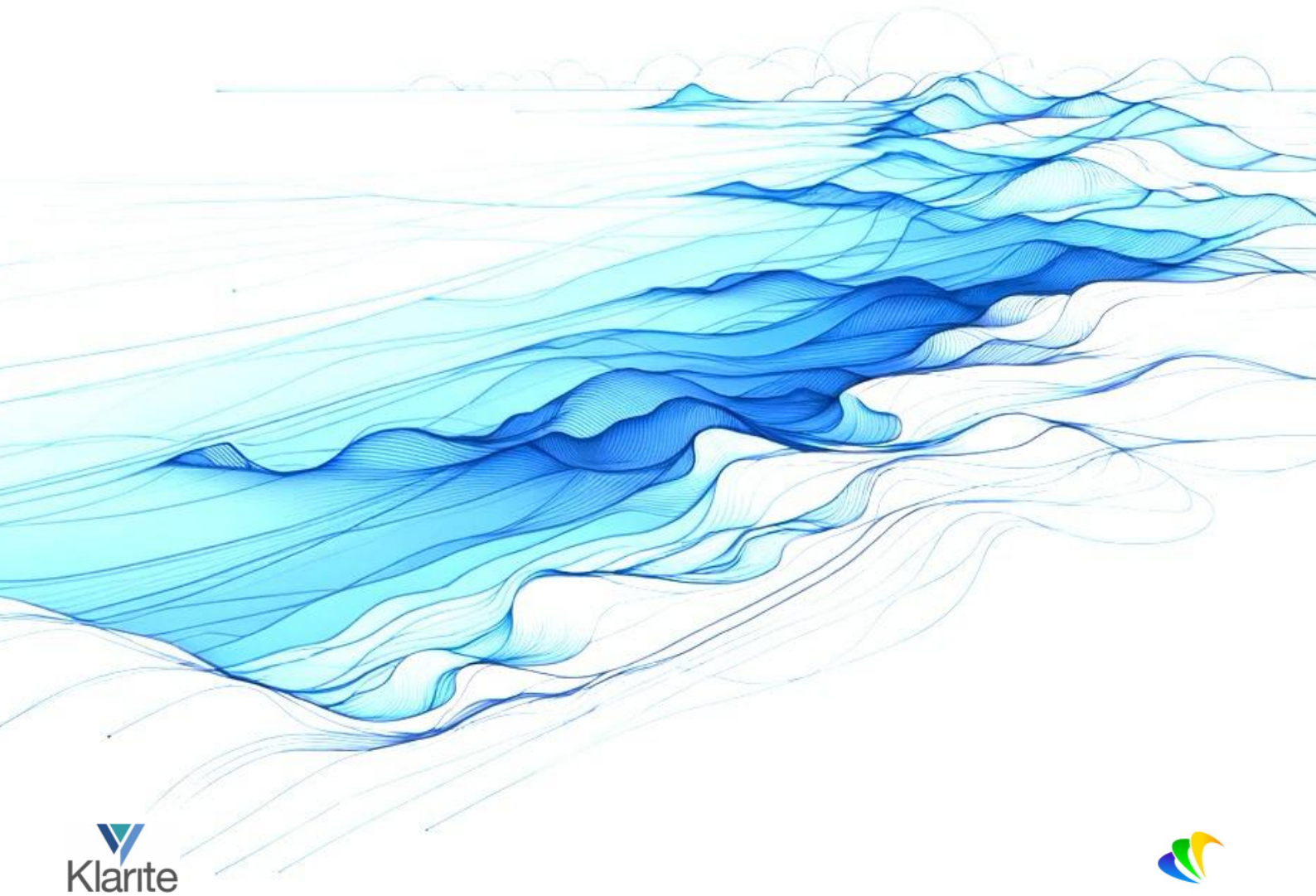
REGIA
Marine Seismic Survey

# Risk Assessment
# Accidental Release of Fuel

Appendix D4: REG-EP-019-D4

Rev 5

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Klarite

# Table of Contents

**1 Introduction 4**
1.1 Purpose and Scope 4
1.2 Consultation in Preparation of the EP 4
**2 Aspect – Accidental Release of Fuel 5**
2.1 How the Aspect Occurs 5
2.2 Extent and Duration of the Aspect 6
**3 Cause-Effect Pathway 8**
**4 Description of the Existing Environment that may be Affected by the Activity 10**
**5 Relevant Legislative and Other Requirements 12**
**6 Defining Acceptable Levels of Risk 13**
**7 Consultation Input 15**
**8 Minimisation of Risks Through Activity Design 17**
8.1 Elimination 17
8.2 Substitution 17
**9 Predicted Levels of Risk 18**
9.1 Change in Water Quality 20
9.2 Change in Sediment Quality 22
9.3 Change in Fauna Behaviour and Physical Condition 23
9.4 Change in Ecosystem Dynamics 44
9.5 Changes to Functions, Interests and Activities and Change in Aesthetic Value 52
9.6 Measures Adopted to Manage Environmental Risks 80
**10 Demonstration Risks Will Be of An Acceptable Level 81**
10.1 Discussion on Principles of ESD 81
10.2 Biological and Ecological Categories 81
10.3 Discussion on Economic, Cultural and Social Categories 81
10.4 Discussion on Consistency with Company Processes 82
**11 Environmental Performance Outcomes 83**
**12 Recommendations 84**
**13 Document Control 85**
**14 References 86**
**Annex 1 96**
Public Comment 96
**Annex 2 97**
Objections and Claims Raised from Consultation 97

**Annex 3** **109**

Loss of Containment Sensitive Species 109

# 1 Introduction

Accidental release of fuel was identified through the Preliminary Environmental Impact and Risk Assessment (**PEIRA**) (Appendix B4) as an aspect needing further assessment. Hence, this document presents a detailed examination of **Accidental Release of Fuel** as a risk pathway between the Regia Marine Seismic Survey (**Regia MSS**) and the existing environment that may be affected by that aspect.

This document also uses information in two preceding study:

1. PEIRA
2. Oil Spill Modelling Analysis (Appendix B11)

## 1.1 Purpose and Scope

The purpose of this document is to assess all acceptable sources of information to provide clear outcomes around levels-of-impact, and any associated mitigation and management measures that may be needed.

This assessment is the second stage of the environmental assessment. Its purpose is to rank the impact according to the criteria set out in the Environmental Assessment Process found in Appendix B3. The purpose of this stage of the assessment is to demonstrate that the impact can be managed to an acceptable level through the adoption of mitigation measures and the setting of an appropriate environmental performance outcome.

The measures adopted because of consultation and because of the assessment will be carried through to the ALARP assessment which occurs in stage three of the overall assessment process. Recommendations will be made if there is any further assessment required in the third stage of the assessment.

## 1.2 Consultation in Preparation of the EP

This document was first published in draft form to the Document Library of the Regia MSS Consultation Hub on 11 September 2023. This was done to acknowledge that the final full Environment Plan (EP) can be a large document that is difficult for readers to digest in the 30-day public comment period. As such, the public and relevant persons were invited to comment on the document with an explicit request for readers to provide feedback on:

- The accuracy of the described environment that may be affected.
- Any omissions of environmental values and sensitivities relevant to the environmental aspect.
- Any errors or omissions of scientific/peer reviewed literature that should be considered.
- Any errors or omissions of relevant legislation or documents of standing that should be considered.
- Any further mitigation or management measures that should be considered.

Up to 22 December 2023, there were no specific comments received on the content of the document.

# 2 Aspect – Accidental Release of Fuel

## 2.1 How the Aspect Occurs

The following hydrocarbons and chemicals will be present on the seismic vessel and support vessels:

- Marine diesel oil (MDO) used as fuel for the vessels.
- Hydraulic fluids such as engine and synthetic oils required for equipment and engine use.
- Chemicals for cleaning and maintenance purposes.

Hydrocarbons and chemicals are stored in contained areas but there is the potential for a loss of containment to occur resulting in a release of hydrocarbons or chemicals to the marine environment. Loss of containment scenarios are details in Table D4-1.

*Table D4-1: Accidental Release of Fuel Scenarios*

| Scenario | Material and Potential Volume | Description |
|---|---|---|
| **Vessel fuel tank rupture** | 257.4 $m^3$ MDO | A collision between the survey vessel, support vessel or a third-party vessel has the potential to result in the breach of the vessel hull and subsequent rupture of a fuel tank. A spill to sea because of vessel collision/grounding is only likely to occur under exceptional circumstances where these conditions resulted in significant damage to one or more of the fuel tanks in the hull of the vessel. These may include:<br>• Navigational error<br>• Vessel loss of power<br>• Floundering due to weather.<br>If a collision/grounding involving the seismic vessel occurred, the worst-case credible scenario would be the loss of the largest single fuel tank volume (consistent with AMSA (2015) guidelines), which is 257.4 $m^3$ of MDO. Vessel fuel tank inventory will be limited to 250$m^3$ to align with the modelling report. |
| **Vessel refuelling failure** | 1.2 $m^3$ to 25 $m^3$ of MDO | A vessel refuelling failure may result in the release of MDO to the marine environment.<br>Using dry-break couplings (which provide an automatic mechanism to seal off both the hose and the fixed pipe end when the hose is disconnected), the maximum credible spill volume from a refuelling failure is the maximum typical volume of a transfer hose (1.2 $m^3$). In the event dry break couplings fail, guidelines indicate the maximum credible spill volume from a refuelling incident with continuous supervision is equivalent to the volume of MDO transferred within a 15-minute period (AMSA 2053), which represent the estimated time required to shut down refuelling operations following discovery of a spill. Based on a transfer volume of 100 $m^3$/hr, this may result in a spill volume of 25 $m^3$. |
| **Loss of containment overboard** | 1 $m^3$ of hydraulic fluid, lubricating fluids, or chemicals | A loss of containment may occur because of mechanical/ structural failure, human error, or poor housekeeping.<br>Should a spill occur on a vessel deck, controls such as equipment bunds, scupper plugs and on-board clean up should prevent the spilt material reaching the marine environment. |

| Scenario | Material and Potential Volume | Description |
|---|---|---|
| | | However, in the event these controls fail, or are not implemented, spill volumes released to the environment are likely to be less than 1 $m^3$ based on the inventory typically used on deck. |

## 2.2 Extent and Duration of the Aspect

Duration: 90 days survey duration +30 days

A loss of containment could occur at any time during the activity (90 days). If there were a loss of containment the consequences of the largest release (fuel tank rupture of MDO) may persist for up to 30 days post-incident before water quality was below acceptable thresholds again.

Extent: Environmental Planning Area

If there were an accidental release of fuel it could potentially disperse 150 km from the location of the vessel. An additional 5 km was added to this range to ensure that coastal sensitivities were included in the search ranges for environmental values and sensitivities to inform the description of environment. This area is the Environmental Planning Area (Appendix B12 MAP-REG-EPM-083).

The 150 km is based on the NERA Reference Case: Consequences analysis of an accidental release of MDO (NERA 2018) that found that MDO spills under 700$m^3$ were reliably predicted to disperse within 150 km from the source of the spill. However, this reference case was based on exposure values that are higher than the current commonly used exposure values for oil spill modelling (NOPSEMA 2019) that are selected to approximate the spatial extent and variability of the receiving environment's contact with oil and subsequently inform risk evaluation and planning for oil spill response and monitoring. Thus, to validate that 150 km was sufficiently conservative a review was undertaken to identify oil spill modelling that has been undertaken in the Otway area since the NOPSEMA Oil Spill Modelling Environment Bulletin was published in April 2019. The review, provided in Oil Spill Modelling Analysis (Appendix B11), confirmed that 150 km was sufficiently conservative to approximate the spatial extent and variability of the receiving environment's contact with oil and subsequently inform risk evaluation and planning for oil spill response and monitoring for a spill up to 250 $m^3$ of MDO within the Regia MSS Operational Area.

### 2.2.1 Analysis of Low Threshold Exposure Ranges

As acknowledged above, the NERA Reference Case (NERA 2018) was prepared before NOPSEMA clarified its expectations for exposure values from modelling to conform to 10 parts per billions (ppb) thresholds for entrained hydrocarbons. Whilst the analysis presented in Appendix B11 did consider the higher thresholds in the NOPSEMA Oil Spill Modelling Environment Bulletin (April 2019), the highest distances in this analysis exceed the Environmental Planning Area distance.

The analysis is reasonable to apply to the Regia MSS for the reasons provided in Appendix B11 and because:

- An accidental release of hydrocarbons from vessel collisions with seismic survey operations has never occurred in Australia.
- A volume of 250$m^3$ has been used as the worst-case release rather than 257.4$m^3$ because fuel tanks are rarely topped out and hydrostatic pressure and/or ballasting can prevent release of the full inventory. The difference of 7.4$m^3$ in predicting the level of risk is immaterial to the analysis.
- The most likely accidental release of hydrocarbons would occur from an accident whilst bunkering which would be a release orders of magnitude less than the predicted loss of 250$m^3$.

- The consequence analysis undertaken relies on modelled results from multiple thousands of modelled runs rather than the typical range of 100 – 300 model runs in a single analysis.

The consequence analysis presented covers all months of the year and the sea states in the operational months September – December will:

- Enhance the natural degradation of entrained hydrocarbons; and
- Significantly limit the spread of entrained hydrocarbons.

If entrained hydrocarbons did exceed the Environmental Planning Area distance:

- The only part of the environment that may be affected by entrained hydrocarbons is water quality and the description of water quality in the bioregion is the same as that provided in Section 4.
- The predicted impacts in an area beyond the environmental planning area remain unchanged.

Whilst the effect range at 10-ppb may be larger, the operational and scientific monitoring plan (OMSP) and arrangements are sufficient to detect exceedances of thresholds noting that:

- Water quality monitoring at sea in the months in which the activity is being carried out is unlikely to be effective, limiting detection options to coastal locations.
- The Otway coastline is known as being one of the highest energy coastlines around Australia further improving natural degradation and limiting the spread of entrained hydrocarbons.

# 3 Cause-Effect Pathway

The PEIRA identified a cause-effect pathway for an accidental release of fuel for the following environmental components and their social, cultural, and economic features:

- Water quality
- Sediment quality
- Benthic assemblages
- Coastal habitats and communities
- Plankton
- Invertebrates
- Fish
- Birds
- Marine reptiles
- Marine mammals
- Coastal development
- Indigenous culture
- Commercial fishing and aquaculture
- Marine industries
- Marine Tourism
- Diving
- Recreational Fishing
- Marine Protected Areas

Hydraulic fluids and lubricating fluids behave similarly to MDO when spilt in the marine environment. Hydraulic fluids are oils of light to moderate viscosity and have a relatively rapid spreading rate. Like MDO, they will dissipate quickly, particularly in high sea states, although lubricating oils are more viscous and so the spreading rate of a spill of these oils would be slightly slower.

Impacts associated with a spill of chemicals to the marine environment will depend on the nature of the liquid released, the volume and its behaviour in the marine environment (whether it sinks, floats, disperses, etc.). In the event of a spill to the marine environment, these liquids would be subjected to rapid dispersion and dilution by the open ocean water conditions and prevailing currents and would remain within the surface waters.

Potential impacts from minor spills of hydraulic fluids, lubricating fluids or chemicals include a temporary and highly localised decline in water quality. This would have limited potential for toxicity to marine fauna or impact socio-economic receptors, due to the short duration of exposure and rapid dilution of the released liquids in the marine environment. As there is no likely cause-effect pathway to impact fauna or socio-economic receptors and impacts to water quality is predicted to be negligible no further assessment is required.

MDO is a light, refined petroleum product that when spilled on water, most of the oil evaporates or naturally disperses quickly (hours to days). However, the rates differ with both water and air temperature, more so with wind speed (and wave energy).

MDO is much lighter than water, so it is not possible for MDO to sink and accumulate on the seabed as pooled or free oil.

Dispersion into the sea by the action of wind and waves can result in 25–50% of the loss of hydrocarbons from surface slicks and dissolution (solubility of hydrocarbons) can account for 1-10% loss from the surface. While the majority of the MDO evaporates quickly, it is common for the residues of MDO spills after weathering to contain n-alkanes, iso-alkanes and naphthenic hydrocarbons.

Spilled MDO can affect biological receptors via direct contact or through inhalation of vapours as the MDO as it disperses. Visual slicks or oil shoreline oil can have impacts on socio-economic and cultural receptors especially where there is commercial, recreational, and traditional fishing, coastal activities, and tourism.

The known and potential environmental risks of a MDO spill are:

- Change in water quality
- Change in sediment quality
- Change in ecosystem dynamics
- Change in physical condition
- Change in fauna behaviour
- Changes to the functions, interests, or activities of other users (e.g., commercial fisheries, shipping).
- Change in aesthetic value

# 4 Description of the Existing Environment that may be Affected by the Activity

As detailed in Section 2.2, the Environmental Planning Area has been adopted as the areal extent within which receptors could be exposed to oil from a MDO spill.

To identify key values and sensitivities that may be at risk from an accidental release of marine diesel oil within the Environmental Planning Area a PMST search was undertaken using the Environmental Planning Area, with the PMST Report available in Appendix B5: PMST Search Reports. A summary of the values and sensitivities protected under the EPBC Act relevant to a loss of containment is detailed in within this document. The summary also identifies any relevant conservation advice or recovery plans.

The identified Cultural Features values and sensitivities (refer to section 3.16, Appendix F3), were also reviewed to assess potential risks from an accidental release of fuel.

In addition, a review was undertaken of commercial fisheries that may fish within the Environmental Planning Area and is documented in the Commercial Fisheries Analysis Report (Appendix B6).

A description of the existing environment that may be affected by an accidental release of fuel is provided for each environmental component in Section 9.

PMST searches were run again prior to resubmission (Rev 2) to ensure any changes to species or listings were identified to control for passage of time. Conservation Advice has also been updated for several species and subsequent changes have been made to Annex 3. Changes relevant to the assessment of an accidental release of fuel include:

- Changes to EPBC Act status of several species
    - Red Knot is listed as Vulnerable (previously Endangered)
    - Sharp-tailed Sandpiper is listed as Vulnerable (previously not listed as threatened)
    - Sooty Shearwater is listed as Vulnerable (previously not listed as threatened)
    - Great Knot is listed as Vulnerable (previously Critically Endangered)
    - Western Alaskan Bar-tailed Godwit is listed as Endangered (previously Vulnerable)
    - Common Greenshank is listed as Endangered (previously not listed as threatened)
    - Ruddy Turnstone is listed as Vulnerable (previously not listed as threatened)
    - Latham's Snipe is listed as Vulnerable (previously not listed as threatened)
    - Terek Sandpiper is listed as Vulnerable (previously not listed as threatened)
    - Grey Plover is listed as Vulnerable (previously not listed as threatened)
    - Eastern Dwarf Galaxias is listed as Endangered (previously Vulnerable)
    - Yarra Pygmy Perch is listed as Endangered (previously Vulnerable)
    - Blue-winged Parrot is listed as Vulnerable (previously not listed as threatened)
- Updates to conservation advice for several species
    - Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW 2024)
    - Conservation Advice for *Calidris acuminata* (Sharp-tailed Sandpiper) (DCCEEW 2024a)
    - Conservation Advice for *Ardenna grisea* (Sooty Shearwater) (DCCEEW 2023i)
    - Conservation Advice for *Calidris tenuirostris* (Great Knot) (DCCEEW 2024f)
    - Conservation Advice for *Limosa lapponica baueri* (Bar-tailed Godwit western Alaskan) (DCCEEW 2024b)
    - Conservation Advice for *Tringa nebularia* (Common Greenshank) (DCCEEW 2024e
    - Conservation Advice for *Arenaria interpres* (Ruddy Turnstone) (DCCEEW 2024c)
    - Conservation Advice for *Gallinago hardwickii* (Latham's snipe) (DCCEEW 2024d)
    - Conservation Advice for *Xenus cinereus* (Terek Sandpiper) (DCCEEW 2024g)

  - Conservation Advice for *Pluvialis squatarola* (Grey Plover) (DCCEEW 2024h)
  - Conservation Advice for *Neophema chrysostoma* (Blue-winged Parrot) (DCCEEW 2023l)
  - Conservation Advice for *Calidris ferruginea* (Curlew Sandpiper) (DCCEEW 2023m)
  - Conservation Advice for *Numenius madagascariensis* (Far Eastern Curlew) (DCCEEW 2023n)
  - Conservation Advice for *Charadrius leschenaultii* (Greater Sand Plover) (DCCEEW 2023o)
  - Conservation Advice for *Galaxiella pusilla* (Dwarf Galaxias) (DCCEEW 2023j)
  - Conservation Advice for *Nannoperca obscura* (Yarra Pygmy Perch) (DCCEEW 2023k
- Removal of bird species, Broad-billed Sandpiper (species no longer appears in PMST).
- Removal of National Heritage place, 'Quarantine Station and Surrounds' (doesn't overlap with the Environmental Planning Area).

These changes have been incorporated throughout the EP and the risk assessment has been revised accordingly [Section added in response to Matters: I16 and I17].

All changes listed above remain relevant after the PMST searches were rerun prior to resubmission of Rev 3, with two exceptions:

- The National Heritage place 'Quarantine Station and Surrounds' which now overlaps with the Environmental Planning Area again.
- Southern Bluefin Tuna (*Thunnus maccoyii*) also has been removed from the February 2025 PMST reports for all areas searched, as it is no longer listed as a threatened species under the EPBC Act (DCCEEW 2024k). This species remains to be discussed here for a number of reasons including the view that a precautionary approach remains appropriate to assess this species that was only recently delisted, the species known relevance to regional fisheries, and to accurately reflect the passage of time over which this EP has been constructed.

Additional changes from the most recent PMST searches relevant to the assessment of an accidental release of fuel include:

- Changes to Biologically Important Areas
  - Pygmy Blue Whale Distribution BIA has been removed (from all areas searched).
  - Distribution BIAs for White Shark have been removed (from all areas searched).
  - Breeding BIA added for Short-tailed Shearwater to three areas searched (Light EMBA, and Underwater Sound EMBAs for Birds and LF cetaceans).
  - Breeding BIA added for White-faced storm-petrel to the EPA.
- Additional Species detected
  - Grey Nurse Shark (*Carcharias taurus*) appears in searches for all areas as 'Species or species habitat may occur within area'.
- Additional Listed Threatened Ecological Community
  - King Island Scrub Complex overlaps the Environmental Planning Area.
- National Heritage place 'Budj Bim National Heritage Landscape – Tyrendarra Area' was present in one additional search area and now overlaps with the Environmental Planning Area.
- World Heritage Property – 'Budj Bim Cultural Landscape' was present in one additional search area and now overlaps with the Environmental Planning Area.

These changes have been incorporated throughout the EP and the risk assessment has been revised accordingly.

# 5 Relevant Legislative and Other Requirements

CGG has considered all the relevant legislative requirements, that apply to the risk of accidental release of fuel (see Appendix B2). Measures that will be adopted to demonstrate how these requirements will be meet are as follows:

- CGG Marine Assurance System which ensures compliance of contract vessels with Navigation Act, MARPOL, COLREGS and Marine Orders.
- Oil Spill Response Plans where the NOPSEMA Accepted OPEP details the role of the vessel operator, CGG and AMSA in the event of an oil spill.
- Consultation Management System which details notification requirements to the AHO and AMSA and to relevant stakeholders as required.

# 6 Defining Acceptable Levels of Risk

| Category | Defined Acceptable Level (General) | Defined Acceptable Level (Aspect Specific) | Rationale |
|---|---|---|---|
| **Principles of ESD** | The petroleum activity results in temporary / reversible, small scale, and/or low intensity environmental damage. | Prevent any accidental release of fuel to the marine environment.<br><br>Have comprehensive emergency response plans, aligned with the National Plan for Maritime Environmental Emergencies, in place to mitigate consequences.<br><br>Have an Operational and Scientific Monitoring Plan in place to monitor the effects of a release of fuel to the marine environment. | No accidental release of fuel to the marine environment.<br><br>Maintain arrangements to respond to an unplanned release of fuel in accordance with the OPEP.<br><br>Maintain arrangements to monitor the effects of a release of fuel to the marine environment in accordance with the OSMP. |
| | The impact and risk assessment process are based on sufficient information to understand if:<br>Serious/irreversible environmental damage is predicted; or<br>The application of the precautionary principle is applied in the presence of scientific uncertainty. | | |
| | Environmental management of the activity must not be inconsistent with EPBC Act Management Plans and Recovery Plans. | | |
| **Biological** | Impacts and risks to biological features will be temporary / reversible, small scale, and/or low intensity environmental damage at population levels. | | |
| **Ecological** | Impacts and risks to ecological features will be temporary / reversible, small scale, and/or low intensity damage to the overall health, diversity, or functioning of the ecosystem. | | |
| **Economic** | Affected persons will not be worse off because of the activity. | Industries, livelihoods, and ecosystem services remain viable, with no sustained financial or operational consequences resulting from changes in species behaviour, abundance, or access to resources. | For species and sensitivities with social, cultural and/or economic values, if the potential ecological impact or risk is deemed acceptable, it is likely that the |

| Category | Defined Acceptable Level (General) | Defined Acceptable Level (Aspect Specific) | Rationale |
|---|---|---|---|
| **Cultural** | Impacts and risks to cultural features including cultural values, traditions, or practices, will be temporary / reversible, small scale, and/or low intensity. | Culturally important species, places, and practices can continue without disruption to their role, accessibility, or long-term viability. | corresponding impact on social, cultural and/or economic values will also be considered acceptable, as the physical presence and health of these species are key for maintaining their social, economic and cultural roles. Predicted levels of impact for species that have social, cultural and economic values will be assessed on a receptor level. |
| **Social** | Measures have been adopted based on the consultation process to address relevant objections and claims of relevant persons. | People and communities can continue engaging with the natural environment, recreational activities, and heritage values without experiencing long-term or irreversible disruption. | |
| | The views of public have been considered in the impact and risk assessment. | | |
| **Company** | Environmental impacts and risks are consistent with the CGG impact and risk assessment process such that for an impact or risk the effect/ consequence rating is medium or below. | As per the general levels. | CGG is a company familiar with managing the effects of seismic sound on the marine environment, and its global operational history supports the reliability of its internal assessment process. The use of CGG's impact and risk matrix, when consistently applied, has not resulted in unacceptable environmental outcomes, which indicates the process produces conservative and realistic assessment outcomes. |

# 7 Consultation Input

CGG carried out the consultations required by the regulations to:

- Improve the predictive quality of this assessment by seeking relevant person input into the preparation of the EP.
- To verify the description of the environment that CGG produced as part of its environmental assessment process through information provided to CGG by relevant persons.
- Receive objections or claims about the adverse effects of the activity on a relevant person's functions, interests, or activities.

The information received from relevant persons can be found in each relevant person consultation report. It has been considered in the preparation of this assessment.

Objections or claims about the adverse of the effects of the activity can also be found in each relevant person's consultation report. They have been assessed for merit and CGG has written a statement of its response to each objection or claim. Any objection or claim relevant to this assessment and subsequently considered in its preparation can be found in

Annex 2.

# 8 Minimisation of Risks Through Activity Design

As part of planning and design of the activity, several activity limitations were considered in accordance with the hierarchy of controls and through the consultation process (see Annex 2). These limitations were evaluated to determine whether the source of risk could be eliminated or substituted through changes in the timing, technology, or design of the activity. As described in Appendix F3, section 3.16.2, due to the interconnection between the tangible and intangible cultural values, all activity limitations are relevant to safeguarding social, economic, and cultural features and values, ensuring protection across all areas.

## 8.1 Elimination

Elimination involves removing the source of an impact or risk entirely through changes to the activity design. In the context of accidental release of fuel, elimination involves removing or reducing the factors that could lead to this risk occurring. One main option was considered and subsequently adopted:

**Bunkering operations will not occur within 50 km of a Commonwealth or State marine park**

Even though spills from collisions and bunkering are extremely unlikely this measure adds a precautionary measure because diesel releases are not expected to travel more than 50 km from the source of the release given the prevailing conditions in the region.

## 8.2 Substitution

Where elimination is not viable, substitution involves altering the timing, location, or sequencing of the activity to reduce the likelihood or consequence of the risk. No substitution-based activity limitations were required in this case, as other measures applied were sufficient to reduce the identified risk to an acceptable level.

# 9 Predicted Levels of Risk

Based upon an understanding of the cause/effect pathway, an accidental release of fuel releases 250 $m^3$ of MDO is used to predict the level of risk to receptors as this is the largest loss of containment scenario.

Table D4-2 provides the criteria used to determine the sensitivity of receptors within the Environmental Planning Area with the following tables assessing each receptor identified within the Environmental Planning Area having regard to the legislative and other requirement.

*Table D4-2 - Receptor Sensitivity Criteria.*

| Sensitivity | Protected Areas | Species Status | BIA | Coastal Habitat Sensitivity | Relevant Receptors |
|---|---|---|---|---|---|
| Low | State - no marine protected areas.<br>Commonwealth - multiple use zones are the dominant component of the protected area. | Species not threatened (or limited to only a few species of a particular faunal grouping).<br>Present in the Environmental Planning Area only occasionally or as vagrants.<br>Populations known to recover rapidly from disturbance. | No BIA (or limited to only a few species of a particular faunal grouping). | Low sensitivity habitat, such as fine-grained beaches, exposed wave-cut platform and exposed rocky shores, with rapid recovery from oiling (~ 1 year or less).<br>Public recreation beaches not present or not widely used.<br>No harbours or marinas. | Sediment quality<br>Plankton<br>Invertebrates<br>Fish<br>Marine protected areas |
| Medium | State – no marine protected area.<br>Commonwealth -little to no special purpose zonation. | Species may be threatened (or some species of a particular faunal grouping).<br>Species may or may not be present at time of activity.<br>Some susceptibility to oiling.<br>Populations may take a moderate time to recover from oiling. | Some intersection with one or more BIAs, generally for distribution or migration rather than breeding. | Moderately sensitive habitat present, such as sheltered rocky rubble coasts, exposed tidal flats, gravel beaches, mixed sand and gravel beaches, with a medium recovery period from oiling (~2-5 years).<br>Public recreation beaches present but not often used.<br>No harbours or marinas | Water quality<br>Benthic assemblages<br>Coastal habitats and communities<br>Seabirds<br>Marine reptiles<br>Marine mammals<br>Commercial fisheries and aquaculture<br>Marine industries<br>Marine protected areas |
| High | State - marine protected area present.<br>Commonwealth -special purposes zones are the dominant component of the protected area. | Species are threatened (or most species of a particular faunal grouping).<br>Species known to be present at time of activity.<br>Known to be susceptible to oiling.<br>Populations may take a long time to recover from oiling. | Significant intersection with one or more BIAs, particularly with regard to foraging or breeding. | Sensitive habitat present, such as mangrove, salt marshes, and sheltered tidal flats, with long recovery periods from oiling (> 5<br>years).<br>Public recreation beaches present that are widely used.<br>Busy harbours or marinas. | Coastal developments<br>Aquatic birds<br>Shorebirds<br>Diving<br>Indigenous culture<br>Marine Tourism<br>Marine protected areas<br>Recreational fishing |

## 9.1 Change in Water Quality

### 9.1.1 Water Quality

| **Water Quality** | |
|---|---|
| **Sensitivity Rating** | **Medium** |
| **Predicted Level of Risk** | **Low** |
| **Environmental Planning Area Existing Environment** | |
| Water quality within the Environmental Planning Area is expected to be typical of offshore waters of southern Australia. Water sampling undertaken for the Beach Otway Development area within the Environmental Planning Area (Ramboll 2020) detailed that the water quality at survey areas indicated an undisturbed mid-depth environment. | |
| Predicted Level of Risk | |
| The Environmental Planning Area is based on the following thresholds where water quality could be potentially at risk:<br>The low threshold to assess the potential for floating oil exposure of 1 g/m$^2$ equates to an average thickness of 1 µm, referred to as visible oil. Oil of this thickness is described as rainbow sheen in appearance, according to the Bonn Agreement Oil Appearance Code (AMSA 2014). This threshold is used to establish the planning area for scientific monitoring.<br>The low threshold of 10 ppb to assess the potential for dissolved and entrained oil exposure represents the very lowest concentration and corresponds generally with the lowest trigger levels for chronic exposure for entrained hydrocarbons in the ANZECC & ARMCANZ (2000) water quality guidelines. This threshold is used to establish the planning area for scientific monitoring.<br>A summary of the mass balance of a MDO spill within the Environmental Planning Area (RPS 2022) showed:<br>Under a constant 5 knot (~2.5 m/s) wind, 40.3% of the oil is predicted to evaporate within 24 hours. Under calm conditions, most of the remaining oil on the water surface will weather at a slower rate due to being comprised of the longer-chain compounds with higher boiling points. Evaporation shall cease when the residual compounds remain, and they will be subject to more gradual decay through biological and photochemical processes.<br>Under a variable-wind where the winds are of greater strength on average, entrainment of MDO into the water column is predicted to increase. Approximately 24 hours after the spill, 60.1% of the oil mass is forecast to have entrained and a further 38.4% is forecast to have evaporated, leaving only a small proportion of the oil floating on the water surface (<0.1%).<br>The increased level of entrainment in the variable-wind case result in a higher percentage decaying at an approximate rate of 1.5% per day with or ~10.5% after 7 days, compared to <0.1% per day and a total of 0.9% after 7 days for the constant-wind case. Given the proportion of entrained oil and the tendency for it to remain mixed in the water column, the remaining hydrocarbons will decay over time scales of several weeks.<br>Based on the weathering properties of MDO water quality within the Environmental Planning Area, 40% of a 250 m$^3$ MDO spill will evaporate within 24 hours with the remaining oil to becoming entrained in the water column where it will decay below threshold levels within 30 days. | |

| **Water Quality** |
| --- |
| Thus, the predicted level of consequence to water quality from a 250 $m^3$ MDO spill is assessed as minor as any consequences will be short-term (< 30 days for oil to decay below low thresholds) within a localised area with full recovery, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of low. |

## 9.2 Change in Sediment Quality

### 9.2.1 Sediment Quality

| **Sediment Quality** | |
|---|---|
| **Sensitivity Rating** | **Low** |
| **Predicted Level of Risk** | **Low** |
| **Environmental Planning Area Existing Environment** | |
| Sediment quality within the Environmental Planning Area is expected to be typical of coastal and nearshore area of southern Australia. Water sampling undertaken for the Beach Otway Development area within the Environmental Planning Area (Ramboll 2020) detailed that the sediment quality at survey areas had a high oxidation reduction potential and low or undetectable levels of toxicants indicating an unmodified seabed environment. | |
| Predicted Level of Risk | |
| In previous risk assessment studies, French-McCay et al. (2005a; 2005b) used a threshold of 10 g/m$^2$ to assess the potential for shoreline accumulation. It would equate to approximately 2 teaspoons of hydrocarbon per square meter of shoreline accumulation. The appearance is described as a stain/film. On that basis, the 10 g/m2 shoreline accumulation threshold has been selected to define the zone of potential "low shoreline accumulation".<br>As detailed in the assessment of water quality, the majority of surface oil will have evaporated or entrained in the water column within ~ 24 hours, thus only a small proportion is likely to move to shoreline areas above the low threshold. Furthermore, wave action in shoreline areas will further breakdown the remaining oil.<br>Thus, the predicted level of consequence to sediment quality from a 250 m$^3$ MDO spill is assessed as minor as consequences will be short-term (< 30 days) within a localised area with full recovery, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of low. | |

## 9.3 Change in Fauna Behaviour and Physical Condition

### 9.3.1 Plankton

| **Plankton** | |
|---|---|
| **Sensitivity Rating** | **Low** |
| **Predicted Level of Risk** | **Low** |
| **Environmental Planning Area Existing Environment** | |

Plankton is a key component in oceanic food chains and support nearly all marine life. Plankton is divided into two groups, namely phytoplankton (microscopic plants) and zooplankton (microscopic animals). Plankton is the dominant biomass of marine ecosystems (CSIRO 2015).

Copepods are the most common zooplankton and are some of the most abundant animals on earth. Plankton communities are highly diverse, with members from almost all phyla. Phytoplankton are photosynthetic organisms that drift with ocean currents and are mostly microscopic; however, some gelatinous plankton can be up to 2 m in diameter. Phytoplankton is grazed by zooplankton such as small protozoa, copepods, decapods, krill and gelatinous zooplankton.

The carrying capacity of marine ecosystems (the mass of fish resources) and recruitment of individual stocks is strongly related to plankton abundance, timing and composition. In the Environmental Planning Area, the seasonal Bonney coast upwelling is a productivity hotspot, with high densities of zooplankton and are important for fish and whales, including culturally significant species (see Appendix F3, section 3.16.1). The primary ecological importance of the Bonney coast upwelling is as a feeding area for the Pygmy Blue Whale (PBW) (*Balaenoptera musculus brevicauda*). The upwelled nutrient-rich water promotes blooms of coastal krill (*Nyctiphanes australis*), which in turn attracts PBW to the region to feed. The upwelling is one of only three identified feeding areas consistently used by PBW in Australian coastal waters (Butler et al. 2002). The upwelling occurs when strong south-easterly surface winds induce warm, nutrient-deficient surface waters away from the coastline. This leads to surface upwellings bringing cool, nutrient-rich deep waters closer to the surface where there is enough sunlight for primary production among planktonic organisms to take place (Hosack and Dambacher 2012).

Plankton distribution from the upwelling area is dependent upon prevailing ocean currents including the Leeuwin Current, East Australia Current, flows into and from Bass Strait and Southern Ocean water masses. Populations are thought 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.

A detailed analysis of satellite-derived ocean data (chlorophyll a levels) for the periods 1998-2000 and 2005- 2014 suggests that the western Tasmanian shelf also accommodates a productive ecosystem. Based upon the Kampf (2015) study, this region forms part of the Great South Australian Coastal Upwelling System and experiences two phytoplankton blooms per annum:

The first and larger bloom – occurs in the late austral summer months (typically February-April) resulting from favourable winds that occur between December-April. Stronger upwelling winds do not always create phytoplankton blooms.

The second smaller bloom – occurs in spring (October) coincident with the onset of spring bloom in the western Tasman Sea. The mechanism for this smaller bloom remains unclear.

| **Plankton** |
| --- |
| Kampf (2015) identifies that the accuracy of satellite data cannot be used to identify upwelling jets however would suggest the existence of upwelling jets on the western Tasmanian shelf. The significance of these jets is that they operate to disperse nutrient-rich water northwards along the shelf and possibly into western Bass Strait. This advective process would explain elevated chlorophyll a level in western Bass Strait – a typical feature of the region during austral summer months. The western Tasmanian upwelling system lies to the west of the Tasmanian mainland and at least 130 km southeast of the acquisition area. |
| **Predicted Level of Risk** |
| Plankton are likely to be exposed to oil within the upper 10 m of the water column in areas close to the spill source where oil concentrations are the highest.<br><br>Phytoplankton is typically not sensitive to the impacts of oil, though they do accumulate it rapidly due to their small size and high surface area to volume ratio (Hook et al. 2016). If phytoplankton is exposed to hydrocarbons at the sea surface, this may directly affect their ability to photosynthesize via smothering and would have implications for the next trophic level in the food chain (e.g., small fish) (Hook et al. 2016). In addition, the presence of surface hydrocarbons may result in a reduction of light penetrating the water column, which may affect the rate of photosynthesis, particularly in instances where there is prolonged presence of surface hydrocarbons over an extensive area such that the phytoplankton was restricted from light exposure, in turn affecting the rate of photosynthesis and inhibiting growth, depending on the concentration range. For example, photosynthesis is stimulated by low concentrations of oil in the water column (10-30 ppb) but become progressively inhibited above 50 ppb. Conversely, photosynthesis can be stimulated below 100 ppb for exposure to weathered oil (Volkman et al. 2004).<br><br>Zooplankton (microscopic animals such as rotifers, copepods and krill that feed on phytoplankton) are vulnerable to hydrocarbons due to their small size and high surface area to volume ratio, along with (in many cases) their high lipid content (that facilitates hydrocarbon uptake and bioaccumulation) (Hook et al. 2016). Water column organisms that come into contact with oil risk exposure through ingestion, inhalation, and dermal contact (NRDA 2012), which can cause immediate mortality or declines in egg production and hatching rates along with a decline in swimming speeds (Hook et al. 2016).<br><br>Plankton is generally abundant in the upper layers of the water column and acts as the basis for the marine food web, meaning that a MDO spill in any one location is unlikely to have long-lasting impacts on plankton populations at a regional level. Variations in the temporal scale of oceanographic processes typical of the ecosystem have a greater influence on plankton communities than the direct effect of spilt hydrocarbons. This is because reproduction by survivors or migration from unaffected areas would be likely to rapidly replenish any losses from permanent zooplankton (Volkman et al. 2004).<br><br>Field observations from oil spills show minimal or transient effects on marine plankton (Volkman et al. 2004). Once background water quality conditions have re-established, the plankton community will take weeks to months to recover (ITOPF 2011), allowing for seasonal influences on the assemblage characteristics.<br><br>Thus, the predicted level of consequence to plankton from a 250 $m^3$ MDO spill is assessed as minor as consequences will be short-term (days to weeks to months), recoverable and affect a small portion of the plankton population that is widely representative of the region and would be unlikely to impede associated food chains within the region, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of low. |

### 9.3.2 Invertebrates

| **Invertebrates** | |
|---|---|
| **Sensitivity Rating** | **Low** |
| **Predicted Level of Risk** | **Low** |
| **Environmental Planning Area Existing Environment** | |
| Studies by the Museum of Victoria found that invertebrate diversity was high in southern Australian waters although the distribution of species was patchy, with little evidence of any distinct biogeographic regions (Wilson and Poore 1987). Results of sampling in shallower inshore sediments reported high diversity and patchy distribution (Parry et al. 1990). In these areas, crustaceans, polychaetes, and molluscs were dominant.<br>Throughout the region, a variety of seabed habits support a range of animal communities such as sparse sponges to extensive 'thickets" of lace corals and sponges, polychaete worms and filter feeders (DNP 2013). Echinoderms, such as sea stars, sea urchins and sea cucumbers are also an important fauna species of the southern Australian and Tasmanian waters, with several species at risk of extinction (DPIPWE 2020).<br>Rock lobster, giant grab, scallops, abalone, and octopus are fished by commercial and recreational fishers in the Environmental Planning Area. Risks to these fisheries are assessed in the section on commercial fishing.<br>Several invertebrate species including torbos, pipis, abalone, limpets, mussels, elephant snails, crayfish/lobster, crabs and squid are identified as culturally significant to the Gunditjmara People as both a resource and in harvesting as a cultural practice (GMTOAC, 2023). Barnabeel (oyster), murrabal (mussel), bam bam (crayfish), abalone and pipi are also culturally important resources to the Wadawurrung People (WTOAC, 2020). Invertebrate species are an important traditional, social and economic resource for the Eastern Maar People. Abalone, cockles and crayfish are collected as tucker along the coast (EMAC, 2015) (Appendix F3, Section 3.16.1). | |
| **Predicted Level of Risk** | |
| The primary modes of exposure for benthic invertebrate communities for a surface oil spill are:<br>Direct exposure to oil within the water column to a depth of 10 m (RPS 2019a).<br>Direct exposure to oil on shoreline or within sediment within 10 m water depth.<br>Indirect exposure to oil through the food web via uptake of oiled plankton, detritus, prey, etc. (NRDA 2012).<br>Acute or chronic exposure, through surface contact, and/or ingestion can result in toxicological risks.<br>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 other invertebrates with no exoskeleton and larval forms may be more prone to impacts from pelagic hydrocarbons. | |

| **Invertebrates** |
| --- |
| Localised impacts to larval stages may occur which could impact on population recruitment. If invertebrates are contaminated by hydrocarbons, tissue taint can remain for several months, although taint may eventually be lost. For example, it has been demonstrated that it took 2-5 months for lobsters to lose their taint when exposed to a light hydrocarbon (NOAA 2002) (see Commercial Fisheries' assessment).<br><br>Exposure to microscopic oil droplets may also impact aquatic biota either mechanically (especially filter feeders) or act as a conduit for exposure to semi-soluble hydrocarbons (that might be taken up by the gills or digestive tract) (McCay-French 2009). Toxicity is primarily attributed to water soluble PAHs, specifically the substituted naphthalene (C2 and C3) as the higher C-ring compounds become insoluble and are not bioavailable.<br><br>ANZECC/ARMCANZ (2000) identifies the following 96-hr LC50 concentrations for naphthalene (a key PAH dissolved phase toxicant in crude oils):<br><br>For the bivalve mollusc, *Katelysia opima*, a concentration of 57,000 ppb<br><br>For six species of marine crustaceans, a concentration between 850 and 5,700 ppb.<br><br>Other possible impacts from the presence of dispersed and non-dispersed oil include effects of oxygen depletion in bottom waters due to bacterial metabolism of oil (and/or dispersants), and light deprivation under surface oil (NRDA 2012).<br><br>Water quality in benthic habitats exposed to entrained hydrocarbons would be expected to return to background conditions within < 30 day. Several studies have indicated that rapid recovery rates may occur even in cases of heavy oiling (Committee on Oil in the Sea 2003).<br><br>Due to the low concentrations and physical properties of the MDO, and the exposed nature of shoreline and well- mixed nature of the waters in the Environmental Planning Area coating of invertebrates and prolonged exposure to hydrocarbons is considered highly unlikely.<br><br>Thus, the predicted level of consequence to invertebrates from a 250 $m^3$ MDO spill is assessed as minor as consequences will be short-term (days to weeks), recoverable and affect a small portion of the invertebrate population would be unlikely to impede associated food chains within the region the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of low. |

### 9.3.3 Fish

| **Fish** | |
|---|---|
| **Sensitivity Rating** | **Low** |
| **Predicted Level of Risk** | **Low** |
| **Environmental Planning Area Existing Environment** | |
| The PMST Report (Appendix B5) identified multiple fish species or species habitat within the Environmental Planning Area as detailed in Annex 3 of this document. None of these fish species were identified to be undertaking biologically important behaviours or have BIAs or habitat critical to the survival of the fish species.<br>The Dwarf Galaxias is a freshwater species (Saddler et al. 2010) and the Yarra Pygmy Perch occurs in lakes, ponds, and slow flowing rivers (Sadler and Hammer 2010) which are outside the Environmental Planning Area.<br>The Australian Grayling is a small to medium-sized, slender, silvery fish with soft-rayed fins lacking any spines. It is endemic to south-eastern Australia, including Victoria, Tasmania, and New South Wales, and is a migratory species that inhabits estuarine waters and coastal seas as larvae/juveniles, and freshwater rivers and streams as adults (Backhouse et al. 2008).<br>The Blue Warehou is a medium-sized, deep-bodied fish, reaching a maximum total length of 90 cm and a maximum weight of 7 kg (TSSC 2015). Globally, the Blue Warehou is confined to Australian and New Zealand waters predominantly in coastal shelf, upper continental slope, and seamount waters offshore from New South Wales, Tasmania, Victoria and South Australia (TSSC 2015). Blue Warehou is a target species for the Tasmania Scalefish Fishery.<br>The eastern population of Gemfish (Eastern Gemfish) is taken as bycatch in commercial fisheries. The largest proportion of catch of the species is taken in the South East Trawl sector of the Commonwealth Southern and Eastern Scalefish and Shark Fishery (SESSF), where it is caught primarily in deepwater trawl nets that are targeting multiple species that are found on the continental shelf. Eastern Gemfish are mesopelagic and inhabit deeper continental shelf habitats and upper slope waters from 100 m to 700 m (down to 1254 m) but are generally found in waters about 250 to 500 m deep (TSSC 2009).<br>The Orange Roughy is a demersal fish targeted by the Southern and Eastern Scalefish and Shark Fishery. They are widely distributed throughout the world and forms dense spawning and feeding aggregations on or near topographic features such as seamounts, canyons, and plateaus (DCCEEW 2023). No spawning or feeding aggregation areas have been identified in the Environmental Planning Area.<br>Southern Bluefin Tuna can grow to 225 cm in length and 200 kg in weight (TSSC 2010). They are a highly migratory species that occurs globally in waters between 30°S and 50°S forming on single global population (TSSC 2010). In Australian waters, they range from northern Western Australia, around the southern region of the continent, to northern New South Wales (TSSC 2010). Southern Bluefin Tuna are a target species for the Southern Bluefin Tuna Fishery.<br>Most of the listed marine ray-finned fish species identified in the PMST Report for the Environmental Planning Area are syngnathids, which includes seahorses and their relatives (sea dragon, pipehorse and pipefish). The majority of these species are associated with seagrass meadows, macroalgal seabed habitats, rocky reefs and sponge gardens located in shallow, inshore waters (e.g., protected coastal bays, harbours and jetties) less than 50 m deep (Fishes of Australia 2015). They are sometimes recorded in deeper offshore waters, where they depend on the protection of sponges and rafts of floating seaweed such as sargassum.<br>The PMST Report (Appendix B5) identified six shark species with the White Shark having foraging or feeding related behaviour and a foraging BIA as detailed in Annex 3 of this document. | |

| **Fish** |
| --- |
| The east coast population of the Grey Nurse Shark covers a range of approximately 2700 km and extends from the Capricornia coast (central Queensland) to Narooma in southern New South Wales. Sightings data from the New South Wales Department of Primary Industries (NSW DPI) includes sightings as far south as the NSW/Victoria border (CoA 2014). Grey Nurse Sharks tend to live in shallow inshore waters, with their preferred habitats have sandy-bottomed gutters or rocky caves and are close to inshore rocky reefs or islands (DCCEEW 2021).<br><br>Gulpener Sharks are targeted by the Southern and Eastern Scalefish and Shark Fishery. There are endemic to Australia in habitats on the upper-slope and are mainly demersal (bottom dwelling) between 180 m to 900 m (Williams et al. 2012) of the southern continental shelf.<br><br>The Porbeagle occurs in waters from southern Queensland to south-west Australia (Last & Stevens 2009). Animals typically occur in oceanic waters off the continental shelf, although they occasionally enter coastal waters (Francis et al. 2002). The Porbeagle is known to undertake seasonal migrations, although the timing and details of these migratory movements are not well-understood (Saunders et al. 2011). Individuals have been tracked moving large distances (i.e. 1500-1800 km along continental shelves and crossing the Atlantic Ocean between Europe and North America) (Francis et al. 2002).<br><br>School Shark appears to have undergone a significant reduction in numbers as the result of commercial fishing in south eastern Australian waters (TSSC 2009a). School Shark is primarily a deep water demersal (bottom-dwelling) species, although individuals have been recorded undertaking daily vertical migrations, remaining at depths of around 500 m during the day and moving up to around 100 m at night (McLoughlin, 2007). Females and juveniles utilise inshore coastal areas around Victoria, Tasmania and parts of South Australia for nursery areas (Pogonoski et al., 2002).<br><br>The Shortfin Mako is a large pelagic shark with a circum-global distribution inhabiting tropical and temperate waters. It is rarely encountered in waters with temperatures below 16°C (Last and Stevens 2009). In Australian waters, the shortfin mako has been recorded in offshore waters all around the continent's coastline except for the Arafura Sea, Gulf of Carpentaria, and Torres Strait. The species primarily occurs in offshore, oceanic waters and is pelagic (has no habitat associations with the seafloor) (Last and Stevens 2009).<br><br>The White Shark is listed as Vulnerable. White Sharks are long-lived, living for 30 years or more (Bruce 2008), and are found throughout temperate and sub-tropical regions in the northern and southern hemispheres (Last & Stephens 2009). The species is also commonly found in inshore waters in the vicinity of islands, and often near seal colonies (Malcolm et al. 2001). The foraging BIA that is within the Environmental Planning Area is centred on Lady Julia Percy Island which is a known seal breeding colony (Appendix B12 MAP-REG-EPM-027). The Environmental Planning Area also overlaps the distribution BIA that covers Australian waters from Barrow Island/Montebello Islands, WA to Yeppoon/Swains Reef, Qld.<br><br>In addition to protected fish species, commercial fish and shark species such as mackerel, salmon, sardines, snapper, sawsharks, whiting and wrasse are likely to be present in the Environmental Planning Area.<br><br>Short finned eels, known as Kooyang, are an important Indigenous cultural value, and may migrate through the Environmental Planning Area (GMTOAC, 2023; WTOAC, 2020; EMAC, 2015). The Environmental Planning Area does not overlap any freshwater or estuaries where eels spend most of their life cycle (VFA 2022) or where Indigenous eel traps are present. Perch, and Blackfish species also hold Indigenous cultural value in traditional, social and economic practices (GMTOAC, 2023; WTOAC, 2020; EMAC, 2015). Blackfish are an inland river fish (VFA 2024b) and therefore outside of the Operational and Planning Areas (Appendix F3, Section 3.16.1). |
| **Predicted Level of Risk** |
| Fish are exposed to in-water hydrocarbon (entrained and dissolved) through a variety of pathways, including:<br><br>Direct dermal contact such as swimming through oil or waters with elevated dissolved hydrocarbon concentrations and other constituents, with diffusion across their gills (Hook et al. 2016). |

| **Fish** |
| --- |
| Ingestion either directly or via food base, fish that have recently ingested contaminated prey may themselves be a source of contamination for their predators. |
| Inhalation where elevated dissolved contaminant concentrations in water pass over the gills. |
| Exposure to hydrocarbons entrained or dissolved in the water column can be toxic to fish. Studies have shown a range of impacts including changes in abundance, decreased size, inhibited swimming ability, changes to oxygen consumption and respiration, changes to reproduction, immune system responses, DNA damage, visible skin and organ lesions, and increased parasitism. However, many fish species can metabolise toxic hydrocarbons, which reduces the risk of bioaccumulation of contaminants in the food web and human exposure to contaminants through the consumption of seafood (NRDA 2012). |
| Sub-lethal impacts in adult fish include altered heart and respiratory rates, gill hyperplasia, enlarged liver, reduced growth, fin erosion, impaired endocrine systems, behavioural modifications and alterations in feeding, migration, reproduction, swimming, schooling, and burrowing behaviour (Kennish 1996). However, fish are highly mobile and unlikely to remain in the area of a spill for long enough to be exposed to sub-lethal doses of hydrocarbons. |
| The toxicity of dissolved hydrocarbons and dispersed oil to fish species has been the subject of a number of laboratory studies (AMSA 1998). Generally, concentrations in the range of 0.1–0.4 mg/L dispersed oil have been shown to cause fish deaths in laboratory experiments (96-hour LC50). No reported studies of the impacts of oil spills on cartilaginous fish (including sharks, rays and sawfish) were found in the literature. |
| The assessment of effects on fish species in the Timor Sea as a result of the Montara well blowout (a light gas condensate), conducted from November 2009 to November 2010 undertaken by Gagnon & Rawson (2011), found that of the species studied (mostly Goldband Snapper Pristipomoides multidens, Red Emperor Lutjanus sebae, Rainbow Runner Elegatis bipinnulata and Spanish Mackerel Scomberomorus commerson), all 781 specimens were in good physical health at all sites. Results show that: |
| Phase 1 study (November 2009, immediately after the blowout ceased) - indicated that in the short-term, fish were exposed to and metabolised petroleum hydrocarbons, however no consistent adverse effects on fish health or their reproductive activity were detected. |
| Phase 2 study (March 2010, 5 months after the blowout ceased) – indicated continuing exposure to petroleum hydrocarbons, as detected by elevated liver detoxification enzymes and PAH biliary metabolites in three out of four species collected close to the spill site, and elevated oxidative DNA damage. |
| Phase 3 study (November 2010, 12 months after the blowout ceased) – showed a trend towards a return to reference levels with often, but not always, comparable biomarker levels in fish collected from reference and impacted sites. This evidence of exposure to petroleum hydrocarbons at sites close to the spill location suggest an ongoing trend toward a return to normal biochemistry/physiology (Gagnon & Rawson 2011). |
| The main finding of the Gagnon & Rawson (2011) study concluded that there were no detectable petroleum hydrocarbons found in the fish muscle samples, limited ill effects were detected in a small number of individual fish, and no consistent adverse effects of exposure on fish health could be detected within two weeks following the end of the well release. Notwithstanding, fishes from close to the Montara well, collected seven months after the discharge began, showed continuing exposure to hydrocarbons in terms of biomarker responses. Two years after the discharge, biomarker levels in fishes had mostly returned to reference levels, except for liver size. However, this was potentially attributed to local nutrient enrichment, or to past exposure to hydrocarbons. Fishes near Heyward Shoal, approximately 100 km southwest of the Montara well, had elevated biomarker responses indicating exposure to hydrocarbons, but were collected close to the Cornea natural hydrocarbon seep. Studies on the Montara discharge have shown recovery in terms of the abundance and composition of fishes, and toxicological and physiological responses of fishes. |
| No reports of oil spills in open waters have been reported to cause fish kills (though mortality in aquaculture pens has), which is likely to be because vertebrates can rapidly metabolise and excrete hydrocarbons (Hook et al. 2016). |
| Recovery of fish assemblages depends on the intensity and duration of an unplanned discharge, the composition of the discharge and whether dispersants are used, as each of these factors influences the level of exposure to potential toxicants. Recovery would also depend on the life cycle attributes of fishes. Species that are abundant, |

| **Fish** |
| --- |
| short-lived and highly fecund may recover rapidly. However less abundant, long-lived species may take longer to recover. The range of movement of fishes will also influence recovery. The nature of the receiving environment would influence the level of impact on fishes.<br>None of the conservation advices or recovery plans for fish or sharks identify oil spill as a threat. The syngnathid species are most likely to be present in the top 10 m of the water column where oil may be present. The other fish and shark species are either demersal species (bottom dwelling) or pelagic species which swim large distances and hence these species are unlikely to be affected by oil from a diesel spill. Impacts to syngnathid species are more likely close to the spill location which oil concentrations would be highest, however as there are no reef or seagrass areas in the Operational Areas it is unlikely, they would be present in significant numbers.<br>Thus, the predicted level of consequence to fish from a 250 $m^3$ MDO spill is assessed as minor as consequences will be short-term (days to weeks), recoverable and affect a small portion of the fish population would be unlikely to impede associated food chains within the region, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of low. |

### 9.3.4 Birds

| **Birds** | |
|---|---|
| **Sensitivity Rating** | **Medium– seabirds** |
| | **High - aquatic birds, shorebirds** |
| **Predicted Level of Risk** | **Low – seabirds, aquatic birds** |
| | **Medium - shorebirds** |
| **Environmental Planning Area Existing Environment** | |
| The PMST Report (Appendix B5) identified multiple bird species or species habitat within the Environmental Planning Area as detailed in Annex 3 of this document. Several of these bird species were identified to be undertaking biologically important behaviours and/or have BIAs within the Environmental Planning Area. No habitat critical to the survival of the bird species were identified within the Environmental Planning Area.<br>The orange-bellied parrot, which is critically endangered is known to migrate through the Environmental Planning Area, however, it does not land at sea or use coastal areas as habitat so impacts to this species are not predicted.<br>A number of albatross and two petrel species were identified as foraging behaviour known or likely within the Environmental Planning Area as detailed in Annex 3 of this document. Of these the following have foraging BIAs:<br>Antipodean Albatross (Appendix B12 MAP-REG-EPM-059)<br>Black-browed Albatross (Appendix B12 MAP-REG-EPM-060<br>Buller's Albatross (Appendix B12 MAP-REG-EPM-071)<br>Campbell Albatross (Appendix B12 MAP-REG-EPM-061)<br>Indian Yellow-nosed Albatross (Appendix B12 MAP-REG-EPM-063)<br>Shy Albatross (Appendix B12 MAP-REG-EPM-066)<br>Wandering Albatross (Appendix B12 MAP-REG-EPM-072)<br>Common Diving Petrel (Appendix B12 MAP-REG-EPM-062)<br>White-face Storm Petrel (Appendix B12 MAP-REG-EPM-075<br>These BIAs cover either most or all the South-east Marine Region (CoA 2015a).<br>In addition, the Common Diving Petrel has a breeding BIA on Lady Julia Percy Island which is within the Environmental Planning Area (Appendix B12 MAP-REG-EPM-062). A breeding BIA was also identified for the White-faced Storm Petrel within the Environmental Planning Area. | |

| **Birds** |
| --- |
| Albatrosses and petrels are among the most oceanic of all seabirds, and seldom come to land unless breeding (CoA 2022). Albatross and petrel species exhibit a broad range of diets and foraging behaviours, and hence at-sea distributions are diverse. Combined with their ability to cover vast oceanic distances, all waters within Australian jurisdiction can be considered foraging habitat, however the most critical foraging habitat is those waters south of 25° where many species spend the majority of their foraging time (CoA 2022).<br><br>Albatrosses have a widespread distribution throughout the southern hemisphere. They feed mainly on cephalopods, fish, and crustaceans, using surface feeding or plunge diving to seize their prey (ACAP 2020). Albatrosses are colonial, usually nesting on isolated islands and foraging across oceans in the winter months with most observations along the edge of the continental shelf (CoA 2022).<br><br>Petrels are oceanic and have a widespread distribution throughout the southern hemisphere. They are colonial and breed on sub-Antarctic and Antarctic islands in a circumpolar band generally between 40°S and 60°S. Petrel species feed on small fish, cephalopods (octopus, squid, and cuttlefish) and crustaceans along the edge of the continental shelf and open waters (CoA 2022).<br><br>Within the Environmental Planning Area Little Penguin breeding and foraging BIAs occur at Black Pyramid, Christmas Island and Councillor Island in Tasmanian waters (Appendix B12 MAP-REG-EPM-064). A small breeding colony also occurs at Middle Island off Victoria. Breeding typically occurs from September to February, but some birds reside at the colony all year round. The Bass Strait supports approximately 60% of the known breeding population, with additional breeding BIAs outside of the Environmental Planning Area located at Albatross Island (Tasmania), Egg Island (Tasmania), Hunter Island (Tasmania), Phillip Island (Victoria), Sisters Island (Tasmania) and Three Hummock Island (Tasmania).<br><br>The Little Tern and Short-tailed Shearwater (migratory marine birds) were identified as breeding known to occur in the Environmental Planning Area with a proportion of the Short-tailed Shearwater breeding and foraging BIAs overlapping the Environmental Planning Area (Appendix B12 MAP-REG-EPM-065). Birds are typically present between September to May. The Environmental Planning Area also overlaps breeding and foraging BIAs for the Wedge-tailed Shearwater (Appendix B12 MAP-REG-EPM-067) that covers an area 160 km from Mutton bird Island where birds may be present between August and May. Short-tailed shearwaters (mutton birds) are identified as being culturally significant to the Gunditjmara People and are used in harvesting practice (GMTOAC, 2023). Shearwaters are also identified as culturally significant species to the Eastern Maar people, along with gannets and Little Penguins (Appendix F3, Section 3.16.1).<br><br>The Black-faced Cormorant has two foraging/breeding BIAs within the Environmental Planning Area, at Christmas Island and Councillor Island just off King Island (Appendix B12 MAP-REG-EPM-074). Breeding usually occurs on rocky islands, but also on stacks, slopes, and sea cliffs in colonies of up to 2,500 individuals (del Hoyo et al. 1992). It feeds in coastal waters, sometimes in sheltered places such as bays and islets and can be found entering rivers along the coast (CoA. 2020a).<br><br>The Australasian Gannet was identified as having a foraging BIA within the Environmental Planning Area (Appendix B12 MAP-REG-EPM-073). The Australasian Gannet generally feeds over the continental shelf or inshore waters. Their diet is comprised mainly of pelagic fish, but also squid and garfish. Prey is caught mainly by plunge-diving, but it is also seen regularly attending trawlers (CoA 2015a).<br><br>Several shorebirds were identified from the PMST Report as being present in the Environmental Planning Area with the threatened species, Black-tailed Godwit, Great Knot, Grey Plover, Lesser Sand Plover, Sharp-tailed Sandpiper, Ruddy Turnstone and Terek Sandpiper identified as roosting in the area. No BIAs for shorebirds were identified. Other threatened shorebirds that are known to occur within the Environmental Planning Area are the Australian Painted Snipe, Blue-winged Parrot, Common Greenshank, Curlew Sandpiper, Eastern Curlew, Eastern Hooded Plover, Greater Sand Plover, Latham's Snipe, Red Knot and Western Alaskan Bar-tailed Godwit. These species are commonly found on coastal shores including beaches and rocky shores and either feed at low tide on worms, crustaceans and molluscs or fish species or feed on aquatic biota. Many of the wader species are migratory travelling from the Northern Hemisphere in non-breeding months. Most inhabit intertidal mudflats, rocky islets, sand beaches, mangroves, rocky coastline and coral reefs. Roosting occurs in similar habitats and species are found feeding on fish, crustaceans, aquatic insects, as well as plants and seeds (Higgins & Davies 1996). |

| **Birds** |
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| Important coastal habitat where shorebirds are likely to be present within the Environmental Planning Area and have a marine interface are wetlands and shorelines. Impacts to these areas are assessed in the respective sections.<br><br>The King Island Important Bird Area (IBA) is within the Environmental Planning Area. Birdlife International (2008) detail the following regarding the IBA. The IBA includes the entire coastline of King Island, which supports significant numbers of Hooded Plovers; Lavinia State Reserve, which supports the critically endangered Orange-bellied Parrot and endemic subspecies of bush birds; and three inshore islands which support large numbers of nesting seabirds. These islands are Christmas Island (a 63 ha Nature Reserve), New Year Island (a 98 ha Game Reserve, on which harvesting of shearwaters is allowed) and Councillor Island (11 ha of Crown Land). The coastline is a mixture of rocky outcrops and long sandy beaches with beach-washed kelp. The IBA is defined as the coastal strip extending from the low water mark to 1 km inland of the high-water mark around the entire island; this is intended to capture most significant habitat for shorebirds and Orange-bellied Parrots.<br><br>Two other IBAs within the Environmental Planning Area are Lawrence Rocks Wildlife Reserve, which consists of two rocky islets off the coast from Portland with a resident Australasian Gannett population, and the Discovery Bay Coast through to Picaninnie Ponds in South Australia with resident populations of Australasian Bittern, Hooded Plover, Rufous Bristlebird and Striated Fieldwren, and non-breeding Orange-bellied Parrot (Parks Victoria 2015). |
| **Predicted Level of Risk** |
| Seabirds, shorebirds, and aquatic birds are sensitive to the impacts of oiling, with their vulnerability arising from the fact that they cross the air-water interface to feed, while their shoreline habitats may also be oiled (Hook et al. 2016). Species that raft together in large flocks on the sea surface are particularly at risk (ITOPF 2011).<br><br>Toxic effects of hydrocarbons on birds may result where the oil is ingested as the bird attempts to preen its feathers, and the preening process may spread the oil over otherwise clean areas of the body (ITOPF 2011). Whether this toxicity ultimately results in mortality will depend on the amount of hydrocarbons consumed and other factors relating to the health and sensitivity of the bird. Birds that are coated in oil also suffer from damage to external tissues including skin and eyes, as well as internal tissue irritation in their lungs and stomachs. Breeding seabirds may be directly exposed to oil via a number of potential pathways. Any direct impact of oil on terrestrial habitats has the potential to contaminate birds present at the breeding sites (Clarke 2010). Bird eggs may also be damaged if an oiled adult sits on the nest. Fresh crude was shown to be more toxic than weathered crude, which had a medial lethal dose of 21.3 mg/egg (Clarke 2010). Studies of contamination of duck eggs by small quantities of crude oil, mimicking the effect of oil transfer by parent birds, have been shown to result in mortality of developing embryos. Engelhardt (1983), Clark (1984), Geraci & St Aubin (1988) and Jenssen (1994) indicated that the threshold thickness of oil that could impart a lethal dose to some intersecting wildlife individual is 10 µm (~10 g/m$^2$). Scholten et al (1996) indicates that a layer 25 µm thick would be harmful for most birds that contact the slick.<br><br>*Seabirds*<br><br>Birds foraging at sea have the potential to directly interact with oil on the sea surface some considerable distance from breeding sites in the course of normal foraging activities. Species most at risk include those that readily rest on the sea surface such as shearwaters and surface plunging species such as terns and boobies. As seabirds are top order predators, any impact on other marine life (e.g., pelagic fish) may disrupt and limit food supply both for the maintenance of adults and the provisioning of young.<br><br>In the case of seabirds, 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 impair waterproofing (ITOPF 2011). A bird suffering from cold, exhaustion and a loss of buoyancy resulting from fouling of plumage may dehydrate, drown, or starve (ITOPF 2011, DSEWPC 2011). It may also result in impaired navigation and flight performance (Hook et al. 2016). Increased heat loss as a result of a loss of water-proofing results in an increased metabolism of food reserves in the body, which is not countered by a corresponding increase in food intake and may lead to emaciation (DSEPWC 2011). The greatest vulnerability in this case occurs when birds are feeding or resting at the sea surface (Peakall et al. 1987). In a review of 45 marine hydrocarbon spills, there was no correlation between the numbers of bird deaths and the volume of the spill (Burger 1993).<br><br>Most of the seabird species that are likely to occur in the Environmental Planning Area forage over an extensive area and are distributed over a wide geographic range. Seabirds plunge diving through the sea surface for prey are most likely to encounter the low concentration of hydrocarbons due to its broader extent than moderate and |

| **Birds** |
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| high concentrations. Seabirds rafting, resting, diving or feeding at sea have the potential to come into contact with oil. However, the low threshold level of exposure is not expected to result in the lethal impacts or feather matting and hypothermia. However, contact at the high threshold is expected to impart toxicity and ecological impacts. Though, oil at high thresholds is only predicted within a small area around the spill location and for a short duration (days).<br><br>The extensive ocean foraging habitat available to species such as albatrosses, petrels, shearwaters and terns and the small area and temporary nature of the hydrocarbon release on the sea surface (~ 24 hours) makes it unlikely that a spill will limit their ability to forage for unaffected prey, nor will the unlikely event of exposure at the sea surface result in permanent injury or mortality. The area where dissolved hydrocarbons would exceed the moderate threshold or entrained hydrocarbons exceed the high threshold during an MDO spill would be relatively small in comparison to the Bass Strait and Otway region where seabirds forage. It is these small areas where sub-lethal or toxic effects to birds may occur. There is a low probability that seabirds would be feeding exclusively or predominantly on fish found in areas of higher hydrocarbon thresholds, thus there is low probability of seabirds experiencing sub-lethal or toxic impacts as a result of consuming hydrocarbon-tainted fish.<br><br>Seabird interactions with shorelines is expected to be largely during periods of rest and breeding activities. Most seabirds are oceanic and seldom come to land unless breeding in areas associated with burrows on sloping ground in coastal forest, scrubland, shrubland or grassland. As detailed in the assessment of coastal habitats and communities due to the exposed nature of the coastal areas within the Environmental Planning Area and the nature of MDO, long-term toxicity or smothering effects in areas of moderate or high MDO are not expected.<br><br>The predicted level of consequence to seabirds from a 250 $m^3$ MDO spill is assessed as minor as consequences are unlikely to occur at thresholds levels where oiling of birds or tainting of food would occur, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of low.<br><br>*Shorebirds*<br><br>Shorebirds are likely to be exposed to oil when it directly impacts their intertidal feeding habitat. Shorebird species foraging for invertebrates on exposed sand and mud flats at lower tides will be at potential risk of both direct impacts through contamination of individual birds (ingestion or soiling of feathers) and indirect impacts through the contamination of foraging areas that may result in a reduction in available prey items (Clarke 2010).<br><br>Shorebird species (e.g., plovers, godwits, curlews, etc.) prefer varying habitats including tidal flats, open saltmarsh, freshwater wetlands, open grasslands and sandy beaches. These habitats on the Victorian coastline inshore of the Operational Area could be exposed to moderate or high threshold shoreline oil due that has not yet evaporated or entrained. Exposure to moderate or high threshold shoreline oil at King Island and the King Island IBA is less likely due to the distance from the Operational Area.<br><br>Due to the proximity to the Victorian coastline, the predicted level of consequence to shorebirds from a 250 $m^3$ MDO spill is assessed as moderate as consequences could be longer lasting (> 30 days) if shorebirds are exposure to oil above low threshold, though if consequences occurred, they are likely to only affect a small portion of the shorebird population due to the low volume of oil that would come onshore, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of medium.<br><br>*Aquatic birds*<br><br>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 (Hook et al. 2016). The Iron Baron vessel spill (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).<br><br>As characteristic of aquatic birds, Little Penguins forage while swimming and often forage for extended periods of time (dawn to dusk) and may forage up to 50 km from the colony. As such Little Penguins are most at risk of direct contact, ingestion or inhalation while feeding at sea. Little Penguins are most likely to encounter the low concentration of hydrocarbons due to its broader extent than moderate and high concentrations. However, the low threshold level of exposure is not expected to result in |

| **Birds** |
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| the lethal impacts of feather matting and hypothermia. The high threshold is expected to impart toxicity and ecological impacts. Given the offshore location of the spill volume, the small area of exposure and temporary nature of the hydrocarbon release on the sea surface (~ 24 hrs) it is unlikely that a spill would limit Little Penguins ability to forage for unaffected prey, nor will the unlikely event of exposure at the sea surface result in permanent injury or mortality.<br><br>The area of exposure to dissolved hydrocarbons above the moderate threshold and entrained hydrocarbons above the high threshold during an MDO spill are relatively small in comparison to the Bass Strait and Otway region. It is these small areas where sub-lethal or toxic effects may occur. There is a low probability that Little Penguins would be feeding exclusively or predominantly on fish found in areas of higher hydrocarbon thresholds, thus there is low probability of Little Penguins experiencing sub-lethal or toxic impacts as a result of consuming hydrocarbon-tainted fish. The Little Penguin foraging/breeding BIAs on Black Pyramid Island off Tasmania and Christmas Island and Councillor Island off King Island are unlikely to be exposed to oil above the low threshold due to the distance from the Operational Area and low volume of MDO that could be spilt.<br><br>The predicted level of consequence to aquatic birds (Little Penguins) from a 250 $m^3$ MDO spill is assessed as minor as consequences are unlikely to occur at thresholds levels where oiling of birds, next or tainting of food would occur, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of low |

### 9.3.5 Marine Reptiles

| **Marine Reptiles** | |
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| **Sensitivity Rating** | **Medium** |
| **Predicted Level of Risk** | **Low** |
| **Environmental Planning Area Existing Environment** | |
| The PMST Report (Appendix B5) identified three turtle species within the Environmental Planning Area, green, leatherback and loggerhead turtle. No BIAs or habitat critical to the survival of the species were identified. The PMST Report also identified foraging, feeding or related behaviour known to occur within area for the leatherback and loggerhead turtle as detailed in Annex 3 of this document.<br>Green turtles' nest, forage and migrate across tropical northern Australia. Green turtles spend their first 5-10 years drifting on ocean currents. Green turtles are predominantly found in Australian waters off the Northern Territory, Queensland, and Western Australian coastlines, with limited numbers in NSW, Victoria, and South Australia (DoEE 2017).<br>Small numbers of leatherback turtles' nest on the Cobourg Peninsula (NT) and there are unconfirmed accounts of leatherback turtles nesting in Western Australia. Leatherback turtles are more commonly found foraging in Australian waters along the east coast and in Bass Strait. The southern waters of Australia are one of five identified foraging sites (where area restricted behaviour occurs) for Leatherback turtles (DoEE 2017).<br>There are two genetically distinct stocks of loggerhead turtles nesting in Australia, one in Queensland (known as the south-west Pacific stock) and one in Western Australia. Loggerhead turtles forage in all coastal states and the Northern Territory, but are uncommon in South Australia, Victoria, and Tasmania (DoEE 2017). | |
| **Predicted Level of Risk** | |
| The Recovery Plan for Marine Turtles (DoEE 2017) identifies oil spill as a threat detailing that there is well documented evidence of the detrimental effects from encountering oil either via external contact, ingestion, or inhalation, resulting in breathing, sight or gastro-intestinal injuries.<br>Sea turtles are vulnerable to the effects of oil at all life stages—eggs, post-hatchlings, juveniles, and adults in nearshore waters. Several aspects of sea turtle biology and behaviour place them at particular risk, including a lack of avoidance behaviour, indiscriminate feeding in convergence zones, and large pre-dive inhalations. Effects of oil on turtles include increased egg mortality and developmental defects, direct mortality due to oiling in hatchlings, juveniles and adults, and negative impacts to the skin, blood, digestive and immune systems and salt glands. Oil exposure affects different turtle life stages in different ways. Thus, information on oil toxicity needs to be organised by life stage. Turtles may be exposed to chemicals in oil in two ways:<br>Internally – eating or swallowing oil, consuming prey containing oil-based chemicals, or inhaling of volatile oil related compounds; and<br>Externally – swimming in oil or dispersants, or oil or dispersants on skin and body.<br>Records of oiled wildlife during spills rarely include marine turtles, even from areas where they are known to be relatively abundant (Short 2011). An exception to this was the large number of marine turtles collected (613 dead and 536 live) during the Macondo spill in the Gulf of Mexico, although many of these animals did not show any sign of oil exposure (NOAA 2013). Of the dead turtles found, 3.4% were visibly oiled and 85% of the live turtles found were oiled (NOAA 2013). Of the captured animals, 88% of the live turtles were later released, suggesting that oiling does not inevitably lead to mortality. | |

| **Marine Reptiles** |
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| There is potential for contamination of turtle eggs to result in similar toxic impacts to developing embryos as has been observed in birds. Studies on freshwater snapping turtles showed uptake of PAHs from contaminated nest sediments, but no impacts on hatching success or juvenile health following exposure of eggs to dispersed weathered light crude (Rowe et al. 2009). However, other studies found evidence that exposure of freshwater turtle embryos to PAHs results in deformities (Bell et al. 2006, Van Meter et al. 2006).<br><br>Turtles may experience oiling impacts on nesting beaches and eggs through chemical exposure, resulting in decreased survival to hatching and developmental defects in hatchlings. Turtle hatchlings may be more vulnerable to smothering as they emerge from the nests and make their way over the intertidal area to the open water (AMSA 1998). Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects including impaired movement and bodily functions (Shigenaka 2003). Hatchlings sticky with oily residues may also have more difficulty crawling and swimming, rendering them more vulnerable to predation.<br><br>Ingested oil may cause harm to the internal organs of turtles. Oil covering their bodies may interfere with breathing because they inhale large volumes of air to dive. Oil can enter cavities such as the eyes, nostrils, or mouth. Turtles may experience oiling impacts on nesting beaches when they come ashore to lay their eggs, and their eggs may be exposed during incubation, potentially resulting in increased egg mortality and/or possibly developmental defects in hatchlings.<br><br>There are no turtle nesting sites within the Environmental Planning Area thus impacts to turtling eggs, post-hatchlings and juveniles are not predicted.<br><br>Turtle interaction with surface oil is likely to include direct contact due to resting behaviours floating on the sea surface and through inhalation of volatile compounds in the vicinity of unweathered MDO. At moderate and high concentrations, toxicity impacts may occur including sub-lethal irritation of skin or cavities. However, due to the absence of turtle BIAs and nesting locations in the Environmental Planning Area. As low numbers of turtles forage or migrate through the Otway area, individual marine reptiles may come into contact with hydrocarbons on the sea surface or within the water column. This is most likely to be at the low threshold levels as exposure levels above the low thresholds would be within a small area of the spill location for a short period of time (~24 hours).<br><br>Thus, the predicted level of consequence to marine turtles from a 250 $m^3$ MDO spill is assessed as minor as consequences will be short-term (days to weeks), recoverable and affect a small portion of the marine turtle population the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of low. |

### 9.3.6 Marine Mammals

| **Marine Mammals** | |
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| Sensitivity Rating | Medium |
| Predicted Level of Risk | Medium |
| Environmental Planning Area Existing Environment | |
| The PMST Report for the Environmental Planning Area (Appendix B5) identified the following for marine mammals:<br>Three species (Blue, Fin and Sei whales) with foraging, feeding or related behaviour known to occur within area.<br>Pygmy blue whale foraging (annual high use area) BIA and known foraging area BIA.<br>Southern Right Whale breeding and migration known to occur within area.<br>Australian Fur-seal breeding known to occur within area.<br>New Zealand Fur-seal and Australian Sea-lion may occur in the area.<br>Six dolphin species likely or may occur in the area.<br>25 whale species likely or may occur in the area.<br>In addition, the Environmental Planning Area overlaps the Southern Right Whale BIAs for reproduction and migration.<br>During consultation, the cultural significance of marine mammals, such as the Southern Right Whale, Blue Whale, Killer Whale, dolphins, seals, and sea lions were highlighted, with connections to songlines, totemic value and kinship, and cultural practices (Appendix F3, Section 3.16.1).<br>The National Recovery Plan for Southern Right whale describes Whale Birthing Dreaming Sites being in coastal bay areas from Port Campbell to Portland, including Warrnambool. These places on Gunditjmara Country are known resting and feeding sites for mothers and calves and are directly related to Gunditjmara Neeyn (midwives), explaining why Gunditjmara is a Matrilineal Nation. (DCCEEW, 2024)<br>More information is provided on those species undertaking biologically important behaviour within the Environmental Planning Area.<br>Australian Fur-seal<br>Australian fur-seals (*Arctocephalus pusillus*) breed on islands of the Bass Strait but range throughout waters off the coasts of South Australia, Tasmania, Victoria and NSW. Numbers of this species are believed to be increasing as the population recovers from historic hunting (Hofmeyr et al. 2008). The species is endemic to south-eastern Australian waters.<br>In Victorian waters they breed on offshore islands, including Lady Julia Percy Island, Seal Rocks in Westernport Bay, Kanowna and Rag Islands off the coast of Wilson's Promontory and The Skerries off Wingan Inlet in Gippsland. In Tasmanian waters they breed on Reid Rocks. There are important breeding sites on Lady Julia Percy Island | |

| **Marine Mammals** |
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| and Seal Rocks, with 25% of the population occurring at each of these islands. Their preferred breeding habitat is a rocky island with boulder or pebble beaches and gradually sloping rocky ledges.<br><br>Haul out sites with occasional pup births are located at Cape Bridgewater, at Moonlight Head, on various small islands off Wilsons Promontory and Marengo Reef near Apollo Bay. Australian fur-seals are present in the region all year, with breeding taking place during November and December.<br><br>Research being undertaken at Lady Julia Percy Island indicates that adult females feed extensively in the waters between Portland and Cape Otway, out to the 200 m bathymetric contour. Seal numbers on the island reach a maximum during the breeding season in late October to late December. By early December, large numbers of lactating females are leaving for short feeding trips at sea and in late December there is an exodus of adult males. Thereafter, lactating females continue to alternate between feeding trips at sea and periods ashore to suckle their pups. Even after pups begin to venture to sea, the island remains a focus, and at any time during the year groups may be seen ashore resting (Robinson et al. 2008, Hume et al. 2004, Arnould & Kirkwood 2007).<br><br>Lady Julia Percy Island and Reid Rocks are within the Environmental Planning Area as is the haul out area at Cape Bridgewater.<br><br>Blue whale<br><br>The Blue Whale (*Balaenoptera musculus*) is listed as an endangered species under the EPBC Act. There are two subspecies of blue whales that use Australian waters (including Australian Antarctic waters), the Pygmy Blue Whale (*B. m. brevicauda*) and the Antarctic Blue Whale (*B. m. intermedia*). The Otway region, where the Operational Area is located, is an important migratory and foraging area for Blue Whales, as shown by passive acoustic monitoring and aerial surveys (Gavrilov 2012, McCauley et al. 2018, Gill et al. 2011). Underwater acoustic monitoring programs have detected Antarctic and Pygmy Blue Whale calls in the Otway Region (McCauley et al. 2018).<br><br>Important foraging grounds for Blue Whales include the Great Australian Bight, South Australia, and off Portland Victoria. Research to date has found that Pygmy Blue Whales occupy the western area of the Bonney Upwelling system in the Eastern Great Australian Bight and adjacent to the Kangaroo Island canyons from November and December (DoE 2015c). Pygmy Blue Whales then move south-east to the Bonney Upwelling system off eastern South Australia and Victoria (e.g., between Robe, SA and Cape Otway, Vic). This occurs predominately between January to April (DoE 2015).<br><br>The Blue Whale was extremely abundant until the early 20th century when they were hunted to near extinction. Approximately 341,830 Blue Whale takes were recorded by commercial whaling in the Antarctic and sub-Antarctic in the 20th century, of which 12,618 were identified as Pygmy Blue Whales (Branch et al. 2004). The current global population of Blue Whales is uncertain but is plausibly in the range of 10,000 to 25,000, corresponding to about 3-11% of the 1911 estimated population size (Reilly et al. 2008).<br><br>The Environmental Planning Area is within the foraging (annual high use) and known foraging area BIA where blue whales predominately occur between January to April (DoE 2015) (Appendix B12 MAP-REG-EPM-068).<br><br>Fin whale<br><br>The Fin Whale is a cosmopolitan migratory species that is listed as vulnerable and occurs from polar to tropical waters but is rarely sighted in inshore waters. Fin Whales show well defined migratory movements between polar, temperate and tropical waters which are essentially north–south with little longitudinal dispersion.<br><br>While Australian Antarctic waters are important feeding grounds for Fin Whales, the species also feeds in the Bonney Upwelling during summer/autumn sometimes in the company of Blue and Sei Whales (DCCEEW 2023b). Areas of upwelling and interfaces with mixed and stratified waters may be an important feature of Fin Whale feeding habitat with the species feeding on planktonic crustacea, krill, some fish, and cephalopods (DCCEEW 2023b). Fin Whales frequently lunge or skim feed at or near the surface and they are known to dive to 230 m to feed.<br><br>There are no BIAs for the Fin Whale within Australian waters. Fin Whales are likely to be foraging in the Environmental Planning Area at similar time as Blue Whales, predominately occur between January to April. |

| **Marine Mammals** |
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| Sei Whale<br>The Sei Whale is listed as vulnerable under the EPBC Act. Sei Whales are considered a cosmopolitan species, ranging from polar to tropical waters, but tend to be found more offshore than other species of large whales. Sei Whales move between Australian waters and Antarctic feeding areas; subantarctic feeding areas (e.g. Subtropical Front); and tropical and subtropical breeding areas. The proportion of the global population in Australian waters is unknown as there are no estimates for Sei Whales in Australian waters.<br>In Australia, Sei Whales occur within Australian Antarctic Territory waters and Commonwealth waters, and have been infrequently recorded off Tasmania, NSW, Queensland, the Great Australian Bight, Northern Territory and Western Australia (Parker 1978, Bannister et al. 1996, Thiele et al. 2000, Chatto and Warneke 2000, Bannister 2008).<br>Sightings of Sei Whales within Australian waters includes areas such as the Bonney coast upwelling off South Australia (Miller et al. 2012), where opportunistic feeding has been observed between November and May (Gill et al. 2015).<br>There are no BIAs for the Sei Whale within Australian waters. Sei Whales are likely to be foraging in the Environmental Planning Area at similar time as Blue Whales, predominately occur between January to April.<br>Southern Right Whale<br>The Southern Right Whale (*Eubalaena australis*) is listed as endangered under the EPBC Act. Southern Right Whales were depleted to less than 300 individuals globally due to commercial whaling in the 19th and 20th centuries (Tormosov et al. 1998). They were protected from whaling in 1935 however, due to illegal whaling in the 1970s and because Southern Right Whales have a slow rate of increase (7% per annum) compared to other marine mammals, their numbers remain low (IWC 2013). Global abundance estimates are 13,000 for the species, across key wintering grounds in South Africa, Argentina, Australia, and New Zealand.<br>Southern Right Whales are distributed in the Southern Hemisphere with a circumpolar distribution between latitudes of 16°S and at least 65°S. They migrate from southern feeding grounds in sub-Antarctic waters to Australia in between May and November to calve, mate and rest (Bannister et al. 1996, DCCEEW 2024). They are distributed across thirteen primary aggregation areas along the southern coast of Australia. In Australian coastal waters, they occur along the southern coastline of the mainland and Tasmania and generally extend as far north as Sydney on the east coast and Perth on the west coast (CoA 2012). There are occasional sightings further north, with the extremities of their range recorded at Hervey Bay and Exmouth (CoA 2012).<br>The peak period for Southern Right Whale mating is from mid-July through to August (CoA 2012). Pregnant females generally arrive during late May/early June and depart with calves in September to October however the general time of arrivals and departures varies on an inter-annual basis. Calving females are known to have high site fidelity and a 3 to 4-year calving interval. Other population classes stay for shorter and variable periods undertaking coastal movements and departing the coast earlier than female-calf pairs (CoA 2012).<br>The Environmental Planning Area overlaps the Southern Right Whale reproduction and migration BIAs (Appendix B12 MAP-REG-EPM-069). |
| **Predicted Level of Risk** |
| Marine mammals may be exposed to the chemicals in oil through:<br>• Internal exposure by consuming oil or contaminated prey.<br>• Inhaling volatile oil compounds when surfacing to breathe.<br>• Dermal contact, by swimming in oil and having oil directly on the skin and body (NRDA 2012, Hook et al. 2016).<br>The effects of this exposure include: |

| **Marine Mammals** |
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| • Maternal transfer of contaminants to embryos.<br>• Hypothermia due to conductance changes in skin, resulting in metabolic shock (expected to be more problematic for non-cetaceans in colder waters).<br>• Toxic effects and secondary organ dysfunction due to ingestion of oil.<br>• Congested lungs.<br>• Damaged airways.<br>• Interstitial emphysema due to inhalation of oil droplets and vapour.<br>• Gastrointestinal ulceration and haemorrhaging due to ingestion of oil during grooming and feeding.<br>• Eye and skin lesions from continuous exposure to oil.<br>• Decreased body mass due to restricted diet.<br>• Stress due to oil exposure and behavioural changes.<br>Whales and Dolphins<br>French-McCay (2009) identifies that a 10–25 µm oil thickness threshold has the potential to impart a lethal dose on marine species, however, they also estimate a probability of 0.1% mortality to cetaceans if they encounter these thresholds based on the proportion of the time spent at surface. Direct surface oil contact with hydrocarbons is considered to have little deleterious effect on whales, possibly due to the skin's effectiveness as a barrier to toxicity, as such effect of oil on cetacean skin is probably minor and temporary (Geraci & St Aubin 1988). Cetaceans in particular have mostly smooth skins with limited areas of pelage (hair covered skin) or rough surfaces such as barnacled skin. Oil tends to adhere to rough surfaces, hair, or calluses of animals, so contact with hydrocarbons by cetaceans is expected to cause only minor hydrocarbon adherence.<br>The physical impacts from ingested hydrocarbon with subsequent lethal or sub-lethal impacts are both applicable to entrained oil. However, the susceptibility of cetaceans varies with feeding habits. Baleen whales (such as blue, fin, humpback and sei whales) are not particularly susceptible to ingestion of oil in the water column but are susceptible to oil at the sea surface as they feed by skimming the surface. Oil may stick to the baleen while they 'filter feed' near slicks. Sticky, tar-like residues are particularly likely to foul the baleen plates.<br>The inhalation of oil droplets, vapours and fumes is a distinct possibility if whales surface in slicks to breathe. Exposure to hydrocarbons in this way could damage mucous membranes, damage airways, or even cause death.<br>Toothed whales and dolphins may be susceptible to ingestion of dissolved and entrained oil as they gulp feed at depth. There are reports of declines in the health of individual pods of killer whales (a toothed whale species), though not the population as a whole, in Prince William Sound after the Exxon Valdez vessel spill (heavy oil) (Hook et al. 2016).<br>It has been stated that pelagic species will avoid hydrocarbon, mainly because of its noxious odours, but this has not been proven. The strong attraction to specific areas for breeding or feeding (e.g., use of the Warrnambool coastline as a nursery area for southern right whales) may override any tendency for cetaceans to avoid the noxious presence of hydrocarbons. So weathered or tar-like oil residues can still present a problem by fouling baleen whales feeding systems.<br>Dolphin populations from Barataria Bay, Louisiana, USA, which were exposed to prolonged and continuous oiling from the Macondo oil spill in 2010, had higher incidences of lung and kidney disease than those in the other urbanised environments (Hook et al. 2016). The spill may have also contributed to unusually high perinatal mortality in bottlenose dolphins (Hook et al. 2016). |

| **Marine Mammals** |
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| There is the potential for the survey to occur when blue, fin and sei whales are foraging in the areas If present, these species may be exposed to oil externally and via ingestion whilst feeding. If large quantities of zooplankton exposed to the spill were ingested, chronic toxicity impacts may occur. However, as oil exposure above low thresholds will only occur within a small area at the spill source and for ~24 hours biological consequences of physical contact with localised areas of low concentrations of hydrocarbons are unlikely to lead to any long-term population impacts, with temporary skin irritation and very light fouling/matting of baleen plates likely to occur. |
| Southern Right Whales may also be present in the area of oil exposure and they and their calves could be exposed to oil. However, as oil exposure above low thresholds will only occur within a small area at the spill source and for ~ 24 hours biological consequences of physical contact with localised areas of low concentrations of hydrocarbons are unlikely to lead to any long-term population impacts. |
| It is unlikely that highly mobile and transient species that are not undertaking biologically important behaviour would be affected by exposure to oil within the relatively small area of the Environmental Planning Area and that oil exposure above low thresholds will only occur within a small area at the spill source. |
| The predicted levels of consequence to whales and dolphins from a 250 $m^3$ MDO spill is assessed as moderate as exposure to oil above low thresholds could occur to whales undertaking biologically important behaviours (feeding, reproduction), though if consequences occurred, they are likely to only affect a small portion of the population due to the low spill volume and short duration of any exposure the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of medium. |
| Pinnipeds |
| Pinnipeds are vulnerable to sea surface exposures given they spend much of their time on or near the surface of the water as they need to surface every few minutes to breathe and regularly haul out on to beaches. Pinnipeds are also sensitive as they will stay near established colonies and haul-out areas, meaning they are less likely to practice avoidance behaviours. This is corroborated by Geraci & St. Aubin (1988) who suggest seals, sea- lions and fur-seals have been observed swimming in oil slicks during a number of documented spills. |
| Exposure to surface oil can result in skin and eye irritations and disruptions to thermal regulation. As a result of exposure to surface oils, pinnipeds, with their relatively large, protruding eyes are particularly vulnerable to effects such as irritation to mucous membranes that surround the eyes and line the oral cavity, respiratory surfaces, and anal and urogenital orifices. 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. |
| For some pinnipeds, fur is an effective thermal barrier because it traps air and repels water. Petroleum stuck to fur reduces its insulative value by removing natural oils that waterproof the pelage. Consequently, the rate of heat transfer through fur seal pelts can double after oiling (Geraci & St. Aubin 1988), adding an energetic burden to the animal. Kooyman et al (1976) suggest that in fact, fouling of approximately one-third of the body surface resulted in 50% greater heat loss in fur seals immersed in water at various temperatures. Fur-seals are particularly vulnerable due to the likelihood of oil adhering to fur. Heavy oil coating and tar deposits on fur-seals may result in reduced swimming ability and lack of mobility out of the water. Davis and Anderson (1976) observed two Gray Seal pups drowning, their "flippers stuck to the sides of their bodies such that they were unable to swim". |
| However, pinnipeds other than Fur-seals are less threatened by thermal effects of fouling, if at all. Oil has no effect on the relatively poor insulative capacity of sea-lion and bearded and ringed seal pelts; oiled Weddell seal samples show some increase in conductance (Oritsland 1975, Kooyman et al. 1976, 1977). ITOPF (2011) documents impacts on species that rely on fur to regulate their body temperature (such as fur-seals), demonstrating these species 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. |

| **Marine Mammals** |
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| It is reported that most pinnipeds scratch themselves vigorously with their flippers and do not lick or groom themselves, so are less likely to ingest oil from skin surfaces (Geraci & St. Aubin 1988). However, mothers trying to clean an oiled pup may ingest oil. All pinnipeds examined to date have the enzyme systems necessary to convert absorbed hydrocarbons into polar metabolites, which can be excreted in urine (Engelhardt 1982, Addison and Brodie 1984, Addison et al. 1986).<br><br>Ingested hydrocarbons can irritate or destroy epithelial cells that line the stomach and intestine, thereby affecting motility, digestion and absorption. However, pinnipeds have been found to have the enzyme systems necessary to convert absorbed hydrocarbons into polar metabolites, which can be excreted in urine (Engelhardt 1982, Addison & Brodie 1984, Addison et al. 1986). Geraci & St. Aubin (1988) suggest that a small phocid weighing 50 kg might have to ingest approximately 1 litre of oil to be at risk.<br><br>Volkman et al (1994) report that benzene and naphthalene ingested by seals is quickly absorbed into the blood through the gut, causing acute stress, with damage to the liver considered likely. If ingested in large volumes, hydrocarbon, may not be completely metabolised, which may result in death.<br><br>Breeding colonies (used to birth and nurse until pups are weaned) are particularly sensitive to hydrocarbon spills (Higgins & Gass 1993). Pinnipeds also appear to rely on scent to establish a motherpup bond (Sandegren 1970, Fogden 1971), and consequently oil-coated pups may not be recognisable to their mothers. This is only theorised, with studies and research indicating interaction between mothers and oiled pups were normal (Davis and Anderson 1976, Davies 1949, Shaughnessy & Chapman 1984).<br><br>The long-term Environmental Impact and Recovery report for the Iron Barren oil spill (in Tasmania, 1995) concluded that “The number of seal pups born at Tenth Island in 1995 was reduced when compared to previous years. There was a strong relationship between the productivity of the seal colonies and the proximity of the islands to the oil spill wherein the islands close to the spill showed reduced pup production and those islands more distant to the oil spill did not” (Tasmanian SMPC 1999).<br><br>Australian sea-lions have ‘naturally poor recovery abilities’ due to ‘unusual reproductive biology and life history’ (TSSC 2005). Due to the extreme philopatry of females and limited dispersal of males between breeding colonies, the removal of only a few individuals annually may increase the likelihood of decline and potentially lead to the extinction of some of the smaller colonies. Extinction of breeding colonies has the potential to further reduce genetic diversity and the already limited genetic flow between colonies. This, in turn, may weaken the genetic resilience of the species and impact on its ability to cope with other natural or anthropogenic impacts. In addition, the extreme philopatry of females suggests that extinction of breeding colonies may lead to a contraction of the range of the species as re-colonisation of breeding sites via immigration is limited.<br><br>For the reasons outlined above, small breeding colonies are under particular pressure of survival from even low levels of anthropogenic mortality.<br><br>As highly mobile species, in general it is very unlikely that marine mammals will be constantly exposed to concentrations of hydrocarbons in the water column for continuous durations (e.g., >96 hours) that would lead to chronic toxicity effects.<br><br>There is the potential for Lady Julia Percy Island and Cape Bridgewater to be exposed to oil above the low threshold levels, though unlikely for Reid Rocks due to the distance from the Operational Area. Thus, seals at Lady Julia Percy Island and Cape Bridgewater could be exposed to oil at levels that could result in some level of impact. As diesel is a light fuel and readily evaporates matting and heavy coating of fur is not predicted. Impacts from inhalation of vapours is more likely as the diesel evaporates resulting in irritations to mucous membranes. Ingestion and tainting of prey are less likely as pinnipeds have large foraging ranges and are less likely to be exposed to oil above low thresholds in the water column.<br><br>The predicted level of consequence to pinnipeds from a 250 $m^3$ MDO spill is assessed as moderate as exposure to oil above low thresholds could occur to breeding and haul out locations, though if consequences occurred, they are likely to only affect a small portion of the population due to the low spill volume and short duration of any exposure the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of medium. |

## 9.4 Change in Ecosystem Dynamics

### 9.4.1 Benthic Assemblages

| **Benthic Assemblages** | |
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| **Sensitivity Rating** | **Medium** |
| **Predicted Level of Risk** | **Medium** |
| **Environmental Planning Area Existing Environment** | |
| Benthic assemblages are biological communities that live in or on the seabed. They typically contain light-dependent taxa such as algae, seagrass and corals, which obtain energy primarily from photosynthesis, and/or animals such as molluscs, sponges and worms. Benthic habitats are the seabed substrates that benthic communities grow on or in; these can range from unconsolidated sand to hard substrates (e.g., limestone) and occur either singly or in combination.<br><br>Given that MDO would only be present on the sea surface or within the water column to a depth of 10 m (RPS 2019a) the existing environment covers those benthic assemblages along the Victorian, South Australian and King Island coastlines within the Environmental Planning Area.<br><br>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. 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 and are important for aggregations of biodiversity and enhanced productivity. The shallowest depth at which the rocky reefs occur in Commonwealth waters is approximately 50 m (CoE 2015a).<br><br>Corals do not occur as a dominant habitat type within the Environmental Planning Area. Reef development by hard corals does not occur further south than Queensland (Tzioumis and Keable, 2007). 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 (BBG 2003, Boreen et al. 1993). Gorgonian corals (soft corals) were identified during seabed surveys of the Beach Otway Development area within the Environmental Planning Area (Ramboll 2020).<br><br>James et al (2013) undertook extensive surveys of macroalgal communities along the Otway Shelf from Warrnambool to Portland in south-west Victoria. Sites were adjacent to shore or on offshore rocky reefs covering a depth range of 0 to 36 meters water depth. These surveys did not locate giant kelp at any site but identified that other brown algae species (Durvillaea, Ecklonia, Phyllospora, Cystophora, and Sargassum) are prolific to around 20 m water depth. Brown algae tend to be replaced by red algae in deeper waters.<br><br>Bull kelp or southern bull kelp (Durvillaea potatorum) is a fast-growing brown macroalgae (seaweed) with large dark brown and leathery strap-like blades. It consists of a body, called the thallus, with a stipe connecting the blades to the holdfast (a structure adhering the bull kelp to the seafloor. Offshore Victoria and Tasmania there are two main species of Durvillaea, these are D. potatorum and D. amatheiae. The approximate distribution of the species is shown in Figure D4-1 with locations within the Environmental Planning Area.<br><br>Bull kelp is a significant habitat. The holdfast can be inhabited by a diverse array of epifauna and infauna invertebrates. These burrow into the holdfast creating holes that can be used by a wide variety of animals. In addition, bull kelp grows in large groups or forests that can become important nursery areas and sanctuary areas for fish, crustaceans and other fauna. Bull kelp has a long history of use by First Nations in Australia, New Zealand, and Chile. In Australia this reportedly dates back 65,000 years | |

| **Benthic Assemblages** |
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| (Thurstan et al. 2018). First Nation people in Tasmania used dried bull kelp to transport water and food. The species name came from this use: potatorum means 'to drink' in Latin (Govt of SA 2023). Wadawurrung Traditional Owners Aboriginal Corporation describe in their Country Plan how kelp forests, with their giant and bull kelps, serve as a habitat for numerous native species, as well as being used to create water carriers (WTOAC 2020).<br>Thurstan et al. (2018) details several First Nations historical references for bull kelp including:<br>Cultural activities and cultural history –mythology and sacred songs.<br>Ceremonial activities –being burned or being used during smoking ceremonies.<br>Medicinal use –bandages and medicinal poultice.<br>Clothing – cloaks and shoes.<br>Diet – raw, jelly, dried and roasted (preserving for several months).<br>Fishing – ropes and fishing nets / traps, traps for short-finned eels, also used to assist during diving for crayfish.<br>Shelter – waterproofing, wind proofing and carpeting.<br>Bulk kelp is also collected by the seaweed industry as described in the assessment of Commercial fishing and aquaculture. |

**Benthic Assemblages**

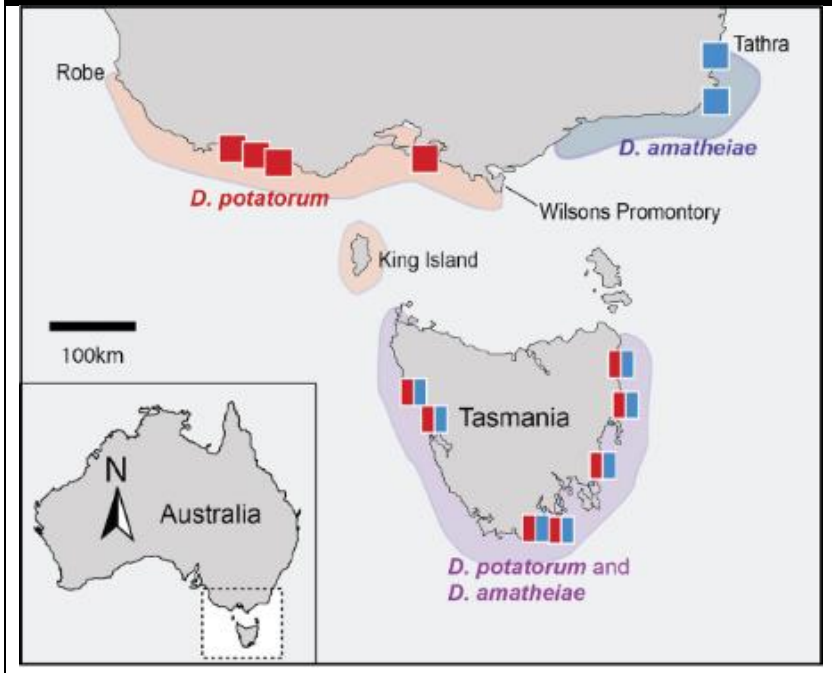



*Figure D4-1 - Distribution of bull kelp off Victoria and Tasmania (Velasquez et al. 2029)*

The PMST Report (Appendix B5) for the Environmental Planning Area did not identify any Key Ecological Features with benthic habitats in water depths > 10 m.

The PMST Report (Appendix B5) for the Environmental Planning Area did identify the Giant Kelp Marine Forests of South East Australia threatened ecological community. The Giant Kelp Forests of South East Australia ecological community is defined as giant kelp growing typically at depths greater than eight metres below sea level and forming a closed or semi-closed surface or sub-surface canopy (TSSC 2012). The ecological community is characterised by a closed to semi-closed surface or subsurface canopy of Macrocystis pyrifera which is the only species of kelp able to provide this three-dimensional structure from the sea floor to the sea surface, so if giant kelp plants are lost or removed, the ecological community no longer exists (TSSC 2012). The giant kelp forests provide habitat for other marine flora such as seaweeds and marine fauna including fish, molluscs (sea snails), bryozoans (lace corals), polychaetes (worms), crustaceans (crabs, isopods, amphipods), echinoderms (sea urchins, seastars) and sponges (TSSC 2012). There distribution is restricted to waters off the coast of Tasmania particularly in the Bruny, Freycinet and Davey bioregions, but also the Boags and Franklin, Flinders and Otway bioregions, the coast of South Australia in the Otway and Coorong bioregions as far west as Margaret Bock Reef and the coast of Victoria in the Otway, Flinders, Central Victoria and Twofold Shelf bioregions as far east as Gabo Island.

| **Benthic Assemblages** |
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| **Predicted Level of Risk** |
| Studies of offshore benthic seaweeds in the northwest Gulf of Mexico prior to and after the Macondo well blowout at Sackett and Ewing banks (in water depths of 55–75 m) found a dramatic die-off of seaweeds after the spill (60 species pre-spill compared with 10 species post-spill) (Felder et al. 2014). Benthic decapod assemblages (crabs, lobsters, prawns) associated with the seaweeds and benthic substrate also showed a strong decline in abundance at both banks post-spill (species richness on Ewing Bank reduced by 42% and on Sackett Bank by 29%), though it is noted that these banks are exposed to influences from Mississippi River discharges that vary year to year, so definitive links to the oil spill are not possible. It is noted, however, that petroleum residues were observed on Ewing Bank, and it is possible that this may have caused localised mortalities, reduced the fecundity of surviving female decapods or reduced recruitment (Felder et al. 2014). Felder et al (2014) also notes that freshly caught soft-sediment decapod samples caught in early and mid-2011 near the spill site exhibited lesions that were severe enough to cause appendage loss and mortality.<br><br>Water quality in benthic habitats exposed to entrained hydrocarbons would be expected to return to background conditions within weeks to months of contact. Several studies have indicated that rapid recovery rates may occur even in cases of heavy oiling (Committee on Oil in the Sea 2003).<br><br>Studies undertaken after the Montara oil spill incident included diver surveys to assess the status of Ashmore, Cartier and Seringapatam coral reefs. These found that other than a region-wide coral bleaching event caused by thermal stress (i.e. caused by sea water exceeding 32°C), the condition of the reefs was consistent with previous surveys, suggesting that any effects of oil reaching these reefs was minor, transitory, or sub-lethal and not detectable (Heyward et al. 2010). This is despite AMSA observations of surface slicks or sheen nears these shallow reefs during the spill (Heyward et al. 2010). Surveys in 2011 indicated that the corals exhibiting bleaching in 2010 had largely survived and recovered (Heyward et al. 2012), indicating that potential exposure to hydrocarbons while in an already stressed state did not have any impact on the healthy recovery of the coral.<br><br>Macroalgae are generally limited to growing on intertidal and subtidal hard substrata in shallow waters within the photic zone. As such, they may be exposed to subsurface and entrained and dissolved hydrocarbons, however, are susceptible to surface hydrocarbon exposure more so in intertidal habitats as opposed to subtidal habitats.<br><br>Smothering, fouling, and asphyxiation are some of the physical effects that have been documented from oil contamination in marine plants (Blumer 1971, Cintron et al. 1981). In macroalgae, oil can act as a physical barrier for the diffusion of $CO_2$ across cell walls (O'Brian & Dixon 1976). The effect of hydrocarbons, however, is largely dependent on the degree of direct exposure and how much of the hydrocarbon adheres to algae, which will vary depending on the oils physical state and relative 'stickiness'. The morphological features of macroalgae, such as the presence of a mucilage layer or the presence of fine 'hairs' will influence the amount of hydrocarbon that will adhere to the algae. 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 oiling. The rapid recovery of algae was attributed to the fact that for most algae, new growth is produced from near the base of the plant while the distal parts (which would be exposed to the oil contamination) are continually lost. Other studies have indicated that kelp beds oiled by crude oil had a 90% recovery within 3-4 years of impact, however full recovery to pre-spill diversity may not occur for long periods after the spill (French- McCay 2004).<br><br>Intertidal macroalgal beds are more prone to oil spills than subtidal beds because, although the mucous coating prevents oil adherence, oil that is trapped in the upper canopy can increase the persistence of the oil, which impacts upon site-attached species. Additionally, when oil sticks to dry fronds on the shore, they can become overweight and break as a result of wave action (IPIECA 2002).<br><br>The toxicity of hydrocarbons to macroalgae varies for the different macroalgal life stages, with water-soluble hydrocarbons more toxic (Van Overbeek and Blondeau 1954, Kauss et al. 1973 cited in O'Brien and Dixon, 1976). Toxic effect concentrations for hydrocarbons and algae have varied greatly among species and studies, ranging 0.002–10,000 ppm (Lewis & Pryor 2013). The sensitivity of gametes, larva and zygote stages however have all proven more responsive to petroleum oil exposure than adult growth stages (Thursby and Steele 2004, Lewis & Pryor 2013). |

| **Benthic Assemblages** |
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| Macrophytes, including seagrasses and macroalgae, require light to photosynthesise. So, in addition to the potential impacts from direct smothering or exposure to entrained and dissolved hydrocarbons, the presence of entrained hydrocarbon within the water column can affect light qualities and the ability of macrophytes to photosynthesise.<br><br>Experiments verified the susceptibility *of Nereocystis luetkeana* (bull kelp – North America) tissue to the direct exposure to several petroleum types. Antrim et al (1995) showed that petroleum treatments resulted in visible tissue damage, with a distinct bleached line being the most visible indication of plant contact with the petroleum. Moderate to heavy colour loss, which was generally followed by rapid decay of tissue, was most pronounced in 24 h exposures to unweathered and weathered diesel.<br><br>Due to the exposed nature of the coastal areas within the Environmental Planning Area and the nature of MDO, long-term effects in areas of moderate MDO exposure are not expected and natural weathering should result in rapid recovery of communities. MDO shoreline loading at the high threshold is not predicted due to the low spill volume. Consequently, impacts resulting in the loss of coastal seaweed to the extent that coastal erosion could be affected are not predicted. [Paragraph added in response to Matter: E14].<br><br>The predicted level of consequence to benthic assemblages from a 250 $m^3$ MDO spill is assessed as moderate as the consequences could be longer lasting (> 30 days) if kelp and other macroalgal areas are exposure to oil above the low threshold level, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of medium. |

### 9.4.2 Coastal Habitats and Coastal Communities

| **Coastal Habitats and Communities** | |
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| **Sensitivity Rating** | **Medium** |
| **Predicted Level of Risk** | **Medium** |
| **Environmental Planning Area Existing Environment** | |
| The Environmental Planning Area overlaps a wide variety of shorelines along Victoria, South Australia, and King Island. Coastal habitats which have the potential to be contacted by MDO spill include sandy shorelines, rocky shorelines, and saltmarsh. Mangroves are not present along the west coast of Victoria or King Island where the Environmental Planning Area. Coastal resources, specifically shell middens and flint, have been identified as having cultural value to the Gunditjmara and Eastern Maar people (Appendix F3, Section 3.16.1).<br>Sandy and rocky shorelines are the dominant the coastal habitats within the Environmental Planning Area.<br>The PMST Report (Appendix B5) for the Environmental Planning Area identified the following Threatened Ecological Communities that are present on the shoreline:<br>• Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community.<br>• Subtropical and Temperate Coastal Saltmarsh.<br>• King Island Scrub Complex<br>The Subtropical and Temperate Coastal Saltmarsh TEC occurs in a relatively narrow strip along the Australian coast, within the boundary along 23°37' latitude along the east coast and south from Shark Bay on the west coast of WA (TSSC 2013). The community is found in coastal areas which have an intermittent or regular tidal influence.<br>The coastal saltmarsh community consists mainly of salt-tolerant vegetation including grasses, herbs, sedges, rushes and shrubs. Succulent herbs, shrubs and grasses generally dominate, and vegetation is generally less than 0.5 m in height (Adam 1990). In Australia, the vascular saltmarsh flora may include many species, but is dominated by relatively few families, with a high level of endism at the species level.<br>The saltmarsh community is inhabited by a wide range of infaunal and epifaunal invertebrates and low and high tide visitors such as fish, birds and prawns (Adam 1990). It is often important nursery habitat for fish and prawn species. Insects are also abundance and an important food source for other fauna. The dominant marine residents are benthic invertebrates, including molluscs and crabs (Ross et al. 2009). Saltmarsh communities are threatened by clearing and fragmentation, land reclamation, altered hydrology and tidal restriction, invasive species, climate change, mangrove encroachment, recreation, eutrophication, grazing, insect control and inappropriate fire regimes (TSSC 2013).<br>The coastal saltmarsh community provides extensive ecosystem services such as the filtering of surface water, coastal productivity and the provision of food and nutrients for a wide range of adjacent marine and estuarine communities and stabilising the coastline and providing a buffer from waves and storms. Most importantly, the saltmarshes are one of the most efficient ecosystems globally in sequestering carbon, due to the biogeochemical conditions in the tidal wetlands being conducive to long-term carbon retention. A concern with the loss of saltmarsh habitat is that it could release the huge pool of stored carbon to the atmosphere.<br>The Assemblages of species associated with open-coast salt-wedge estuaries of western and central KEF are an assemblage of native plants, animals and micro-organisms associated with the dynamic salt-wedge estuary systems that occur within the temperate climate, microtidal regime (< 2 m), high wave energy coastline of western and | |

| **Coastal Habitats and Communities** |
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| central Victoria. The ecological community currently encompasses 25 estuaries in the region defined by the border between South Australia and Victoria and the most southerly point of Wilsons Promontory (DoEE 2018a).<br><br>Salt-wedge estuaries are usually highly stratified, with saline bottom waters forming a 'salt-wedge' below the inflowing freshwater layer of riverine waters. The dynamic nature of salt-wedge estuaries has important implications for their inherent physical and chemical parameters, and ultimately for their biological structure and ecological functioning. Some assemblages of biota are dependent on the dynamics of these salt-wedge estuaries for their existence, refuge, increased productivity and reproductive success. The ecological community is characterised by a core component of obligate estuarine taxa, with associated components of coastal, estuarine, brackish and freshwater taxa that may reside in the estuary for periods of time and/or utilise the estuary for specific purposes (e.g. reproduction, feeding, refuge, migration) (DoEE 2018a).<br><br>The King Island Scrub Complex threatened ecological community is listed as endangered, and is the assemblage of plants, animals and other organisms associated with a type of scrub or tall shrubland that is found on King Island, Tasmania. At the time of listing, the King Island scrub complex occurs in the Cradle Coast Natural Resource Management (NRM) region. King Island scrub complex typically occurs on acidic sandy soils (with or without an organic rich A-horizon) on flats or undulating plains in the north-east, central and south-east coast, and centre of the island, with significant occurrences also in the far south-west of the island, where it lies between the New Dunes and the more fertile plateau country to the east (DCCEEW 2024j).<br><br>The Conservation Advice for this threatened community also mentions the Sea Elephant Conservation Area as a relevant listed ecological community on King Island, and is described as providing a suitable habitat for a range of threatened flora and fauna species including the critically endangered Orange-bellied Parrot and endemic subspecies of bush birds. Southern Elephant Seals (*Mirounga leonine*) once bred on King Island but were wiped out because of the sealing industry in the 19$^{th}$ century. The closest breeding area for the Southern Elephant Seals (listed as vulnerable) to the EPA is Macquarie Island (TSSC 2016c). Oil is listed in this species recovery plan as a potential threat, but no known colonies currently live on King Island, thus impacts to this species and its habitat from oil are not predicted (DEH 2003b). |
| **Predicted Level of Risk** |
| Sandy beaches are regularly exposed to wave action and have low sediment total organic carbon and therefore generally a low abundance of marine life (Hook et al. 2016). The low concentration of total organic carbon and large particle size of sand means that any MDO deposited on the beach would not be retained. However, sandy beaches are important socio-economically, so an MDO spill reaching this type of shoreline may attract attention that is disproportionate to its sensitivity (Hook et al. 2016).<br><br>Depth of penetration in sandy sediment is influenced by:<br>• Particle size – penetration is great in coarser sediments (such as beach sand) compared to mud (in estuaries and tidal flats).<br>• Oil viscosity – MDO quickly penetrates sandy sediments.<br>• Drainage – coarse beach sands allow for rapid drainage (it may reach depths greater than one metre in coarse well-drained sediments).<br>• Animal burrows and root pores – penetration into fine sediments is increased if there are burrows of animals such as worms, or pores left where plant roots have decayed.<br><br>Areas of heavy oiling (>1,000 g/m$^2$ threshold) would likely result in acute toxicity, and death, of many invertebrate communities, especially where oil penetrates sediments through animal burrows (IPIECA 1999). However, these communities would be likely to rapidly recover (recruitment from unaffected individuals and recruitment from nearby areas) as oil is removed from the environment. The results of exposure to oil may be acute (e.g., die off of amphipods and replacement by more tolerant species such as worms or chronic (i.e., gradual accumulation of oil and genetic damage) (Hook et al. 2016). |

| **Coastal Habitats and Communities** |
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| Cracks and crevices, rock pools, overhangs and other shaded areas provide habitat for soft bodied animals such as sea anemones, sponges, and sea- squirts, and become places where hydrocarbons can become concentrated as it strands ashore. The same is true on stable boulder shores where the rich animal communities underneath the rocks are also the most vulnerable to hydrocarbon pollution.<br><br>The vulnerability of a rocky shoreline to oiling is dependent on its topography and composition as well as its position. A vertical rock wall on a wave- exposed coast is likely to remain unoiled if an oil slick is held back by the action of the reflected waves (IPIECA-IOGP 2016). At the other extreme, a gradually sloping boulder shore in a calm backwater of a sheltered inlet can trap enormous amounts of hydrocarbons, which may penetrate deep down through the substratum. The complex patterns of water movement close to rocky coasts also tend to concentrate oil in certain areas. Some shores are well known to act as natural collection sites for litter and detached algae and oil is carried there in the same way. As on all types of shorelines, most of the oil is concentrated along the high tide mark while the lower parts are often untouched. As MDO is less sticky than other oils it is less likely to adhere to rocky shorelines and creates stains.<br><br>Saltmarshes are considered to have a high sensitivity to hydrocarbon exposure. Saltmarsh vegetation offers a large surface area for oil absorption and tends to trap oil. 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 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. However, many case studies have shown good recruitment of annual species in the year following a spill (IPIECA-IOGP 2016).<br><br>Sections of the King Island Scrub Complex community and the Sea Elephant Conservation Area occur on the shorelines along the eastern side of King Island, indicating that a small area of this community is at risk of impact from a worst-case scenario hydrocarbon spill. The majority of this community is located inland within terrestrial ecosystems and is not expected to be impacted by hydrocarbons in the event of a spill. No key threats were identified for these communities as relevant to the proposed activity. The distance to the nearest King Island (western) coastal areas from the Operational Area is ~ 70 km, and the coastal elements of these communities are located on the east coast of King Island, thus, impacts to these communities are not predicted.<br><br>Due to the exposed nature of the coastal areas within the Environmental Planning Area and the nature of MDO, long-term toxicity or smothering effects in areas of moderate MDO exposure are not expected and natural weathering should result in rapid recovery of communities. MDO shoreline loading at the high threshold is not predicted due to the low spill volume. Potential risks arising from a MDO spill on socio-economic receptors (tourism, cultural and/or other social values) are more likely to occur as a result of visual/ aesthetic impacts, rather than ecological impacts.<br><br>The predicted level of consequence to coastal habitats and communities from a 250 $m^3$ MDO spill is assessed as moderate as consequences could be longer lasting (> 30 days) if saltmarsh communities are exposure to oil above the low threshold level the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of medium. |

## 9.5 Changes to Functions, Interests and Activities and Change in Aesthetic Value

### 9.5.1 Commercial Fisheries

| **Commercial Fisheries** | |
|---|---|
| Sensitivity Rating | **Medium** |
| Predicted Level of Risk | **Medium** |
| **Environmental Planning Area Existing Environment** | |
| The Environmental Planning Area overlaps the following fisheries that have catch effort. A description of these fisheries is provided in the Regia MSS Commercial Fishery Review in Appendix B6.<br>Commonwealth:<br>• Bass Strait Central Zone Scallop Fishery<br>• Eastern Tuna and Billfish Fishery<br>• Small Pelagic Fishery (Western sub-area)<br>• Southern and Eastern Scalefish and Shark (SESS) Fishery SESSF following sectors:<br>  ○ Shark Gillnet and Hook<br>  ○ Scalefish Hook<br>  ○ Trawl – otter board<br>• Southern Squid Jig Fishery<br>• Western Tuna and Billfish Fishery<br>Victorian:<br>• Abalone<br>• Giant Crab<br>• Multi-species Ocean<br>• Octopus<br>• Rock Lobster | |

| **Commercial Fisheries** |
|---|
| • Wrasse<br>Tasmanian:<br>• Abalone<br>• Giant Crab<br>• Octopus<br>• Rock Lobster<br>South Australian:<br>• Abalone<br>• Charter Boat<br>• Giant Crab<br>• Marine Scalefish Fishery<br>• Rock Lobster |
| **Predicted Level of Risk** |
| Commercial fishing has the potential to be impacted through exclusion zones associated with the spill, the spill response and subsequent reduction in fishing effort. Exclusion zones may impede access to commercial fishing areas, for a short period of time, and nets and lines may become oiled. The impacts to commercial fishing from a public perception, however, may be much more significant and longer term than the spill itself.<br>Fishing areas may be closed for fishing for shorter or longer periods because of the risks of the catch being tainted by oil. Concentrations of petroleum contaminants in fish and crustacean and mollusc tissues could pose a significant potential for adverse human health effects, and until these products have been cleared by the health authorities, they could be restricted for sale and human consumption. Toxicity in adult fish has been reported in response to crude oils, HFO and diesel (Holdway 2002, Shigenaka 2011). Uptake of hydrocarbons has been demonstrated in bony fish after exposure to water-accommodated fraction hydrocarbons of between 24 and 48 hours. Davis et al (2002) report detectable tainting of fish flesh after a 24-hour exposure at crude concentrations of 0.1 ppm, marine fuel oil concentrations of 0.33 ppm and diesel concentrations of 0.25 ppm. The majority of studies, either from laboratory trials or of fish collected after spill events (including the Hebei Spirit, Macondo, and Sea Empress) find evidence of elimination of PAHs in fish tissues returning to reference levels within two months of exposure (Challenger and Mauseth 2011, Davis et al. 2002, Gagnon & Rawson 2011, Gohlke et al. 2011, Jung 2011, Law 1997, Rawson et al. 2011).<br>Should there be impacts to fish stocks associated with impacts to plankton life phase there is the potential for reduction in profits for commercial fisheries over a longer period of time, and potential for reduced fishing quotas or exclusion zones exclude fishing effort, associated with sustainable fisheries management.<br>The Montara spill of a light gas condensate, (as the most recent [2009] example of a large hydrocarbon spill in Australian waters) occurred over an area fished by the Northern Demersal Scalefish Managed Fishery (with 11 licences held by 7 operators), with Goldband Snapper, Red Emperor, Saddletail Snapper and Yellow Spotted Rockcod being the key species fished (PTTEP 2013). As a precautionary measure, the WA Department of Fisheries advised the commercial fishing fleet to avoid fishing in oil-affected waters. Testing of fish caught in areas of visible oil slick (November 2009) found that there were no detectable petroleum hydrocarbons in fish muscle samples, suggesting fish were safe for human consumption. In the short-term, fish had metabolised petroleum hydrocarbons. Limited ill effects were detected in a small number of individual fish only |

| **Commercial Fisheries** |
| --- |
| (PTTEP 2013). No consistent effects of exposure on fish health could be detected within two weeks following the end of the well release. Follow up sampling in areas affected by the spill during 2010 and 2011 (PTTEP 2013) found negligible ongoing environmental impacts from the spill.<br><br>Similarly, the Macondo well blowout in the Gulf of Mexico (2010), began testing a month after the event showing levels of oil contamination residue in seafood consistently tested 100 to 1,000 times lower than safety thresholds established by the USA FDA, and every sample tested was found to be far below the FDA's safety threshold for dispersant compounds (BP 2015). FDA testing of oysters found oil contamination residues to be 10 to 100 times below safety thresholds (BP 2014). Sampling data shows that post-spill fish populations in the Gulf of Mexico since 2011 were generally consistent with pre-spill ranges and for many shellfish species, commercial landings in the Gulf of Mexico in 2011 were comparable to pre-spill levels. In 2012, shrimp (prawn) and blue crab landings were within 2.0% of 2007-09 landings.<br><br>In the event of a MDO spill, a temporary fisheries closure may be put in place by the fishing authority or voluntarily by the fishers themselves. A temporary fisheries closure, combined with oil tainting of target species (actual or perceived), may lead to financial losses to fisheries and economic losses for individual licence holders. Fisheries closures and the flow on losses from the lack of income derived from these fisheries are likely to have short-term but potentially widespread socio-economic consequences, such as reduced employment in the fisheries and fisheries service industries, such as tackle and bait supplies, fuel, marine mechanical services, accommodation and so forth.<br><br>Oiling of fishing vessel hull and fishing equipment is not predicted given the light nature of MDO and that surface oil is predicted to have evaporated or entrained with 24 hours.<br><br>A spill event may result in a short-term fishing exclusion zone (days to weeks) being implemented by the appropriate fishing authority. Areas of moderate dissolved and high entrained exposure thresholds are expected to be very small as MDO is predicted to weather quickly and the area would return to pre-spill conditions rapidly. MDO is not predicted to accumulate among benthic sediments due to the significant mixing of waters and dilution of the low concentration of hydrocarbons in the water column, as such reducing impacts to habitats in 10 m depth, which are likely slower to recover.<br><br>The predicted level of consequence to commercial fisheries from a 250 $m^3$ MDO spill is assessed as moderate as consequences could be longer lasting (> 30 days) if fishery closures and public perception of fishing tainting occur, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of medium. |

### 9.5.2 Marine Industries

| **Marine Industry** | |
|---|---|
| **Sensitivity Rating** | **Medium** |
| **Predicted Level of Risk** | **Low** |
| **Environmental Planning Area Existing Environment** | |
| Marine industries identified within the Environmental Planning Area are:<br>Defence<br>A defence practice area is located within the Environmental Planning Area. There is also a number of potential unexploded ordnance areas, however, these are not predicted to be impacted by oil exposure and is not assessed further.<br>Desalination Plant<br>The Victorian Desalination Plant, located at Wonthaggi, is outside of the Environmental Planning Area.<br>Offshore Energy<br>Within the Environmental Planning Area there is the Beach Energy Otway Development consisting of subsea infrastructure and an unmanned platform and the Cooper Energy Casino Henry Netherby Development consisting of subsea infrastructure. During the Regia MSS design envelope (1 April 2024 to 31 December 2028) there is the potential for exploration and development activities such as infrastructure inspection, maintenance and repairs campaigns, seabed surveys, seismic surveys, drilling and infrastructure installation to be undertaken with vessels and drill rigs to support the ongoing energy supply of oil and gas and potentially renewables within the Otway Basin.<br>Shipping<br>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. Commercial vessels use the route when transiting between ports on the east, south and west coasts of Australia, and there are regular passenger and cargo services between mainland Australia and Tasmania. Ports Australia provide statistics for port operations throughout Australia's main commercial ports. Based on the latest information (2021) the majority of commercial shipping traffic transiting to and from Victorian ports were container (3,682), general cargo (2,663), bulk liquid carriers (2,019), dry bulk (1,715), car carrier (1,342), bulk gas (220), other cargo (47) and livestock (9).<br>Submarine cables<br>INDIGO-Central submarine cable which at a depths greater than 100 m is not predicted to be affected by oil exposure and is not assessed further. | |
| **Predicted Level of Risk** | |
| Marine industries have the potential to be impacted through exclusion zones associated with the spill and the spill response. Exclusion zones may impede access to shipping lanes, defence practice areas and offshore energy infrastructure, for a short period of time. Oiling of vessel hulls or the Thylacine-A platform is not predicted given the light nature of MDO and that surface oil is predicted to have evaporated or entrained with 24 hours. | |

| **Marine Industry** |
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| Thus, the predicted level of consequence to seaweed industries from a 250 $m^3$ MDO spill is assessed as minor as exposure is likely to be below low thresholds and any consequences would be short-term (days to weeks), recoverable and affect a small portion of marine industries, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of low. |

### 9.5.3 Coastal Developments

| **Coastal Developments** | |
|---|---|
| **Sensitivity Rating** | **High** |
| **Predicted Level of Risk** | **Medium** |
| **Environmental Planning Area Existing Environment** | |
| Local government areas within the Environmental Planning Area are detailed below.<br>Victoria<br>*Mornington Peninsula Shire*<br>Mornington Peninsula Shire coastal areas within the environmental planning area are St Andrews Beach, Rye, Blairgowrie, Sorrento, and Portsea. These towns are popular tourist areas with a variety of beaches and tourist attractions. The area was originally home to the Mayone-bulluk and Boonwurrung-Balluk clans and formed part of the Boonwurrung nation's territory prior to European settlement.<br>*Greater Geelong City*<br>Greater Geelong City coastal areas within the environmental planning area are St Leonards, Swan Bay, Point Lonsdale, Ocean Grove, Barwon Heads, Connewarre, and Breamlea. The largest of these towns is Ocean Grove with a population of 14,714 (ABS 2021). These towns are popular tourist areas with a variety of beaches and access to Port Phillip Bay.<br>*Surf Coast Shore*<br>Within the environmental planning area are the world-famous surfing beaches Bells Beach and Torquay Beach. In addition, the Great Ocean Road follows the coast from Anglesea past Lorne.<br>*Colac Otway Shire*<br>Within the environmental planning area, the Great Ocean Road follows the coast past Apollo Bay and then goes inland at Marengo. The Great Otway National Park coastal areas, including the Aire River outlet, which is a popular campaign area, are within the environmental planning area. The Apollo Bay Port is home to a local fishing industry and commercial fleet which employs more than 70 people and boasts 16 boats, including trawlers, crayfish, and charter boats (Colac Otway Shire 2023).<br>*Corangamite Shire*<br>The main Corangamite Shire coastal areas within the environmental planning area are Princetown and Port Campbell. The Great Ocean Road follows the coast within the shire and the Twelve Apostles Marine National Park abouts the coastal area. Port Campbell is one of the main ports for the Eastern Zone Rock Lobster Fishery (VFA 2023).<br>*Moyne Shire*<br>The main Corangamite Shire coastal areas within the environmental planning area are Peterborough, Warrnambool, and Port Fairy. The three towns are on the Great Ocean Road and are popular tourist areas for sightseeing, beaches and whale watching. | |

| **Coastal Developments** |
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| Glenelg Shire<br><br>Within the Glenelg Shire the main coastal town is Portland which is the oldest European settlement in Victoria. In 2021, the population was 10,016 (ABS 2021). The Great South West Walk, a 250 km walking track, begins in Portland. Portland has become known as 'Tuna Town' because of its reliable tuna fishing and the importance of the species to the tourist economy (VFA 2023a). Portland harbour exists for commercial boats and ships that support export industries and doubles as a first-class boating facility.<br><br>South Australia<br><br>*District Council of Grant*<br><br>The area along the South Australian coast of the environmental planning area is known as the limestone coast. The main town is Port MacDonnell, originally known as *Ngaranga,* which is the southernmost town in South Australia. The area was originally inhabited by the Bungandidj Aboriginal people. The 2021 Census reports that the locality of Port MacDonnell had a population of 859 (ABS 2021). Once a busy shipping port, the town now relies heavily on its fishing and summer tourism industries, particularly rock lobster harvest industry, proclaiming itself "Australia's Southern Rock Lobster Capital".<br><br>Tasmania<br><br>*King Island Council*<br><br>King Island is at the western entrance to Bass Strait and is 64 km long by 27 km wide. The 2021 Census reports that the King Island had a population of 1,617 (ABS 2021). King Island was originally part of a land bridge linking Tasmania with the Australian mainland, which was submerged around 12,000 years ago due to rising sea levels. A human skeleton was discovered in a cave on the island in 1989, which was dated to approximately 14,000 years ago. However, previous examinations had revealed no "shell heaps, bones, charcoal or other remains which might indicate Aboriginal occupation", suggesting that the area was passed through by the ancestors of Aboriginal Tasmanians but not permanently inhabited (Sim 1990). The island is a popular tourist location and produces cheese, lobsters, kelp, and beef. |
| **Predicted Level of Risk** |
| Due to the distance to the South Australian and King Island coastal areas from the Operational Area (~130 km and ~ 70 km respectively) impacts to coastal areas above the low thresholds are not predicted. As the Operational Area is as close as ~7 km to the Victorian coast, there is the potential for diesel above the low threshold to be visible on the ocean surface in coastal waters and as a sheen on shoreline areas. Most of the diesel will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA 1995) and expected to be visible.<br><br>Visible nearshore and shoreline hydrocarbons have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities this can have a knock-on effect to local businesses if beaches are required to be closed to allow for the clean-up of any oil. Due to the low volumes, light nature of marine diesel and substantial wave action with the nearshore area's impacts are likely to be short term and not require intrusive clean-up response.<br><br>The predicted level of consequence to coastal developments from a 250 $m^3$ MDO spill is assessed as moderate as exposure to oil above low thresholds could occur areas nearshore of the Operational Area, though if consequences occurred, they are likely to only affect a small portion of the coastal area for a short duration (hours to days) due to the low spill volume and short duration of any exposure, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of medium. |

### 9.5.4 Indigenous Culture

| **Indigenous Culture** | |
|---|---|
| **Sensitivity Rating** | **High** |
| **Predicted Level of Risk** | **Medium** |
| **Environmental Planning Area Existing Environment** | |
| The information provided below has been sourced from publicly available information and from consultation undertaken in preparing the EP.<br><br>Within the Environmental Planning Area key values and sensitivities in relation to First Nations have been identified and described, through consultation and desktop research, documented in Appendix F3, Section 3.16. These include both tangible and intangibles, for example, Nyamat Mirring Indigenous Protected Area [currently under consultation], Deen Maar, Point Nepean & Mornington Peninsula, Southern Right Whales, Glass Eel, kelp and songlines. The relevant section of this document concerning the value is outlined in the Cultural Features Table, located in Appendix F3, Section 3.16.1.<br><br>The Environmental Planning Area overlaps King Island which was part of a land bridge linking Tasmania with the Australian Mainland and was submerged around 12,000 years ago with rising sea levels. While uninhabited at the time of European discovery by Captain Reed in 1799 the first Tasmanians were a very mobile people, especially by water. They had a wide-ranging territory, travelling in season for hunting, gathering and ceremonial purposes. They built and used several different types of seaworthy boats and research suggests that they passed through but did not permanently inhabit King Island (KIC 2023).<br><br>The Environmental Planning Area overlaps with the following Native Title determinations (Appendix B12 MAP-REG-EPM-92_A):<br><br>Gunditj Mirring Traditional Owners Aboriginal Corporation (GMTOAC) on behalf of the Gunditjmara people.<br><br>Eastern Maar Aboriginal Corporation (EMAC) on behalf of the Eastern Maar people. The Environmental Planning Area overlaps with the following Registered Aboriginal Parties' coastal areas in Victoria:<br><br>Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC) on behalf of the Wadawurrung people.<br><br>Bunurong Land Council Aboriginal Corporation (BLCAC) on behalf of the Bunurong people.<br><br>Non-exclusive rights linked to Native Title determinations, include access to the land and waters and resources therein, the use and enjoyment of lands and waters, camping, and the protection of areas of importance, such as the 'Convincing Grounds; (Appendix F3, Section 3.16.1). As per the Offshore Petroleum and Greenhouse Gas Storage Act 2006, Section 280, Requirement 2(e), offshore activities must carry out the activities in a manner that does not interfere with the enjoyment of native title rights and interests beyond what is necessary for the reasonable exercise of the rights granted under exploration titles. | |

| **Indigenous Culture** |
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| |
| **Predicted Level of Risk** |
| Due to the distance to the South Australian and King Island coastal areas from the Operational Area (~130 km and ~ 70 km respectively) impacts to coastal areas above the low thresholds are not predicted. As the Operational Area is as close as ~7 km to the Victorian coast, there is the potential for diesel above the low threshold to be visible on the ocean surface in coastal waters and as a sheen on shoreline areas. Most of the diesel will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA 1995) and expected to be visible.<br><br>Visible nearshore and shoreline hydrocarbons have the potential to reduce the visual amenity of the area but impacts to cultural values are not predicted due to the low volumes, light nature of marine diesel and substantial wave action with the nearshore areas impacts are likely to be short term and not require intrusive clean-up response, with access, enjoyment and use of Native Title land and waters able to continue.<br><br>The predicted level of consequence to coastal developments from a 250 $m^3$ MDO spill is assessed as moderate as exposure to oil above low thresholds could occur areas nearshore of the Operational Area, though if consequences occurred, they are likely to only affect a small portion of the coastal area for a short duration (hours to days) due to the low spill volume and short duration of any exposure, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of medium. |

### 9.5.5 Protected Areas

| **Protected Areas** | |
|---|---|
| **Sensitivity Rating** | **High** |
| **Predicted Level of Risk** | **Medium** |
| **Environmental Planning Area Existing Environment** | |
| There is one World Heritage Property adjacent to the Environmental Planning Area:<br>Budj Bim Cultural Landscape<br>The Budj Bim Cultural Landscape, located in the traditional Country of the Gunditjmara Aboriginal people in south-eastern Australia, is recognized for its world heritage values due to its ancient and sophisticated aquaculture systems. The Budj Bim lava flow is recognised as an attribute contributing to the Outstanding Universal Value of the Budj Bim World Heritage Site which extends into Portland Bay (Wheeler et al., 2023). The Gunditjmara people utilized the lava flows from the Budj Bim volcano to create an extensive network of channels, weirs, and dams. This network was designed to manage water flow for the systematic trapping, storing, and harvesting of Kooyang (short-finned eel - *Anguilla australis*), providing a sustainable economic and social base for their society over millennia. The Budj Bim Cultural Landscape connects to the coast through waterways and hence these waterways could theoretically be affected by surface oil. Surface oils are not however expected to travel upstream, nor be transported far enough inland to have an impact on the landscape. The coastal waterway that has the potential to be associated with oiling on a small scale is not predicted to impact the cultural values of this World Heritage Property.<br>The PMST Report for the Environmental Planning Area (Appendix B5) identified the following for protected areas.<br>National Heritage Places<br>Four places of National Heritage were identified in the Environmental Planning Area:<br>Great Ocean Road and Scenic Environs (Historic)<br>Point Nepean Defence Sites and Quarantine Station Area (Historic)<br>Quarantine Station and Surrounds (Historic)<br>Budj Bim National Heritage Landscape – Tyrendarra Area (Indigenous)<br>The Point Nepean Defence Sites and Quarantine Station Area is above the shoreline and hence would not be directly affected by oil. It is on the bay side of the Mornington Peninsula which is not predicted to be impacted by a spill.<br>The Quarantine Station and Surrounds is located towards the western end of the Nepean Peninsula on the shore of Port Phillip Bay. The building is on the bay side of the Mornington Peninsula which is not predicted to be impacted by a spill. To the east and south of the main building area the land rises to a height of about 40 metres which is not predicted to be impacted by a spill.The Tyrendarra Area of the Budj Bim Cultural Landscape in Western Victoria contains the remains of a complex system of natural and artificially created wetlands, channels, the stone bases of weirs and stone fish traps that were used by Gunditj Mara people to grow and harvest eels and fish. The remains on Tyrendarra are part of the same system as the remains in the Mt Eccles/Lake Condah area. The Budj Bim Cultural Landscape connects to the coast through waterways and hence these waterways could theoretically be affected by surface oil. Surface oils are not however expected to travel upstream, nor be transported far enough | |

| **Protected Areas** |
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| inland to have an impact on the landscape. The coastal waterway that has the potential to be associated with oiling on a small scale is not predicted to impact the cultural values of this World Heritage Property.<br>The Great Ocean Road and Scenic Environs is above the shoreline and hence would not be directly affected by oil. However, the scenic environs could be impacted by surface or shoreline oil.<br>The Australian Heritage Council found the Great Ocean Road and its scenic environs road from Torquay to Allansford, a journey of 242 kms, as a place of outstanding national heritage significance. Constructed by workers, including more than 3000 returned servicemen, as a memorial to First World War servicemen, the Great Ocean Road is a significant reminder of the participation of Australian servicemen in the First World War, the Australian community's appreciation of their service, and the support provided for the welfare of servicemen and women upon returning to Australia.<br>The scenic environs include all views from the Great Ocean Road and Great Ocean Walk, including the Twelve Apostles, the Bay of Islands and Bay of Martyrs. The coastline from Lorne to Kennett River is among the world's most dramatic cliff and ocean scenery able to be viewed from a vehicle.<br>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 place is also listed for its; outstanding rocky coastline, dinosaur fossil sites, geomorphological monitoring sites, its association with the pioneering landscape architect Edna Walling, and for the significance of Bells Beach to surfing.<br>Commonwealth Heritage Places<br>Six places of National Heritage were identified in the Environmental Planning Area<br>Cape Northumberland Lighthouse SA (Historic, Listed place)<br>Cape Wickham Lighthouse TAS (Historic, Listed place)<br>Fort Queenscliff VIC (Historic, Listed place)<br>Sorrento Post Office VIC (Historic, Listed place)<br>Swan Island Defence Precinct VIC (Historic, Listed place)<br>Swan Island and Naval Waters VIC (Natural, Listed place)<br>Only the Swan Island and Naval Waters includes coastal areas within the Environmental Planning Area and is described.<br>Swan Island is the largest emergent sand accumulation feature in Port Phillip Bay. The island, which has been built principally by wave actions rather than by aeolian forces, has played a major role in determining the pattern of sedimentation in Swan Bay and preserves geomorphological evidence of changing Quaternary sea levels. The eastern and northern shores of the eastern arm of Swan Island are of regional significance as an example of active coastal depositional and erosional processes (DCCEEW 2023c).<br>Swan Island and adjacent naval waters provide important habitat for 46 water bird species, of which 26 species are listed under the Japan-Australia and China-Australia migratory bird agreements, and 8 species are listed under the Bonn Convention on Migratory Species (DCCEEW 2023c). During the migration season Swan Bay supports internationally significant populations of the Eastern Curlew, Ruddy Turnstone, Red-necked Stint, Sharp-tailed Sandpiper, Curlew Sandpiper, and Grey Plover (DCCEEW 2023c). Nationally significant populations of the Greenshank, Pacific Golden Plover, Double-banded Plover, and Lesser Sand Plover also occur (DCCEEW 2023c). Sand Island is the most important high tide roosting area in Swan Bay and at high tide regularly supports half of the shorebirds in the Swan Bay - Mud Islands complex. |

| **Protected Areas** |
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| Ramsar Wetlands<br>Four Ramsar Wetlands were identified in the Environmental Planning Area.<br>Glenelg Estuary and Discovery Bay<br>Key features of the site (DCCEEW 2023d):<br>The Glenelg Estuary and Discovery Bay Ramsar Site is situated in western Victoria. It covers approximately 22,289 hectares and comprises portions of the Lower Glenelg National Park, the Discovery Bay Coastal Park and the Nelson Streamside Reserve. The Glenelg River estuary is the longest in the bioregion, extending 75 kilometres. The Ramsar site comprises three broad systems that support different wetland types: freshwater wetlands, the Glenelg Estuary and the beach and dune system. The site contains several regionally (and internationally) rare wetland types: intact fen peatlands and a humid dune slack system.<br>The site:<br>Supports the nationally vulnerable coastal saltmarsh ecological community and eight nationally / internationally listed threatened flora and fauna species.<br>Provides habitat for 95 waterbird species including 24 species listed under international agreements. Beach nesting birds such as Hooded Plover (*Thinornis rubricollis*) and Red-capped Plover (*Charadrius ruficapillus*) are regularly recorded nesting on the dunes of the Discovery Bay Coastal Park.<br>Supports 14 species of native fish which are diadromous, migrating between habitats for part of their lifecycle by providing food, spawning grounds and nurseries. It also acts as a migration path on which diadromous fishes of the region depend.<br>Provides habitat for obligate aquatic species in the permanent wetlands of the Long Swamp complex and Bridgewater Lakes when the surrounding landscape is dry and during drought conditions.<br>Supports > 1% of the population of the wetland dependent invertebrate species the Ancient Greenling (*Hemiphlebia mirabilis*) in the Baumea sedgelands.<br>The area is popular for recreational and tourism activities, including sightseeing, walking, camping, and recreational fishing. Importantly, the Gunditjmara Indigenous people have a living association with the Ramsar site, which has great cultural significance for them, as it is part of their Koonang (sea) and Bocara Woorrowarook (river forest) country.<br>Lavinia<br>Key features of the site (DCCEEW 2023e):<br>The Lavinia Ramsar site is located on the north-east coast of King Island, Tasmania. The boundary of the site forms the Lavinia State Reserve, with major wetlands in the reserve including the Sea Elephant River estuary area, Lake Martha Lavinia, Penny's Lagoon, and the Nook Swamps. The shifting sands of the Sea Elephant River's mouth have caused a large back-up of brackish water in the site, creating the saltmarsh which extends up to five kilometres inland. The present landscape is the result of several distinct periods of dune formation.<br>The extensive Nook Swamps, which run roughly parallel to the coast, occupy a flat depression between the newer parallel dunes to the east of the site and the older dunes further inland. Water flows into the wetlands from the catchment through surface channels and groundwater and leaves mainly from the bar at the mouth of the Sea Elephant River and seepage through the young dune systems emerging as beach springs. |

| **Protected Areas** |
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| The Lavinia State Reserve is one of the few largely unaltered areas of the island and contains much of the remaining native vegetation on King Island. The vegetation communities present on the site include Succulent Saline Herbland, Coastal Grass and Herbfield, Coastal Scrub and King Island Eucalyptus globulus Woodland. The freshwater areas of the Nook Swamps are dominated by swamp forest. Nook Swamps and the surrounding wetlands contain extensive peatlands.<br><br>The site is an important refuge for a collection of regional and nationally threatened species, including the nationally endangered Orange-bellied Parrot. This parrot is heavily dependent upon the samphire plant, which occurs in the saltmarsh, for food during migration. They also roost at night in the trees and scrub surrounding the Sea Elephant River estuary.<br><br>Several species of birds which use the reserve are rarely observed on the Tasmanian mainland, including the Dusky Moorhen, Nankeen Kestrel, Rufous Night Heron and the Golden-headed Cisticola.<br><br>The site is currently used for conservation and recreation, including boating, fishing, camping and off-road driving. There are artefacts of Indigenous Australian occupation on King Island that date back to the last ice age when the island was connected to Tasmania and mainland Australia via the Bassian Plains.<br><br>Piccaninnie Ponds Karst<br><br>Key features of the site (DCCEEW 2023f):<br><br>The Piccaninnie Ponds Karst Wetlands Ramsar Site is located in south-east South Australia, near Mount Gambier. It is an exceptional example of karst spring wetlands, with the largest and deepest of the springs reaching a depth of more than 110 m. The majority of the water comes from an unconfined regional aquifer and is consistently 14-15 degrees Celsius. The karst springs support unique macrophyte and algal associations, with macrophyte growth extending to 15 m below the surface as a result of exceptional water clarity. A number of different wetland types exist on the site, including a large area of peat fens.<br><br>There are four distinct areas of the Ramsar site. Piccaninnie Ponds (also known as Main Ponds) consists of three interconnected bodies of water - First Pond, The Chasm and Turtle Pond - rounded by an area of shrub dominated swamp. Western Wetland consists of dense closed tea-tree and paperbark shrubland over shallow dark clay on limestone soils. Eastern Wetland includes the spring-fed Hammerhead Pond. Pick Swamp, on the extreme west of the site, includes areas of fen, marshes and sedgelands as well as the spring-fed Crescent Pond on peat soils.<br><br>The system is an important remnant of an extensive system of wetlands that once occupied much of the south-east of South Australia. The major groundwater discharge points are Main Ponds, Hammerhead Pond and Crescent Pond. Water principally leaves the site via Outlet Creek and the Pick Swamp drain outlet, which connect the site to the sea. There are a number of fresh groundwater beach springs located on the site.<br><br>The geomorphic and hydrological features of the site produce a complex and biologically diverse ecosystem which supports considerable biodiversity, including a significant number of species of national and/or international conservation value. These include the orange-bellied parrot, Australasian bittern and Yarra pygmy perch.<br><br>The site attracts 20,000 visitors annually for cave diving, snorkelling, bushwalking, educational activities and birdwatching. The site also has spiritual and cultural value. The Traditional Owners of the land, the Bunganditj (Boandik) and local Indigenous people have a strong connection with the site. Traditionally the site provided a good source of food and fresh water, and evidence of previous occupation still exists.<br><br>Port Phillip Bay (Western Shoreline) and Bellarine Peninsula<br><br>Key features of the site (DCCEEW 2023g):<br><br>The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site is located in the western portion of Port Phillip Bay, near the city of Geelong in Victoria. The site comprises six distinct areas that include Point Cook/Cheetham, Werribee/Avalon, Point Wilson/Limeburners Bay, Swan Bay, Mud Islands, and the Lake Connewarre Complex. |

| **Protected Areas** |
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| The Ramsar site is a low-lying area and a natural discharge point for the rivers draining southern central Victoria. The tidal amplitude within the bay is reduced compared with Bass Strait due to the narrow opening of the Bay (Port Phillip Heads).<br>Port Phillip Bay (Western Shoreline) and Bellarine Peninsula support a variety of wetland types ranging from shallow marine waters to seasonal freshwater swamps and extensive sewage ponds. Wetland areas include freshwater lakes, estuaries, some with White Mangrove, saltmarshes, intertidal mudflats and seagrass beds. The Ramsar site supports some plants species threatened in Victoria, such as Small Scurf-pea and Rare Bitter-bush.<br>This Ramsar site is the sixth most important area in Australia for migratory waders and the most important in Victoria. Large numbers of bird species including Pied Oystercatchers, Banded Stilts, Red-necked Stint, Sharp-tailed Sandpiper, Fairy Tern, Australasian Shoveler, Red-necked Avocets, Blue-billed Duck, and Freckled Duck, have been recorded at the site. Furthermore, the Melbourne Water Corporation Sewage Farm and Western Treatment Plant at Werribee support many waterbirds on its retention ponds.<br>Port Phillip Bay (Western Shoreline) and Bellarine Peninsula provides important habitat for threatened species such as the Little Tern and Striped Legless Lizard. In particular, large numbers of the nationally threatened Orange-bellied Parrot utilise Port Phillip Bay during the winter after their summer migration to Tasmania to breed. Swan Bay and Limeburners Lagoon are also valuable fish breeding grounds for many of the commercial species caught in Port Phillip Bay.<br>There are a number of important indigenous sites within the wetlands, including burial sites, middens and artefacts, with the oldest midden in the area being at least 5000 years old. Currently over three million people live around Port Phillip Bay, which is used intensively for recreation, nature conservation, sewage treatment, aquaculture, fishing, and salt production.<br>Nationally Important Wetlands<br>Information on Nationally Important Wetlands is from the DCCEEW Directory of Important Wetlands. The following wetlands have a coastal intersect.<br>Aire River and Lower Aire River<br>The Aire River is located in south-western Victoria. The Aire River reach is of high value for its flora and fauna which is of national and state significance, particularly its large continuous stands of cool temperate rainforest. There are fourteen threatened flora species within the Aire reach and its associated corridor of which two are listed nationally. There are twenty-seven threatened fauna species within the Aire River reach and its associated corridor of which five are listed nationally. Significant fauna species in the reach are the Cape Barren Goose, Ground Parrot, Rufous Bristlebird, Eastern Barred Bandicoot, and the Australian Grayling.<br>Social values are trout fishing, picnicking, camping, and scenic driving are. Hopetoun Falls Scenic reserve is the most popular area for sight-seeing along the reach.<br>There are approximately eighteen archaeological sites in the area, most of which are Aboriginal shell middens. The area also contains the site of the 1848 Katabanuut Aboriginal massacre.<br>Glenelg River and Estuary<br>The Glenelg River reach begins at Dartmoor, on the southern side of the Grampians National Park, and flows through the Lower Glenelg National Park to the sea at Nelson, near the Discovery Bay Coastal Park. There are 25 threatened flora species found within the Glenelg River reach and its associated corridor of which ten are listed nationally. The river reach provides an important habitat link between the inland woodland environments and coastal environments. There are seventy-two threatened flora species found within the Glenelg River reach and its associated corridor of which 12 are listed nationally.<br>The river was a source a food supplies for the Dhauwurd Wurrung Aboriginal Group. Shell middens and surface scatters as well as isolated artefacts and a scarred tree around the coastal dunes have been found just outside the river reach. The Princess Margaret Rose Caves are of significant historical values and are listed as an historic place |

| **Protected Areas** |
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| of regional significance. Patterson's Canoe Camp recreation area is also of regional significance. Tourism in the river reach is increasing in Nelson and the caves. Other attractions are bushwalking such as the Great South West Walk, camping, sight-seeing, picnicking, canoeing, fishing, motor-boating, house-boating and water-skiing.<br><br>Lavinia Nature Reserve – see Lavinia Ramsar Wetland Description above.<br><br>Lower Merri River<br><br>The Lower Merri River Wetlands consist of two connected wetlands developed in a swale between calcareous dune ridges and fed by the Merri River. Lower Merri River Wetland is of high value for its avifauna. There are large areas of Common Reed Phragmites australis with Spiky Club-sedge, saltmarsh and mudflats. Also, of high value for its geomorphology and are a well-preserved example of interdunal wetlands fed by a small drainage system.<br><br>The wetlands are used for hunting, walking and bird watching. The Mahogany Trail follows the edge of these wetlands. The Mahogany Ship is reputed to be buried under sand dunes adjacent to Saltwater Swamp. Surface scatters exist at Kelly Swamp indicating a history of Aboriginal occupation.<br><br>Princetown Wetlands<br><br>These wetlands consist of swamps of varying salinity on the floodplains of the Gellibrand River and its tributary, the Serpentine (Latrobe) Creek. Wetlands types present are a deep freshwater marsh, semi- permanent saline marshes and a shallow freshwater marsh.<br><br>The Princetown Wetlands have extensive beds of Common Reed (Phragmites australis) and meadows dominated by Beaded Glasswort which can support large numbers of waterbirds. The saltmarsh habitat surrounding these swamps is likely to be important for migration of the Orange-bellied Parrot. Australasian Bittern and Lewin's Rail have been recorded. Camping, fishing, boating, and duck hunting occur within the wetlands.<br><br>Swan Bay<br><br>Swan Bay is a shallow marine embayment partly enclosed by spits and barrier islands such as Swan Island. It is generally <2 m in depth, with 700-1,000 ha of mudflats exposed at low tide, and has extensive seagrass beds. The bay is fringed with saltmarsh including some extensive flats and there are some stands of remnant woodland.<br><br>The bay is of high value for its avifauna and flora. It is very productive for birds, molluscs, and fish. The saltmarsh and intertidal seagrass meadows are regionally significant. The avifauna is particularly diverse, with 190 bird species recorded.<br><br>Swan Bay is a high value wetland for its ecological, recreational, and educational features. Swan Bay is an unusual shallow embayment with a mixture of seagrass species which is relatively undisturbed and in good ecological condition.<br><br>Australian Marine Parks<br><br>Four Australian Marine Parks (AMPs) were identified in the Environmental Planning Area (Appendix B12 MAP-REG-EPM-078). No direct impacts were predicted for any marine park, with the risk of accidental release of fuel being the only cause-effect pathway identified for these parks.<br><br>Apollo<br><br>The Apollo AMP is located off Apollo Bay on Victoria's west coast in waters 80 m to 120 m deep on the continental shelf. The reserve covers 1,184 km2 (DNP 2013). The reserve encompasses the continental shelf ecosystem of the major biological zone that extends from South Australia to the west of Tasmania. The area includes the Otway Depression, an undersea valley that joins the Bass Basin to the open ocean. Apollo AMP is a relatively shallow reserve with big waves and strong tidal flows; the rough seas provide habitats for fur seals and school sharks (DNP 2013).<br><br>The major conservation values of the Apollo AMP (DNP 2013) are: |

| **Protected Areas** |
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| Ecosystems, habitats, and communities associated with the Western Bass Strait Shelf Transition and the Bass Strait Shelf Province and associated with the seafloor features: deep/hole/valley and shelf.<br><br>Important migration area for blue, fin, sei and humpback whales.<br><br>Important foraging area for black-browed and shy albatross, Australasian gannet, short-tailed shearwater and crested tern.<br><br>Cultural and heritage site - wreck of the MV City of Rayville.<br><br>Franklin<br><br>The Franklin AMP covers an area of 671 km2 west of the north-western corner of Tasmania and south-east of King Island (DNP 2013). At its northern end, the waters are only 40 m deep, and in much of the reserve the sea floor slopes gently and is covered by fine and coarse sediments. At the southern end of the reserve there is a valley where the water is up to 150 m deep.<br><br>The major conservation values for the Franklin AMP (DNP 2013) are:<br><br>Examples of ecosystems, habitats and communities associated with the Tasmanian Shelf Province and Western Bass Strait Shelf Transition and associated with sea-floor features shelf, deep/hole/valley, escarpment and plateau.<br><br>Important foraging area for Shy Albatross, Short-tailed Shearwater, Australasian Gannet, Fairy Prion, Little Penguin, Common Diving petrel, Black-faced Cormorant and Silver Gull.<br><br>Black Pyramid Rock, 6 km north of the reserve supports the largest breeding colony of the Australasian gannet in Tasmania, and one of only eight breeding sites for this species in Australia. White shark also forages in the reserve.<br><br>Nelson<br><br>The Nelson AMP spans the deepwater ecosystems (greater than 3,000 m depth) extending from South Australia to the west of Tasmania (DNP 2013). The reserve spans a range of geological features including plateaus, knolls, canyons and the abyssal plain (a large area of extremely flat or gently sloping ocean floor just offshore from the continent). The knoll features provide a rocky substrate above the abyssal plain. Little is known about the benthic biodiversity of this reserve; however, marine mammals are known to occur here.<br><br>The major conservation values of the Nelson AMP (DNP 2013) are:<br><br>Examples of ecosystems, habitats and communities associated with the West Tasmanian Transition and associated with the seafloor features including the abyssal plain/deep ocean floor, canyon, knoll/abyssal hill, plateau, and slope.<br><br>Important migration area for Blue, Fin, Humpback and Sei whales.<br><br>Zeehan<br><br>The Zeehan AMP covers an area of 19,897 km2 to the west and south-west of King Island in Commonwealth waters surrounding north-western Tasmania (DNP 2013). It covers a broad depth range from the shallow continental shelf depth of 50 m to the abyssal plain which is over 3,000 m deep. The reserve spans the continental shelf, continental slope and deeper water ecosystems of the major biological zone that extends from South Australia to the west of Tasmania. Four submarine canyons incise the continental slope, extending from the shelf edge to the abyssal plains. A rich community made up of large sponges and other permanently attached or fixed invertebrates is present on the continental shelf, including Giant Crab. Concentrations of larval Blue Wahoo and Ocean Perch demonstrate the role of the area as a nursery ground. |

| **Protected Areas** |
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| Rocky limestone banks provide important seabed habitats for a variety of commercial fish and crustacean species including the Giant Crab. The area is also a foraging area for a variety of seabirds such as Fairy Prion, Shy Albatross, Silver Gull, and Short Tail Shearwater (DNP 2013). |
| The major conservation values for the Zeehan AMP (DNP 2013) are: |
| Examples of ecosystems, habitats and communities associated with the Tasmania Province, the West Tasmania Transition and the Western Bass Strait Shelf Transition and associated with the seafloor features: abyssal plain/deep ocean floor, canyon, deep/hole/valley, knoll/abyssal hill, shelf and slope. |
| Important migration area for Blue and Humpback whales. |
| Important foraging habitat for Black-browed, Shy and Wandering albatrosses, and Great-winged and Cape Petrels. |
| Victorian Marine Parks and Sanctuaries |
| Four Victorian Marine National Parks (Appendix B12 MAP-REG-EPM-079) and six Marine Sanctuaries were identified in the Environmental Planning Area. In addition, two Conservation Parks, two Wildlife Reserves and three National Parks were identified as having coastal areas within the Environmental Planning Area. |
| The Narrwong Coastal Reserve and Yambuck Coastal Reserve are long stretches of beach between Narrawong and Porty Fairy, however, no information on the reserves could be found. |
| Barwon Bluff Marine Sanctuary |
| Barwon Bluff Marine Sanctuary (17 ha) is located at Barwon Heads, approximately 100 km south-west of Melbourne. The Barwon Bluff Marine Sanctuary Management Plan (Parks Victoria 2007a) identifies the environmental, cultural and social values as: |
| Intertidal reef platforms with a high diversity of invertebrate fauna and flora. |
| Subtidal reefs that support diverse and abundant flora, including kelps, other brown algae, and green and red algae. |
| Calcarenite and basalt reefs extending from The Bluff that are of regional geological significance. |
| Intertidal habitats that support resident and migratory shorebirds, including threatened species. |
| Subtidal habitats that support sedentary and mobile fish and are also used by migratory marine mammals. |
| Marine habitats and species that are of scientific interest and valuable for marine education. |
| Underwater recreation, including visits to subtidal communities that are easily accessible from the shore. |
| Coastal vistas, seascapes and underwater scenery. |
| Important landmark and area for gathering fish and shellfish for the Wathaurong people. |
| Strong historic and ongoing connection with marine education. |
| Remnants from the Earl of Charlemont, a heritage-listed shipwreck. |
| Bay of Islands Conservation Park |

| **Protected Areas** |
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| This coastal park has outstanding ocean views and geological features and covers an extensive area of the coastline (~32 km in length and 950 ha), stretching east from Warrnambool to Peterborough. Sheer cliffs and rock stacks dominate the bays, and the heathlands contain wildflowers. Beaches are accessible at some points (Parks Victoria 1998).<br><br>This park protects the terrestrial environment above the low water mark of this coastline. This Coastal Park is managed under the Port Campbell National Park and Bay of Islands Coastal Park Management Plan (Parks Victoria 1998).<br><br>Discovery Bay Marine National Park and Coastal Park<br><br>The Discovery Bay Marine National Park is situated 20 km west of Portland and covering 2,770 ha. It covers part of the largest coastal basalt formation in western Victoria. In deep water (30 – 60 m) there are low reefs from ancient shorelines or dunes. There is a rich diversity of marine life within this park due to the cold, nutrient rich waters of the area. The deep calcarenite reefs support diverse sponge gardens whilst the shallower reefs support the brown alga Ecklonia radiata. The offshore waters support a diverse array of invertebrates including southern rock lobster, black-lip abalone, and gorgonians. The waters also support great white sharks and blue whales during the summer breeding season. The Discovery Bay Marine National Park abuts the Discovery Bay Coastal Park which are managed via the Ngootyoong Gunditj Ngootyoong Mara South West Management Plan (Parks Victoria 2015). The Plan describes some key values of the Discovery Bay Marine National Park and Coastal Park, namely:<br><br>Important shorebird habitat for migratory species listed under international agreements.<br><br>Two Important Bird Areas, Lawrence Rocks Wildlife Reserve, which consists of two rocky islets off the coast from Portland with a resident Australasian Gannett population, and the Discovery Bay Coast through to Picaninnie Ponds in South Australia with resident populations of Australasian Bittern, Hooded Plover, Rufous Bristlebird and Striated Fieldwren, and non-breeding Orange-bellied Parrot.<br><br>The Bonney Coast, which extends from Robe in South Australia to Discovery Bay, is a productive area because of a nutrient rich cold water upwelling, known as the Bonney Upwelling. This high productivity provides an important feeding ground for seabirds, fur seals and whales. It also greatly influences primary productivity and maintains commercially important fisheries species such as Blacklip Abalone and Southern Rock Lobster. The continental shelf and the Bonney Upwelling draws close to the coast near the township of Portland, and this makes the area a highly significant recreational fishery for Southern Bluefin Tuna. The Bonney Upwelling is also identified as culturally significant to the Gunditjmara People (Appendix F3, Section 3.16.1), with its current bringing cold nutrient-rich waters that support culturally significant species such as phytoplankton, fish, squid, seals, dolphins, whales, penguins, gannets and other sea birds (GMTOAC, 2023).<br><br>Subtidal Reefs with six key natural assets – Brown macroalgae dominated beds, large mobile fish including sharks and rays, motile macroinvertebrates, Giant Kelp Forest communities, sessile invertebrate dominated communities such as thick growths of sponges, ascidians, bryozoans and gorgonians, and mixed red algae sessile invertebrate dominated communities.<br><br>Great Otway National Park<br><br>The Great Otway National Park (103,185 ha) is located near Cape Otway and stretches from the low water mark inland on an intermittent basis from Princetown to Apollo Bay (approximately 100 km). Landscapes within the park are characterised by tall forests and hilly terrain extending to the sea with cliffs, steep and rocky coasts, coastal terraces, landslips, dunes and bluffs, beaches and river mouths. There is a concentration of archaeological sites along the coast, coastal rivers and reefs. The park contains many sites of international and national geological and geomorphological significance including Dinosaur Cove (internationally significant dinosaur fossil site), Lion Headland and Moonlight Head to Milanesia Beach (internationally significant coastal geology and fossils).<br><br>The park provides habitats for the conservation of the Rufous Bristlebird, Hooded Plover, White-bellied Sea Eagle, Fairy Tern, Caspian Tern and Lewin's Rail and native fish such as the Australian Grayling. |

| **Protected Areas** |
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| The park contains significant Aboriginal cultural sites adjacent to rivers, streams and the coastline including over 100 registered archaeological sites, particularly shell middens along the coast, as well as non-physical aspects such as massacre sites, song lines, family links and stories. The park also contains four sites listed on the Victorian Heritage Register including the Cape Otway Light Station and several shipwreck features along the coast (Parks Victoria and DSE 2009).<br>This park protects the terrestrial environment above the low water mark of this coastline. The Park is protected under the Great Otway National Park and Otway Forest Park Management Plan (Parks Victoria and DSE 2009) and relevant values are:<br>Large area of essentially unmodified coastline, linking the land to marine ecosystems and marine national parks.<br>Diverse range of lifestyle and recreation opportunities for communities adjacent to the parks – for local permanent residents and holiday homeowners Regionally, nationally and internationally.<br>Significant tourist attractions, close to access routes and accommodation, such as spectacular coastal scenery along the Great Ocean Road, access to beautiful beaches, clifftop lookouts, picnic areas, historic sites, waterfalls and walking tracks such as the Great Ocean Walk.<br>Basis for continued growth of nature-based tourism associated with the parks and the region, providing economic opportunities for accommodation providers, food and services providers, and recreation, tourism and education operators.<br>Lady Julia Percy Island Wildlife Reserve<br>Lady Julia Percy Island is off the coast of Victoria 22 km south-west of Port Fairy. It is one of the two largest breeding sites for the Australian fur seal species in Australia (DCCEEW 2023h) and provides habitat to migratory seabirds.<br>Lawrence Rocks Wildlife Reserve<br>Lawrence Rocks Wildlife Reserve consists of two small islets about 6.8 ha and 1.5 ha in area that lie about 2 km offshore from Point Danger and about 6 km south-east of Portland in western Victoria (BirdLife International 2023). The islets are composed of basaltic and tuff rock. The habitat on the islets consists of exposed rock and some patches of exotic grasses and native and exotic herbs. The Australasian Gannet breeds on both islets in the IBA. Lawrence Rocks supports a small population of the Australian Fur Seal. BirdLife International have deemed Lawrence Rocks an Important Bird Area (BirdLife International 2023).<br>Marengo Reefs Marine Sanctuary<br>The Marengo Reefs Marine Sanctuary (12 ha) is in Victorian State waters near Marengo and Apollo Bay, which are on the Great Ocean Road, approximately 220 km south-west of Melbourne. The sanctuary protects two small reefs and a wide variety of microhabitats. Protected conditions on the leeward side of the reefs are unusual on this high wave energy coastline and allow for dense growths of bull kelps and other seaweed. There is an abundance of soft corals, sponges, and other marine invertebrates, and over 56 species of fish have been recorded in and around the sanctuary. Seals rest on the outer island of the reef and there are two shipwrecks (the Grange and Woolamai) in the sanctuary (Parks Victoria 2007).<br>The Marengo Reefs Marine Sanctuary Management Plan (Parks Victoria 2007) identifies the environmental, cultural and social values as:<br>Subtidal soft sediments, subtidal rocky reefs and intertidal reefs.<br>High diversity of algal, invertebrate and fish species.<br>Australian fur seal haul out area.<br>Evidence of a long history of Indigenous use, including many Indigenous places and objects nearby. |

| **Protected Areas** |
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| Wrecks of coastal and international trade vessels in the vicinity of the sanctuary. |
| Spectacular underwater scenery for snorkelling and scuba diving. |
| Intertidal areas for exploring rock pools. |
| Opportunities for a range of aquatic recreational activities including seal watching. |
| Merri Marine Sanctuary |
| The Merri Marine Sanctuary is on the Victorian south-west coast near Warrnambool, approximately 260 km west of Melbourne. Merri Reefs Marine Sanctuary (25 ha) is located at the mouth of the Merri River, west of Warrnambool Harbour. Merri Marine Sanctuary contains a mixture of habitats, including intertidal reef, sand, shallow reef and rocky overhang. These areas provide a nursery for many fish species and a habitat for many algae species, hardy invertebrates and shorebirds. Bottlenose dolphins and fur seals are regular visitors to the shore (Parks Victoria 2007c). |
| The Sanctuary is protected with the Merri Marine Sanctuary Management Plan (Parks Victoria, 2007c) identifies the environmental, cultural and social values as: |
| Culturally significant to indigenous communities that have a long association with the area. |
| Merri River, wetlands and islands and headlands provide a variety of habitats. |
| Provision of nursery for many fish species and habitat for algal species, hardy invertebrates and shorebirds. |
| Mornington Peninsula National Park |
| Mornington Peninsula National Park is situated about 70 km south of Melbourne. Mornington Peninsula National Park runs along the coast from Point Nepean, at the western tip of the Mornington Peninsula, to Bushrangers Bay, where it turns inland along the Main Creek valley, still as a narrow band, until it joins the more expansive Greens Bush section of the Park. This park protects the terrestrial environment above the low water mark of this coastline. The Park is managed under the Mornington Peninsula National Park and Arthurs Seat State Park Management Plan, which has identified the key environmental, social and cultural values as (Parks Victoria 2016): |
| Largest and most significant remaining areas of native vegetation on the Mornington Peninsula. Numerous sites and features of geomorphic significance, particularly along the coast (cliffed calcarenite coast sandy forelands and basalt shore platforms). |
| Only representation in the Victorian conservation reserve system of four land systems formed within the Southern Victorian Coastal Plains and the Southern Victorian Uplands. |
| Many significant native plants and vegetation communities, especially in Greens Bush and former McKellar Flora Reserve, and the most extensive remnant coastal grassy forest habitat on the Mornington Peninsula. |
| Highly scenic landscape values along the ocean coast and at Port Phillip heads and the prominent landscape feature of Arthurs Seat. |
| Many significant fauna species, including populations of the nationally significant hooded plover, over 30 species of State significance and many species of regional significance. |
| High quality marine and intertidal habitats, with some pristine areas within Point Nepean. |
| Nationally significant and fascinating historic sites at Point Nepean. |
| Historic Seawinds Gardens in Arthurs Seat State Park. |

| **Protected Areas** |
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| One of the highest recorded densities of Aboriginal archaeological sites along the Victorian Coast |
| South Channel Fort is an important component of the historic fortification defence system of Port Phillip (and an important bird nesting and roosting site). |
| Spectacular scenery and popular surf beaches associated with a wild and rugged coastline. |
| Local and regional economic benefits. |
| Intensively used recreational nodes, e.g. at Portsea, Sorrento, Cape Schanck and Arthurs Seat. |
| Point Addis Marine National Park, Point Danger Marine Sanctuary and Eagle Rock Marine Sanctuary |
| The three protected areas are managed under the Management Plan for Point Addis Marine National Park, Point Danger Marine Sanctuary and Eagle Rock Marine Sanctuary (Parks Victoria 2005). |
| Point Addis Marine National Park lies east of Anglesea and covers 4,600 hectares. The park protects representative samples of subtidal soft sediments, subtidal rocky reef, rhodolith beds and intertidal rocky reef habitats. The park also provides habitat for a range of invertebrates, fish, algae, birds and wildlife. The world-famous surfing destination of Bells Beach is within the park. |
| Point Danger Marine Sanctuary is 20 km south-west of Geelong, close to the township of Torquay and nearby Jan Juc and covers 25 ha. It extends from the high-water mark at Point Danger offshore for approximately 600 m east and 400 m south, encompassing an offshore rock platform. |
| Eagle Rock Marine Sanctuary is about 40 km south-west of Geelong, close to Aireys Inlet and covers 17 ha. The sanctuary extends from high water mark around Split Point between Castle Rock and Sentinel Rock. It extends offshore for about 300 m and includes Eagle Rock and Table Rock. The main habitats protected by the sanctuary include intertidal and subtidal soft sediment, intertidal and subtidal reefs, and the water column. |
| The management plan identifies the following environmental, cultural, and social values for the parks and sanctuaries: |
| Sandy beaches, subtidal soft sediments, subtidal rocky reefs, rhodolith beds and intertidal reefs. |
| High diversity of algal, invertebrate and fish species. |
| High diversity of sea slugs (opisthobranchs) and other invertebrate communities within Point Danger Marine Sanctuary. |
| Evidence of a long history of Indigenous use, including many Indigenous places and objects adjacent to the park and sanctuaries near dunes, headlands, estuaries and creeks. |
| Surf breaks, including those at Bells Beach, which are culturally important to many people associated with surfing. |
| Coastal seascapes of significance for many who live in the area or visit. |
| Recreational and tourism values |
| Spectacular underwater scenery for snorkelling and scuba diving. |
| Intertidal areas for exploring rock pools. |
| Opportunities for a range of recreational activities. |
| Spectacular seascape complementing well-known visitor experiences on the Great Ocean Road. |

| **Protected Areas** |
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| Port Campbell National Park |
| Port Campbell National Park is slightly west of Twelve Apostles Marine National Park and 10 km east of Warrnambool. The park is 1,750 ha that presents an extraordinary collection of wave-sculptured rock formations. Port Campbell National Park is home to various fauna such as the little penguin, short-tailed shearwater, and various whale species (Parks Victoria 1998). |
| Port Phillip Heads Marine National Park |
| Port Phillip Heads Marine National Park is an area of 35.8 km2 that is located at the southern end of Port Phillip Bay. Many areas within the Port Phillip Heads Marine National Park are popular for a range of recreational activities. The habitats that are found within the park are seagrass beds, sheltered intertidal mudflats, intertidal sandy beaches and rocky shores, subtidal soft substrate and rocky reefs. The bay has a high diversity and abundance of marine flora and fauna that provides a migratory site for wader birds (Visit Victoria 2019). The land adjacent to the Port Phillip Heads Marine National Park is within the Port Nepean National Park. |
| Twelve Apostles Marine National Park and The Arches Marine Sanctuary |
| The Twelve Apostles Marine Park is managed in conjunction with the Arches Marine Sanctuary under the Twelve Apostles Marine National Park and The Arches Marine Sanctuary Management Plan (Parks Victoria 2006). |
| The Twelve Apostles Marine National Park (7,500 ha) is located south-east of Port Campbell between Broken Head and Pebble Point and extends offshore 3 nautical miles to the limit of Victorian waters (Parks Victoria 2006). |
| The area is representative of the Otway Bioregion and is characterised by a submarine network of towering canyons, caves, arches, and walls with a large variety of seaweed and sponge gardens plus resident schools of reef fish. The park contains areas of calcarenite reef supporting the highest diversity of intertidal and sub-tidal invertebrates found on that rock type in Victoria (Parks Victoria 2006). |
| The Arches Marine Sanctuary (45 ha) is approximately 600 m offshore from Port Campbell. It has a spectacular dive site of limestone formations, rocky arches, and canyons. The sanctuary is also ecologically significant, supporting habitats such as kelp forests and a diverse range of sessile invertebrates on the arches and canyons. These habitats support schools of reef fish, seals and a range of invertebrates such as lobster, abalone and sea urchins. |
| The Twelve Apostles Marine Park is managed in conjunction with the Arches Marine Sanctuary under the Management Plan for Twelve Apostles Marine National Park and The Arches Marine Sanctuary (Parks Victoria 2006b) and is classified as IUCN II. The Plan describes the key environmental, cultural, and social values as: |
| Unique limestone rock formations, including the Twelve Apostles. |
| Range of marine habitats representative of the Otway marine bioregion. |
| Indigenous culture based on spiritual connection to sea country and a history of marine resource use. |
| Wreck of the Loch Ard (shipwreck). |
| Underwater limestone formations of arches and canyons. |
| Diverse range of encrusting invertebrates. |
| Spectacular dive sites. |
| South Australian Marine and Coastal Conservation Parks |
| Lower South East Marine Park |

| **Protected Areas** |
| --- |
| The Lower South East Marine Park Management Plan 2012 (DEWNR 2012) details the following values: |
| High diversity of plants and animals, including blue whales, due to the influence of the Bonney coast upwelling, an ocean current that supplies nutrient-rich water to the area. |
| Diverse range of habitats ranging from high-energy sandy beaches and freshwater springs, various reef types (shore platforms, fringing and limestone), |
| Kelp forests and algal communities and is strongly influenced by natural processes such as the Bonney coast upwelling. |
| Spring lakes such as Ewen Ponds and Piccaninnie Ponds (both Wetlands of National Importance) emerge from the beaches and are unusual in South Australia. |
| Habitat for several threatened or potentially threatened species that require freshwater and marine environments during their lifecycle, including the pouched lamprey, short-headed lamprey and shortfinned eel. |
| Feeding and resting grounds for migratory and resident shorebirds. |
| Recreational activities including fishing, diving and snorkelling. |
| Commercial fisheries including the Southern Zone Abalone Fishery, the Southern Zone Rock Lobster Fishery, the Marine Scalefish Fishery, the Charter Fishery and the Miscellaneous Giant Crab Fishery. |
| Buandig Aboriginal people have traditional associations with areas of the marine park. |
| Douglas Point Conservation Park |
| Douglas Point Conservation Park provides scenic views of the coastline and is home to a rare daisy that is only found in three other sites in Australia. The coastal park features areas of exposed limestone, sea cliffs, small sandy beaches and dense coastal vegetation, and provides for fishing, diving and bushwalking. The park is managed under the Douglas Point Conservation Park Management Plan (DEH 2003a). |
| Values of the park (DEH 2003) are: |
| The only reserved population of Sand Ixodia in Australia. |
| Conserves vulnerable (SA) Rufous Bristlebird and rare (SA) Beautiful Firetail, regionally uncommon coast velvet-bush and drooping velvet-bush. |
| Nationally endangered Orange-bellied Parrot recorded in the Park. |
| The Park is located within the traditional lands of the Boandik people. The remains of scattered middens are evidence of Aboriginal habitation in the past. |
| Shipwrecks. |
| Nene Valley Conservation Park |
| Nene Valley Conservation Park preserves an area of vegetation typical of sandy coasts in the south-east of South Australia. This vegetation complex has suffered through the effects of clearing and grazing throughout much of its former range. |
| Piccaninnie Ponds Conservation Park |
| The Piccaninnie Pond covers an area of 8.64 km2, that has a wide diversity of fauna and flora with 60 bird species and six vegetation communities. Other vegetation found within the park includes reeds, sedge swamp, open heath and tussock grassland. |

| **Protected Areas** |
| --- |
| Tasmanian Marine and Coastal Parks and Reserves |
| Black Pyramid Rock Nature Reserve |
| Black Pyramid Rock Nature Reserve, situated of Hunter Island has a land mass of 40 ha. Black Pyramid Rock was proclaimed a Wildlife Sanctuary on 30 June 1964 due to it being the largest known breeding ground for Australasian gannets in Australia (DPIWE 2020). The Nature Reserve is managed under the Small Bass Strait Island Reserves Draft Management Plan (DPIWE 2020). |
| Cape Wickham State Reserve |
| The Cape Wickham State Reserve is on the northern tip of King Island and contains Cape Wickham lighthouse and the gravesites of the crew of Loch Leven, a ship that was wrecked nearby. It is designated as IUCN Category V which is a protected landscape/seascape. |
| Christmas Island Nature Reserve |
| Christmas Island is located off the west coast of King Island. It is designated IUCN 1a which is a strict nature reserve, which allows minimal human use. It is a BIA for both breeding and foraging for the little penguin (Commonwealth of Australia, 2015a). It is also a known nesting site of the Little Tern. Christmas Island Nature Reserve is a priority site for management under the King Island Biodiversity Management Plan (TSS 2012). |
| Councillor Island Nature Reserve |
| Councillor Island Nature Reserve is a 10.53 ha granite reserve east of Tasmania approximately 2.5 km off the mainland coastline of Tasmania within the Bass Strait. The island forms part of the King Island Important Bird Area because of its importance for breeding seabirds and waders. |
| Disappointment Bay State Reserve |
| The Disappointment Bay State Reserve is located on the north coast of King Island near Cape Wickham. |
| Lavinia State Reserve |
| Lavinia State Reserve is located on the north-east coast of King Island. The reserve contains a number of rare birds, including the endangered orange-bellied parrot (DELWP 2016). It includes the Lavinia Ramsar site and two freshwater lakes. Lavinia Beach is a popular location for surfing and fishing. The Lavinia Nature Reserve (Ramsar Site) Management Plan draft (2000) is not available online. The Sea Elephant Estuary which is within the Lavinia State Reserve is a priority site for management under the King Island Biodiversity Management Plan (TSS 2012). |
| Reid Rock Nature Reserve |
| Reid Rocks are situated approximately 21.5 km east-south-east of Stokes Point at the southern extremity of King Island in western Bass Strait. The main islet is approximately 500 m long and rises to 13 m above sea level. Reid Rocks became a Nature Reserve on 5 April 1978 due to their importance as an Australian fur seal breeding colony (DPIWE 2020). The Nature Reserve is managed under the Small Bass Strait Island Reserves Draft Management Plan (DPIWE 2020). |
| Seal Rock State Reserve |
| Seal Rock State Reserve is located on the south-east coast of King Island. Species and vegetation communities are seabird rookeries, shining dogwood, triggerplants and coastal complex on King Island. Seal Rock State Reserve is a priority site for management under the King Island Biodiversity Management Plan (TSS 2012). |
| **Predicted Level of Risk** |

| **Protected Areas** |
| --- |
| Due to the distance to the South Australian and King Island coastal areas from the Operational Area (~130 km and ~ 70 km respectively) impacts to coastal areas above the low thresholds are not predicted. As the Operational Area is as close as ~7 to the Victorian coast, there is the potential for diesel above the low threshold to be visible on the ocean surface in coastal waters and as a sheen on shoreline areas. Most of the diesel will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA 1995) and expected to be visible.<br><br>Visible nearshore and shoreline hydrocarbons have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities within protected areas. Due to the low volumes, light nature of marine diesel and substantial wave action with the nearshore areas impacts are likely to be short term and not require intrusive clean-up response.<br><br>The predicted level of consequence to protected areas and their values from a 250 $m^3$ MDO spill is assessed as moderate as exposure to oil above low thresholds could occur in protected areas nearshore of the Operational Area, though if consequences occurred, they are likely to only affect a small portion of coastal areas or marine areas for a short duration (hours to days) due to the low spill volume and short duration of any exposure, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of medium. |

### 9.5.6 Seaweed Industries

| **Seaweed Industry** | |
|---|---|
| **Sensitivity Rating** | **Medium** |
| **Predicted Level of Risk** | **Low** |
| **Environmental Planning Area Existing Environment** | |
| The Australian seaweed industry is small: currently valued at an estimated GVP of AUD $3 million. Of this, the majority is from one company, Kelp Industries Pty Ltd on King Island in Tasmania, who hand collect plants cast bull kelp (*Durvillea pototorum*) on the beaches from predominantly the west coast of the island, predominantly for export to a large alginate manufacturer and for use in biofertiliser products (Australian Seaweed Institute 2023). Australia Bureau of Statistics (ABS) data shows seaweed exports from Australia are valued at $1.5 million for non-human consumption and it is assumed that this is almost entirely from Kelp Industries exports.<br><br>Besides Kelp Industries, other seaweed collectors in Tasmania include Kelpomix and TasKelp. There are also licenses for wild harvest of the invasive species of *Undaria* in Tasmania (KaiHo Ocean Treasure) and some in Victoria (Australian Seaweed Institute 2023).<br><br>The harvesting of native seaweed in Victorian marine waters is prohibited without a permit (s. 112(2) Fisheries Act 1995) and licences enabling seaweed aquaculture are not currently available in Victoria (VFA 2023b).<br><br>While there are numerous research projects taking place or being planned, currently there are two projects in Tasmania (Australian Seaweed Institute 2023). The first, is a CRC-P project involving collaboration with Tassal, Spring Bay Seafoods and University of Tasmania (UTAS). This project aims to demonstrate the benefits of Kelps as part of an integrated multitrophic aquaculture approach. The second is a research collaboration between UTAS and Huon Aquaculture in Storm Bay that will also yield its first harvest in late 2020.<br><br>The west coast of King Island where bull kelp is collected is within the Environmental Planning Area. | |
| **Predicted Level of Risk** | |
| Experiments verified the susceptibility of *Nereocystis luetkeana* (bull kelp – north America) tissue to the direct exposure to several petroleum types. Antrim et al (1995) showed that petroleum treatments resulted in visible tissue damage, with a distinct bleached line being the most visible indication of plant contact with the petroleum. Moderate to heavy colour loss, which was generally followed by rapid decay of tissue, was most pronounced in 24 h exposures to unweathered and weathered diesel. The study did not look at how this would affect the productivity of bull kelp.<br><br>Bull kelp affect by oil would not be suitable for collection and processing which could result in a temporary closure to the industry and a perception of tainting of product. This could lead to financial losses to kelp collection and processing businesses. However, given the distance to King Island from the Operational Area oil exposure above low threshold levels are not predicted and thus impacts are unlikely to be a significant to seaweed collection and associated income.<br><br>The relatively short duration and low volume means there may be short-term and localised consequences, which are ranked as Moderate.<br><br>Thus, the predicted level of consequence to seaweed industries from a 250 $m^3$ MDO spill is assessed as minor as exposure is likely to be below low thresholds and any consequences would be short-term (days to weeks), recoverable and affect a small portion of bull kelp, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of low. | |

### 9.5.7 Tourism Including Diving and Recreational Fishing

| **Tourism including Diving and Recreational Fishing** | |
|---|---|
| **Sensitivity Rating** | **High** |
| **Predicted Level of Risk** | **Medium** |
| **Environmental Planning Area Existing Environment** | |
| The coastal areas of the Environmental Planning Area offer a wide and diverse range for marine based tourism and recreational activities, including snorkelling, scuba diving, surfing, kayaking, whale, and wildlife watching, sailing and charter boat cruises. Popular tourist destinations in the Environmental Planning Area include Portland, Port Fairy, Warrnambool, the Great Ocean Road, Great Otway National Park, and King Island.<br>The west coast of Victoria from Warrnambool to Portland is known as reliable spots to catch tuna, kingfish, and trevalla in areas such as Lawrence Rock, the North Shore, Lady Julia Percy Island, Killarney, The Crags, Minerva Reef, Julia Reef and the Horseshoe off Cape Bridgewater (VFA 2023a). May, June, and July are reliable months to find schools of bluefin tuna (VFA 2023c).<br>The Arches Marine Sanctuary and Twelve Apostles Marine National are well known locally for excellent scuba diving sites (Parks Victoria 2006)<br>Seal and Dolphin watching occur within Discovery Bay Marine National Park and Deen Maar (Lady Julia Percy Island). | |
| **Predicted Level of Risk** | |
| Due to the distance to the South Australian and King Island coastal areas from the Operational Area (~130 km and ~ 70 km respectively) impacts to coastal areas above the low thresholds are not predicted. As the Operational Area is as close as ~7 km to the Victorian coast, there is the potential for diesel above the low threshold to be visible on the ocean surface in coastal waters and as a sheen on shoreline areas. Most of the diesel will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA 1995) and expected to be visible.<br>Visible nearshore and shoreline hydrocarbons have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. Due to the low volumes, light nature of marine diesel and substantial wave action with the nearshore areas impacts are likely to be short term and not require intrusive clean-up response.<br>The predicted level of consequence to tourism and recreation from a 250 $m^3$ MDO spill is assessed as moderate as exposure to oil above low thresholds could occur in areas nearshore of the Operational, though if consequences occurred, they are likely to only affect a small portion of the coastal area for a short duration (hours to days) due to the low spill volume and short duration of any exposure, the likelihood is assessed as rare (based on the absence of any reported seismic vessel collisions in Australia) resulting in a predicted level of risk of medium. | |

Circumstances resulting in a loss of containment of MDO such as a vessel collision and subsequent fuel tank rupture) are low probability events in open ocean areas without restricted navigation. Though shipping activity is relatively high within the Operational Area, modern navigational aids assist in reducing the likelihood of a collision event.

There have been no vessel collisions during a seismic survey in Australia. While undertaking the survey the seismic and support vessels will be moving at a slow speed of up to 10 km/hr and the seismic vessel will always have at least one vessel with it to observe and respond to any vessels that come to close to the seismic vessel, thereby further reducing the risk of collision with third-party vessels. Therefore, the likelihood of a vessel collision resulting in a loss of a full tank of MDO is rare.

## 9.6 Measures Adopted to Manage Environmental Risks

The following measures have been adopted to ensure that the risks associated with potential accidental release of fuel from the survey and support vessels will be of an acceptable level.

These measures have been taken through to the ALARP assessment in the next stage of the CGG assessment process. This assessment can be found in Appendix F2.

| Measure | Measure Type | Details and Justification |
|---|---|---|
| **Consultation Management System** | System | CGG will implement the Consultation Management System to ensure that pre and during survey communications will be undertaken so that other marine users know when, where and how the Regia MSS will be undertaken so they can undertake their activities in a manner that avoids any interactions or can engage with CGG so that both parties can plan activities in a manner that minimises potential displacement to each party. |
| **CGG Marine Assurance System** | System | The marine assurance system, amongst other requirements, ensures compliance of contract vessels with MARPOL, COLREGS, and Marine Orders 21, 30, 59 70,71,72, 91, 95, 96, 97, 98. |
| **Vessel Bunkering Procedure** | Procedure | A procedure which ensures that good practice and industry standards are applied to bunkering operations at sea, including the use of standard bunkering equipment such as dry-break couplings and prior-to-use inspections of bunkering hoses, equipment maintenance records, and certification. The procedure outlines how to undertake a safe transfer (e.g. safety, communication, monitoring, inventory, emergency shut down, spill response and incident reporting). |
| **CGG Technical Operations Manager** | Person | CGG will notify any incidents in accordance with the procedures in the OPEP and OSMP and execute the response strategies outlined in the OPEP and OSMP. |
| **OVID Style Inspection** | Practice | OVID-Style inspections confirm that the seismic vessel has procedures for streamer inspection, maintenance, deployment, and retrieval. |
| **Petroleum SIMOPS Plan** | Resource | A simultaneous operations plan will be developed if the seismic vessels or any equipment will enter the 500 m Petroleum Safety Zone of the Thylacine-A platform. |
| **Oil Pollution Emergency Plan** | Resource | The Oil Pollution Emergency Plan (OPEP) for the Regia MSS is a comprehensive document designed to address potential oil spill incidents during operations. This OPEP are crafted to align with the national system for oil spill preparedness and response, ensuring consistency with established protocols and coordination mechanisms. It outlines specific procedures, responsibilities, and resources necessary to respond to any oil spill event promptly and effectively. The OPEP must be submitted as part of the Implementation Strategy and must therefore be accepted by NOPSEMA prior to the activity commencing. |
| **Oil Spill Monitoring Plan** | Resource | The Operational and Scientific Monitoring Program (OSMP) for the Regia MSS is a comprehensive document designed to address potential oil spill incidents during operations. This OSMP are crafted to align with the national system for oil spill preparedness and response, ensuring consistency with established protocols and coordination mechanisms. It outlines specific procedures, responsibilities, and resources necessary to respond to any oil spill event promptly and effectively. The OSMP must be submitted as part of the Implementation Strategy and must therefore be accepted by NOPSEMA prior to the activity commencing. |

# 10 Demonstration Risks Will Be of An Acceptable Level

## 10.1 Discussion on Principles of ESD

**Temporary, Reversible, Small Scale and Natural variation**

The accidental release of fuel during the petroleum activity is considered highly unlikely due to the presence of robust vessel management systems and stringent operational procedures. In the unlikely event of a release, the environmental consequences are expected to be temporary, reversible, and of low intensity, with the scale of potential impact limited by emergency response measures. The activity includes proactive controls to prevent releases and comprehensive response frameworks to ensure impacts remain small-scale and within acceptable environmental thresholds.

**Based on sufficient information**

The risk assessment process for fuel release incorporates expert judgment, incident history, and site-specific operational data. Modelling of potential spill scenarios, along with knowledge of fuel behaviour in marine environments, informs the assessment. The application of the precautionary principle and alignment with national planning frameworks ensures the evaluation is both conservative and scientifically valid. Monitoring plans are in place to verify assumptions and measure real-world environmental responses.

**Activity not inconsistent with EPBC Act**

The planned activity and its response measures are not inconsistent with relevant EPBC Act recovery and management plans. The implementation of a scientifically defensible Operational and Scientific Monitoring Plan (OSMP), as well as alignment with the National Plan for Maritime Environmental Emergencies, ensures compliance with applicable legislation and guidance. These measures support a structured and legally consistent approach to managing environmental risk.

## 10.2 Biological and Ecological Categories

Accidental fuel release poses a potential risk to marine species and habitats. However, due to comprehensive prevention systems and spill response capabilities, impacts and risks to biological and ecological features are expected to be low. In the event of a release, the affected area would be limited and short-term, with natural recovery likely and no predicted population-level impacts. Ecosystem structure, diversity, and function are expected to remain intact, with no long-term or irreversible ecological consequences.

## 10.3 Discussion on Economic, Cultural and Social Categories

Fuel spills have the potential to disrupt fishing, tourism, and culturally important marine resources. However, the likelihood of such outcomes is minimal due to CGG's effective control systems and rapid-response plans. Economic activities dependent on the marine environment are not expected to suffer long-term impacts. Culturally significant practices and community access to marine areas will not be interrupted or diminished in their value. The social fabric of coastal communities and stakeholders reliant on the marine environment will remain unaffected in any lasting way.

## 10.4 Discussion on Consistency with Company Processes

The risk of fuel release has been assessed in line with CGG's internal environmental risk framework, which incorporates global industry best practice and aligns with national emergency response protocols. Fuel management and emergency preparedness are embedded into CGG's standard operations, with no previous record of significant releases. The company's risk matrix, when applied to this activity, confirms the likelihood of unacceptable impacts is very low. CGG's history of operational integrity and environmental performance underpins the credibility of its risk assessments and supports its ability to deliver environmentally responsible operations.

This chapter predicts the levels of risk to environmental receptors within the Environment Planning Area of the Regia MSS. The survey vessels and support vessels will carry an inventory of oils and fuel and though it is unlikely that a spill will occur during operations the risk is part of carrying out the activity. A summary of the outcomes of the risk assessment is provided in Table D4-3.

*Table D4-3 - Summary of Risk Assessment Outcome for Accidental Release of Fuel.*

| Receptor | Sensitivity | Consequence | Likelihood | Predicted Level of Risk |
|---|---|---|---|---|
| **Water Quality** | Medium | Minor | Rare | Low |
| **Sediment Quality** | Low | Minor | Rare | Low |
| **Benthic Assemblages** | Medium | Moderate | Rare | Medium |
| **Coastal Habitats & Communities** | Medium | Moderate | Rare | Medium |
| **Plankton** | Low | Minor | Rare | Low |
| **Invertebrates** | Low | Minor | Rare | Low |
| **Fish** | Low | Minor | Rare | Low |
| **Birds** | Medium – seabirds | Minor | Rare | Low – seabirds, aquatic birds |
| | High – aquatic birds, shorebirds | Moderate | Rare | Medium - Shorebirds |
| **Marine Reptiles** | Medium | Minor | Rare | Low |
| **Marine Mammals** | Medium | Moderate | Rare | Medium |
| **Coastal Developments** | High | Moderate | Rare | Medium |
| **Indigenous Culture** | High | Moderate | Rare | Medium |
| **Commercial Fisheries** | Medium | Moderate | Rare | Medium |
| **Seaweed Industry** | Medium | Minor | Rare | Low |
| **Marine Industries** | Medium | Minor | Rare | Low |
| **Tourism (inc. Diving and Recreational Fishing** | High | Moderate | Rare | Medium |
| **Protected Areas** | High | Moderate | Rare | Medium |

# 11 Environmental Performance Outcomes

| Defined Acceptable Level (From Section 6) | Environmental Performance Outcome | Rationale |
|---|---|---|
| **Prevent any accidental release of fuel to the marine environment.** | No accidental release of fuel to the marine environment. | Preventing fuel release at the source is the most effective way to protect the marine environment. Implementation of preventative measures, such as robust fuel handling procedures and regular maintenance of equipment, ensures environmental integrity and compliance with relevant legislation. |
| **Have comprehensive emergency response plans, aligned with the National Plan for Maritime Environmental Emergencies, in place to mitigate consequences.** | Maintain arrangements to respond to an unplanned release of fuel in accordance with the OPEP. | The development and maintenance of an Oil Pollution Emergency Plan (OPEP) ensures preparedness to manage and contain any unplanned releases. Alignment with the National Plan for Maritime Environmental Emergencies supports a rapid and coordinated response, limiting environmental harm. |
| **Have an Operational and Scientific Monitoring Plan in place to monitor the effects of a release of fuel to the marine environment.** | Maintain arrangements to monitor the effects of a release of fuel to the marine environment in accordance with the OSMP.<br><br>Monitor any accidental release of fuel until termination criteria are met. | Monitoring the environmental impacts of any fuel release allows for evidence-based decision-making and adaptive management. The Operational and Scientific Monitoring Plan (OSMP) supports compliance with regulatory requirements and ensures environmental outcomes are understood and appropriately managed. |
| **People and communities can continue engaging with the natural environment, recreational activities, and heritage values without experiencing long-term or irreversible disruption.**<br><br>**Culturally important species, places, and practices can continue without disruption to their role, accessibility, or long-term viability.**<br><br>**Industries, livelihoods, and ecosystem services remain viable, with no sustained financial or operational consequences resulting from changes in species behaviour, abundance, or access to resources.** | Social, cultural, and economic features are protected, sustaining their value for people and communities. | Preventing or effectively managing accidental fuel releases protects marine ecosystems and ensures continuity of access to marine resources, which underpin social, cultural, and economic values. By avoiding contamination of culturally significant areas and species, and minimising disruption to fisheries, tourism, and other livelihoods, the measures in place sustain community well-being, cultural heritage, and economic resilience. |

# 12 Recommendations

As demonstrated in this risk assessment, the predicted level of risk to each receptor has either been assessed as medium or low. The predicted levels of risk are clearly below the pre-defined acceptable levels of risk and the mitigation and management measures in place provide reliable prevention to have confidence in the predicted likelihood levels, thus there are no further recommendations.

# 13 Document Control

| Date | Revision | Update |
|---|---|---|
| **6 July 2023** | A | Draft prepared for initial comment |
| **23 August 2023** | B | Update based on comments and relevant person feedback |
| **11 Sept 2023** | 0 | Approved for release on Regia MSS website |
| **20 Dec 2023** | 1 | EP submission to NOPSEMA |
| **14 May 2024** | 2 | Updated following public comment and rerun of the PMST search. |
| **31 October 2024** | 3 | Updated following NOPSEMA assessment. |
| **16 April 2025** | 4 | Updated following NOPSEMA OMR 1 Letter |
| **6 December** | 5 | Updated following NOPSEMA OMR 2 Letter |

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# Annex 1

## Public Comment

The following consultation feedback was received since the beginning of the public comment period starting 25 January 2024. Table D4-4 shows how this feedback has been incorporated into the environmental assessments.

*Table D4-4 - Public comment input.*

| Matter | Matter ID | Changes made arising from public comment |
|---|---|---|
| **Matter: Failure of EP to address coastal erosion due to loss of seaweed** | E14 | EP Appendix D4 (Accidental Release of Fuel), Section 9.4.1 (Benthic Assemblages) has been updated in response to these claims to reflect that, impacts resulting in the loss of coastal seaweed to the extent that coastal erosion could be affected, are not predicted. |
| **Matter: Geographic range and all species need to be defined and considered** | I16 | CGG has considered these claims and has rerun the PMST reports to ensure that all information on the likely/known presence of relevant species within the area, as well as information on their protection status, Biologically Important Areas (BIAs) and behaviours is up to date. The updated PMST reports are provided in full in EP Appendix B5. |
| **Matter: Lack of detail on EPBC-listed species and enforceable measures** | I17 | CGG has considered these claims and has rerun the PMST reports to ensure that all information on the likely/known presence of relevant species within the area, as well as information on their protection status, Biologically Important Areas (BIAs) and behaviours is up to date. The updated PMST reports are provided in full in EP Appendix B5. |

# Annex 2

## Objections and Claims Raised from Consultation

During the consultation process relevant persons were invited to raise objections and claims about the adverse effects of the activity. An assessment of merit of each objection or claim has been made by CGG which can be found in the consultation report using the Feedback ID number shown in Table D4-5. If an objection or claim had merit and was relevant to this assessment it has been included in the table below.

*Table D4-5 - Objections and Claims raised from consultation.*

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| **4042** | Concern about fuel spillage and its impact on the natural environment. | This has been thoroughly assessed in D4 and the risks determined to be of an acceptable level, with preventative and mitigative measures applied. | 832 |
| **4168** | Risks of oil spills impacting marine life, including endangered species like the Southern Right Whale and the Tasmanian Rock Lobster. | Titleholder has conducted a thorough risk assessment relating to accidental release of fuel (D4), wherein which both receptors of concern mentioned in this feedback have been assessed. An OPEP and OSMP have also been designed and incorporated into the EP to establish a clear and systematic framework for preventing, managing and mitigating oil pollution incidents on the vessels deployed during the Regia MSS (G3). | 2278 |
| **4307** | The stakeholder was concerned about the environmental impact of gas released during seismic testing and production. | No impact assessment relating to the release of hydrocarbons has been conducted by CGG because hydrocarbon release is not an expected aspect of the activity. CGG has however conducted a thorough risk assessment relating to accidental release of fuel (D4). An OPEP and OSMP have also been designed and incorporated into the EP to establish a clear and systematic framework for preventing, managing and mitigating oil pollution incidents on the vessels deployed during the Regia MSS (G3). | 2273 |
| **4356** | Concerns about the harm and damage to the marine ecosystem. | Titleholder has undertaken a thorough analysis and assessment of all relevant literature to inform its decisions. The MSS will not impact the marine environment within the area of operation. Mitigation plans are in place to reduce any impacts to as low as practicable. | 2831 |
| **4069** | Concerned about the harm being inflicted on oceans by unnecessary gas exploration. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation | 1673 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| | | process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | |
| **4075** | Concerns about marine life and ecosystems. | The effects of underwater sound have been extensively assessed based on the latest scientific literature. CGG has committed to a variety of protective measures for various marine fauna (see G1) | 2117 |
| **4103** | Expresses strong opposition to the proposed plans for potential oil spills, highlighting significant concern for environmental risks in the area. The individual identifies as a local resident. | Title holder has undertaken a thorough analysis and assessment of all relevant literature to inform its decisions. This includes an assessment of all risks associated with marine spills. There is a comprehensive Oil Pollution Emergency Plan and management, and mitigation plans for accidental release of materials or waste overboard. | 1022 |
| **4104** | Feedback expresses that the proposed drilling is close to a marine park, threatening this area. An oil spill could cause irreversible damage, similar to the harm already experienced along much of the coast. | Title holder has undertaken a thorough analysis and assessment of all relevant literature to inform its decisions. This includes an assessment of all risks associated with marine spills. There is a comprehensive Oil Pollution Emergency Plan and management, and mitigation plans for accidental release of materials or waste overboard. Regia MSS is a seismic program not a drilling one. | 1022 |
| **4128** | Lack of adequate monitoring of species present or likely to be impacted. | Title holder has undertaken a thorough analysis and assessment of all relevant literature to inform its decisions regarding species that may be affected by the Regia MSS. The MSS will not impact the population stability of any taxa within the area of operation. Mitigation plans are in place to reduce any impacts to as low as practicable. | 3237 |
| **4130** | Lasting and unrecoverable damage mentioned. | The titleholder acknowledged the feedback, noting that risks and impacts are assessed in the Environmental Plan (EP) and can be found in D1 to D4 and E1 to E9, and F3. Measures to minimise adverse impacts on marine life are outlined in the EP in G1. | 4808 |
| **4154** | Questions a previous statement that indicated there would be no mortal effects from seismic activities. | The titleholder acknowledged the feedback, noting that impacts and risks to the marine environment are assessed in the Environmental Plan (EP) and can be found in D1 to D4 and E1 to E9, and F3. Measures to minimise adverse impacts on the marine environment are outlined in the EP in G1. | 2088 |
| **4158** | Reference to the destruction and degradation of the marine | The titleholder acknowledged the feedback, noting that impacts and risks to the marine environment are assessed | 2830 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| | environment observed during diving trips. | in the Environmental Plan (EP) and can be found in D1 to D4 and E1 to E9, and F3. Measures to minimise adverse impacts on the marine environment are outlined in the EP in G1. | |
| **4163** | Request to explicitly consider protection for bird colonies on the north of King Island. | The only effects to the bird colonies on King Island arise from an accidental release of fuel. This has been assessed thoroughly in D4 and consultation with the EPA Tasmania identified protection measures to be adopted for birds on King Island in the event of a spill. | 2033 |
| **4166** | Risk to the marine environment with the plan. | Titleholder has conducted a series of thorough risk assessments including the following aspects: Accidental release of waste (D1), Fauna Interactions ( D2), Invasive Marine Species ( D3) and Accidental release of fuel ( D4), wherein which relevant receptors have been assessed. | 2677 |
| **4168** | Risks of oil spills impacting marine life, including endangered species like the Southern Right Whale and the Tasmanian Rock Lobster. | Titleholder has conducted a thorough risk assessment relating to accidental release of fuel (D4), wherein which both receptors of concern mentioned in this feedback have been assessed. An OPEP and OSMP have also been designed and incorporated into the EP to establish a clear and systematic framework for preventing, managing and mitigating oil pollution incidents on the vessels deployed during the Regia MSS (G3). | 2278 |
| **4175** | Seismic blasting is harmful and disruptive to marine life of many species. | The titleholder acknowledged the feedback, noting that impacts and risks to marine life are assessed in the Environmental Plan (EP) and can be found in D1 to D4 and E1 to E9, and F3. Measures to minimise adverse impacts on marine life are outlined in the EP in G1. | 3343 |
| **4176** | Seismic blasting negatively affects not only whales but also crucial marine life, including fish, crustaceans, and zooplankton, all of which play vital roles in the marine ecosystem. | The titleholder acknowledged the feedback, noting that impacts and risks to marine life are assessed in the Environmental Plan (EP) and can be found in D1 to D4 and E1 to E9, and F3. Measures to minimise adverse impacts on marine life are outlined in the EP in G1. | 2074 |
| **4177** | Seismic blasting would have a significant negative effect on marine creatures and ecosystems. | The titleholder acknowledged the feedback, noting that impacts and risks to marine life are assessed in the Environmental Plan (EP) and can be found in D1 to D4 and E1 to E9, and F3. Measures to minimise adverse impacts on marine life are outlined in the EP in G1. | 3343 |
| **4186** | Stakeholder expressed concern about the destruction and depletion of the ocean due to the activity. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work | 2963 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| | | below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | |
| **4187** | Stakeholder expressed concern about the potentially devastating impact of seismic testing on ocean marine life. | The titleholder acknowledged the feedback, noting that impacts and risks to marine life are assessed in the Environmental Plan (EP) and can be found in D1 to D4 and E1 to E9, and F3. Measures to minimise adverse impacts to marine life are outlined in the EP in G1. | 3209 |
| **4189** | Stakeholder noted concern for harm being inflicted on our oceans by unnecessary gas exploration. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | 1653 |
| **4190** | Stakeholder noted concern for harm being inflicted on our oceans by unnecessary gas exploration. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | 1655 |
| **4191** | Stakeholder noted concern for harm being inflicted on our oceans by unnecessary gas exploration. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation | 1659 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| | | process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | |
| **4192** | Stakeholder noted concern for harm being inflicted on our oceans by unnecessary gas exploration. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | 1661 |
| **4193** | Stakeholder noted concern for harm being inflicted on our oceans by unnecessary gas exploration. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | 1662 |
| **4194** | Stakeholder noted concern for harm being inflicted on our oceans by unnecessary gas exploration. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | 1663 |
| **4195** | Stakeholder noted concern for harm being inflicted on our oceans by unnecessary gas exploration. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and | 1665 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| | | scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | |
| **4196** | Stakeholder noted concern for harm being inflicted on our oceans by unnecessary gas exploration. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | 1667 |
| **4197** | Stakeholder noted concern for harm being inflicted on our oceans by unnecessary gas exploration. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | 1670 |
| **4211** | Stakeholder stated they were extremely concerned about the risks, damage and destruction caused by exploration activities in the marine environment. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan. | 1049 |
| **4253** | The possible effects to marine life and ecosystems are my primary concern | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work | 2117 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| | | below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | |
| **4259** | The proposed works will harm and damage the climate and ocean life. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | 2256 |
| **4265** | The seismic process is going to affect local marine life, ecosystems, and the climate in the community. | Title holder has undertaken a thorough analysis and assessment of all relevant literature to inform its decisions. The MSS will not impact the population stability of any taxa within the area of operation. Mitigation plans are also in place to reduce any impacts to defined acceptable levels and as low as reasonably practicable. | 1259 |
| **4267** | The Stakeholder also objected to the project on the basis that it would impact every marine creature and sea bird. | Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan. Title holder has undertaken a thorough analysis and assessment of all relevant literature to inform its decisions. The MSS will not impact the population stability of any taxa within the area of operation. Mitigation plans are in place to reduce any impacts to as low as practicable. | 2064 |
| **4274** | The stakeholder claims that seismic exploration poses a significant danger to marine life in general. This claim suggests a strong opposition to the practice | The titleholder publicly responded to this interactive map comment explaining that legislative framework in Australia permits some impact from offshore petroleum if it is managed and | 2107 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| | due to its perceived harmful effects on the marine ecosystem. | of an acceptable level. We believe that responsible development of gas is essential for maintaining the current quality of life we all enjoy and ensuring we pass that quality of life on to future generations. Gas is part of the Labour governments energy transition plan. | |
| **4276** | The stakeholder does not accept the blasting activity as beneficial or more important than existing marine life and structures. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | 2255 |
| **4288** | The stakeholder objected to the project on the basis that it would impact the Stakeholder personally and every person in the community who love the ocean. Stakeholder noted that they do not support the activity and find it distressing to even think about the damage that could be caused for thousands of creatures and the future of herself, other people of Port Fairy and the greater community. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan. | 2064 |
| **4301** | The stakeholder stated that the proposed activity is environmentally unsound irrespective of the assessment process and predicted environmental risk. | Petroleum activities do not operate to a no-impact standard. Instead, the Regia MSS is required to define the acceptable levels of impact and risk, and work below those levels. Acceptable levels of impact are established based on relevant up-to-date technical and scientific studies, government advice, and are considerate of the information gathered through the consultation process. This information is used to make predictions of the levels of impact we expect to occur and compares those to the previously defined acceptable levels and is presented in the Environment Plan | 1747 |
| **4307** | The stakeholder was concerned about the environmental impact of gas released during seismic testing and production. | No impact assessment relating to the release of hydrocarbons has been conducted by CGG because hydrocarbon release is not an expected aspect of the activity. CGG has however conducted a thorough risk assessment | 2273 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| | | relating to accidental release of fuel (D4). An OPEP and OSMP have also been designed and incorporated into the EP to establish a clear and systematic framework for preventing, managing and mitigating oil pollution incidents on the vessels deployed during the Regia MSS (G3). | |
| **4315** | The statement suggests that the significant harm caused by seismic activity to marine life and commercial fisheries, along with the existing natural gas supplies and climate change issues, renders the industrialisation of Port Fairy's coastline unacceptable. It emphasises community disapproval of allowing major oil companies to profit at the expense of the local environment and tourism. | We believe impacts from our activity can be managed to below acceptable levels. Further development of the offshore area would be subject to multiple future approvals. The visual impact from this survey would be temporary and similar to the shipping/fishing activity that already occurs in the region (Event ID 2076). | 2076 |
| **4354** | Uncertainty about the full extent of damage to the marine ecosystem. | Titleholder has undertaken a thorough analysis and assessment of all relevant literature to inform its decisions. The MSS will not impact the marine environment within the area of operation. Mitigation plans are in place to reduce any impacts to as low as practicable. | 2831 |
| **4358** | The stakeholder was concerned about the impacts on flora and fauna being damaged and killed away from the coastline. | Title holder has undertaken a thorough analysis and assessment of all relevant literature to inform its decisions. The MSS will not impact the population stability of any flora or fauna within the area of operation. Mitigation plans are in place to reduce any impacts to as low as practicable. | 2821 |
| **4362** | Concerns about the lack of environmental reviews of seismic surveys at necessary scales to assess, mitigate and monitor impacts. | The titleholder has undertaken a thorough analysis and assessment of all relevant literature to inform its decisions. The titleholder responded providing links to large scale studies on seismic undertaken in Australian waters and offered to provide individual with impact assessments when they became available. | 1389 |
| **4363** | Stakeholder noted opposition to the harmful effects on marine life and the pristine coast. | The titleholder provided information on identifying potential impacts and risks and putting mitigations in place such as, conducting survey during time of year marine mammals are less likely to be in area, reducing sound source to lowest setting and reducing number of times activated, implementing marine mammal and fish monitoring programs, exclusion zones, following strict NOPSEMA guidelines. Provided link to PEIRA and document library on website. | 786 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| **4364** | Concern about the future of ocean health for children and sea life, including whale children. | Titleholder responded in Event ID: 1416, describing CGG's commitment to safeguarding marine mammals, the assessment process, regulations and measures currently in place. The stakeholder was provided with consultation information and invited to engage. | 1410 |
| **4200** | Stakeholder noted that dolphins use clicks and whistles as a complex form of communication, with observations of bottlenose dolphins using distinctive whistles for individuals within their pod, similar to how humans use names. Claimed that blasts from seismic testing could cause temporary and permanent hearing loss in dolphins and whales, citing instance near Peru, where some 900 long-beaked common dolphins and black porpoises washed up dead along a stretch of beach, shown to have had fractures in their ear bones and signs of bleeding from their middle ears. - LINK provided. | "A Preliminary Environmental Impact and Risk Assessment is undertaken during an impact assessment process (our PEIRA is available here). The PEIRA is compiled to identify environmental values and sensitivities, to provide an evaluation of the environmental impacts and risks associated with the project. The PEIRA is then used to inform the environmental assessment documents, and as above, the environmental impact and risk treatments, which are being uploaded in the document library. The draft Environmental Impact Assessments are in the document library now, for review and feedback.<br><br>For transparency we are uploading the entire documents, however if there is a concern you would like a summary or specific information on, please let us know. Further information on marine mammal treatments is covered below in response to concern 6." | 2886 |
| **4452** | Stakeholder claims that potential impacts on World Heritage Values of Budj Bim and the life-cycle of Kooyang have not been properly assessed or addressed. | Regia team responded by referencing the relevant impact assessments in the Environment Plan (EP) (EVT070), this information was also provided in Event ID 7363.<br><br>Previously provided in Event ID 2521, 2356, 2357, 2358, 2359, 2360, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417. | 7136 |
| **4453** | Stakeholder claims that potential impacts on World Heritage Values of Budj Bim and the life-cycle of Kooyang have not been properly assessed or addressed. | Regia team responded by referencing the relevant impact assessments in the Environment Plan (EP) (EVT070), this information was also provided in Event ID 7363.<br><br>Previously provided in Event ID 2521, 2356, 2357, 2358, 2359, 2360, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417. | EVT070 |
| **4487** | Claims that CGG's proposed activities are inconsistent with the Recovery Plans made under the EPBC Act, the Southern Right Whale Recovery Plan and the Blue Whale Recovery Plan. GMTOAC states that these activities pose known physical and behavioural risks to the Eastern Population of Southern Right Whales and to | CGG maintains that its approach aligns with statutory obligations and industry best practice. It asserts that all regulatory requirements under Regulation 34 have been met, and that its environmental performance outcomes and control measures are grounded in the best available science and tailored to the ecological and cultural sensitivities revealed through | EVT352 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| | Pygmy Blue Whales. These risks include impacts from anthropogenic underwater noise, particularly seismic noise, vessel strikes, climate-driven changes in prey availability, and the cumulative effects of these pressures, all of which have the potential to injure or kill individuals and affect populations.<br><br>GMTOAC notes that under the EPBC Act Program and NOPSEMA's decision-making guidelines, an Environment Plan cannot be accepted if it is inconsistent with a recovery plan. It emphasises that both Recovery Plans contain "Very High" importance actions requiring that Blue Whales and Southern Right Whales must be able to continue using their Biologically Important Areas (BIAs) without auditory impairment, injury, or displacement. The plans also call for preventing disruption and displacement of Karntubul (Southern Right Whales) from BIAs due to anthropogenic noise such as seismic surveys. | consultation. The Regia MSS Environment Plan (EP) was designed to ensure impacts and risks are reduced to As Low As Reasonably Practicable (ALARP) and to an acceptable level.<br><br>Regarding whale protection, CGG highlights that the EP includes specific mitigation measures for culturally and ecologically significant marine fauna, including species noted in relevant Recovery Plans. Early correspondence in February 2023 identified Southern Right Whales and Pygmy Blue Whales as key sensitivities, and the EP commits to spatial and temporal avoidance measures, sound-source shutdowns, and exclusion zones to protect them. These measures explicitly consider cultural significance, such as timing restrictions to avoid the Karntubul (Southern Right Whale) birthing period. The whales, Karntubul and Wuuloc, are identified in the EP as sensitive receptors with dedicated protective measures.<br><br>CGG confirms that these cultural and ecological sensitivities were incorporated into the environmental assessment. The EP acknowledges the sacred cultural status of Koontapool (Southern Right Whale) and Wuuloc (Pygmy Blue Whale) for the Gunditjmara people and includes them in impact and cumulative risk assessments. Appendix F3 references the Nyamat Mirring Plan 2023–2033 and recognises Gunditjmara spiritual connections, including to Karntubul.<br><br>CGG substantively addresses the relevant issues, including underwater noise, vessel interactions, and cumulative effects. The EP sets out noise-management frameworks, timing restrictions, and cumulative impact analyses consistent with the concerns raised. | |
| **4490** | CGG has failed to adequately assess the impacts of its proposed activity on the Budj Bim World Heritage Cultural Landscape. GMTOAC further states that CGG did not sufficiently evaluate impacts on Kooyang, a culturally significant species whose lifecycle and migration underpin the world heritage values of the Budj Bim Cultural Landscape and extend well beyond its physical boundaries. | Culturally significant features, including the Budj Bim landscape, were included in both impact and cumulative risk assessments using a methodology that blends scientific evidence with cultural narratives. Regarding Kooyang (Eel), CGG maintains that this culturally important species, whose lifecycle is central to the world heritage values of Budj Bim, was addressed within the EP's impact and cumulative assessments. These assessments include both Kooyang's cultural significance and ecological role. CGG reiterates that its EP is consistent with statutory obligations, based on best-available science, and | EVT352 |

| Feedback ID | Objection or Claim Summary | Titleholder Response | Event ID |
|---|---|---|---|
| | | tailored to the cultural and ecological sensitivities identified. CGG maintains that the Budj Bim Cultural Landscape and Kooyang have been incorporated into the EP and that this inclusion meets regulatory standards for demonstrating ALARP and acceptable levels of impact. | |
| **4493** | Claims that CGG's proposed seismic activities contribute both directly and indirectly to broader threats faced by Southern Right Whales, including industrialisation of the marine environment, climate change, and pollution or contamination from vessel discharges. | Broader threats such as climate change and industrialisation fall outside the scope of the Environment Plan, as outlined in the response to Statements 156–166. The EP assesses only the environmental risks directly associated with the proposed activity. These risks are evaluated in the D Appendices, which demonstrate that any residual risks have been reduced to an acceptable level. | EVT352 |

# Annex 3

## Loss of Containment Sensitive Species

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan Conservation Advice Listing Advice |
|---|---|---|---|---|---|---|---|
| ***Fish*** | | | | | | | |
| **Australian Grayling** | Species or species habitat known to occur within area | Vulnerable | | | | None identified | Conservation Advice *Prototroctes maraena* Australian Grayling (TSSC 2021) |
| **Blue Warehou** | Species or species habitat known to occur within area | Conservation Dependent | | | | None identified | Commonwealth Listing Advice *Seriolella brama* Blue Warehou (TSSC 2015) |
| **Eastern Dwarf Galaxias, Dwarf Galaxias** | Species or species habitat known to occur within area | Endangered | | | | None identified | National Recovery Plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Saddlier et al. 2010)<br>Conservation Advice for *Galaxiella pusilla* (Dwarf Galaxias) (DCCEEW 2023j) |
| **Eastern Gemfish** | Species or species habitat known to occur within area | Conservation Dependent | | | | None identified | Commonwealth Listing Advice on *Rexea solandri* (TSSC 2009) |
| **Orange Roughy, Deep-sea Perch, Red Roughy** | Species or species habitat likely to occur within area | Conservation Dependent | | | | None identified | None identified |
| **Yarra Pygmy Perch** | Species or species habitat known to occur within area | Endangered | | | | None identified | National Recovery Plan for the Yarra Pygmy Perch (*Nannoperca obscura*) (Sadler and Hammer 2010)<br>Conservation Advice for *Nannoperca obscura* (Yarra Pygmy Perch) (DCCEEW 2023k) |
| ***Sharks*** | | | | | | | |
| **Little Gulper Shark** | Species or species habitat likely to occur within area | Conservation Dependent (listed as *Centrophorus zeehaani)* | | | | None identified | Commonwealth Listing Advice on *Centrophorus zeeha* (southern dogfish) (TSSC 2013) |
| **Porbeagle, Mackerel Shark** | Species or species habitat likely to occur within area | | Migratory | Migratory Marine Species | | None identified | None identified |
| **School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark** | Species or species habitat likely to occur within area | Conservation Dependent | | | | None identified | Commonwealth Listing Advice on *Galeorhinus galeus (*TSSC 2009a) |
| **Shortfin Mako, Mako Shark** | Species or species habitat likely to occur within area | | Migratory | Migratory Marine Species | | None identified | Listing Advice *Isurus oxyrinchus* shortfin mako shark (TSSC 2014) |
| **White Shark, Great White Shark** | Foraging, feeding or related behaviour known to occur within area | Vulnerable | Migratory | Migratory Marine Species | | Distribution and foraging | Recovery Plan for the White Shark (*Carcharodon carcharias*). (DSEWPaC 2013b) |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan Conservation Advice Listing Advice |
|---|---|---|---|---|---|---|---|
| ***Syngnathidae*** | | | | | | | |
| **Australian Smooth Pipefish, Smooth Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Brushtail Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Bullneck Seahorse** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Common Seadragon, Weedy Seadragon** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Deepbody Pipefish, Deep-bodied Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Hairy Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Halfbanded Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Javelin Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Knifesnout Pipefish, Knife-snouted Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Leafy Seadragon** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Mollison's Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Mother-of-pearl Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan Conservation Advice Listing Advice |
|---|---|---|---|---|---|---|---|
| **Port Phillip Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Pugnose Pipefish, Pug-nosed Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Red Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Ringback Pipefish, Ring-backed Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Robust Pipehorse, Robust Spiny Pipehorse** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Sawtooth Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Short-head Seahorse, Short-snouted Seahorse** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Spiny Pipehorse, Australian Spiny Pipehorse** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Spotted Pipefish, Gulf Pipefish, Peacock Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Trawl Pipefish, Bass Strait Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Tucker's Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| **Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |
| ***Seabirds*** | | | | | | | |
| **Antipodean Albatross** | Foraging, feeding or related behaviour likely to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | Foraging<br>Whole South-east Marine Region | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan<br>Conservation Advice<br>Listing Advice |
|---|---|---|---|---|---|---|---|
| **Australasian Gannet** | Breeding known to occur within area | | | | Listed | Foraging: year round<br>40 km buffer around coast off Portland | Wildlife Conservation Plan for Seabirds (CoA 2020a) |
| **Black-browed Albatross** | Foraging, feeding or related behaviour likely to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | Foraging<br>Whole South-east Marine Region | National Recovery Plan for Albatrosses and Petrels (CoA 2022)<br>Commonwealth Listing Advice on Black-browed Albatross (*Thalassarche melanopris*) (TSSC 2005) |
| **Blue Petrel** | Species or species habitat may occur within area | Vulnerable | | | Listed | None identified | Conservation Advice *Halobaena caerulea* Blue Petrel (TSS 2015) |
| **Buller's Albatross, Pacific Albatross** | Foraging, feeding or related behaviour likely to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | Foraging | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |
| **Campbell Albatross, Campbell Black-browed Albatross** | Foraging, feeding or related behaviour likely to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | Foraging<br>Whole South-east Marine Region | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |
| **Common Diving-Petrel** | Breeding known to occur within area | | | | Listed | Foraging: year round<br>Breeding: July – January<br>Buffer around Tasmania and Victoria | None identified |
| **Fairy Prion** | Species or species habitat known to occur within area | Vulnerable | | | Listed | None identified | Wildlife Conservation Plan for Seabirds (CoA 2020a) |
| **Fairy Prion (southern)** | Species or species habitat known to occur within area | Vulnerable | | | | None identified | Conservation Advice *Pachyptila turtur subantarctica* fairy prion (southern) (TSSC 2015) |
| **Flesh-footed Shearwater, Fleshy-footed Shearwater** | Species or species habitat known to occur within area | | Migratory | Migratory Marine Birds | Listed (as *Puffinus carneipes*) | None identified | Wildlife Conservation Plan for Seabirds (CoA 2020a)<br>Commonwealth Listing Advice on *Ardenna carneipes* (Flesh-footed Shearwater) (TSSC 2014) |
| **Gould's Petrel, Australian Gould's Petrel** | Species or species habitat may occur within area | Endangered | | | | None identified | Gould's Petrel (*Pterodroma leucoptera leucoptera*) Recovery Plan (DEC NSW 2006) |
| **Greater Crested Tern** | Breeding known to occur within area | | Migratory | Migratory Wetlands Species | Listed (as *Sterna bergii*) | None identified | Wildlife Conservation Plan for Seabirds (CoA 2020a) |
| **Grey-headed Albatross** | Species or species habitat may occur within area | Endangered | Migratory | Migratory Marine Birds | Listed | None identified | National Recovery Plan for Albatrosses and Petrels (CoA 2022)<br>Approved Conservation Advice for *Thalassarche chrysostoma* (Grey-headed Albatross) (DEWHA 2009) |
| **Indian Yellow-nosed Albatross** | Species or species habitat likely to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | Foraging<br>Most of the South-east Marine Region | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |
| **Little Penguin** | Breeding known to occur within area | | | | Listed | Breeding and foraging BIAs occur at Black Pyramid, Christmas Island and Councillor Island | Wildlife Conservation Plan for Seabirds (CoA 2020a) |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan<br>Conservation Advice<br>Listing Advice |
|---|---|---|---|---|---|---|---|
| **Northern Buller's Albatross, Pacific Albatross** | Foraging, feeding or related behaviour likely to occur within area | Vulnerable | | | Listed (as *Thalassarche sp. nov.)* | None identified | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |
| **Northern Giant Petrel** | Foraging, feeding or related behaviour likely to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | None identified | National Recovery Plan for Albatrosses and Petrels (CoA 2022)<br>Commonwealth Listing Advice on *Macronectes halli* (Northern Giant-Petrel) (TSSC 2001) |
| **Northern Royal Albatross** | Foraging, feeding or related behaviour likely to occur within area | Endangered | Migratory | Migratory Marine Birds | Listed | None identified | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |
| **Salvin's Albatross** | Foraging, feeding or related behaviour likely to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | None identified | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |
| **Short-tailed Shearwater** | Breeding known to occur within area | | Migratory | Migratory Marine Birds | Listed (as *Puffinus tenuirostris*) | Foraging<br>Breeding<br>Buffer around Tasmania including Bass Strait | None identified |
| **Shy Albatross** | Foraging, feeding or related behaviour likely to occur within area | Endangered | Migratory | Migratory Marine Birds | Listed | Foraging<br>Whole South-east Marine Region | National Recovery Plan for Albatrosses and Petrels (CoA 2022))<br>Conservation Advice *Thalassarche cauta* Shy Albatross (TSS 2020) |
| **Silver Gull** | Breeding known to occur within area | | | | Listed (as *Larus novaehollandiae*) | None identified | Wildlife Conservation Plan for Seabirds (CoA 2020a) |
| **Soft-plumaged Petrel** | Species or species habitat may occur within area | Vulnerable | | | Listed | None identified | Conservation Advice *Pterodroma Mollis* Soft-plumaged Petrel (TSS 2015a) |
| **Sooty Albatross** | Species or species habitat likely to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | None identified | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |
| **Sooty Shearwater** | Species or species habitat may occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed (as *Puffinus griseus*) | None identified | Wildlife Conservation Plan for Seabirds (CoA 2020a)<br>Conservation Advice for *Ardenna grisea* (Sooty Shearwater) (DCCEEW 2023i) |
| **Southern Giant-Petrel, Southern Giant Petrel** | Foraging, feeding or related behaviour likely to occur within area | Endangered | Migratory | Migratory Marine Birds | Listed | None identified | National Recovery Plan for Albatrosses and Petrels (CoA 2022)<br>Commonwealth Listing Advice on *Macronectes giganteus* (Southern Giant-Petrel) (TSSC 2001a) |
| **Southern Royal Albatross** | Foraging, feeding or related behaviour likely to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | None identified | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |
| **Wandering Albatross** | Foraging, feeding or related behaviour likely to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | None identified | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan Conservation Advice Listing Advice |
|---|---|---|---|---|---|---|---|
| **Wedge-tailed Shearwater** | | | Migratory Marine Birds | Migratory Marine Birds | Listed | Foraging:<br>Breeding: August - May<br>160 km around breeding area on Mutton Bird Island | Wildlife Conservation Plan for Seabirds (CoA 2020a) |
| **White-bellied Sea-Eagle** | Breeding known to occur within area | | | | Listed | None identified | Wildlife Conservation Plan for Seabirds (CoA 2020a) |
| **White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian)** | Species or species habitat likely to occur within area | Vulnerable | | | | None identified | Lord Howe Island Biodiversity Management Plan (DECC 2007) – not relevant to Environmental Planning Area |
| **White-capped Albatross** | Foraging, feeding or related behaviour known to occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed | None identified | National Recovery Plan for Albatrosses and Petrels (CoA 2022) |
| ***Shorebird*** | | | | | | | |
| **Australasian Bittern** | Species or species habitat known to occur within area | Endangered | | | | None identified | Conservation Advice *Botaurus poiciloptilus* Australasian Bittern. Threatened Species Scientific Committee (TSSC 2019a) |
| **Australian Fairy Tern** | Species or species habitat known to occur within area | Vulnerable | | | | None identified | Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (DSEWPaC. 2011)<br>National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE 2020) |
| **Australian Painted Snipe** | Species or species habitat known to occur within area | Endangered | | | Listed - overfly marine area (as *Rostratula benghalensis (sensu lato)*) | None identified | Approved Conservation Advice for *Rostratula australis* (Australian Painted Snipe) (DSEWPaC 2013)<br>National Recovery Plan for the Australian Painted Snipe (*Rostratula australis*) (CoA 2022a) |
| **Bar-tailed Godwit** | Species or species habitat known to occur within area | | Migratory | Migratory Wetlands Species | Listed | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Black-eared Cuckoo** | Species or species habitat known to occur within area | | | | Listed - overfly marine area (as *Chrysococcyx osculans*) | None identified | None identified |
| **Black-faced Cormorant** | Breeding known to occur within area | | | | Listed | Breeding<br>Foraging | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Black-faced Monarch** | Species or species habitat may occur within area | | Migratory | Migratory Terrestrial Species | Listed - overfly marine area | None identified | None identified |
| **Black-tailed Godwit** | Roosting known to occur within area | Endangered | Migratory | Migratory Terrestrial Species | Listed - overfly marine area | None identified | Conservation Advice for *Limosa limosa* (Black-tailed Godwit) (DCCEEW 2024i)<br>Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan<br>Conservation Advice<br>Listing Advice |
|---|---|---|---|---|---|---|---|
| **Blue-winged Parrot** | Species or species habitat known to occur within area | Vulnerable | | | Listed - overfly marine area | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015)<br>Conservation Advice for *Neophema chrysostoma* (Blue-winged Parrot) (DCCEEW 2023l) |
| **Cape Gannet** | Breeding known to occur within area | | | | Listed | None identified | None identified |
| **Cattle Egret** | Species or species habitat may occur within area | | | | Listed - overfly marine area (as *Ardea ibis*) | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Common Greenshank, Greenshank** | Species or species habitat known to occur within area | Endangered | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Conservation Advice for *Tringa nebularia* (Common Greenshank). (DCCEEW 2024e)<br>Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Common Noddy** | Species or species habitat likely to occur within area | | Migratory | Migratory Marine Birds | Listed | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Common Sandpiper** | Species or species habitat known to occur within area | | Migratory | Migratory Wetlands Species | Listed | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Curlew Sandpiper** | Species or species habitat known to occur within area | Critically Endangered | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Conservation Advice for *Calidris ferruginea* (Curlew Sandpiper) (DCCEEW 2023m) |
| **Double-banded Plover** | Roosting known to occur within area | | Migratory | Migratory Wetlands Species | Listed – overfly marine area | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Eastern Curlew, Far Eastern Curlew** | Species or species habitat known to occur within area | Critically Endangered | Migratory | Migratory Wetlands Species | Listed | None identified | Conservation Advice for *Numenius madagascariensis* (Far Eastern Curlew) (DCCEEW 2023n) |
| **Hooded Plover, Hooded Dotterel** | Species or species habitat known to occur within area | | | | Listed - overfly marine area (as *Thinornis rubricollis)* | None identified | None identified |
| **Fork-tailed Swift** | Species or species habitat likely to occur within area | | Migratory | Migratory Marine Birds | Listed - overfly marine area | None identified | None identified |
| **Great Knot** | Roosting known to occur within area | Vulnerable | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Conservation Advice for *Calidris tenuirostris* (great knot) (DCCEEW 2024f)<br>Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Brown Skua** | Species or species habitat may occur within area | | | | Listed (as *Catharacta skua*) | None identified | None identified |
| **Greater Sand Plover, Large Sand Plover** | Species or species habitat likely to occur within area | Vulnerable | Migratory | Migratory Wetlands Species | Listed | None identified | Conservation Advice for *Charadrius leschenaultii* (Greater Sand Plover) (DCCEEW 2023o)<br>Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan<br>Conservation Advice<br>Listing Advice |
|---|---|---|---|---|---|---|---|
| **Grey Plover** | Roosting known to occur within area | Vulnerable | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Conservation Advice for *Pluvialis squatarola* (Grey Plover) (DCCEEW 2024h)<br>Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Grey-tailed Tattler** | Roosting known to occur within area | | Migratory | Migratory Wetlands Species | Listed (as *Heteroscelus brevipes*) | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Hooded Plover, Hooded Dotterel** | Species or species habitat known to occur within area | | | | Listed - overfly marine area (as *Thinornis rubricollis)* | None identified | None identified |
| **Latham's Snipe, Japanese Snipe** | Species or species habitat known to occur within area | Vulnerable | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Conservation Advice for *Gallinago hardwickii* (Latham's snipe) (DCCEEW 2024d)<br>Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Lesser Sand Plover, Mongolian Plover** | Roosting known to occur within area | Endangered | Migratory | Migratory Wetlands Species | Listed | None identified | Conservation Advice *Charadrius mongolus* Lesser Sand Plover (TSSC 2016c)<br>Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Little Curlew, Little Whimbrel** | Roosting likely to occur within area | | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Little Tern** | Species or species habitat may occur within area | Vulnerable | Migratory | Migratory Marine Birds | Listed (as *Sterna albifrons*) | None identified | Commonwealth Listing Advice on *Sterna albifrons sinensis* (Little Tern (Western Pacific)) (TSSC 2002)<br>Conservation Advice for *Sternula albifrons* (Little Tern) (DCCEEW 2025) |
| **Magpie Goose** | Species or species habitat may occur within area | | | | Listed - overfly marine area | None identified | None identified |
| **Marsh Sandpiper, Little Greenshank** | Roosting known to occur within area | | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit** | Species or species habitat known to occur within area | Endangered | | | | None identified | Conservation Advice for Limosa lapponica baueri Bar-tailed Godwit (western Alaskan) (DCCEEW 2024b) |
| **Orange-bellied Parrot** | Species or species habitat known to occur within area | Critically Endangered | | | Listed - overfly marine area | None identified | Commonwealth Listing Advice on *Neophema chrysogaster* (TSSC 2006).<br>National Recovery Plan for the Orange-bellied Parrot, *Neophema chrysogaster* (DEWLP 2016) |
| **Osprey** | Species or species habitat known to occur within area | | Migratory | Migratory Wetlands Species | Listed | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Pacific Golden Plover** | Roosting known to occur within area | | Migratory | Migratory Wetlands Species | Listed | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Pectoral Sandpiper** | Species or species habitat known to occur within area | | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan Conservation Advice Listing Advice |
|---|---|---|---|---|---|---|---|
| **Pied Stilt, Black-winged Stilt** | Roosting known to occur within area | | | | Listed - overfly marine area | None identified | None identified |
| **Pin-tailed Snipe** | Roosting likely to occur within area | | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Plains-wanderer** | Species or species habitat likely to occur within area | Critically Endangered | | | | None identified | Conservation Advice *Pedionomus torquatus* Plains-wanderer (DoE 2015a)<br>National Recovery Plan for the Plains-wanderer (*Pedionomus torquatus*) (DoE and SA DEWNR 2016) |
| **Rainbow Bee-eater** | Species or species habitat may occur within area | | | | Listed - overfly marine area | None identified | None identified |
| **Red Knot, Knot** | Species or species habitat known to occur within area | Vulnerable | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Conservation Advice *Calidris canutus* Red Knot (DCCEEW 2024)<br>Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Red-capped Plover** | Roosting known to occur within area | | | | Listed - overfly marine area | None identified | None identified |
| **Red-necked Avocet** | Roosting known to occur within area | | | | Listed - overfly marine area | None identified | None identified |
| **Red-necked Phalarope** | Roosting known to occur within area | | Migratory | Migratory Wetlands Species | Listed | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Red-necked Stint** | Roosting known to occur within area | | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Ruddy Turnstone** | Roosting known to occur within area | Vulnerable | Migratory | Migratory Wetlands Species | Listed | None identified | Conservation Advice for *Arenaria interpres* (Ruddy Turnstone) (DCCEEW 2024c)<br>Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Rufous Fantail** | Species or species habitat known to occur within area | | Migratory | Migratory Terrestrial Species | Listed - overfly marine area | None identified | None identified |
| **Sanderling** | Roosting known to occur within area | | Migratory | Migratory Wetlands Species | Listed | None identified | None identified |
| **Satin Flycatcher** | Breeding known to occur within area | | Migratory | Migratory Terrestrial Species | Listed - overfly marine area | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Sharp-tailed Sandpiper** | Roosting known to occur within area | Vulnerable | Migratory | Migratory Wetlands Species | Listed | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015)<br>Conservation Advice for *Calidris acuminata* (Sharp-tailed Sandpiper) (DCCEEW 2024a) |
| **Swift Parrot** | Species or species habitat likely to occur within area | Critically Endangered | | | Listed - overfly marine area | None identified | National Recovery Plan for the Swift Parrot (*Lathamus discolor*) (Saunders & Tzaros 2011)<br>Conservation Advice *Lathamus discolor* Swift Parrot (TSSC 2016b) |
| **Swinhoe's Snipe** | Roosting likely to occur within area | | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan<br>Conservation Advice<br>Listing Advice |
|---|---|---|---|---|---|---|---|
| **Terek Sandpiper** | Roosting known to occur within area | Vulnerable | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Conservation Advice for *Xenus cinereus* (Terek Sandpiper) (DCCEEW 2024g)<br>Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Whimbrel** | Roosting known to occur within area | | Migratory | Migratory Wetlands Species | Listed | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **White-throated Needletail** | Species or species habitat known to occur within area | Vulnerable | Migratory | Migratory Terrestrial Species | Listed - overfly marine area | None identified | Conservation Advice *Hirundapus caudacutus* White-throated Needletail (TSSC 2019) |
| **Wood Sandpiper** | Roosting known to occur within area | | Migratory | Migratory Wetlands Species | Listed - overfly marine area | None identified | Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) |
| **Yellow Wagtail** | Species or species habitat may occur within area | | Migratory | Migratory Terrestrial Species | Listed - overfly marine area | None identified | None identified |
| ***Turtles*** | | | | | | | |
| **Green Turtle** | Species or species habitat may occur within area | Vulnerable | Migratory | Migratory Marine Species | Listed | None identified | Recovery Plan for Marine Turtles (DoEE 2017) |
| **Leatherback Turtle, Leathery Turtle** | Breeding likely to occur within area | Endangered | Migratory | Migratory Marine Species | Listed | None identified | Recovery Plan for Marine Turtles (DoEE 2017)<br>Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle*)* (DEWHA 2008) |
| **Loggerhead Turtle** | Breeding likely to occur within area | Endangered | Migratory | Migratory Marine Species | Listed | None identified | Recovery Plan for Marine Turtles (DoEE 2017) |
| ***Dolphins*** | | | | | | | |
| **Bottlenose Dolphin** | Species or species habitat may occur within area | | | | | | None identified |
| **Common Dolphin, Short-beaked Common Dolphin** | Species or species habitat may occur within area | | | | | | None identified |
| **Dusky Dolphin** | Species or species habitat likely to occur within area | | Migratory | Migratory Marine Species | | | None identified |
| **Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin** | Species or species habitat likely to occur within area | | | | | | None identified |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan Conservation Advice Listing Advice |
|---|---|---|---|---|---|---|---|
| **Risso's Dolphin, Grampus** | Species or species habitat may occur within area | | | | | | None identified |
| **Southern Right Whale Dolphin** | Species or species habitat may occur within area | | | | | | None identified |
| ***Whales*** | | | | | | | |
| **Andrew's Beaked Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **Antarctic Minke Whale, Dark-shoulder Minke Whale** | Species or species habitat likely to occur within area | | Migratory | Migratory Marine Species | | None identified | None identified |
| **Arnoux's Beaked Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **Blainville's Beaked Whale, Dense-beaked Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **Blue Whale** | Foraging, feeding or related behaviour known to occur within area | Endangered | Migratory | Migratory Marine Species | | Foraging (annual high use area) | Conservation Management Plan for the Blue Whale (DoE 2015c) |
| **Cuvier's Beaked Whale, Goose-beaked Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **Dwarf Sperm Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **False Killer Whale** | Species or species habitat likely to occur within area | | | | | None identified | None identified |
| **Fin Whale** | Foraging, feeding or related behaviour known to occur within area | Vulnerable | Migratory | Migratory Marine Species | | None identified | Conservation Advice *Balaenoptera physalus* Fin Whale (TSSC 2015b) |
| **Gray's Beaked Whale, Scamperdown Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan Conservation Advice Listing Advice |
|---|---|---|---|---|---|---|---|
| **Hector's Beaked Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **Humpback Whale** | Species or species habitat likely to occur within area | | Migratory | Migratory Marine Species | | None identified | Listing Advice *Megaptera novaeangliae* Humpback Whale (DAWE 2022a) |
| **Killer Whale, Orca** | Species or species habitat likely to occur within area | | Migratory | Migratory Marine Species | | None identified | None identified |
| **Long-finned Pilot Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **Minke Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **Pygmy Right Whale** | Foraging, feeding or related behaviour likely to occur within area | | Migratory | Migratory Marine Species | | None identified | None identified |
| **Pygmy Sperm Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **Sei Whale** | Foraging, feeding or related behaviour known to occur within area | Vulnerable | Migratory | Migratory Marine Species | | None identified | Conservation Advice *Balaenoptera borealis* sei whale (TSSC 2015c) |
| **Shepherd's Beaked Whale, Tasman Beaked Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **Short-finned Pilot Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **Southern Bottlenose Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |

| Common Name | Presence | Threatened Category | Migratory Status | Migratory Category | Marine Status | Biologically Important Area | Management Plan<br>Conservation Advice<br>Listing Advice |
|---|---|---|---|---|---|---|---|
| **Southern Right Whale** | Breeding known to occur within area | Endangered | Migratory (as Balaena glacialis australis) | Migratory Marine Species | | Reproduction and Migration BIAs | Conservation Management Plan for the Southern Right Whale (CoA 2012)<br>National Recovery Plan for the Southern Right Whale (DCCEEW 2024) |
| **Sperm Whale** | Species or species habitat may occur within area | | Migratory | Migratory Marine Species | | None identified | None identified |
| **Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| **True's Beaked Whale** | Species or species habitat may occur within area | | | | | None identified | None identified |
| ***Pinnipeds*** | | | | | | | |
| **Australian Fur-seal, Australo-African Fur-seal** | Breeding known to occur within area | | | | Listed | None identified | None identified |
| **Australian Sea-lion, Australian Sea Lion** | Species or species habitat known to occur within area | Endangered | | | Listed | None identified | Conservation Advice *Neophoca cinerea* Australian Sea Lion (TSSC 2020b)<br>Recovery Plan for the Australian Sea Lion (*Neophoca cinerea*) (DSEWPaC. 2013a) |
| **Long-nosed Fur-seal, New Zealand Fur-seal** | Species or species habitat may occur within area | | | | Listed | None identified | None identified |