

# Minerva Pipeline Removal (Victorian State Waters) EPBC Referral Supporting Document

Woodside

# TABLE OF CONTENTS

<b>1.</b>	<b>INTRODUCTION</b>	<b>4</b>
1.1	Project overview	4
1.2	Scope	4
<b>2.</b>	<b>PROJECT DESCRIPTION</b>	<b>6</b>
<b>3.</b>	<b>DESCRIPTION OF THE ENVIRONMENT</b>	<b>7</b>
3.1	Physical Environment	7
3.1.1	Bathymetry	7
3.1.2	Sediment Quality	7
3.1.3	Water Quality	7
3.2	Biological Environment	8
3.2.1	Benthic and Shoreline Habitats	8
3.2.2	Threatened and Migratory Species	8
3.2.3	Biologically Important Areas and Habitat Critical to the Survival of a Species	8
3.3	Protected and Significant Areas	9
3.3.1	Key Ecological Features	9
3.3.2	World Heritage Properties	9
3.3.3	National Heritage Properties	9
3.3.4	Wetlands	9
3.3.5	Threatened Ecological Communities	9
3.3.6	Protected Areas	10
3.4	Socio-Economic Environment	10
3.4.1	Cultural Features and Heritage Values	10
3.4.1.1	Background	10
3.4.1.2	First Nations Peoples	10
3.4.2	Marine Parks	12
3.4.2.1	Sea Country Values	12
3.4.2.2	Indigenous Archaeological Heritage Assessment	13
3.4.2.3	Intangible Cultural Heritage	15
3.4.2.4	Historic Sites of Significance	17
3.4.2.5	Underwater Cultural Heritage	18
3.4.2.6	World, National and Commonwealth Heritage Listed Places	18
3.4.3	Commercial Fisheries	18
3.4.4	Tourism and Recreation	18
3.4.5	Oil and Gas Activities	18
3.4.6	Defence Activities	18
<b>4.</b>	<b>POTENTIAL IMPACT AND MITIGATION</b>	<b>18</b>
4.1	Environmental Impact and Risk Assessment	20
4.1.1	Planned Activity Impact Assessment	21
4.1.2	Unplanned Event Risk Assessment	21
4.2	Environmental Impact Assessment: Planned and Unplanned Activities	22
<b>5.</b>	<b>MNES SIGNIFICANT IMPACT ASSESSMENT</b>	<b>37</b>
5.1	Threatened Species	37
5.1.1	Vulnerable Species	38
5.1.1.1	Vulnerable Seabirds	38

5.1.1.2	Vulnerable Marine Mammals.....	39
5.1.1.3	Vulnerable Marine Reptiles .....	40
5.1.1.4	Vulnerable Fish, Sharks and Rays .....	41
5.1.2	Critically Endangered and Endangered Species.....	43
5.1.2.1	Critically Endangered and Endangered Seabirds .....	43
5.1.2.2	Critically Endangered and Endangered Marine Mammals.....	45
5.1.2.3	Critically Endangered and Endangered Marine Reptiles .....	50
5.2	Migratory Species	51
5.2.1	Migratory Seabirds .....	52
5.2.2	Migratory Marine Mammals.....	52
5.2.3	Migratory Marine Reptiles .....	53
5.2.4	Migratory Fish, Sharks and Rays .....	54
<b>6.</b>	<b>REFERENCES</b>	<b>55</b>

# 1. INTRODUCTION

Woodside Energy (Victoria) Pty Ltd (Woodside), as titleholder under the Offshore Petroleum and Greenhouse Gas Storage Regulations 2021 (Vic) (referred to as the Regulations), proposes to undertake decommissioning activities within pipeline licence VIC/PL33(v).

The decommissioning activities proposed by Woodside include the removal of the Minerva pipeline bundle and stabilisation materials in Pipeline Licence VIC/PL33(v), in Victorian State Waters, is proposed to occur approximately 5.5 km south-southwest (SSW) of the township of Port Campbell, Victoria and in water depths of approximately ~20 – 60 m. The 10-inch steel pipeline is proposed to be recovered up to the horizontal directional drill (HDD) location, approximately 800 m from shore.

Field management activities to maintain the pipeline bundle VIC/PL33(v) such that it can be removed may also be undertaken. These activities will hereafter be referred to as the proposed action and form the scope of this EPBC Referral Supporting Document.

## 1.1 PROJECT OVERVIEW

The Minerva-3 and Minerva-4 offshore production wells were drilled in Commonwealth waters in late 2002 and the pipeline was laid in VIC/PL33(v) in 2003. The construction of the Minerva onshore gas plant was completed in December 2004, and the onshore and offshore facilities were commissioned and commenced production in January 2005. Production of the field ceased in September 2019 and the pipeline in VIC/PL33(v) was flushed of hydrocarbons to < 30 ppm oil in water and filled with treated potable water to preserve it. A vessel-based campaign was conducted in 2021 to disconnect flowlines from wells and install additional barrier plugs in the wells.

Woodside proposes to undertake the following activities under the EPBC Referral, referred to as the proposed action:

- removal of the Minerva pipeline bundle and associated equipment in Victorian State Waters, referred to as the Minerva subsea infrastructure, within VIC/PL33(v)
- management of the Minerva subsea infrastructure until it is removed.

The proposed action is part of a joint decommissioning campaign to remove the Minerva subsea infrastructure in both Victorian and Commonwealth waters. Activities in Commonwealth waters are beyond the scope of the EPBC Referral and are subject to approvals granted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

## 1.2 SCOPE

The purpose of this report is to assess the potential impacts of the proposed action on the marine environment within Victorian state-waters.

The proposed action related to the Minerva pipeline in VIC/PL33(v) will occur in Victorian State waters. A description of the petroleum activity is provided in Section 3. The spatial boundary of the petroleum activity has been described and assessed using the operational area, which is described in Section 3.3.

The pipeline bundle within the horizontally directionally drilled (HDD) section of VIC/PL33(v) will be subject to a future decommissioning Environment Plan (EP) and is beyond the scope of this referral.

The onshore section of the Minerva pipeline in pipeline licence VIC/PL228 (i.e., between the Otway gas plant and the territorial seas baseline) is owned by Casino Henry Joint Venture and operated by Cooper Energy. The onshore section of the Minerva pipeline (from the HDD to the Otway gas plant) is beyond the scope of this report and subject to future approvals.

Activities in Commonwealth waters are beyond the scope of this referral.

The scope of this referral does not include the movement of the project vessels outside of the proposed action area (referred to as the project area). The project area shown in Figure 1-1 defines the spatial boundary of the proposed action; the planned aspects of the proposed action will not extend beyond the project area. Woodside has defined a project area, as a 1,000 m buffer around VIC/PL33(v) in Victorian coastal waters area.

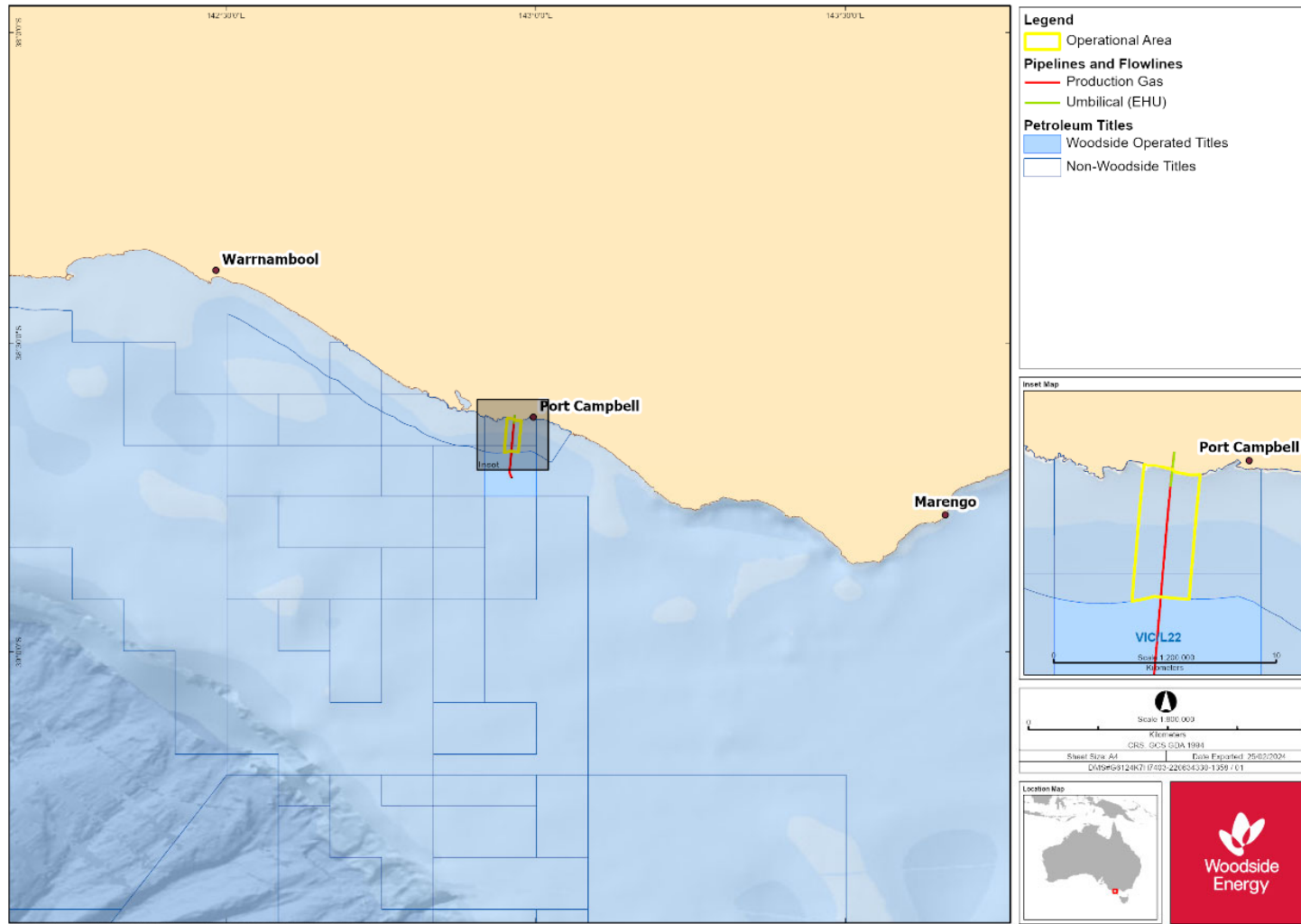


Figure 1-1 Location of the project area

## 2. PROJECT DESCRIPTION

The broader components of the project are described in Section 1.1. Components that are relevant for this report include:

- **Pipeline bundle recovery:** The pipeline bundle will be recovered by cutting it into sections on the seabed and recovering the sections. Sediment relocation may be required to de-bury the pipeline bundle, which would be done using a mass flow excavator (MFE) deployed from and recovered to a vessel. Relocated sediment will be distributed around the pipeline. The pipeline bundle will be recovered from the coastal waters limit to as close as practicable to the shoreline. The point near the shoreline at which the pipeline, umbilical and chemical injection lines will be cut will be determined by accessibility. This point will be the closest point to the shoreline at which the pipeline, umbilical, and chemical injection lines are buried < 0.5 m. This depth balances removal of as much of the Minerva subsea infrastructure as practicable while reducing seabed disturbance from deburial of the subsea infrastructure. The HDD section of the pipeline bundle remaining in place will have environmental plugs installed. The pipeline cut upon which the environmental plug will be installed will be made by a cutting tool that leaves a clean surface and does not deform the pipeline, such as a diamond wire saw or chop saw. The interior of the pipeline bundle is at hydrostatic pressure, so negligible ingress or egress of water into or out of the HDD section of the pipeline bundle is expected to occur.
- **Inspection, Maintenance and Repair (IMR):** There is no intention to carry out routine IMR activities prior to field abandonment beyond those required for removal of the Minerva subsea infrastructure. Non-routine IMR may be required after significant external events, such as storms or third-party interactions, or when anomalous conditions are detected. Inspection may be undertaken to verify the integrity of the infrastructure for recovery as part of the equipment removal activities. If any defects are identified, the engineered removal methods will be adjusted accordingly, rather than repairs conducted. IMR activities are typically undertaken from an offshore support vessel via a Remote Operated Vehicle (ROV). IMR activities may include the following: general visual inspection, multibeam echo sounder (MBES), marine growth removal, sediment relocation, corrosion surveys.
- **Decommissioning environmental surveys:** Woodside may carry out environmental monitoring as part of decommissioning activities. Given the nature and scale of the environmental impacts and risks from the historical, present, and future petroleum activities in VIC/PL33(v), the following environmental values are expected to be monitored:
  - visual observations of the seabed to determine the nature and extent of seabed disturbance and quantify benthic habitat
  - measurements of potential contaminants to sediments, such as metals, metalloids, and hydrocarbons
  - confirmation of removal of the Minerva subsea infrastructure which is required to be removed
  - confirmation of the as left condition of the seabed
- **Vessel operations:** A single multi-purpose construction vessel (MCV) is expected to be the only vessel required to remove the Minerva subsea infrastructure and undertake field management activities. Ad hoc support may be provided as required by a small local supply vessel. Support vessel visits to the MCV are expected to be infrequent and of short duration, as the MCV will change crews and reprovision when returning recovered Minerva subsea infrastructure to shore. All vessels will have a suitable survey class for the activities it is performing. The MCV will produce routine discharges to the sea in accordance with relevant requirements. Vessels will display navigational lighting and external lighting required for safe operations. Lighting levels will be determined primarily by operational safety and navigational requirements under relevant legislation, specifically the Commonwealth *Navigation Act 2012*. The vessels will be lit to maintain operational safety on a 24-hour basis.
- **Remotely Operated Vehicles:** Work class ROV's deployed from the MCV will be used throughout the proposed action. ROV's may be used for:
  - Visual inspections and observations
  - Seabed and hazard survey

- Marine growth removal
  - Sediment relocation
  - Subsea rigging, handling, and cutting
  - Tooling and cutting infrastructure
  - Recovery of dropped objects
  - As found/as left surveys
- **Helicopter operations:** Whilst unlikely, helicopters may be used during the proposed action for unplanned transfers to or from the MCV (e.g., medical evacuation), as required. Helicopter operations within the project area are limited to take-off and landing on the helideck.
  - **Chemical discharge:** the chemicals that may be released to the environment during the petroleum activity include residual chemicals within the Minerva subsea infrastructure and chemicals used during the removal of Minerva subsea infrastructure and IMR activities. Chemicals onboard the MCV will be stored as required within appropriate storage facilities. Hazardous chemicals will be stored within bunds or in secure areas to prevent accidental overboard discharges. All chemicals that are planned to be released or discharged to the marine environment during the proposed action will be evaluated using Woodside's chemical assessment process.

The removal of subsea infrastructure is expected to commence from Q4 2024 (~ late October) to Q1 2025 (~March) for a period of approximately 25-60 days (including weather contingency) in Victorian waters.

### 3. DESCRIPTION OF THE ENVIRONMENT

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

#### 3.1 PHYSICAL ENVIRONMENT

##### 3.1.1 Bathymetry

Bathymetry in the project area is generally flat. The seabed is characterised by unconsolidated sandy sediments, with the seabed gently sloping from the coastal waters boundary to the southernmost part of the operational area.

##### 3.1.2 Sediment Quality

Advisian carried out sediment sampling in the Minerva field around wellheads, the pipeline, and at several reference sites. Sediments were characterised by sand-sized fractions (62.5 µm–2 mm), with little finer or coarser sediments at most sites sampled.

Concentrations of metals in sediments were generally consistent across all sites sampled by Advisian. None of the metals exceeded the default guideline values for toxicants in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARCAMZ, 2000). Several metals were below the limit of detection at many (or all) sites, such as cadmium, cobalt, copper, lead, and mercury. Concentrations of hydrocarbons (total petroleum hydrocarbons, total recoverable hydrocarbons, aromatic hydrocarbons, and polycyclic aromatic hydrocarbons) were below laboratory limits of detection in all samples. Radioactivity of sediments was measured for a suite of radionuclides, which were generally consistent across all sites, several sites were below the laboratory limits of detection.

##### 3.1.3 Water Quality

Sampling by Advisian (2021) in late summer showed a thermocline between approximately 30 m and 50 m water depth, which may be the result of solar heating and reduced wind-driven mixing, as the preceding months have relatively long day lengths, maximum temperatures, and low winds, compared to the rest of the year. Turbidity was low in the upper part of the water column and increased near the seabed.

Water quality sampling by Advisian (2021) showed no evidence of contamination. Samples at sites near Minerva subsea infrastructure were consistent with samples at reference sites, with no evidence of elevated levels of potential contaminants. Hydrocarbons (TPH, TRH, PAH and BTEXN) were below laboratory limits of reporting in all samples. Nutrients were consistent across all sites sampled.

## 3.2 BIOLOGICAL ENVIRONMENT

### 3.2.1 Benthic and Shoreline Habitats

Benthic habitat within the project area is unconsolidated sediment with sparse epifauna. Infauna sampling by Advisian (2021) showed similarities between sites in terms of abundance and species richness, however taxa were variable between sites. This may be a consequence of the relatively low number of samples taken (three samples per site) and the limited volume of sediment recovered by the coring method. The benthic habitat within the project area is similar to those found in similar depths across the Southeast Marine Region.

Shoreline habitats are not relevant as the project area is located offshore.

### 3.2.2 Threatened and Migratory Species.

**Appendix B** presents the threatened and migratory species within the project area and includes the extent of likely presence.

The PMST results identified 47 species listed as 'threatened' species and 42 marine fauna species listed as 'migratory' within the project area.

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

Biologically important areas (BIAs) are those locations where aggregations of members of a species are known to undertake biologically important behaviours, such as breeding, resting, foraging or migration. BIAs have been identified using expert scientific knowledge about species abundance, distribution, and behaviours. BIAs are not recognised by the EPBC Act but are identified by DCCEEW to aid in the management and protection of threatened fauna.

A review of the PMSTs identified BIAs for 11 protected species that intersect with the project area. The identified protected species and their BIAs are shown in Table 3-1 (below):

*Table 3-1 BIAs within the project area*

Species	BIA Type
<i>Whales</i>	
Pygmy Blue Whale	Foraging (annual high use area)
	Distribution
Southern Right Whale	Migration
	Reproduction
<i>Sharks</i>	
White Shark	Known distribution
	Distribution (low density)
<i>Seabirds</i>	
Antipodean Albatross	Foraging
Black-browed Albatross	Foraging

Species	BIA Type
Buller's Albatross	Foraging
Campbell Albatross	Foraging
Common Diving Petrel	Foraging
Indian Yellow-nosed Albatross	Foraging
Shy Albatross	Foraging likely
Wandering Albatross	Foraging

Habitats critical for the survival of a species, referred to as critical habitats, are recognised under the EPBC Act as Matters of National Environmental Significant (MNES) (CoA, 2013). Critical habitats may be identified in species recovery plans made under the EPBC Act or listed on the register of critical habitat maintained by the minister under the EPBC Act. Woodside considers critical habitats carry greater weight than BIAs.

The Draft National Recovery Plan for Southern Right Whale (DCCEEW, 2022) identifies habitat critical to the survival of the species under the EPBC Act. The Recovery Plan is not yet in effect, however, identifies reproductive BIAs of the southern right whale, which overlaps the project area, as critical habitat.

### 3.3 PROTECTED AND SIGNIFICANT AREAS

#### 3.3.1 Key Ecological Features

The project area does not overlap any key ecological features.

#### 3.3.2 World Heritage Properties

The project area does not overlap any World Heritage properties.

#### 3.3.3 National Heritage Properties

The following National Heritage property was identified to overlap the project area in the PMST report:

- Great Ocean Road and Scenic Environs

This is a terrestrial National Heritage property and therefore will not be impacted by the proposed action, thereby, is excluded from this report.

#### 3.3.4 Wetlands

There are no Wetlands of International Importance (RAMSAR wetlands) within the project area. The following Nationally Important Wetlands are in proximity to the project area:

- Princetown Wetlands (16 km from the project area)
- Lower Aire River Wetlands (44 km from the project area)
- Aire River (44 km from the project area)

#### 3.3.5 Threatened Ecological Communities

Several threatened ecological communities (TECs) listed under the EPBC Act occur in proximity to the project area:

- Giant Kelp Forests of South East Australia, listed as Endangered (5 km from the project area)
- Subtropical and Temperate Coastal Saltmarsh, listed as Vulnerable (6 km from the project area)
- Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community, listed as Endangered (6 km from the project area).

### 3.3.6 Protected Areas

There are no Australian or Victorian protected areas overlapping the project area. Table 3-2 outlines protected areas in proximity to the project area:

Table 3-2 Summary of protected areas in waters near the project area

Protected Area	IUCN Category or Relevant Park Zone	Distance from Project Area (km)
Australian Marine Parks		
Apollo	Multiple Use Zone (IUCN Zone VI)	50
Victorian Protected Areas		
Twelve Apostles Marine National Park	IUCN Category II – National Park	5
The Arches Marine Sanctuary	IUCN Category III – Natural Monument or Feature	5
Port Campbell National Park	IUCN Category II – National Park	6
Bay of Islands Coastal Park	IUCN Category III – Natural Monument or Feature	13
Great Otway National Park	IUCN Category II – National Park	16
Marengo Reefs Marine Sanctuary	IUCN Category III – Natural Monument or Feature	61

## 3.4 SOCIO-ECONOMIC ENVIRONMENT

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

### 3.4.1 Cultural Features and Heritage Values

#### 3.4.1.1 Background

Woodside recognises the 'environment' for the purpose of the evaluation required under the Regulations includes:

- the heritage value of places; and
- the social, economic, and cultural features of the broader environment.

In this section, the heritage value of places within the project area and the cultural features of the project area are described.

In line with *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS 2013) (Burra Charter) and associated practice notes, Woodside understands heritage value to refer to the cultural significance of a place to an individual or group. A cultural feature, by contrast, is understood to be comparable to the Burra Charter term “fabric” and refer to a place’s elements, fixtures, contents, and objects which have cultural values. Although these features are necessarily physical, the place they inhabit or comprise may have tangible or intangible dimensions (Australia ICOMOS 2013)

Through consultation with relevant persons, Woodside recognises the deep spiritual and cultural connection to the environment that First Nations peoples hold.

#### 3.4.1.2 First Nations Peoples

As a starting point for understanding social and cultural features of the environment for Indigenous (First Nations) groups, Woodside uses the existing systems, such as native title, to identify Indigenous groups that may have functions, interests or activities that may be affected. To that end, Woodside identifies native title

representative bodies and nominated representative entities, as well as native title claimant applications (claims), native title determinations and Indigenous Land Use Agreements (ILUAs) which the project area overlaps. While acknowledging that cultural features and heritage values may exist outside of the native title framework, native title claims, native title determinations and ILUAs are defined under the *Native Title Act 1993* (Cth) (Native Title Act). Woodside considers this to be the broadest extent over which Indigenous groups have claimed native title rights and interests.

Native title claims are applications made to the Federal Court under the Native Title Act for a determination or decision about native title in a particular area. A claim is made by a native title claim group which asserts it holds native title rights and interests in an area of land and/or water, according to its traditional laws and customs. By making a claim, the native title claim group seeks a decision that native title exists so that its native title rights and interests are recognised by the common law of Australia. This is called a native title determination. A determination is a decision by a recognised body, such as the Federal Court or High Court of Australia, that native title either does or does not exist in relation to a particular area (National Native Title Tribunal).

A requirement to establishing a positive determination of native title in court is proving that there is an organised society that occupied the land and/or waters at the time of British annexation and that there is a continuous system of law and customs that gives right to the land and or waters, and that this has been handed down from generation to generation. The requirement of an 'organised society' is set out by Justice Toohey in the historic judgment of *Mabo v Queensland (No 2)* [1992] HCA 23; (1992) 175 CLR 1 ('Mabo'). Justice Toohey had the following to say (at 187):

'it is inconceivable that indigenous inhabitants in occupation of land did not have a system by which land was utilized in a way determined by that society. There must, of course, be a society sufficiently organized to create and sustain rights and duties...'

Therefore, Woodside understands that native title rights and interests are held communally by an organised society, that native title claims are understood to represent the area over which Indigenous groups are claiming these rights and interests, and that native title determinations provide clarity on where native title rights and interests are found to either exist or not exist. Where native title rights or interests are determined to exist, they will be held by a Registered Native Title Body Corporate (section 57 of the Native Title Act) in trust or as agent for native title holders. The National Native Title Register holds information about the determination of claimant applications.

ILUAs are voluntary agreements between native title parties and other people or bodies about the use and management of land and/or waters and are registered by the Native Title Registrar in the Register of ILUAs. An ILUA can be made over areas where:

- native title has been determined to exist in at least part of the area; or
- a native title claim has been made; or
- where no native title claim has been made.

While registered, ILUAs operate as a contract between the parties, including relevant native title holders (National Native Title Tribunal).

The Native Title Act provides for a Representative Aboriginal/Torres Strait Islander Body (Native Title Representative Body) to be recognised by the Commonwealth Minister for an area. Native Title Representative Bodies have specialist functions set out in the Native Title Act within the area for which they are the Native Title Representative Body. However, the functions of a Native Title Representative Body are such that they do not hold details on the cultural features or heritage values of an area and therefore do not inform Woodside's understanding of heritage values or cultural features.

To understand the existing marine environment for Indigenous groups, Woodside uses the native title claim area, Registered Aboriginal Party area, and/or ILUA as it considers this to be greatest extent of the area over which a Traditional Custodian has claimed rights and interests under Australian law. Woodside acknowledges that, extending responsibility for those claims, determinations or ILUAs to areas which Indigenous groups have elected to not include in their claims or ILUAs can have significant cultural consequences for Traditional Custodians as well as over time, building an expectation in the broader Indigenous community that a group is responsible for maintaining sea country over which they do not hold traditional knowledge. Woodside also acknowledges that an Indigenous group's relative proximity to any Operational Areas is not necessarily a meaningful indicator of the connection of Indigenous groups to the area and providing advice over such areas can be culturally dangerous. As a result, caution must be used

when conducting broader engagement. Woodside understands that Indigenous groups are keenly aware of the extent of their rights, interests and responsibilities for Country, and these are generally discrete, defined areas. The project area for the proposed action is defined in Section 1.

For the proposed action in this report, there is one coastal ILUA, one native title claims or determinations and one Registered Aboriginal Parties (RAPs) overlapping the project area

Table 3-3: Summary of Native Title Claims, Determinations, RAPs, and ILUAs which overlap the Operational Area

Claim / Determination / ILUA / RAP	Operational Area and Traditional Custodian Group Overlap
Claim / Determination	
Eastern Maar People	Yes - Eastern Maar Aboriginal Corporation RNTBC (EMAC)
RAP	
Eastern Maar Aboriginal Corporation RNTBC (EMAC)	Yes – EMAC
ILUA	
BHPP - Minerva	Yes – No Traditional Custodian Group listed

### 3.4.2 Marine Parks

Woodside acknowledges that Commonwealth and State Marine Park Management Plans have sought to recognise cultural values of Indigenous groups. Australian Marine Parks (AMP) describe this framework in the following way: ‘when making decisions about what can occur in marine parks and what action we will take to protect marine parks, we take values into account’. AMP summarises these values as natural values, cultural values, heritage values and socio-economic values. Woodside is triggered to undertake an assessment of cultural values within Marine Park Management Plans where the project area overlaps an AMP. Woodside considers the management plans of marine parks that overlap the project area to determine whether cultural features and heritage values have been identified and whether there are specified Traditional Custodians or representative bodies referenced to contact regarding potential cultural features and heritage values.

The project area does not overlap any AMPs or State Marine Parks.

The South-east Commonwealth Marine Reserves Network Management Plan 2013-2023 identifies that “Indigenous people from at least 17 distinct Aboriginal language groups have occupied, used and managed coastal land and sea environments in and adjacent to the South-east Marine Region for thousands of years. Their relationship with the Region began when sea levels were much lower, allowing Indigenous people to harvest species and use parts of the Region that are now covered by deeper offshore waters” (Director of National Parks, 2013). The assessment of First Nations’ people connection to the project area Section 3.4.2.1, including consideration of underwater cultural heritage.

Multiple Management Plans note the significance of the marine park areas to Aboriginal groups. For example, the Management Plan for the Twelve Apostles Marine National Park and The Arches Marine Sanctuary states “that Sea Country is central to the culture of Indigenous communities in south-western Victoria. The park and sanctuary are an integral part of this sea Country and present an opportunity to build community awareness of their cultural significance” (Parks Victoria, 2006). Sea country values and Indigenous archaeological heritage are addressed in Section 3.4.2.5.

#### 3.4.2.1 Sea Country Values

Woodside recognises the potential for marine ecosystems to include cultural features as well as environmental values. This is one aspect of the broader concept of “sea country”, which can be defined as the area of sea over which an Indigenous group has interests, cultural value, connection and use. ‘Country’ refers to more than just a geographical area: it is shorthand for all the values, places, resources, stories and cultural obligations associated with that geographical area (Smyth, 2007). An impact to marine ecosystems has the potential to impact cultural features where the impact is detectable within sea country—the seascape which Traditional Custodians view, interact with or hold knowledge of. The link between environmental protection and cultural heritage protection is illustrated in the Australian Government’s Indigenous Protected Areas Program. The Indigenous Protected Areas program provides for “areas of land and sea managed by

Indigenous groups as protected areas for biodiversity conservation...IPAs deliver environmental benefits...Managing IPAs also helps Indigenous communities protect the cultural values of their country for future generations..." (DCCEEW, 2023).

McNiven (2004) suggests that "For those mainland groups whose exploitation of the sea was limited to littoral resources, it is likely that seascapes extended no more than c. 20–30 km out to sea, out to the horizon and the limit of human visibility. ... However, in some coastal places, clouds that can be seen well over 100 km out to sea are imbued with spiritual significance. For those groups with elaborate canoe technology, seascapes extend well over the horizon." There is evidence of watercraft being used for short ocean voyages to visit some islands offshore Victoria, however they tended to be more frequently used on inland lakes and rivers (Gaughwin and Fullagar, 1995).

Cultural features of coastal areas may include marine species (e.g., whales) that may travel many thousands of kilometres through areas with similar cultural values to multiple Indigenous language groups. As noted in Section 3.2.2, Southern Right Whales are a highly mobile migratory species that can travel thousands of kms between habitats used for these essential life functions (Kenney, 2018) passing Indigenous language groups along the southern and eastern coasts of Australia. For a further description of whales, whale distribution and whale migration patterns, see Section 3.2.2.

As set out above, an impact to marine ecosystems has the potential to impact cultural values where the impact is detectable within Sea Country. Woodside considers that impact to cultural values of marine species will be adequately managed in areas of traditional Sea Country, and therefore management of the environmental values will preserve the cultural values of environmental receptors, as assessed in Section 4.2.

Woodside consults on cultural values of Sea Country where Traditional Custodians or representative institutions are identified, or self-identify, as relevant persons.

### 3.4.2.2 Indigenous Archaeological Heritage Assessment

Woodside understands that communal cultural connection may exist between Traditional Custodians and land and waters. It is understood from the onshore archaeological record that Aboriginal people have occupied the Australian continent for at least 65,000 years (Clarkson et al., 2017) and in many places maintain a strong continuing connection that is said to extend back in Indigenous cosmology to the beginning of time.

It is understood that the sea level has risen significantly during the 65,000 years of Indigenous occupation of Australia, and areas that were once inhabited are now submerged on the continental shelf (Veth et al., 2019). Sea levels reached a minimum of -130 m at the Last Glacial Maximum ~20,000 years ago (Benjamin et al., 2020). Material preserved on the ancient landscape to -130 m has the potential to provide further information about the earliest periods of human occupation (Veth et al., 2019; UWA, 2021).

Recent archaeological discoveries demonstrate that the now submerged landscape was occupied and inhabited and can retain archaeological material from this time (Benjamin et al., 2020; Benjamin et al., 2023 see Ward et al, 2021 for an opposing view (noting Ward et al., 2022, has been retracted)).

In recognition of this, Woodside considers the ancient landscape between the mainland and -130 m water depth as an area where potential Indigenous archaeological material may exist on the seabed, as this covers the full extent of this possible Indigenous occupation. Known Indigenous heritage places including archaeological sites within Commonwealth waters may be protected subject to declarations under the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*, *Underwater Cultural Heritage Act 2018* or EPBC Act 1999. However, these Acts only extend protection to heritage places specified by declaration or otherwise included on a statutory list. Archaeological material on the ancient landscape is a relevant matter for the proposed activity as there is overlap between the project area and the ancient landscape, and potential for seabed disturbance from planned activities and therefore potential for impacts to archaeological material.

Aboriginal cultural heritage within Victorian State waters is protected under the *Aboriginal Heritage Act 2006*. The waters within the project area, and waters are identified as "areas of cultural heritage sensitivity" within the Aboriginal Cultural Heritage Information System (ACHRIS) online mapping tool. For the Minerva Decommissioning EP, an Application for Advice for the Victorian Aboriginal Heritage Register was submitted. 3 Aboriginal Places were identified adjacent to the project area; however First Peoples State Relations confirmed these Places are not located near the project area.

No archaeological sites within the project area were identified by Traditional Custodians.

### 3.4.2.2.1 Cultural Features and Heritage Values identified in Publicly Available Literature

Publicly available sources were assessed for any records of previously identified Sea Country values or cultural features that may overlap with the project area. Where cultural features or Sea Country values were identified these are summarised in Table 3-4 according to the First Nations groups (where identified or inferable) who hold these values.

Table 3-4: First Nations groups with cultural features and values within the project area

First Nations Group	Features and Values	Source	Potential for overlap
			Project Area
Eastern Maar (Maar, Eastern Gunditjmara, Tjap Wurrung, Peek Whurrong, Kirrae Whurrung, Kurn Kopan Noot and/or Yarro waetch (Tooram Tribe))	Value: "Deen Maar Island [Lady Julia Percy Island] is a culturally significant site and special place to Eastern Maar and Gunditjmara peoples."	Victoria State Government, 2023	No
	Feature: Eels, perch, blackfish, yabbies, abalone, cockles, crayfish	Eastern Maar Aboriginal Corporation, 2015	Yes
	Feature: Ancient middens		No
	Value: "Spirits of our dead reside in our waterways and water bodies"		Possible
	Value: "A story associated with Deen Maar Island is that the spirits go first to Deen Maar and then up to the stars, as Bunjil had done"		Possible
	Value: Responsibility to protect cultural heritage		Yes
	Value: Connections with the sea and its resources		Yes
	Value: "The coastline is home to sites that are important for our Dreaming - Three Sisters Rocks and Deen Maar (Lady Julia Percy Island) where our Ancestors leave the earth."		Possible
	Value: "The connection with our Sea Country extends well beyond the current shoreline to the edge of the continental shelf."		Yes
	Value: Dreaming and creation stories		Possible
	Value: Songlines across the land and out to sea		Possible
	Feature: middens and burial sites along the coastline		Possible
	Value: "Koontapool Woorrkngan Yakeen (Whale Birthing Dreaming Sites), are in coastal bay areas from Port Campbell to Portland, including Warrnambool. These places on		DCCEEW, 2022

First Nations Group	Features and Values	Source	Potential for overlap
			Project Area
	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.”		
	Value: Yambuk and Deen Maar are spiritually significant places	Lovett on behalf of the Gunditjmara People v State of Victoria (No 5) [2011] FCA 932	No
	Value: Fishing at Port Fairy		No

### 3.4.2.2 Feedback Received via Consultation to Inform Existing Environment Description

Consultation was conducted in preparation for the submission of the Minerva Decommissioning and Field Management (State) EP. Indigenous cultural values are communally held. This is reflected in Vision 3 of Dhawura Ngilan that “Aboriginal and Torres Strait Islander heritage is managed... according to community ownership” (Heritage Chairs of Australia and New Zealand, 2021). Dhawura Ngilan also specifically notes that “Aboriginal and Torres Strait Islander... intangible knowledge systems, which are held in songlines and language, are endangered. This knowledge is held by Elders and the community...”. Through consultation with relevant persons, Registered Native Title Bodies Corporate have identified or raised topics relating to environmental values of cultural interest.

Table 3-5 - Feedback received via consultation with First Nations groups

Relevant First Nations Group / Individuals	Consultation Context	Description of Value / Feature / Interest	Potential for overlap with Project Area
Eastern Maar Aboriginal Corporation	Consultation in the course of preparing this EP	Interest: Being notified in the event of leaks from wells	Yes
		Feature: Risks to whales from the activities described in this EP	Yes
		Feature: Noise impacts to eels	Yes
		Value: Eels - “We are the eel people”	Yes
		Value: Intangible heritage	Yes

### 3.4.2.3 Intangible Cultural Heritage

Cultural knowledge, as expressed through songlines, dreaming, dance and other cultural practices, can be associated with tangible objects and physical sites that are culturally important to First Nations people

(Ardler, 2021; Bursill et al., 2007). Intangible cultural heritage can also be embodied in the practices, representations, expressions, knowledge, uses and skills associated with physical sites (UNESCO, 2019). As a result, physical features may have intangible dimensions (ICOMOS, 2013). In terms of identified cultural features and heritage values related to intangible values, see below some additional context:

- **Songlines:** Oral Songlines are often described by First Nations people as the law of the land and make up part of the Dreaming (Neale and Kelly, 2020). Songlines are viewed in Western academia as a framework for relating people to land and consist of a series of invisible, interconnected routes along the landscape that mark significant sites for First Nations people (Higgins, 2021). Songlines demonstrate First Nations peoples' strong connections to land by revealing shared knowledge that is place-specific (Roberts, 2023). The land's physical features are instrumental in maintaining songlines because this is how ancestral spirits journeyed through, and interacted with, the physical landscape leaving shared knowledge behind. The interconnection between the physical and spiritual is where songlines become intrinsically tied to significant places across Country. As a result, geographical landforms are recorded within songlines and become sacred places. Such landforms can include inter alia: rocks, mountains, rivers, caves, and hills (Higgins, 2021). Songlines can become lost, fragmented, or broken when there is a loss of Country or forced removal from Country (Neale and Kelly, 2020). Physical sites that have been identified as comprising a component of a songline are important to protect in order to prevent the fragmenting or breaking apart of songlines and loss of sacred cultural knowledge. No specific details of songlines have been provided by relevant persons during consultation for this Activity. The Activity is located within the ancient landscape where prominent landscape features (e.g., rocks, mountains, rivers, caves and hills) would have been visible or used by Traditional Custodians and therefore likely to be incorporated in songlines. In Australia, songlines can stretch thousands of kilometres, making up a complex and organic network of stories containing cultural knowledge of First Nations communities across the land (Neale and Kelly, 2020). Songlines can also extend out to Sea Country and contain cultural knowledge that is tied to geographic features, atmospheric phenomena and marine plants and animals. Often songlines containing references to a seascape or Sea Country make mention of mythical events occurring around marine life, fishing areas, submerged rocks or coral. Songlines that embody seascapes can reflect how a group may relate to, or value, Sea Country—for example connections to nearby islands that they once inhabited in their songlines (Smyth and Isherwood, 2016). Songlines can also be used as proof of long-standing connection to land and support a legal entitlement to land rights (Higgins, 2021). Examples where songlines contain strong references to Sea Country are more common in Pacific Islander and Torres Strait Islander communities, who often refer to seascapes and skylines in their songlines in order to communicate sacred knowledge that assists in safe navigation of the ocean (Neale and Kelly, 2020). Whilst no specific details of songlines have been provided by relevant persons during consultation for this Activity, it can be confirmed that no landforms typical of songlines have been identified or are anticipated to be impacted by the Activity.
- **Creation/dreaming sites, sacred sites and ancestral beings:** Sources identified by Woodside contained descriptions of the location of ancestral beings or creation/dreaming/ sacred sites and placed these locations on land, islands, within inland water sources such as rivers and in the sea (e.g., Portland Bay). It is acknowledged that some ancestral beings are noted to live within or originate from the sea generally, and some creation stories talk to the creation of features from or in the sea. Additionally, places on shore or at sea are (without further information or specificity) assumed to have been created on some level in First Nations cosmology.
- **Cultural obligations to care for Country:** Caring for Country collectively refers to the cultural obligations of individuals and groups, as well as rituals and ceremonies required for the physical and spiritual health of the environment. In the literature reviewed by Woodside, caring for Country was noted to include, but is not limited to, maintenance of the physical environment and ecosystem. It may also have cultural, spiritual, and ritual dimensions such as caring for ancestral beings or ensuring cultural safety.

- **Knowledge of Country/customary law and transfer of knowledge:** Knowledge of and familiarity with the features of Sea Country is itself a “value”. The inherent potential for restricted or secret knowledge (or information that is not wished to be shared) makes this difficult to assess even through consultation with Traditional Custodians. However, aspects such as limitations on access to sites or disruption/relocation of First Nations communities may have implications for the preservation of First Nations knowledge. Further, connection to Country may be damaged where people are displaced or disrupted (e.g., during colonisation) or where there is a loss of technical skills or environmental knowledge (McDonald and Phillips, 2021). Transfer of knowledge includes continuing traditional practices to pass on practical skills. This transfer of knowledge may be integral to managing a group’s intangible cultural heritage (UNESCO, 2003).
- **Connection to Country:** Describes the multi-faceted relationship between First Nations people and the landscape, which is envisioned as having personhood and spirit. It is also an aspect of personal identity for many First Nations people. In the case of Sea Country this can mean identifying as a Saltwater person, where “essence of being a 'Saltwater' person is ontological... it is about how people relate spiritually to the sea and engage with spiritual forces that created it, the marine flora and fauna and people” (McDonald and Phillips, 2021).
- **Access to Country, including Sea Country:** Is necessary for the continuation of other values including caring for Country and the transfer of traditional knowledge. Being on Country can be an important way of expressing or maintaining connection to Country (Australian Indigenous HealthInfoNet. n.d.). Access is also a value in its own right as a continuation of traditional Sea Country access and use.
- **Cultural Safety:** refers to respecting local Lore and culturally significant areas to protect individuals from cultural harm. There are many cultural implications for those (Aboriginal and non-Aboriginal) who do not follow cultural advice or access Country in culturally inappropriate ways. Cultural safety may include observing gender restricted areas, respecting significant places and restricted areas as well as following the advice from those with cultural authority.
- **Kinship systems and totemic species:** Individuals may have kinship to specific species (Smyth, 2008; Juluwarlu, 2004) and/or a responsibility to care for species (Muller, 2008). Kinship arises from totemic associations within First Nations “skin group” systems. It is forbidden for an individual to kill or eat a species who is from the same “skin group” (Juluwarlu, 2004). They may also have certain obligations linked to caring for Country. It is assumed that marine species may have kinship/totemic relationships to Traditional Custodians, but it is understood that these relationships do not prohibit people outside of that “skin group” from hunting or eating that same species (Juluwarlu, 2004).
- **The DCCEEW Draft National Recovery Plan for the southern right whale (*Eubalena Australis*)** notes that “In Victoria, Koontapool (Southern Right Whales) occur along the coastlines of south-west Victoria in Gunditjmarra Sea Country to feed and birth. These Koontapool Woorkngan Yakeen (Whale Birthing Dreaming Sites), are in coastal bay areas from Port Campbell to Portland, including Warrnambool. These places on Gunditjmarra Country are known resting and feeding sites for mothers and calves and are directly related to Gunditjmarra Neeyn (midwives), explaining why Gunditjmarra is a Matrilineal Nation” (DCCEEW, 2022). The southern right whale is addressed in Sections 3.2.2, 4 and 5.1.1.2
- **Resource collection:** A number of marine species are identified in literature and consultation as important resources, particularly as food sources. In addition to their immediate value as sustenance, the gathering and preparation of these resources is informed by cultural knowledge, and an inability to use these resources may result in a loss of ability to transfer that knowledge to future generations.

#### 3.4.2.4 Historic Sites of Significance

There are no known sites of historic heritage of significance within the project area.

### **3.4.2.5 Underwater Cultural Heritage**

A search of the Australasian Underwater Cultural Heritage Database, which records known Maritime Cultural Heritage (shipwrecks, aircraft, relics, and other underwater cultural heritage) in Australian waters does not contain records of sites within the project area.

### **3.4.2.6 World, National and Commonwealth Heritage Listed Places**

No listed World or National heritage places overlap project area. One National Heritage Place identified in the PMST report overlaps the project area, however, it is a terrestrial feature and therefore excluded from this report (refer to Section 3.3.3).

### **3.4.3 Commercial Fisheries**

The project area overlaps 1 commercial fishery and 3 State-managed fisheries.

Vessels in the Shark Gillnet and Hook sector of the Southern and Eastern Scalefish and Shark Fishery (SESSF), the Victorian Rock Lobster Fishery, Wrasse Fishery and Multi-species Ocean Fishery are known to operate within the project area.

### **3.4.4 Tourism and Recreation**

Recreational and tourism activities are valuable foundations for the local and regional economy. Key activities include sight-seeing, surfing, and fishing. However, these are generally land-based or near-shore activities and given the operational area is located approximately 5.5 km from Port Campbell, Victoria, in approximate water depths of 55-60 m, these activities are not expected to overlap the operational area.

### **3.4.5 Oil and Gas Activities**

Nearby oil and gas production fields include the Otway Gas Field Development, operated by Beach Energy and the Casino, Henry, Netherby (CHN) gas field operated by Cooper Energy. Both operations do not overlap the project area.

### **3.4.6 Defence Activities**

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

The closest training and practice areas to the project area are located to the east in and around Port Phillip Bay and Western Port Bay areas.

Mine fields were laid in Australian waters during World War II. Post-war minefields were swept to remove mines and to make marine waters safe for maritime activities however areas of unexploded ordnance (UXO) still exist. The closest areas to the project area that have been identified as dangerous due to UXO, are located south and east of Wilson's Promontory (approximately 300 km east of the project area).

## **4. POTENTIAL IMPACT AND MITIGATION**

A formal impact and risk assessment was completed for each environmental aspect and source of hazard for the activities described in Section 2 using the Environmental Hazard Identification (ENVID) workshop process. The objective of the impact and risk assessment is to demonstrate that the identified impacts and risks associated with the petroleum activity are reduced to as low as reasonable practicable (ALARP) and are of an acceptable level. Impacts, risks and potential consequences were identified based on planned and potential interaction with the activity (based on the description in Section 2), the existing environment (Section 3) and the outcomes of Woodside's consultation process (discussed within the EPBC Act referral submission).

A general description of potential impacts, risks and mitigation measures is provided. Risk described in this section represents the residual risk once the controls identified in relevant subsections have been implemented. Section 5 provides a more detailed assessment against Matters of National Environmental Significance Significant Impact Guidelines 1.1 (CoA, 2013).

The impact and risk assessment process is illustrated in Figure 4-1 and considers planned (routine and non-routine) activities, unplanned (accidents/incidents) events and emergency conditions. The process considered previous risk assessments for similar activities, reviews of relevant studies, reviews of past performance, external stakeholder consultation feedback and a review of the existing environment. The process includes:

- confirming the sources of hazards for the planned activities and unplanned events
- identifying environmental impact and risk receptors
- analysing environmental impact and risk receptors
- identifying potential controls to reduce the impacts and risks
- allocating a likelihood rating for unplanned events
- allocating a severity rating for planned activities and unplanned events
- accepting controls through an ALARP process
- assessing final acceptability of the risks and impacts using the Woodside acceptability criteria.

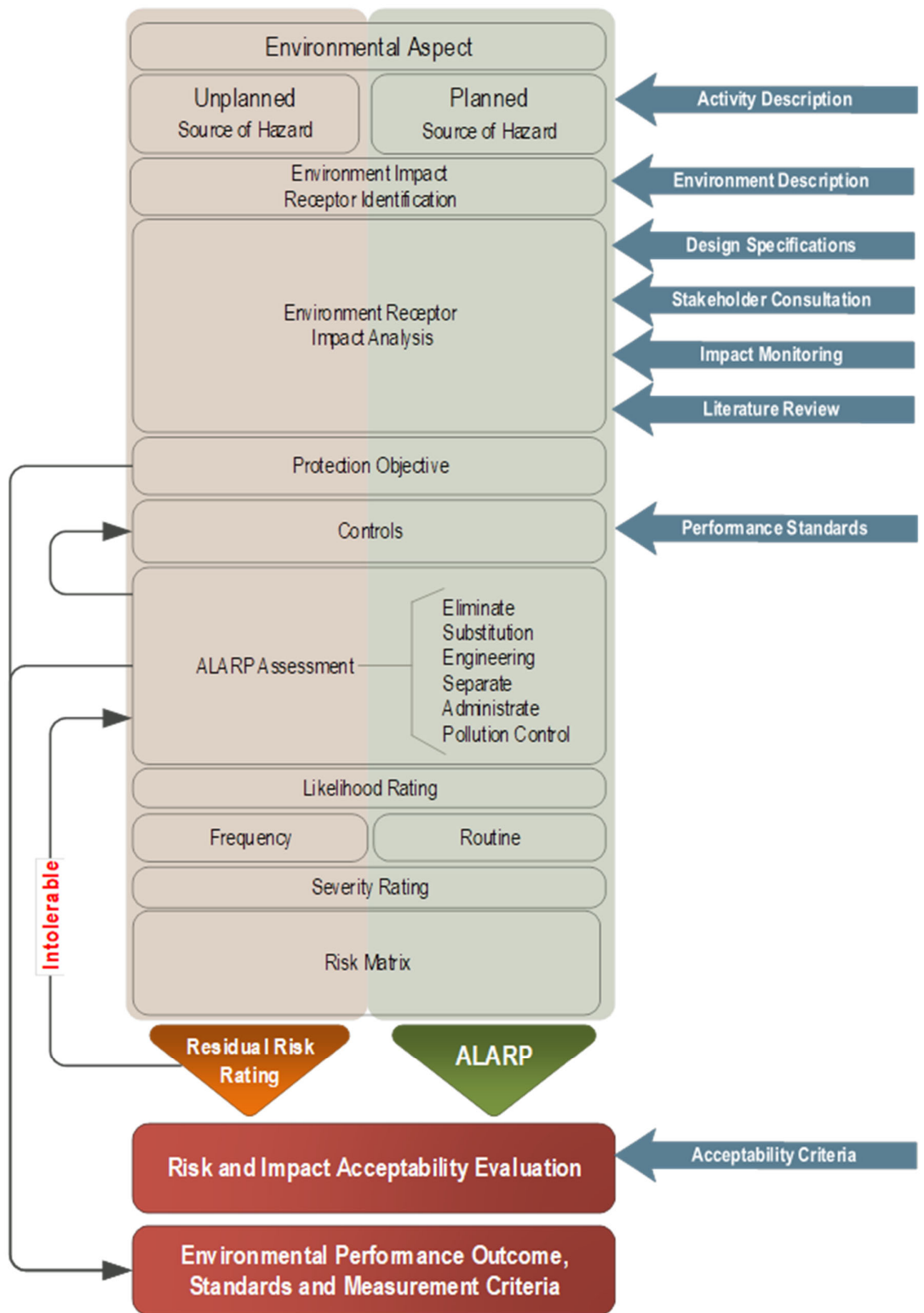


Figure 4-1 Integrated impact and risk assessment

#### 4.1 ENVIRONMENTAL IMPACT AND RISK ASSESSMENT

The environmental impacts were based on the environmental receptors identified in Section 3 with the impact descriptions developed in an initial screening process that identified the specific receptor that may be impacted. Further quantitative or qualitative definition of the impact was then completed to understand the impact (planned or unplanned) and to confirm that the severity of the risk and impact was correctly assigned during the evaluation process.

### 4.1.1 Planned Activity Impact Assessment

All planned activities were assessed as being a routine impact and defined as such in the ENVID. The description and degree of impact formed the basis for the severity rating applied with a quantitative assessment of impact conducted where possible to allow the impact to be well understood and clearly categorised on the severity table. Where this was not possible, a robust qualitative assessment was completed and the severity rating assigned during the ENVID process in accordance with the HSE Risk Matrix, which is consistent with the Risk Management Severity Table (Table 4-2) taking into account any of the mitigative controls assigned. Where relevant, the potential for cumulative impacts or potential impacts to the values of World Heritage Properties from planned activities has also been evaluated. Given routine operations are planned, and impacts are mitigated via the application of control measures, likelihood or residual risk ratings were not applied.

### 4.1.2 Unplanned Event Risk Assessment

Risk ranking of unplanned events is the product of the consequence of an event (severity) and the likelihood of that event occurring.

Likelihood and potential severity ratings were assigned in accordance with the Woodside (PetDW) HSE Risk Matrix (Table 4-1 Table 4-1 Woodside risk matrix used for rating planned activities and unplanned events), which allowed the risk of individual events to be categorised in a methodical and structured process. This was completed based upon judgement by the ENVID assessment team with detailed potential impact descriptions used to support a robust and comprehensive decision.

The potential severity rating was determined based on the potential impact that may occur once the source of hazard had occurred considering the application of mitigative controls in place to reduce the impact (Table 4-2).

The likelihood rating is based on the frequency of the source of hazard actually occurring with preventative controls taken into consideration (Table 4-3).

Table 4-1 Woodside risk matrix used for rating planned activities and unplanned events

Likelihood	Severity Level				
	1	2	3	4	5
Highly Likely	30	90	300	900	3000
Likely	10	30	100	300	1000
Probable	3	9	30	90	300
Unlikely	1	3	10	30	100
Highly Unlikely	0.3	0.9	3	9	30

Table 4-2 Woodside severity level definitions for environmental and community

Severity Level	Descriptor	Severity Factor
5	Severe impact to the environment and where recovery of ecosystem function takes 10 years or more; or Severe impact on community lasting more than 12 months or a substantiated human rights violation impacting 6 or more people	1000
4	Serious impact to the environment, where recovery of ecosystem function takes between 3 and up to 10 years; or Serious impact on community lasting 6-12 months or a substantiated human rights violation impacting 1-5 persons	300
3	Substantial impact to the environment, where recovery of ecosystem function takes between 1 and up to 3 years; or Substantial impact on community lasting 2-6 months	100
2	Measurable but limited impact to the environment, where recovery of ecosystem function takes less than 1 year; or Measurable but limited community impact lasting less than one month	30
1	Minor, temporary impact to the environment, where the ecosystem recovers with little intervention; or Minor, temporary community impact that recovers with little intervention	10

Table 4-3 Woodside likelihood definitions

Uncertainty	Frequency	Likelihood Factor
Highly Likely	Likely to occur within a 1-year period	3
Likely	Likely to occur within a 1–5-year period	1
Probable	Likely to occur within a 5-20 year period	0.3
Unlikely	Likely to occur within a 20-50 year period	0.1
Highly Unlikely	Not likely to occur within a 50 year period	0.03

## 4.2 ENVIRONMENTAL IMPACT ASSESSMENT: PLANNED AND UNPLANNED ACTIVITIES

Table 4-4 summarises the impacts, control measures and risks associated with the activities of the proposed action.

Table 4-4 Impacts, control measures and risks associated with the proposed action

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
<b>Planned Events</b>							
Physical Presence	<p>Presence of project vessels during the petroleum activity.</p> <p>The subsea infrastructure removal activities require the MCV to be in the project area for 45-60 days, contingent on weather conditions. The MCV will be continually operating 24-hours a day, seven days a week during the proposed action. The MCV will leave the project area as required to return to port to offload recovered subsea infrastructure, receive provisions and change out crew. Field management activities (not expected to occur, only if required) would typically occur over a short duration (&lt; 7 days in the project area). The project area consists of a 1 km wide corridor extending around the pipeline. A 500 m cautionary zone will also exist around the MCV for the duration of the proposed action. This may cause interference or displacement of other marine users such as commercial shipping and fishing.</p>	<p>Interference with or displacement of other marine users (e.g., commercial shipping, commercial fishing and/ or other third-party vessels).</p> <p><b>Commercial Shipping</b> The main shipping channel for vessels (e.g., cargo tankers) travelling between major Australian and foreign ports is located south of the project area, about 75 km south of Warrnambool. This shipping channel is used by over 1,000 vessels per year, or about 3-4 vessels per day. The physical presence of the subsea infrastructure on the seabed will not impact upon commercial shipping.</p> <p>The subsea infrastructure removal activities and field management activities (if required) are short in duration and the potential for disruption to commercial shipping is negligible given most commercial vessel traffic is beyond the project area. If a commercial vessel did travel through the operational area, impacts to the vessel would be limited to a short-term displacement (i.e., deviating around the MCV) when subsea infrastructure removal activities or field management activities are being undertaken.</p> <p><b>Commercial fishing</b> Several Commonwealth and Victorian- managed fisheries overlap the project area (Section 3.4.3). Analysis of the current fishery spatial and temporals, depth range of activity, historical fishing effort data, fishing methods and consultation feedback indicate that there is a low potential for active commercial fisheries in waters where the project area is located. The physical presence of vessels undertaking subsea infrastructure removal or field management activities is relatively short duration. Commercial fishing vessels may be displaced from part the project area when vessels undertaking the proposed action are present, however this would credibly affect a very small number of commercial fishers (if any). Such a displacement is not expected to cause any impacts to commercial fishers.</p> <p>The presence of the Minerva subsea infrastructure on the seabed is not expected to impact commercial fishers. Trawl fishing may avoid the subsea infrastructure to avoid gear becoming snagged on the infrastructure, however there are no active demersal trawl fisheries within the project area. Scallop dredges may interact with the Minerva subsea infrastructure; however, no scallop fishing has occurred in recent years in the vicinity of the project area, with effort occurring east of the project area.</p>	30	N/A	-	Establishment of a safety exclusion zone around MCV vessel and communicated to marine users.	<p>Establishment of a 500 m cautionary zone around MCV reduces the likelihood of interaction with other marine users.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p>
	<p>Presence of subsea infrastructure.</p> <p>May interfere with, or displace the activities of trawl fishers. The Minerva subsea infrastructure has been in place for over 20 years and is shown on current nautical charts issued by the Australian Hydrographic Office (AHO).</p>		10	N/A	-	<p>Project vessel compliant with relevant navigation safety requirements under the <i>Navigation Act 2012</i> and subsidiary Marine Orders.</p> <p>Notify AHO prior to commencing equipment removal or field management activities.</p> <p>Notify AMSA JRCC prior to commencing equipment removal or field management activities.</p> <p>Notify relevant fishing industry government departments, representative bodies, and licence holders, of activities prior to commencement and upon completion of equipment removal or field management activities.</p>	<p>Legislative requirements to be followed which reduces the risk of third-party vessel interactions due to ensuring safety requirements are fulfilled and other marine users are aware of the presence of the project vessels.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p> <p>Notification to the AHO will enable them to issue a notice to mariners (if required), thereby reducing the likelihood of interaction with other marine users.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p> <p>AMSA JRCC requested that Woodside notify them of vessels commencing petroleum activities prior to commencement.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p> <p>Communicating the petroleum activities to relevant persons makes them informed and aware, thereby reducing the likelihood of their functions, interests, and activities being impacted by the petroleum activity.</p> <p>Benefits outweigh cost/sacrifice. Control is also Standard Practice.</p>

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
						<p>Notify DoD prior to commencing equipment removal or field management activities.</p> <p>Establish and maintain a publicly available interactive map which provides relevant persons with updated information on activities being conducted as part of the petroleum activity.</p>	<p>Notification was requested by DoD during consultation. Communicating the activities to other marine users makes them informed and aware, thereby reducing the likelihood of interfering with other marine users.</p> <p>Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p> <p>Interactive map provides additional alternative method for marine users to obtain information on the timing of activities, thereby reducing the likelihood.</p> <p>Control is feasible, standard practice with minimal cost.</p>
Seabed disturbance	<p>Subsea infrastructure removal and field management activities.</p> <p>Minerva subsea infrastructure removal and field management activities may disturb the seabed. Activities that may result in seabed disturbance include:</p> <ul style="list-style-type: none"> <li>deburial of the pipeline bundle</li> <li>removal of the Minerva subsea infrastructure from the seabed</li> <li>placing temporary equipment on the seabed during infrastructure removal and field management activities, such as recovery baskets and clump weights (all of which will be recovered)</li> <li>marine growth removal from the Minerva subsea infrastructure.</li> </ul> <p>The estimated seabed disturbance footprint from subsea infrastructure removal is approximately 9 800 m<sup>2</sup></p>	<p>Disturbance of benthic habitats.</p> <p>Reduction in water quality from sediment resuspension.</p> <p><b>Benthic habitat</b></p> <p>Benthic habitat throughout the operational area is largely unconsolidated sandy sediment with sparse epibenthic biota and infauna. The water depth in the project area is between approximately 20 and 60 m. There is no evidence of benthic primary producer habitat, such as seagrass, macroalgae, or zooxanthellate corals, in the operational area. Benthic habitats along the pipeline bundle route are characterised by unconsolidated sandy sediments, which are mobile (e.g., burial of the pipeline bundle over time, changes in the burial state of the pipeline bundle between surveys etc.). Such habitat is widely represented in the region and is not particularly unique or sensitive to disturbance.</p> <p>Recovery of disturbed unconsolidated sandy sediment habitat within the disturbance footprint will occur naturally over time. There is evidence of natural bedload sediment transport (e.g., burial of the pipeline bundle following installation and very low portion of fine sediments), which will infill any depressions in the seabed over time. Recovery of ecological communities in sandy benthic habitats is expected to occur within one year (e.g., Demie et al., 2003a, 2003b).</p>	10	N/A	-	<p>No planned anchoring.</p> <p>Wet parked items will be tracked and removed from the seabed</p> <p>As-left survey to confirm no subsea infrastructure has been left in situ.</p>	<p>Anchoring the MCV in water depths of the operational area would require substantial anchor chain to be deployed, resulting in disturbance to benthic habitats. While anchoring would reduce combustion emissions associated with use of the DP system, the additional time required to deploy and recover anchors would substantially extend the duration of the activity. Reliable vessel station-keeping provided by DP is critical for the safety of subsea infrastructure removal and field management activities.</p> <p>The control delivers an environmental benefit.</p> <p>Enables inventory of equipment to be maintained and no wet parked items are unintentionally left in situ</p> <p>An as-left survey following removal of the Minerva subsea infrastructure will confirm that the Minerva subsea infrastructure has been removed.</p>
	<p>ROV operations</p> <p>A work class ROV will be used during subsea infrastructure removal activities and may be required for field management activities (e.g., general visual inspection (GVI)). ROV operations may result in seabed disturbance due to sediment resuspension from thruster use and temporary contact between the ROV and the seabed. ROV operations will primarily occur within the disturbance footprint of subsea infrastructure removal, hence there is not expected</p>	<p><b>Water Quality</b></p> <p>Seabed disturbance may result in the resuspension of sediments, resulting in an increase in turbidity. Sediments in the Minerva field consist almost entirely of sand-sized or larger particles, which have relatively high settling velocities compared to silt- and clay-sized particles. Most resuspended sediments will settle within seconds to minutes of being resuspended and within 10's of metres of the resuspension location.</p> <p>Benthic communities associated with the unconsolidated sandy habitat in the Minerva field are characterised by filter- and deposit-feeding epifauna and infauna assemblages. Increased turbidity may impact upon these communities by reducing feeding efficiency. The widespread nature of similar habitat in</p>	10	N/A	-	<p>Review of existing survey data by a suitably qualified marine archaeologist to inform areas for laydown of supporting equipment to avoid or where not possible, minimise physical impacts to cultural features and prospective areas.</p> <p>Reporting of any new suspected underwater cultural heritage sites identified through the archaeological review to the Australasian Underwater Cultural Heritage Database (AUCHD) within 21 days of the discovery.</p>	<p>Review of data by suitably qualified marine archaeologist will inform potential exclusion or avoidance areas for seabed disturbance.</p> <p>Implementing this process will protect and minimise any physical impacts to underwater cultural heritage. Additionally, this process is not inconsistent with the draft guidelines for working in the near and offshore environment to protect Underwater Cultural Heritage (DCCEE, 2023)</p> <p>Meets legislative requirements and community expectations.</p>

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
	to be any net increase in disturbance footprint from ROV operations.	the region means such communities are likely to be well-represented. Hence, the impacts to water quality from seabed disturbance will be temporary and localised.				Unexpected finds of potential Underwater Cultural Heritage <sup>1</sup> sites/ features, including First Nations UCH, are managed in accordance with the Unexpected Finds Procedure	Allows management of new finds in accordance with legislative requirements, expert advice, and community expectations.
	Decommissioning environmental surveys  An as-left survey will be undertaken as part of decommissioning activities. The survey is intended to confirm that the infrastructure has been removed, identify any debris / dropped objects for retrieval, and assess seabed condition. The proposed as-left survey will include a GVI and sediment sampling. The total area of seabed disturbance for this activity is expected to be less than 10 m <sup>2</sup> .	<b>Marine Fauna</b>  Highly mobile demersal fauna, such as fishes, can move away from areas of disturbance and may be attracted to deburial and marine growth removal activities as prey (e.g., infauna) may be more readily available. Fauna that are not readily mobile, such as sessile benthic epifauna and infauna, will be lost within the disturbance footprint. Most of the disturbance footprint is associated with the pipeline bundle.  Marine fauna assemblages associated with disturbed habitat are expected to recover through natural processes over time. Based on the changes in benthic habitat and burial status of the pipeline bundle between inspections in 2014 and 2021, the timeframe for recovery of fauna from benthic habitat disturbance is expected to be less than seven years.	10	N/A	-	Environmental monitoring program to confirm no unacceptable contamination or damage to the seabed or subsoil caused by titleholder activities, exists within the title.	Survey results will be used to confirm the condition of the environment following equipment removal.
Light emissions	Artificial light from project vessels and ROV.  Artificial lighting on the vessels could be required on a 24-hour basis over the duration of the activity for safety and navigational purposes. This safety and navigational lighting will generate light glow and direct illumination of surrounding surface waters. Most external lighting aboard the vessels is directed towards working areas such as the main decks, although spot lighting into the marine environment may also be used on an as-needed basis. The ROV will also have lights, however light emissions around the ROV are localised due to absorption in the water column.	Light emissions (light spill and glow) from external lighting on the project vessels causing alterations to normal marine fauna behaviour.  <b>Cetaceans</b> Southern right whales and pygmy blue whales may occur in proximity to the project area. Both are seasonally present and may undertake biologically important behaviours (Section 3.2). Cetaceans in general are not recognised as being impacted by artificial light emissions, and artificial light emissions are not recognised as a threat for either pygmy blue whales or southern right whales. As such, impacts from artificial light emissions from the petroleum activity are not expected to result in impacts to these species. <b>Fish and Zooplankton</b> Fish and zooplankton may be directly or indirectly attracted to light. Light spill from the project vessels onto the surrounding surface waters, particularly during night-time activities, is likely to result in aggregations of fish around the project vessels as they are attracted to the light and increased food availability. However, the operational area does not contain any significant feeding, breeding, or aggregation areas for important fish species and the light emissions will only occur while vessels are undertaking the petroleum activity. No impacts to white sharks are expected to occur from light emissions. The potential for increased predation activity and impact to fish and zooplankton is anticipated to be temporary and minor.  Short-finned eels are an important cultural value of Traditional Owners, with EMAC describing their importance during consultation. Short-finned eels may migrate through the project area when moving between freshwater environments where they feed and mature and oceanic environments. Short-finned eels undertake diel migrations in the water column, spending daylight hours in deep water, and night hours near the sea surface.	10	N/A	-	Limit external lighting to that required for navigational and safety requirements, except for emergencies.  Implementation of the Frontline Offshore Seabird Management Plan to minimise potential for light attraction.	Limiting artificial lighting during the petroleum activity reduces the potential for impacts to marine fauna. Minimum lighting requirements for safe navigation and operations will be maintained.  Adaptive management framework outlined in the Offshore Seabird Management Plan will prevent population level impacts from occurring, and the care and release protocol will reduce impacts at the individual level.  Control is feasible but a minimum level of lighting is required on project vessels for safety.  Benefit outweighs cost, given the low costs in implementation and potential benefits in providing certainty that population level impacts to nocturnal seabirds will not occur.

<sup>1</sup> Underwater Cultural Heritage is defined as any trace of human existence that has a cultural, historical, or archaeological character and is located under water, in accordance with the UCH Act.

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
		<p>Short-finned eels do not feed during migration, so the diel migration is not in response to movements of prey.</p> <p><b>Seabirds and Migratory Shorebirds</b></p> <p>Negative potential impacts to seabirds and migratory shorebirds attracted by artificial lighting can include disorientation causing collision, entrapment, stranding, grounding, and interference with navigation (being drawn off course from usual migration routes). Seabirds may either be attracted by the light source itself or indirectly as structures in deep water environments tend to attract marine life at all trophic levels, creating food sources and shelter for seabirds (Surman, 2002; Wiese et al., 2001).</p> <p>The project area overlaps the foraging BIAs for several species of seabirds (Section 3.2.3), with no nesting BIAs overlapping. During the proposed action, a small number of seabirds and migratory shorebirds may be attracted to the project vessel within the operational area. However, as this is not expected to result in impacts to birds beyond a temporary change in behaviour, any impact is anticipated to be temporary and minor. Seabirds typically nest on isolated islands, and there are no known nesting locations for threatened or migratory seabirds within 20 km of the project area. Hence impacts to fledgling seabirds listed as threatened or migratory under the EPBC Act will not occur.</p> <p><b>Marine Turtles</b></p> <p>The PMST search identified three EPBC Act listed marine reptile species with potential to occur or have habitat within the light assessment area (the loggerhead, leatherback, and green turtle). However, neither the green nor loggerhead turtle are expected to occur within the project area with both species rarely seen off the Victorian coast, preferring warmer climates in northern and eastern Australia. Whilst breeding behaviour for the leatherback turtle was identified as likely to occur within the light assessment area, these waters do not represent critical habitat for the species and breeding for the leatherback turtle has not been recorded in Victoria (Limpus, 2009).</p> <p>Impacts of artificial light emissions on marine turtles will be limited to temporary behavioural impacts (e.g., attraction) of individual animals. Localised behavioural impacts to individual marine turtles from light emissions are considered negligible, with no impact predicted at a community or population level.</p>					
Noise emissions	<p>Generation of underwater noise from project vessel, ROV, subsea cutting and infrastructure deburial activities.</p> <p>A summary of noise source characteristics are provided in <b>Appendix C</b>.</p>	<p>Noise emission may impact upon fauna by:</p> <ul style="list-style-type: none"> <li>reducing ability to perceive noise</li> <li>behavioural impacts</li> <li>masking of biologically important sounds.</li> </ul> <p>Refer to <b>Appendix C</b> for a more detailed description of environmental impacts and risks from underwater noise.</p>	10	N/A	-	<p>Do not undertake activities in reproduction habitat critical to the southern right whale during peak calving period (May to August).</p> <p>Prohibit timing of Beach seabed survey in VIC/L22 overlapping with the petroleum activity.</p>	<p>In accordance with the draft National Recovery Plan for Southern Right Whales anthropogenic underwater noise from activities should be planned at a time when Southern Right Whales are not present. The implementation of a temporary avoidance measure from May to August is considered necessary to avoid impacts in the habitat critical to the survival (HCTS) of Southern Right Whales during the critically important calving season.</p> <p>Beach Energy intends to undertake a seabed survey which partially overlaps VIC/L22 (the production licence for Minerva). An access agreement is in place between Woodside and Beach. The terms of the agreement permit Woodside to decline Beach access when subsea infrastructure removal and plug and abandonment activities are underway.</p> <p>Preventing Beach from undertaking the seabed survey in VIC/L22 simultaneously with either subsea</p>

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
							<p>infrastructure removal or plug and abandonment activities reduces the potential for cumulative impacts.</p> <p>The timing of the Beach survey is flexible, and Woodside routinely consults with Beach as required.</p>
						All vessels to comply with EPBC Regulations – Part 8 Division 8.1 interacting with cetaceans in relation to distances to cetaceans.	<p>Implementation of controls for reduced vessel speed around cetaceans can potentially reduce the underwater noise footprint of a vessel and lower the likelihood of interaction above significant thresholds.</p> <p>Controls adopted based on legislative requirements – must be adopted.</p>
						Implement Planned Maintenance System (PMS) on MCV.	<p>Maintenance and inspection completed as scheduled on PMS reduces the generated noise emissions and associated impacts. Machinery maintenance is part of normal operations to verify operation in accordance with manufacturer’s guidelines.</p> <p>Propulsion systems on the vessels will be operated in accordance with manufacturer’s instruction and ongoing maintenance to allow efficient operation.</p>
						Limit vessel speeds to 6 knots or less in the operational area (excluding emergencies).	<p>Limiting vessel speeds may reduce machinery noise and cavitation, reducing underwater noise source levels in the operational area.</p> <p>Limiting vessel speeds within the operational area can readily be done but may result in additional time required to complete some activities. Limiting vessel speeds also reduces the likelihood and consequence of vessel collisions with whales, providing additional benefit.</p>
	<p>Generation of atmospheric noise from helicopter operations.</p> <p>A summary of noise source characteristics are provided in <b>Appendix C</b>.</p>		10	N/A	-	<p>Implement adaptive management procedure during daylight hours.</p> <p>Adaptive management procedure to include:</p> <ul style="list-style-type: none"> <li>▪ MFOs onboard MCV undertaking equipment removal to monitor for pygmy blue and southern right whales 30 minutes prior to commencing DP operations. Proceed with DP operations only when no pygmy blue and southern right whales have been sighted, to the limits of visibility, over the 30-minute monitoring period.</li> <li>▪ MFOs onboard vessel undertaking equipment removal to monitor for pygmy blue and southern right whales 1 hr before sundown prior to undertaking night-time DP operations.</li> <li>▪ Proceed with night-time DP operations only when no pygmy blue or southern right whales observed, to the limits of visibility, 1 hr before the preceding sundown.</li> </ul>	<p>Adaptive management measures are intended to ensure that no whales are in proximity to vessels before commencing discrete activities that emit relatively high levels of underwater noise. This will reduce the noise levels received by whales, with a consequent reduction in potential impacts.</p> <p>The observation time periods provide sufficient time for MFOs to determine the presence of pygmy blue or southern right whales in proximity to the MCV before commencing activities that emit relatively high levels of underwater noise. Deferring these activities until no whales are present is an effective means of reducing noise levels received by whales. The control is reliant on the detection of whales, which is provided by MFOs. The requirement for MFOs to be trained and have relevant regional experience ensures MFOs are an effective detection control.</p>

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
	<p>Generation of underwater noise from acoustic survey equipment within operational area.</p> <p>A summary of noise source characteristics are provided in <b>Appendix C.</b></p>		10	N/A	-	<p>At least one dedicated marine fauna observer (MFO) to detect whales during daylight hours from MCV with regionally relevant experience.</p>	<p>MFO are routinely used during seismic surveys to implement reactive source controls (reducing or ceasing acoustic emission from seismic source) when whales are detected within shutdown zones. MFOs may be effective at detecting whales when conditions are suitable. MFO detection rates may be reduced by:</p> <ul style="list-style-type: none"> <li>▪ high sea states, which make whales surfacing harder to detect</li> <li>▪ poor visibility conditions, such as fog, smoke, or haze</li> <li>▪ night time.</li> </ul> <p>Day lengths during summer months (when the Minerva subsea infrastructure removal campaign is planned) are approx. 15 hrs, which would require two MFO shifts to implement the control during daylight hours.</p> <p>MFOs alone to not reduce underwater noise impacts on whales, as they are a detection control. Upon detection, a reduction in impact (if required) would rely on reducing or ceasing the noise emissions (e.g., not commencing operations requiring DP) or modifying the path between the noise source and the whale (e.g., moving away from the whale).</p> <p>MFOs are generally accepted practice on seismic surveys, but increasingly being implemented during other petroleum activities in areas where whales exhibit biologically important behaviours. MFOs would increase costs. Requiring MFOs observing during daylight hours on the equipment removal vessel could constrain activities if MFOs were unavailable (e.g., unwell). This could be mitigated by having more than one MFO, or providing for vessel crew to observe for whales of the MFO is temporarily unavailable.</p>
Atmospheric emissions	<p>Atmospheric emissions from vessel engines and generators, and incinerators on vessel.</p> <p>The MCV will operate using marine diesel oil (MDO) to power the vessel engines, generators, mobile and fixed plant and equipment and the incinerator for the duration of the infrastructure removal activities.</p> <p>The combustion of fuel and the incineration of waste on-board the vessels will generate emissions of greenhouse gases, such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and non-GHG such as sulphur oxides (SO<sub>x</sub>) and nitrous oxides (NO<sub>x</sub>), particulate material and volatile organic compounds. These emissions are associated primarily with project</p>	<p>Localised and temporary reduction in ambient air quality from non-GHG emissions and contribution to global GHG emissions.</p> <p>Atmospheric emissions generated during the infrastructure removal activities will result in a localised, temporary reduction in air quality in the environment immediately surrounding the discharge point and present a negligible contribution to the GHG emissions. The closest residential area is Port Campbell, approximately 5.5 km to the north of the project area. The quantities of atmospheric emissions will quickly dissipate into the surrounding atmosphere, therefore will not impact any residential areas. Gaseous emissions under normal circumstances quickly dissipate into the surrounding atmosphere. The impact of atmospheric emissions on air quality is anticipated to be temporary and minor, with no impacts to marine fauna.</p>	10	N/A	-	Compliance with Marine Order 97 (Marine Pollution Prevention – Air Pollution)	<p>Control is based on a legislative requirement and reduces likelihood of air pollution.</p> <p>The control must be adopted.</p>

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
	vessel fuel consumption and waste incineration. The average MDO use during the subsea equipment removal activity is approximately 15,000 L per day for the MCV, which yields approximately 40 t CO2-e.						
Routine discharges from project vessels within operational area  Discharges during recovery of subsea infrastructure	Routine discharge to the marine environment of: <ul style="list-style-type: none"> <li>sewage, grey water and putrescible wastes</li> <li>deck and bilge water</li> <li>brine or cooling water</li> </ul>	Localised, minor, and temporary water quality impacts.  <b>Water Quality</b> Sewage, greywater and food waste will be treated aboard the vessels prior to being discharged overboard. The discharges will comply with MARPOL requirements.  Routine vessel discharges may result in a localised, temporary reduction in water quality. Discharges such as sewage, marine growth, and putrescible waste, may increase the biological oxygen demand in the water column as solids decompose. Given the relatively small volumes and intermittent nature of such discharges, along with the well-mixed and highly oxygenated receiving environment, any decrease in dissolved oxygen will be minor, temporary, and localised.  Discharges from vessels may also increase turbidity and, if traces of oils are present (e.g., in bilge water treated to MARPOL requirements), result in a surface sheen. Turbidity plumes and any surface sheens will dilute and break up rapidly in the receiving environment, with impacts to water quality expected to be limited to within 10s of metres from the discharge location.  <b>Sediment Quality</b> Vessel discharges will not credibly impact upon sediment quality given the discharge location at the sea surface, the water depth of the project area and the well-mixed open sea receiving environment.	10	N/A	-	Chemicals intended, or likely, to be discharged to the marine environment will have an environmental assessment completed before use.  Compliance with relevant Marine Orders giving effect to MARPOL.	Environmental assessment of chemicals will reduce the consequence of impacts resulting from discharges to the marine environment by ensuring chemicals have been assessed for environmental acceptability.  Planned discharges are required for the safe execution of activities and therefore no reduction in likelihood can occur.  Controls based on legislative requirements, must be accepted. Reduces potential impacts of inappropriate discharges from vessels. Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.
	Discharges of preservation fluid and residual hydraulic fluid during subsea infrastructure recovery.  Discharges of material from cuts to subsea infrastructure during recovery  Removal of the Minerva subsea infrastructure will result in the discharge of the contents of some structures to the sea. The pipeline and chemical injection lines were flushed during cessation of production to < 30 ppm hydrocarbons and then filled with potable water treated with preservation chemicals to manage corrosion. The hydraulic cores within the umbilical were not flushed and remain filled with hydraulic fluid. The chemicals within the Minerva subsea infrastructure that may be discharged to sea were selected in accordance with the	Localised, minor, and temporary water quality impacts. Localised, minor impacts to sediment quality  <b>Water Quality</b> Discharges of treated water and chemicals from the Minerva subsea infrastructure will occur during recovery. Treated potable water in the pipeline and chemical injection lines may result in toxic effects due to the presence of residual chemicals and hydrocarbons. However, given the length of time since dosing, the chemicals in the treated water will have substantially been degraded or consumed and the potential for toxic effects diminished accordingly. These products are biodegradable, do not biomagnify or bioaccumulate. Upon release to the sea, the treated water will mix within the water column and the residual chemicals consumed. Water and glycol-based hydraulic fluid in the umbilical that will be released during the proposed action have low toxicity, are readily biodegradable and do not bioaccumulate. Given the nature of the hydraulic fluids, along with the relatively small discharge volume, impacts to water quality form their discharge will be negligible.  <b>Sediment Quality</b>	10	N/A	-	Debris created during Minerva subsea infrastructure removal to be recovered where practicable.  Environmental monitoring program to confirm no unacceptable contamination or damage to the seabed or subsoil caused by titleholder activities, exists within the title.	Recovery of relatively small debris (e.g., cobble-sized concrete) is not feasible due to the small size, however larger debris may feasibly be recovered by ROV. This may reduce man-made material left on the seabed, potentially reducing the environmental impact. An ROV will be available during Minerva subsea infrastructure removal, which could identify and recover relatively large (300 mm x 300 mm) debris created during removal. The as-left ROV survey may also provide an opportunity to identify and recover relatively large debris.  Survey results will be done as part of the decommissioning activity.

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
	<p>chemical selection procedure accepted at the time of selection.</p> <p>Cutting of the pipeline bundle may release small amounts of material, such as concrete spalling off the pipeline when cut with shears.</p> <p>Marine growth removal on the seabed may need to be removed during equipment removal (e.g., to provide access to valves or rigging points for lifts).</p>	<p>Sediment quality may be impacted by the discharge or release of materials during the removal process. The pipeline bundle is planned to be cut using hydraulic shears – which don't generate swarf – but may be cut with a diamond wire saw or chop saw as a contingency. Some spalling of concrete weight coating will occur at the cut locations. The steel in the pipeline and chemical lines will deform rather than shatter if cut using shears. A small amount of swarf from the approximately 5 mm width saw kerf will be released if a diamond wire saw or chop saw are used. Concrete is considered to pose no or negligible risk to the receiving environment.</p> <p>Steel is considered to have no or negligible toxicity risk to the receiving environment.</p> <p>A small amount of the polyethylene plastic coating on the two 2" chemical lines and umbilical may be released to the environment if the pipeline bundle is cut using a saw that generates swarf. The size of swarf particles are small (&lt; 5 mm) are therefore considered microplastics. amounts of the microplastics will be released during pipeline bundle removal and recovery activities, the filter-feeding animals living directly adjacent to the pipeline bundle are unlikely to encounter – and eat – enough microplastics to cause lethality.</p> <p>Traces of scale within the pipeline bundle may also be released as swarf. Given the very small quantities of scale measured and consequent small amount of scale swarf, negligible impacts to sediment will occur.</p>					
Waste management	<p>Hazardous and non-hazardous waste generated during project vessel operations:</p> <p>Project vessels generate a variety of solid wastes, including domestic and industrial wastes. These include aluminium cans, bottles, paper and cardboard, scrap steel, chemical containers, batteries, and medical wastes.</p>	<p>Increase waste to landfill.</p> <p>Additional usage of onshore waste reception facilities.</p> <p>Availability of materials from recycling</p>	10	N/A	-	<p>Marine Order 95 (pollution prevention – garbage) (as appropriate to vessel class), which gives effect to Annex V of MARPOL.</p>	<p>Control is based on legislative requirements and reduces the likelihood of an unplanned release. Control must be accepted.</p>
		<p>Waste generated by vessels during the proposed action will be transported to and managed appropriately by third parties. Environmental impacts associated with onshore disposal relate to the small incremental increase in waste volumes received at the onshore licensed waste recycling and disposal sites. The environmental impacts associated with waste disposal onshore are anticipated to be minor, based on the minor quantities involved and recycling of some materials.</p>				<p>Disposal of any hazardous waste associated with the subsea infrastructure will comply with the relevant State and Commonwealth legislation.</p>	<p>Control is based on legislative requirements and reduces the likelihood of an unplanned release. Control must be accepted.</p>
	<p>Recovered subsea infrastructure from decommissioning activities:</p> <p>Recovered subsea infrastructure will be removed from the title area and disposed of in accordance with the waste management plan developed during the contracting phase. The waste management plan will address the waste management hierarchy and disposal methods and appropriate transfer of ownership of recovered equipment.</p> <p>Treatment of the subsea infrastructure potentially involves decontamination (e.g., residual contaminants deposited during production) at an onshore location. If treatment is successful, the subsea infrastructure can be recycled or disposed of.</p>	<p>Hazardous wastes generated by vessels will be classified and managed in accordance with the waste management procedures. This will include ensuring hazardous materials are disposed of by suitable waste management facilities.</p> <p>Environmental impacts associated with recovered subsea infrastructure disposal will depend on the classification of the waste in accordance with the waste management hierarchy:</p> <ul style="list-style-type: none"> <li>Reuse of subsea infrastructure has no or very minor environmental impact.</li> <li>Recycling of subsea infrastructure requires energy use associated with a recycling process (e.g., use of heat etc). The use of energy has very minor environmental impact.</li> <li>The disposal of subsea infrastructure to landfill contributes to the overall volume of waste going to landfill each year.</li> </ul>	30	N/A	-	<p>Waste will be managed in accordance with the waste management plan (Section 9.5).</p> <p>The waste management plan includes details on:</p> <ul style="list-style-type: none"> <li>waste management hierarchy</li> <li>storage of waste</li> <li>transport and disposal of waste</li> <li>waste legislation and standards</li> <li>waste monitoring and reporting.</li> </ul>	<p>Reduces the risk of unsuitable disposal through efficient use of resources and reduces the risk of unplanned contamination of waste streams during disposal.</p> <p>Control considered standard practice. Benefits outweigh cost sacrifice.</p>
						<p>Waste management contractor evaluation and selection will include a preference for contractors who are able to follow the waste management hierarchy philosophy, including achieving recycling targets and minimising waste volumes disposed to landfill.</p>	<p>Waste management practices will aim to reduce the volume of waste to landfill.</p> <p>Control is feasible and can be implemented with minimal cost. Control considered standard practice. Benefits outweigh cost sacrifice.</p>

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
<b>Unplanned Events</b>							
Unplanned surface release of Marine Deisel Oil (MDO)	<p>Surface release of MDO from a project vessel from a vessel collision.</p> <p>The largest single fuel tank is &lt; 330 m<sup>3</sup> on the MCV used for infrastructure removal activities and presents the maximum credible release volume that could be released in the event of a vessel collision. This scenario is the worst-case credible spill scenario for the proposed activity and was modelled accordingly. The likelihood of a vessel collision is unlikely, given slow-moving vessel operations associated with the proposed activity, the historical absence of large third-party vessel transiting the project area, and the controls in place to prevent collision at sea.</p>	<p>Temporary and localised reduction in water quality with potential for toxicity effects to marine fauna and flora, oiling of offshore, nearshore and shoreline habitats. Impacts to socio-economic receptors.</p> <p>A worst-case MDO release to the marine environment would result in a localised and temporary reduction in water quality in the upper surface waters of the water column. While MDOs are generally considered to be non-persistent oils, they a small percentage by volume of hydrocarbons that are classified as persistent. When released at sea, MDO will spread and thin out quickly and more than half of the volume can be lost to evaporation. No shoreline contact above the impact threshold concentration is predicted to occur. A worst-case release of MDO from a vessel collision has the potential to have an impact to the environment, lasting a period of one to three years. Given the extent, the worst-case severity is considered to be substantial. No impacts to sediment quality are expected, as the spilled hydrocarbons are associated with surface waters.</p>	100	0.1	10	No bunkering in the operational area.	<p>The MCV will return to port several times during the petroleum activity, providing an opportunity to take on provisions and fuel. Hence, there is little need for bunkering in the operational area.</p> <p>The control is feasible with minimal cost. Benefits outweigh any cost sacrifice.</p>
		Establishment of a safety exclusion zone around project vessels and communicated to marine users.				<p>Reduces likelihood of vessel collision with third parties. Third-party vessels must navigate the safety exclusions zone to reduce the risk. The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p>	
		Use MDO instead of heavier grades of fuel oil.				<p>Marine diesel is a light fuel oil and is less persistent in the marine environment than intermediate or heavy fuel oils.</p> <p>Limiting project vessels to marine diesel reduces the risk to the marine environment in the event of a spill.</p> <p>Control is feasible. Benefits outweigh any cost sacrifice</p>	
		Project vessel compliant with relevant navigation safety requirements under the Navigation Act 2012 and subsidiary Marine Orders.				<p>Legislative requirements to be followed which reduces the risk of third-party vessel interactions due to ensuring safety requirements are fulfilled and other marine users are aware of the presence of project vessels.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost/sacrifice.</p>	
		Notify AHO prior to commencing equipment removal or field management activities.				<p>Notification to the AHO will enable them to issue a notice to mariners (if required), thereby reducing the likelihood of interaction with other marine users.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p>	
		Notify AMSA JRCC prior to commencing equipment removal or field management activities.				<p>AMSA JRCC requested that Woodside notify them of vessels commencing petroleum activities prior to commencement.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p>	
		Notify relevant fishing industry government departments, representative bodies, and licence holders, of activities prior to commencement and upon completion of equipment removal or field management activities.				<p>Communicating the activities to fishing industry stakeholders makes them informed and aware, thereby reducing the likelihood of displacing other marine users.</p> <p>Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p>	
		<p>The project area overlaps a white shark distribution BIA, however the project area is not known to be particularly important habitat or host aggregations of white sharks.</p> <p>Short-finned eel adults and larvae may occur within the project area, which are culturally important to First Nations groups. Given the life history of short-finned eels and the nature and scale of the hydrocarbon spill risk, no impacts at a population level would occur. Adult short-finned eels spend daylight hours near the seabed and ascend to near the surface, hence they are only likely to encounter spilled hydrocarbons during night. The migration and recruitment periods are protracted, and the distribution of the species is across much of south-eastern Australia. Eels in freshwater environments, where they spend most of their life cycle, will not credibly be impacted. Hence, only a very small portion of the population would credibly be impacted by a hydrocarbon spill.</p> <p>The most likely impact to fish, shark and rays is from the dissolved aromatic hydrocarbons or entrained hydrocarbon droplets, particularly when through the pathways of ingestion or the coating of gill structures. This could lead to respiratory problems (reduction in oxygen exchange efficiency) or an accumulation of hydrocarbons in tissues. While fish, sharks and rays do not generally break the sea surface, individuals may feed near the surface for short periods. The probability of prolonged exposure to a surface slick by fish, shark and ray species is unlikely.</p>	10	0.03	3	<p>Provide updates on the petroleum activity to relevant persons as requested during consultation for the preparation of the EP (refer to Sections 5 and 9.10.1).</p>	<p>Communicating the petroleum activities to relevant persons makes them informed and aware, thereby reducing the likelihood of their functions, interests, and activities being impacted by the petroleum activity.</p> <p>Benefits outweigh cost/sacrifice. Control is also Standard Practice.</p>
		<p><b>Fish, Sharks and Rays</b></p> <p>The most likely impact to fish, shark and rays is from the dissolved aromatic hydrocarbons or entrained hydrocarbon droplets, particularly when through the pathways of ingestion or the coating of gill structures. This could lead to respiratory problems (reduction in oxygen exchange efficiency) or an accumulation of hydrocarbons in tissues. While fish, sharks and rays do not generally break the sea surface, individuals may feed near the surface for short periods. The probability of prolonged exposure to a surface slick by fish, shark and ray species is unlikely.</p> <p><b>Marine Mammals</b></p> <p>Eight species of threatened or migratory marine mammals were identified by the EPBC Protected Matters search for the EMBA (Section 3). BIAs overlapping the project are include:</p> <ul style="list-style-type: none"> <li>▪ Pygmy blue whale: <ul style="list-style-type: none"> <li>- Foraging areas</li> </ul> </li> <li>▪ Southern right whale:</li> </ul>				<p>Establish and maintain a publicly available interactive map which provides relevant persons with updated information on activities being conducted as part of the petroleum activity.</p>	<p>Interactive map provides additional alternative method for marine users to obtain information on the timing of activities, thereby reducing the likelihood.</p>

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
		<ul style="list-style-type: none"> <li>- Migration</li> <li>- Reproduction</li> </ul> <p>Marine mammals come to the sea surface to breathe air. They are therefore theoretically vulnerable to impacts caused by contact with hydrocarbons at the sea surface. Whales and dolphins are smooth-skinned, hairless mammals so oil tends not to stick to their skin and since they do not rely on fur for insulation, they are therefore not as sensitive to the physical effects of oiling.</p> <p>The way whales and dolphins consume their food may affect the likelihood of their ingesting oil. Baleen whales (such as humpback whales), which skim the surface, are more likely to ingest oil than toothed whales, which are 'gulp feeders' (Helm et al., 2015). Spilled oil may also foul the baleen fibres of baleen whales, thereby impairing food-gathering efficiency or resulting in the ingestion of oil or oil-contaminated prey. Baleen whales may therefore be vulnerable to oil if feeding.</p> <p>Ingested oil, particularly the lighter fractions, can be toxic to marine mammals. Ingested oil can remain within the gastro-intestinal tract and be absorbed into the bloodstream and thus irritate and destroy epithelial cells in the stomach and intestine. Pygmy blue whale foraging occurs seasonally in the region between January and March. A spill during this time may pose an increased risk to pygmy blue whales should in-water hydrocarbons coincide with areas of high prey density for pygmy blue whales. Given the relatively quick weathering of MDO, the period in which such an impact could occur is relatively short (days).</p> <p><b>Marine Turtles</b></p> <p>Marine turtles are unlikely to occur within the project area (Section 5.1.1.3 and Section 5.1.2.3). One species, the leatherback turtle, was identified as potentially occurring in low numbers. No BIAs for leather back turtles, such as nesting or important foraging habitat, occur within the project area.</p> <p>Direct contact of marine turtles with hydrocarbons and exposure from hydrocarbon components may result in digestion and absorption of hydrocarbons through food contamination or direct physical contact. This may cause damage to the digestive tract and other organs irritation of mucous membranes (such as those in the nose, throat and eyes), leading to inflammation and infection.</p> <p><b>Seabirds and shorebirds:</b></p> <p>Several species of seabirds were identified as potentially occurring within the project area (Appendix B).</p> <p>Birds exposed to hydrocarbons may suffer a range of internal and external health effects. Direct contact with hydrocarbons and exposure from hydrocarbons has the potential to cause:</p> <ul style="list-style-type: none"> <li>▪ oiled feathers affecting the ability of the birds to fly and those birds on the sea surface may suffer from loss of buoyancy and drown or die from hypothermia</li> <li>▪ skin irritation or ulceration of eyes, mouth or nasal cavities</li> <li>▪ internal effects from poisoning or intoxication through ingestion, preening and ingestion of oil via their prey items</li> <li>▪ reduced reproduction ability</li> </ul>				<p>Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p> <p>Marine Order 91 (marine pollution prevention – oil) (as appropriate to vessel class), which gives effect to MARPOL Annex I – Oil.</p> <p>In the event of a spill, emergency response activities implemented in accordance with the OPEP.</p>	<p>Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p> <p>Marine Order 91 required vessels to have a SOPEP, which is implemented in the event of an oil spill. By ensuring a SOPEP is in place for the vessel, the consequence of a spill may be reduced. Control is based on a legislative requirement and must be adopted.</p> <p>Implementing the OPEP efficiently to deal with unplanned hydrocarbon spills will help to reduce impacts to the marine environment.</p> <p>The control is feasible and standard practice. Costs associated with implementing response strategies vary dependant on nature and scale of spill event. Benefits outweigh any cost sacrifice.</p>

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
		<ul style="list-style-type: none"> <li>▪ reduction in the number of eggs laid</li> <li>▪ decreased shell thickness</li> <li>▪ disruption of the normal breeding and incubating behaviours.</li> </ul> <p>The surface oil component poses the greatest risk of impact to seabirds due to the amount of time they spend on or near the sea surface. Individuals are at risk of lethal or sub-lethal physical and toxic effects due to external exposure (oiling of feathers) and ingestion, especially those close to the source point where concentrations are at their highest. Even small quantities of feathers contaminated by oil can be lethal, causing hypothermia and reduced buoyancy (O'Hara and Morandin, 2010). Seabirds are less likely to be affected by entrained and dissolved hydrocarbons, except through the ingestion of contaminated prey.</p> <p>Seabirds spend most of their time at sea, travelling over large distances to forage over the open ocean, returning to land during breeding only; therefore, some seabirds may transit the offshore waters of the project area and encounter surface oil. While individual seabirds may be affected, it is not predicted that large numbers of seabirds will be impacted from surface oil as they are unlikely to be present in significant numbers due to their vast distribution area. The risk of impact is greater should a release occur within the chick-rearing period where adults forage closer to breeding colonies. The risk may also be greater during summer months when upwelling occurs, as seabirds may forage in the relatively high productivity during this period.</p>					
Minor spills and leaks of chemicals and hydrocarbons	<p>Minor spills and leaks of chemicals and hydrocarbons on the vessels from subsea equipment (such as ROVs) reaching the marine environment:</p> <p>During the proposed action, the handling, use and storage of chemicals and hydrocarbons on the project vessels will be required, which may include:</p> <ul style="list-style-type: none"> <li>• fuel and refined oil</li> <li>• hydraulic fluids and oils</li> <li>• greases and lube oils</li> <li>• cleaning and cooling agents</li> </ul> <p>Spills and leaks of chemicals and hydraulic fluid on the deck of the project vessel could occur because of spillage during handling, inadequate bunding and storage, inadequate method of securing or tank and pipework failure, leaks from equipment or rupture or failure of hoses.</p> <p>Leaks or rupture of ROV and subsea tool hydraulic hoses may occur through equipment malfunction or line pinches, which would lead to the</p>	<p>Localised and temporary reduction in water quality adjacent to the spill and minor adverse toxicity effects to surface and water column biota.</p> <p>Given the minor quantities involved (less than 20 L), the accidental discharge of chemicals and hydraulics has the potential to result in a localised reduction in water quality and a minor potential for toxicity impacts to plankton and fish populations (surface and water column biota). Large, more mobile fauna are likely to be transient within the operational area and toxic impacts are unlikely to occur to these species. The potential impacts would most likely be highly localised and restricted to the immediate area in the footprint of the release. Any impact is temporary and minor. Impact will decrease rapidly as the release dilutes and disperses in the marine environment. No impacts are predicted to benthic habitat communities in the project area.</p>	10	0.1	1	<p>Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily.</p> <p>Drainage or bunding in place to contain spilled fluids at high-risk spill locations on project vessel deck.</p> <p>Chemicals intended, or likely, to be discharged to the marine environment will have an environmental assessment completed before use.</p> <p>Marine Order 91 (marine pollution prevention – oil) (as appropriate to vessel class), which gives effect to MARPOL Annex I – Oil.</p>	<p>Implementation of procedures for chemical storage and handling on the MODU and project vessels will reduce the consequence of impacts resulting from unplanned discharges to the marine environment by ensuring chemicals have been assessed for environmental acceptability.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p> <p>Reduces the likelihood of contaminated deck drainage water being discharged to the marine environment.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p> <p>Environmental assessment of chemicals will reduce the consequence of impacts resulting from discharges to the marine environment by ensuring chemicals have been assessed for environmental acceptability.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p> <p>Marine Order 91 required vessels to have a SOPEP, which is implemented in the event of an oil spill. By ensuring a SOPEP is in place for the vessel, the consequence of a spill may be reduced. Control is based on a legislative requirement and must be adopted.</p> <p>The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p>

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
	loss of small volumes of hydraulic fluids directly to the marine environment. Accidental release of hydraulic fluids volumes from such failures are expected to be low (less than 20 L).					Spill kits positioned in high-risk locations around the rig (near potential spill points such as transfer stations).	Spill kits would reduce the likelihood of a deck spill from entering the marine environment. The consequence is unchanged. The control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.
						Critical hoses outside bunded areas (such as ROVs) are inspected and maintained as part of PMS.	Maintenance and inspection completed as scheduled on PMS reduces the risk of leaks to the marine environment. Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.
Loss of solid hazardous and non-hazardous wastes	Accidental loss of solid hazardous and non-hazardous wastes or dropped objects to the marine environment: Project vessels produce a variety of solid wastes, including domestic and industrial wastes. These include aluminium cans, bottles, paper and cardboard, scrap steel, chemical containers, batteries, and medical wastes. There is the potential for solid wastes to be lost overboard to the marine environment, particularly during adverse weather events and back loading activities and due to incorrect waste storage. Waste items lost overboard are typically small wind-blown items such as plastic containers and cardboard.	Localised decline in water quality, toxic effects to marine fauna and potential injury to fauna. Disturbance of benthic habitat and associated communities. The potential impacts of solid wastes accidentally discharged to the marine environment include pollution (debris) and disturbance of the seabed. Marine fauna may interact with the lost waste, resulting in entanglement or ingestion, leading to injury and death of individual animals. Migratory and threatened species may transit through the project area, including cetaceans, seabirds, and sharks. Loss of solid waste to the marine environment is highly unlikely to have a significant environmental impact to marine fauna, based on the types and frequency of wastes that could be lost and the transient nature of the marine fauna. Impacts are anticipated to be temporary and minor. In the unlikely event of loss of subsea infrastructure to the marine environment, potential impacts would be limited to localised physical impacts on benthic communities over the footprint of the lost subsea infrastructure. The subsea infrastructure would subsequently be recovered if feasible. Impacts will also be temporary in nature. Any elevated turbidity would be very localised and temporary and is therefore not expected to have any significant impact to environment receptors, such as filter feeders. Seabed disturbance will largely be limited to the original footprint of the infrastructure being lifted, which is already disturbed by the removal of the Infrastructure.	10	0.3	3	Marine Order 95 (pollution prevention – garbage) (as appropriate to vessel class), which gives effect to Annex V of MARPOL. Vessels' work procedures implemented for lifts, bulk transfers, and cargo loading.	Control is based on legislative requirements and reduces the likelihood of an unplanned release of garbage to the sea. Control must be accepted. Reduces the likelihood of an unplanned release. Lifting, bulk transfer and cargo loading procedures will enable lifts to be performed in a safe manner and reduce likelihood of a dropped object event. Control is considered standard practice and can be implemented at minimal cost. Environmental benefit outweighs cost sacrifice.
	Dropped objects: There is the potential for objects to be dropped overboard from the project vessel to the marine environment. Small items dropped may include personal protective gear (such as glasses, gloves, hard hats) and small tools (such as spanners). During the recovery of subsea equipment there is the potential for larger dropped objects to occur (such as subsea infrastructure) because of human error or failure of lifting equipment during the recovery of subsea infrastructure. Woodside considers this a very unlikely event given the lifting methods and the nature and condition of the equipment. If subsea infrastructure is dropped during the proposed action, Woodside will endeavour to locate and recover the lost equipment.			10	0.3	3	Recovered subsea infrastructure to be stored securely on deck to prevent loss overboard. Attempt recovery of solid wastes or equipment lost overboard where safe and practicable to do so.
Interaction with marine fauna	Accidental collision between project vessels and marine fauna in the operational area: The movements of vessels in the project area may present a potential hazard to slow moving marine	Potential lethal impact or injury to protected marine fauna species. <b>Cetaceans</b> The likelihood of vessel-whale collision being lethal is influenced by vessel speed. The risk of a collision causing mortality of the	30	0.1	3	Implement adaptive management procedure during daylight hours. Adaptive management procedure to include: <ul style="list-style-type: none"> <li>MFOs onboard MCV undertaking equipment removal to monitor for pygmy blue and southern right whales 30 minutes prior to commencing DP</li> </ul>	Adaptive management measures are intended to ensure that no whales are in proximity to vessels before commencing discrete activities that emit relatively high levels of underwater noise. This will reduce the noise levels received by whales, with a consequent reduction in potential impacts.

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
	<p>megafauna and other marine fauna present. Vessel movements can result in collisions between the vessel (hull, propellers) and marine fauna, with potential impacts ranging from minor behavioural interferences (e.g., avoidance) to severe impacts such as injury and mortality through vessel strikes. The MCV will move slowly within the project area and will be stationary for much of the time (e.g., when lifting equipment or making cuts in the pipeline bundle). The MCV will demobilise from the project area throughout the activity to transport subsea infrastructure for onshore disposal; five interim demobilisations from the operational area are expected to be required.</p>	<p>whale increases as the vessel speed increases (Jensen and Silber, 2003; Laist et al., 2001). Vanderlaan and Taggart (2007) found that the chance of lethal injury to a large whale because of a vessel strike declines from 80% at 15 knots to about 20% at 8.6 knots.</p> <p>The MCV will be typically either stationary or moving slowly in the project area; hence, the chance of a vessel-whale collision resulting in lethal outcome within these waters is much reduced. Vanderlaan and Taggart (2007) estimated the risk is less than 10% at a speed of four knots. Vessel-whale collisions at this speed are uncommon and, based on reported data contained in the United States of America National Ocean and Atmospheric Administration database (Jensen and Silber, 2004), there are only two known instances of collisions when the vessel was travelling at less than six knots, both from whale-watching vessels that were deliberately placed among whales.</p> <p>Four listed threatened and migratory species of cetacean were identified as potentially occurring in or having habitat in the project area: the sei whale, blue whale, fin whale, and southern right (Appendix A). The project area intercepts the southern right whale migration and reproduction BIA, and the pygmy blue whale foraging BIA (Section 3.2.3). Southern right whales are seasonally present between May and September. The petroleum activity will not be undertaken during this period, hence the risk of collision between vessels and southern right whales is low. Pygmy blue whales are seasonally present in the region between January and March, which coincides with higher productivity in the water column due to the Bonney Upwelling. The Bonney Upwelling, and most observations of pygmy blue whales, occur to the west of the project area. However, blue whales have been observed in proximity to the project area and hence may be present during the proposed action, particularly between January and March.</p> <p>The worst-case consequence from a vessel strike would be the fatality of a single EPBC Act-listed individual species. However, as they would represent an individual within the population, it is not expected to result in a long-term threat to the population. Given the slow speed and relatively short duration of vessel activities in the project area, a collision between a vessel and a cetacean is unlikely. The worst-case consequence is a measurable, but small, decrease in the cetacean population, which would not result in changes to ecosystem function or risk the ongoing recovery of cetacean populations.</p> <p><b>Marine Turtles</b></p> <p>The Recovery Plan for Marine Turtles in Australia 2017-2027 (CoA, 2017) identifies boat strike as a threat to marine turtles, particularly in areas where turtles occur in high density. Only one species of turtle is reasonably expected to occur in the project area – the leatherback turtle. There are no BIAs or habitat critical for the survival of leatherback turtles in the project area. Leatherback turtles would only occur infrequently and in low numbers (i.e., individual turtles) in the project area. Given the nature of vessel movements undertaking the petroleum activity in the operational area and the low number of leatherback turtles, collisions between vessels and turtles are not expected to occur.</p> <p><b>Species Recovery Plans and Approved Conservation Advice</b></p>				<p>operations. Proceed with DP operations only when no pygmy blue and southern right whales have been sighted, to the limits of visibility, over the 30-minute monitoring period.</p> <ul style="list-style-type: none"> <li>MFOs onboard vessel undertaking equipment removal to monitor for pygmy blue and southern right whales 1 hr before sundown prior to undertaking night-time DP operations.</li> <li>Proceed with night-time DP operations only when no pygmy blue or southern right whales observed, to the limits of visibility, 1 hr before the preceding sundown.</li> </ul> <p>At least one dedicated marine fauna observer (MFO) to detect whales during daylight hours from MCV with regionally relevant experience.</p> <p>Limit vessel speeds to 6 knots or less in the operational area (excluding emergencies).</p>	<p>The observation time periods provide sufficient time for MFOs to determine the presence of pygmy blue or southern right whales in proximity to the MCV before commencing activities that emit relatively high levels of underwater noise. Deferring these activities until no whales are present is an effective means of reducing noise levels received by whales. The control is reliant on the detection of whales, which is provided by MFOs. The requirement for MFOs to be trained and have relevant regional experience ensures MFOs are an effective detection control.</p> <p>MFO are routinely used during seismic surveys to implement reactive source controls (reducing or ceasing acoustic emission from seismic source) when whales are detected within shutdown zones. MFOs may be effective at detecting whales when conditions are suitable. MFO detection rates may be reduced by:</p> <ul style="list-style-type: none"> <li>high sea states, which make whales surfacing harder to detect</li> <li>poor visibility conditions, such as fog, smoke, or haze</li> <li>nighttime.</li> </ul> <p>Day lengths during summer months (when the Minerva subsea infrastructure removal campaign is planned) are approx. 15 hrs, which would require two MFO shifts to implement the control during daylight hours.</p> <p>MFOs alone do not reduce underwater noise impacts on whales, as they are a detection control. Upon detection, a reduction in impact (if required) would rely on reducing or ceasing the noise emissions (e.g., not commencing operations requiring DP) or modifying the path between the noise source and the whale (e.g., moving away from the whale).</p> <p>MFOs are generally accepted practice on seismic surveys, but increasingly being implemented during other petroleum activities in areas where whales exhibit biologically important behaviours. MFOs would increase costs. Requiring MFOs observing during daylight hours on the equipment removal vessel could constrain activities if MFOs were unavailable (e.g., unwell). This could be mitigated by having more than one MFO, or providing for vessel crew to observe for whales if the MFO is temporarily unavailable.</p> <p>Limiting vessel speed to 6 knots or less in the operational area reduces the likelihood and consequence of collisions between vessels and marine fauna.</p>

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Control Measures	Justification
		<p>Woodside has considered information contained in relevant recovery plans and approved conservation advice for cetaceans and marine turtles that identify vessel strike as a threat.</p> <p>Woodside has evaluated the impacts and risks associated with vessel strike and vessel disturbance. Woodside considers the proposed action is not inconsistent with:</p> <ul style="list-style-type: none"> <li>National Strategy for Reducing Vessel Strike on Cetaceans and Other Marine Megafauna (CoA, 2017)</li> <li>Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017)</li> <li>Conservation Management Plan for the Blue Whale (DoE, 2015)</li> <li>Conservation Management Plan for the Southern Right Whale (CoA, 2012)</li> <li>Draft National Recovery Plan for the Southern Right Whale (DCCEEW, 2022)</li> </ul> <p>The environmental risk assessment of vessel collisions with marine fauna aligns with the conservation objectives of the publications listed above. Controls have been adopted to manage the risk to a level that is acceptable and as low as reasonable practicable (ALARP).</p>					
Introduction of Invasive Marine Species	<p>Movement of project vessels and immersible equipment from known high invasive marine species risk areas:</p> <p>Project vessel activities have the potential to result in the introduction of invasive marine species (IMS) through:</p> <ul style="list-style-type: none"> <li>discharges of vessel ballast water containing IMS</li> <li>translocation of species through biofouling of vessel hull or niches (such as sea chests, bilges, or strainers)</li> <li>translocation of species on submerged equipment.</li> </ul> <p>Unconsolidated sandy sediments are the most common benthic habitat type in the project area, which is not conducive for many IMS. Should a project vessel be mobilised from international waters, there is the potential for transferring IMS from international waters into the operational area and to Australia if the vessel is required to sail to a port. All vessels entering Australian waters are subject to IMS risk management requirements. Woodside applies additional IMS risk management requirements for vessels undertaking the petroleum activity.</p>	<p>Introduction of invasive marine species to area leading to major impact on native species.</p> <p>The open waters of the project area are not conducive to the settlement and establishment of IMS. Water depths in the project area range from ~20-60 m and there is very little hard substrate (aside from the Minerva subsea infrastructure being removed). Therefore, the risk of establishment, whilst credible, is remote given the water depth and absence of hard substrate. IMS may economically damaging in areas where they have become established. Such impacts include direct damage to assets (fouling of vessel hulls and infrastructure, water intakes and outfalls, etc.) and depletion of commercially harvested marine life (e.g., shellfish stocks). There is little historical and current fishing effort in the project area, and no fixed facilities that may be impacted by IMS in proximity to the project area. Given the low likelihood of IMS translocation to, and colonisation within the project area, the risk to other users is low.</p>	100	0.03	3	<p>Project vessels will manage their ballast water using one of the approved ballast water management options, as specified in the Australian Ballast Water Management Requirements.</p> <p>Project vessels will manage their biosecurity risk associated with biofouling as specified in the Australian Biofouling Management Requirements.</p> <p>Woodside's IMS risk assessment process will be applied to the vessels and immersible equipment undertaking the petroleum activity that enter the operational area.</p> <p>Based on the outcomes, management options commensurate with the risk will be implemented to minimise the likelihood of IMS being introduced.</p>	<p>Controls based on legislative requirements under the <i>Biosecurity Act 2015</i> must be accepted. Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.</p> <p>Reduces the likelihood of transfer of marine pests between vessels within the operational area. No change in consequence would occur.</p> <p>Controls based on legislative requirements under the <i>Biosecurity Act 2015</i> – must be adopted.</p> <p>Risk assessment process includes initial risk screening, and the application of appropriate controls measures to be implemented. In doing so, the likelihood of transferring marine pests between the vessels and immersible equipment within operational area is reduced. No change in consequence would occur.</p> <p>Control is feasible and can be implemented at minimal cost. Control is considered good practice and implemented across all of Woodside's operations. Benefits outweigh any cost sacrifice.</p>

## 5. MNES SIGNIFICANT IMPACT ASSESSMENT

An assessment of potential significant impacts on relevant matters of national environmental significance (MNES) occurring within the proposed Minerva Pipeline Decommissioning project area was completed in accordance with the MNES Significant Impact Guidelines 1.1 (CoA, 2013) and considered proposed and existing mitigation controls to avoid or minimise potential impacts on the marine environment, as outlined in Section 4. To assist in assessing whether a significant impact to MNES is likely to occur, the guidelines provide a set of significant impact criteria unique to each MNES group. The assessment presented here, utilises these criteria. The relevant MNES includes:

- Listed threatened species
- Listed migratory species

In accordance with the guidelines, a significant impact is defined as 'an impact which is important, notable, or of consequence, having regard to its context or intensity'. For an impact to be considered 'likely', it is not necessary for the impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility.

A summary of the MNES relevant to the project area is provided in Table 5-1.

*Table 5-1 - Summary of Matters of National Environmental Significant (MNES) in the project area*

MNES	Number	Relevance
World Heritage Properties	None	Not relevant
National Heritage Places	None	Not Relevant
Wetlands of International Importance	None	Not relevant
Great Barrier Reef Marine Park	None	Not relevant
Commonwealth Marine Area	None	Not Relevant
Listed Threatened Ecological Communities	None	Not relevant
<b>Listed Threatened species<sup>1</sup></b>	<b>44</b>	<b>Relevant</b>
<b>Listed Migratory species</b>	<b>42</b>	<b>Relevant</b>

<sup>1</sup>Species listed as conservation dependant under the EPBC act are not matters of environmental significant for the purposes of Part 3 of the EPBC Act and are exempt from requirements for environmental approvals (CoA, 2013).

### 5.1 THREATENED SPECIES

In accordance with CoA, 2013, an action will require approval if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:

- extinct in the wild
- critically endangered
- endangered, or
- vulnerable.

A report was generated from the EPBC Act Protected Matters Search Tool (PMST) to identify listed threatened species that are known to occur or may occur within the project area. Terrestrial species (such as terrestrial mammals, reptiles, and bird species) that appear in the PMST results and do not have habitats along shorelines are not relevant to the proposed actions impacts and risks and have therefore been excluded from this referral. Relevant threatened species occurring within the project area are summarised in **Appendix B**.

The report identified 17 critically endangered and endangered species, and 27 vulnerable species that may occur within the project area.

### 5.1.1 Vulnerable Species

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species
- reduce the area of occupancy of an important population
- fragment an existing important population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of an important population
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
- introduce disease that may cause the species to decline, or
- interfere substantially with the recovery of the species.

The PMST report identified 27 species listed as vulnerable that may occur within the project area, including:

- 23 Seabird species
- 2 Marine Mammal species
- 1 Marine Reptile species
- 1 Shark species

Woodside considered that the proposed action will not have a significant impact on any of the species listed as vulnerable (Table 5-2, Table 5-3, Table 5-4 and Table 5-5).

#### 5.1.1.1 Vulnerable Seabirds

Table 5-2 Significant impact assessment of vulnerable seabird species that could occur in the offshore project area

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Lead to a long-term decrease in the size of an important population	<p><i>Not Significant</i></p> <p>An important population of this species does not exist in the project area.</p> <p>Impact on this species as a result of vessel light and atmospheric noise are expected to be negligible behavioural impacts which will not result in a decrease in the species population.</p>
Reduce the area of occupancy of the important population	<p><i>Not Significant</i></p> <p>An important population of this species does not exist in the project area.</p> <p>Impact on this species as a result of light and atmospheric noise emissions are expected to be negligible and will not reduce the available habitat for the species.</p>
Fragment an existing important population	<p><i>Not Significant</i></p> <p>An important population of this species does not exist in the project area.</p> <p>There is no impact credible pathway from the proposed action that will result in the fragmentation of a population of this species.</p>
Adversely affect habitat critical to the survival of a species	<p><i>Not Significant</i></p> <p>There is no habitat critical to the survival of this species in or in close proximity to the project area.</p>

Disrupt the breeding cycle of an important population	<i>Not Significant</i> An important population of this species does not exist in the project area. Impacts to this species are expected to be negligible behavioural impacts to a small number of individuals. These impacts will not disrupt the breeding cycle of the species.
Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline	<i>Not Significant</i> Light and atmospheric noise emissions will be localised, temporary and of short duration. These will not impact the availability or quality of this species habitat to an extent where the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable, species' habitat	<i>Not Significant</i> With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the proposed action is remote.
Introduce disease that may cause the species to decline	<i>Not Significant</i> There is not credible pathway that could result in the Proposed Action introducing a disease that may cause the species to decline.
Interfere substantially with the recovery of the species	<i>Not Significant</i> Given the above, and the control measures (Table 4-4), the proposed action is being undertaken in a manner such that the anthropogenic threats to seabirds are minimised, or where possible, eliminated. As such, the proposed action is not inconsistent with the Draft Wildlife Conservation Plan for Seabirds (CoA, 2015) and the recovery of the species.

### 5.1.1.2 Vulnerable Marine Mammals

Table 5-3 Significant impact assessment of vulnerable marine mammal species that could occur in the offshore project area

<b>Significant Impact Criteria (CoA, 2013)</b>	<b>Assessment of Significance of Impact</b>
Lead to a long-term decrease in the size of an important population	<i>Not Significant</i> Fin Whales and Sei Whales may occur within the project area. An important population of these species does not exist in the project area. Impact on this species as a result of vessel light and atmospheric noise are expected to be negligible behavioural impacts which will not result in a decrease in the species population.
Reduce the area of occupancy of the important population	<i>Not Significant</i> An important population of this species does not exist in the project area. Impact on this species as a result of light and atmospheric noise emissions are expected to be negligible and will not reduce the available habitat for the species.
Fragment an existing important population	<i>Not Significant</i>

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
	<p>An important population of this species does not exist in the project area.</p> <p>There is no impact credible pathway from the proposed action that will result in the fragmentation of a population of this species.</p>
Adversely affect habitat critical to the survival of a species	<p><i>Not Significant</i></p> <p>There is no habitat critical to the survival of marine mammal species in or in close proximity to the project area.</p>
Disrupt the breeding cycle of an important population	<p><i>Not Significant</i></p> <p>An important population of this species does not exist in the project area.</p> <p>Impacts to this species are expected to be negligible behavioural impacts to a small number of individuals. These impacts will not disrupt the breeding cycle of the species.</p>
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p><i>Not Significant</i></p> <p>Light and atmospheric noise emissions will be localised, temporary and of short duration. These will not impact the availability or quality of this species habitat to an extent where the species is likely to decline.</p>
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in vulnerable species' habitat	<p><i>Not Significant</i></p> <p>With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the proposed action is remote.</p>
Introduce disease that may cause the species to decline	<p><i>Not Significant</i></p> <p>There is not credible pathway that could result in the proposed action introducing a disease that may cause the species to decline.</p>
Interfere substantially with the recovery of the species	<p><i>Not Significant</i></p> <p>Given the above, and the control measures (Table 4-4), the proposed action is being undertaken in a manner such that the anthropogenic threats to marine mammals are minimised, or where possible, eliminated. As such, the proposed action is not inconsistent with Conservation Advice <i>Balaenoptera borealis</i> Sei Whale (TSSC, 2015a) and Conservation Advice <i>Balaenoptera physalus</i> Fin Whale (TSSC, 2015b).</p>

### 5.1.1.3 Vulnerable Marine Reptiles

Table 5-4 Significant impact assessment of vulnerable marine reptile species that could occur in the offshore project area

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Lead to a long-term decrease in the size of an important population	<p><i>Not Significant</i></p> <p>An important population of this species does not exist in the project area.</p>

	Impact on this species as a result of vessel light and noise are expected to be negligible behavioural impacts which will not result in a decrease in the species population.
Reduce the area of occupancy of the important population	<i>Not Significant</i> An important population of this species does not exist in the project area. Impact on this species as a result of vessel light and noise emissions are expected to be negligible and will not reduce the available habitat for the species.
Fragment an existing important population	<i>Not Significant</i> An important population of this species does not exist in the project area. There is no impact credible pathway from the proposed action that will result in the fragmentation of a population of this species.
Adversely affect habitat critical to the survival of a species	<i>Not Significant</i> There is no habitat critical to the survival of this species in or in close proximity to the project area.
Disrupt the breeding cycle of an important population	<i>Not Significant</i> An important population of this species does not exist in the project area. Impacts to this species are expected to be negligible behavioural impacts to a small number of individuals. These impacts will not disrupt the breeding cycle of the species.
Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline	<i>Not Significant</i> Light and atmospheric noise emissions will be localised, temporary and of short duration. These will not impact the availability or quality of this species habitat to an extent where the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable, species' habitat	<i>Not Significant</i> With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the proposed action is remote.
Introduce disease that may cause the species to decline	<i>Not Significant</i> There is not credible pathway that could result in the Proposed Action introducing a disease that may cause the species to decline.
Interfere substantially with the recovery of the species	<i>Not Significant</i> Given the above, and the control measures (Table 4-4)), the proposed action is being undertaken in a manner such that the anthropogenic threats to marine reptiles are minimised, or where possible, eliminated. As such, the proposed action is not inconsistent with the Recovery Plan for Marine Turtles (DoEE, 2017) and the recovery of the species.

#### 5.1.1.4 Vulnerable Fish, Sharks and Rays

Table 5-5 Significant impact assessment of vulnerable fish, sharks and ray species that could occur in the offshore project area

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Lead to a long-term decrease in the size of an important population	<p><i>Not Significant</i></p> <p>An important population of this species does not exist in the project area.</p> <p>Impact on this species as a result of vessel light and atmospheric noise are expected to be negligible behavioural impacts which will not result in a decrease in the species population.</p>
Reduce the area of occupancy of the important population	<p><i>Not Significant</i></p> <p>An important population of this species does not exist in the project area.</p> <p>Impact on this species as a result of vessel light and noise emissions are expected to be negligible and will not reduce the available habitat for the species.</p>
Fragment an existing important population	<p><i>Not Significant</i></p> <p>An important population of this species does not exist in the project area.</p> <p>There is no impact credible pathway from the proposed action that will result in the fragmentation of a population of this species.</p>
Adversely affect habitat critical to the survival of a species	<p><i>Not Significant</i></p> <p>There is no habitat critical to the survival of this species in or in close proximity to the project area.</p>
Disrupt the breeding cycle of an important population	<p><i>Not Significant</i></p> <p>An important population of this species does not exist in the project area.</p> <p>Impacts to this species are expected to be negligible behavioural impacts to a small number of individuals. These impacts will not disrupt the breeding cycle of the species.</p>
Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p><i>Not Significant</i></p> <p>Light and atmospheric noise emissions will be localised, temporary and of short duration. These will not impact the availability or quality of this species habitat to an extent where the species is likely to decline.</p>
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable, species' habitat	<p><i>Not Significant</i></p> <p>With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the proposed action is remote.</p>
Introduce disease that may cause the species to decline	<p><i>Not Significant</i></p> <p>There is not credible pathway that could result in the Proposed Action introducing a disease that may cause the species to decline.</p>
Interfere substantially with the recovery of the species	<p><i>Not Significant</i></p> <p>Given the above, and the control measures (Table 4-4), the proposed action is being undertaken in a manner such that the anthropogenic threats to marine reptiles are minimised, or where possible, eliminated. As such, the proposed action is not inconsistent with the National Recovery Plan for the White Shark</p>

(*Carcharodon carcharias*) (DSWEPaC, 2013) and the recovery of the species.

## 5.1.2 Critically Endangered and Endangered Species

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population
- reduce the area of occupancy of the species
- fragment an existing population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of a population
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
- introduce disease that may cause the species to decline or interfere with the recovery of the species.

The PMST report identified 17 species listed as critically endangered or endangered that may occur within the project area, including:

- 13 Seabird species
- 2 Marine Mammal species
- 2 Marine Reptile species

Woodside considered that the proposed action will not have a significant impact on any of the species listed as critically endangered or endangered (Table 5-6, Table 5-7 and Table 5-8)

### 5.1.2.1 Critically Endangered and Endangered Seabirds

Table 5-6 Significant impact assessment of critically endangered and endangered seabird species that could occur in the offshore project area

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Lead to a long-term decrease in the size of a population	<p><i>Not Significant</i></p> <p>There are 13 critically endangered and endangered Seabird species that may be present in the project area (Appendix B).</p> <p>The project area does not overlap important habitat for any of these species except for the foraging BIA for the Shy Albatross.</p> <p>The primary sources of potential impacts for the Shy Albatross and other critically endangered or endangered seabird species are atmospheric noise and light emissions from the proposed action. Marine discharges from the vessel and subsea infrastructure are expected to have no lasting effect to the species.</p> <p>As described in Table 4-4, impacts as a result of atmospheric noise and light emissions are expected to be limited to minor temporary behavioural impacts (avoidance or attraction to activities associated with the proposed action).</p> <p>Given the above, no long-term decrease in the size of Shy Albatross and other seabird populations will occur as a result of the proposed action.</p>

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Reduce the area of occupancy of the species	<p><i>Not Significant</i></p> <p>As described in Table 4-4, impacts to seabirds as a result of atmospheric noise and light emissions are expected to be limited to minor temporary behavioural impacts (avoidance or attraction to activities associated with the proposed action).</p> <p>Given the above, the Shy Albatross will not be displaced from the foraging BIA overlapping the project area.</p> <p>No other aspects could credibly reduce the area of occupancy of critically endangered or endangered seabird species.</p>
Fragment an existing population into two or more populations	<p><i>Not Significant</i></p> <p>There is no impact credible pathway from the proposed action that will result in the fragmentation of a population of seabird species.</p>
Adversely affect habitat critical to the survival of a species	<p><i>Not Significant</i></p> <p>There is no habitat critical to the survival of seabirds in or in close proximity to the project area.</p>
Disrupt the breeding cycle of a population	<p><i>Not Significant</i></p> <p>The project area does not overlap important breeding areas for seabirds.</p> <p>Seabirds typically nest on isolated islands, and there are no known nesting locations for endangered or critically endangered seabirds within 20 km of the project area.</p> <p>Given this, the proposed action will not disrupt the breeding cycle of critically endangered and endangered seabird populations.</p>
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p><i>Not Significant</i></p> <p>As described in Table 4-4, impacts to seabirds as a result of atmospheric noise and light emissions are expected to be limited to minor temporary behavioural impacts (avoidance or attraction to activities associated with the proposed action).</p> <p>Vessel and subsea infrastructure discharges are expected to result in localised and temporary reduction in water quality.</p> <p>As such, the proposed action will not modify, destroy, remove, isolate or decrease the availability or quality of habitat for critically endangered and endangered seabird species to the extent that the species is likely to decline.</p>
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	<p><i>Not Significant</i></p> <p>With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the proposed action is remote.</p>
Introduce disease that may cause the species to decline	<p><i>Not Significant</i></p> <p>There is not credible pathway that could result in the proposed action introducing a disease that may cause the species to decline.</p>
Interfere with the recovery of the species	<p><i>Not Significant</i></p> <p>The action areas in the Wildlife Conservation Plan for Seabirds (CoA, 2020) relevant to the proposed action include:</p>

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
	<ul style="list-style-type: none"> <li>Action 2E: Mitigate against impacts of light pollution by vessels at sea</li> </ul> <p>Given the mitigation measures to reduce the impact of light emissions on seabird species (Table 4-4), the proposed action is being undertaken in a manner such that the anthropogenic threats to seabirds are minimised. As such, the proposed action is not inconsistent with the Wildlife Conservation Plan for Seabirds (CoA, 2020) and the recovery of the species.</p>

### 5.1.2.2 Critically Endangered and Endangered Marine Mammals

Table 5-7 Significant impact assessment of critically endangered and endangered marine mammal species that could occur in the offshore project area

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Lead to a long-term decrease in the size of a population	<p><i>Not Significant</i></p> <p>The project area overlaps BIAs of the pygmy blue whale (foraging and distribution) and southern right whale (migration and reproduction).</p> <p>The primary sources of potential impacts to whales from the proposed action are underwater noise and unplanned vessel interactions. Noise interference and vessel strike is identified as a key threat to pygmy blue whales and southern right whales in the Conservation Management Plan for the Blue Whales (DoE, 2015) and the Draft National Recovery Plan for the Southern Right Whale (DCCEEW, 2022). Marine discharges from the vessel and subsea infrastructure are expected to have no lasting effect to the species.</p> <p>As described in Table 4-4, impacts as a result of underwater noise emissions are expected to be limited to temporary behavioural impacts (avoidance) to a small number of migrating pygmy blue whales within the foraging and distribution BIA. On the basis of the noise modelling results (refer to Appendix C), the risk of a whales being exposed to TTS or PTS from continuous underwater noise sources associated with the proposed action is highly unlikely.</p> <p>The reproduction BIA for southern right whales overlaps the project area between May and October, with peak abundance occurring between July and August. The proposed action will not occur between May and August during peak whale abundance, therefore, will not disrupt the breeding cycle or migration of this species and will not result in a reduction of the population.</p> <p>The MCV will be typically either stationary or moving slowly in the project area; hence, the chance of a vessel-whale collision resulting in lethal outcome within these waters is much reduced. The worst-case consequence from a vessel strike would be the fatality of a single individual pygmy blue whale or southern right whale. However, as they would represent an individual within the population, it is not expected to result in a long-term decrease to the population.</p>

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
	Given the above, no long-term decrease in the size of the pygmy blue whale and southern right whale populations will occur as a result of the proposed action.
Reduce the area of occupancy of the species	<p><i>Not Significant</i></p> <p>The only continuous underwater noise source related to the proposed action is from project vessels and subsea infrastructure removal. As described Table 4-4, behavioural impacts would be limited to short-term impacts, such as attraction or avoidance, and be localised within 10's of metres from the noise source.</p> <p>As described above, pygmy blue whales and southern right whales will not be displaced from the possible foraging area.</p> <p>No other aspects could credibly reduce the area of occupancy of pygmy blue whales or southern right whales.</p>
Fragment an existing population into two or more populations	<p><i>Not Significant</i></p> <p>There is no impact credible pathway from the proposed action that will result in the fragmentation of a population of pygmy blue whales.</p>
Adversely affect habitat critical to the survival of a species	<p><i>Not Significant</i></p> <p>There is no habitat critical to the survival of the pygmy blue whale in or in close proximity to the project area.</p> <p>The project area overlaps the reproduction BIA of the southern right whale, which will be classified as habitat critical to the survival of the species when the Draft National Recovery Plan for Southern Right Whales comes into effect (DCCEEW, 2022). The proposed action will not occur within the breeding and calving period of southern right whales May until August. Given this, no adverse impacts to habitat critical to the survival of the species will occur.</p>
Disrupt the breeding cycle of a population	<p><i>Not Significant</i></p> <p>Pygmy blue whales do not breed or calve in or in close proximity of the project area. As described above, impacts within the distribution and foraging BIA are expected to be limited to temporary behavioural disturbance to a small number of individuals and pygmy blue whales are not expected to be displaced from the possible foraging BIA. Given this, the proposed action will not disrupt the breeding cycle of the pygmy blue whale population.</p> <p>As described above, the proposed action will not overlap with the southern right whale reproduction BIA occurring between May-September. Southern right whales will therefore not be displaced from the reproduction BIA. Impacts within the migratory BIA are expected to be limited to temporary behavioural disturbance to a small number of individuals and southern right whales are not expected to be displaced from the migration BIA.</p> <p>Given this, the proposed action will not disrupt the breeding cycle of the southern right whale population.</p>
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p><i>Not Significant</i></p> <p>The only continuous underwater noise source related to the proposed action is from project vessels and subsea infrastructure removal. As described Table 4-4, behavioural impacts would be</p>

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
	<p>limited to short-term impacts, such as attraction or avoidance, and be localised within 10's of metres from the noise source.</p> <p>Other aspects such as vessel and subsea infrastructure discharges are expected to result in localised and temporary reduction in water quality and are expected to have no lasting effect on habitat for the pygmy blue whales and southern right whales.</p> <p>As such, the proposed action will not modify, destroy, remove, isolate or decrease the availability or quality of pygmy blue whale and southern right whale habitat to the extent that the species is likely to decline.</p>
<p>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</p>	<p><i>Not Significant</i></p> <p>With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the proposed action is remote.</p>
<p>Introduce disease that may cause the species to decline</p>	<p><i>Not Significant</i></p> <p>There is not credible pathway that could result in the proposed action introducing a disease that may cause the species to decline.</p>
<p>Interfere with the recovery of the species</p>	<p><i>Not Significant</i></p> <p><b>Pygmy Blue Whale</b></p> <p>The two action areas in the Conservation Management Plan for the Blue Whale (2015-2025) (DoE, 2015b) that are relevant to the proposed action are:</p> <ul style="list-style-type: none"> <li>• A.2: Assessing and addressing anthropogenic noise (actions 3)</li> <li>• A.4: Minimising vessel collisions (action 3)</li> </ul> <p><b>Action Area A.2, Action 3 of the Blue Whale CMP that states that:</b></p> <p><i>“anthropogenic noise in biologically important areas (BIAs) will be managed such that any blue whale continues to utilise the area without injury, and is not displaced from a foraging area”.</i></p> <p>Behavioural impacts would be limited to short-term impacts, such as attraction or avoidance, and be localised within 10's of metres from the noise source.</p> <p>Woodside considers that the implementation of the proposed management and mitigation measures (refer to Appendix C) demonstrates, with a high level of confidence, that unacceptable impacts to pygmy blue whales will be prevented, by minimising the risk of injury to pygmy blue whales or displacement of pygmy blue whales from the Bonney Upwelling foraging area, as a result of underwater noise emissions associated with the proposed action.</p> <p>Best practice management measures in accordance with the principles of ESD have been established within this plan and successful implementation will ensure that, with a high degree of certainty, the anthropogenic noise from the proposed action will be managed such that any blue whale will be able to continue to</p>

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
	<p>utilise the migratory BIA without injury, and no blue whale will be displaced from a foraging area.</p> <p><b>Action Area A.4, Action 3 states that:</b></p> <p><i>“Ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented”</i></p> <p>The risk of vessel strikes on pygmy blue whales has been considered within this assessment and in the planning for the proposed action. Control measures have been adopted and are described in Table 4-4. The risk of injury to pygmy blue whales as a result of vessel strike has been assessed as low.</p> <p><b>Conclusion:</b></p> <p>Given the above, the proposed action is not inconsistent with the Conservation Management Plan for the Blue Whale (2015-2025) (DoE, 2015).</p> <p><b>Southern Right Whale</b></p> <p>The two action areas in the Draft National Recovery Plan for the Southern Right Whale (DCCEEW, 2022) that are relevant to the proposed action are:</p> <ul style="list-style-type: none"> <li>• A5: Assess and address impacts to Southern Right Whales from anthropogenic underwater noise (actions 2, 3 and 4)</li> <li>• A.6: Manage, minimise and mitigate the threat of vessel strike within the Southern Right Whale BIAs and HCTs (actions 1, 3 and 5)</li> </ul> <p><b>Action Area A5, Action 2 states that:</b></p> <p><i>“Actions within and adjacent to Southern Right Whale BIAs and HCTS should demonstrate that it does not prevent any Southern Right Whale from utilising the area or cause injury (TTS and PTS) and/or disturbance.”</i></p> <p>As described in Appendix C, injury (TTS and PTS) will not credibly occur to southern right whales as a result of the proposed activities.</p> <p><b>Action Area A5, Action 3 requires the action to:</b></p> <p><i>“Ensure environmental assessments associated with underwater noise generating activities include consideration of national policy (e.g., EPBC Act Policy Statement 2.1) and guidelines related to managing anthropogenic underwater noise and implement appropriate mitigation measures to reduce risks to Southern Right Whales to the lowest possible level.”</i></p> <p>As demonstrated in Appendix C, behavioural impacts would be limited to short-term impacts, such as attraction or avoidance, and be localised within 10’s of metres from the noise source.</p> <p>Woodside considers that the implementation of the proposed management and mitigation measures (refer to Table 4-4) demonstrates, with a high level of confidence, that unacceptable impacts to southern right whales will be prevented, by minimising the risk of injury or displacement of southern right whales from the migration and reproduction BIA, as a result of underwater noise emissions associated with the proposed action.</p>

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
	<p>Best practice management measures in accordance with the principles of ESD have been established within this plan and successful implementation will ensure that, with a high degree of certainty, the anthropogenic noise from the proposed action will be managed such that any southern right whale will be able to continue to utilise the migratory and reproduction BIAs without injury, and no southern right whale will be displaced from a foraging or breeding area.</p> <p><b>Action Area A5, Action 4 requires the action to:</b></p> <p><i>“Quantify risks of anthropogenic underwater noise to Southern Right Whales, including behavioural disturbance, changes to vocalisations, and physiological effects to whales.</i></p> <p>Woodside commissioned JASCO to conduct underwater sound transmission loss modelling to determine the potential impact of the proposed action on behavioural and physiological impacts to whales (Appendix C). Results quantify that temporary behavioural impacts to southern right whales are likely within 10s of meters from the source (vessel). Noise modelling results indicate no physiological impacts (TTS or PTS) to southern right whales will credibly occur from the proposed action.</p> <p><b>Action Area A6, Action 1 requires the action to:</b></p> <p><i>“Assess risk of vessel strike to Southern Right Whales in BIAs”</i></p> <p>The risk of vessel strikes on southern right whales has been considered within this assessment and in the planning for the proposed action. Control measures have been adopted and are described in Table 4-4. The risk of injury to southern right whales as a result of vessel strike has been assessed as low.</p> <p><b>Action Area A6, Action 3 requires the action to:</b></p> <p><i>“Ensure environmental impact assessments and associated plans consider and quantify the risk of vessel strike and associated potential cumulative risks in BIAs”</i></p> <p>The proposed action overlaps the migration and reproduction BIAs for the southern right whale. The southern right whale reproduction BIA peak period occurs between May-September. Given that the proposed action will not occur within the peak reproductive period May until August, the risk of injury to southern right whales as a result of vessel strike during the migration BIA has been assessed as low. Avoidance and mitigation measures as described in Table 4-4 will be implemented during the proposed action.</p> <p><b>Action Area A6, Action 5 requires the action to:</b></p> <p><i>“Ensure all vessel strike incidents are reported in the National Ship Strike Database managed through the Australian Marine Mammal Centre, Australian Antarctic Division.”</i></p> <p>As described in Table 4-4, in the unlikely event that vessel strikes with southern right whales occur, it will be reported to the National Ship Strike Database within the required timeframes.</p> <p><b>Conclusion:</b></p> <p>Given the above, the proposed action is not inconsistent with the Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022).</p>

### 5.1.2.3 Critically Endangered and Endangered Marine Reptiles

Table 5-8 Significant impact assessment of critically endangered and endangered marine reptile species that could occur in the offshore project area

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Lead to a long-term decrease in the size of a population	<p><i>Not Significant</i></p> <p>The PMST Report identified the loggerhead turtle and leatherback turtle to potentially occur within the project area.</p> <p>The primary sources of potential impacts for the turtle species are noise and light emissions from the proposed action. Marine discharges from the vessel and subsea infrastructure are expected to have no lasting effect to the species.</p> <p>The loggerhead turtle is not expected to occur within the project area, as the species is rarely seen off the Victorian coast, preferring warmer climates in northern and eastern Australia. Whilst breeding behaviour for the leatherback turtle was identified as likely to occur within the light assessment area, these waters do not represent critical habitat for the species and breeding for the leatherback turtle has not been recorded in Victoria (Limpus, 2009).</p> <p>As described in Table 4-4, impacts as a result of light and noise emissions are expected to be limited to minor temporary behavioural impacts (avoidance or attraction to activities associated with the proposed action).</p> <p>Given the above, no long-term decrease in the size of loggerhead and leatherback turtle populations will occur as a result of the proposed action.</p>
Reduce the area of occupancy of the species	<p><i>Not Significant</i></p> <p>As described above, both the loggerhead turtle and leatherback turtle are unlikely to occupy the project area. The loggerhead turtle prefers warmer climates in northern and eastern Australia, and the project area does not represent critical habitat for the leatherback turtles.</p> <p>No other aspects could credibly reduce the area of occupancy of critically endangered or endangered seabird species.</p>
Fragment an existing population into two or more populations	<p><i>Not Significant</i></p> <p>There is no impact credible pathway from the proposed action that will result in the fragmentation of a population of turtle species.</p>
Adversely affect habitat critical to the survival of a species	<p><i>Not Significant</i></p> <p>There is no habitat critical to the survival of turtles in or in close proximity to the project area.</p>
Disrupt the breeding cycle of a population	<p><i>Not Significant</i></p> <p>As described above, sightings of loggerhead turtles within the project area is not expected to occur. Whilst breeding behaviour for the leatherback turtle was identified as likely to occur within the light assessment area, these waters do not represent critical habitat for the species and breeding for the leatherback turtle has not been recorded in Victoria (Limpus, 2009).</p>

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
	Given this, the proposed action will not disrupt the breeding cycle of critically endangered and endangered turtle populations.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p><i>Not Significant</i></p> <p>As described in Table 4-4, impacts as a result of light emissions are expected to be limited to minor temporary behavioural impacts (avoidance or attraction to activities associated with the proposed action).</p> <p>Vessel and subsea infrastructure discharges are expected to result in localised and temporary reduction in water quality.</p> <p>As such, the proposed action will not modify, destroy, remove, isolate or decrease the availability or quality of habitat for critically endangered and endangered turtle species to the extent that the species is likely to decline.</p>
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	<p><i>Not Significant</i></p> <p>With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the proposed action is remote.</p>
Introduce disease that may cause the species to decline	<p><i>Not Significant</i></p> <p>There is not credible pathway that could result in the proposed action introducing a disease that may cause the species to decline.</p>
Interfere with the recovery of the species	<p><i>Not Significant</i></p> <p>The action area in the Recovery Plan for Marine Turtles (DoEE, 2017) that is relevant to the proposed action is:</p> <ul style="list-style-type: none"> <li>• A8: minimise light pollution</li> </ul> <p>Impacts as a result of light emissions are expected to be limited to minor temporary behavioural impacts (avoidance or attraction to activities associated with the proposed action).</p> <p>Although there are no actions in the Recovery Plan for Marine Turtles (DOEE, 2017) directly addressing vessel strike, vessel disturbance including boat strike is recognised as a key threat to turtles.</p> <p>Leatherback and loggerhead turtles would only occur infrequently and in low numbers (i.e., individual turtles) in the operational area. Given the nature of vessel movements undertaking the petroleum activity in the operational area and the low number of leatherback turtles, collisions between vessels and turtles are not expected to occur.</p> <p>Given the above, and the control measures (Table 4-4), the proposed action is being undertaken in a manner such that the anthropogenic threats to marine reptiles are minimised, or where possible, eliminated. As such, the proposed action is not inconsistent with the Recovery Plan for Marine Turtles (DoEE, 2017) and the recovery of the species.</p>

## 5.2 MIGRATORY SPECIES

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species
- result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species

The PMST report (excluding terrestrial species, **Appendix B**) identified 42 species listed as migratory that may occur within the project area, including:

- 29 Seabirds species
- 8 Marine Mammals species
- 3 Marine Reptiles species
- 2 Shark species

Woodside considered that the proposed action will not have a significant impact on any of the species listed as migratory (Table 5-9, Table 5-10, Table 5-11, and Table 5-12).

### 5.2.1 Migratory Seabirds

Table 5-9 Significant impact assessment of migratory seabird species that could occur in the offshore project area

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p><i>Not Significant</i></p> <p>The project area overlaps important foraging areas of 7 migratory bird species including:</p> <ul style="list-style-type: none"> <li>• Antipodean Albatross</li> <li>• Black-browed Albatross</li> <li>• Buller's Albatross</li> <li>• Campbell Albatross</li> <li>• Indian Yellow-nosed Albatross</li> <li>• Shy Albatross</li> <li>• Wandering Albatross</li> </ul> <p>The proposed action is not expected to modify the habitat in the project area such that these species will be affected.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	<p><i>Not Significant</i></p> <p>With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the Proposed Action is remote.</p>
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p><i>Not Significant</i></p> <p>As described above, the project area overlaps the important foraging areas of 7 migratory bird species.</p> <p>Impacts to these species are expected to be slight or negligible behavioural impacts to a small number of individuals. These impacts will not disrupt the feeding behaviour of the species.</p>

### 5.2.2 Migratory Marine Mammals

Table 5-10 Significant impact assessment of migratory marine mammal species that could occur in the offshore project area

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p><i>Not Significant</i></p> <p>The project area is not an important habitat for marine mammal species except for the endangered pygmy blue whale and southern right whale.</p> <p>The only continuous underwater noise source related to the proposed action is from project vessels and subsea infrastructure removal. As described in Appendix C, noise from project vessels and infrastructure removal activities is not predicted to result in major behavioural impacts to these species. Injury from noise associated with the proposed action is not considered credible.</p> <p>Other aspects such as routine vessel discharges and seabed disturbance from subsea infrastructure removal activities will result in changes in water quality that will be localised, temporary and of short duration. No lasting effect on marine mammals is expected.</p> <p>As such, the proposed action will not substantially modify, destroy, or isolate an area of important habitat for these migratory species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	<p><i>Not Significant</i></p> <p>The project area is not an important habitat for marine mammal species except for the endangered pygmy blue whale and southern right whale.</p> <p>With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the proposed action is remote.</p>
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p><i>Not Significant</i></p> <p>The project area is not an important habitat for marine mammal species except for the endangered pygmy blue whale and southern right whale.</p> <p>The southern right whale is known to breed in close proximity of the project area. Southern right whales migrate within the region from April- November and reproduce between May and September. The proposed action is planned to occur outside of the reproduction time period, with a temporary avoidance measure in place May until August, but may overlap the southern right whale migration period.</p> <p>As described above, impacts are expected to be limited to temporary behavioural disturbance to a small number of individuals. Impacts within the pygmy blue whale feeding and distribution BIA, and the southern right whale migration BIA are expected to be limited to temporary behavioural disturbance to a small number of individuals.</p> <p>Given this, impacts will not disrupt the breeding, feeding, migration or resting behaviour of the species.</p>

### 5.2.3 Migratory Marine Reptiles

Table 5-11 Significant impact assessment of migratory marine reptile species that could occur in the offshore project area

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p><i>Not Significant</i></p> <p>The project area is not an important habitat for migratory marine reptile species.</p> <p>The proposed action will not substantially modify, destroy, or isolate an area of important habitat for these migratory species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	<p><i>Not Significant</i></p> <p>The project area is not an important habitat for migratory marine reptile species.</p> <p>With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the proposed action is remote.</p>
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p><i>Not Significant</i></p> <p>An important population of these species does not exist in the project area.</p> <p>Impacts to these species are expected to be slight or negligible behavioural impacts to a small number of individuals. These impacts will not disrupt the breeding, feeding, migration or resting behaviour of the species.</p>

## 5.2.4 Migratory Fish, Sharks and Rays

Table 5-12 Significant impact assessment of migratory fish, sharks and ray species that could occur in the offshore project area

Significant Impact Criteria (CoA, 2013)	Assessment of Significance of Impact
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p><i>Not Significant</i></p> <p>The project area is not an important habitat for fish species except for the White Shark. The project area intersects the White Shark Distribution BIA.</p> <p>The proposed action will not substantially modify, destroy, or isolate an area of important habitat for these migratory species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	<p><i>Not Significant</i></p> <p>With the implementation of the proposed management and mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the proposed action is remote.</p>
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p><i>Not Significant</i></p> <p>The project area overlaps the white shark BIA.</p> <p>Impacts to these species are expected to be slight or negligible behavioural impacts to a small number of individuals. These impacts will not disrupt the breeding, feeding, migration or resting behaviour of the species.</p>

## REFERENCES

- ANZECC/ARMCANZ (2000). National Water Quality Management Strategy Paper No. 4. Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, The Guidelines, Chapters 1-7. Australian and New Zealand Environment and Conservation Council/ Agriculture and Resource Management Council of Australia and New Zealand. October 2000.
- Australian Indigenous HealthInfoNet, n.d. Country, culture and spirituality. Available at: <https://healthinfonet.ecu.edu.au/learn/health-topics/social-and-emotional-wellbeing/country-culture-spirituality/>
- Benjamin, J., O'Leary, M., McDonald, J., Wisemen, C., McCarthy, J., Beckett, E., Morrison, P., Stankiewicz, F., Leach, J., Hacker, J., Baggaley, P., Jerbic, K., Fowler, M., Fairweather, J., Jefferies, P., Ulm, S., Bailey, G. (2020). Aboriginal artefacts on the continental shelf reveal ancient drowned cultural landscapes in northwest Australia. *PLoS ONE* 15: e0233912.
- Benjamin, J., O'Leary, M., McCarthy, J., Reynen, W., Wiseman, C., Leach, J., Bobeldyk, S., Buchler, J., Kermeen, P., Langley, M., Black, A., Yoshida, H., Parnum, I., Stevens, A., Ulm, S., McDonald, J. Veth, P., Bailey, G. (2023). Stone artefacts on the seabed at a submerged freshwater spring confirm a drowned cultural landscape in Murujuga, Western Australia. *Quaternary Science Reviews*, (313). <https://doi.org/10.1016/j.quascirev.2023.108190>.
- Clarkson, C., Jacobs, Z., Marwick, B., Fullagar, R., Wallis, L., Smith, M., Roberts, R., Hayes, E., Lowe, K., Carah, X., Florin, S., McNeil, J., Cox, D., Arnold, L., Hua, Q., Huntley, J., Brand, H., Manne, T., Fairbairn, A., Shulmeister, J., Lyle, L., Salinas, M., Page, M., Connell, K., Park, G., Norman, K., Murphy, T. and Pardoe, C. 2017. Human occupation of northern Australia by 65,000 years ago. *Nature* (547) 306–310. Doi: <https://doi.org/10.1038/nature22968>
- Commonwealth of Australia (CoA). 2012. Conservation Management Plan for the Southern Right Whale. Accessed from: [Conservation Management Plan for the Southern Right Whale \(dcceew.gov.au\)](https://www.dcceew.gov.au/conservation/management-plans/southern-right-whale)
- Commonwealth of Australia (CoA). 2013. Matters of Environmental Significance – Significant impact guidelines 1.1. Available from: [Matters of National Environmental Significance: Significant Impact Guidelines 1.1 \(dcceew.gov.au\)](https://www.dcceew.gov.au/matters-of-environmental-significance/significant-impact-guidelines-1.1).
- Commonwealth of Australia (CoA). 2015. CoA. 2015. Conservation Management Plan for the Blue Whale. Commonwealth of Australia. Accessed March 2024 from The Wildlife Conservation Plan for Migratory Shorebirds. Commonwealth of Australia. Accessed March 2024 from [Conservation Management Plan for the Blue Whale \(dcceew.gov.au\)](https://www.dcceew.gov.au/conservation/management-plans/blue-whale)
- Commonwealth of Australia (CoA). 2017. National Strategy for Reducing Vessel Strike on Cetaceans and Other Marine Megafauna. Accessed from: [National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Mega-fauna \(dcceew.gov.au\)](https://www.dcceew.gov.au/conservation/management-plans/national-strategy-reducing-vessel-strike-cetaceans)
- Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2022). Draft National Recovery Plan for the Southern Right Whale (*Eubalaena australis*). Accessed from: <https://www.dcceew.gov.au/environment/biodiversity/threatened/recovery-plans/comment/draft-recovery-plan-southern-right-whale-2023#:~:text=in%20Western%20Australia,-.The%20draft%20National%20Recovery%20Plan%20for%20the%20Southern%20Right%20Whale,support%20recovery%20of%20the%20species>
- Department of Climate Change, the Environment, Energy and Water (DCCEEW). 2023. Indigenous Protected Areas. Accessed at <https://www.dcceew.gov.au/environment/land/indigenous-protected-areas>
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). 2013. Recovery Plan for the White Shark (*Carcharodon carcharias*). A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 2000. In effect under the EPBC Act from 06-Aug-2013. Commonwealth of Australia, 2013.
- Department of Sustainability, Environment, Water, Populations and Communities (DSEWPaC). 2012. Conservation Management Plan for the Southern Right Whale. A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 2011-2021. Department of Sustainability, Environment, Water, Population and Communities. Accessed from <https://www.awe.gov.au/environment/biodiversity/threatened/recovery-plans/conservation-management-plan-southern-right-whale-recovery-plan-2011-2021>
- Department of the Environment (DoE). 2015. Conservation Management Plan for the Blue Whale - A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999. Department of the

- Environment, Canberra, ACT: Commonwealth of Australia. Available from: [Conservation Management Plan for the Blue Whale \(dcceew.gov.au\)](https://www.dcceew.gov.au/conservation/management-plan/blue-whale)
- Department of the Environment and Energy (DoEE) (2017). Recovery Plan for Marine Turtles in Australia. Accessed May 2022 from: [dcceew.gov.au/sites/default/files/documents/recovery-plan-marine-turtles-2017.pdf](https://www.dcceew.gov.au/sites/default/files/documents/recovery-plan-marine-turtles-2017.pdf)
- Dernie, K.M., Kaiser, M.J. & Warwick, R.M. 2003a. Recovery rates of benthic communities following physical disturbance. *Journal of Animal Ecology*. 72(6):1043-1056.
- Dernie, K.M., Kaiser, M.J., Warwick, R.M. & Richardson, E.A. 2003b. Recovery of soft sediment communities and habitats following physical disturbance. *Journal of Experimental Marine Biology and Ecology*. 286: 415-434.
- Director of National Parks. (2013). South-east Commonwealth Marine Reserves Network management plan 2013-23. Director of National Parks, Canberra. Available from: <https://parksaustralia.gov.au/marine/pub/plans/se-network-management-plan2013-23.pdf>
- Gaughwin, D. & Fullagar, R. (1995). Victorian Offshore Islands in a Mainland Coastal Economy. *Australian Archaeology*, 40: 38 – 50.
- Helm, R., Costa, D., Debruyne, T., O'Shea, T., Wells, R. & Williams, T. 2015. Overview of Effects of Oil Spills on Marine Mammals. *Environmental Science, Biology*.
- Higgins, N. (2021). Songlines and Land Claims; Space and Place, *International Journal for the Semiotics of Law*, 34(3):1-19.
- International Council of Monument and Sites (ICOMOS). 2013. The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, International Council of Monument and Sites. Available at: <https://australia.icomos.org/publications/burra-charter-practice-notes/>
- International Council on Monuments and Sites (ICOMOS) (2019). Budj Bim Cultural Landscape (Australia) No 1577. Available from: <https://whc.unesco.org/document/176137>
- Jensen, A.S. and Silber, G.K. (2003). Large whale ship strike database. U.S. Department of Commerce. National Oceanic and Atmospheric Administration. Technical Memorandum NMFS-OPR. 37 pp.
- Juluwarlu. (2004). Wanggarra: That which gives life. Available at: <https://www.youtube.com/watch?v=uvJr4-d475w>
- Kenney RD (2018). Right Whales: *Eubalaena Glacialis*, *E. Japonica*, and *E. Australis*, in B. Würsig, J. G. M. Thewissen and K. M. Kovacs. *Encyclopedia of Marine Mammals (Third Edition)*. Academic Press. pp 817-822.
- Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M. (2001). Collisions between ships and whales. *Marine Mammal Science*, 17: 35-75.
- Limpus, C.J. (2009). A Biological Review of Australian Marine Turtles. 6. Leatherback Turtle *Dermochelys coriacea* (Vandelli). Queensland Environmental Protection Agency, January 2009.
- McDonald, E.M., & Phillips, T. (2021). Report of an Ethnographic Consultation Regarding Woodside's Scarborough Gas Project & Submerged Landscape, Pilbara, Western Australia – Phase I. Report by Ethnoscience to Murujuga Aboriginal Corporation.
- McNiven, I. (2004). Saltwater People: spiritscapes, maritime rituals and the archaeology of Australian indigenous seascapes. *World Archaeology*, 35(3): 329-349.
- Muller, S. (2008). Community-Based Management of Saltwater Country, Northern Australia. *Development* 51: 139–143.
- Neale, M. and Kelly, L., 2020. *Songlines: The Power and the Promise*. Thames & Hudson Australia Pty Ltd, Australia.
- O'Hara P.D. and Morandin L.A. (2010). Effects of sheens associated with offshore oil and gas development on feather microstructure of pelagic seabirds. *Marine Pollution Bulletin* 60: 672-678.
- Parks Victoria. 2006. Twelve Apostles Marine National Park and The Arches Marine Sanctuary Management Plan, Parks Victoria.
- Smyth, D. & Isherwood, M. (2016). 'Protecting sea country: indigenous people and marine protected areas in Australia' in *Big, Bold and Blue : Lessons From Australia's Marine Protected Areas*, edited by Wescott G & Fitzsimons J, CSIRO Publishing, Victoria

- Smyth, D. (2007). "Sea Countries of the North-West: Literature review on Indigenous connection to and uses of the North West Marine Region" Sea countries of the North-west: Literature review on Indigenous connection to and uses of the North-west Marine Region (dcceew.gov.au).
- Smyth, D. (2008). Just Add Water? Taking Indigenous Protected Areas into Sea Country.
- Surman, C. (2002). Survey of the marine avifauna at the Laverda-2 appraisal well (WA-271-P) Enfield Area Development and surrounding waters. Report prepared for Woodside Energy Ltd., Perth.
- TSSC. 2015a. Conservation Advice *Balaenoptera borealis* sei whale. Threatened Species Scientific Committee. Accessed from <http://www.environment.gov.au/biodiversity/threatened/species/pubs/34-conservation-advice-01102015.pdf>
- TSSC. 2015b. Conservation Advice *Balaenoptera physalus* fin whale. Threatened Species Scientific Committee. Accessed from <http://www.environment.gov.au/biodiversity/threatened/species/pubs/37-conservation-advice-01102015.pdf>
- United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2019). 43COM 8B.14 - Budj Bim Cultural Landscape (Australia). Available from: <https://whc.unesco.org/en/decisions/7371>
- UWA. (2021). Scarborough Pipeline Cultural Heritage Assessment: Establishing Archaeological Potential and Significance. Technical report by UWA for Woodside Energy Limited.
- Vanderlaan, A.S.M. and Taggart, C.T. (2007). Vessel collisions with whales: The probability of lethal injury based on vessel speed. *Marine Mammal Science*, 23: 144-156.
- Veth, P., McDonald, J., Ward, I., O'Leary, M., Beckett, E., Benjamin, J., Ulm, S., Hacker, J., Ross, P. and Bailey, G. (2019). A Strategy for Assessing Continuity in Terrestrial and Maritime Landscapes from Murujuga (Dampier Archipelago), North West Shelf, Australia. *The Journal of Island and Coastal Archaeology* 15(4): 477-503. Doi: 10.1080/15564894.2019.1572677
- Ward, I., Larcombe, P., Ross, P. and Fandry, C. (2022). Applying geoarchaeological principles to marine archaeology: A reappraisal of the "first marine" and "in situ" lithic scatters in the Dampier Archipelago, NW Australia. *Geoarchaeology* (37), 783– 810. <https://doi.org/10.1002/gea.21917>.
- Wiese, F. K., Montevecchi, W. A., Davoren, G.K., Huettmann, F. Diamond, A.W. and Linke, J. (2001). Seabirds at risk around offshore oil platforms in the North-west Atlantic. *Marine Pollution Bulletin*, 42: 1285-1290.

# APPENDIX A



Australian Government

Department of Climate Change, Energy,  
the Environment and Water

# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 21-Mar-2024

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

# Summary

## Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	1
<a href="#">Wetlands of International Importance (Ramsar)</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	1
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	73
<a href="#">Listed Migratory Species:</a>	45

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <https://www.dcceew.gov.au/parks-heritage/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Lands:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	81
<a href="#">Whales and Other Cetaceans:</a>	13
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None
<a href="#">Habitat Critical to the Survival of Marine Turtles:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have

<a href="#">State and Territory Reserves:</a>	1
<a href="#">Regional Forest Agreements:</a>	1
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">EPBC Act Referrals:</a>	13
<a href="#">Key Ecological Features (Marine):</a>	None
<a href="#">Biologically Important Areas:</a>	13
<a href="#">Bioregional Assessments:</a>	None
<a href="#">Geological and Bioregional Assessments:</a>	None

# Details

## Matters of National Environmental Significance

### National Heritage Places [\[ Resource Information \]](#)

Name	State	Legal Status
Historic		
<a href="#">Great Ocean Road and Scenic Environs</a>	VIC	Listed place

### Commonwealth Marine Area [\[ Resource Information \]](#)

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

#### Feature Name

Commonwealth Marine Areas (EPBC Act)

### Listed Threatened Species [\[ Resource Information \]](#)

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.  
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Ardenna grisea</a> Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Callocephalon fimbriatum</a> Gang-gang Cockatoo [768]	Endangered	Species or species habitat likely to occur within area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Falco hypoleucos</a> Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Halobaena caerulea</a> Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Limosa lapponica baueri</a> Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Neophema chrysogaster</a> Orange-bellied Parrot [747]	Critically Endangered	Migration route likely to occur within area
<a href="#">Neophema chrysostoma</a> Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pachyptila turtur subantarctica</a> Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Phoebastria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pterodroma leucoptera leucoptera</a> Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
<a href="#">Pterodroma mollis</a> Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
<a href="#">Stagonopleura guttata</a> Diamond Firetail [59398]	Vulnerable	Species or species habitat may occur within area
<a href="#">Sternula nereis nereis</a> Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche bulleri platei</a> Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche chrysostoma</a> Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Thinornis cucullatus cucullatus</a> Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area
<b>FISH</b>		
<a href="#">Nannoperca obscura</a> Yarra Pygmy Perch [26177]	Endangered	Species or species habitat may occur within area
<a href="#">Prototroctes maraena</a> Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Serirolella brama</a> Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area
<a href="#">Thunnus maccoyii</a> Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area
<b>FROG</b>		
<a href="#">Litoria raniformis</a> Southern Bell Frog,, Growling Grass Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
<b>MAMMAL</b>		
<a href="#">Antechinus minimus maritimus</a> Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Dasyurus maculatus maculatus (SE mainland population)</a> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
<a href="#">Isoodon obesulus obesulus</a> Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area
<a href="#">Mastacomys fuscus mordicus</a> Broad-toothed Rat (mainland), Tooarrana [87617]	Endangered	Species or species habitat known to occur within area
<a href="#">Miniopterus orianae bassanii</a> Southern Bent-wing Bat [87645]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Petaurus australis australis</a> Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Potorous tridactylus trisulcatus</a> Long-nosed Potoroo (southern mainland) [86367]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pseudomys novaehollandiae</a> New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<b>PLANT</b>		
<a href="#">Glycine latrobeana</a> Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat may occur within area
<a href="#">Haloragis exalata subsp. exalata</a> Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Prasophyllum spicatum</a> Dense Leek-orchid [55146]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pterostylis chlorogramma</a> Green-striped Greenhood [56510]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pterostylis cucullata</a> Leafy Greenhood [15459]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pterostylis tenuissima</a> Swamp Greenhood, Dainty Swamp Orchid [13139]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Senecio psilocarpus</a> Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Thelymitra epipactoides</a> Metallic Sun-orchid [11896]	Endangered	Species or species habitat likely to occur within area
<a href="#">Xerochrysum palustre</a> Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat may occur within area
<b>REPTILE</b>		
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
<a href="#">Lissolepis coventryi</a> Swamp Skink, Eastern Mourning Skink [84053]	Endangered	Species or species habitat known to occur within area

## SHARK

<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Migration route known to occur within area
<a href="#">Galeorhinus galeus</a> School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area

## Listed Migratory Species

[ [Resource Information](#) ]

Scientific Name	Threatened Category	Presence Text
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardenna carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Ardenna grisea</a> Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Phoebastria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Sternula albifrons</a> Little Tern [82849]		Species or species habitat may occur within area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche chrysostoma</a> Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Migratory Marine Species</b>		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Migration route known to occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
<a href="#">Eubalaena australis as Balaena glacialis australis</a> Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area
<a href="#">Lamna nasus</a> Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Species or species habitat likely to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat likely to occur within area
<b>Migratory Wetlands Species</b>		

Scientific Name	Threatened Category	Presence Text
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species	<a href="#">[ Resource Information ]</a>	
Scientific Name	Threatened Category	Presence Text
Bird		

Scientific Name	Threatened Category	Presence Text
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
<a href="#">Ardenna carneipes as Puffinus carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Ardenna grisea as Puffinus griseus</a> Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area
<a href="#">Bubulcus ibis as Ardea ibis</a> Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area overfly marine area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
<a href="#">Chalcites osculans as Chrysococcyx osculans</a> Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Eudyptula minor</a> Little Penguin [1085]		Breeding known to occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area overfly marine area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Halobaena caerulea</a> Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area
<a href="#">Neophema chrysogaster</a> Orange-bellied Parrot [747]	Critically Endangered	Migration route likely to occur within area overfly marine area
<a href="#">Neophema chrysostoma</a> Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area overfly marine area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pachyptila turtur</a> Fairy Prion [1066]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Phalacrocorax fuscescens</a> Black-faced Cormorant [59660]		Breeding known to occur within area
<a href="#">Phoebetria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pterodroma mollis</a> Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area
<a href="#">Rostratula australis as Rostratula benghalensis (sensu lato)</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
<a href="#">Stercorarius antarcticus as Catharacta skua</a> Brown Skua [85039]		Species or species habitat may occur within area
<a href="#">Sterna striata</a> White-fronted Tern [799]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Sternula albifrons as Sterna albifrons</a> Little Tern [82849]		Species or species habitat may occur within area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche bulleri platei as Thalassarche sp. nov.</a> Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche chrysostoma</a> Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Thinornis cucullatus as Thinornis rubricollis</a> Hooded Plover, Hooded Dotterel [87735]		Species or species habitat likely to occur within area overfly marine area
<a href="#">Thinornis cucullatus cucullatus as Thinornis rubricollis rubricollis</a> Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat likely to occur within area overfly marine area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
<b>Fish</b>		
<a href="#">Heraldia nocturna</a>		
Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
<a href="#">Hippocampus abdominalis</a>		
Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
<a href="#">Hippocampus breviceps</a>		
Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
<a href="#">Histiogamphelus briggsii</a>		
Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
<a href="#">Histiogamphelus cristatus</a>		
Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
<a href="#">Hypselognathus rostratus</a>		
Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
<a href="#">Kaupus costatus</a>		
Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
<a href="#">Leptoichthys fistularius</a>		
Brushtail Pipefish [66248]		Species or species habitat may occur within area
<a href="#">Lissocampus caudalis</a>		
Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
<a href="#">Lissocampus runa</a>		
Javelin Pipefish [66251]		Species or species habitat may occur within area
<a href="#">Maroubra perserrata</a>		
Sawtooth Pipefish [66252]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Mitotichthys semistriatus</a> Halfbanded Pipefish [66261]		Species or species habitat may occur within area
<a href="#">Mitotichthys tuckeri</a> Tucker's Pipefish [66262]		Species or species habitat may occur within area
<a href="#">Notiocampus ruber</a> Red Pipefish [66265]		Species or species habitat may occur within area
<a href="#">Phycodurus eques</a> Leafy Seadragon [66267]		Species or species habitat may occur within area
<a href="#">Phyllopteryx taeniolatus</a> Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
<a href="#">Pugnaso curtirostris</a> Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
<a href="#">Solegnathus robustus</a> Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
<a href="#">Solegnathus spinosissimus</a> Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
<a href="#">Stigmatopora argus</a> Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
<a href="#">Stigmatopora nigra</a> Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
<a href="#">Stipecampus cristatus</a> Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Urocampus carinirostris</a> Hairy Pipefish [66282]		Species or species habitat may occur within area
<a href="#">Vanacampus margaritifer</a> Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
<a href="#">Vanacampus phillipi</a> Port Phillip Pipefish [66284]		Species or species habitat may occur within area
<a href="#">Vanacampus poecilolaemus</a> Longsnout Pipefish, Australian Longsnout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area

#### Mammal

<a href="#">Arctocephalus forsteri</a> Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
<a href="#">Arctocephalus pusillus</a> Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area

#### Reptile

<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

#### Whales and Other Cetaceans

[ Resource Information ]

Current Scientific Name	Status	Type of Presence
<b>Mammal</b>		
<a href="#">Balaenoptera acutorostrata</a> Minke Whale [33]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Species or species habitat likely to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area

## Extra Information

### State and Territory Reserves [\[ Resource Information \]](#)

Protected Area Name	Reserve Type	State
Port Campbell	National Park	VIC

### Regional Forest Agreements [\[ Resource Information \]](#)

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State
<a href="#">West Victoria RFA</a>	Victoria

### EPBC Act Referrals [\[ Resource Information \]](#)

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Controlled action</b>			
<a href="#">Casino Gas Field Development</a>	2003/1295	Controlled Action	Post-Approval
<a href="#">Otway Development</a>	2002/621	Controlled Action	Post-Approval
<b>Not controlled action</b>			
<a href="#">Enterprise 1 Exploration Drilling Program, near Port Campbell, Vic</a>	2019/8438	Not Controlled Action	Completed
<a href="#">Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia</a>	2015/7522	Not Controlled Action	Completed
<a href="#">INDIGO Central Submarine Telecommunications Cable</a>	2017/8127	Not Controlled Action	Completed
<a href="#">Victorian Generator Project</a>	2005/1984	Not Controlled Action	Completed
<b>Not controlled action (particular manner)</b>			
<a href="#">'Moonlight Head' 3D seismic survey, VIC/P38(V), VIC/P43 and VIC/RL8</a>	2005/2236	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action (particular manner)</b>			
<a href="#">3D seismic program VIC/P38(v), VIC/P43 and VIC/RL8</a>	2003/1137	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Enterprise Three-dimensional Transition Zone Seismic Survey, Victoria</a>	2016/7800	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">INDIGO Marine Cable Route Survey (INDIGO)</a>	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">The Enterprise 3D Seismic Acquisition Survey, Otway Basin, Vic</a>	2012/6565	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Vic/P37(v) and Vic/P44 3D marine seismic survey</a>	2003/1102	Not Controlled Action (Particular Manner)	Post-Approval

#### Referral decision

<a href="#">The Enterprise 3D Seismic Acquisition Survey, Otway Basin, VIC</a>	2012/6545	Referral Decision	Completed
--	-----------	-------------------	-----------

#### Biologically Important Areas

[ [Resource Information](#) ]

Scientific Name	Behaviour	Presence
<b>Seabirds</b>		
<a href="#">Ardenna pacifica</a> Wedge-tailed Shearwater [84292]	Foraging	Likely to occur
<a href="#">Diomedea exulans (sensu lato)</a> Wandering Albatross [1073]	Foraging	Known to occur
<a href="#">Diomedea exulans antipodensis</a> Antipodean Albatross [82269]	Foraging	Known to occur
<a href="#">Pelecanoides urinatrix</a> Common Diving-petrel [1018]	Foraging	Known to occur
<a href="#">Thalassarche bulleri</a> Bullers Albatross [64460]	Foraging	Known to occur
<a href="#">Thalassarche cauta cauta</a> Shy Albatross [82345]	Foraging likely	Likely to occur

Scientific Name	Behaviour	Presence
<a href="#">Thalassarche chlororhynchos bassi</a> Indian Yellow-nosed Albatross [85249]	Foraging	Known to occur
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Foraging	Known to occur
<a href="#">Thalassarche melanophris impavida</a> Campbell Albatross [82449]	Foraging	Known to occur
<b>Sharks</b>		
<a href="#">Carcharodon carcharias</a> White Shark [64470]	Distribution (low density)	Likely to occur
<a href="#">Carcharodon carcharias</a> White Shark [64470]	Known distribution	Known to occur
<b>Whales</b>		
<a href="#">Balaenoptera musculus brevipcauda</a> Pygmy Blue Whale [81317]	Distribution	Known to occur
<a href="#">Balaenoptera musculus brevipcauda</a> Pygmy Blue Whale [81317]	Foraging (annual high use area)	Known to occur

# Caveat

## 1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

## 2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

## 3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

## 4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact us](#) page.

[© Commonwealth of Australia](#)

Department of Climate Change, Energy, the Environment and Water

GPO Box 3090

Canberra ACT 2601 Australia

+61 2 6274 1111

# APPENDIX B

**Threatened and migratory species predicted to occur within the project area**

Value/Sensitivity Common Name	Scientific Name	Threatened Status	Migratory Status	Sensitivities within Project Area
<b><i>Fishes, Sharks, and Rays</i></b>				
White Shark, Great White Shark	<i>Carcharodon carcharias</i>	Vulnerable	Migratory	Migration route known to occur within area
School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark	<i>Galeorhinus galeus</i>	Conservation Dependent	-	Species or species habitat may occur within area
Porbeagle, Mackerel Shark	<i>Lamna nasus</i>	-	Migratory	Species or species habitat likely to occur within area
Blue Warehou	<i>Seriolella brama</i>	Conservation Dependent	-	Species or species habitat known to occur within area
Southern Bluefin Tuna	<i>Thunnus maccoyii</i>	Conservation Dependent	-	Species or species habitat likely to occur within area
<b><i>Marine Mammals</i></b>				
Sei Whale	<i>Balaenoptera borealis</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour likely to occur within area
Blue Whale	<i>Balaenoptera musculus</i>	Endangered	Migratory	Foraging, feeding or related behaviour known to occur within area
Fin Whale	<i>Balaenoptera physalus</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour likely to occur within area
Pygmy Right Whale	<i>Caperea marginata</i>	-	Migratory	Foraging, feeding or related behaviour may occur within area
Southern Right Whale	<i>Eubalaena australis</i>	Endangered	Migratory (as <i>Balaena glacialis australis</i> )	Species or species habitat known to occur within area

Value/Sensitivity Common Name	Scientific Name	Threatened Status	Migratory Status	Sensitivities within Project Area
Dusky Dolphin	<i>Lagenorhynchus obscurus</i>	-	Migratory	Species or species habitat may occur within area
Humpback Whale	<i>Megaptera novaeangliae</i>	-	Migratory	Species or species habitat likely to occur within area
Killer Whale, Orca	<i>Orcinus orca</i>	Vulnerable	Migratory	Species or species habitat likely to occur within area
<b>Reptiles</b>				
Loggerhead Turtle	<i>Caretta caretta</i>	Endangered	Migratory	Breeding likely to occur within area
Green Turtle	<i>Chelonia mydas</i>	Vulnerable	Migratory	Species or species habitat may occur within area
Leatherback Turtle, Leathery Turtle, Luth	<i>Dermochelys coriacea</i>	Endangered	Migratory	Breeding likely to occur within area
<b>Birds</b>				
Common Sandpiper	<i>Actitis hypoleucos</i>	-	Migratory	Species or species habitat known to occur within area
Fork-tailed Swift	<i>Apus pacificus</i>	-	Migratory	Species or species habitat likely to occur within area
Flesh-footed Shearwater, Fleshy-footed Shearwater	<i>Ardenna carneipes</i>	-	Migratory	Foraging, feeding or related behaviour likely to occur within area
Sooty Shearwater	<i>Ardenna grisea</i>	Vulnerable	Migratory	Species or species habitat may occur within area
Australasian Bittern	<i>Botaurus poiciloptilus</i>	Endangered	-	Species or species habitat likely to occur within area
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	Vulnerable	Migratory	Species or species habitat may occur within area

Value/Sensitivity Common Name	Scientific Name	Threatened Status	Migratory Status	Sensitivities within Project Area
Red Knot, Knot	<i>Calidris canutus</i>	Vulnerable	Migratory	Species or species habitat may occur within area
Curlew Sandpiper	<i>Calidris ferruginea</i>	Critically Endangered	Migratory	Species or species habitat may occur within area
Pectoral Sandpiper	<i>Calidris melanotos</i>	-	Migratory	Species or species habitat may occur within area
Antipodean Albatross	<i>Diomedea antipodensis</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour likely to occur within area
Southern Royal Albatross	<i>Diomedea epomophora</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour likely to occur within area
Wandering Albatross	<i>Diomedea exulans</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour likely to occur within area
Northern Royal Albatross	<i>Diomedea sanfordi</i>	Endangered	Migratory	Foraging, feeding or related behaviour likely to occur within area
Latham's Snipe, Japanese Snipe	<i>Gallinago hardwickii</i>	Vulnerable	Migratory	Species or species habitat likely to occur within area
Blue Petrel	<i>Halobaena caerulea</i>	Vulnerable	-	Species or species habitat may occur within area
White-throated Needletail	<i>Hirundapus caudacutus</i>	Vulnerable	Migratory	Species or species habitat known to occur within area
Swift Parrot	<i>Lathamus discolor</i>	Critically Endangered	-	Species or species habitat may occur within area
Bar-tailed Godwit	<i>Limosa lapponica</i>	-	Migratory	Species or species habitat likely to occur within area

Value/Sensitivity Common Name	Scientific Name	Threatened Status	Migratory Status	Sensitivities within Project Area
Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit	<i>Limosa lapponica baueri</i>	Endangered	-	Species or species habitat may occur within area
Southern Giant-Petrel, Southern Giant Petrel	<i>Macronectes giganteus</i>	Endangered	Migratory	Species or species habitat may occur within area
Northern Giant Petrel	<i>Macronectes halli</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour likely to occur within area
Orange-bellied Parrot	<i>Neophema chrysogaster</i>	Critically Endangered	-	Migration route likely to occur within area
Blue-winged Parrot	<i>Neophema chrysostoma</i>	Vulnerable	-	Species or species habitat known to occur within area
Eastern Curlew, Far Eastern Curlew	<i>Numenius madagascariensis</i>	Critically Endangered	Migratory	Species or species habitat may occur within area
Fairy Prion (southern)	<i>Pachyptila turtur subantarctica</i>	Vulnerable	-	Species or species habitat known to occur within area
Sooty Albatross	<i>Phoebastria fusca</i>	Vulnerable	Migratory	Species or species habitat likely to occur within area
Gould's Petrel, Australian Gould's Petrel	<i>Pterodroma leucoptera leucoptera</i>	Endangered	-	Species or species habitat may occur within area
Soft-plumaged Petrel	<i>Pterodroma mollis</i>	Vulnerable	-	Species or species habitat may occur within area
Australian Painted Snipe	<i>Rostratula australis</i>	Endangered	-	Species or species habitat likely to occur within area
Little Tern	<i>Sternula albifrons</i>	-	Migratory	Species or species habitat may occur within area
Australian Fairy Tern	<i>Sternula nereis nereis</i>	Vulnerable	-	Breeding likely to occur within area

Value/Sensitivity Common Name	Scientific Name	Threatened Status	Migratory Status	Sensitivities within Project Area
Buller's Albatross, Pacific Albatross	<i>Thalassarche bulleri</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour likely to occur within area
Northern Buller's Albatross, Pacific Albatross	<i>Thalassarche bulleri platei</i>	Vulnerable	-	Foraging, feeding or related behaviour likely to occur within area
Indian Yellow-nosed Albatross	<i>Thalassarche carteri</i>	Vulnerable	Migratory	Species or species habitat likely to occur within area
Shy Albatross	<i>Thalassarche cauta</i>	Endangered	Migratory	Foraging, feeding or related behaviour likely to occur within area
Grey-headed Albatross	<i>Thalassarche chrysostoma</i>	Endangered	Migratory	Species or species habitat may occur within area
Campbell Albatross, Campbell Black-browed Albatross	<i>Thalassarche impavida</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour likely to occur within area
Black-browed Albatross	<i>Thalassarche melanophris</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour likely to occur within area
Salvin's Albatross	<i>Thalassarche salvini</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour likely to occur within area
White-capped Albatross	<i>Thalassarche steadi</i>	Vulnerable	Migratory	Foraging, feeding or related behaviour known to occur within area
Eastern Hooded Plover, Eastern Hooded Plover	<i>Thinornis cucullatus cucullatus</i>	Vulnerable	-	Species or species habitat likely to occur within area
Common Greenshank, Greenshank	<i>Tringa nebularia</i>	Endangered	Migratory	Species or species habitat likely to occur within area

**Key environmental sensitivities and timing of biologically important activity**

Category	Environmental Sensitivity	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Habitats / Communities	Phytoplankton abundance	Assumed peak occurrence associated with Bonney Upwelling				Present year-round							
	Zooplankton abundance	Assumed peak occurrence associated with Bonney Upwelling				Present year-round							
	Seagrass	Present year-round in coastal areas											
	Macroalgae	Present year-round											
TEC	Bonney Coast Upwelling	Upwelling event											
Marine Fauna (threatened/migratory species)	<b>Marine Mammals</b>												
	Pygmy Blue Whale	Foraging occurs during Bonney Upwelling – BIA											
	Dusky Dolphin	Assumed present year-round – prefers inshore habitats but may also be pelagic at times											
	Fin Whale	Present during the Bonney Upwelling event											
	Humpback Whale				Nth Migration through SEMR						Sth Migration through SEMR		
	Killer Whale	Assumed present year-round – frequent sightings off Vic along the continental slope and shelf											
	Pygmy Right Whale	Uncommon / few or no records available for Vic.											
	Sei Whale	Sighted during the Bonney Upwelling event											
	Southern Right Whale				Migration BIA								
						Reproduction BIA							
	<b>Marine Reptiles</b>												
Green turtle	Occurs in limited numbers in Vic and SA												

Category	Environmental Sensitivity	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Leatherback Turtle	Foraging in the SEMR is known to occur											
	Loggerhead Turtle	Uncommon in southern Australia											
	<b><i>Fish, Sharks, and Rays</i></b>												
	Porbeagle	Assumed present year-round											
	White Shark	Assumed present year-round with breeding, distribution and foraging BIAs identified throughout the region											
	Blue Warehouse	Assumed present year-round											
	Eastern School Shark	Assumed present year-round											
	Southern Bluefin Tuna	Assumed present year-round											
	<b><i>Birds</i></b>												
	Antipodean Albatross	Foraging known to occur all year											
	Black-browed Albatross				Fledglings (Apr – May)		Present – foraging BIA			Breeding within SEMR on Macquarie Is.			
	Buller's Albatross	Foraging BIA – however, records indicate the species is mainly present around Tas when in the SEMR (species endemic to NZ)											
	Campbell Albatross					Present in the non-breeding season – foraging BIA			Breeds on Campbell Island, south of NZ Aug – May				
	Indian Yellow-nosed Albatross			Fledgling Mar-Apr				Non-breeding visitor – foraging BIA			Breeding occurs in South Africa – eggs laid in Sep-Oct		
	Shy Albatross	Assumed present year-round – foraging BIA. Breeding occurs in SEMR with eggs laid in Sept and fledglings in Apr											
	Wandering Albatross	Assumed present year-round – foraging BIA. Breeding occurs biennially on Macquarie Island with eggs laid in Dec and fledglings between mid-Nov and late-Feb											
	Birds – other seabirds (with no BIAs identified)	Various species – assumed present											

Category	Environmental Sensitivity	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Birds – shorebirds	Various species – assumed present											
Legend		Peak occurrence / activity (reliable and predictable)											
		Activity can occur throughout the year											
		Low level of occurrence/ activity (may vary from year to year)											
		No occurrence											

# APPENDIX C

## 1.1. Noise Emissions Impact Assessment

### 1.1.1. Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Noise emissions	Generation of underwater noise from project vessel, Remote Operated Vehicle (ROV), subsea cutting and infrastructure deburial activities.	Noise emission may impact upon fauna by: <ul style="list-style-type: none"> <li>▪ reducing ability to perceive noise</li> <li>▪ behavioural impacts</li> <li>▪ masking of biologically important sounds.</li> </ul>	10	N/A	-	Type A Low Order Impact	Tolerable
	Generation of atmospheric noise from helicopter operations.		10	N/A	-	Type A Low Order Impact	Tolerable
	Generation of underwater noise from acoustic survey equipment within project area.		10	N/A	-	Type A Low Order Impact	Tolerable

### 1.1.2. Source of Risk

Noise emissions to the environment may occur during the petroleum activity from:

- the operation of a vessel during equipment removal and field management activities
- subsea equipment removal activities
- the operation of survey and positioning equipment
- non-routine helicopter operations.

A summary of noise source characteristics for noise sources associated with the petroleum activity are provided in Table 1-1. Further descriptions of noise sources are provided in the sections below.

**Table 1-1: Summary of noise sources generated during the petroleum activity**

Activity	Estimated SPL (dB re 1 µPa rms)	Frequency	Type
Project Vessels	< 181 dB re 1 µPa at 1 m	1 to 1,000 Hz	Continuous
Infrastructure Cutting	136–141 dB re 1 µPa at 10 m	Around 5 kHz	Continuous
Multibeam echo sounder (MBES)	210–247 dB re 1 µPa at 1 m	75-900 kHz	Impulsive

#### 1.1.2.1. Vessel Noise

Vessels will generate underwater noise from vessel engines and machinery and propeller cavitation within the project area. The nature of noise emissions depends on the activities being undertaken by the vessel. Typically only one vessel will be active in the project area when undertaking the petroleum activity (with potential intermittent, short visits by a local small support vessel); however, there is the potential for cumulative impacts from other anthropogenic noise sources in the region. Cumulative impacts from simultaneous operations are considered in Section 1.1.3.3.

Vessel movements using main engines within the project area will be 6 knots or less. Noise emissions of from project vessels using main engines at speeds slower than 6 knots are characterised by continuous engine noise transmitted through the hull, with negligible noise from propeller cavitation.

The Multi-purpose Construction Vessel (MCV) will use Dynamic Positioning (DP) to maintain position when undertaking equipment removal activities and Inspection, Maintenance and Repair (IMR) activities. The DP system will use the thrusters to maintain vessel position. Noise generated by vessels using DP includes machinery noise from thruster motors and potentially noise generated by cavitation by thruster propellers. Cavitation is undesirable due to the resulting propeller damage and inefficiency, and thrusters are designed to avoid cavitation. The noise generated by DP thrusters depends on the energy required to hold position. DP thruster noise during calm conditions and low current speeds are substantially lower than thruster noise during relatively high energy metocean conditions or strong currents. Noise energy from DP thrusters is concentrated between 100 and 1,000 Hz, with the source sound pressure level (SPL) up to 181 db re 1  $\mu$ Pa at 1 m.

#### 1.1.2.2. Subsea Equipment Removal Noise

An ROV deployed from the MCV will be used during the removal of the Minerva subsea infrastructure and may be used during field management activities. The ROV will generate underwater noise through the operation of machinery on the ROV (e.g., thrusters, hydraulics etc.). Noise levels from the ROV are substantially lower than those generated by the MCV. Given the noise generated from the ROV operation will not be the primary source of noise emissions during their deployment, the overall contribution of ROV noise is considered negligible.

Subsea cutting tools, such as shears, chop saws, and diamond wire saws, will generate underwater noise. Noise emissions from cuttings tools will be intermittent and relatively brief (e.g., approximately 2 minutes per cut for shear cutting tool, with approximately 20 minutes between cuts to reposition the cutting tool). Woodside's experience using shears to cut the Griffin gas export pipeline indicated that a shear cut was completed in less than 5 seconds, with typically 6 to 8 minutes required to set up the tooling between each cut. While shear cutting noise is short duration, it is not an impulsive noise source; rather, it is a continuous noise source with a short duration. Cuts with diamond wire or shop saws are expected to take longer, with diamond wire cutting of the pipeline potentially taking up to 30 minutes to complete.

Pangerc et al. (2016) described the underwater sound measurement data during an underwater diamond wire cutting of a 32-inch conductor (10 m above seabed in around 80 m depth) and found the sound radiated from the diamond wire cutting of the conductor was not easily discernible above the background noise at the closest recorder located 100 m from the source.

Deburial will be carried out with appropriate tooling such as a mass flow excavator. Xodus (2017) detailed that a mass flow excavator produced broadband sound with a source level of up to 162 dB re 1  $\mu$ Pa.

#### 1.1.2.3. Survey and Positioning Equipment Noise

During the as-left survey, MBES may be deployed on the ROV. MBES operate at frequencies like those of 'fish finders' by commercial fishers. The noise generated is highly directional and at high frequencies (75 to 900 kHz) (Jiménez-Arranz et al., 2020) and hence attenuates rapidly in the water column. Peak source levels of MBESs may be up to 210 dB re 1  $\mu$ Pa at 1 m ( $L_{p,rms}$ ).

#### 1.1.2.4. Helicopter Noise

Helicopter transfers are not planned during the petroleum activity but may be required in non-routine circumstances (e.g., medical evacuation of crew). Vessel crew transfers will occur when vessels are in port. Non-routine helicopter activities may occur in the project area, including the landing and take-off of helicopters on vessel helidecks. Sound emitted from helicopter operations is typically below 500 Hz (Richardson et al.,

1995). The peak received level diminishes with increasing helicopter altitude, but the duration of audibility often increases with increasing altitude. Richardson et al. (1995) reports that helicopter sound is audible in air for four minutes before it passed over underwater hydrophones, but detectable underwater for only 38 seconds at 3 m depth and 11 seconds at 18 m depth. Noise levels reported for a Bell 212 helicopter during fly-over was reported at 162 dB re 1  $\mu$ Pa and for Sikorsky-61 is 108 dB re 1  $\mu$ Pa at 305 m (Simmonds et al., 2004).

#### 1.1.2.5. Underwater Sound Transmission Loss Modelling

Woodside commissioned Jasco to undertake underwater noise sound transmission loss modelling for the Minerva decommissioning activities (Connell et al., 2024). The modelling study considered several sound sources in the Minerva field. The scenario relevant to equipment removal activities is Scenario 4, which is described by Connell et al. (2024) as:

- Vessel noise from a multi-purpose support vessel (MPSV) removing subsea infrastructure, including pipelines, following a track and making headway at a rate 240 m/day.

Scenario 4 modelled by JASCO (Connell et al., 2024) is summarised in Table 1-2. Noise source spectra for the noise sources considered by JASCO (Connell et al., 2024) are shown in Figure 1-1, with the equipment removal vessel shown in green (the MPSV).

**Table 1-2: Description of modelled scenarios**

Scenario	Site(s)	Location	Operation Name	Operation Description	Operation Time
4	7	500 m from Minerva Well-3	MPSV Subsea infrastructure removal	<ul style="list-style-type: none"> <li>▪ MPSV removing subsea infrastructure and pipeline – 240 m/day</li> </ul>	24 hr

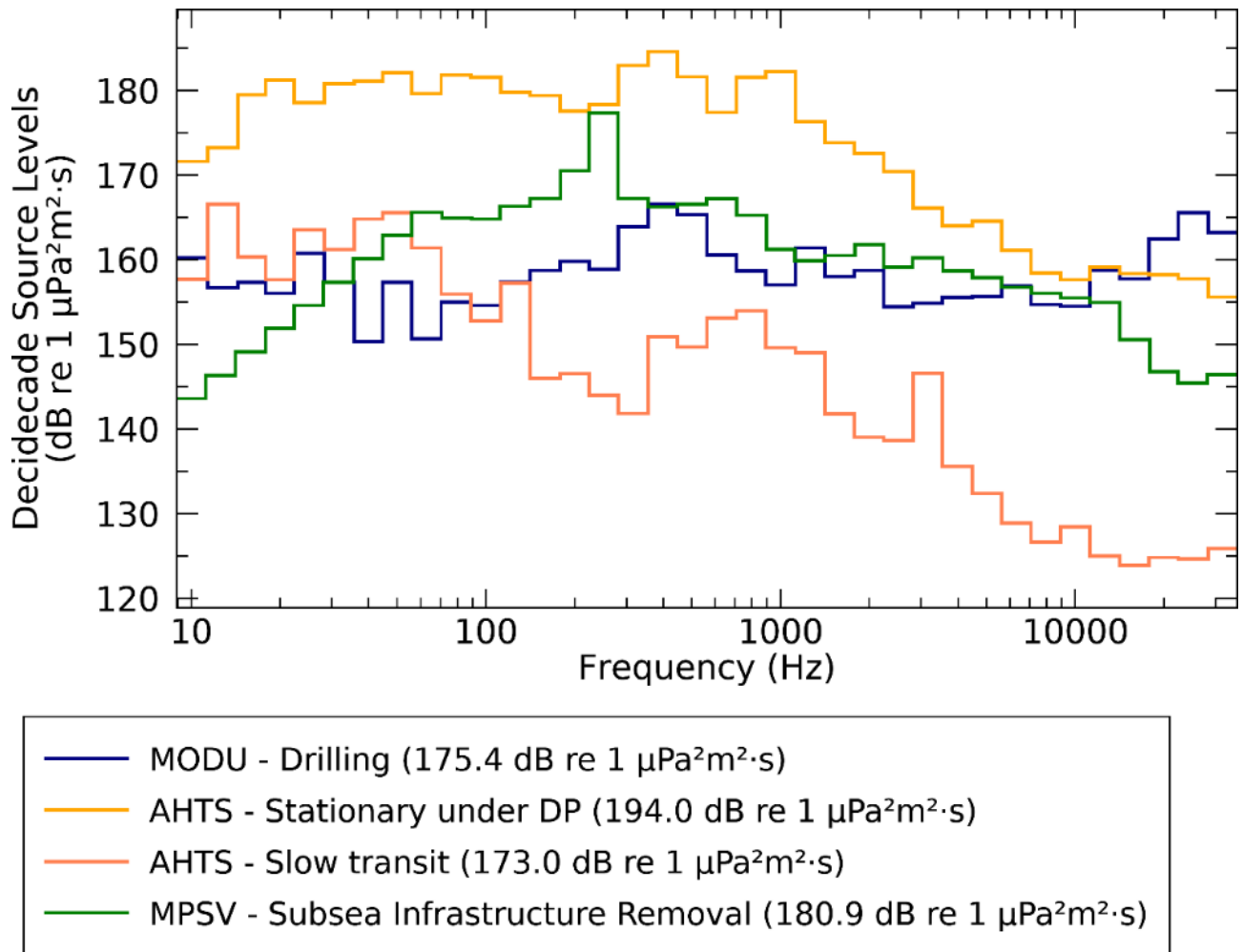


Figure 1-1: Energy source level spectra (in decidecade frequency-band) for all sound sources (from Jasco, 2024)

The JASCO study (Connell et al., 2024) assessed distances from operations where underwater sound levels reached thresholds corresponding to various levels of potential impact to marine fauna. The animals considered included marine mammals, turtles, and fish. Due to the variety of species considered, several different thresholds were used for evaluating effects, including mortality, injury, temporary reduction in hearing sensitivity, and behavioural disturbance.

The modelling methodology considered scenario-specific source levels and range-dependent environmental properties. Estimated underwater acoustic levels for non-impulsive (continuous) noise sources presented as peak sound pressure levels (SPL,  $L_p$ ), and as accumulated sound exposure levels (SEL,  $L_E$ ) as appropriate for different noise effect criteria. The duration of the SEL accumulation is defined as integrated over a 24-hour period.

The  $SEL_{24h}$  is a cumulative metric that reflects the dosimetric impact of noise levels over 24 hours based on the assumption that an animal is consistently exposed to such noise levels at a fixed position. The corresponding  $SEL_{24h}$  radii represent an unlikely worst-case scenario. More realistically, mobile fauna (e.g., marine mammals) would not stay in the same location for 24 hours. Therefore, a reported radius for  $SEL_{24h}$  criteria does not mean that marine fauna travelling within this radius of the source will be injured, but rather that an animal could be exposed to the sound level associated with impairment if it remained in that location for 24 hours.

### 1.1.3. Environmental Impact Assessment

Several fauna within the project area may be impacted by noise from the petroleum activity, including:

- marine mammals
- fishes
- turtles

Anthropogenic noise has been identified as a threat to these taxa.

#### 1.1.3.1. Marine Fauna

##### *Marine Mammals*

Marine mammals that may occur within the project area predominantly include migratory and threatened cetaceans. Anthropogenic noise has been identified as a threat to several cetaceans that may occur within the project area, including the pygmy blue whales and southern right whales – both of which have BIAs overlapping and in proximity to the project area. The reproductive BIA for southern right whales is recognised as habitat critical to the survival of southern right whales in the *Draft National Recovery Plan for the Southern Right Whale Eubalena australis* (Commonwealth of Australia, 2022).

Marine mammals rely on sound for critical life functions such as detecting predators, navigation and identifying prey (Erbe, 2012; Erbe et al., 2016; Weilgart, 2007r). Underwater noise can affect these life functions, cause behaviour changes and/or cause injury through TTS and PTS. The continuous noise impact threshold levels shown in Table 1-3 are derived from relevant literature and have been used to determine the likelihood of marine mammals experiencing behaviour responses, TTS, or PTS from the petroleum activity. Thresholds are defined by functional hearing groups.

**Table 1-3: Continuous noise impact thresholds for acoustic effects on marine mammals**

Hearing Group	Behavioural Change <sup>1</sup> SPL (dB re 1 µPa)	TTS Onset <sup>2</sup> Weighted SEL <sub>24h</sub> (dB re 1 µPa <sup>2</sup> .s)	PTS Onset <sup>2</sup> Weighted SEL <sub>24h</sub> (dB re 1 µPa <sup>2</sup> .s)
Low-frequency cetaceans	120	179	199
High-frequency cetaceans	120	178	198
Very high-frequency cetaceans	120	153	173
Otariid seals	-	199	219

<sup>1</sup> ESA Section 7 Consultation Tools for Marine Mammals on the West Coast (National Oceanic and Atmospheric Administration, 2019)

<sup>2</sup> Southall et al. (2019)

The project area overlaps part of the pygmy blue whale foraging BIA associated with the Bonney Upwelling. Migrating pygmy blue whales may be exposed to underwater noise generated by vessels and the MODU. While the Project area lies offshore off the humpback whale migration corridor, there is the potential for humpback whales to be exposed to underwater noise generated by the Petroleum Activity.

The *Conservation Management Plan for the Blue Whale* (Commonwealth of Australia, 2015), a recovery plan made under the EPBC Act, defines BIAs for pygmy blue whales, with particular emphasis placed on foraging areas and migration corridors. As noted above, the project area partially overlaps the foraging BIA associated with the Bonney Upwelling. The *Guidance on Key Terms within the Blue Whale Conservation Management Plan* (DAWE, 2021) elaborates on the recovery plan and makes a number of points that relate to the assessment of underwater noise impacts to pygmy blue whales in this EP (Table 1-4).

**Table 1-4: Selected definitions from DAWE (2021) for elements of the Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015) relevant to the Petroleum Activity**

Recovery Plan Element	Definition
<p>“Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury, and is not displaced from a foraging area”</p>	<p>The intent of this requirement is to ensure that any blue whale can continue to forage with a high degree of certainty in a foraging area, and that any blue whale is not displaced from a foraging area. In instances where a threat of environmental harm exists and there is scientific uncertainty as to the outcome, a precautionary approach must be taken.</p> <p>A precautionary approach should be taken to the management of industry activities proposed to occur in or adjacent to designated BIAs (foraging areas) due to the increased likelihood of whales foraging in those locations at critically important times.</p> <p>Activities proposed to occur outside designated foraging areas must adopt best practice adaptive management approaches in the event that indicators of whale foraging (such as aggregating in a particular area) are evident to ensure that impacts to whales are not unacceptable e.g., injury or displacement.</p>
<p>Definition of ‘a foraging area’</p>	<p>Foraging – verb (i) to wander in search of supplies. (Macquarie Dictionary 8th ed. 2020)</p> <p>Feeding – verb (i) to take food; eat; graze. (Macquarie Dictionary 8th ed. 2020)</p> <p>Noting the potential for whale foraging and feeding to occur in areas of high primary productivity outside of designated Foraging Areas, consideration also needs to be given to management of industry activities and underwater anthropogenic noise where opportunistic foraging potential exists.</p> <p>In areas other than those identified in the CMP or NCVA (described in points (i) and (ii) above), where it can be reasonably predicted that blue whale foraging is probable, known or whale presence is detected, adaptive management should be used during industry activities to prevent unacceptable impacts (i.e., no injury or biologically significant behavioural disturbance) to blue whales from underwater anthropogenic noise. In-field observations of actual whale feeding are difficult to detect, so indicators of probable foraging should be used as a proxy.</p>
<p>Definition of ‘displaced from a foraging area’</p>	<p>The recovery plan requirement, Action A.2.3, applies in relation to BIAs. A whale could be displaced from a foraging area if impact mitigation is not implemented. This means that underwater anthropogenic noise should not:</p> <ul style="list-style-type: none"> <li>▪ Stop or prevent any blue whale from foraging</li> <li>▪ Cause any blue whale to move on when foraging</li> <li>▪ Stop or prevent any blue whale from entering a foraging area</li> </ul> <p>It is considered that a whale is displaced from a foraging area if foraging behaviour is disrupted, regardless of whether the whale can continue to forage elsewhere within that foraging area. Mitigation measures must be implemented to reduce the risk of displacement occurring during operations where modelling indicates that behavioural disturbance within a foraging area may occur.</p>
<p>Definition of ‘injury to Blue Whales’</p>	<p>For the purpose of interpreting and applying Action Area A.2 of the Blue Whale CMP, injury is both permanent and temporary hearing impairment (Permanent Threshold Shift and Temporary Threshold Shift) and any other form of physical harm arising from anthropogenic sources of underwater noise.</p>

Based on the *Guidance on Key Terms within the Blue Whale Conservation Management Plan* (DCCEEW, 2021), underwater noise emissions from the petroleum activities program must not:

- result in TTS or PTS to pygmy blue whales
- displace a pygmy blue whale from a foraging BIA.

The sound transmission loss modelling study by JASCO (Connell et al., 2024) indicated the SEL<sub>24h</sub> threshold for PTS would not be exceeded at ranges of > 30 m (Table 1-5, Figure 1-2). Hence, a marine mammal would

be required to remain within 30 m of the MCV for 24 hr to receive sufficient noise energy to exceed this threshold; this is not credible.

The SEL<sub>24h</sub> threshold for TTS may occur at ranges of up to 670 m for marine mammals, with 0.37 km<sup>2</sup> the maximum area ensonified above the TTS threshold (Table 1-5, Figure 1-2). While the modelling indicates the SEL<sub>24h</sub> TTS threshold may be exceeded, this scenario would require a marine mammal to remain within the  $R_{max}$  radii (as per functional hearing group) for 24 hrs continuously. Marine mammals naturally move within the environment, and it is not credible that an animal would remain within the  $R_{max}$  for a sufficient period to induce TTS. Observation of southern right whales with calves by Nielsen et al. (2019), which are known to move slowly and have long residence times in coastal waters while calving and nursing, recorded a minimum observed speed of 0.18 m/s (approximately 0.6 km/h) and an average movement speed of 0.64 m/s (approximately 2.3 km/h). Southern right whales typically calve and nurse in shallow coastal waters and these behaviours are unlikely to occur in much of the project area as typical project area depths are > 10 m. Consequently, TTS will not credibly occur in any marine mammals because of the petroleum activity.

No injury – as defined by the *Guidance on Key Terms within the Blue Whale Conservation Management Plan* (DAWE, 2021) – will credibly occur to pygmy blue whales or southern right whales (which are low-frequency cetaceans).

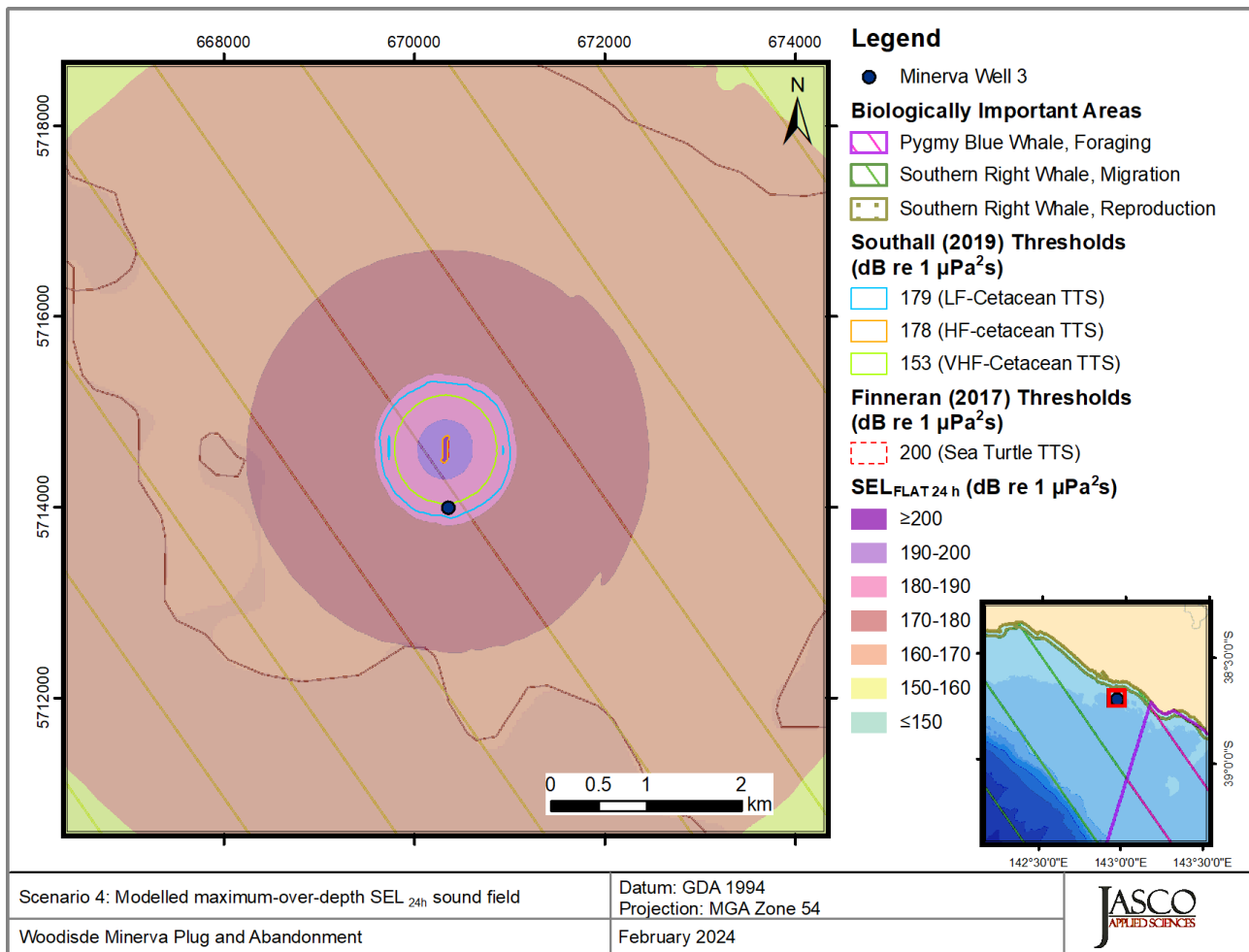
The operational area overlaps a very small portion of the southern right whale reproduction BIA. This BIA is recognised as habitat critical for the survival of southern right whales in the and the *Draft National Recovery Plan for the Southern Right Whale Eubalena australia* (Commonwealth of Australia, 2022). The *EPBC Act Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Commonwealth of Australia, 2013) states that an action is likely to have a significant impact on critically endangered species (e.g., southern right whale) if there is a real chance or possibility that it will adversely affect habitat critical to the survival of a species. The *Draft National Recovery Plan for the Southern Right Whale Eubalena australis* (Commonwealth of Australia, 2022) recognises the reproduction BIA, which a small portion of the operational area overlaps, is habitat critical for the survival of southern right whales. The presence of southern right whales in the reproduction BIA is highly seasonal, with whales typically present between May and September, with peak numbers during July and August (Commonwealth of Australia, 2022). Woodside implements a temporal exclusion during the peak period of May until August. Given that few or no southern right whales will be present in the BIA outside this peak period, significant impacts to southern right whales from underwater noise emissions are unlikely to occur.

**Table 1-5: Scenario 4 (i.e., equipment removal) SEL<sub>24h</sub>: Maximum ( $R_{max}$ ) horizontal distances to frequency-weighted SEL<sub>24h</sub> PTS and TTS thresholds based on Southall et al. (2019) and Finneran et al. (2017) and area ensonified**

Hearing Group	PTS		TTS	
	$R_{max}$ (km)	Area (km <sup>2</sup> )	$R_{max}$ (km)	Area (km <sup>2</sup> )
Low-frequency cetaceans	0.03	/	0.67	0.37
High-frequency cetaceans	-	-	0.03	/
Very high-frequency cetaceans	0.03	/	0.53	0.24
Otariid seals	-	-	0.03	/

A dash (-) indicates the level was not reached within the limits of the modelled resolution (20 m).

A slash (/) indicates that the area is less than an area associated with the modelled resolution (0.0013 km<sup>2</sup>).



**Figure 1-2: Scenario 4, Subsea infrastructure removal, accumulated SEL<sub>24h</sub>: Sound level contour map showing weighted maximum-over-depth SEL<sub>24h</sub> results, along with isopleths for TTS in low and very-high-frequency cetaceans. Thresholds omitted here were not reached or not long enough to display graphically (from Connell et al., 2024)**

The modelling study by JASCO (Connell et al., 2024) predicted that behavioural impacts for low-, high-, and very high-frequency cetaceans could occur at a maximum range ( $R_{max}$ ) of up to 2.40 km from the MCV (Table 1-6 and Figure 1-3). The results indicate the behavioural impact threshold for low-frequency cetaceans will be exceeded within the pygmy blue whale foraging BIA. As such, there is the potential for pygmy blue whales in proximity to the MCV to suffer behavioural disturbance. Behavioural responses are hard to predict, but the received level of sound intensity contributes to such responses (NOAA, 2019).

Studies of foraging blue whales in proximity to large ships (with greater source levels than the MCV) showed no observable behavioural effects until the range between whales and large ships was < 900 m (McKenna, 2011); substantially less than the 2.40 km  $R_{max}$  range for the 120 dB SPL  $L_p$  behavioural disturbance threshold predicted by the JASCO study (Connell et al., 2024). This suggests the 120 dB SPL  $L_p$  threshold may be overly conservative for foraging blue whales.

McKenna (2011) observed apparent changes in behaviour in feeding blue whales that experienced close passes (i.e., < 900 m separation) with large ships, such as:

- increased time on the surface between feeding dives after a close pass by a large ship
- reduced number of feeding lunges during dives after a close pass by a large ship.

McKenna (2011) noted substantial variation between individual blue whales in response to close passes with large ships and suggested habituation to noise may explain such variation. Of note, McKenna (2011) did not observe any blue whales cease foraging activity in response to close passes with large vessels. This suggests

that the noise levels produced by the MCV may not be sufficient to displace pygmy blue whales from a foraging area as defined in Table 1-4.

The results of the modelling study by JASCO (Connell et al., 2024) indicate the 120 dB SPL  $L_p$  behavioural impact threshold will not be exceeded within the southern right whale reproduction BIA, which is approximately 3 km from the project area at the closest point.

**Table 1-6: Scenario 4 (i.e., equipment removal) Summary of sound transmission loss modelling results for combined cetacean functional hearing groups behavioural and TTS thresholds**

SPL ( $L_p$ ; dB re 1 $\mu$ Pa)	Behavioural Response $R_{max}^*$ (km)	Behavioural Response $R_{95\%}^{**}$ (km)
180	–	–
170 <sup>a</sup>	–	–
160	0.02	0.02
158 <sup>b</sup>	0.02	0.02
150	0.06	0.06
140	0.34	0.32
130	0.89	0.85
120 <sup>c</sup>	2.40	2.16
110	5.70	5.43
100	15.0	13.9

\*  $R_{max}$  is the maximum range from the sound source predicted by the modelling at which the threshold value occurs.

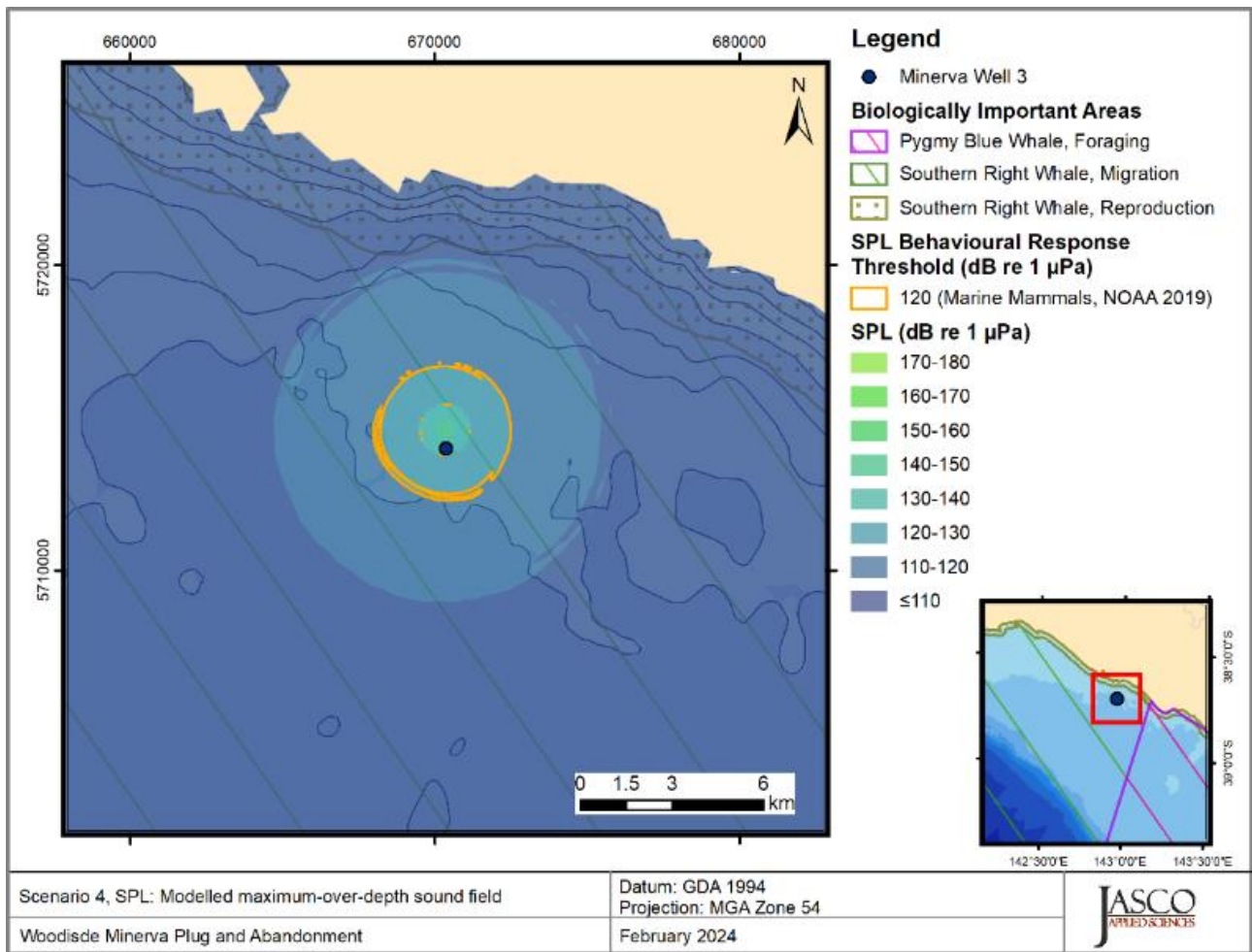
\*\*  $R_{95\%}$  is the range within which the threshold value is reached 95% of the time.

<sup>a</sup> 48 hr threshold for recoverable injury for fish with a swim bladder involved in hearing (Popper et al., 2014).

<sup>b</sup> 12 h threshold for TTS for fish with a swim bladder involved in hearing (Popper et al., 2014).

<sup>c</sup> Threshold for LF, HF & VHF-cetacean behavioural response to non-impulsive noise (NOAA, 2019).

A dash (-) indicates the level was not reached within the limits of the modelled resolution (20 m).



**Figure 1-3: Scenario 4, Subsea infrastructure removal, SPL: Sound level contour map showing the unweighted maximum-over-depth sound field in 10 dB steps, and the isopleths for behavioural response threshold for marine mammals (from Connell et al., 2024).**

Underwater noise from MBES is high-frequency in nature and overlaps the functional hearing range of high-frequency and very-high frequency cetaceans. High-frequency noise from MBES attenuates rapidly in the water column and will not credibly exceed PTS or TTS thresholds for high- and very high-frequency cetaceans. Behavioural impacts would be limited to short-term impacts, such as attraction or avoidance, and be localised within 10's of metres from the noise source.

**Marine Turtles**

Marine turtles are at low risk of mortality or permanent injury from continuous anthropogenic noise sources, such as project vessels (Popper et al., 2014). Marine turtles have also been shown to avoid low-frequency sounds (DeRuiter and Doukara, 2012).

The JASCO modelling study (Connell et al., 2024) used the impact thresholds listed in Table 1-7 and Table 1-8 to assess the potential for impacts to marine turtles (and fishes, considered below). The modelling study results indicated the SEL<sub>24h</sub> threshold for PTS in marine turtles would not be exceeded by the MCV. The SEL<sub>24h</sub> threshold for TTS in marine turtles would only occur to R<sub>max</sub> of 30 m. It is not credible that a marine turtle would remain within 30 m of the MCV vessel for 24 hours, hence TTS in marine turtles will not credibly occur because of the petroleum activity.

While more qualitative than the PST and TTS thresholds, the exposure criteria in Table 1-7 suggest that impacts to marine turtles from underwater noise will be limited to masking and behavioural disturbance within hundreds of metres of the MCV. Given the lack of important turtle habitat and the low number of turtles in the

region, such impacts will be limited to individual turtles. Functional hearing in marine turtles is adapted to low frequencies, hence impacts from MBES are unlikely to occur.

**Table 1-7: Criteria for vessel noise exposure for fish and marine turtles, adapted from Popper et al. (2014).**

Type of Animal	Mortality and Potential Mortal Injury	Impairment			Behaviour
		Recoverable Injury	TTS	Masking	
Fish: No swim bladder (particle motion detection)	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: Swim bladder not involved in hearing (particle motion detection)	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: Swim bladder involved in hearing (primarily pressure detection)	(N) Low (I) Low (F) Low	170 dB SPL for 48 h	158 dB SPL for 12 h	(N) High (I) High (F) High	(N) High (I) Moderate (F) Low
Turtles	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) High (I) Moderate (F) Low
Fish eggs and fish larvae	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) Moderate (I) Moderate (F) Low

Sound pressure level dB re 1  $\mu$ Pa.

Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N) – tens of metres, intermediate (I) – hundreds of metres, and far (F) – thousands of metres.

**Table 1-8: Acoustic effects of continuous noise on turtles, weighted SEL<sub>24h</sub>, Finneran et al. (2017)**

PTS onset thresholds (received level) Weighted SEL <sub>24h</sub> (L <sub>E,24h</sub> ; dB re 1 $\mu$ Pa <sup>2</sup> s)	TTS onset thresholds (received level) Weighted SEL <sub>24h</sub> (L <sub>E,24h</sub> ; dB re 1 $\mu$ Pa <sup>2</sup> s)
220	200

### ***Fish, Sharks, and Rays***

All fish species can detect noise sources, although hearing ranges and sensitivities vary substantially between species. Sensitivity to sound pressure seems to be functionally correlated in fishes to the presence and absence of gas-filled chambers in the sound transduction system. These enable fishes to detect sound pressure and extend their hearing abilities to lower sound levels and higher frequencies (Popper et al., 2019). Based on their anatomy, Popper et al. (2014) classified fishes into three animal groups, comprising:

- fishes with swim bladders whose hearing does not involve the swim bladder or other gas volumes
- fishes whose hearing does involve a swim bladder or other gas volume

- fishes without a swim bladder that can sink and settle on the substrate when inactive.

The criteria defined in Popper et al. (2014) for continuous (Table 1-7) noise sources on the above groups have been adopted.

Based on criteria developed by Popper et al. (2014) for noise impacts on fish, project vessel noise has a low risk of resulting in mortality and a moderate risk of TTS impacts when fish are within tens of metres from the source. The most likely impacts to fish from noise will be behavioural responses, reducing any TTS impact. Individual demersal fish may be impacted in the vicinity of the project area and tuna and billfish and other mobile pelagic species may transverse the project area.

Short-finned eels were identified as a cultural value by EMAC, and traditional owners have a long association with this species. Short-finned eels have a swim bladder not involved in hearing. Using the criteria in Table 1-7, there is negligible risk of mortality, injury or TTS from underwater noise arising from the petroleum activity. Masking and behavioural impacts may occur; however, these will be limited to within hundreds of metres of the MCV. The migration period for short-finned eels is protracted over autumn and summer (Todd, 1980), and the species is distributed across south-western Australia. Hence, masking and behavioural impacts to short-finned eels would only affect a small portion of the migrating population of eels, with no impacts on eels in their freshwater environments.

The project area is not known to be an important spawning or aggregation habitat for commercially caught targeted species. Therefore, no impacts to fish stocks from underwater noise are expected.

Any impacts from noise sources to fish, sharks and rays are anticipated to be temporary and minor and relate to behavioural changes only.

### ***Birds***

Birds are not particularly vulnerable to underwater noise but may be impacted by noise from helicopters. Routine helicopter operations are not planned but may be required in non-routine circumstances. The project area is not a known seabird aggregation area, although several species of seabirds may forage within the project area. Seabirds may be attracted to the presence of the vessel, and hence there may be a higher density of birds around the vessel than in the surrounding environment.

Helicopter noise during landing and take-off may result in behavioural disturbance to seabirds. Seabirds are likely to move away from helicopter noise, resulting in a short-term behavioural disturbance. This impact would only occur during a short period (minutes) when helicopters are landing or taking off. Seabirds are expected to resume normal behaviour once the noise source is no longer in the project area. As such, impacts to birds from noise emissions are limited to short-term, localised behavioural response, with recovery expected to occur once the noise source is no longer present.

#### **1.1.3.2. Cultural Values and Heritage Features**

Through consultation and review of available literature, Woodside understands that marine fauna that may be affected by noise emissions, such as marine mammals and turtles, are culturally important to Traditional Custodians. Traditional Custodians value these species both tangibly as well intangibly as they can be considered a resource or linked to songlines and dreaming stories. Traditional Custodians also have connection to many marine species through kinship and totemic systems; an individual may have obligation to care for a species to which they are kin. Traditional Custodians may also have a cultural obligation to care for the environmental values of Sea Country.

For example, activities that impact turtle populations and their marine environment may have an indirect impact on some Indigenous communities if they deplete hunting areas and threaten local food security (Delisle et al., 2018).

Related intangible cultural heritage may include the transmission of cultural knowledge about whales and whale behaviour, including birthing areas, whale communication and migratory patterns. Such cultural knowledge may be associated with various cultural functions and activities that support the social and economic life of a community (Fijn, 2021). Inter-generational transmission of cultural knowledge (including songlines) relating to marine reptiles may be impacted where changes results in reduced sightings (e.g.,

through population decline, changes to migration routes or changes to migration seasonality). This transfer of knowledge may be integral to managing a group's intangible cultural heritage (UNESCO, 2003).

As described in the environmental impact assessment (Section 1.1.3), potential impacts to marine fauna are predicted to be at an individual level, which are not considered to be ecologically significant at a population level. Impacts are not expected to occur to ecologically significant proportions of the populations of the species, nor expected to result in a decrease of the quality of the habitat such that the extent of these species is likely to decline. As such, cultural values and intangible cultural heritage associated with these species are expected to be maintained.

### 1.1.3.3. Cumulative Impacts

Cumulative underwater noise impacts may occur because of the petroleum activity occurring simultaneously with the Minerva plug and abandonment activities. No other noise-generating activities that may credibly cause cumulative impacts were identified.

The JASCO study (Connell et al., 2024) modelled a range of scenarios that generate underwater noise, including MODU drilling and a support vessel on standby with simultaneous subsea infrastructure removal by the MCV (Scenario 5 in Table 1-2).

The results of the modelling study by JASCO (Connell et al., 2024) found little evidence of cumulative impacts, with the results of the combined drilling and subsea infrastructure removal activities (Scenario 5 in Table 1-2) having no material difference than the drilling activity alone (Scenario 3 in Table 1-2). These results are summarised below in Table 1-9 and Table 1-10. On this basis, the potential for cumulative underwater noise impacts from simultaneous Minerva plug and abandonment and subsea infrastructure removal activities is negligible.

**Table 1-9: Scenarios 3 (drilling with support vessel), 4 (equipment removal) and 5 (simultaneous drilling with support vessel and equipment removal) SEL<sub>24h</sub>: Maximum ( $R_{max}$ ) horizontal distances to frequency-weighted SEL<sub>24h</sub> PTS and TTS thresholds based on Southall et al. (2019) and Finneran et al. (2017) and area ensonified**

Hearing Group	Frequency-Weighted SEL <sub>24h</sub> Threshold ( $L_{E,24h}$ ; dB re 1 $\mu\text{Pa}^2\cdot\text{s}$ )	Scenario 3		Scenario 4		Scenario 5	
		$R_{max}$ (km)	Area (km <sup>2</sup> )	$R_{max}$ (km)	Area (km <sup>2</sup> )	$R_{max}$ (km)	Area (km <sup>2</sup> )
<b>PTS</b>							
LF cetaceans	199	0.18	0.07	0.03	/	0.18	0.09
HF cetaceans	198	–	–	–	–	–	–
VHF cetaceans	173	0.26	0.16	0.03	/	0.28	0.18
Otariid Seals	219	–	–	–	–	–	–
Sea turtles	220	–	–	–	–	–	–
<b>TTS</b>							
LF cetaceans	179	2.09	7.12	0.67	0.37	3.37	8.92
HF cetaceans	178	0.16	0.06	0.03	/	0.16	0.07
VHF cetaceans	153	1.99	7.91	0.53	0.24	3.02	8.77
Otariid Seals	199	0.07	0.01	0.03	/	0.07	0.02

Hearing Group	Frequency-Weighted SEL <sub>24h</sub> Threshold ( $L_{E,24h}$ ; dB re 1 $\mu\text{Pa}^2\cdot\text{s}$ )	Scenario 3		Scenario 4		Scenario 5	
		$R_{\text{max}}$ (km)	Area (km <sup>2</sup> )	$R_{\text{max}}$ (km)	Area (km <sup>2</sup> )	$R_{\text{max}}$ (km)	Area (km <sup>2</sup> )
Sea turtles	200	0.15	0.05	0.03	/	0.15	0.06

A dash (-) indicates the level was not reached within the limits of the modelled resolution (20 m).

A slash (/) indicates that the area is less than an area associated with the modelled resolution (0.0013 km<sup>2</sup>).

**Table 1-10: Scenarios 3 (drilling with support vessel), 4 (equipment removal) and 5 (simultaneous drilling with support vessel and equipment removal) summary of sound transmission loss modelling results for combined cetacean functional hearing groups behavioural and TTS thresholds**

SPL ( $L_p$ ; dB re 1 $\mu\text{Pa}$ )	Scenario 3		Scenario 4		Scenario 5	
	Behavioural Response $R_{\text{max}}^*$ (km)	Behavioural Response $R_{95\%}^{**}$ (km)	Behavioural Response $R_{\text{max}}^*$ (km)	Behavioural Response $R_{95\%}^{**}$ (km)	Behavioural Response $R_{\text{max}}^*$ (km)	Behavioural Response $R_{95\%}^{**}$ (km)
180	–	–	–	–	–	–
170 <sup>a</sup>	–	–	–	–	–	–
160	0.13	0.12	0.02	0.02	0.13	0.12
158 <sup>b</sup>	0.15	0.14	0.02	0.02	0.15	0.14
150	0.43	0.39	0.06	0.06	0.44	0.40
140	1.09	0.96	0.34	0.32	1.25	1.10
130	3.61	3.06	0.89	0.85	3.23	2.82
120 <sup>c</sup>	9.57	8.36	2.40	2.16	9.15	8.65
110	23.2	20.8	5.70	5.43	23.5	20.8
100	45.2	40.6	15.0	13.9	45.0	40.5

\*  $R_{\text{max}}$  is the maximum range from the sound source predicted by the modelling at which the threshold value occurs.

\*\*  $R_{95\%}$  is the range within which the threshold value is reached 95% of the time.

<sup>a</sup> 48 hr threshold for recoverable injury for fish with a swim bladder involved in hearing (Popper et al., 2014).

<sup>b</sup> 12 h threshold for TTS for fish with a swim bladder involved in hearing (Popper et al., 2014).

<sup>c</sup> Threshold for LF, HF & VHF-cetacean behavioural response to non-impulsive noise (NOAA, 2019).

A dash (-) indicates the level was not reached within the limits of the modelled resolution (20 m).

### 1.1.4. Environmental Performance Outcomes, Performance Standards and Measurement Criteria

Environmental Performance Outcomes	Controls	Performance Standards	Measurement Criteria
<p>EPO 5 Noise emissions managed to limit impacts to marine fauna to short-term behavioural impacts only (severity level ≤ 2)<sup>1</sup>.</p> <p>EPO 6 Undertake the petroleum activity in a manner that does not cause acoustic injuries to, or prevent biologically important behaviours of, pygmy blue whales.</p>	<p>C 5.1 Do not undertake activities in reproduction habitat critical to the southern right whale during peak calving period.</p>	<p>PS 5.1 No equipment removal activities within the operational area during May-August</p>	<p>MC 5.1.1 Records show that equipment removal activities within the operational area are undertaken between September and April.</p>
	<p>C 5.2 Prohibit timing of Beach seabed survey in VIC/L22 overlapping with the petroleum activity.</p>	<p>PS 5.2 No overlapping timing of Beach seabed survey in VIC/L22 with the petroleum activity.</p>	<p>MC 5.2.1 Records show that Beach seabed survey was not conducted simultaneously within VIC/L22 with the petroleum activities described in this EP.</p>
	<p>C 5.3 All vessels to comply with EPBC Regulations – Part 8 Division 8.1 interacting with cetaceans in relation to distances to cetaceans.</p>	<p>PS 5.3 Project vessels comply with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures<sup>1</sup>:</p> <ul style="list-style-type: none"> <li>▪ vessels will not travel greater than six knots within 300 m of a cetacean or turtle (caution zone) and not approach closer than 100 m from a whale.</li> <li>▪ vessels will not approach closer than 50 m for a dolphin or turtle and/or 100 m for a whale (with the exception of animals bow riding).</li> <li>▪ if the cetacean or turtle shows signs of being disturbed, vessels will immediately withdraw from the caution zone at a constant speed of less than six knots.</li> </ul>	<p>MC 5.3.1 Daily vessel reports and incident reports demonstrate no breaches with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans.</p>
	<p>C 5.4 Implement PMS on MCV.</p>	<p>PS 5.4 MCV has PMS to ensure engines and power generation equipment,</p>	<p>MC 5.4.1 Records demonstrate MCV contractor maintenance has been satisfactorily completed as scheduled in PMS.</p>

<sup>1</sup>For safety reasons, the distance requirements below are not applied for a vessel holding station or with limited manoeuvrability.

Environmental Performance Outcomes	Controls	Performance Standards	Measurement Criteria
		compressors, and machinery are maintained.	
	C 5.5 Limit vessel speeds to 6 knots or less in the project area (excluding emergencies).	PS 5.5 Movements of project vessels within the project area to be 6 knots or less (excluding emergencies)	MC 5.5.1 Daily vessel reports and incident reports record incidents where 6 knot limit was exceeded.
	C 5.6 Implement adaptive management procedure during daylight hours.	PS 5.6.1 Implement adaptive management procedure during daylight hours. Adaptive management procedure to include: <ul style="list-style-type: none"> <li>▪ MFOs onboard MCV undertaking equipment removal to monitor for pygmy blue and southern right whales 30 minutes prior to commencing DP operations. Proceed with DP operations only when no pygmy blue and southern right whales have been sighted, to the limits of visibility, over the 30-minute monitoring period.</li> <li>▪ MFOs onboard vessel undertaking equipment removal to monitor for pygmy blue and southern right whales 1 hr before sundown prior to undertaking night-time DP operations. Proceed with night-time DP operations only when no pygmy blue or southern right whales observed, to the limits of visibility, 1 hr before the preceding sundown.</li> </ul>	MC 5.6.1.1 Records demonstrate that observation periods prior to commencing DP operations were undertaken and DP operations delayed in whales sighted as per the performance standard.
		PS 5.6.2 At least one dedicated MFO to detect whales during daylight hours from MCV with regionally relevant experience.	MC 5.6.2.1 Records demonstrate that MFO undertake observations for whales. MC 5.6.2.2 MFO resumes to demonstrate suitable qualifications and regionally relevant experience.

<sup>1</sup> Defined as 'Measurable but limited impact (< 1 year) on marine environment, limited community impact (< 1 month)'

## 2. References

- Commonwealth of Australia, 2015. Conservation Management Plan for the Blue Whale: A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999*. Department of the Environment, Canberra.
- Commonwealth of Australia, 2022. Draft National Recovery Plan for the Southern Right Whale *Eubalena australis*. Department of Climate Change, Energy, the Environment and Water, Canberra.
- Connell, S.C., Koessler, M.W., Chatfield, B.S., 2024. Woodside Minerva Decommissioning Noise Modelling - Acoustic Modelling for Assessing Marine Fauna Sound Exposures (Document No. 03326). JASCO Applied Sciences (Australia) Pty Ltd, Capalaba.
- Delisle, A., Kim, M., Stoeckl, N., Lui, F.W., Marsh, H., 2018. The socio-cultural benefits and costs of the traditional hunting of dugongs *Dugong dugon* and green turtles *Chelonia mydas* in Torres Strait, Australia. *Oryx* 52, 250 – 261.
- Department of Climate Change, Energy, the Environment and Water (DCCEEW). 2021. Guidance on Key Terms Within the Blue Whale Conservation Management Plan. DCCEEW. Accessed from: [Guidance on key terms within the Blue Whale Conservation Management Plan \(dcceew.gov.au\)](https://www.dcceew.gov.au/blue-whale/conservation-management-plan/guidance-on-key-terms)
- DeRuiter, S.L., Doukara, K.L., 2012. Loggerhead turtles dive in response to airgun sound exposure. *Endangered Species Research* 16, 55–63. <https://doi.org/10.3354/esr00396>
- Erbe, C., 2012. Effects of underwater noise in marine mammals, in: Popper, A., Hawkins, A. (Eds.), *The Effects of Noise on Aquatic Life, Advances in Experimental Medicine and Biology*. Springer, pp. 17–22.
- Erbe, C., Dunlop, R.A. and Dolman, S.J. (2016). Effects of noise on marine mammals. In: *Effects of anthropogenic noise on animals*. Eds: Slabbekoorn, H., Doling, R.J., Popper, A.N. and Fay, R.R. Springer Handbook of Auditory Research. pp 277-309.
- Fijn, N., 2021. Donald Thomson: Observations of animal connections in visual ethnography in northern Australia. *Ethnos* 86, 44-68.
- Jiménez-Arranz, G., Banda, N., Cook, S., Wyatt, R., 2020. Review on existing data on underwater sounds produced by the oil and gas industry (Revision No. 5.1). Seiche Measurements Ltd, Devon.
- McKenna, M.F., 2011. Blue whale response to underwater noise from commercial ships (Doctor of Philosophy). University of California, San Diego, San Diego.
- National Oceanic and Atmospheric Administration, 2019. ESA Section 7 Consultation Tools for Marine Mammals on the West Coast | NOAA Fisheries [WWW Document]. NOAA Fisheries. URL <https://www.fisheries.noaa.gov/west-coast/endangered-species-conservation/esa-section-7-consultation-tools-marine-mammals-west> (accessed 7.6.20).
- Nielsen, M.L., Sprogis, K.R., Bejder, L., Madsen, P.T., Christiansen, F., 2019. Behavioural development in southern right whale calves. *Marine Ecology Progress Series* 629, 219–234.

- Pangerc, T., S. Robinson, P. Theobald, and L. Galley. 2016. Underwater sound measurement data during diamond wire cutting: First description of radiated noise. *Proceedings of Meetings on Acoustics* 27(1): 040012. <https://doi.org/10.1121/2.0000322>.
- Popper, A.N., Hawkins, A.D., Fay, R.R., Mann, D.A., Bartol, S.M., Carlson, T.J., Coombs, S., Ellison, W.T., Gentry, R.L., Halvorsen, M.B., Løkkeborg, S., Rogers, P., Southall, B.L., Zeddies, D.G., Tavolga, W.N., 2014. ASA S3/SC1.4 TR-2014 sound exposure guidelines for fishes and sea turtles: a technical report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI. Springer, New York.
- Richardson, W., Greene, C., Malme, C., & Thomson, D. (1995). *Marine Mammals and Noise*. Academic Press, San Diego, CA.
- Simmonds, M., Dolman, S. and Weilgart, L. (2004). *Oceans of Noise*. A WDCS Science Report. The Whale and Dolphin Conservation Society (WDCS). Wiltshire, United Kingdom.
- Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P. and Tyack, P.L. (2019) Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. *Aquatic Mammals*, 45: 125-232. DOI: <https://doi.org/10.1578/AM.45.2.2019.125>
- Todd, P.R., 1980. Size and age of migrating New Zealand freshwater eels (*Anguilla* spp.). *New Zealand Journal of Marine and Freshwater Research* 14, 283–293.
- United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2003. 2003 Convention for the Safeguarding of the Intangible Cultural Heritage, United Nations Educational, Scientific and Cultural Organisation. Available at: <https://ich.unesco.org/en/convention>.
- Weilgart, L.S., 2007. A brief review of known effects of noise on marine mammals. *International Journal of Comparative Psychology* 20, 159–168.
- Xodus (2017). Dunlin Subsea Decommissioning Environmental Statement. Report No. XOD=DUN-HSE-RPT-00003, Report prepared for Fairfield Betula Limited, by Xodus.