned Discharges – Installation, Testing and Preservation fluids	Planned Discharges – Operational	Unplanned Physical Presence – Interaction with Marine Fauna	Unplanned Discharge – Minor LOC	Unplanned Discharge – Hazardous / Non-hazardous waste	Seabed Disturbance	GHG Emissions	Underwater Sound Emissions – Impulsive	Underwater Sound Emissions – Continuous	Introduction, Establishment and Spread of IMS	Accidental Hydrocarbon Release	Oil Spill Response
food resources	coastal environments							marine fauna Section 6.2.2		to freshwater rivers and wetlands Section 6.4.4			severity from IMS Section 6.7.4	invertebrates, fish, and sharks Section 6.8.5	severity to marine fauna Section 7.0
Culturally significant species	Cetaceans			✓ Consequence Level 1 – minor local impacts to marine mammals Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Low inherent risk severity to marine fauna Section 6.2.2	✓ Low inherent risk to marine fauna Section 6.2.2	✓ Low inherent risk to marine mammals Section 6.2.2		✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.5	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to cetaceans. Section 6.8.5	✓ Moderate inherent risk severity to marine fauna Section 7.0
Culturally significant species	Pinnipeds			✓ Consequence Level 1 – minor local impacts to marine mammals Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Low inherent risk severity to marine fauna Section 6.2.2	✓ Low inherent risk to marine fauna Section 6.2.2	✓ Low inherent risk to marine mammals Section 6.2.2		✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4		✓ Consequence Level 2 – localised and short-term impacts to pinnipeds. Low Risk Severity. Section 6.6.5	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to pinnipeds. Section 6.8.5	✓ Moderate inherent risk severity to marine fauna Section 7.0
Culturally significant species	Seabirds	✓ Consequence Level 1 - temporary and localised change in marine fauna behaviour Section 6.2.1				✓ Low inherent risk severity to marine fauna Section 6.2.2		✓ Low inherent risk to avifauna Section 6.2.2		✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4				✓ Moderate inherent risk severity to avifauna Section 6.8.5	✓ Moderate inherent risk severity to avifauna Section 7.0
Culturally significant species	Plankton associated with the productivity of Bonney Upwelling (Key Ecological Feature)	✓ Consequence Level 1 - temporary and localised change in marine fauna behaviour.		✓ Consequence Level 1 – minor local impacts to plankton Section 6.2.1		✓ Low inherent risk severity to marine fauna.	✓ Low inherent risk to marine water and sediment quality.			✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4	✓ Consequence Level 2 – localised and short-term impacts to plankton. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to plankton. Section 6.6.5	✓ Moderate inherent risk severity from IMS. Section 6.7.4	✓ Moderate inherent risk severity to plankton. Section 6.8.5	✓ Moderate inherent risk severity to marine fauna

Cultural feature of the environment relating to First Nations people's heritage sites and values	Environmental receptor where the cultural feature may exist	Planned Emissions - Light	Planned Emissions - Atmospheric	Planned Discharges – Installation, Testing and Preservation fluids	Planned Discharges – Operational	Unplanned Physical Presence – Interaction with Marine Fauna	Unplanned Discharge – Minor LOC	Unplanned Discharge – Hazardous / Non-hazardous waste	Seabed Disturbance	GHG Emissions	Underwater Sound Emissions – Impulsive	Underwater Sound Emissions – Continuous	Introduction, Establishment and Spread of IMS	Accidental Hydrocarbon Release	Oil Spill Response
		Section 6.2.1				Section 6.2.2	Section 6.2.2								Section 7.0
Water quality	Offshore			✓ Consequence Level 1 – localised and temporary decrease in water quality Section 6.2.1	✓ Consequence Level 1 – localised and temporary decrease in water quality Section 6.2.1		✓ Low inherent risk to water and sediment quality Section 6.2.2	✓ Low inherent risk severity to water quality Section 6.2.2	✓ Consequence Level 1 – localised and temporary decrease in water quality Section 6.3.4.4					✓ Low inherent risk severity to water quality Section 6.8.5	
Benthic habitats	Nearshore benthic habitats / reefs							✓ Low inherent risk severity to benthic habitats Section 6.2.2		✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4			✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Low inherent risk severity to benthic habitats Section 6.8.5	
Intertidal communities and shorelines	Mangroves, macroalgae, seagrass, coastal saltmarsh, rocky and sandy shorelines.									✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4			✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats Section 7.0
Marine Park/ coastal reserves / wetlands	Wilsons Promontory, Ninety Mile Beach, Marengo Reef									✓ Consequence Level 1 – minor impact to freshwater rivers and wetlands Section 6.4.4				✓ Moderate inherent risk severity to coastal saltmarsh and wetlands Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats Section 7.0

8.3 Impact and Risk Evaluation

8.3.1 Tangible and Heritage Sites

8.3.1.1 Coastal/ Island Places and Objects

Cultural heritage objects that may be found along the coast and islands within the monitoring area include shell middens, artefact scatters, and LDADs (the occurrence of stone artefacts at low densities) (Section 4.4.2). Shell middens and artefact scatters may be located close to the shoreline, whereas LDADs are typically found further inland (Biosis 2023).

Cultural heritage places located within the monitoring area that are significantly mentioned within relevant Country Plans or which have been identified through consultation include:

- The Convincing Ground
- Deen Maar
- Discovery Bay Coastal Park
- Wilsons Promontory
- Tyrendarra lava flow.

Potential disruption to cultural features

Cultural heritage objects and places have the potential to be exposed to shoreline hydrocarbons in an unlikely accidental hydrocarbon release event. Exposure of cultural heritage objects and places to hydrocarbons has the potential to degrade those objects and places, and their cultural value, and disrupt cultural practices, customs and traditions which may occur as associated with the object or place if those things are tainted or access to practice culture is restricted.

The spill modelling report (RPS 2025) shows stochastic modelling predicting shorelines with the potential to be exposed to shoreline hydrocarbon. Shoreline accumulation will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA 1995). As a result, only coastal/island objects and places along the high tide mark have the potential to be exposure exposed to shoreline hydrocarbons. Cultural heritage objects and places located above the high tide mark are not expected to be exposed, and therefore, not expected to be impacted by shoreline hydrocarbons. Cultural heritage objects and places located below to low tide mark may have some limited exposure to hydrocarbons entrained in the water column.

The exposure of cultural heritage objects and places from shoreline hydrocarbons at the high tide mark could occur. Deen Maar Island, being a place considered by Traditional Owners to be linked to the transition of spirits from the earth, could be exposed to hydrocarbons around its rocky shores.

Deen Maar Island is not typically accessed but is a constant visual and spiritual link for First Nations peoples on the Mainland. Its cultural value in this respect would be unlikely to be disrupted by a spill of hydrocarbons of the nature and scale provided for within this plan. The topography of Deen Maar Island, and exposure to the ocean, provides a natural resilience against hydrocarbon spills; rocky shores lead into steep cliffs to the vegetated plateau high above the water. Due to the exposed location of Deen Maar Island, the highly volatile nature of the hydrocarbons associated with this activity (light non-persistent), hydrocarbons accumulating on shorelines in the region, and potentially around cultural heritage objects and places, are likely to be readily removed in the presence of tidal and/or wave action. Beaches and rocky shores on the mainland, facing Deen Maar Island, and which may hold a place in ceremony and knowledge transfer also have the potential to be exposed to hydrocarbons, though modelling indicates that these areas (~77km north west of the

operational area) may have the potential to be exposed to only Low concentrations of hydrocarbons; these levels of (light) hydrocarbons do not typically require intervention and are naturally dispersed over days and weeks.

The heritage value of cultural heritage objects and places temporarily exposed to shoreline hydrocarbons is not expected to change. The temporary exposure of cultural heritage objects and places to shoreline hydrocarbons may temporarily contaminate the objects or sites however, weathering of light non-persistent hydrocarbons will prevent long-term hydrocarbon exposure. Although this could disrupt cultural linkages to exposed components of the environment; this disruption would be temporary and recoverable. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Consultation with First Nations groups indicates that First Nations people would like to be engaged in the event of a spill, to be part of the recovery efforts (Consultation Day GMTOAC 17 February 2024, Ref: FN-GMTOAC-20240405-Email for Athena Supply Project - Athena Supply Project). This was re-affirmed by GLaWAC during consultation in the development of this EP (Event ID 2025 0828 141512 7349). The involvement of First Nations people would be expected to accelerate recovery of Country and avoid additional disruption to cultural heritage from response efforts. It would also facilitate cultural reconnection with Sea Country impacted by a potential spill, and acknowledge the significant relationship between First Nations people, Sea Country and the culturally significant species and ecosystems.

Relevant First Nations groups will be engaged in the event an accidental hydrocarbon release will expose cultural heritage objects and places to hydrocarbons as specified in Section 6.8.5 and the OPEP. Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during such emergency events. This list will be shared with the relevant state control agency.

The intrinsic link between coastal/island objects and places and First Nations people is expected to be maintained given values of the objects and places is not expected to change and First Nations people will be central to the management of these objects and places in the event of an accidental hydrocarbon release.

8.3.1.2 Submerged Sites

Sea Country is considered by First Nations Groups to extend beyond formally defined RAP areas to include sea and submerged lands to the edge of the continental shelf. Activity aspects with the potential to interact with the seabed are limited to within the Operational Area. The Operational Area may overlap areas that were above sea level, and inhabited around pervious glacial maxima, over 10,000 years ago. Amplitude Energy investigated the potential heritage landscapes identified as of particular significance during consultation and review of First Nations Country Plans. Of concern were the cultural values associated with Budj Bim which is established within the Tyrendarra Lava flow. Features of this nature do not occur within the operational area; please refer to Section 6.3.4.4 for further details including of newer volcanic features in the region.

Potential disruption to cultural features

Submerged sites have the potential to be impacted by Activity aspects that disturb the seabed. Disturbance to seabed within the operational area is expected to be localised and recoverable (Table 8-2). The area of impact is small compared to the extent and distribution of the substrate types within the operational area across the wider region (Sections 6.0 and 0, Table 8-2). No underwater cultural heritage sites, including other cultural artefacts, have been identified within the operational area.

The likelihood of identifying cultural artefacts within the operational area is considered low given the high energy nature of the ocean in the region, and the exposed, eroded seabed (Section 6.3.4.4). Consultation with Heritage Victoria indicated that the risk of the project impacting cultural heritage was low, given the limited footprints involved. Large scale impacts to submerged landscapes were also not expected given the limited seabed footprints involved in the Activity (pers comm Heritage Victoria 2024). However, impacts could still have the potential to occur. Given this, additional control measures have been designed into the EP (Section 6.3.4.4)

Given the operational area, and associated seabed disturbance is located away from reported landscape features of particular cultural significance (recent Tyrendarra Lava Flow and analogous lava flow complexes), the expected absence of artifacts, and that disturbance to cultural heritage (if it were unexpectedly found) is regulated to avoid damage (CM30: Underwater Cultural Heritage Disturbance Risk Management Measures), the intrinsic links between submerged sites and First Nations people are expected to be maintained.

An accidental release of hydrocarbons has the potential to impact on submerged sites, via contact with hydrocarbons entrained within the water column. However, given the limited volumes, and low persistence of the hydrocarbons associated with this activity, any hydrocarbon contact would be brief and would not be expected to change the nature or integrity of submerged features.

The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

8.3.2 Intangible Heritage Sites and Values

8.3.2.1 Sea Country

Sea Country is an intrinsic value to First Nations people. Sea Country may include parts of open ocean, beaches, land and freshwater on the coast, habitats, and may encompass all living things, beliefs, values, creation spirits and cultural obligations connected to an area. The operational area and monitoring area overlaps Sea Country as described by First Nations Groups respective Country Plans. Many First Nations groups have a close connection with the sea and its resources which are central to culture. It is a place of abundant resources and habitat to culturally significant flora and fauna. Caring for Sea Country is vitally important to First Nations groups of the Otway region. First Nations people's wellbeing and confidence is reliant on the authority to access and practice on Country (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023; Eastern Maar Aboriginal Corporation 2014).

Potential disruption to cultural features

Activity impacts and risks to the biological and physical components of sea country are described in Sections 6.0 and 0. First Nations intangible cultural heritage values associated with Sea Country including ecosystems and species are considered based on their ecological values, food sources or culturally significant totemic values. The First Nations people's values of marine ecosystems and species have the potential to change if there are impacts to ecosystem functioning and integrity or species population.

As summarised in Table 8-2, potential impacts and risks to fish, marine mammals and seabirds and shorebirds, and water and sediment quality are mostly limited to localised and short-term impacts (Level 1 or 2 consequences), with no impacts at the population level, or which would manifest in disruption to a cultural feature. As an activity with limited nature and scale, close to existing offshore infrastructure, potential disruption to Sea Country values is expected to be negligible; energy infrastructure has previously been installed on the seabed as well as onshore, and continues to

coexist with First Nations peoples values, memories and Songlines relating to Country (ACMI 2010; Biosis 2023).

The introduction, establishment and spread of IMS and accidental hydrocarbon release is a risk of up to Moderate severity, and could affect marine resources, including resources collected by First Nations peoples in Coastal Areas. With preventative and response controls in place, impacts and risks from these aspects are not expected to eventuate, nor result in widespread long-term impacts to Sea Country or impacts to ecosystem functioning and integrity or species populations. Links between environment receptors and cultural features could be disrupted in the unlikely event of a major hydrocarbon spill, or remote event of IMS introduction and spread, but are expected to be recoverable. The risk severity is considered to be the same for the cultural feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

8.3.2.2 Creation/ Dreaming sites, Songlines, Sacred sites and Ancestral beings

Creation/ Dreaming sites, Songlines, ceremonial sites link First Nations people to ancestors, culture, traditions, customs, traditional laws and Country. Songlines relating to the flooding gives significance to now submerged landscapes. Onshore, the Convincing Ground remains a place of ceremony for the Gunditjmara who gather at the site annually to reflect on the ongoing impacts of colonisation on their people (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023). Deen Maar is an important Dreaming site where Ancestors leave the earth. Karntubul (whales) are Ancestors of Gunditjmara and have featured in dreaming stories, ceremony, song and dance of Gunditjmara.

Potential disruption to cultural features

Activity impacts to seabed are limited to the operational area, offshore and are not associated with landscapes of particular cultural significance such as the Tyrendarra Lava Flow that occurs further west, or the submerged land bridge linked to Wilsons Promontory further east. Activity risks events have the potential to affect cultural features highlighted as of importance during consultation, including the Convincing Ground, Deen Maar, and whales. These Activity risks therefore have the potential to disrupt the intrinsic links between First Nations people and the values of Creation/Dreaming, songlines, sacred sites and Ancestral beings. As evaluated in Section 8.3.2.1, disturbance to seabed in the operational area is expected to be localised and recoverable (Table 8-2). The area of impact is small compared to the extent and distribution of substrate type identified within the operational area and its occurrence across the wider region (Sections 6.0 and 0, Table 8-2). Landscape scale impacts (submerged landscapes) were also not expected given the limited seabed footprints involved (*pers comm Heritage Victoria, 2024*). Energy infrastructure has previously been installed on the seabed as well as onshore, and continues to coexist with First Nations peoples values, memories and Songlines relating to Country (Biosis 2023). Given the changes to seabed from Activity aspects are localised, short-term and recoverable, and the absence of submerged landscapes, the intrinsic links between First Nations people and Songline values of benthic habitats is expected to be maintained.

Shoreline hydrocarbon exposure to The Convincing Ground and Deen Maar has the potential to change the intangible cultural heritage values (for example, Creation/ Dreaming sites, sacred sites and Ancestral beings) of these sites. As evaluated in Section 8.3.1.1, the (risk) temporary exposure of The Convincing Ground and Deen Maar to shoreline hydrocarbons is not expected to change the heritage values of the site. The temporary exposure to shoreline hydrocarbons may temporarily contaminate the sites however, weathering of light non-persistent hydrocarbons will prevent long-term hydrocarbon contamination. Relevant First Nations groups will be notified in the event an accidental hydrocarbon release will expose The Convincing Ground and/or Deen Maar to hydrocarbons as specified in Section 6.8.5 and the OPEP. The risk severity is considered to be the

same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during such emergency events. This list will be shared with the relevant state control agency. The intrinsic links between First Nations people and cultural heritage values (Creation/ Dreaming sites, sacred sites and Ancestral beings) of The Convincing Ground and Deen Maar is expected to be maintained given First Nations people will be central to the management of these sites in the event of an accidental hydrocarbon release.

As summarised in Table 8-2, potential impacts to whales from Activity aspects are mostly limited to localised and short-term impacts (Level 1 or 2 consequences), such as small, temporary changes to migratory or foraging behaviours (see Section 6.6.5), and which be managed to minimise behavioural disturbance to southern right whales and blue whales. The risk of vessels physically interacting with whales is Low and managed through the implementation of cautionary and no-approach zones around whales. These risks, though unlikely, if they were to eventuate, are not anticipated to impact population levels, distribution or local ecosystem function. With controls in place, impacts and risks to whales from Activity aspects are not expected to impact the intrinsic links between First Nations people and whales that are valued as Ancestral beings, and will not affect populations or distributions of whales to the extent that Gunditjmara practice of 'calling in' whales would be disrupted. As such, the intrinsic links between First Nations people and Ancestral beings (whales) is expected to be maintained. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy commits to CM05: Ongoing Consultation and Notification, to ensure First Nations people will be central to the management of First Nations people's heritage sites and values.

8.3.2.3 Cultural Obligations to Care for Country

First Nations people may be culturally obligated and inherently responsible to care, protect and heal Country for present and future generations. The roles held relating to taking care of Country and knowledge holding may vary amongst individuals and within clans and family groups. Roles include taking care of culturally significant species or habitats of significant species known to be important food resources (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023). The obligation to care for Country can be deep rooted in First Nations cultural laws and customs (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023). Caring for Country emphasises the protection and management of land, waters and plants and animals that reside in these areas and ensures they are preserved for future generations (Gunaikurnai Land and Waters Aboriginal Corporation 2015).

Potential disruption to cultural features

By sharing of information through consultation, Country Plans, and on Country teachings, First Nations people have articulated the particular values and sensitivities that are important to them, and which will require particular consideration within the assessment of impacts and risks and their management. This is consistent with their cultural ties to and inherent responsibility to care for Country. As evaluated in Section 8.3.2.1, Activity aspects are not expected to result in widespread long-term impacts to Sea Country or impacts to ecosystem functioning and integrity or species populations. Table 8-2 summarises how potential impacts and risks to marine wildlife, water and sediment quality, and cultural heritage are mostly limited to localised and short-term impacts (Level 1 or 2 consequences).

As an activity with limited nature and scale, close to existing infrastructure, potential disruption to Sea Country values is expected to be negligible; energy infrastructure has previously been installed

on the seabed as well as onshore, and continues to coexist with First Nations peoples intangible cultural heritage values including memories and Songlines relating to Country (ACMI 2010; Biosis 2023).

The unplanned introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response have the potential for moderate risk to environment receptors. With controls in place impacts and risks to Sea Country are not expected to impact ecosystem functioning and integrity or species populations.

The exclusion of First Nations people from accessing Country or decision-making processes for Country may risk disrupting the intrinsic and important link between First Nations people and obligations to care for Country. Scenarios where First Nations people are restricted in their access to Country could occur in the event of an accidental hydrocarbon release for safety reasons. To maintain and ensure First Nations people are central to the management of the Country, relevant First Nations groups will be notified in the event an accidental hydrocarbon release as specified in Section 6.8.5 and the OPEP. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during such emergency events. First Nations people's and obligations to care for Country is expected to be respected and maintained given First Nations people will be central to the management of these sites in the event of an accidental hydrocarbon release which could impact them.

Amplitude Energy commits to CM05: Ongoing Consultation and Notification, to ensure First Nations people will be central to the management of First Nations people's heritage sites and values.

8.3.2.4 Knowledge Systems

First Nations peoples ecological, spiritual, traditional and cultural knowledge may be passed from generation to generation using cultural practices (Dreaming stories, ceremony, song and dance) where knowledge holders (Elders) are the custodians of knowledge. This knowledge includes (but is not limited to) culturally significant species, and landscape features that hold Dreaming and creation stories or are events and ceremonial places critical for intergenerational knowledge sharing and cultural practice.

Receptors relevant to First Nations people knowledge systems include:

Culturally significant species including food resources, cetaceans, pinnipeds, seabirds and plankton (refer to Sections 8.3.3.1, 8.3.3.2, 8.3.3.3, and 8.3.3.4)

Cultural heritage places including benthic habitats, The Convincing Ground, Deen Maar, Discovery Bay Coastal Park, Wilson Promontory, and Tyrendarra lava flow (refer to Section 8.3.1.1 and Section 8.3.1.2).

Potential disruption to cultural features

Impacts and risks resulting in the exclusion of access to cultural heritage places or displacement/reduction in population of culturally significant species have the potential to disrupt the intrinsic link between environment receptors and knowledge systems.

Activity aspects are not expected to result in widespread long-term impacts to environment receptors (including those that are part of knowledge systems). Table 8-2 summarises how potential impacts and risks to environment receptors are mostly limited to localised and short-term impacts (Level 1 or 2 consequences). As an activity with limited nature and scale, and in close proximity to

existing infrastructure, potential disruption to knowledge systems is expected to be negligible. Energy infrastructure has previously been installed on the seabed as well as onshore, and continues to coexist with First Nations peoples values, memories and Songlines relating to Country (ACMI 2010; Biosis 2023).

The unplanned introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response have the potential for moderate risk to environment receptors. If access to heritage places is restricted or if the value doesn't exist within the local area of Country, knowledge systems of that value can potentially be disrupted or lost.

The potential to exclude First Nations people from accessing Country may risk disrupting the intrinsic links between First Nations people and knowledge systems. Scenarios where First Nations people are restricted access to Country may occur in the event of an accidental hydrocarbon release for safety reasons. The temporary exposure of cultural heritage places to shoreline hydrocarbons may temporarily result in restricted access to cultural heritage places. Due to the highly volatile nature of the hydrocarbons (MGO and Condensate) as a light non-persistent hydrocarbon (see Section 6.8.3.2), shoreline hydrocarbons at cultural heritage places, are likely to be easily washed off in the presence of tidal and/or wave action. As a result, access restrictions (if any) would be temporary and not long-term. Relevant First Nations groups will be engaged in the event an accidental hydrocarbon release will expose cultural heritage places to hydrocarbons as specified in Section 6.8.5 and the OPEP. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy maintains a list of key First Nations contacts who have expressed an interest in the protection of cultural heritage during such emergency events. The intrinsic links between environment receptors and First Nations peoples knowledge systems is expected to be maintained given First Nations people will be central to the management of these sites in the event of an accidental hydrocarbon release.

As summarised in Table 8-2, potential impacts and risks to culturally significant species such as fish, marine mammals and seabirds and shorebirds are mostly limited to localised and short-term impacts (Level 1 or 2 consequences). The introduction, establishment and spread of IMS and accidental hydrocarbon release has the potential for moderate inherent risk. With controls in place, impacts and risks from these aspects are not expected to result in impacts to species populations. As such, the intrinsic link between environment receptors and First Nations peoples is expected to be maintained.

Amplitude Energy commits to CM05: Ongoing Consultation and Notification, to ensure First Nations people will be central to the management of First Nations people's heritage sites and values.

8.3.2.5 Connection to Country

First Nations people may hold strong connections to the south-east marine region, as occupation of coastal areas dates back over at least 40,000 years (DoE 2015a). The Victorian coast is of significance with respect to First Nations tangible and intangible cultural heritage. This includes areas where there may be no physical evidence of past cultural activities but includes places of spiritual or ceremonial significance, places where traditional plant or mineral resources occur or trade and travel routes (Aboriginal Victoria 2008).

Potential disruption to cultural features

Impacts and risks and restriction of access to Sea Country are potential risks to the intrinsic links between First Nations people and connection to Country.

As evaluated in Section 8.3.2.1, impacts and risks from Activity aspects are not expected to result in widespread long-term impacts to Sea Country or impacts to ecosystem functioning and integrity or species populations. Table 8-2 summarises how potential impacts and risks to marine fauna, water and sediment quality, and cultural heritage are mostly limited to localised and short-term impacts (Level 1 or 2 consequences). As an activity with limited nature and scale, and in close proximity to existing infrastructure, potential disruption of Connections to Country is expected to be negligible; energy infrastructure has previously been installed on the seabed as well as onshore and continues to coexist with First Nations peoples intangible cultural heritage values, memories and Songlines relating to Country (ACMI 2010; Biosis 2023).

The introduction, establishment and spread of IMS and accidental hydrocarbon release has the potential for moderate inherent risk. With controls in place, impacts and risks to Sea Country are not expected to impact ecosystem functioning and integrity or species populations. As such, the intrinsic links between environment receptors and First Nations peoples connection to Country is expected to be maintained.

As evaluated in Section 8.3.2.5, restriction of access to Country may occur in the event of an accidental hydrocarbon release for safety reasons. The presence of shoreline hydrocarbons may temporarily result in restricted access to Country. Due to the nature of the hydrocarbons associated with the Activity (MGO and Condensate) being light and non-persistent (see Section 6.8.3.2), shoreline hydrocarbons are likely to be readily weathered and washed off in the presence of tidal and/or wave action. As a result, if access to Country is affected, it would be temporary and not long-term. Relevant First Nations groups will be engaged in the event an accidental hydrocarbon release will expose cultural heritage places to hydrocarbons as specified in Section 6.8.5 and the OPEP. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during such emergency events. The intrinsic link between the environment receptors and First Nations peoples connection to Country is expected to be maintained given First Nations people will be central to the management of these sites in the event of an accidental hydrocarbon release.

8.3.3 Ecosystems and Species

8.3.3.1 Culturally Significant Species and Food Resources

Culturally significant food resources occur in the Otway Region. Highlighted during consultation and cultural training were short-finned eels (Kooyang). Kooyang migrate through the Otway Region including State waters and the Commonwealth Marine Area to/from freshwater systems in Gunditjmara Country to/from spawning grounds in the Coral Sea. Gunditjmara engineered aquaculture systems from volcanic formations associated with the Tyrendarra Lava flow (circa. 30,000 years old) to create Budj Bim. Eels were captured, fattened up, harvested, smoked and traded.

Potential disruption to cultural features

Eels are an important resource for First Nations people as identified during consultation and review of relevant First Nations group Country Plans (Table 4-6). First Nations groups and specific individuals within the groups may have responsibility to care for eels and their habitats to ensure associated cultural practices, and ventures such as cultural education tourism, can continue for future generations (Table 4-6). Koster et al. (2024), and Church et al. (2021), identify conservation considerations for the short-finned eel. These include potential changes to river flows from climate

change, and physical/anthropogenic habitat modification, both of which have the potential to affect the migratory success of populations, and therefore, affect the cultural practices associated with eel migration.

As summarised in Table 8-2, potential impacts to eels from Activity aspects are limited to Level 2 consequences of localised and short-term impacts to behaviour of individuals, but no population level impacts. There are no habitat modifications caused by the activity which would be expected to have an impact on migration to or from freshwater systems where they are harvested. This is because of the limited nature and scale of impacts to environment receptors, generally limited to the operational area and ecological thresholds for planned aspect of the activity, and the offshore location of the activity, away from freshwater habitats where the species migrates from and to, via a highly dispersed migration through the South East Marine Region.

Subsea noise generated by activity vessels and equipment has the potential to cause minor behavioural reactions in fish, including eels (i.e. possible brief changes to swimming speed / direction in the vicinity of Activity activities), which will not result in changes to eel migratory behaviour or success. The sources of noise, and potential affects effects on fish and eel is described in more detail in Section 6.5.4. There is negligible risk that planned aspects of the activity may either directly or indirectly impact on eel populations or migratory outcomes. As an existing activity with limited nature and scale, potential disruption to sea country values is expected to be negligible; energy infrastructure has previously been installed on the seabed as well as onshore, and continues to coexist with First Nations peoples values, memories and Songlines relating to Sea Country (ACMI 2010; Biosis, 2023).

The unplanned introduction, establishment and spread of IMS, and accidental hydrocarbon release from the activity carry moderate risk. With controls in place (described in Section 6.0 and 0), these unplanned events are not expected to occur, or result in long term impacts to species populations. As such, the cultural ties and intrinsic links between environment receptors and First Nations peoples is expected to be maintained.

8.3.3.2 Culturally Significant Species – Cetaceans

First Nations people around Australia have long had a strong connection to whales, which has significance as totemic ancestors to some groups. Karntubul (whales) in Sea Country hold deep cultural significance to the Gunditjmara and feature in Dreaming stories, ceremony, song and dance traditions.

Cetaceans are culturally significant species for the First Nations peoples as identified during consultation and review of relevant First Nations group Country Plans (Table 4-6). First Nations people have a cultural responsibility to ensure cetaceans that reside within and migrate through Sea Country are cared for and healthy and their habitat is sustained. Whales feature in Dreaming stories, ceremony, song and dance of some First Nations groups along the coasts of Australia. The protection of Karntubul (whale) species is paramount to Gunditjmara spiritual, physical wellbeing and it is the responsibility of Gunditjmara people to care for Sea Country and protect the species for present and future generations. Whales are also a resource, and Gunditjmara people still collect parts of beached whales, as has been done for thousands of years (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023).

EPBC threatened and migratory cetaceans are present within the operational area and monitoring area during seasonal migrations. A Pygmy blue whale foraging BIA and a Southern right whale migration BIA and reproduction BIA overlaps the operational area. The monitoring area overlaps a foraging and distribution BIAs for the pygmy blue whale, migration and reproduction BIAs for the southern right whale, and foraging BIAs for the humpback whale (Section 4.4.2).

Potential disruption to cultural features

First Nations groups and specific individuals within the groups may have kinship and/or responsibility to care for culturally significant species and their habitats (see Table 4-6). It is considered that impacts to species at a population level may inhibit First Nations people's ability to perform their obligations to care for culturally significant species and their habitats.

There is potential that individual whales could be behaviourally affected or physically impacted by the presence/movement and noise of vessels which may occasionally be required for inspection and maintenance of the subsea facilities. Control measures have been established to minimise the risk of physical impact and behavioural disturbance. Therefore, the potential that overall whale occurrence nearby the coast, or the numbers of beached whales will be influenced by the activity is considered negligible.

As summarised in Table 8-2, potential impacts to cetaceans from Activity aspects are limited to Level 2 consequences of localised and short-term impacts to behaviour of individuals, but no population level impacts. These consequences are considered to be unlikely to occur, and the risk to whales is considered to be Low. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Low). This is considered appropriate as cultural practices incorporate the movement of populations of whales into the region. Whilst there may be low level impacts to individuals, these impacts are not expected to result in changes to whale migratory outcomes, impact population levels or change population distributions. An accidental hydrocarbon release carries moderate risks. With controls in place (described in Section 6.8 and Section 7.0), impacts and risks from these aspects are not expected occur, or to result in impacts to species populations. As such, the cultural ties and intrinsic links between environment receptors and First Nations peoples is expected to be maintained.

8.3.3.3 Culturally Significant Species – Pinnipeds

Pinnipeds such as seals and sealions may be of significant value to First Nations people. The First Nations people of the Otway region have a profound relationship with Sea Country and seals feature in cultural practices and Dreaming stories and have been hunted as a valuable food resource. Koorn Moorn (seals) feature in song and dance of the Gunditjmara people and are also a food resource. There is evidence of the collection of seals within the Tarragal cave site that date back to 10,000 years (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023).

Important colonies and breeding habitats are found within the Monitoring Area and are in within proximity of the operational area (Section 4.4.2).

Potential disruption to cultural features

First Nations groups and specific individuals within the groups may have kinship and/or responsibility to care for culturally significant species and their habitats (see Appendix 4). It is considered that impacts to species at a population level may inhibit First Nations people's ability to perform their obligations to care for culturally significant species and their habitats. If responsibilities have not been met it could result in a sense of powerlessness to members of First Nation groups responsible for the protection and care of these species (Holcombe 2022).

As summarised in Table 8-2, potential impacts to pinnipeds from Activity aspects are limited to Level 1 consequences of minor and local to behaviour and possible temporary changes to habitat in the offshore environment, within or local to the operational area, and not within coastal environments where fauna are more likely to be encountered by people; no discernible disruption to cultural links would be expected. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Low).

Accidental hydrocarbon releases have the potential for moderate inherent risk wider afield, including in coastal areas. As described in Section 6.0, hydrocarbon exposure, of the potential nature and scale associated with Activity risks, would not be expected to result in changes to pinniped foraging and breeding behaviours or impact population levels. There is negligible risk that aspects of the Activity may either directly or indirectly impact on pinniped populations. With controls in place, these impacts and risks from these aspects are not expected to impact culturally significant species at a population level and hence are not expected to impact the value of culturally significant species. As such, the cultural ties and intrinsic links between environment receptors and First Nations peoples cultural heritage values is expected to be maintained.

8.3.3.4 Culturally Significant Species – Seabirds

Seabirds may play a vital role in some First Nations cultural stories and traditions and birds and eggs are a source of food to many First Nations groups. Different avian species hold deep connections to lore and represent spiritual emblems or totems. The arrival of migratory seabirds and breeding seasons of seabirds are important markers for the different seasons observed by First Nations groups (Eastern Maar Aboriginal Corporation 2014). Magpie gees and Cape Barren geese were harvested for food from wetland habitats (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023). For the Gunaikurnai people of Gippsland, sea birds play a role in their cultural stories and traditions. One notable story involves Borun, the pelican, who is a significant figure in their creation story. Borun is considered the ancestor of the Gunaikurnai people, highlighting the importance of sea birds in their cultural heritage (Gunaikurnai Land and Waters Aboriginal Corporation 2015).

Seabirds are of significant value to some First Nations people. Foraging BIAs for nine seabird species overlap the Operational Area. Breeding, migration and aggregation areas can be found within the monitoring area (See Section 4.4.2, and Figure 4-7 to Figure 4-12).

Potential disruption to cultural features

First Nations groups and specific individuals within the groups may have kinship and/or responsibility to care for culturally significant species and their habitats (Appendix 4). It is considered that impacts to species at a population level may inhibit First Nations people's ability to perform their obligations to care for culturally significant species and their habitats. If responsibilities have not been met it may result in a sense of powerlessness to members of First Nation groups responsible for the protection and care of these species (Holcombe 2022).

As summarised in Table 8-2, potential impacts could result from temporary changes to the physical environment, such as via the introduction of a source of artificial light, which could be visible at distances up to ~48km from the operational area. As described in Section 6.0, impacts from planned Activity aspects such as light, are limited to Level 1 consequences of minor and local to behaviour, not resulting in population level impacts, or which change migratory outcomes.

Accidental hydrocarbon release is considered a Low risk for seabirds. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Low). With controls in place, these impacts and risks from these aspects are not expected to impact culturally significant species at a population level, as such, the cultural ties and intrinsic link between environment receptors and First Nations peoples cultural heritage values is expected to be maintained.

The unplanned introduction, establishment and spread of IMS, and accidental hydrocarbon release from the activity carry moderate risk. With controls in place (described in Section 6.0 and 0), these unplanned events are not expected to occur, or result in long term impacts to species populations.

As such, the cultural ties and intrinsic links between environment receptors and First Nations peoples is expected to be maintained.

8.3.3.5 Bonney Upwelling – Key Ecological Features

The Bonney Upwelling plays a crucial role for the ecosystems of the Otway region. The plankton that blooms with the Bonney Upwelling system supports many culturally significance species and are integral to the diets of culturally significant marine species such as whales, seals, fish and sea birds. The Gunditj Mirring people recognise the significance of the Bonney Upwelling as a dominant feature in the Otway marine region which brings cool nutrient rich water to the surface which supports plankton blooms.

Phytoplankton and zooplankton are widespread throughout oceanic environments and will occur within the operational area and monitoring area with a high level of diversity. Coastal krill swarms throughout the water column of continental shelf waters primarily in summer and autumn (linked to the Bonney Upwelling), feeding on microalgae and forming a fundamental component of the food chain that provides for culturally significant species.

Potential disruption to cultural features

First Nations groups and specific individuals within the groups may have kinship and/or responsibility to care for culturally significant species and their habitats (Appendix 4). Changes in the frequency or intensity of the Bonney Upwelling impacts the abundance of plankton which can have impacts on culturally significant species in the region such as whales, seals, fish and sea birds (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023).

In relation to the physical occurrence and characteristics of the Bonney Upwelling, Butler et al. (2004) identify climate change as a possible influence on its strength or frequency, though was not of serious concern. As summarised in Table 8-2, potential impacts to physical oceanographic processes are limited. The Activity contributes minor quantities of GHG emissions to Australia's carbon budget. There are no aspects of the Activity which may have a discernible effect on the occurrence, extent or productivity of the Bonney Upwelling. With regards the plankton that are associated with upwelling events, Activity aspects may have very localised and temporary impacts to negligible proportions of the plankton population (Table 8-2). These impacts will not result in changes to plankton local or regional diversity or productivity of plankton, or those fauna which rely on them as a food source. Therefore, the intrinsic links between these environment receptors and First Nations peoples cultural heritage values associated with plankton is expected to be maintained irrespective of the Activity activities.

8.3.3.6 Water Quality

Water can be of particular cultural significance to First Nations peoples as an integral part Country, songs, ceremonies, hunting and collecting, and other activities that bind people to their Country and each other. Aboriginal communities in Victoria maintain strong connections to waters and culture and may have knowledge of particular water sources. Water sources on Country may be culturally significant or archaeologically prospective. Water may be an intrinsic value to First Nations people, and it may include parts of Sea Country, beaches, land and freshwater habitats on the coast.

Potential disruption to cultural features

Planned discharges and unplanned releases have the potential to change water quality of offshore and coastal waters. The change in water quality has the potential to impact culturally significant species and harm Country. Community concerns from the Wadawurrung people on changes in water

quality from pollution from industry and development has been noted (Wadawurrung Traditional Owners Aboriginal Corporation 2020).

As summarised in Table 8-2, potential impacts to water quality from planned Activity aspects are limited to Level 1 consequences of minor, temporary, and localised changes in the offshore environment. It is inferred that this level of impact in the offshore environment, would not cause disruption to the linkage between the environment receptor and First Nations peoples cultural practices. However, an accidental hydrocarbon release has the potential for more widespread reduction in water quality in Sea Country, and which could cause concern as to actual or perceived impacts to water quality. Relevant First Nations groups will be engaged in the event of an accidental hydrocarbon release as specified in Section 6.8.5 Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during such emergency events. With controls in place, the risks from an accidental hydrocarbon release are not expected to result in widespread long-term impacts to Sea Country or impacts to ecosystem functioning and integrity, or species populations. As such, intrinsic links between First Nations people and cultural heritage values associated with water quality is expected not expected to be disrupted long term and would be recoverable.

8.3.3.7 Benthic Habitats, Intertidal Communities, and Shorelines

Benthic habitats may be valuable to First Nations people for their ecological values to sustain culturally significant species and for food resources. Benthic habitats within the Otway and Broader Bass Strait include sponge-dominated reef and sandy substrates. Within the operational area, patchy epifauna and presence of hard platform is consistent with the description of a KEF of the South-East bioregion, that is, shelf rocky reefs and hard substrates. Reefs provide habitat and shelter for fish and are important for aggregations of biodiversity and enhanced productivity (DoE 2015b). These are in deeper offshore waters and not accessible without a vessel suitable for offshore conditions and equipment that can reach the seabed in 60-80 m of water.

The operational area does not include an intertidal environment. Intertidal communities and shorelines include mangroves, macroalgae, seagrass, coastal saltmarsh, rocky and sandy shorelines. Intertidal reefs and sandy shorelines may be valued by First Nations people for their role in supporting culturally significant species. Intertidal communities and shorelines provide habitat and shelter to both marine and terrestrial fauna, including infauna and epifaunal invertebrates, fish and birds. Sea Country for Wadawurrung people includes coastal habitats such as seagrass and saltmarsh (Wadawurrung Traditional Owners Aboriginal Corporation 2020).

Potential disruption to cultural features

Impacts to benthic habitats, if at a widespread level, could disrupt intrinsic links between First Nations people and cultural heritage values of benthic habitats. Widespread changes have the potential to impact population levels of culturally significant species which might be available as a resource.

As evaluated in Section 8.3.1.2, change in benthic habitat in the operational area is expected to be localised, short-term and recoverable (Table 8-2). The area of impact is small compared to the extent and distribution of the benthic habitats identified within the operational area and wider region (Sections 6.0 and 0, and Table 8-2). Planned activity aspects will not impact on coastal benthic habitats; there would be no change to the level or diversity of resources available to First Nations people.

Changes to ecosystem functioning and integrity of intertidal communities and shorelines poses a potential risk to intrinsic links between First Nations people and the cultural heritage values of intertidal communities and shorelines. As summarised in Table 8-2, the introduction, establishment

and spread of IMS has the potential for moderate inherent risk of either directly or indirectly impacting intertidal communities and shoreline habitats. With controls in place, impacts and risks from these aspects are not expected to result in widespread long-term impacts to intertidal communities and shorelines including ecosystem functioning and integrity. An accidental hydrocarbon release has the potential for more widespread impacts to benthic habitat within Sea Country and is more relevant in shallow coastal waters where there is higher potential for hydrocarbons to accumulate, and for benthic assemblages to be exposed over longer periods. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Relevant First Nations groups will be engaged in the event of an accidental hydrocarbon release as specified in Section 6.8.5 Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during and the recovery of Sea Country in such emergency events. With controls in place, the risks from an accidental hydrocarbon release are not expected to result in widespread long-term impacts to Sea Country or impacts to ecosystem functioning and integrity, or species populations. As such, intrinsic links between environment receptors and First Nations peoples cultural heritage values is expected not expected to be disrupted long term and would be recoverable.

8.3.3.8 Marine Park/ Coastal Reserves/ Wetlands

Marine Parks, Coastal Reserves, and wetlands are protected areas which are managed for the primary purpose of conserving the biodiversity found in them, while sometimes also allowing for sustainable use of natural resources. First Nations people may have strong cultural associations with Sea Country and have cultural responsibilities of Country within Marine Parks and Reserves. Some First Nations groups including the Gunaikurnai people jointly manage the Marine Parks and reserves on Country. The Marine parks and reserves around Wilsons Promontory and Ninety Mile Beach National Park were inhabited Gunaikurnai ancestors and are important for the Gunaikurnai people's connection to Country (Gunaikurnai Land and Waters Aboriginal Corporation 2015). The Marengo Reef Marine Park holds cultural significance for the Eastern Maar people and is a habitat for culturally significant marine species (Eastern Maar Aboriginal Corporation 2014).

Potential disruption to cultural features

Changes to ecosystem functioning and integrity of Marine Parks, coastal reserves and wetlands poses a potential risk to intrinsic links between First Nations people and the cultural heritage values of these places.

There is no overlap between the operational area and Marine Parks, Coastal Reserves and wetlands of International and National Importance, therefore, there is no direct risk to intrinsic links between First Nations people and cultural heritage values associated with Marine Parks, Coastal Reserves, and wetlands for planned Activity aspects.

As summarised in Table 8-2, the introduction, establishment and spread of IMS and accidental hydrocarbon release has the potential for moderate inherent risk of either directly or indirectly impacting Marine Park, coastal reserve, and wetlands. Relevant First Nations groups will be engaged in the event of an accidental hydrocarbon release as specified in Section 6.8.5. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during and the recovery of Sea Country in such emergency events. With controls in place to prevent and mitigate impacts if they were to occur, aspects are not expected to result in widespread long-term impacts to Marine Parks, Coastal

Reserves, or to wetlands, when considering ecosystem functioning and integrity. As such, intrinsic links between environment receptors and First Nations peoples cultural heritage values is not expected to be disrupted long term and would be recoverable.

8.4 Control Measures, ALARP, and Acceptability

Table 8-3 provide a summary of the control measures and ALARP and Acceptability Assessment relevant to interactions with cultural features of the environment relating to First Nations people's heritage sites and values.

Table 8-3: First Nations Heritage Values and Sensitivities ALARP, Control Measures and Acceptability Assessment

First Nations Heritage Values and Sensitivities	
ALARP Decision Context and Justification	**ALARP Decision Context: Type B** ALARP decision context B has been applied in relation to First Nations people cultural heritage because the Activity carries residual (Moderate) risks and Level 4 consequences in relation to environment receptors that are linked to First Nations Cultural Heritage, cultural features. Controls to manage residual risks from the Activity upon physical, biological and social environment receptors have been considered and established in Sections 6.0 and 0. Additional Controls have been considered, and selected for aspects, specifically in relation to the protection and recovery of the intrinsic links between environment receptors and cultural heritage, for those risks which are of Moderate risk severity, these are: • Underwater sound emissions (Section 6.5.5 and 6.6.5) • Introduction, establishment and spread of IMS (Section 6.7.4) • Accidental hydrocarbon release (Section 6.8.5). • The additional Control Measures are described below.
Additional Control Measure	**Source and Description of Control**
CM23: Underwater Cultural Heritage Disturbance Risk Management Measures	Amplitude Energy Cultural Heritage Disturbance Risk Management Measures acknowledge legislative requirements and establishes the methods by which potential disturbance to cultural heritage is identified including via screening, consultation, and expert advice as required. The measures apply to the offshore Activity to ensure impacts and risks throughout the Activity remain within acceptable levels and are managed to ALARP. In accordance with advice from Heritage Victoria and DPC during Activity consultation, and in line with the UCH Guidelines (DCCEEW 2024d), prior to commencement of well construction activities a suitably qualified and experienced cultural heritage team will review geophysical data gathered during seabed surveys (refer CM13 Seabed Survey) for underwater cultural heritage and allow for the consideration of underwater cultural heritage and landscapes in final infrastructure locations so that it is avoided by the subsequent activities, with a suitable exclusion area. The team will include a marine archaeologist and will also have familiarity with first Nations cultural landscapes and experience in identifying landscape features from geophysical data. Any subsequent management advice (e.g. exclusion zones) will be provided to Heritage Victoria and accounted for within Activity installation procedures. If cultural heritage is identified, it will be mapped, along with suitable exclusion area and its location integrated into Activity inductions and procedures to ensure it is avoided during Activity.

First Nations Heritage Values and Sensitivities	
CM22: Engagement During Emergency Response	Engagement with relevant First Nations Representatives in the event of a loss of containment of hydrocarbons which may extend to coastlines to obtain advice on the management of cultural sensitivities which may be in the spill trajectory. Consultation in the event of a spill will ensure that relevant First Nations peoples are involved in the protection of cultural features that may be in the spill trajectory, and that government agencies support the protect and deflect strategy thus minimising potential impacts and risks to sensitivities. Engagement with relevant State Agencies and First Nations groups in the event of a spill, with information provided on an as-needed basis, to identify and protect cultural heritage sites from disturbance associated with spill response activities. The Eastern Maar, Gunditj Mirring, Wadawurrung and Gunaikurnai Indigenous groups were consulted. The Wadawurrung group felt that, given the location of the operation activities, further consultation was not required. The Eastern Maar and Gunaikurnai Aboriginal Corporations would like to be contacted in the event of a spill which could impact shorelines, to provide cultural heritage advice. Additionally, the Gunditj Mirring Traditional Owners Aboriginal Corporation requested to play a role in oil spill response activities.
Impact and Risk Summary	
Residual Impact Consequence	**Level 2** - Localised short-term impacts to components of the environment which are linked to cultural values and sensitivities. *Planned activities and impacts will not disrupt cultural linkages with the environment.*
Residual Risk Consequence	• Underwater sound: **Level 2** • Introduction and Spread of IMS: **Level 4** • Accidental Hydrocarbon release: **Level 3** • Spill Response: **Level 3** • Unplanned discharges chemical and hydrocarbon LOC: **Level 2** • Unplanned discharges waste: **Level 2** • Interaction with marine fauna: **Level 2**
Likelihood	• Underwater sound: **Possible (C)** • Introduction and Spread of IMS: **Remote (E)** • Accidental Hydrocarbon release: **Unlikely (D)** • Unplanned discharges chemicals and hydrocarbons LOC: **Unlikely (D)** • Unplanned discharges waste: **Unlikely (D)** • Interaction with marine fauna: **Unlikely (D).**
Residual Risk	Moderate or lower for all aspects Potential long-term changes to cultural features associated with IMS and major hydrocarbon spills, though expected to be ultimately recoverable with involvement of First Nations peoples in the response to incidents, and repair of environment receptors and associated cultural features.
Demonstration of Acceptability	
Principles of ESD	Impacts from planned activities are assessed as having no greater than Level 2 consequence, which is not considered as having the potential to result in serious or irreversible environmental damage. In relation to intrinsic links to First Nations people's heritage sites and values; no disruption to these links are expected. Consequently, no further evaluation against the principles of ESD is required.

First Nations Heritage Values and Sensitivities	
	The risk events associated with the activity are up to Moderate Severity, Level 4 consequence, though remote likelihood. Because of the Level 4 consequence, assessment against the principles of ESD is required. The level 4 consequence relates specifically to the risk of introducing, the spread and establishment of IMS. With the established processes in place, there is little residual uncertainty associated with the risk of IMS introduction, spread and establishment, as the activities are well known and well-practiced in the region, the cause pathways are well known, and risks are well regulated and managed under Australian biosecurity laws and guidance, and specific risk treatment measure (IMS Risk Management Protocol) developed by Amplitude Energy which operationalises the laws and guidance. Where ecosystem functions could be affected, and which could impact on resource distribution; these changes would be expected to be ultimately recoverable with involvement of First Nations peoples in the response to incidents, and repair cultural features of the environment. It is not considered that there is significant scientific uncertainty associated with this aspect. Therefore, the precautionary principle has not been applied beyond the precautionary measures already integrated into the IMS Risk Management Protocol.
Legislative and Conventions	• OPGGS Act • *Underwater Cultural Heritage Act 2018* • EPBC Act 1999 and EPBC Regulations 2000 • EPBC Act Listed Species Recovery Plans (including Blue Whale and Southern Right Whale), and species listing advice for Humpback whales • *Climate Change Act 2022* (Cth) • *National Greenhouse and Energy Reporting Act 2007* (Cth) • Paris Agreement • AMSA Marine Order 3 [Seagoing qualifications] • AMSA Marine Order 30 [Prevention of collisions] • AMSAs Marine Order 91 [Marine Pollution Prevention – oil] • OPGGS(E)R – Amplitude Energy Victorian OPEP (VIC-EPER-EMP-0001) • OPGGS(E)R- Amplitude Energy OSMP (VIC-ER-EMP-0002) • *Navigation Act 2014* - Notifications
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • External Affairs, Investor Relations, Community and Stakeholder Management (MS05) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11) Activities will be undertaken in accordance with the Implementation Strategy of this EP.
External Context	• Gunditjmara Nyamat Mirring Plan 2023 – 2033 (Gunditjmara Sea Country Plan) (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023) • Eastern Maar Meerreengeeye Ngakeeppoorryeeyt (Eastern Maar Aboriginal Corporation 2014)

First Nations Heritage Values and Sensitivities	
	• Paleert Tjaara Dja Let's make Country good together 2020 – 2030 – Wadawurrung Country Plan (Wadawurrung Traditional Owners Aboriginal Corporation 2020) • Gunaikurnai Whole-of-Country Plan (Gunaikurnai Land and Waters Aboriginal Corporation 2015). • Assessing and Managing Impacts to Underwater Cultural Heritage in Australian Waters. Guidelines on the application of the UCH Act 2018 (DCCEEW 2024d) • Consultation: All relevant persons, including First Nations Organisations and peoples have been identified, or provided the opportunity to self-identify, including, though not limited to, groups and individuals located in areas adjacent to the operational area, and areas which could be affected in the event of a hydrocarbon spill. Relevant persons, including First Nations peoples, have been provided with information on the activity, and where applicable, in a format requested by them. Amplitude Energy continues to provide opportunities to engage on the activities described in this plan. Section 11.0 provides a summary of all consultation undertaken for the activity. Feedback received during consultation which has informed this EP, and the management of impacts and risks includes: – Information from GMTOAC in relation to cultural heritage sites and values that are important to them; these were eel migration, whale migration, the Bonney Upwelling System and associated productivity, and Deen Maar. These sites and values align with the Gunditjmara Sea Country Plan. – Advice from Heritage Victoria and DPC was sought during consultation. Advice from Heritage Victoria related to the potential presence of UCH, the collection of seabed data, and reducing the uncertainty as to the presence of and impacts to cultural heritage. This has resulted in adapting control measures to provide for additional specialist UCH advice and review relevant seabed data prior to activity commencement, to reduce uncertainty.
Acceptability Outcome	Acceptable • The Activity aspects will not impact the intrinsic links of First Nations people to the Environment. The activity is not expected to have a significant impact (e.g. changes in population levels, ecosystem function, physical oceanography of the region) on cultural features of the environment (e.g. eels, whales, upwelling systems) relating to First Nations people's heritage sites, values, and cultural practices. • Whilst the activity will contact the seabed, the risk of disturbing potential cultural heritage is considered to be low given the offshore location of the activities and localised and temporary nature and scale. The (Low) risk of disturbing cultural heritage within the operational area is further reduced by recording, reporting and assessing any anomalies identified on the seabed before they are disturbed. • The potential risks of the activity associated with unplanned events including IMS introduction, establishment and spread, and accidental hydrocarbon release, are preventable. These risks are managed to ALARP, and any impact to intrinsic links are expected to be ultimately recoverable with the involvement of respective First Nations people, and acceptable if the adopted controls are implemented.

First Nations Heritage Values and Sensitivities	
	To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: EPO20: No impact to underwater cultural heritage.

Table 8-4: Potential Impacts to Cultural Features - Extended ALARP Assessment

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
Management of Knowledge and Change	Disruption to cultural link to, or practice associated with, a component of the environment	By continuing to enable engagement Cooper Energy can modify control measures according to new information which may become available.	Yes	Administrative effort and travel	No new risks introduced	Implement. Refer to description of MOC process within the Implementation Strategy of this EP.
Record and Report Marine Mammal Observations	Disruption to cultural link to, or practice associated with, a component of the environment	Provides data which can be viewed by interested persons. May assist alleviate any concerns in relation to the activity affecting whale migration and links to cultural practices such as 'calling in whales'	Yes	Administrative effort	No new risks introduced	Implement. Refer to reporting requirements within the Implementation Strategy of this EP. This conclusion is responsive to consultation with GMTOAC for the approved Athena Supply Project Environment Plan (**Athena Supply Project**) and their particular interest in eel migration. Refer to consultation ID: FN-GMTOAC-20240214-Email This requirement has been included within

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
						Implementation Strategy Section 12.12.
Record and make available observations of culturally significant species to First Nations Groups	Disruption to cultural link to, or practice associated with, a component of the environment	May be of interest to First Nations Groups and their research partners, to build on existing knowledge.	N/A – not typically reported	Administrative effort	No new risks introduced	Implement. Added to reporting requirements within the Implementation Strategy of this EP. This conclusion is responsive to consultation with GMTOAC for the approved Athena Supply Project Environment Plan (**Athena Supply Project**) and their particular interest in eel migration. Refer to consultation ID: FN-GMTOAC-20240214-Email. This requirement has been included within Implementation Strategy Section 12.12
Tag and track any eels observed by activity ROVs	Disruption to cultural link to, or practice associated with, a component of the environment	May be of interest to GMTOAC and their research partners, to build on existing knowledge of how and when eels	No precedents for activities of this nature/scale	Significant planning effort and field work and associated additional costs. Specialist researchers required to develop	Potential to cause harm to eels, and damage equipment. Not practicable in the offshore environment	Reject. Not possible.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
		disperse through the Bass Strait.		and implement tagging program extending overall time of the activity offshore.	to capture and tag eels with ROV	
Engagement of First Nations peoples during Emergency Spill Response	Disruption to cultural link to, or practice associated with, a component of the environment.	By engaging First Nations peoples during spill response, the response can be managed to account for and protect cultural values and sensitivities in a culturally appropriate way.	Yes	Administrative effort to maintain contact details. Additional costs associated with meeting fees (as applicable) Additional cost to engage First Nations peoples during a spill response.	No new risks introduced	Implement. Included as a Control Measure within the OPEP. This conclusion is responsive to consultation with GMTOAC for the approved Athena Supply Project Environment Plan (**Athena Supply Project**) and their particular interest in recovery of Country in response to disasters. CM22 includes this requirement to engage with relevant First Nations Representatives in the event of a loss of hydrocarbons which may extend to coastlines to obtain advice on the

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
						management of cultural sensitivities. Refer to consultation ID: FN-GMTOAC-20240405-Email.
Project inductions to all relevant marine crew include information on the cultural links with elements of the environment that may be observed in the operational area, including whales.	Disruption to cultural link to, or practice associated with, a component of the environment.	By providing information on the cultural heritage aspects which may occur in the activity area the marine crews understanding of the importance and significance of these things may be enhanced and will be consistent across the team.	Yes	Administrative effort / travel to prepare / deliver inductions to marine crew.	Risk of sharing information that is culturally sensitive. Mitigation: only provide information that is publicly available.	Implement. Added to induction requirements within the Implementation Strategy of this EP.
Use of cultural heritage monitors on vessels to oversee implementation of controls protecting cultural values.	Disruption to cultural link to, or practice associated with, a component of the environment.	No benefit. Trained marine mammal observers will be established on vessels to implement MMO protocols. Risks to UWCH are considered Low given nature and scale of the activities (ref discussion with Heritage Victoria, 2024).	No precedents for activities of this nature/scale	Costs associated with training additional personnel for offshore work, medical checks, mobilisation.	Potential exceedance of vessel capacity (bed space). HSEC risks associated with working offshore.	Reject. Existing oversight and reporting established for the project is considered sufficient

9.0 Cumulative Impact Assessment

In the context of offshore petroleum activities cumulative environmental impacts are defined by the regulator, NOPSEMA, as successive, additive, or synergistic impacts of collectively significant activities or projects with material impacts on the environment that have the potential to accumulate over temporal and spatial scales (NOPSEMA Environment Plan Decision Making Guideline, N-04750-GL1721 A524696, Jan 2024).

The effects of past project activities, and currently operating activities, are captured when describing the existing condition of and any pressure or threats affecting the environment (refer to Section 4.0: Description of the Environment). This baseline condition and understanding of the capacity of the receiving environment and receptors to accommodate changes, considering existing pressures and threats, informs the environmental impact assessments conducted in Section 6.0.

The focus of the cumulative impact assessment is to build on these assessments by considering the potential impacts from the planned components of the proposed activity on key matters in conjunction with the potential impacts from other reasonably foreseeable future projects and activities. Impacts and risks from unplanned aspects have not been considered in the cumulative impact assessment. It is not reasonable to consider unplanned aspects for cumulative environmental effects, because of the low likelihood relating to unplanned events for the subsea installation Activity and other foreseeable future projects and activities.

The types of activities and projects typically considered in cumulative impact assessment (CIA) are large in scale and are of relevance in terms of potentially contributing to or compounding material impacts in the relevant project area. While an environmental value is at the centre of the CIA this doesn't mean that every potential impact of regional concern to that value needs to be addressed. For example, while loss of habitat to a threatened species may be of regional concern, there may be no reason to incorporate those potential impacts into a project-initiated CIA if the project under assessment does not contribute to long term habitat reduction (Minerals Council of Australia 2015). The scoping assessment is used to identify where the Activity contributes to cumulative impacts which may be material.

In accordance with regulation 56 of the OPGGS(E)R (Sections 1.3.1 and Appendix 3), this section of the EP refers to the accepted **ECSP OPP**. The accepted OPP is publicly available on the NOPSEMA website (Cooper Energy 2025). The OPP includes a cumulative impact assessment (CIA) of the ECSP Activities within Section 11 of the OPP (AEL 2025). Given the activities for the Activity are a part of ECSP, the cumulative impact assessment (CIA) for the Activity within this EP is considered covered under the CIA detailed in the OPP.

The OPP identifies EPOs, control measures, EPSs, and measurement criteria that have been developed as part of a systematic approach to the management of environmental risks to address potential cumulative impacts. Amplitude Energy acknowledges the need for shared responsibility to manage cumulative impacts and will actively collaborate with other petroleum titleholders, share relevant data and promote coordinated efforts to ensure that all reasonably foreseeable activities adhere to acceptable environmental standards to mitigate cumulative impacts.

Amplitude Energy will communicate specific work programs with other the Otway Basin Petroleum Titleholders with the aim of minimising the potential for cumulative impacts associated with underwater sound, should activity timings potentially result in concurrent activities and overlap biologically important period (January to June) for blue whales (refer CM09 and CM11).

Any observation, incidents, and opportunities for improvement regarding the interaction with other users will be reported to other petroleum titleholders. This additional control has been adopted and

included against CM09: Titleholder Collaboration and CM11: Campaign Risk Review as updated in Section 9.2.

9.1 Identify Reasonably Foreseeable Future Projects and Activities

In accordance with CM27 within the OPP: *Each future EP resulting from the East Coast Project OPP will undertake a review for additional or significantly revised reasonably foreseeable projects. Additional or significantly revised projects will be assessed as per CIA methodology (Section 11.1 of the OPP). Any cumulative impacts from new, significantly revised or currently unknown activities that results in an unacceptable level of impact to receptors, will be subject to new or revised control measures within the appropriate EP to reduce cumulative impacts to ALARP.*

A review for additional or significantly revised reasonably foreseeable projects was undertaken in accordance with Section 11.1 of the OPP, refer Table 9-1.

Only one additional or significantly revised reasonably foreseeable projects when compared with Section 11.2.1 of the OPP was identified as part of this review:

- Beach Energy's Offshore Gas Victoria - Well Completions, Well Interventions, Plugging and Abandonment Activities Environment Plan (Beach Energy 2025b). Accepted 15th October 2025.

Table 9-1 has been updated to reflect this change. The rest of the CIA in Section 11 of the **ECSP OPP** is still applicable and as a whole is considered a conservative, valid and appropriate CIA for the Activity within this EP.

Table 9-1: Reasonably Foreseeable Future Projects or Activities in the Offshore Otway Basin.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
Petroleum Activities – Additional foreseeable projects since the ECSP OPP					
Beach Energy Limited	Offshore Gas Victoria - Well Completions, Well Interventions, Plugging and Abandonment Activities	Accepted	2025 – 2026 Well completions: 75-100 days Well intervention: 30 days P&A (contingency): 15-20 days Support operations: 9-13 days	No – there is no potential overlap of planned impact EMBAs associated with Beach well completions, intervention and P&A, activities and timings of the Activity's vessel-based activities as they are scheduled to finish prior to Activity commencement.	There is no potential overlap activities as these activities plan to occur sequentially.
Petroleum Activities – Assessed within the ECSP OPP					
Amplitude Energy (Cooper Energy)	Operations of the existing CHN facilities to the Athena Gas Plant since 2006 (CHN operations) (Cooper Energy, 2024). Includes regular vessel-based inspections, maintenance and repair; and well	Existing	Ongoing End of field life ~2050	Yes – there is a potential temporal overlap of installation activities occurring with CHN operations IMR campaigns. At the time of preparing this EP there is no planned IMR campaign concurrent with installation activities.	Yes – the Activity is adjacent to the existing CHN facilities and will ultimately become part of the operating facilities. **Light EMBA** A 'localised (small radius of light glow around vessels)' assessed for Cooper's CHN activities, could be overlapped by the Activity's precautionary 20 km operational EMBA. The CHN EMBA overlaps foraging BIAs for multiple bird species, including albatross and gannets. **Sound EMBA** Noise EMBAs (5.97 km marine mammal behaviour criteria during resupply) resulting from CHN Operation vessels overlap with those of this EP (refer Appendix 6).

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
	workovers using a MODU.			It is expected that future monitoring campaigns as described in this EP will be scheduled sequential with IMR campaigns for CHN Operations.	The CHN EMBA overlaps: • Foraging BIAs for pygmy blue whale, including the annual high use area. • Migration BIA and reproduction BIA for southern right whale. • Distribution BIA for white shark.
Amplitude Energy (Cooper Energy)	Athena Supply Project (ASP) - Exploration Drilling (Cooper Energy 2024b)	Accepted	2025-2029 (~60 days per well, max 3 wells)	Yes – potential temporal overlap of exploration drilling schedule with timing of the Activity (i.e., surveys), though generally these offshore works would be scheduled sequentially to occur sequentially.	Yes – the operational areas overlap. **Light EMBA** A precautionary 49 km flaring associated light EMBA applied by Amplitude Energy for ASP will overlap with the Activity's precautionary 20 km routine light EMBA. The ASP EP flaring EMBA overlaps: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species • one breeding BIA for the wedge-tailed shearwater • orange-bellied parrot was identified as known to occur. **Sound EMBA** Modelling for ASP EP predicted the furthest sound contour distance for exploration drilling activities within the operational area was 23 km to reach the noise criteria threshold for behavioural effects in marine mammals. This is likely to overlap those of the Activity (Appendix 6). Exploration activities noise EMBAs overlap: • foraging BIA for the pygmy blue whale • migration BIA and reproduction BIA for the southern right whale

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					• distribution BIA for the white shark.
Beach Energy Limited	Operations of Halladale, Speculant, Geographe, Thylacine gas fields to the Otway Gas Plant (Otway operations) (Beach 2023a). Includes regular vessel-based inspections, maintenance and repair. And well workovers using a MODU.	Existing	Ongoing End of field life ~2037	Yes – potential temporal overlap of IMR campaigns schedule with timing of the Activity, though there is also potential for activities to occur sequentially.	Yes – potential overlapping of Beach Otway operations underwater sound and light emissions EMBAs with the Activity's underwater sound and light emissions EMBAs. **Light EMBA** A precautionary 20 km light EMBA was applied by Beach, which may overlap Activity's 20 km operational EMBA. The Beach light EMBA overlaps: • foraging BIAs for multiple bird species, such as albatross, petrels, and shearwater species, • breeding BIAs for the wedge-tailed shearwater, and • roosting BIAs for little curlew, pin-tailed snipe, and swinhoe's snipe **Sound EMBA** Modelling predicted the furthest sound contour distance for Beach IMR activities as 7.5 km to reach the noise effect criteria for behavioural effects in marine mammals (Beach 2024a) and this overlaps with those of this EP (Appendix 6). The Beach noise EMBAs overlaps: • the migration BIA for the southern right whale, • the foraging BIAs for the pygmy blue whale, including the annual high use area.
Beach Energy Limited	Offshore Gas Victoria Drilling and P&A Activities (Beach 2024b)	Accepted	2025-2028 Drilling: 30-40 days per well, max 5 wells P&A: 15-20 days per well, max 5 wells	Yes – potential overlap of planned impact EMBAs associated with Beach drilling and P&A activities and timings of the Activity's vessel-based activities.	Yes – potential overlap of underwater sound and light emissions EMBAs between Beach drilling and P&A activities and Activity's vessel-based activities. The Beach drilling and P&A operational area does not overlap with the Activity's operational area. **Light EMBA** A precautionary 20 km light EMBA applied by Beach could overlap with the Activity's precautionary 20 km routine light EMBA. There

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					is no flaring allowed for under the Offshore Gas Victoria Drilling and P&A Activities EP (Beach 2024b). Therefore, concurrent overlap of the routine light EMBAs (20 km) is considered the main source for potential cumulative impact. Beach's light EMBA overlaps: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species • likely migration route for the orange-bellied parrot • foraging BIA for the white shark. **Sound EMBA** Modelling for Beach activities predicted the furthest sound contour distance for exploration drilling activities within the operational area was 19.6 km to reach the noise criteria threshold for behavioural effects in marine mammals. This overlaps with the noise EMBA for the Activity. Beach noise EMBAs overlaps: • foraging BIA for pygmy blue whale • migration BIA for southern right whale • distribution BIA for white shark.
Beach Energy Limited	Geophysical/ Geotechnical Survey (Beach Energy 2023b)	Accepted	2024-2028	Yes – potential temporal overlap of planned impact EMBAs during geophysical survey and timing of the Activity's vessel-based activities. There is also potential for activities to occur sequentially.	Yes – potential overlapping of Beach Geophysical/Geotechnical surveys underwater sound and light emissions EMBAs with the Activity's underwater sound and light emissions EMBAs. **Light EMBA** A precautionary 20 km light EMBA applied by Beach could overlap the Activity's 20 km routine light EMBA. Beach's light EMBA overlaps: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species • breeding BIAs for the little penguin, white bellied sea eagle, and short-tailed shearwater, and

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					• roosting BIAs for little curlew, pin-tailed snipe, and swinhoe's snipe. **Sound EMBA** Modelling for Beach activities area predicted the furthest sound contour distance for geophysical surveys within the Otway operational area was 145 m to reach the noise criteria threshold for behavioural effects in marine mammals. This is unlikely to overlap the noise EMBA for the Activity's noise EMBA, if activities occur concurrently. Beach's noise EMBAs overlaps: • migration BIA for the southern right whale, and • foraging BIAs for the pygmy blue whale, including the annual high use area.
ConocoPhillips	Exploration Drilling (ConocoPhillips 2024)	Accepted	2025-2028 (typically, 30-40 days per well, max 6 wells)	Yes – potential overlap of the end of the ConocoPhillips drilling activities and start of the installation activities.	Yes – potential overlap of underwater sound and light emissions EMBAs between ConocoPhillips exploration drilling activities and vessel related activities described in this EP. The ConocoPhillips exploration drilling operational area (VICP/79 portion) is located adjacent to the Activity operational area. **Light EMBA** A precautionary 49 km flaring associated light EMBA applied by ConocoPhillips could overlap with a portion of the Activity's precautionary 20 km routine light EMBA. ConocoPhillips flaring EMBA overlaps: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species • breeding BIAs for petrel, shearwater, penguin and cormorant species • migration route for the orange-bellied parrot. **Sound EMBA**

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					Modelling for ConocoPhillips activities predicted the furthest sound contour distance for exploration drilling activities within the operational area was 12.6 / 22.8 km non-shelf / on shelf edge locations to reach the noise criteria threshold for behavioural effects in marine mammals. The Activity noise EMBA only overlaps shelf areas. ConocoPhillips noise EMBAs overlaps: • foraging BIA for the pygmy blue whale • migration BIA for the southern right whale • distribution BIA for the white shark.
Woodside Energy	Minerva Decommissioning and Field Management (Woodside 2024).	Accepted	2024-2025 Approximate duration is 90-120 day.	The accepted EP describes the activities being completed in 2025. The activity has not been completed at the time of preparing this EP, and Woodside are required to remove the remaining kit at the Minerva field on blocks VIC/L22 and VIC/PL33 by April 2028. Therefore, there is potential for overlap of the Activity with decommissioning at Minerva.	Yes – potential overlap of underwater sound and light emission EMBAs between Minerva decommissioning activities and Activity. The Minerva decommissioning operational area is located adjacent to the Activity's operational area. **Light EMBA** Woodside do not define a light EMBA outside of their operational area. However, overlap associated with the light EMBAs for Activity may occur due to the proximity of Minerva decommissioning operational area to the Activity. The precautionary 20 km routine light EMBA for the Activity may overlap with the vessel activities within the Minerva decommissioning operational area. Woodside's operational area overlaps: • migratory route for the orange-bellied parrot • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** Modelling for Woodside activities predicted the furthest sound contour distance for decommissioning activities within the operational area was 2.4 km (during equipment removal) to reach

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					the noise criteria threshold for behavioural effects in marine mammals. Noise EMBAs for the Activity will not overlap those of the Minerva Decommissioning and Field Management activities. Woodsides noise EMBAs overlaps: • foraging BIA for the pygmy blue whale • migration BIA for the southern right whale.
Woodside Energy	Minerva Plug and Abandonment (Woodside 2024)	Completed	2025 Approximate duration 40 – 160 days	No potential overlap, the Minerva Plug and Abandonment activities have been completed.	• No potential overlap, the Minerva Plug and Abandonment activities have been completed.
CGG - Regia	Seismic Survey (CGG 2024)	Proposed	2024-2028 60 days acquisition 90 days in field One survey between November – May) or Two separate surveys April – June, and or September – November.	Yes – potential temporal overlap of planned impact EMBAs associated during seismic acquisition timeframe and timings of the Activity. There is also potential for the activities to occur sequentially.	Yes – potential overlapping of CGG-Regia underwater sound and light emissions EMBAs with the Activity's underwater sound and light emissions EMBAs. **Light EMBA** The Activity 20 km light EMBA may overlaps the precautionary 20 km light EMBA applied by CGG. CGG's light EMBA overlaps: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** Modelling for CGG activities predicted the sound contour distance to reach the noise criteria threshold for behavioural effects up to 44 km. This will overlap with the noise EMBA described in this EP. Results predicted a maximum distance of ~23 km for pygmy blue whale, and ~15 km for southern right whale. CGG's noise EMBA overlaps: • the migration BIA for the southern right whale, • the distribution and foraging BIA (annual high use area) for the pygmy blue whale, and

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					• the foraging BIA for the Australian Fur-seal.
Beach Energy	Development of Artisan and La Bella gas fields (Beach 2024a).	Accepted OPP Proposed Development.	2024-ongoing Seabed assessments: up to 30 days Drilling activities for production wells: 70 to 90 days per well Plugging wells: 30 days per well Inspections and modifications to existing seabed infrastructure: 30 - 120 days per field.	Yes – potential temporal overlap during the development of Artisan and La Bella gas fields with timings of Activity. There is also potential for activities to occur sequentially.	Yes – potential overlapping of Artisan and La Bella development activities' underwater sound and light emissions EMBAs with the Activity underwater sound and light emissions EMBAs. **Light EMBA** The precautionary 20 km light EMBAs applied by Beach may overlap the Activity routine EMBA during activities. Beach's light EMBA overlaps: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** Preliminary modelling for Beach predicted the furthest sound contour distance to reach the noise criteria threshold as <3-7 km for development activities. This may overlap the predicted Activity EMBA. Beach's sound EMBA overlaps: • foraging BIAs for pygmy blue whale, including annual high use area, • migration BIAs for southern right whale.
Offshore Wind					
Alinta Energy and JERA Nex (Spinifex Offshore Wind)	Construction, operation, decommissioning and associated surveys and monitoring for multiple offshore wind farms.	Feasibility licence	The licence was awarded in March 25. The project is in the pre-planning phase and as such no specific details are currently publicly	Yes – potential temporal overlap of the Spinifex Offshore Wind installation with timings of the Activity. There is also potential for activities to occur sequentially.	Yes – There is potential spatial overlap of underwater sound and light EMBAs associated with The Spinifex Offshore Wind installation and Activity. **Light EMBA** Due to the early phase of development, no modelling has been completed to identify the light EMBA for The Spinifex Offshore Wind installation, however, the Activity predicted the light EMBAs to be up to 20 km, therefore an overlap could occur using a proxy

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
	The licence area is ~285 km^2 in size and expected to be a 1GW+ development in size. It is located ~24 km from the East Coast Project operational area.		available for this installation. Suggested dates are: Surveys – ~2025 – 2028; Turbine Installation – ~2031; Typical operation period of 25 years (DCCEEW 2025i).		20 km EMBA. This proxy light EMBA for the licence area will overlap: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species **Sound EMBA** Due to the early phase of development, there is no publicly available modelling to identify the sound EMBA for The Spinifex Offshore Wind installation. However, proxy modelling from comparative offshore windfarm designs (Norro et al. 2013) of ~20 km marine mammal behavioural threshold overlaps modelling for this EP. The Spinifex licence area overlaps: • foraging BIAs for pygmy blue whale, including annual high use area, • migration BIAs for southern right whale Given the nature and scale of the Activity, and the control measures in place (designed with consideration to relevant species recovery plans), the additive effect of the Activity's vessel-based activities are expected to be negligible.
Commercial Fisheries					
Bass Strait Central Zone Scallop Fishery	Towed dredge fishing method with managed seasonal / area closures and total allowable catch controls.	Active	July to 31 December each year.	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	No – The Activity's operational area overlaps with the fishery management area, however, based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Activity is not expected. Refer to Table 4-4 for further information on commercial fisheries.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
Eastern Tuna and Billfish Fishery	Fishing conducted using pelagic longline, minor line (such as handline, troll, rod and reel) method.	Active	Season goes all year, commencing on 1 January each year.	Yes – potential temporal overlap of fishing vessel activities with timings of the activity. There is also potential for activities to occur sequentially.	No – The Activity's operational area overlaps with the fishery management area, however, based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Activity is not expected. Refer to Table 4-4 for further information on commercial fisheries.
Small Pelagic Fishery	Midwater trawl, purse seine and jigging and mine line methods are permitted for fishing.	Active	12-month fishing season commences 1st May each year	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	No – The Activity's operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Activity is not expected. Refer to Table 4-4 for further information on commercial fisheries.
Southern and Eastern Scalefish and Shark Fishery – Commonwealth Gillnet and Shark Hook Sector	Fishing conducted using demersal gillnet, demersal longline and auto-longline methods.	Active	12-month fishing season commences 1st May each year.	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Activity's operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. **Light EMBA** The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Activity if fishing occurs within the light EMBA. Modelling predicted the light EMBAs to be within 20 km. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** The localised sound EMBA around the fishing vessel may be overlapped by the Activity if fishing occurs within the sound EMBA.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. However, given the spatial area of the fishery the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-4 for further information on commercial fisheries.
Southern and Eastern Scalefish and Shark Fishery – **Commonwealth Scalefish Hook Sector**	Multi-gear fishery.	Active	12-month fishing season commences 1st May each year.	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Activity operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. **Light EMBA** The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Activity if fishing occurs within the light EMBA. Modelling predicted the light EMBAs to occur within 20 km. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** The localised sound EMBA around the fishing vessel may be overlapped by the Activity if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery, the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-4 for further information on commercial fisheries.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
Southern and Eastern Scalefish and Shark Fishery – Commonwealth Trawl Sector	Multi-gear fishery.	Active	12-month fishing season commences 1st May each year.	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Activity's operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. **Light EMBA** The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Activity if fishing occurs within the light EMBA. The light EMBA will occur within 20 km. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** The localised sound EMBA around the fishing vessel may be overlapped by the Activity if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery, the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-4 for further information on commercial fisheries.
Southern Blue Fin Tuna Fishery	Pelagic longline and purse seine fishing gear is used in this fishery.	Active	12-month fishing seasons commences 1st December each year.	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	No – The Activity's operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Activity is not expected Refer to Table 4-4 for further information on commercial fisheries.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
Southern Squid Jig Fishery	Single method of jigging.	Active	12-month fishing seasons commences 1st December each year.	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Activity's operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. **Light EMBA** The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Activity if fishing occurs within the light EMBA. Modelling predicted the light EMBA to occur within 20 km. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** The localised sound EMBA around the fishing vessel may be overlapped by the Activity if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery, the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-4 for further information on commercial fisheries.
Victorian Abalone Fishery	Hand collected by divers.	Active	12-month fishing season commences 1st April each year.	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	No – The Activity's operational area overlaps with the fishery management area, however, based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessel and the Activity is not expected. Refer to Table 4-4 for further information on commercial fisheries in Victorian state waters.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
Victorian Rock Lobster Fishery	Baited pot collection method. Season is split into male and female open seasons.	Active	Female open season: Nov 16-May 31. Male open season: Nov 16 – 16 Sept	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the activity's operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. **Light EMBA** The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Activity if fishing occurs within the light EMBA. Modelling predicted the light EMBA will occur within 20 km. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** The localised sound EMBA around the fishing vessel may be overlapped by the Activity if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery, the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-4 for further information on commercial fisheries in Victorian state waters.
Victorian Giant Crab Fishery	Baited pot collection method with only one entrance and one chamber.	Active	Female open season: Nov 16-May 29 Male open season: Nov 16 – 16 Sept	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to Activity's operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. **Light EMBA**

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
	Season is split into male and female open seasons.			potential for activities to occur sequentially.	The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Activity if fishing occurs within the light EMBA. Modelling predicted the light EMBAs occur within 20 km. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** The localised sound EMBA around the fishing vessel may be overlapped by the Activity if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-4 for further information on commercial fisheries in Victorian state waters.
Victorian Scallop Fishery	Using scallop dredge.	Active	12-month fishing season commencing 1st April.	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	No – The Activity's operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Activity is not expected. Refer to Table 4-4 for further information on commercial fisheries in Victorian state waters.
Victorian Octopus Fishery	Baited pots collection method.	Active	Year-round season	Yes – potential temporal overlap of fishing vessel activities with timings of Activity. There is also	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Activity's operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
				potential for activities to occur sequentially.	**Light EMBA** The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Activity if fishing occurs within the light EMBA. Modelling predicted the light EMBA to occur within 20 km. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** The localised sound EMBA around the fishing vessel may be overlapped by the Activity if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-4 for further information on commercial fisheries in Victorian state waters.
Victorian Sea Urchin Fishery	Hand collection.	Active	12-month fishing season commencing 1st July each year.	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	No – The Activity's operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Activity is not expected. Refer to Table 4-4 for further information on commercial fisheries in Victorian state waters.
Victorian Wrasse Fishery	Hook and line collection.	Active	Year-round season.	Yes – potential temporal overlap of fishing vessel activities	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
				with timings of the Activity. There is also potential for activities to occur sequentially.	Activity's operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. **Light EMBA** The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Activity if fishing occurs within the light EMBA. Modelling predicted the light EMBA to occur within 20 km. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** The localised sound EMBA around the fishing vessel may be overlapped by the Activity if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery refer Figure 4-24 the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-4 for further information on commercial fisheries in Victorian state waters.
Bass Strait Central Zone Scallop Fishery	Towed dredge fishing method with managed seasonal / area closures and total allowable catch controls.	Active	July to 31 December each year.	Yes – potential temporal overlap of fishing vessel activities with timings of the Activity. There is also potential for activities to occur sequentially.	No – The Activity's operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Activity is not expected. Refer to Table 4-4 for further information on commercial fisheries.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
Commercial Shipping					
Numerous shipping channels throughout the Otway Basin	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 main shipping channel for vessels (e.g., cargo tankers) travelling between major Australian and foreign ports is located south of the Otway Development, about 75 km (40 nm) south of Warrnambool.	Active	All year round, about 3-4 vessels per day.	Yes – potential temporal overlap of shipping activities with timings of the Activity. There is also potential for activities to occur sequentially.	Yes – potential overlapping with underwater sound and light emissions. **Light EMBA** The localised (small radius of light glow) expected around shipping vessels may be overlapped by the Activity if shipping comes within the 20 km light EMBA. The Shipping activity throughout the Otway Basin may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. **Sound EMBA** The localised sound EMBA around the shipping vessel may be overlapped by the Activity if shipping comes within the sound EMBA described in this EP. The Shipping activity throughout the Otway Basin may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the shipping areas (Figure 4-28) the overlap from the light and sound EMBAs will be relatively small compared to the available shipping channels throughout the Otway Basin.
Defence					
King Island UXO	The King Island UXO was used during 1954 as an Air-to-Air Firing Range. This	Existing	Ongoing	N/A	No – the Activity's operational area does not intersect any UXO sites.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
	area is classed as slight potential.				
Bass Strait Sea Dumping UXO	The Bass Strait Sea Dumping UXO area was used for the dumping of ordnance and other items in 1998-1999.	Existing	Ongoing	N/A	No – the Activity's operational area does not intersect any UXO sites.
Swan Island Defence Precinct	The Swan Island training area is located in the eastern side of Swan Island, near to Queenscliff in Victoria. It is a join training facility operated by the Australian Secret Intelligence Services.	Existing	Ongoing	Yes – potential temporal overlap of Swan Island Defence Precinct activities with timings of the Activity. There is also potential for activities to occur sequentially.	No – the Activity's operational area does not overlap with the Swan Island Defence Precinct. The large distance between the two areas prevents potential spatial overlap of underwater sound EMBAs.

9.2 Scoping Assessment to Identify Relevant Key Environmental Matters

In accordance with regulation 56 of the OPGGS(E)R (Sections 1.3.1 and Appendix 3), this section of the EP refers to the accepted **ECSP OPP**. The accepted OPP is publicly available on the NOPSEMA website (Cooper Energy 2025).

The OPP includes a cumulative impact assessment (CIA) of the ECSP Activities within Section 11 of the OPP (AEL 2025). Given the activities for the subsea installation Activity are a part of **ECSP OPP**, the scoping assessment to identify relevant key environmental matters presented in Table 11-2 of the accepted **ECSP OPP** is appropriate to support this aspect of the cumulative impact assessment (CIA) for the Activity within this EP therefore considered covered under the CIA detailed in the OPP.

9.3 Detailed Cumulative Impact Assessment

In accordance with regulation 56 of the OPGGS(E)R (Sections 1.3.1 and Appendix 3), this section of the EP refers to the accepted **ECSP OPP**. The accepted OPP is publicly available on the NOPSEMA website (Cooper Energy 2025).

Given that there has been no change to the foreseeable future projects and activities that may overlap with the installation activities since the preparation and acceptance of the **ECSP OPP**, and that the Activity description is concordant with the OPP activity description (refer Table 14-3) Section 11.3 of the **ECSP OPP** the cumulative impact assessment (CIA) covers for the CIA for the subsea installation Activity (this EP).

10.0 Environmental Performance Outcomes, Standards, and Measurement Criteria

This section summarises the EPOs, standards, and measurement criteria that have been developed as part of a systematic approach to the management of environmental risks as identified in Section 6.0.

The EPOs, standards and criteria related to the Activity activities are shown in . Also shown are key responsible and accountable personnel who will ensure the EP is implemented and records of implementation retained.

The following legislative and guideline definitions are used in this section:

- EPOs – a measurable level of performance required for the management of the environmental aspects of the activity to ensure the environmental impacts or risks will be of an acceptable level.
- EPSs – a statement of performance required of an adopted control measure.
- Measurement criteria – defines the measure by which environmental performance will be measured to determine whether the EPO has been met.

A summary of the EPOs are listed in Table 10-1.

The associated control measures, EPSs, measurement criteria are listed in Table 10-2.

Table 10-1: Environmental Performance Outcomes

Reference	Environmental Performance Outcome
EPO1	Manage atmospheric emissions generated by activities defined in this EP in accordance with MARPOL Annex VI (Prevention of Air Pollution from Ships) enacted in the Navigation Act 2012, with no impacts to amenity outside of the operational area.
EPO2	Only approved chemicals (which meet low ecotoxicity pre-screening criteria or are further justified as ALARP) will be discharged to sea within project discharges.
EPO3	The selection of the location for subsea infrastructure and associated planned impacts will: • Avoid areas of high relief outcrops, reefs, and sponge beds, where practicable. • Not disturb underwater heritage as defined under the Underwater Cultural Heritage Act 2018.
EPO4	Planned vessel discharges will meet AMSA Discharge Standards for operating in Australian waters.
EPO5	Undertake Seabed Surveys to inform the selection of the location for subsea infrastructure and associated planned impacts, including potential changes to seabed quality.
EPO6	Seabed disturbance is limited to the planned disturbance areas defined in this EP and within the operational area.
EPO7	Impacts to commercially targeted species will be limited to temporary[3] and localised[3] change in fauna behaviours. [3] Temporary and localised change in fauna behaviours for commercially targeted species limited to activity durations and seabed disturbance footprint defined in Section 6.3.2.
EPO8	Undertake Ongoing Engagement with relevant First Nations groups to ensure identified tangible and intangible cultural heritage and potential risks to cultural heritage values remains current and its protection is provided for within the EP for the Activity.
EPO9	Artificial light generated by the Activity will be managed to ensure biologically important behaviours of light-sensitive species that occur within the Activity light EMBA can continue while project activities are being undertaken, by applying relevant measures from the National

Reference	Environmental Performance Outcome
	Light Pollution Guidelines for Wildlife (DCCEEW, 2023a), whilst meeting lighting requirements for safe navigation and work at night.
EPO10	Manage direct and indirect GHG emissions from the Activity consistent with Australia's international GHG emissions commitments, as outlined in the *Climate Change Act 2022* (Cth). Emissions are to be determined based on the NGER scheme and managed by the Safeguard Mechanism.
EPO11	Impacts to marine fauna from underwater anthropogenic noise emissions will be limited to temporary* behavioural change localised** to the noise source. **Not exceeding the duration of the activity component (i.e. vessel campaign) (described in Section 3.2).* ***Not exceeding the noise EMBA defined for the activity (described in Sections 6.5 and 1.1).*
EPO12	No death or injury[1] to EPBC Act listed threatened, migratory or cetacean species. *[1]Injury to cetaceans as defined as either auditory impairment (TTS) (DAWE 2021) or auditory injury (AUD INJ) i.e. Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (Houser 2021; Finneran 2024). Auditory injury may or may not result in a PTS.*
EPO13	Project related underwater noise within biologically important areas[1] and habitat critical to the survival of relevant species will be managed through the implementation of Amplitude Energy Offshore Victoria Whale Disturbance Risk Management Process, such that: • Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area. • Southern right whales are not prevented from utilising biologically important areas[2] or habitat critical to the survival of a species or cause auditory impairment[1]. • The risk of behavioural disturbance to southern right whales will be limited to temporary behavioural disturbance of individuals. *[1]Biologically important behaviours such as reproduction, feeding, migration and resting (DCCEEW, 2023a).* *[2]Injury to cetaceans as defined as either auditory impairment (TTS) (DAWE 2021) or auditory injury (AUD INJ) i.e. Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (2021; Finneran 2024). Auditory injury may or may not result in a PTS.*
EPO14	For activity specific environment plans undertake review of modelling and impact/risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable.
EPO15	Implement Fisheries Damages Protocol to provide a compensation mechanism to fishers who damage fishing equipment on Activity infrastructure outside of the PSZ.
EPO16	No unplanned release of chemicals or hydrocarbons to the marine environment.
EPO17	No unplanned release of waste to the marine environment.
EPO18	No introduction, establishment or spread of invasive marine species
EPO19	No vessel strike with EPBC Act listed threatened, migratory or cetacean species.
EPO20	No impact to underwater cultural heritage.
EPO21	No unplanned interactions between the project vessels and other marine users.

In addition to EPO8 and EPO20, all the other EPOs define the performance of Amplitude Energy in protecting First Nations Cultural Values and Sensitivities as identified in Section 4.4.4 .

Table 10-2: Environmental Performance Outcomes, Standards and Measurement Criteria

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO16 **EPO21**	CM01: Marine exclusion and caution zones	EPS1.1: Marine exclusion and caution zones will not exceed distances required for safe operations. These zones, where established, will extend only as far as: • A temporary 500 m safety exclusion zone around activity vessel, established via Notice to Mariners.	Notice to Mariners request placed with AHO to notify mariners of project caution/exclusion zones.	Activity Manager
		• A 500 m PSZ gazetted around the wells and other equipment where required for equipment integrity management. Subsea infrastructure will be marked on navigational charts for awareness.	PSZ gazetted does not exceed 500 m.	
EPO16 **EPO21**	CM02: Pre-start notifications	EPS2.1: AHO will be notified of activities where vessels will be in the Operational Area no less than 4 weeks to allow generation of Notice to Mariners (NTM).	Email records confirm notification of the subsea installation activities within 4 weeks of commencement.	Activity Manager
		EPS2.2: AMSA's JRCC will be notified 24–48 hours before operations commence to enable AMSA to distribute an AUSCOAST warning. AMSA JRCC will be notified at the end of activities.	Email records confirm AMSA notification for the subsea installation activities within appropriate timeframe.	Vessel Master
EPO9 **EPO16** **EPO21**	CM03: Marine Assurance Process	EPS3.1: The vessels will meet navigational safety requirements under the *Navigation Act 2012* and associated Marine Orders, including but not limited to: • AMSA MO 21: Safety and emergency arrangements gives effect to SOLAS regulations dealing with life-saving appliances and arrangements, safety of navigation and special measures to enhance maritime safety. • AMSA MO 27 - Safety of Navigation and Radio Equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards. • AMSA MO 30 - Prevention of collisions requires that onboard navigation, radar equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards.	Vessel inspection records demonstrate compliance with the *Navigation Act 2012* and Marine Orders. Vessel Inspection records show vessel certification is in date.	Vessel Master

EPO	Control	EPS	Measurement Criteria	Responsible Person
		• AMSA MO 70 - Seafarer certification meets the requirements for qualifications and training.		
EPO16 **EPO21**		EPS3.2: The vessels will adhere to navigational safety requirements under the *Navigation Act 2012* and associated Marine Orders, including but not limited to: • AMSA Marine Order 31 - SOLAS and non-SOLAS certification requires that vessels undertaking the Activity will have in date certification in accordance with AMSA Marine Order 31 (Vessel surveys and certification). • AMSA MO Part 93: Marine Pollution Prevention – Noxious Liquid Substances – requires that vessels undertaking activities will have emergency plans to address pollution events (including containment and clean up) involving noxious liquids.	Vessel Inspection records demonstrate compliance with the *Navigation Act 2012* and Marine Orders Vessel Inspection records show vessel certification is in date.	
EPO1		EPS3.3: Vessels will comply with Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution (appropriate to vessel class) for emissions from combustion of fuel including: • Hold a valid International Air Pollution Prevention (IAPP) certificate and have a current international energy efficiency certificate. • Have a Ship Energy Efficiency Management Plan (SEEMP) as per MARPOL 73/78 Annex VI. • Engine NOx emission levels will comply with Regulation 13 of MARPOL 73/78 Annex VI. • Sulphur content of diesel/fuel oil complies with Marine Order Part 97 and Regulation 14 of MARPOL 73/78 Annex VI.	Premobilisation checklist (or current OVIS or equivalent) confirms: • Valid IAPP certificate and current international energy efficiency certificate • SEEMP in place (as appropriate to class) • NOx emission levels comply with regulations • Bunker receipts verify use of low sulphur fuel.	
EPO4 **EPO16** **EPO17**		EPS3.4: All discharges will comply with relevant MARPOL 73/78, *Navigation Act 2012*, *Protection of the Sea (Prevention of Pollution) Act 1983* and subsequent Marine Order requirements (as appropriate for vessel classification): • 2017 Guidelines for the Implementation of MARPOL Annex V to assist shipowners, masters and crews in applying the Annex V discharge requirements.	Pre-mobilisation checklist (or current OVIS or equivalent)/ inspection records for vessels (as appropriate for vessel class) confirms: • Current International Oil Pollution Prevention (IOPP) certificate	

EPO	Control	EPS	Measurement Criteria	Responsible Person
		• AMSA MO 91 - Marine Pollution Prevention (Oil) • Bilge water treated via a MARPOL (or equivalent) approved oily water separator and only discharge if oil content less than 15 ppm.	• Oil record book maintained and current with all discharges and transfers • Oily water separator is present.	
		EPS3.5: In accordance with MARPOL Annex I and AMSA MO 91 [Marine Pollution Prevention – oil], a Shipboard Marine Pollution Emergency Plan (SMPEP) or Shipboard Oil Pollution Emergency Plan (SOPEP) (according to class) is required to be developed. To prepare for a spill event, the SMPEP/SOPEP details: • Response equipment available to control a spill event. • Review cycle to ensure that the SMPEP/SOPEP is kept up to date. • Testing requirements, including the frequency and nature of these tests. In the event of a spill, the SMPEP/SOPEP details: • Reporting requirements and a list of authorities to be contacted. • Activities to be undertaken to control the discharge of hydrocarbon. Bunkering / bulk liquids will be transferred in accordance with operational procedure(s) to reduce the risk of an unintentional release to sea during transfer.	Vessel Inspection records confirm approved SOPEP or SMPEP. Records of vessel spill exercises being completed as per schedule.	
		EPS3.6: The vessels will meet AMSA MO 95 - Marine Pollution Prevention (Garbage), MARPOL 73/78 Annex V which requires that a garbage management plan and garbage record book is in place and implemented to manage waste offshore. Requirements include: • Segregating waste on the vessels. • Storing solid wastes in designated areas before sending them to shore for recycling, disposal, or treatment. • Waste receptacles that contain light-weight, solid waste will be covered to prevent waste from blowing overboard. • No discharge of waste or plastic products from general operational or maintenance.	Pre-mobilisation checklist (or current OVIS or equivalent)/ inspection records for vessels (as appropriate for vessel class) confirms: • A Garbage Management Plan is on board marine vessels (as relevant to vessel class and type) that includes for the requirements in EPS3.6. • Current and completed Garbage Record Book outlining waste discharge in accordance with AMSA MO 95 (as relevant to vessel class and type).	

EPO	Control	EPS	Measurement Criteria	Responsible Person
		EPS3.7: Vessels will comply with AMSA MO 96 - Marine Pollution Prevention (Sewage), Requirements for offshore discharge of sewage have been incorporated into the MARPOL 73/78 sewage discharge control measure. Sewage discharged at sea is done so only in accordance with AMSA discharge standards and treated via a MARPOL (or equivalent) approved sewage treatment system as applicable. Food waste only discharged in accordance with AMSA, MARPOL when: • Vessel is en route and >12 nm from land. • Food waste is comminuted or ground to <25 mm and vessel is en route and >3 nm from land. • Food waste is comminuted or ground to <25 mm and platform is >12 nm from land.	Pre-mobilisation checklist (or current OVIS or equivalent)/ inspection records for vessels (as appropriate for vessel class) confirms: • Valid International Sewage Pollution Prevention (ISPP) Certificate demonstrating the vessel has a MARPOL approved sewage treatment plant (as relevant to relevant to vessel class and type). • If there is no MARPOL approved sewage treatment plant, records of sewage treated using an approved comminuted and disinfecting system are maintained in an Official Log Book (or similar) that records discharge locations and volumes in accordance with AMSA MO 95 (as relevant to vessel class and type). • Certification documentation. • Vessel logs confirm location and grinding status / size of discharges.	
EPO17		EPS3.8: Vessel cargo will be loaded, stowed and secured in accordance with AMSA Marine Order 42 (Carriage, Stowage and Securing of Cargoes and Containers).	Vessel inspection records confirm cargo appropriately stored.	
EPO16		EPS3.9: From 1 January 2026 applicable vessels will not use or store firefighting foams containing PFOS, as adopted by the International Maritime Organisation (IMO).	Pre-mobilisation vessel inspection records confirm firefighting foams do not contain PFOS.	
EPO4 **EPO16** **EPO17**		EPS3.10: Equipment used to treat discharges to AMSA standards is installed and operational on the vessels (as relevant to class), or otherwise the respective discharges do not occur.	Pre-mobilisation vessel inspection records confirm compliance with EPS3.10.	

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO7 **EPO21**	CM04: Fisheries Damage Protocol	EPS4.1: A Fisheries Damage Protocol (developed with SETFIA) is in place to provide a compensation mechanism to fishers who damage fishing equipment on Activity infrastructure outside of a PSZ. The protocol was established in collaboration with SETFIA (fisheries peak body). The protocol includes: • An incident report form with prompts for details of fishing activities, sea state, details of any damaged gear, details of repairs required, photos, dates and times. • Commitment for initial response to claimant within 4 working days confirming details. • The mutually agreed process for selecting the Tribunal (an independent assessor), whose decision is final and binding. • Requirement for Tribunal to be formed within 21 days of initial notification to undertake assessment of evidence and determine fault and damages payable.	Consultation records show Fisheries Damage Protocol has been followed for fishers seeking compensation.	Chief Operating Officer
		EPS4.2: In event that the Tribunal determines compensation is payable under the Fisheries Damage Protocol: • Payment will be made within 14 days of that decision. • A deed of release is provided to the claimant where compensation is payable, in the form provided for in the Protocol (schedule 5).	Tribunal determination document outlining reasons for the determination. Records showing provision of deed of release. Record of payment.	
EPO15 **EPO16** **EPO21**	CM05: Ongoing consultation	EPS5.1: Further engagement will take place during the development and implementation of component EPs. This will include: • Details relating to notification of third-party stakeholders. • Engagement with other titleholders in the Otway with respect to each other's ongoing activities and potential cumulative impacts. • Relevant information received will be included within the EPs as appropriate.	Notification records demonstrate stakeholders are notified during development and implementation of this EP as per the Installation EP stakeholder notifications register. Communication records with other Otway operators. Notification records follow the requirements of Section 12.12.	Activity Manager

EPO	Control	EPS	Measurement Criteria	Responsible Person
		EPS5.2: Notification of activity commencement and completion to relevant stakeholders as per notifications register.	Consultation records demonstrate that relevant stakeholders have been notified prior to commencement and following completion of the activity as per the Installation EP stakeholder notifications register.	
		EPS5.3: Any complaints received by Amplitude Energy from other marine users in relation to air quality will be investigated and outcomes shared with the person who made the complaint.	Incident records available for any air quality events. Consultation records with complainant include sharing of investigation outcomes and actions undertaken.	
		EPS5.4: Notifications for any on-water activities and ongoing consultations undertaken per Section 12.12.	Notification records follow the requirements of Section 12.12.	
		EPS5.5: Observation, incidents, and opportunities for improvement regarding the interaction with other marine users will be reported to other petroleum titleholders.	Notification records. Consultation records.	
EPO9	CM06: Light Management Measures	EPS6.1: Vessel lighting will be limited to the minimum required with the exception of emergency events for navigational and safety requirements. The vessels will implement light management measures developed with consideration to the National Light Pollution Guidelines for Wildlife, these include, but are not limited to: • Outward facing lights will be reduced to minimum levels required for a safe work environment. • Directions to minimise the use of non-essential lights (e.g. close blinds, turn off lights when leaving a room) will be included in vessel inductions. • Recording and reporting of any seabirds found on the vessels in need of care. • Procedures to manage and care for any seabirds found on board requiring care, including remote advice from Zoos Victoria Marine Response Unit (MRU) or equivalent.	Induction pack for vessels includes light management measures and seabird reporting process. Seabird management procedure in place which includes care and response strategies. Daily vessel logs report seabirds found on vessels. MRU or equivalent advice documented in event stranded seabird requires care.	Vessel Master

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO1 **EPO10**	CM07: Planned Maintenance System	EPS7.1: Planned maintenance will be implemented throughout the activity. This ensures that critical equipment on vessels will be maintained in manufacturer's instructions and ongoing maintenance to ensure efficient operation including: • Combustion Equipment (Vessels).	Vessel PMS records confirm compliance with PMS for Combustion Equipment.	Vessel Master
EPO4		EPS7.2: Planned maintenance will be implemented throughout the activity. This ensures that critical equipment on vessels will be maintained in manufacturer's instructions and ongoing maintenance to ensure efficient operation including: • Equipment involved in discharge management.	HSE inspection records and daily logs show ongoing planned maintenance in compliance with PMS.	
EPO11 **EPO12** **EPO13**		EPS7.3: Equipment and propulsion systems generating impulsive or continuous sound emissions will be operated in accordance with manufacturer's instructions and ongoing maintenance in accordance with vessel planned maintenance system, to ensure efficient operation.	HSE inspection records and daily logs show ongoing planned maintenance in compliance with PMS.	
EPO2	CM08: Amplitude Energy Offshore Chemical Assessment Procedure	EPS8.1: The Amplitude Energy Offshore Chemical Assessment Procedure will be used to ensure that project chemicals with the potential to be discharged to sea are not of unacceptable risk. This will be done by: • preferentially selecting products that are on the current OSPAR PLONOR list, and/or • are rated Gold/Silver/E or D under the UK OCNS, and do not have a substitution warning, or, • have a completed a hazard assessment confirming they are not of unacceptable risk (toxic, very bioaccumulative (and bioavailable), and highly persistent) and are justified by technical need and analysis of alternatives.	Amplitude Energy Offshore Chemical Assessment Procedure. Completed and approved chemical assessment. Operational reports show discharge of only approved chemicals.	Activity Manager
		EPS8.2: An accepted chemical list will be issued to the offshore project team detailing which products may be discharged and in what circumstances.	Completed and approved chemical assessment and distribution records.	Activity Manager
N/A	CM09: Titleholder Collaboration	EPS9.1: Amplitude Energy will share sightings data with other Titleholders in the Otway region and local research organisations to help inform each other's programs of work and respective risk reviews.	Records which demonstrate Amplitude Energy involvement in industry collaboration efforts.	Activity Manager

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO6	CM10: Offshore Operational Procedures	EPS10.1: Retrieval of installation support equipment, including transponders, from the sea floor prior to or at the completion of the activities.	Operations reports confirm retrieval of all installation support equipment and transponders	Vessel Master
EPO11 **EPO13** **EPO19**		EPS10.2: Vessel operators shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8) and Victorian (Marine Mammals) Regulations within respective jurisdictions, as a minimum, and shall report vessel interactions with dolphins and whales. Caution zones will be extended to 500m around all whales. Helicopters will not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on. Marine mammal sightings will be recorded and submitted to DCCEEW. Sightings will be reported within three months of the end of the activity.	Daily operations report details when whales and dolphins sighted, and the interaction management actions that were implemented, if required. Notification records reporting vessel interactions to reporting body (currently DCCEEW / DEECA at the time of writing). Helicopter flight records demonstrate restrictions adhered to. Records of whale sightings reports being made to DCCEEW within 3 months of campaign end.	Vessel Master
EPO11 **EPO12** **EPO13** **EPO14**	CM11: Campaign Risk Review	EPS11.1: A Campaign Risk Review, as detailed in Figure 12-6 will be undertaken in the 6-months prior to a campaign activity commencing, to: • Model noise emissions for any additional activity scenarios not already provided for in this EP. • Integrate into modelling the latest relevant sound exposure thresholds to review previously discounted control measures against updated guidance and newly accepted EPs to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. Focus on aspect: subsea noise, and risks to endangered whale species, specifically pygmy blue whales, and southern right whales. A risk review may also be triggered during the offshore campaign where DP nighttime triggers have been exceeded, if ≥ 3 sightings of blue whales or >3 sightings of southern right whales are recorded within the observation zone for 3 consecutive days, or if concerns are raised by a member of the project or community.	Pre-campaign Risk Review report dated 6-months prior to campaign and considers each of the points in EPS11.1. Log maintained of when risk review triggers were met, and review recommendations by the panel.	Activity Manager

EPO	Control	EPS	Measurement Criteria	Responsible Person
		Risk Reviews during the campaign will be informed by a panel including MFO's experienced in the region, Activity Manager (or delegate), Vessel master (or delegate) and Amplitude Energy HSEC Representative. Recommendations will be managed in accordance with the Amplitude Energy MOC process.		
EPO14		EPS11.2: The Amplitude Energy Environmental Protocol describes how environmental impact and risk management, including risk assessments, is undertaken for activities including offshore campaigns. As part of pre-campaign planning a risk review (refer Figure 12-5) will be undertaken to re-assess campaign environmental impacts and risks to ensure acceptability criteria are met and that impacts and risks are reduced to ALARP.	Pre-campaign Risk Review addresses the requirements of EPS11.2**.**	
EPO9		EPS11.3: Review analogue light modelling scenarios to ensure that the scenarios and thresholds remain appropriate for the activity.	Pre-campaign Risk Review report dated 6-months prior to campaign and confirms the analogues used for light modelling remain appropriate.	
EPO16		EPS11.4: Review the LoC modelling scenarios to ensure that the modelled scenarios and thresholds are appropriate for the activity.	Pre-campaign Risk Review report dated 6-months prior to campaign and confirms scenarios used for LoC modelling remain appropriate.	
EPO14		EPS11.5: Each future EP resulting from the **East Coast Project OPP** will undertake a review for additional or significantly revised reasonably foreseeable projects. Additional or significantly revised projects will be assessed as per CIA methodology (Section 8.1). Any cumulative impacts from new, significantly revised or currently unknown activities that results in an unacceptable level of impact to receptors, will be subject to new or revised control measures within the appropriate EP to reduce cumulative impacts to ALARP.	This EP includes an assessment addressing EPS11.5.	
EPO3 **EPO5** **EPO6**	CM12: Seabed Survey	EPS12.1: Seabed surveys (geophysical, geotechnical, visual and contaminant sampling) will be undertaken for the purposes of collecting information to manage risks to the Shelf rocky reefs and hard substrates KEF values (high relief outcrops, reefs and sponge beds), sediment quality, underwater heritage, debris and hazards on the seafloor.	Seabed survey undertaken prior to pre-lay of infrastructure and commencement of installation.	

EPO	Control	EPS	Measurement Criteria	Responsible Person
		Seabed surveys will be undertaken prior to finalising location of flowline and umbilical paths, and subsea infrastructure locations. Relevant survey seabed findings (benthic environment, heritage, hazards) will be included in future EPs if available at the time of preparing EP. In the event unpredicted contaminants are detected Cooper Energy will undertake a human health and environmental risk assessment to ensure ALs and EPOs are met.	Results of seabed survey incorporated into determining final installation location, and layout to avoid sensitive features. If unpredicted contaminants are detected a human health and environmental risk assessment is completed.	
EPO7 **EPO11** **EPO12** **EPO13** **EPO19**	CM13: Offshore Victoria Whale Disturbance Risk Management Procedure	EPS13.1: Active DP thruster management: • Vessel DP thrusters will not be operated with loading outside of DP system Activity Specific Operation Guideline (ASOG) (DP ASOG will require loading not to exceed 70% except as necessary to avoid an emergency).	Vessel DP ASOGs. MMO daily report shows DP thrusters did not exceed ASOG loading.	Vessel Master
		EPS13.2: Marine Mammal Monitoring: • 30-minute pre-start whale observation will be required within the DP observation zone for the activity, before DP operations commence, or nighttime criteria is met for DP operations at night. To be completed by the Dedicated MMO. • Ongoing monitoring for marine mammals throughout daylight hours across the monitoring network, with at least one dedicated MMO available offshore at all times whilst DP operations are happening.	Daily reports confirm MMO present offshore during DP. MMO reports confirm 30-minute MMO pre-watch completed / nighttime criteria met prior to DP operations. MMO reports confirm monitoring during daytime.	Activity Manager Vessel Master
		EPS13.3: DP Observation Zones The DP Observation Zones for the Activity are determined by specialist subsea noise modelling service provider and include: • 7.74 km during SBP operations during geophysical activities. • 7.87 km during installation of flowlines and umbilicals at nearshore locations (Annie-2, Juliet, and Nestor). • 21.7 km during installation of flowlines and umbilicals at offshore locations (Isabella (Elanora-1/ST1)). • 2.4 km during USBL use during geotechnical surveys and positioning activities.	MMO daily reports include correct DP observation zones for vessels.	Activity Manager

EPO	Control	EPS	Measurement Criteria	Responsible Person
		• 750 m during pre-lay activities.		
		EPS13.4: Marine Mammal Observation Network The observer network for the Activity will comprise: • Dedicated MMO on support vessels, with two MMOs if daylight exceeds 12-hours (sunrise-sunset) to provide continuous observation in daylight hours. There will be at least one MMO within the DP Observation Zone at all times when DP Ops are happening. • Officers of the Watch on support vessels observing as per normal vessel shift patterns and duties; the officer of the watch will provide coverage for the dedicated MMO during normal work breaks. If there is only one dedicated MMO offshore and that MMO is unable to complete their duties, then a second MMO will be mobilised to the DP Observation Zone before DP operations commence. • Helicopter crew (personnel transfers from shore to installation vessel) observing opportunistically during over-sea transit. • Observations from other operators working in the region where the information is shared. • Observations from publicly available Citizen Science.	Daily reports and MMO reports confirm the make-up of the observer network meet EPS13.4. During the activity, weekly summary of publicly available Citizen Science and other Operators (if available) working in the region, shared with MMOs.	Activity Manager
		EPS13.5: Observation uncertainty: Species confirmation criteria will be developed for blue whale and southern right whale ID, by an experienced MMO (5+ years' experience) and will be provided to the Activity Dedicated MMOs. For crew observers, dedicated MMOs will advise on species where there is uncertainty.	MMO support materials include blue whale and southern right whale confirmation criteria.	Activity Manager
		EPS13.6: DP Suspension Actions: • Suspension of DP operations (if safe to do so) where a blue or southern right whale is observed within the relevant activity DP Observation Zone. • Suspension of DP operations (if safe to do so) before any whale is observed within the Activity DP TTS zone continuously for 20 hours.	MMO reports detail: • If / when DP was suspended (due to whale presence). • If a favourable heading was adopted. • If a prestart observation was undertaken.	Vessel Master

EPO	Control	EPS	Measurement Criteria	Responsible Person
		– Note 1 If a whale is observed within 30 minutes of sunrise in the TTS zone it should be assumed that the whale was present throughout the preceding night period unless there is clear evidence to the contrary. – Note 2 - If during DP operations any whale is observed within the Activity DP TTS zone prior to sunset, it should be assumed that the whale could remain within the DP TTS zone until sunrise unless there is clear evidence to the contrary, and the 20-hour time frame considers the inability to observe whale movement overnight. – *These situations are hypothetical and the measure is highly precautionary given the conservatism applied to the modelling of accumulated sound exposure levels which assumes no movement of the whale.* • Adopt favourable heading to reduce thruster load (and associated noise) and slowly increase separation from whale if safe to do so. • Apply 60-minute pre-start observation prior to recommencing activities, from the time the BW or SRW was last observed in the activity DP observation zone. • Night-time criteria: DP operations are to be avoided (if safe to do) so when: 3 or more sightings of blue or southern right whales occurred in the DP Observation Zone within 3-hours prior to sunset, or a blue or southern right whales are observed within the 30 minutes prior to sunset inside the observation zone and have not been observed leaving the zone. ***Whether it is safe to take action is determined by the person in command of the vessel (i.e. vessel master or their delegate). MMO reports will detail the reasons for any delay of DP suspension actions (in event required) for safe operation purposes, as instructed by the vessel master or their delegate.*	• If night-time criteria were followed. • Instructions from the vessel master (or delegate) in relation to EPS13.6.	
		EPS13.7: Daily Reporting: A daily MMO report will be issued, consolidating all sightings and actions from across the monitoring network.	Daily MMO reports include sightings and actions from across the monitoring network.	Activity Manager
		EPS13.8: MMO Capacity and Competency: • Dedicated Lead MMO minimum experience / competency is multiple offshore campaigns as a marine mammal observer with experience	MMO program induction pack includes the information outlined in EPS17.8.	Activity Manager

EPO	Control	EPS	Measurement Criteria	Responsible Person
		observing blue whale and southern right whale within BIAs (or international equivalent). • At times of year when daylight hours exceed 12-hours, there will be a second dedicated MMO (minimum experience / competency is: at least one offshore campaign as a marine mammal observer, and familiar with the ID features for blue whales and southern right whales. • Dedicated MMOs shall have demonstrated prior experience in the ID of large baleen whales, distance estimation and systems of recording and reporting, and understand the Australian regulatory requirements. • MMOs shall be hired from service providers with expertise in marine mammal observing. • MMO experience and competency will be reviewed and confirmed by the MMO service provider and checked by Amplitude Energy prior to their mobilisation to monitor a DP Observation Zone. • Vessel Officers of the Watch: the dedicated MMO(s) will be supported by trained bridge crew. Bridge crews will be inducted into Activity requirements and whale ID and will have a high base level of observation experience and competency noting watchkeeping duties are a core competency, and marine mammal observation for collision avoidance and to minimise behavioural disturbance to endangered blue and southern right whales, is applicable to all offshore marine users. • Helicopter Crew: Helicopter crew will complete MMO Program Induction. • MMO Program Inductions - Dedicated MMOs, Vessel Officers of the Watch, and helicopter crews shall receive an induction including: – overview of the Activity – description of species that are the focus for the program and why – marine mammal monitoring and action requirements – ID criteria for endangered whales – reporting requirements.	MMO program induction records for Helicopter Crew and Vessel Officers of the Watch. Pre-mobilisation checks of competency for DMMO's confirm they meet EPS13.8. Daily MMO report confirms at least minimum numbers of MMO's on vessels in line with EPS13.8.	

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO12 **EPO13**		EPS13.9: The Whale Disturbance Risk Management Procedure will be implemented, assisting the implementation of CM10. Applicable Provisions within the procedure include: • Establishment of a communications protocol between observers, vessel master and project team. • Dedicated MMO for the hours of daylight (defined as sunset to sunrise). A 2nd MMO where necessary if daylight extends beyond 12-hr period. • Dedicated MMOs shall have demonstrated prior experience in the ID of large baleen whales, distance estimation and systems of recording and reporting. • Inducted crew observers to support dedicated MMO during rest breaks. • Reporting of any injured marine mammal to relevant response and regulatory agencies.	Activity specific behavioural disturbance distances from noise modelling report included in campaign specific procedure. Daily report confirms crew observers. MMO reports confirm presence of MMO/s. MMO training records demonstrate prior experience. Notification records are available for injured marine mammals.	Chief Operating Officer
EPO13	CM14: Other Detection Technologies	EPS14.1: Amplitude Energy will continue to seek other technologies for whale detection through discussions with specialist service providers, other titleholders, and/or participation in the AEP Marine Noise Working Group. Technologies that are identified will be assessed with the campaign risk review panel. Evaluation criterion will include technology readiness, the level of risk reduction (specific to the risk event) afforded by the technology, Activity integration feasibility and costs. Where detection technologies are used, they will be in addition to the MMO program and technology effectiveness will be shared with other operators in the region.	Records of engagement with other Titleholders, service providers and/or AEP Marine Noise working group. Completed risk review evaluates other detection technology.	Manager Environment and Sustainability
EPO4 **EPO17**	CM15: Waste Management Practices	EPS15.1: Vessels implement a garbage management plan. • The waste hierarchy is applied to project wastes. • Waste with potential to be windblown is contained and restrained. • Waste lost overboard is recorded and recovered if possible. • Waste transfers are recorded.	Garbage management plan includes garbage categories, storage and containment. Waste transfer records detail all waste transfers.	Vessel Master / OIM

EPO	Control	EPS	Measurement Criteria	Responsible Person
			Daily reports include incidents of waste overboard and details of recovery / attempts.	
EPO18	CM16: Amplitude Energy IMS Risk Management Protocol	EPS16.1: - Vessels will comply with the Australian biofouling management requirements and Australian ballast water management requirements. Vessels' biofouling and ballast management histories are used to complete an IMS Risk assessment prior to the vessel arriving within the operational area. Subsequent risk management actions are completed in accordance with the Vessel Biofouling and Ballast Water Management Plans for Low-risk Vessels, or otherwise in accordance with recommendations of a qualified IMS inspector.	Completed IMS Risk Assessments for vessels and equipment that may be deployed into the marine environment showing 'low risk'. Vessel Biosecurity Import Records.	Chief Operating Officer
EPO4 **EPO16**	CM17: Activity Fire Fighting Foam Screening and Quarantine Standard	EPS17.1: From 01 July 2025, firefighting foams for well construction activities (i.e. response standby Aqueous Film Forming Foam (AFFF) for the well test package) will not contain PFOS, PFOA, PFHxS and related substances in compliance with IChEMS (Schedule 7). Firefighting foam SDS will be screened for these substances; any firefighting foams that do not comply with this requirement as of 01 July 2025 will not be used or stored offshore, or, if any legacy products are found offshore, they will be quarantined.	Review records and SDS for activity firefighting foams. Evidence of activity firefighting foams being quarantined where they do not meet the requirements.	Activity Manager
EPO16	CM18: NOPSEMA Accepted Safety Cases	EPS18.1: Activities will be managed in accordance with the accepted safety case revisions.	Accepted Safety Cases in place. Implementation records confirm safety case control measures have been implemented.	Activity Manager
EPO16	CM19: Oil Pollution Emergency Plan (OPEP)	EPS19.1: Emergency spill response capability is maintained in accordance with the OPEP. Emergency response activities will be implemented in accordance with the OPEP.	Pre-campaign readiness records confirm spill response capability is maintained as per the OPEP requirements. Records confirm that emergency response activities have been implemented in accordance with the OPEP.	Chief Corporate Services Officer

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO16	CM20: Operational and Scientific Monitoring Plan (OSMP)	EPS20.1: Operational and scientific monitoring will be implemented in accordance with the OSMP.	OSMP is in place. Records confirm that operational and scientific monitoring have been implemented in accordance with the OSMP.	Chief Corporate Services Officer
EPO6 **EPO17**	CM21: Retrieval of dropped objects were practicable	EPS21.1: If practicable to do so, objects accidentally dropped to the seabed will be retrieved.	Dropped object recorded as an incident, and location of dropped object recorded if practicable. Daily reports demonstrate retrieval of dropped object.	Vessel Master OIM
EPO20	CM22: Engagement During Emergency Response	EPS22.1: Engagement with relevant First Nations Representatives in the event of a loss of containment of hydrocarbons which may extend to coastlines to obtain advice on the management of cultural sensitivities which may be in the spill trajectory.	Engagement Records show engagement with First Nations representatives.	Chief Corporate Services Officer
	CM23: Underwater Cultural Heritage Disturbance Risk Management Measures	EPS23.1: Amplitude Energy will ensure the activity is compliant with the *Underwater Cultural Heritage Act 2018* (Underwater Heritage Act) by: • Seabed survey data will be reviewed prior to subsea installation activities and used to inform equipment laydown locations to avoid impacts to underwater cultural heritage. • Review of relevant seabed survey data will be conducted by a suitably qualified and experienced cultural heritage team. The team will include a marine archaeologist, have familiarity with First Nations cultural landscapes and experience in identifying landscape features from geophysical data. • If cultural heritage is identified, it will be mapped, along with suitable exclusion zone and its location integrated into Activity inductions and procedures to ensure it is avoided during Activity. • UCH Review Report will be provided to relevant RAP.	Pre-campaign risk review communications confirm equipment laydown areas to avoid any UCH identified within Geophysical survey reports. UCH Review Report interprets geophysical data and maps findings with exclusion zones. Activity inductions and procedures include identified UCH and controls. Email / meeting records show distribution of UCH review report. Notification and Reporting Records demonstrate new UCH reported to DCCEEW (or delegate) within 21 days of discovery.	Activity Manager

EPO	Control	EPS	Measurement Criteria	Responsible Person
		• Implementing a process for reporting and managing unexpected finds during the activity, including reporting of any new suspected underwater cultural heritage to DCCEEW (or delegate) within 21 days of discovery.		

11.0 Consultation

11.1 Summary

Amplitude Energy is committed to engaging with relevant persons (as that term is defined in regulation 25 of the OPGGS(E)R) in a transparent, genuine and meaningful way, through our consultation process. We recognise that our consultation process must be robust and systematic, so that it is consistently and demonstrably compliant with the applicable regulatory requirements. Amplitude Energy consulted with relevant persons in the course of preparing this EP in accordance with our consultation process, and applicable regulations and guidelines. Amplitude Energy's consultation process sought to acknowledge that any consultation process must also have a degree of adaptability, as it is a "real world" activity in a dynamic environment, that will vary depending on the nature of the authority, persons or organisations to be consulted. This is because the purpose of consultation is to inform Amplitude Energy's understanding of the environment, including the social, cultural and heritage values of features that may be impacted by our EP activities.

This section sets out how Amplitude Energy has carried out consultation for the ECSP: Installation EP, in accordance with the OPGGS(E)R, and having regard to the published guidance materials from NOPSEMA. Amplitude Energy commenced consultation from as early as December 2024, with select stakeholders, including those that had communicated a specific need for early engagement on such projects. The broader consultation process, with the majority of stakeholders, commenced mid-May 2025 and ran until prior to the submission date of this EP. The design of our consultation process ensured that relevant persons were identified and provided sufficient information and a reasonable time period to make an informed assessment of the potential impacts of our EP activities. Given the broad range and geographical spread of relevant persons, a variety of engagement methods were used to ensure they were provided with sufficient information, and opportunities to obtain further information. These engagement methods included phone calls, emails, SMS messages, social media advertisements, newspaper advertisements, radio advertisements, a dedicated consultation website, audio-video presentations, community information sessions (online and in-person), tailored meetings and tailored information sheets.

Overall, there were limited enquiries, claims or objections raised in the consultation process by relevant persons. For the limited concerns raised, Amplitude Energy carefully assessed the merits of the claims or objections on a case-by-case basis, and (where appropriate) adopted new or changed control measures to reduce the relevant risks or impacts to an acceptable level and ALARP, and consistent with the principles of ecologically sustainable development. This is described further in Sections 6.0 and 1.0.

Where Amplitude Energy has received input from Relevant Persons in consultations undertaken in the course of preparing other environment plans, it has considered and applied that input in the course of preparing this EP and included where appropriate.

Consultation in the course of preparing this EP has been completed in accordance with the regulatory and legal requirements for such consultation. This EP demonstrates that Amplitude Energy's consultation process has met or exceeded the requirements of the OPGGS(E)R. Should Amplitude Energy receive any further concerns or feedback regarding this EP after the EP has been accepted by NOPSEMA, these will be managed as described in Section 12.12.

11.2 Regulatory Compliance – Summary of Requirement

Regulatory compliance has been achieved, and this EP demonstrates that:

- Per **regulation 25(1) of the OPGGS(E)R**, identification of, and consultation with, relevant persons has occurred (see Section 11.3).
- Per **regulation 25(2) of the OPGGS(E)R**, sufficient information has been provided to relevant persons to enable them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities (see Section 11.3.2).
- Per **regulation 25(3) of the OPGGS(E)R**, a reasonable period for consultation has been provided to each relevant person to consider the information, make their assessment and provide feedback if they wish to do so (see Section 11.3.3).
- Per **regulation 25(4) of the OPGGS(E)R**, relevant persons have been advised that they may request that particular information provided during consultation not be published, and ensuring that such information is not published (see Section 11.3.4).
- Based on the information and feedback acquired through the consultation process, appropriate measures have been adopted to reduce the impacts and risks associated with the activity (See Appendix 7).

This EP sets out the following information pursuant to regulation 24(b) OPGGS(E)R (see Appendix 7 and the Sensitive Information file):

- A summary of each response made by a relevant person.
- Our assessment of the merits of any objection or claim about the adverse impacts of any activity to which the EP relates.
- Our response, or proposed response, to each objection or claim.
- Any measures adopted as a result of consultation.
- Copies of the full text of any responses given by a relevant person.

Amplitude Energy continuously reviews and improves its policies and procedures, to reflect changes in law, regulator guidelines, judicial decisions and industry standards. Additionally, following the appeal decision of *Santos NA Barossa Pty Ltd v Tipakalippa* [2022] FCAFC 193, Amplitude Energy has conducted an extensive review of its methodology for identifying and consulting with relevant persons, for the purposes of preparing this EP.

The following NOPSEMA guidelines were also considered in planning and delivering our consultation process:

- GL2086 – Consultation in the course of preparing an environment plan – May 2024.
- GN1344 – Environment plan content requirements – July 2025.
- GN1488 – Oil pollution risk management- July 2021.
- GN1785 – Petroleum activities and Australian Marine Parks – January 2024.
- GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2024.

Table 11-1: OPGGS(E) Regulation Consultation Requirements

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
34 Criteria for acceptance of environment plan. ***Regulation 34 provides that the criteria for acceptance of an environment plan are that the plan demonstrates that:*** • ***(g)(i) the titleholder has carried out the consultations required by section 25; and*** • ***(g)(ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate.***	Regulation 25 establishes a duty on titleholders to carry out consultation in the course of preparing an environment plan. In order to accept an environment plan under regulation 33, NOPSEMA must be reasonably satisfied (as per regulation 34) that the environment plan demonstrates the duty (to carry out consultation with relevant persons required by regulation 25) has been discharged and that the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate. Consultation should be a genuine and meaningful two-way dialogue in which relevant persons are given sufficient information and time to allow them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities. The consultation process used for different activities may vary depending on a range of factors, certain key principles should be evident in the environment plan.	This EP demonstrates that these requirements were met: The below summary rows setting out how the consultations required by regulation 25 were carried out; and Adopting measures as a result of consultation: Report on Consultation in Appendix 7.
25(1) Consultation with relevant authorities, persons and organisations etc. ***In the course of preparing an environment plan (including a revised environment plan referred to in Division 5) a titleholder must consult each of the following (a relevant person):*** • ***Each Commonwealth, State or Northern Territory agency or authority to which the activities to be carried out under the environment plan may be relevant.*** • ***If the plan relates to activities in the offshore area of a State—the Department of the responsible State Minister.***	Titleholders are required to identify and consult with each authority, person or organisation who falls within the categories of relevant persons set out in regulation 25. Titleholders must clearly identify in their environment plan who is a relevant person and the rationale the titleholder has used to determine who they consider falls within that definition. Environment plans should set out the processes that have been applied to identifying and determining who are relevant persons, as well as the process undertaken for consultation. Authorities, persons and organisations are to be identified on a case-by-case basis. Factors such as the nature of the activity, the environment in which the activity is being undertaken and the possible impacts and risks of the activity should be taken into account when determining whether the activity may be relevant to authorities, or determining who has functions, interests or activities that may be affected. Regulation 25, like most statutory consultation provisions, imposes an obligation that must be capable of practicable and reasonable discharge by the titleholder. It also involves 'some decisional choice' that the titleholder must make in identifying relevant persons and in how the consultation is undertaken. Processes for the identification of relevant persons must provide for sufficiently broad capture of ascertainable persons and organisations who may have their functions, interests or activities affected or that may be affected by the activity.	This EP sets out how Amplitude Energy satisfied the requirements of this regulation in Section 11.3.1 This section, in conjunction with Appendix 7, identifies each relevant person identified for the purpose of this EP and the methodology adopted to identify such relevant persons.

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
• ***If the plan relates to activities in the Principal Northern Territory offshore area—the Department of the responsible Northern Territory Minister.*** • ***A person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan.*** • ***Any other person or organisation that the titleholder considers relevant.***	Publication in appropriate media forms may be a reasonable tool to assist in the identification of relevant persons and inform the delivery of more targeted notices to potentially relevant persons. It is recognised that in any community consultation there will inevitably be persons within a group who could not participate for various reasons, however the absence of their participation would not invalidate the process provided reasonable efforts were made to identify the relevant persons and to consult with them. The process should include reference to multiple sources of information, such as publicly available materials, review of databases and registers, published guidance, previous history, as well as advice from authorities and other relevant persons. In some cases, relevant persons have developed guidance detailing their functions, interests or activities and how and when they wish to be consulted on activities. Titleholders should take this guidance into account in developing consultation processes with relevant persons. Titleholders may also consider how they can create awareness of their activities to encourage potentially relevant persons to make themselves known to the titleholder.	
25(2) Consultation with relevant authorities, persons and organisations etc. ***For the purpose of the consultation, the titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person.***	Information provided must be sufficient to allow an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person. Again, the titleholder has a "decisional choice" to make in how information will be given to allow the "relevant person" to make the assessment contemplated by regulation 25(2). Titleholders should consider the functions, interests or activities of relevant persons and the impacts and risks that affect them when determining information requirements. The environment plan must demonstrate that the duty (to carry out consultation with relevant persons) has been discharged and that the consultation provided sufficient information about the environment and impacts on the environment. The level of information necessary is likely to vary for different relevant persons and may depend on the degree to which a relevant person is affected. Different consultation processes may be required for relevant persons and organisations depending on information requirements. What constitutes sufficient information as part of a consultation processes may differ depending on the relevant person(s) and the environment plan should demonstrate that the process was suited to the type of relevant person. Generic, targeted electronic mailouts or links to a webpage may not be sufficient.	Section 11.3.2 sets out the methodology adopted to preparing and presenting sufficient information to relevant persons, along with the different types of information prepared for relevant persons.

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
	Information should be in a form that is readily accessible and appropriate for the relevant person being consulted. Materials provided may include written forms, pictorial or other graphics, verbal briefings or presentations, and the use of other technologies. Information may well need to be provided in an iterative manner, as finer detail and precision is developed through the consultation process. Titleholders are encouraged to discuss expectations around the type and level of detail of information required with relevant persons early when commencing consultation.	
25(3) Consultation with relevant authorities, persons and organisations etc. ***The titleholder must allow a relevant person a reasonable period for the consultation.***	Titleholders must provide a "reasonable period" for the relevant person to make an informed assessment of the possible consequences of the proposed activity on their functions, interests or activities and so they are able to respond with any concerns. The nature, scale and complexity of an activity, as well as the extent and severity of potential impacts and risks on a relevant person's functions, interests or activities may inform what makes a reasonable period for consultation. Relevant persons may have also provided the titleholder with their views of what constitutes reasonable timeframes, their availability and or accessibility issues that should be taken into account. Therefore, what is a reasonable period for consultation should be considered on a case-by-case basis.	Section 11.3.3 sets out Amplitude Energy's approach to ensuring that relevant persons were provided with reasonable periods for consultation.
25(4) Consultation with relevant authorities, persons and organisations etc. ***The titleholder must tell each relevant person the titleholder consults that:*** ***(a) the relevant person may request that particular information the relevant person provides in the consultation not be published; and*** ***(b) information subject to such a request is not to be published under this Part.***	-	See Section 11.3, Appendix 7 and the Sensitive Information file.
24 Other information in environment plan.	The consultation process should be documented within the environment plan through the titleholder report on consultation and the sensitive information report.	See Appendix 7 for the Report on Consultation.

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
The environment plan must contain the following: • ***A statement of the titleholder's corporate environmental policy.*** • ***A report on all consultations under section 25 of any relevant person by the titleholder, that contains:*** – ***A summary of each response made by a relevant person.*** – ***An assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates.*** – ***A statement of the titleholder's response, or proposed response, if any, to each objection or claim.*** – ***A copy of the full text of any response by a relevant person.*** – ***Details of all reportable incidents in relation to the proposed activity.***	Under regulation 24(b) of the Environment Regulations, the environment plan must contain a report on the consultation which provides: i. a summary of each response made by a relevant person ii. an assessment of the merits of any objection or claim about adverse impact of each activity to which the environment plan relates iii. a statement of the titleholder's response, or proposed response, if any, to each objection or claim iv. a copy of the full text of any response by a relevant person. NOPSEMA expects the environment plan to also provide descriptions of the consultation processes, and the rationale used to determine who and how to consult with relevant persons, including the approach to provision of sufficient information and how a reasonable period for the consultation was determined. This will assist to provide a basis for NOPSEMA to form a reasonable satisfaction view that the titleholder has carried out the consultations required by regulation 25. The consultation process should also assist the titleholder to meet its obligation under section 280 or 460 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 which requires that it must carry out the petroleum or greenhouse gas activity respectively in a manner that does not interfere with navigation, fishing, conservation of resources of the sea and seabed, other offshore electricity infrastructure and petroleum activities, and the enjoyment of native title rights and interests (within the meaning of the Native Title Act 1993) to a greater extent than is necessary for the reasonable exercise of the titleholder's rights and obligations. Titleholders should ensure that a summary containing the main matters raised in each response made by a relevant person is included in the consultation report. Assist the titleholder to meet its obligation under section 280 or 460 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 which requires that it must carry out the petroleum or greenhouse gas activity respectively in a manner that does not interfere with navigation, fishing, conservation of resources of the sea and seabed, other offshore electricity infrastructure and petroleum activities, and the enjoyment of native title rights and interests (within the meaning of the Native Title Act 1993) to a greater extent than is necessary for the reasonable exercise of the titleholder's rights and obligations. Titleholders should ensure that a summary containing the main matters raised in each response made by a relevant person is	

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
	included in the consultation report. The report on consultation should not include the full text or extracts of the full text of any response by a relevant person. Under regulation 26(8), this information must be contained in the sensitive information part of the environment plan and not anywhere else in the plan. The report on consultation should also include clear and precise identification of claims and objections presented, an assessment of the merit of each objection or claim with sufficient rationale provided to support that assessment, and a demonstration of the suitability of any measures adopted as a result of the consultation. Full text (source) records must be provided to verify the accuracy of the summary of the consultation. NOPSEMA interprets the term "full text" to mean an unedited version of the correspondence received without redacted or modified text. Titleholders will need to document in written form all communications undertaken between themselves and relevant persons. This may require documenting the minutes of meetings, undertaking written communications wherever practicable and requesting that responses from relevant persons be provided in writing where practical.	
22(15) and (16) Implementation strategy for environment plan ***(15) The implementation strategy must provide for appropriate consultation with:*** ***(a) relevant authorities of the Commonwealth, a State or a Territory; and*** ***(b) other relevant interested persons or organisations.*** ***(16) The implementation strategy must comply with the Act, this instrument, any other regulations made under the Act, and any other environmental legislation applying to the activity.***	Demonstrating in an environment plan that ongoing consultation is a part of a titleholder's implementation strategy as required by regulation 22(15), is separate to demonstrating that requirements for relevant persons consultation outlined in this guideline have been met.	Section 12.12 of the Implementation section.

11.3 Consultation with Relevant Authorities, Personal and Organisations – Regulation 25 OPGGS(E)R

11.3.1 Identifying Relevant Persons – 25(1)

In properly discharging our consultation obligations for identifying relevant persons under regulation 25(1)(a), (b), (c), (d) and (e) of the OPGGS(E)R, we have adopted a methodology that is reasonable, pragmatic and factors in the practical aspects of the consultation process, while remaining compliant with applicable law. This methodology is consistent with NOPSEMA's Guidelines and demonstrates Amplitude Energy's cognisance of:

- the planned activities
- the geographical extent to which the environment may be impacted by unplanned activities, risks and impacts.

The below graphic sets out an overview of the process undertaken by Amplitude Energy to identify relevant persons.

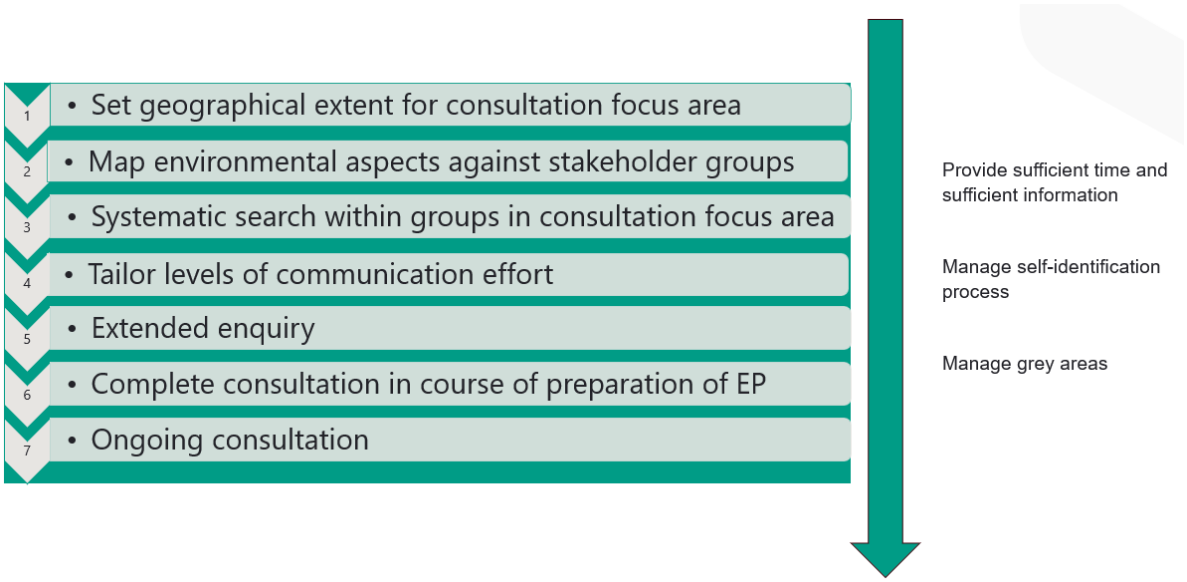


Figure 11-1: Process Steps

11.3.1.1Geographical Extent for Consultation Focus Area

The purpose of consultation is to gain input from individuals, groups and authorities who are potentially affected by the activities under the EP, so that these risks and impacts can be assessed and reduced to an acceptable level and ALARP.

The first phase of our methodology for identifying relevant persons was to overlay the extent of potential impacts from our planned and unplanned activities with persons or organisations whose interests, activities or functions could be impacted.

Our methodology and rationale for this approach is set out further below.

Planned activities

We considered the largest spatial area where a person's interests, activities or functions could be impacted by the planned activities and determined this to be the noise EMBA. We refer to this as the Activities EMBA.

The persons that may be affected by planned activities do not necessarily reside proximate to the activities, but have functions, interests or activities that potentially overlap with the Activities EMBA.

For example, a person with fishing quota overlapping the Activities EMBA, or a conservation organisation with an interest in protecting marine mammals transiting the area, may be based outside of the Activities EMBA but nonetheless be a relevant person for the purpose of Amplitude Energy's consultation.

Unplanned activities

Of the potential unplanned activities, the one that carries the highest level of public interest and potential consequences is a hydrocarbon spill.

We used quantitative spill modelling for a loss of containment during activities, to determine the total geographic area that could potentially be impacted by a hydrocarbon spill. We use the EMBA (identified in Section 4.2) to guide where to focus consultation efforts and to delineate a Consultation Focus Area (CFA)[9]. We do this because whilst the EMBA (and therefore CFA) is large, and impacts are unlikely, it provides conservatism in how broadly we seek relevant persons.

Our impact and risk assessment at Section 6.8 notes that in the unlikely event of a spill there is some potential for social affects beyond the CFA. However, as described in section 6.8.5.4, exposure concentrations are not uniform to the outer extent of these thresholds. Rather, exposure levels are lower outside the EMBA, and therefore the potential consequences are generally of lower severity and scale, and the risk of occurrence is more remote. Having regard to this, we consider that the ecological impacts boundary depicted by the EMBA represents a natural and reasonable point at which to transition from direct identification of relevant persons, to the extended enquiry process described in Section 11.3.1.5.

Through our extended enquiry process, sufficiently broad capture and reasonable opportunity was provided for self-identification by relevant persons outside the CFA. We undertook broad coverage advertising of consultation on this EP in national, state-wide and regional press, and we also made enquiries with the ~290 relevant persons that we consulted with, as to whether there were any other potentially interested persons they thought we should contact. Further advertising via radio, social and regional press media was run to advertise our community sessions and webinars, and subsequently to notify the public of the pending closing of consultation, all of which created additional opportunities for self-identification.

Overall, by using in combination of:

- a CFA that identified and concentrated efforts on persons who might have functions, interests or activities within the EMBA

[9] *Sometimes stochastic oil spill modelling will generate small sections of an EMBA that outlie the contiguous EMBA. These outliers are reviewed and treated on a case-by-case basis as to whether we extend the CFA to encompass them. We consider the modelled exposure concentrations at specific locations, the likelihood of exposure, brevity of exposure, and the types of persons and organisations in those areas that could be impacted, as well as previous consultation in those areas. In this instance our existing environment and impact and risk assessments have been informed by two recently accepted EPs in the Gippsland region and one in the Otway region. These EPs also address the potential impacts from a L2/3 hydrocarbon spill. In all cases, any outliers to the CFA are well covered by expansive extended enquiry, as well as direct identification of potentially affected PBCs/RAPs in eastern Victoria.*

- an extensive extended enquiry process with a sufficiently broad capture to seek out and allow for self-identification of persons outside the CFA.

Amplitude Energy has been able to discharge its consultation requirements in a practical and reasonable manner, that supports the objects of the OPGGS(E)R.

For this EP, in addition to completing direct enquiry within and adjacent to the CFA, we undertook additional direct enquiry for the following locations that are proximal to the CFA:

- The whole LGA coastal area if any part of the LGA is adjacent to the EMBA (full coastal extent of Glenelg, Moyne, Warrnambool, Corangamite and Colac-Otway LGA areas).
- The offshore area adjacent to those LGA areas (to capture relevant fisheries, both state and Commonwealth, to determine relevant persons from the fishing sector).

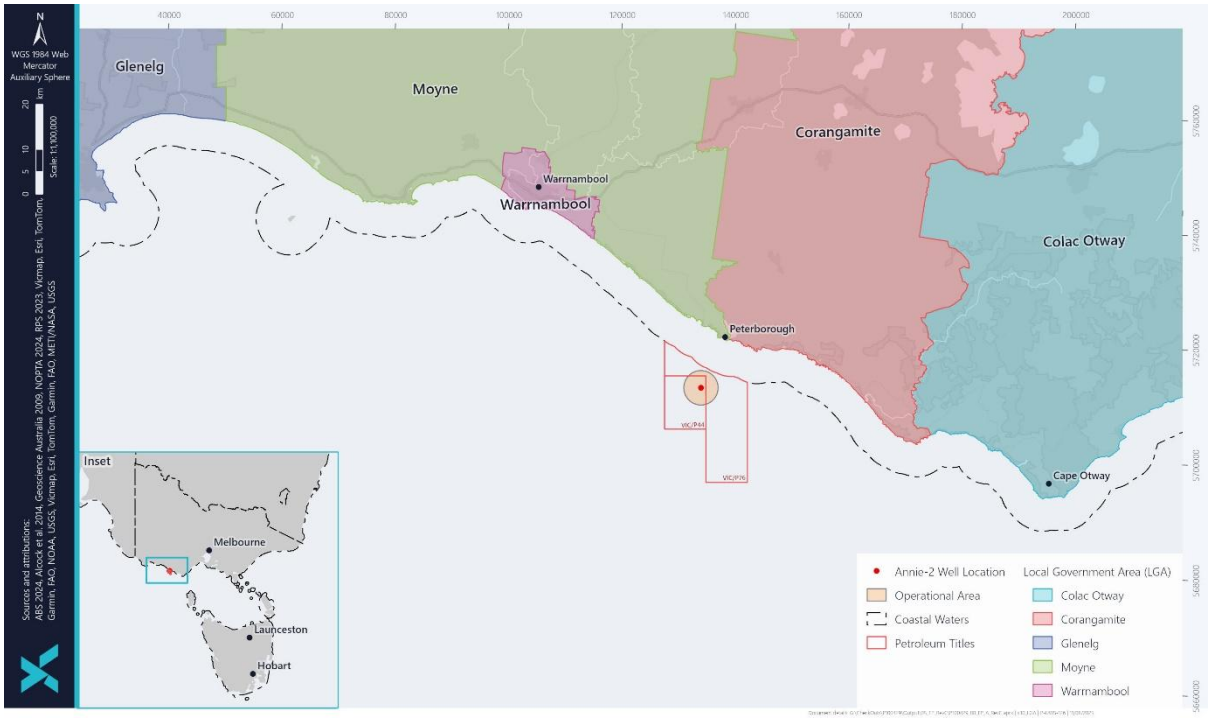


Figure 11-2: Consultation Focus Area LGAs

11.3.1.2Defining Relevant Person Categories

The second phase of our methodology for identifying relevant persons was to assess the categories of relevant persons who might have their functions, interests or activities affected by our activities under the EP. By mapping these categories of relevant persons, we were then able to perform more detailed searches and research for identification purposes.

Consistent with the objects of the OPGGS(E)R, a broad approach was taken to the 'relevant persons' concept and this included government departments and agencies, private sector organisations and individuals. The "interests" of relevant persons were not confined to legal interests in land or property but also included environmental values and sensitives in connection with the sea and marine resources that may be affected.

To support identification of groups of relevant persons that may be affected, they were mapped against environmental aspects to determine how their functions, interests or activities may be affected by our activities. This mapping is shown in Table 11-2.

Commonwealth and State government departments and agencies are not included in this mapping table. Rather, in their case we considered whether the activities may be relevant to their roles and responsibilities, and reviewed:

- GL1887 - Consultation with Commonwealth agencies with responsibilities in the marine area.
- GN1785 - Petroleum activities and Australian Marine Parks.
- Amplitude Energy's prior consultation in the Otway Basin.
- Desktop analysis to identify any agency or department changes.

Appendix 7 of the EP provides lists of the relevant persons that were identified, and our rationale for their inclusion in the list.

Table 11-2: Aspects, and Groups of Relevant Persons

Group of Relevant Person	Indicative level of effort	Physical presence		Planned emissions				Planned discharges			Unplanned interaction				Accidental release
		Displacement	Seabed disturbance	Light	Underwater sound	Atmospheric	Greenhouse gas	Subsea operational	Surface operational	Routine from vessel	Marine fauna	IMS introduction	Dropped object	Waste	Hydrocarbons
Business, industry and research															
Marine based businesses	2	X										X			X
Energy operators	2	X			X						X	X			X
Other infrastructure	2	X	X										X		X
Research	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tourism	2	X									X				X
First Nations															
Eastern Maar	1		X	X	X		x	X			X				X
Gunditjmara	1		X	X	X		x	X			X				X
Wadawurrung (have previously advised they only wish to be informed)	2		X	X	X		x	X			X				X
Bunurong	1						x				X				X
Gunaikurnai	1						x				X				X
Other First Nations peoples (if identified)	1		X	X	X		x	X			X				X
Fisheries licence holders or representatives															

Group of Relevant Person	Indicative level of effort	Physical presence		Planned emissions				Planned discharges			Unplanned interaction				Accidental release
		Displacement	Seabed disturbance	Light	Underwater sound	Atmospheric	Greenhouse gas	Subsea operational	Surface operational	Routine from vessel	Marine fauna	IMS introduction	Dropped object	Waste	Hydrocarbons
Fishers – major peak bodies – SIV and SETFIA	1	X	X		X			X			X	X			X
Fishers- other	2														
Recreational fishers	2	X	X		X			X			X	X			X
Aquaculture operators	2		X		X			X			X	X			X
Interest groups															
Conservation & environment	2		X	X	X	X	X	X	X	X	X	X	X	X	X
Marine recreation	2	X									X				X
Coastal community interest groups	2			X		X	X				X				X
Government															
Local government authorities (also manage ports in CFA)	2			X		X									X

11.3.1.3 Search within Relevant Persons Categories

A systematic search was undertaken across each group for relevant persons within the CFA, using the following tools:

- Amplitude Energy's established and ongoing operational presence in the area for 8 years, and previous consultation undertaken for this and other activities in the region.
- Web searches
- Review of other operators' EPs in same general area for comparable projects
- Asking known relevant persons
- Asking other stakeholders who may not be relevant persons themselves
- Reviewing NOPSEMA guideline – consultation with Commonwealth agencies with responsibilities in the marine area.

This search effort placed maximum weight on known functions, interests or activities that fall within the Activities EMBA (i.e. state/national conservation groups, fishing licence holders, peak bodies), as these may be affected by impacts and risks known to be present. The secondary, but still substantial, search effort targeted identified groups in the CFA.

We have operated in this area for many years, so most of the relevant persons with functions, interests or activities within the Activities EMBA were already known to us, as were many with functions, interests or activities more generally within the CFA.

As new groups of relevant persons were identified they were added to Table 11-2 and were subject to the systematic search for members of that group.

11.3.1.4 Tailoring Communications to Relevant Person Categories

Genuine and reasonable efforts were made to elicit a response from relevant persons identified in Appendix 7. This level of effort varied from multiple emails to multiple attempts via multiple channels (if other channels for contacting a relevant person were ascertainable). This was based on a qualitative, case-by-case assessment, that sought to achieve a balance between overwhelming relevant persons and providing reasonable prompts and opportunities to those wishing to be consulted. We considered factors such as:

- The relevant person's administrative maturity (with shire councils, NGOs, and businesses assumed to have mature communication practices).
- Whether they were represented by other organisations (such as peak bodies or Registered Aboriginal Parties (RAPs)/Prescribed Body Corporates (PBCs)).
- Whether they could be resource poor and potentially not monitoring communications.
- The likelihood, extent or severity of potential risks and impacts to the relevant person's functions, activities and interests.

Our general approach was to implement at least the minimum level effort described in Table 11-3 for each type of stakeholder.

Table 11-3: Levels of Effort Examples

Relevant person	Minimum Level of effort (1 being highest)	Rationale
RAP or PBC	1	Can be under-resourced. Important conduit to community.
Fishing peak body- SIV, TA and SETFIA – cover the majority of potentially impacted fishers	1	Important conduit to members.
Individual fisher-not represented	2	Experience tells us they do not like to be over-engaged and will respond if wish to engage.
Individual fisher-represented	None	If clearly represented, they generally would not wish to be contacted.
Fishers – smaller representative bodies such as local co-ops and sub-regional groups	2	Reasonable maturity, monitor correspondence as a primary function, and represented by peak body.
Local conservation group	2	Typically responsive in the Otway region when a project of interest.
Business	2	Monitoring correspondence is a critical business function.
Local government authority	2	High level of administrative capability.

Table 11-4: Levels of Effort

Level of effort	Description of minimum follow up to initial contact
1	Multiple calls and emails to elicit a response if none received. Email notification advising consultation closing with respect to the relevant person
2	Email to notify the relevant person that we were approaching the time of submission of the EP to NOPSEMA. (Not required if already in dialogue) For unrepresented fishers, SMS reminders sent where contact numbers were ascertainable to better suit their complex work hours.

11.3.1.5 Extended Engagement

The majority of relevant persons were expected to be ascertainable through the systematic search described in Section Appendix 7. However, we considered that some relevant persons might be missed due to factors including geographic location or inadequate communication from their representative bodies. Through extended enquiry, reasonable additional efforts were made to contact these persons.

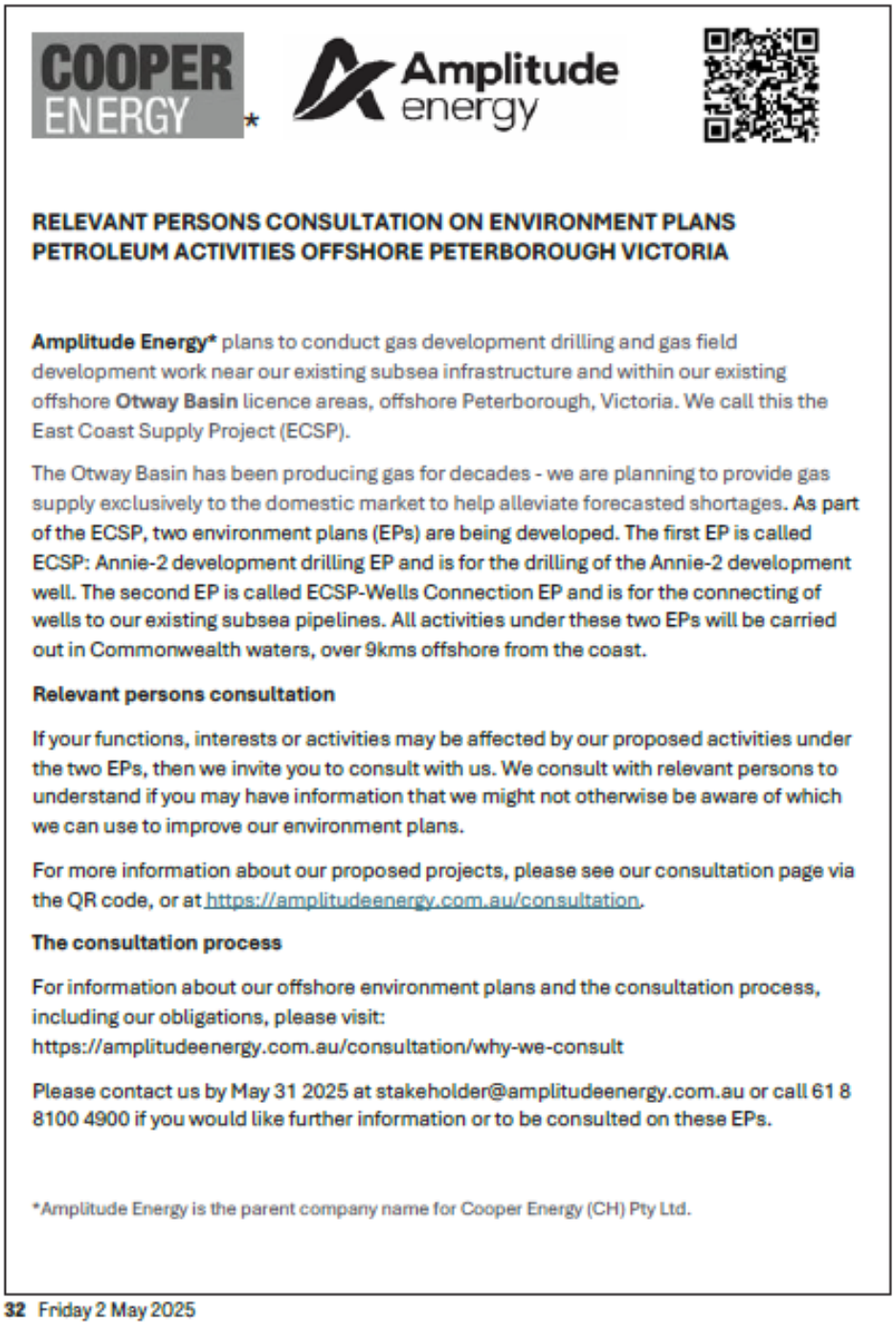
Extended enquiry comprised media advertisements in late April/early May 2025 (with some added late May 2025 and mid-July 2025 – see Figure 11-3 and Figure 11-4) inviting consultation through:

- Coastal regional press over the CFA and extended east to Southern NSW, west to Robe SA, and south to King Island (see map in Figure 11-6).
- Melbourne metropolitan (state-wide) press – *The Herald Sun.*

- National Indigenous media - *Koori Mail* and *National Indigenous Times.*
- National press through *The Australian.*

A link to the consultation web pages was also provided on our Amplitude Energy website.

Examples of posted advertisements are below:



COOPER ENERGY* Amplitude energy

RELEVANT PERSONS CONSULTATION ON ENVIRONMENT PLANS PETROLEUM ACTIVITIES OFFSHORE PETERBOROUGH VICTORIA

Amplitude Energy* plans to conduct gas development drilling and gas field development work near our existing subsea infrastructure and within our existing offshore **Otway Basin** licence areas, offshore Peterborough, Victoria. We call this the East Coast Supply Project (ECSP).

The Otway Basin has been producing gas for decades - we are planning to provide gas supply exclusively to the domestic market to help alleviate forecasted shortages. As part of the ECSP, two environment plans (EPs) are being developed. The first EP is called ECSP: Annie-2 development drilling EP and is for the drilling of the Annie-2 development well. The second EP is called ECSP-Wells Connection EP and is for the connecting of wells to our existing subsea pipelines. All activities under these two EPs will be carried out in Commonwealth waters, over 9kms offshore from the coast.

Relevant persons consultation

If your functions, interests or activities may be affected by our proposed activities under the two EPs, then we invite you to consult with us. We consult with relevant persons to understand if you may have information that we might not otherwise be aware of which we can use to improve our environment plans.

For more information about our proposed projects, please see our consultation page via the QR code, or at https://amplitudeenergy.com.au/consultation.

The consultation process

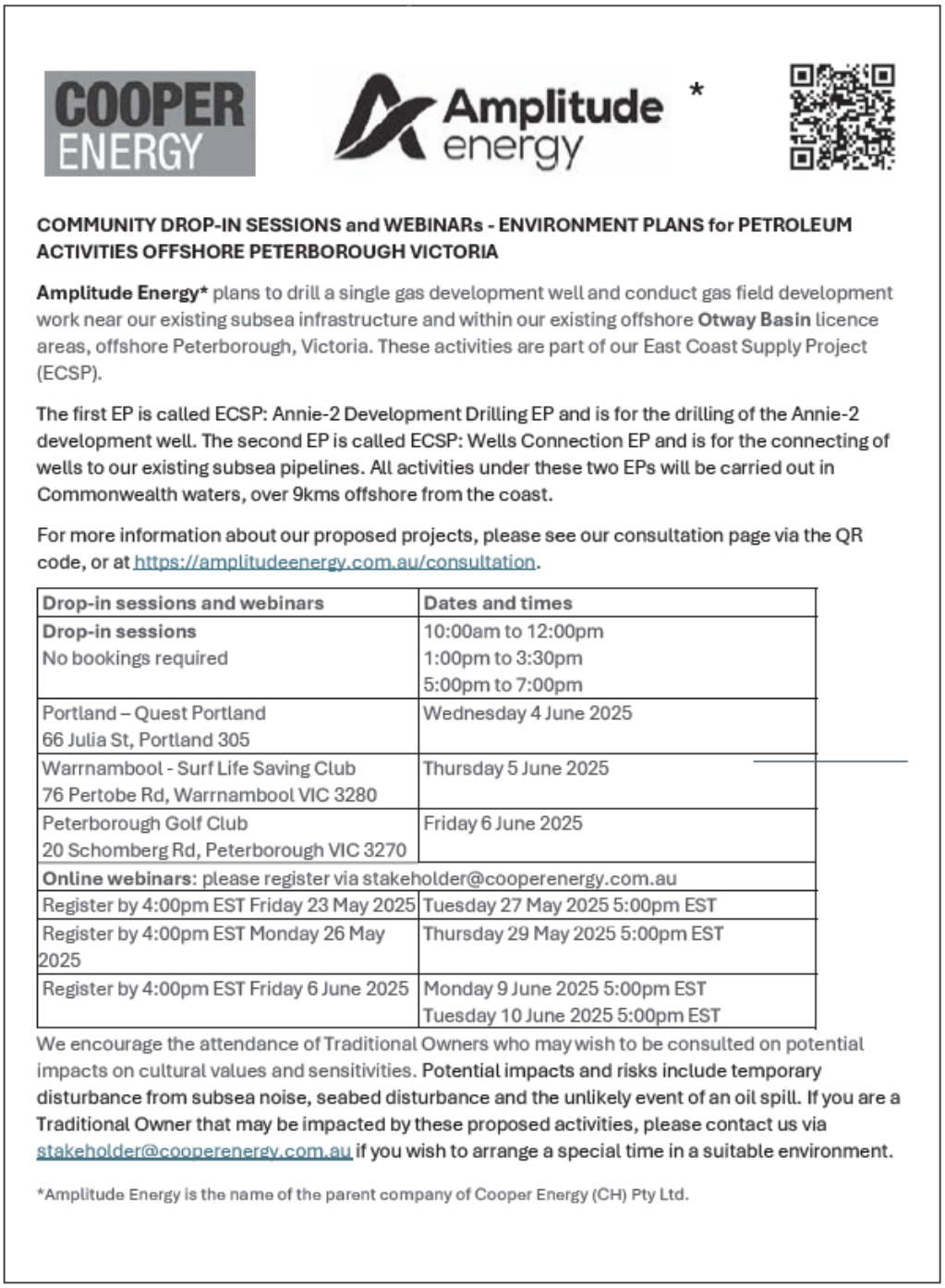
For information about our offshore environment plans and the consultation process, including our obligations, please visit:
https://amplitudeenergy.com.au/consultation/why-we-consult

Please contact us by May 31 2025 at stakeholder@amplitudeenergy.com.au or call 61 8 8100 4900 if you would like further information or to be consulted on these EPs.

*Amplitude Energy is the parent company name for Cooper Energy (CH) Pty Ltd.

32 Friday 2 May 2025

Figure 11-3: Torquay Surf Coast Times (*2 May 2025*)



COOPER ENERGY

Amplitude energy *

COMMUNITY DROP-IN SESSIONS and WEBINARs - ENVIRONMENT PLANS for PETROLEUM ACTIVITIES OFFSHORE PETERBOROUGH VICTORIA

Amplitude Energy* plans to drill a single gas development well and conduct gas field development work near our existing subsea infrastructure and within our existing offshore **Otway Basin** licence areas, offshore Peterborough, Victoria. These activities are part of our East Coast Supply Project (ECSP).

The first EP is called ECSP: Annie-2 Development Drilling EP and is for the drilling of the Annie-2 development well. The second EP is called ECSP: Wells Connection EP and is for the connecting of wells to our existing subsea pipelines. All activities under these two EPs will be carried out in Commonwealth waters, over 9kms offshore from the coast.

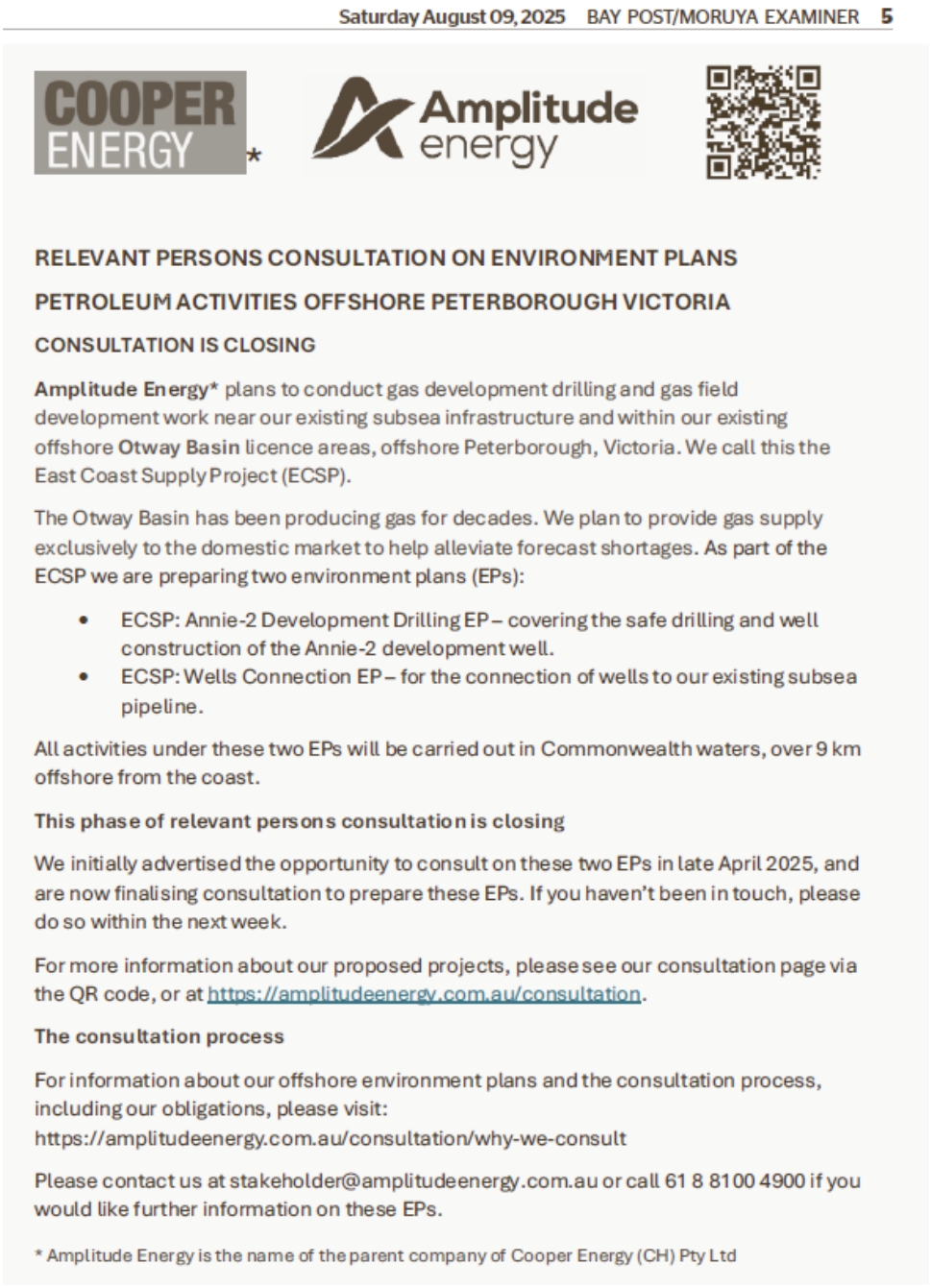
For more information about our proposed projects, please see our consultation page via the QR code, or at https://amplitudeenergy.com.au/consultation.

Drop-in sessions and webinars	**Dates and times**
Drop-in sessions No bookings required	10:00am to 12:00pm 1:00pm to 3:30pm 5:00pm to 7:00pm
Portland – Quest Portland 66 Julia St, Portland 305	Wednesday 4 June 2025
Warrnambool - Surf Life Saving Club 76 Pertobe Rd, Warrnambool VIC 3280	Thursday 5 June 2025
Peterborough Golf Club 20 Schomberg Rd, Peterborough VIC 3270	Friday 6 June 2025
Online webinars: please register via stakeholder@cooperenergy.com.au	
Register by 4:00pm EST Friday 23 May 2025	Tuesday 27 May 2025 5:00pm EST
Register by 4:00pm EST Monday 26 May 2025	Thursday 29 May 2025 5:00pm EST
Register by 4:00pm EST Friday 6 June 2025	Monday 9 June 2025 5:00pm EST Tuesday 10 June 2025 5:00pm EST

We encourage the attendance of Traditional Owners who may wish to be consulted on potential impacts on cultural values and sensitivities. **Potential impacts and risks include temporary disturbance from subsea noise, seabed disturbance and the unlikely event of an oil spill. If you are a Traditional Owner that may be impacted by these proposed activities, please contact us via stakeholder@cooperenergy.com.au if you wish to arrange a special time in a suitable environment.**

*Amplitude Energy is the name of the parent company of Cooper Energy (CH) Pty Ltd.

Figure 11-4: Koori Mail - Drop-in Sessions (21 May 2025)



Saturday August 09, 2025 BAY POST/MORUYA EXAMINER 5

COOPER ENERGY* Amplitude energy

RELEVANT PERSONS CONSULTATION ON ENVIRONMENT PLANS

PETROLEUM ACTIVITIES OFFSHORE PETERBOROUGH VICTORIA

CONSULTATION IS CLOSING

Amplitude Energy* plans to conduct gas development drilling and gas field development work near our existing subsea infrastructure and within our existing offshore **Otway Basin** licence areas, offshore Peterborough, Victoria. We call this the East Coast Supply Project (ECSP).

The Otway Basin has been producing gas for decades. We plan to provide gas supply exclusively to the domestic market to help alleviate forecast shortages. As part of the ECSP we are preparing two environment plans (EPs):

- ECSP: Annie-2 Development Drilling EP – covering the safe drilling and well construction of the Annie-2 development well.
- ECSP: Wells Connection EP – for the connection of wells to our existing subsea pipeline.

All activities under these two EPs will be carried out in Commonwealth waters, over 9 km offshore from the coast.

This phase of relevant persons consultation is closing

We initially advertised the opportunity to consult on these two EPs in late April 2025, and are now finalising consultation to prepare these EPs. If you haven't been in touch, please do so within the next week.

For more information about our proposed projects, please see our consultation page via the QR code, or at https://amplitudeenergy.com.au/consultation.

The consultation process

For information about our offshore environment plans and the consultation process, including our obligations, please visit:
https://amplitudeenergy.com.au/consultation/why-we-consult

Please contact us at stakeholder@amplitudeenergy.com.au or call 61 8 8100 4900 if you would like further information on these EPs.

* Amplitude Energy is the name of the parent company of Cooper Energy (CH) Pty Ltd

Figure 11-5: Bay Post/Moruya Examiner – Consultation Closing (9 August 2025)

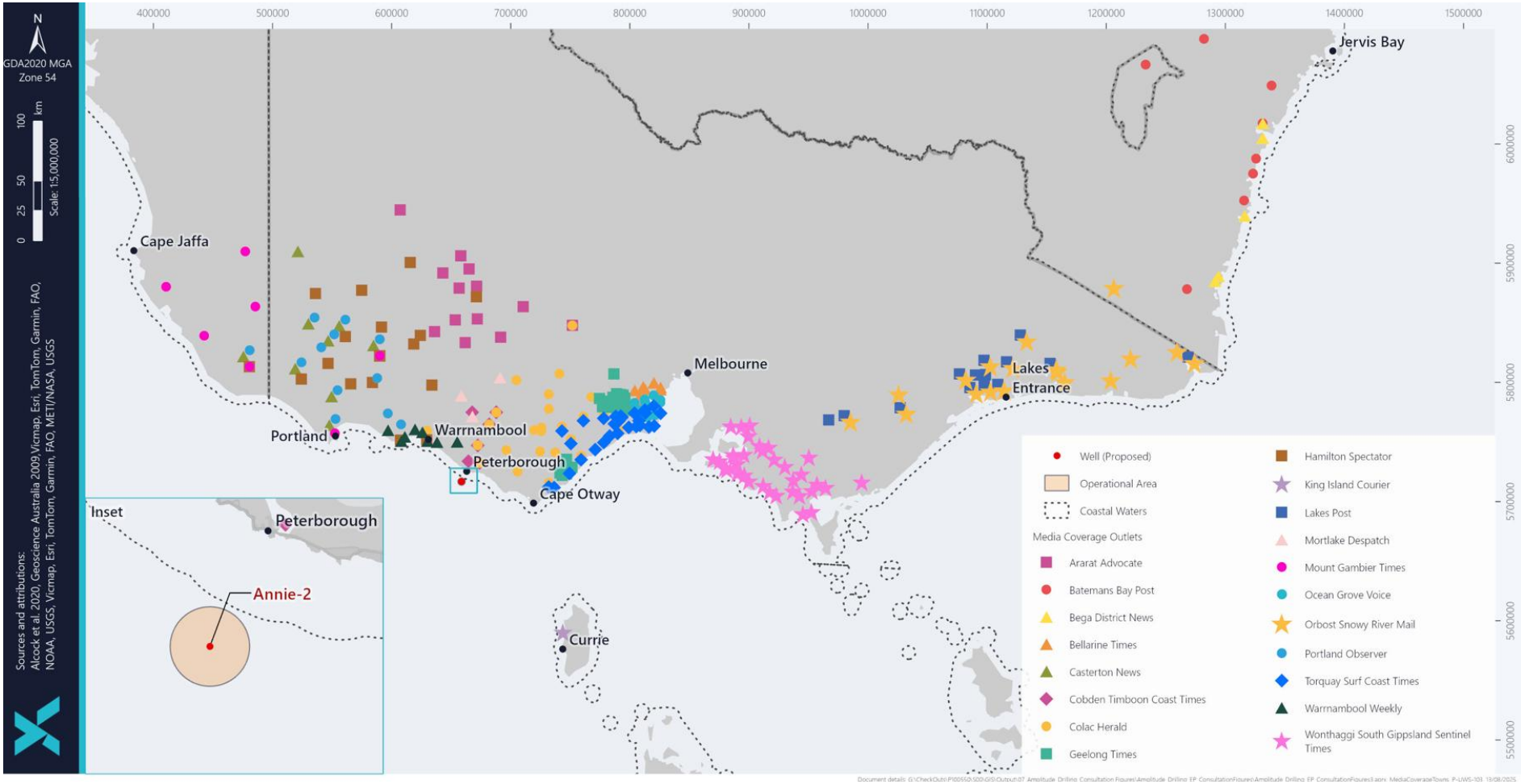


Figure 11-6: Distribution of Advertisements in Regional Press

In addition to using the above efforts and tools to identify relevant persons, we also ran a further radio, social media and print media campaign to promote the community drop-in sessions and webinars which comprised the following:

- Regional newspaper over western Victoria that also provided good coverage over the EMAC, GMTOAC and WTOAC RAP areas.
- Radio advertisements on local radio stations (Coast FM, 37B FM, Mixx FM, 3HA FM) in areas covering the CFA between 2 June 2025 and 6 June (4 x 30 sec per day for 5 days).
- Geo-targeted Facebook advertisements designed to specifically target the area in and around the CFA published between 21 May 2025 to 31 May 2025.
- A dedicated page on the Amplitude Energy website.
- A link to that page on the corporate website home page.

A recording of the webinar was also posted on the consultation website to allow any interested person access to information about the proposed activities.

11.3.1.6 Summary of Media Used

Table 11-5: Summary of Advertisements Run

Media	Invitation to consult	Drop-in sessions	Closing consultation
Koori Mail	7 May 2025	21 May 2025	13 August 2025
National Indigenous Times	5 May 2025 (for 7 days)		
The Australian	1 May 2025		7 August 2025
The Herald Sun	1 May 2025		7 August 2025
Ararat Advocate		23 May 2025	
Batemans Bay Post	19 July 2025		9 August 2025
Bellarine Times	2 May 2025		8 August 2025
Bega District News	19 July 2025		9 August 2025
Casterton News	29 April 2025	20 May 2025	5 August 2025
Cobden Timboon Coast Times	30 April 2025	21 May 2025	6 August 2025
Colac Herald	2 May 2025	21 May 2025	6 August 2025
Geelong Times	2 May 2025		8 August 2025
Hamilton Spectator	2 May 2025	23 May 2025	8 August 2025
Lakes Post	14 May 2025		6 August 2025
King Island Courier	29 May 2025		7 August 2025
Mortlake Dispatch	1 May 2025	22 May 2025	7 August 2025
Mt Gambier Times	2 May 2025		8 August 2025
Ocean Grove Voice	2 May 2025		8 August 2025
Orbost Snowy River Mail	23 July 2025		6 August 2025
Portland Observer	2 May 2025	23 May 2025	8 August 2025
Torquay Surf Coast Times	2 May 2025		8 August 2025
Warrnambool Weekly	2 May 2025	23 May 2025	8 August 2025
Wonthaggi South Gippsland Sentinel Times	13 May 2025		5 August 2025

Media	Invitation to consult	Drop-in sessions	Closing consultation
Facebook	7 May 2025 (14 days)	21 May 2025 (10 days)	18 August 2025 (1 month)
Instagram	7 May 2025 (14 Days)	21 May 2025 (10 days)	18 August 2025 (1 month)
Radio 3YB FM & Coast FM	2 May 2025 (5 days)	2 June 2025 (5 days)	13 August 2025 (18 days)

11.3.1.7 Community Drop-in Sessions

Community drop-in sessions were broadly advertised as described in Section 11.3.1.5.

Amplitude Energy made specific efforts to ensure that the 9 community drop-in sessions it held were widely advertised (as described in Table 11-5), easily accessible, and provided at a range of times and dates, so as to maximise opportunities for relevant persons to participate in the consultation process. Traditional Owners were specifically encouraged to attend these sessions and were encouraged to notify us if they had any specific requirements (e.g. for special times or separate spaces to other community members).

The 9 community drop-in sessions conducted are listed in Table 11-5.

Table 11-6 Community Drop-in Sessions

Session	Date	Location
1.	10.00am – 12.00pm, Wednesday 4 June 2025	Quest Portland, 66 Julia St, Portland
2.	1.00pm – 3.30pm, Wednesday 4 June 2025	Quest Portland, 66 Julia St, Portland
3.	5.00pm – 7.00pm, Wednesday 4 June 2025	Quest Portland, 66 Julia St, Portland
4.	10.00am – 12.00pm, Thursday 5 June 2025	Warrnambool Surf Life Saving Club, 76 Pertobe Rd, Warrnambool
5.	1.00pm – 3.30pm, Thursday 5 June 2025	Warrnambool Surf Life Saving Club, 76 Pertobe Rd, Warrnambool
6.	5.00pm – 7.00pm, Thursday 5 June 2025	Warrnambool Surf Life Saving Club, 76 Pertobe Rd, Warrnambool
7.	10.00am – 12.00pm, Friday 6 June 2025	Peterborough Golf Club, 20 Schomberg Rd, Peterborough
8.	1.00pm – 3.30pm, Friday 6 June 2025	Peterborough Golf Club, 20 Schomberg Rd, Peterborough
9.	5.00pm – 7.00pm, Friday 6 June 2025	Peterborough Golf Club, 20 Schomberg Rd, Peterborough

11.3.1.8 Webinars

Opportunities were provided to join 6 separate webinars (Table 11-7). Sessions 1-4 were broadly advertised in Western Victoria as described in Section 11.3.1.5. Invitations to join these webinars were sent via email to all non-government relevant persons as identified at that time. Amplitude Energy made specific efforts to spread these webinar dates across a range of dates, to maximise opportunities for participation.

This provided another opportunity for relevant persons to self-identify, and to receive sufficient information to understand how their functions, interests or activities may be impacted by our activities.

Table 11-7: Webinars

Session	Date	Details
1.	Tuesday 27 May 2025 5:00pm EST	Advertised in regional press, social media and radio.
2.	Thursday 29 May 2025 5:00pm EST	
3.	Monday 9 June 2025 5:00pm EST	Advertised in regional press, social media and radio, and invitations sent to non-government relevant persons as identified at the time.
4.	Tuesday 10 June 2025 5:00pm EST	
5.	Wednesday 18 June 2025 5:00pm EST	Invitations sent to non-government relevant persons as identified at the time.
6.	Thursday 19 June 2025 5:00pm EST	

A webinar recording was posted on our website and made available from 18 June 2025 up until submission of this EP.

11.3.1.9 Self-Identification

In addition to relevant persons that were identified by us, other relevant persons were able to self-identify at any time.

Our approach was not to impose any unnecessary barriers to being considered a relevant person. However, the person would need to demonstrate more than a general interest, and instead advise how their functions, interests or activities may be affected by our activities and provide full contact details to be thereafter included in consultation as a relevant person (if they wished to be included).

Once confirmed as relevant persons, any self-identified relevant persons were consulted in accordance with the process already described in Section 11.3. Levels of effort to communicate described in Section 11.3.1.4 were designated as Level 2, as once such a relevant person had indicated a willingness to engage and provided contact details, it was reasonable to assume any follow up correspondence was received and no further effort was needed to pursue a response.

Two individuals self-identified as relevant persons during community drop-in sessions in Warrnambool, having seen the advertising via social media. Another person from Glenelg Shire self-idented in response to our advertising of the community sessions and attended one of our webinars.

11.3.2 Providing Relevant Persons Sufficient Information – 25(2)

To satisfy regulatory requirements, Amplitude Energy must give each relevant person sufficient information to allow them to make an informed assessment of the possible consequences of the proposed activity on their functions, interests or activities. Amplitude Energy has prepared and provided information to relevant persons with these requirements and applicable guidelines in mind.

Our approach was to build information flow from the simple to the complex, so relevant persons could gain the depth of information needed relative to their category, and likelihood and degree to which they could be impacted. Noting many relevant persons either have limited time to read

through correspondence and/or are experiencing consultation fatigue, our approach to providing sufficient information to relevant persons, was typically to:

- First, capture the relevant person's attention that their functions, interests or activities may be affected by our activities under the EP.
- Second, bring key risks and impacts to their further attention.
- Third, draw them to our website where more detailed information was available, and ensure pathways for additional information were clear.

Table 11-8 Information Provided

Information type	Purpose	Key content
Project webpage	The project webpage on the consultation website provides information specific to this EP.	• Why we plan to drill the well • Description of proposed activities • Link to information sheet including: – Map – Diagrams and images – Activity detail – Simple layout of high-level impacts and risks – Easy links to areas of interest – Activity detail – Environmental impacts and risks • Easy links to specific high-level impacts and risks, such as: – Interaction with other marine users – Seabed disturbance – Underwater sound – Greenhouse gas emissions – Other atmospheric emissions – Light emissions – Planned discharges – Invasive marine species – Unplanned interactions with marine fauna – Accidental or uncontrolled hydrocarbon release – Loss of Materials or Waste Overboard • Easy links to tailored information for the following groups: – Research – Marine recreation – Conservation and environment – Recreational fishing – Commercial fishing – Coastal community – Coastal business – First Nations

Information type	Purpose	Key content
		• Contact form.
Consultation pages	The consultation pages and the corporate website provide an overview of different activities, and other useful information for relevant persons and other stakeholders.	• Amplitude Energy's general activities and maps of offshore titles • Link to NOPSEMA's community consultation brochure • Amplitude Energy's consultation obligations • Purpose of consulting with relevant persons • Description of an environment plan • Overview of the different activities that might occur in the exploration and production lifecycle • Decommissioning • Oil spill preparedness.
Bulk email # 1	Invited relevant persons to consult on the proposed activities	• Noted location of proposed activities. • Provided background information of the existing CHN fields and the need for additional gas supply. • Purpose of consultation. • Why we consult with relevant persons. • Described the development activities proposed. • Provided overview of timing and duration of proposed activities. • Downloadable information sheet with maps and diagrams • Link to consultation webpage where they could find tailored information. • Queried as to whether they knew other relevant persons. • Link to NOPSEMA brochure "Consultation on offshore petroleum environment plans – information for the community". • Asked that if an organisation they share information with members or other relevant persons. • Provided an indicative consultation timeline with flexibility noted. • Provided "quick response table" to make responding easier. • Provided clear contact details. • Noted that they should advise if any information they provided was not to be published. • Offered to meet in a manner that met the relevant person's needs.
Bulk email # 2	Advised non-government relevant persons of community consultation drop-in sessions and webinars.	• Invited attendance at community consultation drop-in sessions and/or webinars.
Bulk email #3	Advised that this phase of consultation was closing	• Noted this phase of consultation was closing. • EP is being prepared for submission to NOPSEMA.

Information type	Purpose	Key content
		• Requested that if they had not already done so, they contact by the end of the following week. • Noted that ongoing consultation would continue for the life of the project.

Our website was structured so a person could access broad information, but with highlighted pathways to areas of particular interest. This allowed the website user to navigate easily to specific areas, while ensuring all other topics were visible, in case they had wider interests than would be immediately obvious to us. The website provided broader, contextual information about the activities (e.g. that the gas will be supplied into the East Coast market where there is an expected shortfall of gas supply in future etc), to provide transparency to relevant persons, and explain why we are undertaking these activities, and how they fit into our future plans.

A clear point of contact was provided on the website, and in all correspondence, for relevant persons to direct their communications, seek additional information or clarifications, or request meetings (as applicable).

A link to the NOPSEMA brochure "Consultation on offshore petroleum environment plans – Information for the community" was also included on the website, to ensure relevant persons understood what to expect with the consultation process and how to participate effectively.

The Amplitude Energy website was continuously updated during the consultation process to include relevant information. A video presentation used for webinars was uploaded for general access via the consultation website.

We did not provide our draft EP or draft chapters to relevant persons prior to submission to NOPSEMA, and no requests for such were made by relevant persons. We considered that sharing any early drafts of the EP would be unproductive, as it would not capture the full learnings or benefits of the consultation process.

In addition to the reasonable general information that was provided to all relevant persons, Amplitude Energy also provided information responsively to relevant persons. When responding to relevant persons, specific inquiries were made to confirm whether there was any further information required for those relevant persons to consider the potential impact of the activities on their functions or interests.

11.3.3 Providing Relevant Persons Reasonable Period – 25(3)

To satisfy regulatory requirements, Amplitude Energy must provide relevant persons a reasonable period to identify the possible consequences of the proposed activity on their functions, interests or activities and to respond. The time required for this to occur depends on factors such as the hours available to the relevant person, complexity of issues that may be raised and, in the case of organisations, whether members and/or management are to be consulted. Noting that complex issues may arise in consultation, and it is an iterative process, reasonable time must be given to both the relevant person and Amplitude Energy to review and respond to each other's feedback and/or requests. These reasonable timeframes should be determined on a case-by-case basis and appropriately communicated.

With this in mind, Amplitude Energy commenced consultation with one Traditional Owner group in December 2024, in line with their consultation protocol that requested early engagement. This resulted in a positive meeting in April 2025 with members of the PBC. Consultation also commenced

in April 2025 with the closest RAP to the proposed activities, to ensure they would have sufficient time to call a properly notified and conducted meeting in accordance with the rules of their organisation, should that be their decision.

For the majority of relevant persons, consultation commenced later in May 2025, with a mailout containing sufficient information for a relevant person to determine whether their functions, interests or activities might be affected. Weblinks included in the email took them to specific locations on the website, and the website was designed so they could find the information that might be most relevant to their specific interests. Consultation information and opportunities were provided up until late August 2025. Throughout this period, we invited relevant persons to contact us if they required further information or wished to discuss any potential impacts or risks that might affect their functions, interests or activities.

We also provided significant flexibility in when, where and how we could discuss feedback, which included phone calls, online meetings and exchange of correspondence up until prior to submission of the EP. We had regard to any material provided to us by relevant persons setting out how they wished to be consulted when engaging with those relevant persons. We also informed relevant persons of our planned consultation schedule (Figure 11-7), whilst allowing for variations to that schedule based on their reasonable input.

As a general rule, we considered 30 days to be a reasonable period for relevant persons to either raise initial issues or signal their intention to consult and potentially request additional time or information to do so. Notwithstanding this general view, we took an adaptive approach to the period of time and number of contact attempts made for relevant persons and sought to ensure they were given reasonable opportunities to raise any concerns or queries they had about the proposed activities.

The indicative base timeline for consultation is as follows:

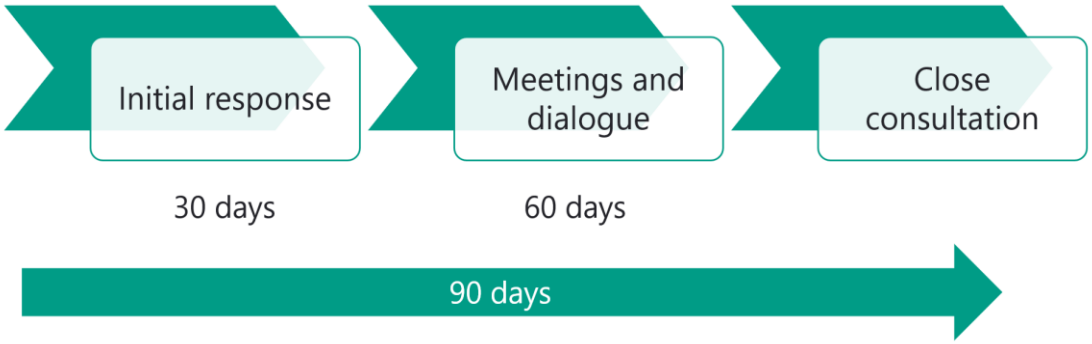


Figure 11-7: Indicative Timeline

The timeline could be extended based on individual relevant person's reasonable requests.

Other factors we considered in deciding whether a relevant person had been provided with a reasonable period for consultation, were whether during dialogue with the relevant person, a point was reached where either no new issues were being raised for consideration, or they became unresponsive.

As described in Section 11.4, for First Nations groups, consultation periods were extended beyond target dates and benchmarked against other relevant legislative processes.

No relevant person indicated to Amplitude Energy that they considered that insufficient time for consultation was provided.

Amplitude Energy considers that a reasonable period of time was afforded to all relevant persons who wished to be consulted in the course of the preparation of this EP.

11.3.4 Sensitive Information – 25(4)

In accordance with regulation 25(4) of the OPGGS(E)R, when engaging in consultation, Amplitude Energy advised relevant persons that they may request that particular information provided during consultation not be published, and that information subject to that request will not be published in the Environmental Plans. See Table 11-8 wherein the initial email noted that respondents could request that sensitive information not be published.

11.4 Consultation Approach with Traditional Owners

Amplitude Energy is committed to carrying out respectful and effective consultation with relevant Traditional Owners and building positive and ongoing relationships. In planning, developing and implementing its consultation process with Traditional Owners, we have been cognisant of:

- NOPSEMA's consultation guideline (GL2086 – Consultation in the course of preparing an environment plan – May 2024).
- Recent judicial decisions, namely Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193, Cooper v NOPSEMA (No 2) [2023] FCA 1158 and Munkara v Santos NA Barossa Pty Ltd (No 3) [2024] FCA 9.
- Applicable legislation including the Aboriginal Heritage Act 2006 (Vic) that recognises Registered Aboriginal Parties (RAPs) and the Native Title Act 1993 (Cth) that recognises native titleholders.

It is clear from the Full Federal Court's decision in the *Tipakalippa* appeal (and further reflected in NOPSEMA's consultation guidelines for Regulation 25) that some reasonable limits must be applied to titleholder's duty to consult with relevant persons, to ensure that the process is workable. To this end, a titleholder's obligation to consult under regulation 25 of the OPGGS(E)R may be discharged without:

- Accommodating every extension of time or other request made by a particular consultee.
- Obtaining consent from the consultee to the activity.
- Obtaining confirmation from the consultee, that the process has been carried out to their subjective preferences or individual satisfaction.
- What the titleholder must do is provide:
  - Sufficient information to enable the relevant person to make an informed assessment of the possible consequences of the activity on their functions, interests or activities.
  - A reasonable period of time for the relevant person to provide feedback, and for the titleholder to assess their objections or claims, and action the assessment and response.

While Amplitude Energy identified both RAPs and PBCs and individual Traditional Owners as relevant persons, Amplitude Energy had regard to the rule books and stated preferences of RAPs and PBCs that those organisations were the nominated representative entities to engage in consultation. Amplitude Energy specifically inquired with relevant RAPs and PBCs as to whether they were aware of other groups or individuals with whom Amplitude Energy should consult, to ensure that it was inclusive and wide-reaching in its consultation with Traditional Owners.

Individual Traditional Owners and Traditional Owners who may not be affiliated with a RAP or PBC were able to self-identify as relevant persons throughout the consultation process, and extended

enquiry, webinars and drop-in sessions afforded additional opportunities for any such relevant persons to engage with Amplitude Energy in consultation (using the methodology set out above).

11.4.1 Consultation Approach with Traditional Owners Representative Groups

Having regard to the above, our consultation with RAPs and PBCs has included the following key actions:

1. Undertaking desktop research to identify RAPs and PBCs overlapping the CFA.
2. Providing each of the identified RAPs and PBCs with reasonable information in plain English about the activities covered by this EP.
3. Explaining to each of the identified RAPs and PBCs the purpose of consultation, and how cultural values and heritage are important to the preparation of the EP.
4. Reviewing published literature/sources (e.g. consultation guidelines, protocols or Sea Country plans) for each identified RAP and PBC, to improve our understanding of the cultural features and heritage values overlapping with the operational area or EMBA.
5. Reviewing published rules, constitutions and other material to identify specific requirements of organisations for consultation (e.g. notice requirements, preferences for how material is prepared, decision making processes).
6. Enquiring how each of these identified RAP/PBCs wish to be consulted.
7. Enquiring directly with each identified RAP/PBC as to whether they have any information they wish to provide on their cultural values and heritage.
8. Enquiring directly with each identified RAP/PBC as to whether they are authorised to consult on behalf of their members.
9. Requesting that each identified RAP/PBC shares consultation information with their members and any other person they consider relevant.
10. Informing identified RAPs/PBCs of our targeted end date for carrying out consultation, but that we can also accommodate reasonable requests for extensions of time.

If there was no response from the RAP/PBC to our initial communication, we followed up at least 4 times, and (where possible) via multiple communication channels. This demonstrates a reasonable level of effort, respecting that participation in consultation is voluntary (for the relevant person), that the activity may not be a concern or priority for some RAP/PBCs (as some RAP/PBCs have expressly confirmed), and that 'spamming' such organisations may lead to 'consultation fatigue'.

Where a RAP/PBC responded seeking further engagement, we used best endeavours to conduct consultation in accordance with their expressed preferences and requirements. For example, where they requested a face-to-face meeting or presentation, then (where practicable) it was conducted at their chosen time and location, in their preferred format (including pre-approved agendas, topics and PowerPoint slides) and with their nominated attendees. We also offered and provided financial assistance to cover the associated transportation and meeting costs (as appropriate). Additionally, where a RAP/PBC provided specific guidance as to how it preferred consultation to occur, significant efforts were made to tailor our consultation process accordingly. From the outset of consultation, we also sought to communicate clearly to those relevant persons, the steps we had already taken to tailor the process to their stated preferences, and where there might be further opportunities to do so.

For any meetings or presentations conducted with RAP/PBCs, special care was taken to ensure that we used materials that were tailored to the interests of the relevant RAP/PBC, were in plain language suitable for an audience with a non-technical background and incorporated extensive visual elements to aid understanding. In preparing consultation material specific to Traditional Owners, Amplitude Energy reviewed the RAP organisation's own published materials to get a feel for the communication style with their members and seek to emulate it and invited their feedback on

the materials provided. We also engaged an external consultant to review consultation material for Traditional Owners, to ensure that it was fit-for-purpose and culturally appropriate and sought to adhere to specific preferences and protocols provided by any Traditional Owner groups, to the extent reasonably possible.

Our subject matter experts also attended meetings and presentations to Traditional Owner groups, so that they could hear feedback directly, and respond promptly and accurately to any questions. We also invited and answered questions throughout the meeting, to facilitate a two-way dialogue. This allowed the audience to provide relevant information to us, and to ask questions to get any further information they required, or fill any gaps in understanding, which they may have had. It also demonstrated to us that our audience was clearly engaging with, and understanding, the content of our presentation, based on their considered, detailed and extensive questions.

Where a RAP/PBC requested additional time to conduct a meeting with members, we considered 42 days to be a reasonable timeframe for calling and preparing for that meeting. This timeframe reflects that 21 days is often the minimum notice period provided in PBCs' Rule Books and then allows for a further 21 days to perform the associated administrative tasks. We did not rigidly enforce a 42-day time limit but treated it as a useful reference in discussions with the RAP/PBCs and were willing to accommodate reasonable extensions of time.

In determining whether we had provided a reasonable period of time for consultation with RAP/PBCs, we benchmarked this against other relevant legislative processes, for example:

- Regulation 30 of the OPGGS(E)R, which sets out a public consultation period of 30 days.
- The Department of Mines and Petroleum "Guidelines for Consultation with Indigenous People by Mineral Explorers" (Department of Mines, Industry Regulation and Safety, 2004)**[1]** which directs a period of 21- 30 days of consultation with Traditional Owners.
- While repealed, guidance taken from the Aboriginal Cultural Heritage Act 2021—Consultation Guidelines (Government of Western Australia, 2023) suggests that up to 12 weeks may be a reasonable period of time to allow identification, contact, and response, from Traditional Owners (subject to any alternative timeframe being agreed through co-design of consultation).
- Recent DCCEEW consultation on offshore wind zone (Southern Ocean) in the same general offshore region as this project allowed for 2 months.

Amplitude Energy notes that in *Tipakalippa*, at paragraph 136, Lee J commented that "…it must be taken to be the regulatory intention that the consultation requirement cannot be one that is incapable of being complied with in a reasonable time." In line with this reasoning and having regard to the benchmarks referred to above, Amplitude Energy considers that the total period of time provided to RAP/PBCs for consultation is reasonable, even on a highly conservative view.

11.4.2 Reasonable Opportunity

Our primary efforts to proactively consult with Traditional Owners were made through engagement with the RAP/PBCs as described in the section above. In adopting this approach to consultation with Traditional Owner groups, we were cognisant of:

- The United Nations Declaration of the Rights of Indigenous People which encourages consultation to be undertaken with Indigenous peoples' through their chosen representative entity.
- The Aboriginal Heritage Act 2006 (Vic) which recognises RAPs as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage and the primary source of advice relating to Aboriginal places and objects in the appointed region.

- The published rules and constitutions of such RAP/PBCs, and whether their objectives and powers indicated that they were the appropriate authority to engage with in respect of such matters, on behalf of their members.

We also recognised that by approaching individual members of a RAP/PBC directly, we may be perceived to be undermining their nominated representative body and circumventing its proper processes. This could be perceived as disrespectful, cause division within those communities, and may not actually be effective in establishing what cultural features, values or beliefs are held by the relevant peoples, as a people. This was particularly the case where PBCs and RAPs responded to Amplitude Energy confirming that they considered their organisation to be the correct body to be consulting with for the purpose of the regulations.

Notwithstanding the above, broader efforts were also made to consult with any interested individual Traditional Owners through the following key actions:

1. Placing public notice advertisements in selected local, state and national newspapers to facilitate the opportunity for First Nations persons to self-identify and consult with us. This included the Koori Mail and the National Indigenous Times).
2. Requesting that identified RAP/PBCs distribute consultation information to their members and any other individuals they consider to be relevant, to enable them to self-identify and consult with us.
3. Requesting that identified RAP/PBCs identify any individuals that should be consulted, so that we could contact them directly.
4. Requesting that other First Nations organisations that were not relevant persons identify individuals that should be consulted so that we could contact them directly.

Where we consulted with any Traditional Owners, we provided information on the activities covered by the EP, an explanation of the purpose of consultation, and how cultural values and heritage are important to the preparation of the EP. We would also advise them if we were already in contact with their representative body (if that was not already apparent), so they could determine for themselves whether to engage with us directly or allow their representative body to do so.

In considering how to ensure that we reached Traditional Owners, through our extended enquiry methods, we had specific regard to:

- The public notification process provided under section 66 of the Native Title Act, where the Registrar notifies the general public through the Koori Mail and a local newspaper in the area.
- The content of our advertisements – which were specifically designed to be easily understood and to make it easy to seek further information (i.e. through our consultation website) or engagement with us (i.e. through a designated contact person).

Amplitude Energy has held regular internal meetings with environment and community engagement team members, to discuss this EP and in particular, our consultation process. As part of these meetings, we regularly reviewed and challenged the soundness of our consultation methodology and considered other opportunities to consult with individual Traditional Owners and/or RAP/PBCs. Some of the opportunities considered (but ultimately dismissed for the reasons outlined below) included:

- Requesting evidence from the RAP/PBCs that they had shared consultation information with their members and other persons they considered relevant, as per our repeated requests and since we did not have a line of sight to this. This option was ultimately discounted, as there has been nothing to suggest that any of the RAP/PBCs would not, or had not, fulfilled their role and responsibilities to members (e.g. by sharing information and complying with any member consultation requests). Therefore, it would have been inappropriate for us to question this, or to

ask to review their communications, and this would be inconsistent with how we treat other organisations that represent communal interests.

- Attempting to contact members of RAP/PBCs directly, notwithstanding they had not self-identified and expressed interest in consultation directly with Amplitude Energy. This was ultimately considered to be inappropriate, given the strong rationale described above for treating RAP/PBCs as the primary point of contact, and appropriate authority to speak to the cultural values and sensitivities held by the group (rather than the beliefs of an individual). Additionally, Amplitude Energy was cognisant of the risk that seeking to identify and then contact individual RAP/PBCs members, may be intrusive and unlawful from a privacy perspective, given that the members' contact details were not readily available from a public source or offered by the RAP/PBC itself.
- Attempting to speak with RAP/PBCs directly, by visiting their offices without having scheduled a formal meeting in advance. We determined that this would be inappropriate, as it would be inconsistent with our aim of engaging with Traditional Owners in a voluntary, respectful and productive way.

11.5 Consultation Approach with Individual Traditional Owners

In *Tipakalippa*, the Federal Court when considering the requirements for consultation under regulation 25 (then regulation 11A), had regard to case law concerning the requirements under the Native Title Act 1993 to provide a 'reasonable opportunity' to participate in decision-making. The Court indicated that under the Native Title Act, reasonable notice should be provided to relevant native title group members, but exhaustive communications with each and every person are not required. This approach has been endorsed by NOPSEMA in the context of regulation 25 consultation and can be found in the NOPSEMA guidelines.

Amplitude Energy considers that it provided all relevant persons a reasonable opportunity to participate in consultation through the process described in this EP.

11.6 Assessment of Merits of Claims or Objections

Amplitude Energy assessed the merit of any claims or objections raised by relevant persons during consultation (including ongoing consultation) in line with the following process.

For a claim to have merit, it must first and foremost be relevant to the EP and the activities captured by the EP. After passing this relevancy test, the objection or claim should have a reasonable and credible basis for related effects or impacts to occur. This test does not need to be exhaustive, as a proper construction of the Regulations requires that all reasonable matters should be assessed.

Once a claim or objection is considered both relevant and reasonable, Amplitude Energy responds as follows:

1. If the claim or objection raised by the Relevant Person is already addressed in the EP, Amplitude Energy will respond to the Relevant Person by outlining how the claim or objection has been considered and captured in the EP.
2. If, following Amplitude Energy's evaluation of the claim or objection, it results in new risks/impacts being identified and/or additional controls being developed, the outcomes are shared with the Relevant Person.

The above steps may comprise an iterative process, and there may be a point at which consultation on an issue is concluded (and the relevant obligations discharged) without the Relevant Person being satisfied with the outcome.

Amplitude Energy must have fully considered matters raised and demonstrate that impacts and risks of the activity are reduced to ALARP and an acceptable level.

In the case of Traditional Owners interests including intangible cultural heritage issues, Amplitude Energy will work with the Relevant Person to gain an appropriate understanding of the relevant claims or objections and aims to work collaboratively to manage and mitigate impacts and risks, where reasonably practicable.

As noted above, Amplitude Energy has satisfied its obligations under section 25 of the Regulations. Amplitude Energy acknowledges that relevant persons may have different views as to whether the consultation obligations have been discharged.

11.7 Compliance with Consultation Requirements

Section 11.2 sets out in comprehensive detail the steps that have been undertaken to ensure there has been full compliance with the consultation requirements for this EP.

This compliance can be summarised as follows:

- The steps outlined in Section 11.3.1 had been followed, resulting in reasonably ascertainable relevant persons being identified in Appendix 7.
- Sufficient information had been provided as described in Section 11.3.2.
- Sufficient time had been provided as per Section 11.3.3.
- The merits of objections or claims raised by relevant persons (if any) had been considered, and resultant measures (if any) proposed to address those impacts and risks had been communicated to the respective relevant persons and captured in the EP, as described in Appendix 7.
- The date that the current and potentially final phase of consultation was closing had been communicated to any relevant persons with whom an active dialogue had been established, unless that engagement had clearly concluded.

We consider that we have met the required statutory criteria for consultation for the EP, and in some cases engaged with relevant persons in a manner that has exceeded those criteria.

11.8 Report on Consultation – Regulation 24(b) OPGGS(E)R

The report on all consultations under regulation 25 of the OPGGS(E)R of any relevant person, which is provided in Appendix 7, includes:

- A summary of information provided to relevant persons.
- A summary of each response made by a relevant person, as required under regulation 24(b)(i) of the OPGGS(E)R.
- Our assessment of the merits of any objection or claim about the adverse impact of each activity, as required under regulation 24(b)(ii) of the OPGGS(E)R.
- Our response, or proposed response, to each objection or claim, as required under regulation 24(b)(iii) of the OPGGS(E)R.

12.0 Implementation

12.1 Amplitude Energy Management System (AEMS)

The AEMS is Amplitude Energy's integrated system which consolidates all of Amplitude's business processes into one system of management, to manage every aspect of Amplitude Energy's business (such as HSEC, Operations, Well Construction, Engineering and Finance) in accordance with a set of core concepts (Table 12-1).

The AEMS document hierarchy is shown in Figure 12-1 with the AEMS standards listed in Table 12-2 and Amplitude Energy's Health, Safety and Environment (HSE) Policy shown Figure 12-2.

Table 12-1: Amplitude Energy's Management System Core Concepts

Core Concepts	
People	How we organise (line and function) Which roles we need Which skills we need How we build and sustain capability
Culture	Why we exist What we value How we work together How we communicate
Process	What we do How we do it How we learn How we continuously improve
Technology	Which tools we use How we use them How we support people to perform their role
Governance	How we manage risk How we make decisions How we ensure safety, quality and technical integrity



Figure 12-1: AEMS Document Hierarchy

Table 12-2: AEMS Standards

AEMS Standard	Focus Area
MS00	Statement of Intent and Expectations
MS01	Accountability and Leadership
MS02	People Management
MS03	Risk Management
MS04	Strategy and Planning Management
MS05	External Affairs, Investor Relations, Community and Stakeholder Management
MS06	Information Systems
MS07	Operations Management
MS08	Technical Management
MS09	Health, Safety and Environment Management
MS10	Incident and Crisis Management
MS11	Supply Chain and Procurement Management
MS12	Technical Assurance and Compliance Management
MS13	Financial Management
MS14	Commercial Marketing and Economics Management
MS15	Asset Lifecycle Management

Health, Safety and Environment Policy

AEMS | Health & Safety | Policy

This policy describes our approach to managing Health, Safety and Environmental risks at Amplitude Energy

Our Commitment

Amplitude Energy is committed to taking all reasonably practicable steps to protect the health and safety of our workers, contractors, partners, and the communities in the areas where we operate.

In addition, we will ensure our business is conducted in an environmentally responsible manner.

Our Actions

We will:

- **Integrate** health, safety and environmental requirements into our daily work, our business planning and our decision making
- **Comply** with all relevant health, safety and environmental laws and regulations
- **Provide** resources and systems to enable delivery of our health, safety and environmental objectives
- **Identify, control and monitor** risks that have the potential to harm people and the environment to as low as reasonably practical
- **Empower** our people, regardless of position, to "Stop the Job" if they consider it necessary to prevent harm to themselves, others or the environment
- **Consult, communicate and promote participation** of our workforce to build and maintain a strong health, safety and environment culture
- **Ensure** all employees and contractors are trained, competent and suitably supervised so that works are undertaken in a safe and environmentally responsible manner
- **Collaborate** proactively with our stakeholders and the communities where we operate
- **Investigate and learn** from our incidents and from those in our industry
- **Set, measure and monitor** health, safety and environmental targets to drive continuous improvement in our performance
- **Report** publicly and transparently on our health, safety and environmental performance

Governance

The HSE Improvement Forum has oversight of this policy. The Managing Director is accountable for communicating this Policy and for ensuring compliance with its undertakings. All Executive Leadership Team members and Managers shall ensure the effective implementation, management and monitoring of our HSE Management System and its subsequent outcomes.

All Staff are responsible for compliance with our policy, standards, and procedures.

This policy will be reviewed at appropriate intervals and revised as necessary to keep it current.

Policy authorised by

Jane Norman
Managing Director & CEO
Date: 11 February 2025 Review Date: 13 July 2026

Figure 12-2: Amplitude Energy's Health, Safety and Environment Policy

12.2 Asset Integrity Management

The integrity of all Amplitude Energy Assets is managed in line with MS08: Technical Management. Well integrity is planned and assured through adhering to the requirements of the Well Integrity Management Protocol. These requirements inform the development of a Well Operations Management Plan (WOMP).

An accepted WOMP is required for the entire well life cycle and must be in place before drilling can commence. The WOMP describes the well integrity management, controls, verification, and maintenance for well activities. Well integrity is demonstrated through the maintenance of a primary and a secondary well barrier envelope. The WOMP details the well barrier elements and performance standards and their implementation through the well life cycle.

Amplitude Energy manages the integrity of the well through every phase of the well construction cycle. The overall strategy of the integrity management plan is to maintain the assets as close to their design condition as possible. Accordingly, the integrity of the well is maintained and monitored in several ways throughout their life cycle, until the well is plugged and abandoned. The integrity management elements include:

- design, pressure containment and primary protection functions:
  - design basis and documentation
  - protection and support structures
  - corrosion protection system
  - restriction and safety zone systems
  - intervention procedures
  - well integrity reviews.
- monitoring and inspection:
  - marine activity monitoring
  - weather (exceedance) monitoring
  - ROV visual and CP inspection
  - relevant persons engagement (facility awareness).

12.3 Activity Planning

The development and ongoing management of offshore facilities is planned and executed in accordance with MS15: Asset Lifecycle Management. Amplitude Energy uses a gated process; the process workflow is divided into phases (Figure 12-3). Each phase is subject to assurance processes and a gate review, the outcomes of which include continue, stop, hold, or recycle.

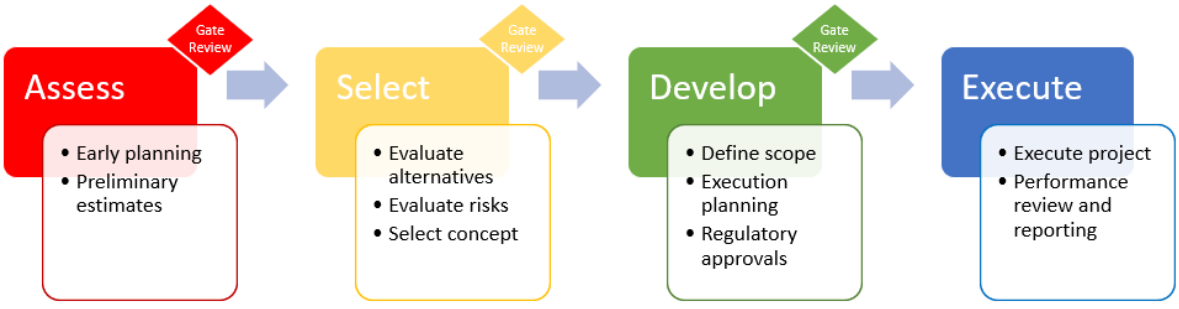


Figure 12-3: Activity Workflow

12.3.1 Decommissioning Planning

Decommissioning of an asset involves well plugging, deconstruction and removal (base case) in a safe and environmentally responsible manner, processing of materials, reagents, waste and infrastructure associated with the operations, and rehabilitation of the area.

Well decommissioning activities, also referred to as well plug and abandonment (P&A) activities, will be covered by a future EP that is submitted prior the term of EP has ended [HOLD Amplitude to confirm].

Section 572(3) of the OPGGS Act requires titleholders to remove all equipment and other property in their title area that is neither used, nor to be used, in connection with operations. This obligation is ongoing and covers both the removal of equipment and property at the end of production and the removal of disused infrastructure at appropriate points throughout the life of an asset.

Amplitude Energy's Decommissioning Protocol acknowledges legislative requirements and illustrates the company's management system for integrating decommissioning planning across operations. The Protocol outlines roles and responsibilities, along with requirements for decommissioning planning for onshore and offshore assets and associated financial provisions.

The objectives of this protocol are to:

- Define the requirement for decommissioning as part of the lifecycle of assets.
- Define the requirement for a decommissioning plan to be developed and maintained for each asset, or group of assets within an operational area. The decommissioning plan must consider, where practical, progressive decommissioning of assets when equipment is not intended to be returned to operation
- Define the requirements for financial provisions to ensure decommissioning is completed in accordance with the decommissioning plan and that appropriate provisions are allocated for non-operated assets.

Options for other than the complete removal of all property may be considered, in which case the decommissioning plan must demonstrate that the alternative delivers equal or better environmental outcomes compared to complete removal, and that the approach complies with all other legislative and regulatory requirements. Therefore, for the purposes of planning, full removal must be the base case until an alternative end-state is accepted by the regulator.

Where onshore treatment and disposal of wastes is to be undertaken as a component of decommissioning, management of this waste must be in accordance with the respective legislation of the States or Territory. Depending on the remaining operational life, this may require specific plans for:

- waste management
- Licensing and regulation of waste transport, storage, treatment, resource recovery and disposal.

12.4 Contractor Management

The Supply Chain and Procurement Management Standard details Amplitude Energy's contractor management system, which provides a systematic approach for the selection and management of contractors to ensure any third party has the appropriate safety and environment management system and structures in place to achieve HSEC performance in accordance with Amplitude Energy's expectations.

This standard applies to sub-contractors, Third Party Contractors (TPCs) and suppliers conducting work at Amplitude Energy sites or providing services to Amplitude Energy. The Standard addresses operational HSEC performance of all contractors while working under an Amplitude Energy contract or in an area of Amplitude Energy responsibility or which may be covered under the HSEC Management System. The key HSEC steps include:

- Planning – HSEC assessment of potential contractors, suppliers and / or TPCs.
- Selection – submission and review of contractors and/or TPCs HSEC management data.
- Implementation – onsite contractors and/or TPCs HSEC requirements including induction and training requirements.
- Monitoring, review and closeout – ongoing review of contractors and/or TPCs HSEC performance including evaluation at work handover.
- Prior to Contractor commencement of operations, contractors must have in place a Amplitude Energy approved HSE Management System that meets minimal regulatory requirements and ensures compliance with this EP.

Amplitude Energy will undertake an on-hire inspection of the relevant vessel against EP requirements. Amplitude Energy shall also provide primary contractors with this EP and EP commitments register, inclusive of the EPOs and EPSs established in this plan. This is one of a number of means to ensure contractors are aware of, and comply with, EP requirements. Also see Section 12.6.

12.5 Organisational Structure, Roles and Responsibilities

As required by Section 22(3) of the OPGGS(E)R this section outlines the chain of command (Figure 12 4) and roles and responsibilities (Table 12 3) of employees and contractors in relation to the implementation, management and review of this EP.

The emergency response structure for the activity is detailed in the Offshore Victoria OPEP (VIC-ER-ERP-0001).

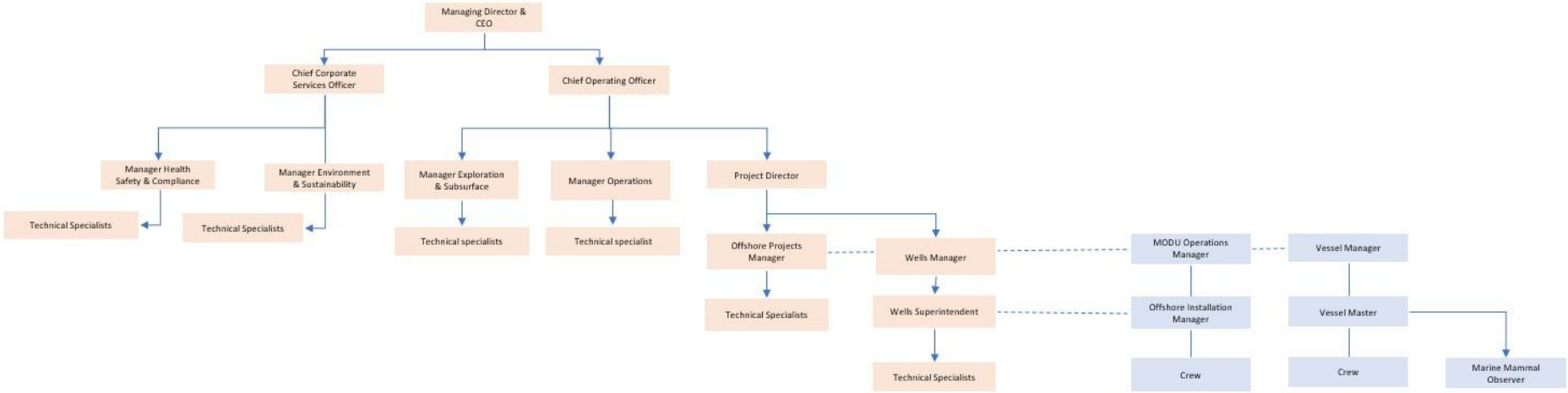


Figure 12-4: Amplitude Energy Offshore Operational Organisational Structure

Table 12-3: Amplitude Energy Environmental Roles and Responsibilities

Role	Responsibilities
Amplitude Energy	
Managing Director & CEO	The Managing Director & CEO is accountable for ensuring a framework has been established through which the Management System requirements will be met.
Chief Operating Officer	Ensures: • Compliance with the Amplitude Energy HSEC Policy and Management System. • Audits and inspections to verify HSEC and integrity performance are scheduled and undertaken. • Adequate resources are in place to meet the requirements within the EP and OPEP. • Adequate emergency response capability is in place. • Incidents and non-conformances are recorded, reported and investigated.
Chief Corporate Services Officer	Ensures: • Amplitude Energy's Emergency Response preparedness is appropriate for the risks posed by the activity. • Emergency Response Training, Competency and Testing is commensurate to the risks associated with the current offshore activity.
Manager Environment & Sustainability	Ensures: • Environmental regulatory requirements are embedded within the Amplitude Energy Management System. • Compliance with relevant statutory and Amplitude Energy Management System requirements. • Specialist environment input and support is provided to implement the EP during the activity, Management and Board as required. • Identify and communicate relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP and OPEP to the activities. • Develop the environmental component of inductions. • Environmental incidents are investigated in accordance with Amplitude Energy requirements and learnings are disseminated appropriately. • An in-depth and up to date knowledge of the legal and statutory Environmental obligations for is maintained. • Environmental performance is monitored, evaluated and reported as appropriate at all levels in the organisation. • Review of environmental monitoring records to ensure compliance with the requirements (EPOs, EPS's and processes described in Section 10.0 of the EP. • Assess environmentally relevant changes as per the MOC process. • Review any non-conformances relevant to environment performance to ensure corrective actions are appropriate to prevent recurrence. • Prepare and submit environmental incident reports and performance reports to regulators.
Manager Health Safety & Compliance	Coordinates: • Amplitude Energy's approach to Emergency Response and Preparedness. • Emergency Response Training. • Competency and testing commensurate to the risks associated with the current offshore activity.

Role	Responsibilities
	• Maintain and test oil spill response arrangements.
Project Director	Ensures: • Compliance with the Amplitude Energy HSEC Policy and Management System components applicable to the Activity. • Compliance with relevant statutory and Amplitude Energy Management System requirements. • Provides resources for management for Activity execution • Promotes a high level of HSE performance and drives improvement opportunities
Activities Manager / Well Manager / Manager Exploration & Subsurface	Ensures in relation to respective area of responsibility (Exploration, Drilling, Operations): • Compliance with the Amplitude Energy HSEC Policy and Management System components applicable to the Activity. • Compliance with this EP and controls implemented. • Contractor prequalification and qualification processes are undertaken. • Personnel are inducted with EP requirements and are aware of their environmental responsibilities. • Response arrangements in the OPEP are in place and tested commensurate to the risks associated with the current offshore activity. • Environmentally relevant changes are assessed and approved by Amplitude Energy. • Environmental incidents are reported internally and externally, and investigations undertaken. • Inspections and audits undertaken. • Actions from environmental audits and incidents are tracked to completion. • Relevant persons engagement is undertaken. • Review any non-conformances relevant to environment performance to ensure corrective actions are appropriate to prevent recurrence. • Well integrity management plans are developed, maintained and implemented. • Provides technical capability to support the development and review of decommissioning plans for the well.
Wells Superintendent	Ensures: • Roles and Responsibilities are communicated to offshore personnel. • Compliance with EP commitments (EPOs/EPSs) for the offshore activity. • Implementation of risk assessment processes and management of change for the offshore activity. • Environmentally relevant changes are assessed and approved by Amplitude Energy. • Appropriate source control resources are available and maintained, relevant to the activity. • Relevant plans are implemented.
Contractors	
Vessel Manager	Ensures in relation to respective area of responsibility: • Compliance with the Amplitude Energy HSEC Policy. • Compliance with this EP and controls are implemented. • Support implementation of whale disturbance risk management measures described in this EP. • Personnel are inducted with EP requirements and are aware of their environmental responsibilities.

Role	Responsibilities
	• Response arrangements in the OPEP are in place and tested. • Environmentally relevant changes are assessed and approved by Amplitude Energy. • Environmental incidents are reported internally and externally, and investigations undertaken. • Inspections and audits undertaken. • Actions from environmental audits and incidents are tracked to completion.
Offshore Installation Manager	Ensures: • Compliance with relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP. • Inductions are completed, and record of attendance maintained. • Chemicals that have the potential to be discharged to the marine environment are assessed and approved using the Amplitude Energy's Offshore Chemical Assessment Procedure. • Environmentally relevant changes are assessed and approved by Amplitude Energy • Incidents are reported to the Amplitude Energy Project Manager. • Monitoring and other records are collated and provided to the Amplitude Energy Project Manager on completion of the program. • HSEC inspections are undertaken throughout the offshore activity to ensure ongoing compliance with the EP requirements. • Corrective actions identified from incidents or inspections are implemented.
Vessel Master	Ensure compliance with relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP where relevant to their role.
Marine Mammal Observer	• Support implementation of whale disturbance risk management measures described in this EP. • Observe for Marine Mammals in accordance with EP requirements. • Record and report all marine mammal sighting events.
Offshore Crews	Ensure compliance with relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP where relevant to their role.

12.6 Training and Awareness

OPGGS(E)R Section 22(4) requires that the implementation strategy detail measures to ensure each employee or contractor working on, or in connection with, the activity is aware of their responsibilities in relation to this EP, including during emergencies or potential emergencies.

12.6.1 Amplitude Energy Personnel

Amplitude Energy personnel competency and training requirements are outlined in position descriptions and reviewed during the recruitment process. Competencies and training are initiated as defined in the Training and Development Procedure.

Personnel training records are maintained internally in accordance with MS06 Information and Systems Management.

12.6.2 Contractor Personnel

Contractors engaged to work on the activity are assessed and engaged in accordance with the requirements of the MS11 Supply Chain and Procurement Management.

Competency of contractors is assessed as part of the pre-qualification and qualification process and requires contractors to define the competency and training requirements necessary to ensure that contractor personnel have the relevant knowledge and skills relevant to their role.

12.6.3 Environment Induction

Amplitude Energy and contractor personnel who work on the activity will complete an induction.

The environmental component of the induction will include information as detailed in Table 12-4. Records of personnel that complete the induction will be maintained internally in accordance with MS06 Information and Systems Management.

Table 12-4: Environmental Components to be included in Environmental Inductions

Component	**Offshore**	**Onshore**
	Vessel	Activity Management
Description of the environmental sensitivities and conservation values of the operations area and surrounding waters. Information on the cultural links with elements of the environment that may be observed in the operational area, including whales.	✓	✓
Controls to be implemented to ensure impacts and risks are ALARP and of an acceptable level.	✓	✓
Requirement to follow procedures and use risk assessments/job hazard assessments to identify environmental impacts and risks and appropriate controls.	✓	✓
Procedures for responding to and reporting environmental hazards or incidents.	✓	✓
Overview of emergency response and spill management procedures.	✓	✓
Megafauna sighting and vessel interaction procedures.	✓	X

12.7 Emergency Response

12.7.1 General Response

Amplitude Energy manages emergencies from offshore Victoria activities in accordance with its Incident Management Plan (IMP). The purpose of the IMP is to provide the Amplitude Energy Incident Management Team (IMT) with the necessary information to respond to an emergency affecting operations or business interruptions. The IMP:

- Describes the Emergency Management Process.
- Details the response process.
- Lists the roles and responsibilities for the IMT members.

- Includes a communications management instructions outlining the types of communications which should occur and by whom within Amplitude Energy. Amplitude Energy maintains an Emergency Contacts Directory which lists Stakeholders relevant to different types of incidents.

12.7.2 Oil Pollution Emergency Plan

In accordance with Commonwealth OPGGS(E)R Section 22(8) and (9), the implementation strategy must include an OPEP/Emergency Response Plan (ERP) and arrangements for testing the response arrangements within these plans.

The Amplitude Energy Offshore Victoria OPEP and Offshore Victoria Operational and Scientific Monitoring Plan (OSMP) provide for oil spill response and monitoring arrangements for this activity. These documents are submitted with this EP.

Roles and responsibilities for maintaining oil spill response capability and preparedness, testing and review arrangements and oil spill response competency and training requirements are detailed in the OPEP. The OPEP also includes Section 2.4 outlining Notification and Ongoing Consultation requirements in the event of a spill requiring OPEP activation.

Vessels will operate under the vessel's SMPEP (or equivalent appropriate to class) or spill clean-up procedures to ensure timely response and effective management of any vessel-sourced oil spills to the marine environment. The SMPEP (or equivalent) is routinely tested. The SMPEP (or equivalent) is designed to ensure a rapid and appropriate response to any vessel oil spill and provides guidance on practical information that is required to undertake a rapid and effective response, and reporting procedures in the event of a spill.

12.8 Chemical Assessment and Selection

Amplitude Energy's Offshore Chemical Assessment Procedure requires that all relevant chemicals planned for use offshore for a project and operations that will be or have the potential to be discharged to the environment are assessed and approved prior to use. This process is used to ensure:

- All relevant chemicals are assessed in accordance with the process
- All assessments are logged and made available on the Offshore Environment Chemical Environment Assessment (OECEA) database
- The OECEA is reviewed on an annual basis to ensure compliance with active Environment Plans (EPs) and ongoing activities.
- The acceptance or rejection of chemicals that require ALARP justification is elevated to the relevant Amplitude Energy Project Manager and/or senior technical representative.
- If there is no Offshore Chemical Notification Scheme (OCNS) or Eco-toxicity data available, and environmental assessment of the chemical is not possible, the discharge of the product offshore will not be approved.

The evaluation process uses a series of steps to assess chemicals by first screening chemicals against public databases. Where necessitated by the screening, such as where public data shows a chemical to have toxicity, bioaccumulation or biodegradation outside of defined thresholds, an ALARP justification is completed. This ALARP justification includes consideration of alternatives, and a detailed technical justification is required to approve the chemical. The ALARP Justification must be approved by the Project Manager. Where technical justification for the chemical cannot be provided, the chemical is not accepted for use.

A summary of the evaluation process is detailed in Table 12-5.

Table 12-5: Amplitude Energy Offshore Chemical Assessment Procedure Steps to Propose a New Chemical

Step	Evaluation	Input	Outcomes
1	Characterise proposed chemical.	Confirm the following: chemical name & supplier chemical Function/purpose formulation, where available CAS number, where available eco toxicity, where available estimated use, dosage and discharge.	Proceed to Step 2.
2	Identify sensitive factors	Chemical assessment is only required for chemicals which are to be discharged to the marine environment. If a chemical is used within a closed system or will remain downhole or stored onboard the vessel, the chemical can be accepted as 'Zero Discharge'. Refer to EP to determine proximity to priority sensitivities. Sensitive factors may include: • Species endemicity/ uniqueness • Species diversity • Biological productivity including benthic primary productivity, and • The social/cultural value of an area.	Where chemical is to be used in an entirely closed loop system no further action is required. Where chemical is to be discharged - proceed to Step 3.
3	Decision: Check PLONOR List.	Refer to OSPAR PLONOR List.	Where the chemical is listed the chemical is approved at Step 3. Where the chemical Is not listed go to Step 4.
4	Decision: Check OCNS Definitive Ranked Lists of Registered Substances.	Search the OCNS Definitive Ranked Lists of Registered Substances for the product name or equivalent branding.	Is the chemical is listed on the OCNS Definitive Ranked List? If yes go to Step5. Where the chemical is not listed go to Step 6.
5	Determine the OCNS Hazard Quotient	Use the OCNS Definitive Ranked Lists of Registered Substances to determine the Risk Banding. Where applicable use the Chemical Hazard Assessment and Risk Management calculator (CHARM) to rank the chemical.	No further action is needed for chemicals with a HQ band Gold, Silver, or OCNS grouped E or D, with no product or SUB warnings. Where chemicals have a HQ colour banded white, blue, orange or purple, or OCNS grouped C, B or A go to step 8
6			Where the chemical does not have a product or substitution warning no

Step	Evaluation	Input	Outcomes
	Determine OCNS Substitution or Product Warning.	Use OCNS Definitive Ranked Lists of Registered Substances or obtain from the current CEFAS template. Always use the latest version.	further action is required and chemical is approved.
			Where the chemical has a product or substitution warning reasonable effort should be made to seek an alternative replacement. go to Step 7.
7	Consider an alternative or complete ALARP justification.	Chemical assessor and chemical requestor work together to seek alternative. If no alternatives are available (based on technical requirements, HSE risk and chemical availability) technical justification is required to proceed with selected chemical.	Where there is no technical justification for the chemical it is not accepted for use. Where there is a technical justification an ALARP Justification must be approved by the Project Manager.

Where a chemical is not included on the OCNS Definitive Ranked List, an Eco-toxicity assessment is undertaken. If the use is short term use (<6 months) and no eco toxicity data for the exact chemical (product) is available, eco-toxicity data from a chemically similar product may be accepted for assessment.

12.9 Invasive Marine Species Risk Assessment

Amplitude Energy's Invasive Marine Species Risk Management Process (CMS-EN-PRO-0002) was developed to:

- Integrate Australian IMS management requirements into Amplitude Energy's offshore operations.
- Prevent the introduction, establishment or spread of a known or potential invasive marine species (attributable to Amplitude Energy activities) within Australian waters.
- Ensure appropriate reporting in the event of identification of a marine pest, to enable a response in accordance with the Australian Marine Pest Emergency Plan.

The procedure details the actions to be undertaken during the contracting phase for vessels, subsea infrastructure, and submersible equipment (e.g. ROVs) for an Activity within an Amplitude Energy operational area (as defined under the EP for the activity). The procedure incorporates key considerations from IMO Biofouling Guidelines (IMO, 2023), Australian Government (2009) biofouling guidelines, and Australian Biofouling Management Requirements (DAFF, 2023); the inputs, decision points and general flow of the of IMS risk management actions are shown in Figure 12-5.

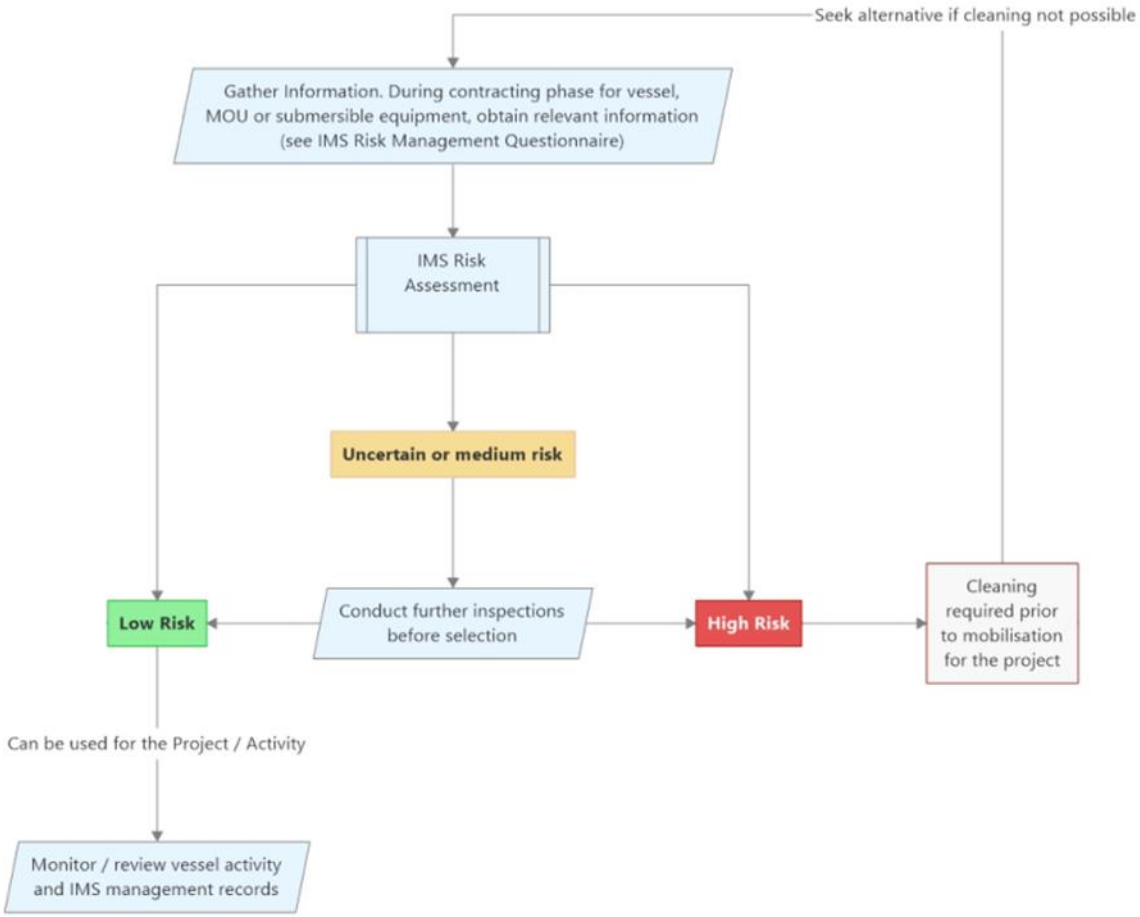


Figure 12-5: Amplitude Energy IMS Risk Management Flow

12.10 Marine Mammal Risk Review and Management

Amplitude Energy implements risk reviews prior to undertaking offshore activities.

The Offshore Victoria Whale Disturbance Risk Management Procedure is designed to reduce impacts and risks to as low as reasonably practicable, and to acceptable levels. The procedure specifically deals with risks of physical interaction (vessel strike), and behavioural disturbances (because of subsea noise) to whales, and other marine mammals. Focus is given to the two Endangered Whale Species (EWS) which undertake important behaviours within both the Otway and the Gippsland Regions.

The procedure communicates how whale interaction and disturbance risks are to be managed by offshore project teams, and crews on offshore vessels involved in offshore projects, in both the Otway and Gippsland regions. The procedure is informed by the respective offshore activity EPs, relevant government guidelines and species conservation management plans. The risk review framework addressing campaign timing in relation to seasonal sensitivities (pygmy blue whale and southern right whale important behaviours) is shown in Figure 12-6.

Figure 12-7 shows the process that will be followed by the MMOs and vessels operating on the Activity, as described in Section 6.5.1 and CM13.

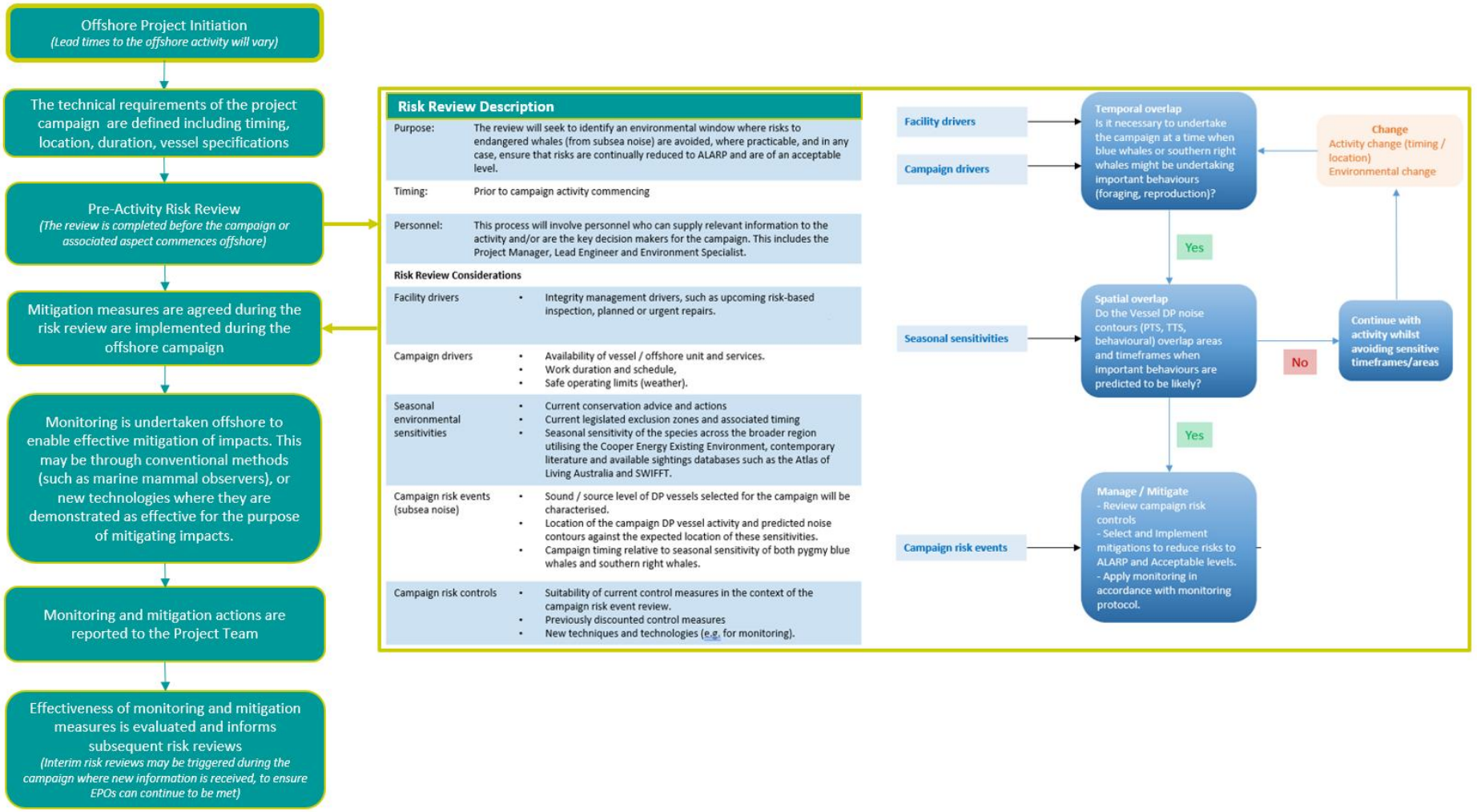


Figure 12-6: Campaign Risk Review Framework

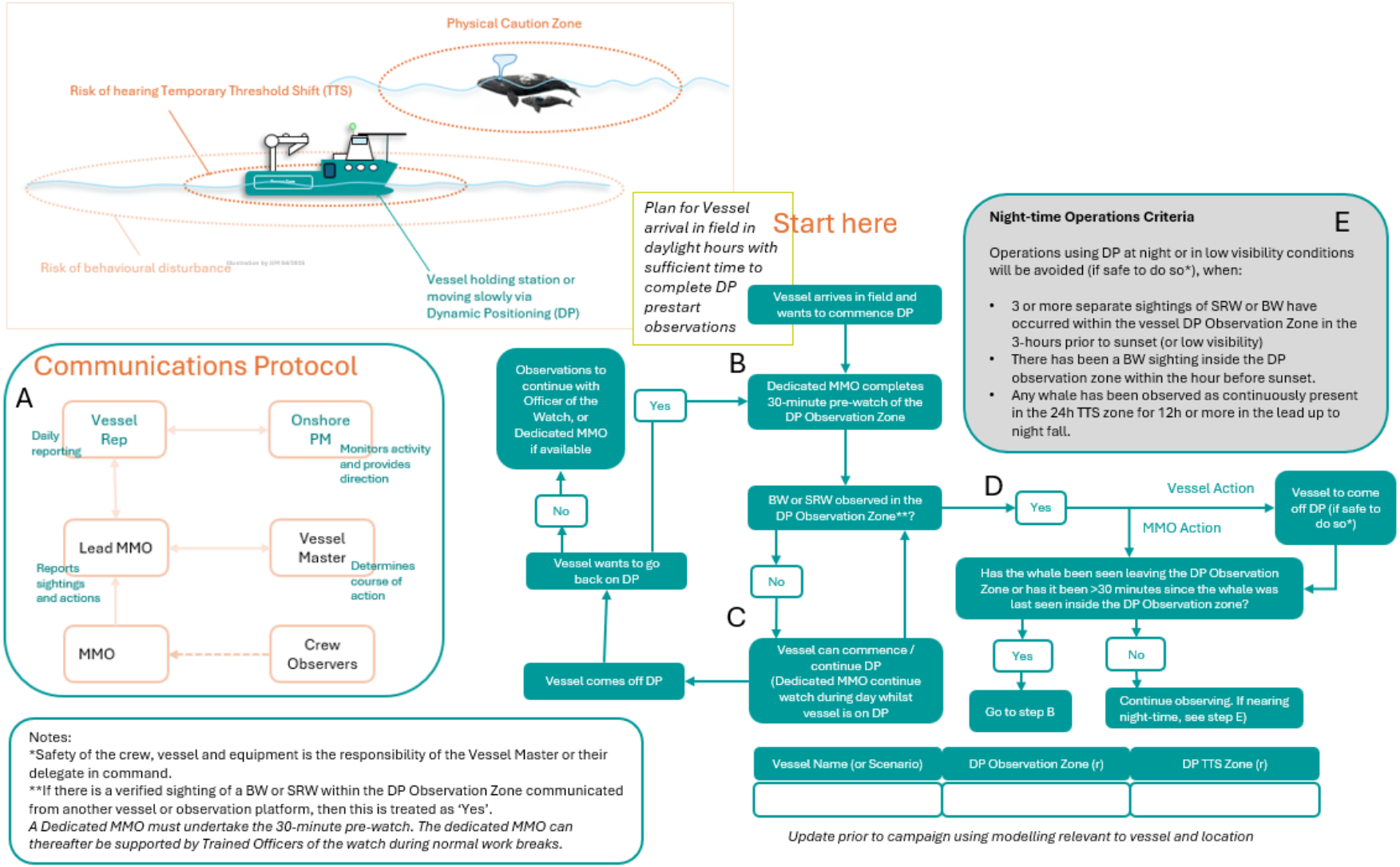


Figure 12-7: Marine Mammal Monitoring and Action Flow Chart

12.11 Inventory Management

12.12 Ongoing Consultation – Regulation 22(15)

Ongoing consultation is that which occurs following the final submission of the environment plan to NOPSEMA prior to acceptance and during the implementation phase. Ongoing consultation supports the following:

- Implementation of commitments made during consultation such as:
  - Notifications of milestones or start and end of activities as agreed.
  - Follow ups that may be agreed (e.g. commitments to data sharing).
  - Consultation in preparation of emergency events that ensures emergency preparedness is maintained.
- Consultation with newly identified relevant persons to:
  - Capture new comments or concerns.
  - Assess if significant new impacts or risks arise, or any opportunity for continuous improvement.
  - Provide feedback on assessment of issues or concerns raised, and any resultant improvements made to the EP.
- Consultation with existing relevant persons to:
  - Consider any changes to impacts or risks where that change might affect those relevant persons' functions, interest or activities.
  - Assess the merits of any objection or claim raised about those changes.
  - Respond to each objection or claim.
  - Incorporate any new measures to be adopted as a result of this consultation via MOC process outlined in this EP.

To support ongoing consultation, Amplitude Energy will monitor for new relevant persons and maintain the EP stakeholder notifications register noting triggers for any agreed notifications or follow ups.

This consultation process has been developed considering the OPGGS(E)R, guidance and case law, and Amplitude Energy company values. However, consultation is a "real world" activity in a dynamic environment and grey areas may appear. Where this occurs, we will manage the change in accordance with our MOC process considering the above. Where unresolved, the objects of the OPGGS(E)R will further guide the MOC process.

12.13 Management of Change

MS08 Technical Management and Management of Change (MoC) General Protocol (CMS-TS-PRO-0002) describes the requirements for dealing with change management. The objective of the MoC process is to ensure that changes do not increase the risk of harm to people, assets or the environment; and to ensure impacts remain at an acceptable level. This includes:

- Deviation from established corporate processes.
- Changes to offshore operations and/or status of infrastructure.
- Deviation from specified safe working practice or work instructions/procedures.
- Implementation of new systems.

- Significant change of HSEC-critical personnel.

Environmentally relevant changes include:

- New activities, assets, equipment, processes or procedures proposed to be undertaken or implemented that have the potential to impact on the environment and have not been:
  - Assessed for environmental impact previously, in accordance with the relevant standard.
  - Authorised in the existing management plans, procedures, work instructions or maintenance plans.
- Proposed changes to activities, assets, equipment (including change of well or infrastructure status that may be undertaken under another EP), processes or procedures that have the potential to impact on the environment or interface with the environmental receptor.
- Changes to the existing environment including (but not limited to) fisheries, tourism and other commercial and recreational uses, and any changes to protective matter requirements, and information which may be shared by traditional owners (e.g., through consultation).
- Changes to the requirements of an existing external approval (e.g. changes to conditions of environmental licences).
- Changes, updates or environmental performance improvement identified from incident investigations, emergency response activities or emergency response exercises, and annual audits.
- Inclusion of any additional, or the improvement of, existing control measures to ensure avoidance of impacts to underwater cultural heritage values that are identified visually during offshore activities.

For any MoC with identified environmental impacts or risks, an impact/risk assessment will be undertaken to ensure that impacts and risks from the change can be managed to meet the nominated EPOs set out in the accepted EP as well as be ALARP and of an acceptable level.

Depending on the nature of the change, an MOC may be completed for a single change (e.g. associated with a discrete offshore campaign), or for a series of changes (e.g. following annual EP review and update). In either case, where an MOC is raised, the change(s) are evaluated against Regulatory criteria (Section 12.13.3) and the EP revised and/or resubmitted where required.

12.13.1 Identifying Change

Environmentally relevant changes will be identified via activity and baseline reviews, after action reviews and on an ad-hoc basis. Reviews will seek to identify both internal and external changes which might result in deviations from the impact and risk profiles provided for within the accepted EP. The reviews include a number of elements:

- Regular review of new and upcoming regulatory and policy change via access to weekly alerts coving changes across legislation and guidelines. This process also assists with the identification and evaluation of relevant government sustainability targets such as emissions reduction targets.
- Involvement with industry associations such as Australian Energy Producers (AEP) and Carbon Market Institute (CMI).
- Monthly review and reporting of recordable incidents; this includes investigation of incidents and may initiate the change assessment process depending on the nature of the incident.

- Review of seabed survey data to identify the presence of underwater cultural heritage receptors that may initiate the implementation of additional control measures to ensure the nominated EPOs set out in the accepted EP are met.
- Annual EP audits (refer to Section 12.15.3) with findings and actions tracked to closure via Synergi.

Annual EP review and update; this process involves:

- Update of relevant legislation, integrating changes identified via the regular review process (if changes have not already triggered an interim update).
- Check of environmental baseline via review of publicly available government databases including PMST search application and UCH database.
- Inclusion of additional or updated environmental baseline relevant to the EP, from sources such as EPBC management plans, and data acquired from seabed surveys undertaken prior to subsea installation activities.
- Pre-activity reviews. During the planning phase for offshore vessel activities, the campaign components are reviewed in the context of the accepted EP to ensure the activities and associated impacts and are provided for.
- After-activity reviews or lessons learned reviews following offshore campaigns; these reviews provide a means to identify, share and act upon opportunities for improvement in relation to the management of impacts and risks.
- Engagement with relevant persons (refer to Section 11.0).

Environmentally relevant changes identified through these processes are recorded and tracked through to integration within relevant documents (e.g. plans, protocols etc.) and implementation within the business.

The regulatory requirement to revise and resubmit an EP is described in Section 12.13.3.

12.13.2 Changes to Titleholders and Nominated Liaison Person

Section 1.6 details the titleholders and nominated liaison person and contact details. Any change in these details is required to be notified to NOPSEMA as soon as possible.

12.13.3 Revisions to the EP

In the event that the proposed change introduces a significant new environmental impact or risk, results in a significant increase to an existing risk, or through a cumulative effect of a series of changes there is a significant increase in environmental impact or risk, this EP will be revised for re-submission to NOPSEMA in line with the MOC process described herein.

Where a change results in the EP being updated, the change/s are to be logged within the document revision description (Appendix 1).

In addition the titleholder is obligated to ensure that all specific activities, tasks or actions required to complete the activity are provided for in the EP. Section 39(1) of the OPGGS(E)R require that where there is a significant modification or new stage of the activity a proposed revision of the EP will be submitted to NOPSEMA.

In addition, a revised EP will be submitted in the circumstances outlined in Section 12.13.1.

12.14 Incident Reporting and Recording

Amplitude Energy's Incident and Crisis Management Protocol and Incident Investigation and Reporting Protocol provide for a systematic method of incident reporting and investigation and a process for monitoring close out of preventative.

The incident reporting and investigation documentation defines the:

- Method to record, report, investigate and analyse accidents and incidents.
- Legal reporting requirements to the regulators within mandatory reporting timeframes.
- Process for escalating reports to Amplitude Energy senior management and the Amplitude Energy Board.
- Methodology for determining root cause.
- Responsible persons to undertake investigations.
- Classification and analysis of incidents.

Any complaints received from third parties relevant to the activities are managed in accordance with the Cooper Energy Incident Investigation and Reporting Protocol. If complaints are received, they are recorded in Amplitude Energy's incident management system (Synergi) with appropriate corrective actions assigned. Where appropriate, feedback on corrective actions is also provided to the complainant. Where complaints may relate to fisheries, such as an equipment damage claim, this is managed in accordance with both Amplitude Energy Incident Investigation and Reporting Protocol and the Fisheries Damages Protocol.

Notification and reporting requirements for environmental incidents to external agencies are listed in Table 12-6. Notification and reporting requirements for oil spills (Level 2/3) are detailed in the OPEP.

Table 12-6: External Incident Reporting Requirements

Incident Type	Description	Requirement	Timing	Contact
Recordable Incident	OPGGS(E)R: An incident arising from the activity that breaches an EPO or EPS in the EP that applies to the activity that is not a reportable incident.	**Written Notification:** As a minimum, the written monthly recordable report must include a description of: • All recordable incidents occurred during the calendar month. • All material facts and circumstances concerning the incidents that the operator knows or is able to reasonably find out. • Corrective actions taken to avoid or mitigate any adverse environmental impacts of the incident. • Corrective actions that have been taken, or maybe taken, to prevent a repeat of similar incidents occurring.	Before the 15th day of the following calendar month.	**Written Notification:** NOPSEMA - **submissions@nopsema.gov.au**
Reportable Incident	OPGGS(E)R: An incident arising from the activity that has caused, or has the potential to cause, moderate to significant environmental damage. For Amplitude Energy, reportable incidents include, but are not limited to, those that have been identified through the risk assessment process as having an inherent impact consequence	**Verbal Notification:** The notification must contain: • All material fact and circumstances concerning the incident. • Any action taken to avoid or mitigate the adverse environmental impact of the incident. • The corrective action that has been taken or is proposed to be taken to stop control or remedy the portable incident. • This must be followed by a written record of notification as soon as possible after notification.	Commonwealth Waters Within 2 hours of notification of the incident	**Verbal Notification:** NOPSEMA – Phone 1300 674 472 **Written Notification:** NOPSEMA - **submissions@nopsema.gov.au** NOPTA – **reporting@nopta.gov.au**
		Written Notification: Verbal notification of a reportable incident to the regulator must be followed by a written report. As a minimum, the written incident report will include: • The incident and all material facts and circumstances concerning the incident.	Commonwealth Waters Within 3 days of notification of the incident	Written Notification: NOPSEMA - **submissions@nopsema.gov.au**

Incident Type	Description	Requirement	Timing	Contact
	Level 3, 4 or 5, or at a minimum, the following incidents: A level 2/3 spill incident. IMS Introduction.	• Actions taken to avoid or mitigate any adverse environmental impacts. • The corrective actions that have been taken, or may be taken, to prevent a recurrence of the incident. • The action that has been taken or is proposed to be taken to prevent a similar incident occurring in the future.		
		Written Notification: Written reports to be submitted to National Offshore Petroleum Titles Administrator (NOPTA) and DJSIR (for incidents in Commonwealth waters).	Within 7 days of written report submission to NOPSEMA	**Written Notification:** NOPTA – **reporting@nopta.gov.au**
Reportable incident - in the event an AMP may be exposed to hydrocarbons		**Verbal Notification:** Notification must be provided to the Director of National Parks and include: • titleholder details • time and location of the incident (including name of marine park likely to be affected) • proposed response arrangement • Confirmation of providing access to relevant monitoring and evaluation reports when available. • Contact details for the response coordinator.	As soon as possible	**Verbal Notification:** Marine Park Compliance Duty Officer – Phone 0419 293 465
Reportable Incident – Invasive Marine Species		**Written Notification:** Suspected or confirmed IMS Introduction.	Before the 15th day of the following calendar month.	**Written Notification:** NOPSEMA – **submissions@nopsema.gov.au**
			Immediate written notification (following phone call to NOPSEMA). Incident report* emailed within 3	Written Notification: NOPTA: **reporting@nopta.gov.au**

Incident Type	Description	Requirement	Timing	Contact
			days of the incident. *Complete relevant sections of NOPSEMA incident reporting form FM0831.	
			As soon as possible	Verbal Notification DAFF - Phone 1800 900 090
Reportable Incident - Injury or Death to Fauna		**Written Notification:** Impacts to MNES, specifically injury to or death of EPBC Act-listed species. **https://www.environment.gov.au/biodiversity/threatened/listed-species-and-ecological-communities-notification**	Within 7 days	**Written Notification:** Email: **EPBC.Permits@environment.gov.au**
		Impact to cetacean/s in or beyond the Australian Whale Sanctuary resulting in death, injury or harassment. **https://www.dcceew.gov.au/environment/marine/marine-species/cetaceans/notification-interactions**	Within 7 days	DCCEEW Phone: 1800 920 528 Email: **EPBC.Permits@environment.gov.au**
		Vessel strike with cetacean.	Within 72 hours of incident.	DCCEEW – National Ship Strike Database **https://data.marinemammals.gov.au/report/shipstrike**

12.15 Environmental Performance Monitoring and Reporting'

Amplitude Energy implements a range of measures aiming to ensure that for the duration of the Activity:

- The environmental impacts and risks of the activity continue to be identified and reduced to a level that is ALARP and acceptable.
- Control measures detailed in the EP are effective in reducing the environmental impacts and risks of the activity to ALARP and an acceptable level.
- Emissions and discharges are monitored.
- Environmental performance outcomes and standards set out in the EP are being met.

These measures are integrated throughout this EP and key assurance processes are summarised in Table 12-7.

Table 12-7: Summary of Assurance Processes

Process	Frequency & Responsibility
Change management reviews	See Section 12.11
Tracking of Emissions and Discharges	See Section 12.15.1
Audit and Inspections	See Section 12.15.3
Management of non-conformance	See Section 12.11

12.15.1 Emissions and Discharges

Quantitative monitoring, record-keeping and reporting of emissions and discharges is undertaken for all activities within the scope of this EP. Emissions and discharge monitoring and records required for vessel-based activities are detailed in Table 12-8. These are used to validate inputs and assumptions to the impact assessments within the EP, ensuring impact profiles remain within defined acceptable levels. Copies of emission and discharge records will be retained in accordance with Section 12.16.

Record logs of vessel discharges are retained in accordance with MARPOL.

Table 12-8: Emissions and Discharge Monitoring

Aspect	Monitoring	Monitoring Frequency	Records
Site Surveying			
Project chemical discharges to marine environment	Chemical name Chemical type Chemical use Chemical volume	Weekly	Offshore Reports
Treated bilge	Volume Location Vessel Speed	As required	Oil Record Book
Food scraps	Volume Location	As required	Garbage Record Book
Sewage and greywater	Volume Location	As required	Maintenance Records
Spill	Volume	As required	Daily Report

Aspect	Monitoring	Monitoring Frequency	Records
	Chemical / Oil type		
Fuel use	Volume	Daily	Incident Report
GHG Emissions	Volume (Fuel usage)	Daily	Daily Report
Installation, Testing and Preservation			
Project chemical discharges to marine environment	Chemical name Chemical type Chemical use Chemical volume	Weekly	Offshore Reports
Cementing discharges	Nature of discharge Volume Location	As required	Daily Report
Waste	Volume sent ashore	As required	Garbage Record Book or Waste Manifest
Spill	Volume Chemical / Oil type	As required	Daily Report
Fuel use	Volume	Incident Report	
GHG emissions	Volume (Fuel usage) Volume / Rate (Flaring)	Daily	Daily Report
Support Activities			
Project chemical discharges to marine environment	Chemical name Chemical type Chemical use Chemical volume	Weekly	Offshore Reports
Routine release of hydraulic fluid		As required	Offshore Reports
Treated bilge	Volume Location Vessel Speed	As required	Oil Record Book
Food scraps	Volume	Daily	Daily Report
Sewage and greywater	Volume Location	As required	Maintenance Records
Fuel use	Volume	Daily	Daily Report
Ballast water discharge	Volume Location	As required	Ballast Water Record System.
GHG Emissions	Volume (Fuel usage)	Daily	Daily Report

12.15.2 Activity Commencement and Cessation Notifications

Activity notification requirements are detailed in Section 11.0 (Consultation).

12.15.3 Annual Performance Report

As required by Section 51 (1) OPGGS(E)R, Amplitude Energy will submit an annual EP performance report to the regulator (NOPSEMA). This report will provide sufficient detail to enable the Regulator

to determine whether the environmental performance outcomes and standards in the EP have been met.

The report will be submitted annually, by 31 December each year.

12.15.4 Fauna Reporting

Cetacean observation data will be submitted to the DCCEEW, within 3 months of the completion of an Activity.

Observation data in relation to culturally significant species will be made available to First Nations Groups where requested.

12.15.5 Audit and Inspection

Environmental performance of offshore operations and activities will be audited and reviewed in several ways to ensure that:

- Environmental performance standards to achieve the EPOs are being implemented and reviewed.
- Potential non-compliances and opportunities for continuous improvement are identified.
- Environmental monitoring requirements are being met.

Non-conformance with the environmental performance standards outlined in this EP will be managed as per Section 12.15.6.

Opportunities for improvement or non-compliances noted will be communicated to relevant personnel at the time of the review/inspection/audit to ensure adequate time to implement corrective actions. The findings and recommendations of inspections or audits will be documented and distributed to relevant personnel for comment, and any actions tracked until completion.

12.15.5.1 EP Compliance

An annual audit will be conducted and used to inform the annual EP performance report (see section 12.15.3) submitted to NOPSEMA.

The Audit scope will include the performance outcomes and performance standards contained in the EP and the requirements detailed in the implementation strategy, to ensure that the environmental performance outcomes and environmental performance standards are being met.

Any environmentally relevant changes and opportunities to improve environmental performance will be assessed as described in Section 12.13 and incorporated into EP revisions as required.

The following arrangements review the environmental performance of offshore vessel activities:

- A premobilisation Marine Assurance inspection will be undertaken for offshore vessels to ensure they can meet the requirements of the EP and OPEP.
- An Activity-wide pre-start readiness review to ensure controls measures are in place, resourced and communicated to enable compliance.
- HSEC inspections will be undertaken throughout the offshore activity at least fortnightly to ensure ongoing compliance with relevant EP requirements. The scope of the inspections will include (but is not limited to) a range of marine and Activity assurance checks:
  - Spill readiness (i.e., provision spill kits and drills in accordance with vessel SOPEP/SMPEP).
  - Waste management in accordance with the EP, EPOs and EPSs.
  - Control measure performance for project activities occurring on the vessels.

- Chemical Inventory checks to ensure campaign chemicals are accepted via the Offshore Chemical Assessment Procedure.
- Maintenance checks for equipment identified within an EP EPS (e.g. oily water separator).

Non-compliance and improvement opportunities will be communicated to Amplitude Energy HSEC onshore for advice, tracking and reporting in accordance with Section 12.15.6.

12.15.6 Management of Non-Conformance

In response to any EP audit and inspection non-compliances, corrective actions will be implemented and tracked to completion as per the Incident Investigation and Reporting Protocol (CMS-ER-PRO-0001).

Corrective actions will specify the remedial action required to fix the breach and prevent its reoccurrence and is delegated to the person deemed most appropriate to fulfil the action. The action is closed out only when verified by the appropriate Manager and signed off. This process is maintained through the Amplitude Energy corrective action tracking system.

Where more immediacy is required, non-compliances will be communicated to relevant personnel and responded to as soon as possible. Where relevant the results of these actions will be communicated to the offshore crew during daily toolbox meetings or at daily or weekly HSEC meetings.

Amplitude Energy will carry forward any non-compliance items for consideration in future operations to assist with continuous improvement in environmental management controls and performance outcomes.

12.16 Records Management

In accordance with the Section 52 of the OPGGS(E)R, Amplitude Energy will store and maintain documents or records relevant to the EP in accordance with the Technical Information Management Procedure (CMS-IM-PCD-0002).

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