BMNGH-PER-REP-2006-02 Preliminary Assessment Report Marine Ecology

Blue Mackerel Offshore Wind Farm

Blue Mackerel North Pty Ltd

23 December 2025

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GHD Pty Ltd | ABN 39 008 488 373
180 Lonsdale Street, Level 9
Melbourne, Victoria 3000, Australia
T +61 3 8687 8000 | **F** +61 3 8732 7046 | **E** melmail@ghd.com | **ghd.com**

Acknowledgement of Country

GHD acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the land, water and sky throughout Australia on which we do business. We recognise their strength, diversity, resilience and deep connections to Country. We pay our respects to Elders of the past, present and future, as they hold the memories, knowledges and spirit of Australia. GHD is committed to learning from Aboriginal and Torres Strait Islander peoples in the work we do.

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Appendix A Protected Matters Search Tool Search Results
Appendix B Victorian Biodiversity Atlas Search Results
Appendix C Victorian FeAST Assessment

Abbreviations

Table 1.1 Abbreviations list

Abbreviation	Description
AH Act	*Aboriginal Heritage Act 2006* (Vic)
AHD	Australian Height Datum
AS	Australian Standard
AUD	Australian Dollars
BMN	Blue Mackerel North Pty Ltd
CD	Chart Datum
CHMP	Cultural Heritage Management Plan
CPT	Cone Penetration Test
CPTu	Electrical CPT with recording of the pore water pressure
Cth	Commonwealth
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cth)
DEECA	Department of Energy, Environment and Climate Action (Vic)
DGPS	Differential Global Positioning System
DH	Downhole
DP	Dynamic Positioning
DPR	Daily Progress Report
DTP	Department of Transport and Planning (Vic)
EE Act	*Environment Effects Act 1978*
EES	Environment Effects Statement (Vic)
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement (Cth)
EMP	Environmental Management Plan
EP Act	*Environment Protection Act 1970* (Vic)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Vic)
ERP	Emergency Response Plan
FFG Act	*Flora and Fauna Guarantee Act 1988* (Vic)
FLA	Feasibility Licence Area
FLiDAR	Floating LiDAR
FTE	Full-Time Equivalent
GIR	Geotechnical Interpretative Report
GIS	Geographic Information System
GLaWAC	Gunaikurnai Land and Waters Aboriginal Corporation
GRR	Geotechnical Risk Register
GNSS	Global Navigation Satellite System
GSNI	Geological Survey of Northern Ireland
GST	Goods and Services Tax

Abbreviation	Description
GW	Gigawatt
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drilling
HSE	Health, Safety and Environment
HSEQ	Health, Safety, Environment and Quality
HSSE	Health Safety Security and Environment
HSWL	High Still Water Level
IPA	Indigenous Protection Area
ITT	Invitation to Tender
LAT	Lowest Astronomical Tide
LSWL	Low Still Water Level
MACA	*Marine and Coastal Act 2018* (Vic)
MBES	Multi-Beam Echo Sounder
MP	Monopile
MSL	Mean Sea Level
nm	Nautical Mile
NDA	Non-Disclosure Agreement
NSS	Normal Sea State
OEI	*Offshore Electricity Infrastructure Act 2021* (Cth)
OSP	Offshore substation platforms
OWF	Offshore Wind Farm
PDE	Project Design Envelope
PEP	Project Execution Plan
PM	Project Manager
PPE	Personal Protective Equipment
PPT	Piezocone Penetration Test (= PCPT)
PSS	Peak Sea State
P&E Act	*Planning and Environment Act 1987* (Vic)
QA	Quality Assurance
QC	Quality Control
RAP	Registered Aboriginal Party
RTK	Real Time Kinematic
SCPT	Seismic Cone Penetration Test
SLR	Sea Level Rise
SME	Subject Matter Expert
TIL	Transmission and Infrastructure Licence
TRG	Technical Reference Group
UCH	*Underwater Cultural Heritage Act 2018* (Cth)
UXO	Unexploded Ordnance
WTG	Wind Turbine Generator

Glossary

Table 1.2 Glossary terms and definitions

Term	Definition
Discipline specific terms	
Australia's marine regions	A profile of the ecological and biophysical features and socio-economic characteristics of a marine bioregion. Marine bioregional plans have been developed for four of Australia's marine regions - South-west, North-west, North and Temperate East. Marine Bioregional Plans will help improve the way decisions are made under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), particularly in relation to the protection of marine biodiversity and the sustainable use of our oceans and their resources by our marine-based industries.
Bioregion	A large area that has similar types of plants, animals and ocean conditions within its boundaries, but different from other similarly sized areas. In this document, 'bioregion' means provincial bioregion as defined in the Integrated Marine and Coastal Regionalisation of Australia Version 4.0 (see mesoscale bioregion).
Key Ecological Feature (KEF)	Key ecological features are elements of the Commonwealth marine environment that, based on current scientific understanding, are considered to be of regional importance for either the region's biodiversity or ecosystem function and integrity.
Mesoscale bioregion	The Integrated Marine and Coastal regionalisation of Australia (IMCRA v4.0) classified Australia's marine environment into ecologically relevant bioregions for regional planning.
Project	Blue Mackerel Offshore Wind Farm Project
Proponent	Blue Mackerel North Pty Ltd
Province	A large-scale biogeographic unit derived from evolutionary processes in which suites of endemic species coexist.
Ramsar site	Ramsar sites (or Ramsar wetlands) are wetlands of international importance listed under the Ramsar Convention on Wetlands. The Convention on Wetlands, known as the Ramsar Convention, is an intergovernmental environmental treaty established in 1971 by UNESCO, which came into force in 1975. It provides for national action and international cooperation regarding the conservation of wetlands, and wise sustainable use of their resources. Ramsar identifies wetlands of international importance, especially those providing waterfowl habitat. There are 66 Ramsar sites in Australia.
Threatened species (listed species)	For the purposes of this report, threatened species refers to species considered threatened in Victoria or Australia. This includes species that are listed as Vulnerable, Endangered or Critically Endangered in Victoria under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), or listed as Vulnerable, Endangered or Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
Victorian Biodiversity Atlas (VBA)	The VBA is administered by the Victorian Department of Energy, Environment and Climate Action and replaces several legacy systems, including the Flora Information System, the Atlas of Victorian Wildlife, and the Aquatic Fauna Database. The VBA encompasses vertebrate and invertebrate animals, fungi, vascular and non-vascular plants from terrestrial and aquatic environments, including marine waters to the three nautical mile statutory limit. It includes both native and naturalised exotic species (including weeds and pests) but is not intended to hold data on cultivated or domesticated species.

1. Introduction

The Blue Mackerel Offshore Wind Farm Project ('the Project') proposes the installation of a 1 gigawatt (GW) offshore wind farm off the Gippsland coast. The Project is being developed by Blue Mackerel North Pty Ltd (BMN).

The Australian Minister for Climate Change and Energy declared a 15,000 km^2 area off Gippsland as suitable for offshore renewable energy in December 2022 and awarded BMN a feasibility licence in May 2024 for an area of approximately 163 km^2, which allows BMN to begin the assessment work to support the Project's approvals. An *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral for marine surveys was submitted in September 2024 and was determined by a delegate of the Commonwealth Minister to be 'not a controlled action subject to conditions' (EPBC reference number 2024/09934). The portion of the surveys undertaken in Victorian waters also received consent under the *Marine and Coastal Act 2018*.

The Project involves construction of offshore wind turbine generators, inter-array cables, and export cables to connect the offshore wind farm to VicGrid's proposed connection hub. Works will occur within Commonwealth waters, Victorian coastal waters and onshore within Victoria. The Project is therefore expected to require preparation of an Environment Impact Statement and approval under the EPBC Act as well as planning approvals under relevant Victorian legislation. This preliminary assessment is being prepared to inform referrals of the marine components of the Project under Commonwealth and Victorian legislation.

A more detailed project overview is provided within Section 2 of this report, which provides further information on the key infrastructure associated with the Project, the construction, operation and decommissioning activities.

1.1 Purpose of this report

The purpose of this report is to characterise the existing environment and identify potential impacts and mitigation measures for the Project to support the Project referrals under the EPBC Act and *Environment Effects Act 1978* (EE Act).

1.2 Scope and limitations

1.2.1 Scope

This Preliminary Assessment Report - Marine Ecology presents the results of a review of the marine environmental and social features and sensitivities that are relevant to the offshore study area and the offshore Proposed Action Area (PAA). The report also provides a preliminary assessment of the potential impacts of the Project on the marine features and sensitivities.

The scope of this report is to:

– Identify key potential marine environmental impacts associated with the Project;
– Identify implications of the findings under relevant Commonwealth and state legislation; and
– Recommend studies to enhance the understanding of baseline conditions and impacts for the project

This Preliminary Assessment Report - Marine Ecology considers potential impacts resulting from the offshore components of the Project in Commonwealth and state waters, including the cable shore crossing points and the intertidal zone up to the Highest Astronomical Tide (HAT) boundary.

1.2.2 Limitations

This report: has been prepared by GHD for Blue Mackerel North Pty Ltd and may only be used and relied on by Blue Mackerel North Pty Ltd for the purpose agreed between GHD and Blue Mackerel North Pty Ltd as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Blue Mackerel North Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by Blue Mackerel North Pty Ltd and others (including Government authorities). GHD has not independently verified or checked this information beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 3.5 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

2. Project overview

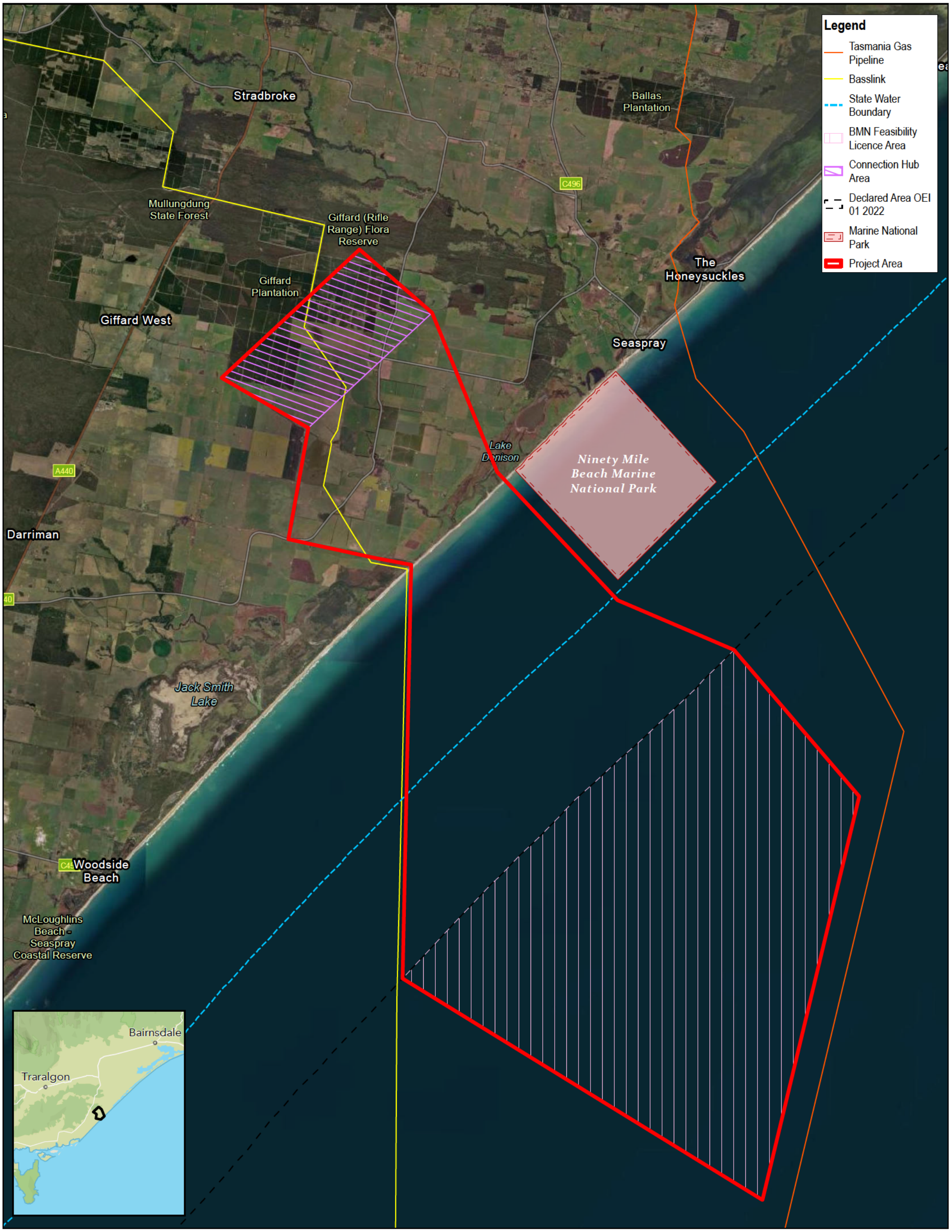
The Project proposes the installation of a 1 GW wind farm off the coast of Brataualung and Tatungalung Country, Gippsland, approximately 10 km from Seaspray, Victoria. The Project intends to connect to Victoria's electricity network via VicGrid's proposed connection hub, near Giffard, Victoria.

The Project includes the following key infrastructure:

- Offshore wind turbine generators (WTGs) installed on foundations secured into the seabed (fixed foundations), arranged in an optimal array layout with up to 70 turbines , depending on the type of turbine selected and its energy generating capacity. Each turbine would have a capacity ranging from 15 MW up to 23 MW
- Network of subsea inter-array cables connecting the WTGs, laid on the seafloor and protected by armouring or burial
- Potentially one or two offshore substation platforms installed on foundations secured into the seabed (fixed foundations)
- Export cables, laid on the seafloor and protected by armouring or burial
- Shore crossing using a trenchless construction method (horizontal directional drilling (HDD) or direct pipe)
- Onshore buried transmission cables between the shoreline and VicGrid's proposed connection hub. The onshore transmission cable will be between 6 km and 10 km in length, with the route determined by landholder access agreements and the avoidance and minimisation of impacts on environmental and heritage values. Trenching will be the primary construction method, with HDD or direct pipe preferred at environmentally sensitive locations such as waterway crossings and at crossing with existing roads and infrastructure. Cables will be installed in lengths and connected with sub-surface joining

VicGrid is responsible for land acquisition and approvals for the connection hub. The Victorian Government is also assessing the role of deepwater ports, including the Victorian Renewable Energy Terminal at the Port of Hastings, to support the construction and assembly of Victorian offshore wind projects. It is anticipated that port expansion works or upgrades would be undertaken by the Port to service multiple developments and offshore wind farm projects. The connection hub and port infrastructure are therefore outside the scope of this report.

The Project traverses the Victorian terrestrial environment in Wellington Shire local government area, Victorian coastal waters and Commonwealth marine waters in the Bass Strait as shown in Figure 2.1.



Paper Size ISO A3

0 0.85 1.7 2.55 3.4

Kilometers

Map Projection: Lambert Conformal Conic
Horizontal Datum: GDA2020
Grid: GDA2020 Vicgrid

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Revision No. **C**
Date **5/11/2025**

Project overview and relevant jurisdictions

FIGURE 2.1

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Data source:DEECA 2025,VicMap,2025 ;Aerial Imagery: ESRI Basemap- Vicgrid Basemap - ESRI 2024 - Aerial Data Custodian, Data Set Name/Title, Version/Date. Created by:kdarey

2.1 Activity description

This section outlines the key activities associated with the offshore components of the Project. As this report provides a preliminary assessment focused on marine ecology, onshore components and associated activities have been excluded from the scope of this assessment. Details regarding onshore elements are presented in a separate report (GHD, 2025b).

Construction of the Project will include the following key activities:

– Offshore surveys and site preparation:
  - Minimal seabed preparation where micro-siting is not possible, including removal of hazards (e.g., UXO, small rocks and boulders)
  - Offshore installation of navigational aids
– Offshore key construction activities:
  - Installation of offshore foundations for WTGs and substation(s)
  - Installation of turbine components and offshore substation substructures on foundations
  - Installation of scour protection to foundations, as required
  - Laying of the inter-array cables by trenching and burial and/or with armouring
  - Laying of export cable by trenching and burial and/or with armouring
  - Shore crossing: cable pull-in from offshore to onshore using Horizontal Directional Drilling (HDD) or direct pipe (subject to feasibility/technical or engineering constraints). A shore crossing will connect the offshore export cables to the onshore transmission cable.
  - Testing and commissioning of the wind farm
  - Provision of installation vessels, and other support vessels (e.g., guard vessels)

The operational life of the Project is estimated to be up to 40 years, during which time typical operational activities could include the:

– Ongoing monitoring and operation of the WTGs
– Routine and ad-hoc offshore maintenance activities. Activities may include major maintenance activities such as blade repair/replacement)
– Ongoing infrastructure performance and environmental monitoring
– Repowering (subject to any required regulatory approvals) at the end of WTGs' design life, involving replacement with new WTGs on existing foundations, thereby extending design life further

A decommissioning plan will be prepared during detailed design and refined during the projects operational life and in accordance with relevant legislation, guidance and policy. The decommissioning plan will address how infrastructure will be decommissioned in accordance with OEI Act and regulations.

Decommissioning activities will be similar in type and scale to the construction methods and will involve similar vessels and equipment. Decommissioning activities would be reviewed in discussion with the transmission system operator and regulator at the time considering any other existing or proposed future use.

It is anticipated that decommissioning will include:

– The WTG and offshore substation foundations and any unburied cables will be designed to allow for structures above the seabed to be removed
– Buried cables and subsea foundations below the mudline will likely remain in situ to avoid the environmental disturbance caused by removal
– Consideration of reinstatement and/or rehabilitation activities
– Mitigation and monitoring

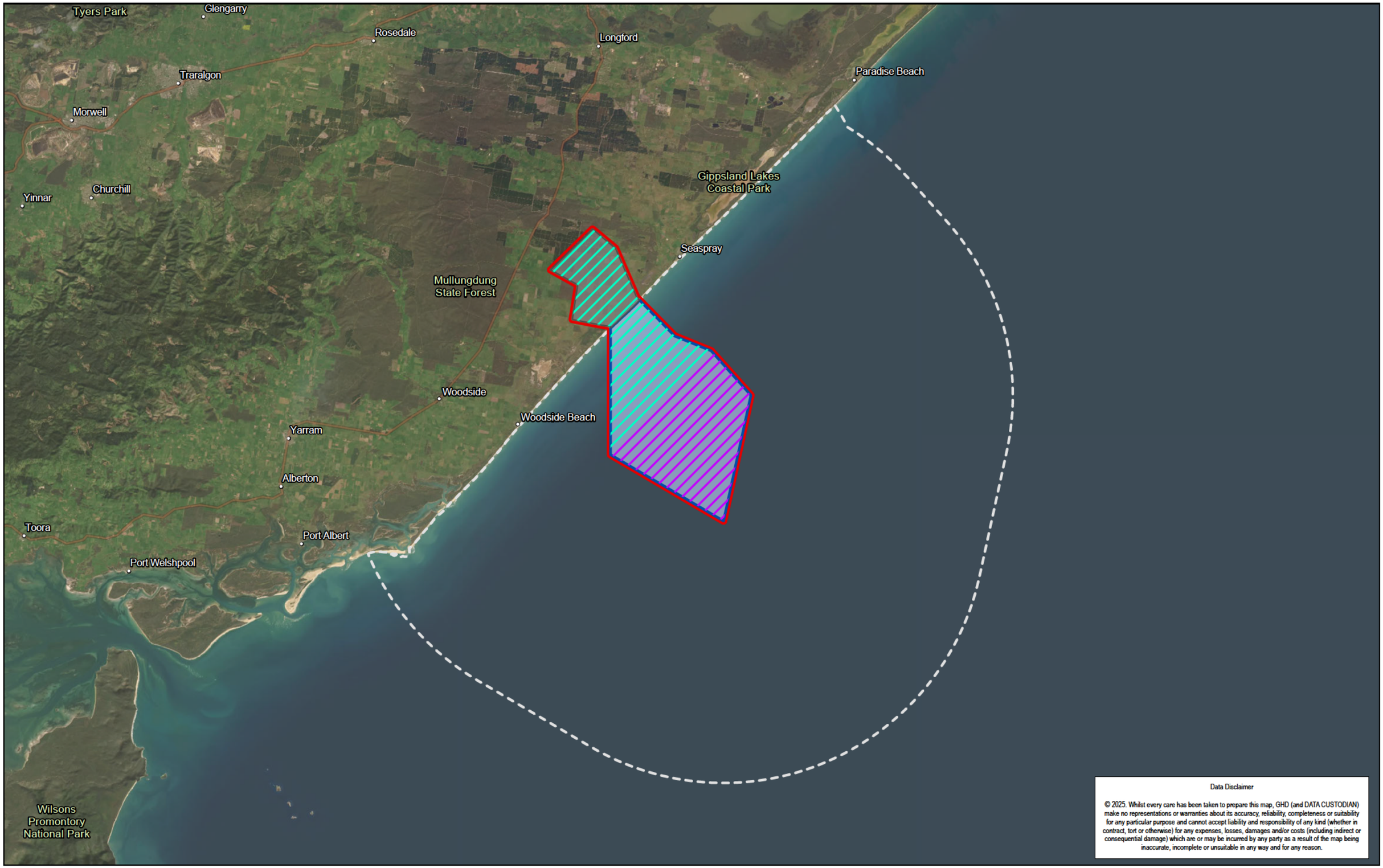
3. Method

This section describes the methodology applied in this assessment, including the definition of spatial areas relevant to the Project, the desktop review process and data sources consulted, the framework used to assess the likelihood of species occurrence, and the approach adopted for impact assessment.

3.1 Project areas

The following areas are defined for the Project (see Figure 3.1):

- **Offshore Study Area**: The area used for desktop searches, defined as a 30 km buffer around the Offshore PAA. This buffer is clipped at the Highest Astronomical Tide (HAT) line
- **Project Area:** The total area encompassed by the Project boundary, including all offshore and onshore components. This includes the marine and terrestrial sections of the export cable corridor as well as the feasibility licence area
- **Offshore PAA**: The portion of the Project Area located offshore (marine) seaward of the HAT line
- **Feasibility Licence Area**: The area covered by BMN's feasibility licence (FL-001), granted in May 2024. The area spans approximately 163 km² and authorises BMN to undertake assessment activities to support Project approvals
- **Export Cable Area:** The designated corridor for laying inter-array and export cables, including the shore crossing. Installation methods may include trenching and burial and/or armouring. The shore crossing refers to the transition zone where offshore export cables connect to onshore transmission infrastructure, typically installed via horizontal directional drilling (HDD) or direct pipe, subject to feasibility and engineering constraints.
- **Onshore PPA**: The portion of the PAA located onshore (terrestrial and aquatic), separated from the offshore area by the HAT line



Data Disclaimer

Legend

- offshore Proposed Action Area
- onshore Terrestrial Action Area
- offshore study area
- Project Area
- BMN Feasibility Licence Area
- Export Cable Area

Paper Size ISO A3

0 5 10

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Blue Mackerel North Pty Ltd
Blue Mackerel Offshore Wind Farm
EIA and Approvals

Preliminary Assessment Project Areas and Study Context

Project No. **12656248**
Revision No. **0**
Date **1/10/2025**

FIGURE 3.1

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Print date: 01 Oct 2025 - 17:56

Data source: World Imagery: Earthstar Geographics
Hybrid Reference Layer: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community. Created by: bpalm

3.2 Desktop review and data sources

A desktop review of the databases listed below were completed to inform this report:

- Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) (DCCEEW) (see full report in Appendix A)
- The Victorian Biodiversity Atlas (VBA), maintained by the Department of Energy, Environment and Climate Action (DEECA) (see full report in Appendix B)
- The Atlas of Living Australia (ALA) database, maintained by the Commonwealth, Scientific and Industrial Research Organisation (CSIRO)
- Birdata Database, maintained by Birdlife Australia
- Coastkit, maintained by DEECA
- Coastkit FeAST Assessment, maintained by DEECA (see full report in Appendix C)
- Australian Marine Spatial Information System (AMSIS)
- VicFlora Flora of Victoria to identify flora species occurrences
- Victorian Fisheries Authority (VFA)

3.3 Likelihood of occurrence

In addition to the desktop review of ecological values and sensitivities within the offshore study area, a likelihood of occurrence assessment was undertaken for Commonwealth listed species under EPBC Act and Victorian state legislation the *Flora and Fauna Guarantee Act 1988* (FFG Act). This assessment was informed by a range of information for each species and community to establish whether they are expected to occur within the Offshore PAA and wider offshore study area. Identified species were assigned a likelihood ranking based on the framework presented in Table 3.1. As this report focuses on marine ecological values and sensitivities, terrestrial and freshwater species identified during desktop searches are not considered further in this assessment and are addressed in a separate report (GHD, 2025b).

Table 3.1 Likelihood of occurrence assessment framework

Likelihood	Decision framework	Implications for assessment and reporting
Known to occur	Species has been recorded within the Offshore PAA or Offshore Study Area during field surveys OR For marine species, there are recent (within 5 years) and nearby (within 10 km) historical records of the species AND suitable high-quality habitat present within the Offshore PAA or Offshore Study Area	**Included in all reporting** These species were included in all reporting to: 1. Assess and species habitat 2. Define key ecological features including important populations and habitat critical to the survival of the species 3. Assess potential species-specific impacts 4. Identify provisional avoidance and mitigation measures 5. Undertake potential significance of impact assessments on residual impacts
Likely to occur (High likelihood)	Habitat is present in the Offshore PAA or Offshore Study Area and the species has been recorded in the Offshore PAA or Offshore Study Area, or in connected habitat adjacent to the Offshore PAA or Offshore Study Area, in the last 11 to 30 years. OR Habitat is present in the Offshore PAA or Offshore Study Area and the species has been recorded within its dispersal range/limit from the Offshore PAA or Offshore Study Area in the last 11 to 30 years, and there are no significant barriers to movement between the records and the Offshore PAA or Offshore Study Area.	
	For terrestrial species, there are recent (within 10 years) and nearby (within 10 km) historical records of the species AND suitable high-quality habitat present within the Offshore PAA or Offshore Study Area	

Likelihood	Decision framework	Implications for assessment and reporting
May occur (Moderate – Low likelihood)	Habitat is present in the Offshore PAA or Offshore Study Area and the species has been recorded in the Offshore PAA or Offshore Study Area, or in connected habitat adjacent to the Offshore PAA or Offshore Study Area, more than 31 years ago OR Habitat is in the Offshore PAA or Offshore Study Area, the Offshore PAA or Offshore Study Area is within the species modelled distribution range, and the species may use the habitat at least occasionally or opportunistically OR Habitat is in the Offshore PAA or Offshore Study Area, and it could be used in the future as climate refugia	
	There are older (10-20 years) and more regional (10-30 km) historical records of the species AND suitable low to moderate quality habitat present within the Offshore PAA or Offshore Study Area.	
	There are no nearby or regional historical records of the species and the species was not detected in field surveys BUT suitable moderate or high-quality habitat is present within the Offshore PAA or Offshore Study Area AND the species has life history characteristics that warrant increased conservatism in likelihood assessment (i.e. cryptic species or species with temporal or spatial dynamism such as transient, wide-ranging species or species that are dormant for extended periods)	
	The species is unlikely to occur in the Offshore PAA or Offshore Study Area but has a reasonable likelihood of occurring immediately adjacent and should be included in impact assessment due to the potential for indirect impacts on the species.	
Unlikely to occur (Very low likelihood)	Habitat is not present within the Offshore PAA or Offshore Study Area or adjacent to the Offshore PAA or Offshore Study Area and the Offshore PAA or Offshore Study Area is within the species distribution. OR Habitat is present in the Offshore PAA or Offshore Study Area and the species has been recorded within its dispersal range/limit from the Offshore PAA over 30 years ago, and there are no significant barriers to movement between the records and the Offshore PAA or Offshore Study Area	**Included in likelihood of occurrence reporting only** These species were not included in impact assessment given they are unlikely to occur in the Project.
	The species has been historically recorded locally or regionally, however, no suitable habitat occurs within the Offshore PAA or Offshore Study Area, and the species has limited mobility or temporal dynamism, allowing increased confidence that it is unlikely to occur within the Offshore PAA or Offshore Study Area even on a transient basis.	
	The species has NOT been recorded locally or regionally AND only small areas of very low-quality habitat are present in the Offshore PAA or Offshore Study Area AND the species is readily detected wherever present.	
Highly unlikely to occur (Negligible likelihood)	The species has NOT been historically recorded in the region AND no suitable habitat is present AND the Offshore PAA or Offshore Study Area is generally outside the species current known range.	
	The species has well-known and highly specific habitat requirements that are not present in the Offshore PAA or Offshore Study Area AND the species has low mobility. This is reserved for species where there is very high confidence that the species will not occur.	

3.4 Impact assessment methodology

The impact assessment (refer to Section 6) identifies potential direct and indirect impacts associated with the proposed offshore activities.

These are aligned with the DCCEEW Key Environmental Factors (KEFs), as outlined in the *Key Environmental Factors for Offshore Windfarm Environmental Impact Assessment under the EPBC Act* (DCCEEW, 2023), and are considered across both Victorian coastal waters and Commonwealth waters.

Identified impacts are then carried through to a significance assessment, outlined in Section 7 under the EPBC Act and the EE Act. For the EPBC Act, the assessment follows the criteria set out in the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (DoE, 2013a). For the EE Act, the assessment aligns with the Ministerial Guidelines for Assessment of Environmental Effects (DELWP, 2023), which outline the process for determining whether a project is likely to have a significant effect on the environment and therefore requires an Environment Effects Statement (EES).

A 'significant impact' is defined as one that is important, notable, or consequential, taking into account the context and intensity of the impact. The likelihood of a significant impact is determined by factors such as the sensitivity, value, and quality of the environment, as well as the intensity, duration, magnitude, and geographic extent of the proposed action.

An impact is considered 'likely' if there is a real or not remote chance of it occurring. Where there is scientific uncertainty and the potential for serious or irreversible impacts, the *precautionary principle* is applied.

To account for varying sensitivities and impact pathways, the assessment considers different receptor groups (e.g., seabirds, marine mammals).

3.5 Assessment limitations and assumptions

The following assumptions and limitations apply to the services undertaken by GHD in connection with preparing this report:

- The services are limited to those specifically detailed in the report and are subject to the scope limitations stated in Section 1 and set out in the report
- The preliminary ecological assessment is limited to a desktop assessment. The findings of this assessment may need to be confirmed through detailed field assessments
- The impact assessment and mitigation measures is based on dimensions and construction methods provided by BMN, or where these have not been provided, an assumed dimension or construction method based on similar projects. Should these dimensions or construction methods change, assessments of potential impacts will require review and updating as required
- The assessment of impacts in this report is standalone and does not consider the cumulative impacts of other components of the project or the cumulative impacts of projects occurring in the region
- With regard to threatened fauna species, EPBC Act-listed migratory species and Bass Strait migratory species, this report considers offshore ecological impacts only and other onshore impacts will be considered in a separate report for the Preliminary Onshore Ecology Desktop Assessment – Blue Mackerel Offshore Wind Farm (GHD, 2025b)

Use of databases

The Victorian Biodiversity Atlas (VBA) database can be used to search a defined geographical area to produce species lists of flora and fauna that have been recorded historically within the searched area. The database lists are only as accurate as the quality and quantity of data that have been recorded and documented from the area.

Location details for many records (typically older records) have a relatively low degree of accuracy (e.g., within 1 km). Thus, the database search may not pick up some records of species that were made within the site historically.

These datasets are not exhaustive. In other words, many locations locally and across Victoria have a low level of documented survey effort for one or more groups of flora and fauna. The environs located within the offshore PAA (particularly coastal and offshore areas) are likely to be subject to low levels of survey effort historically as a result of limited access and lower numbers of local infrastructure developments in contrast with urban areas and major regional centres. During field surveys, it is not uncommon to find species at locations for which there are few or no previous nearby database records.

4. Legislative context

Table 4.1 summarises the key Commonwealth and state legislation relevant to the assessment and management of potential impacts of the Project on the marine environment. Where legislation prescribes standards or control measures to mitigate potential impacts, these have been considered in the impact assessment.

Table 4.1 Key legislation relevant to the marine components of the Project

Legislation	Description and relevance to the Project
Commonwealth legislation	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as Matters of National Environmental Significance (MNES). In addition, management plans, recovery plans and conservation advice are established in relation to species, ecological communities and protected areas/properties listed under the EPBC Act. Administered by the Commonwealth DCCEEW. The preliminary assessment in this report has considered the MNES that could be directly or indirectly impacted by the Project. The outcomes of the assessment are detailed in Section 7 of this report. MNES of relevance to this report include: – Ramsar Wetlands – Commonwealth Marine Area – Threatened Ecological Communities – Threatened and Migratory Species
Offshore Electricity Infrastructure Act 2021 (OEI Act)	Sets out a licensing and regulatory framework for the construction, installation, operation, maintenance and decommissioning of offshore renewable energy and offshore electricity transmission infrastructure; and applies to offshore locations in Commonwealth waters. Administered by the Offshore Infrastructure Registrar (OIR). Prior to commencing offshore infrastructure activities, a licence holder is required to submit a management plan to the OIR for assessment.
Australian Maritime Safety Authority Act 1990	Promotes maritime safety and protects the marine environment from pollution from ships and other environmental damage caused by shipping. Provides for a national search and rescue service and facilitates the preparation and response to marine pollution events such as oil spills. Administered by the Commonwealth Australian Maritime Safety Authority (AMSA). Response to marine pollution events from vessels associated with the Project would be undertaken in accordance with the National Plan for Maritime Emergencies (NATPLAN). All vessels used by the Project will need to comply with AMSA requirements for safety.
Biosecurity Act 2015	Regulates and manages biosecurity threats to Australia, including management of vessel ballast water and biofouling to prevent the introduction, establishment or spread of diseases or pests (e.g., invasive marine species (IMS)). Administered by the Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF). The Project is required to implement control measures that reduce the likelihood of the introduction and establishment of IMS. The Act will guide requirements for incoming vessels (or other goods and services) required for the Project, including Ballast water management in accordance with Australian Ballast Water Management Requirements.
Protection of the Sea (Prevention of Pollution from Ships) Act 1983	Relates to the protection of the sea from pollution by air emissions, oil, sewage, waste and other substances discharged from vessels, and gives effects to certain requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL). Administered by AMSA. Several Marine Orders are enacted under this Act that will apply to Project vessels, including but not limited to: – Marine order 91: Marine pollution prevention—oil – Marine order 95: Marine pollution prevention—garbage – Marine order 96: Marine pollution prevention—sewage – Marine order 97: Marine pollution prevention—air pollution – Marine order 98: Marine pollution—anti-fouling systems

Legislation	Description and relevance to the Project
Fisheries Administration Act 1991	Relates to the management of Australian (Commonwealth managed) fisheries. Administered by the Australian Fisheries Management Authority (AFMA). Of particular relevance to the Project is the allocation of fishing rights and management areas. Commonwealth managed fisheries relevant to the Project are summarised in Section 5.8.
Underwater Cultural Heritage Act 2018	Protects the heritage values of underwater cultural heritage and relics of older than 75 years, including shipwrecks, sunken aircraft and other types of underwater cultural heritage. Administered by DCCEEW. Project activities are required to not disturb or damage underwater heritage and to observe the requirements of protected zones. Potential impacts are considered in a separate report (GHD, 2025a)
Environment Protection (Sea Dumping) Act 1981	Regulates the loading and dumping of waste at sea; and also fulfils Australia's international obligations under the London Protocol to prevent marine pollution by controlling dumping of wastes and other matter. Administered by DCCEEW. Permits are required from DCCEEW for all ocean disposal activities such as cable burial using imported materials (rock for armour/cable protection, etc). In the event that any Project infrastructure remains in-situ at the end of its use, a Sea Dumping Permit may be required. DCCEEW is currently reviewing its regulatory arrangements for abandonment of offshore infrastructure and considers proposals to abandon infrastructure at sea on a case-by-case basis.
State legislation	
Flora and Fauna Guarantee Act 1988	Establishes a legal and administrative structure to enable and promote the conservation of native flora and fauna and to provide for a choice of procedures which can be used for the conservation, management or control of flora and fauna and the management of potentially threatening processes. Administered by the Department of Energy, Environment and Climate Action (DEECA). The Project is required to assess the potential impacts on Threatened species and communities listed under the Act and the Project may require a Permit to Take Protected Flora/Fauna. A permit may be required for any survey activities with the potential to disturb FFG Act listed species.
Environment Protection Act 2017	The purpose of the legislation is to enhance protection of Victoria's environment and human health through a proportionate, risk-based environment protection framework. Administered by the Environment Protection Authority (EPA) Victoria. The Project has a general environmental duty to reduce the risk of harm from its activities to human health and the environment from pollution or waste.
Environment Effects Act 1978	Establishes a process for assessing the potential environmental effects of a proposed development and enables statutory decision-makers to determine whether a project with potentially significant environmental effects should proceed. Administered by the Department of Transport and Planning (DTP). The preliminary assessment in this report has considered referral criteria and matters protected by the state that could be directly or indirectly impacted by the Project. The outcomes of the assessment are detailed in Section 7 of this report.
Wildlife Act 1975	Establishes procedures to protect and conserve wildlife, allows for the sustainable use of and access to wildlife; and regulates the conduct of persons engaged in wildlife related activities. The Project may require authorisation for handling and managing fauna.
Marine and Coastal Act 2018	Provides an integrated approach to planning and managing the marine and coastal environment by enabling protection of the coastline and the ability to address the long term challenges of climate change, population growth and ageing coastal structures. Administered by DEECA. The Project will require consent to undertake works on marine and coastal Crown land and would be required to align with requirements of any local coastal and marine management plans applicable to the Project Area.
National Parks Act1975	Provides for the establishment of national parks, state parks, marine national parks and coastal parks. Administered by DEECA.

Legislation	Description and relevance to the Project
	The Offshore PAA does not overlap with any marine national parks or coastal parks, however, a number of parks are in the broader vicinity
Marine Safety Act 2010	Provides for safe marine operations in Victoria amongst other provisions by imposing a range of safety duties, providing for the regulation and management of the use of, and navigation of vessels in state waters. Administered by Maritime Safety Victoria. Project vessels are required to implement a range of safety duties, ensure masters are licensed and specific navigational and pilotage requirements are adhered to.
Emergency Management Act 2013	Establishes governance arrangements for emergency management in Victoria. Administered by Emergency Management Victoria. The project's emergency management plans would be integrated with the governance arrangements described in the Act, as well as the NATPLAN.
Pollution of Waters by Oil and Noxious Substances Act 1986	Provides for the protection of the sea and certain waters from pollution by oil and other substances and to implement MARPOL. Administered by the EPA Victoria. Project vessels are required to adhere to the requirements of this Act, including the implementation of MARPOL requirements.
Fisheries Act 1995	Provides a legislative framework for the regulation, management and conservation of Victorian fisheries including aquatic habitats. Administered by the Victorian Fisheries Authority (VFA). Of particular relevance to the Project is the allocation of fishing rights and management areas. Victorian managed fisheries relevant to the Project are summarised in Section 5.6.4. A permit may be required by contractors undertaking surveys on fish.
Heritage Act 2017	Provides for the protection and conservation of the non-Aboriginal heritage of Victoria, including shipwrecks and other heritage in marine and coastal waters. Administered by Heritage Victoria (DTP). Project activities are required to not disturb or damage maritime heritage and to observe the requirements of protected zones. Potential impacts are considered in a separate report (GHD, 2025a).

5. Existing environment

This Section describes the existing environment in which the planned activities would take place, including the physical, ecological and social condition of the area, as well as the surrounding environment that could be indirectly affected.

5.1 Regional context

The Southeast Shelf Transition province is within the Twofold Shelf mesoscale bioregion. The habitat of the province is characterised by the expanse of sandy substrate offshore, and occasional reef habitat nearshore, along with the cool, nutrient-rich waters, which form the mixing of two major current systems resulting in the form of the Upwelling East of Eden (see Figure 5.2 and Section 5.2.3) (Arup, 2024).

The Offshore PAA is located in the Twofold Shelf mesoscale bioregion within Australia's South-east Marine Region (Figure 5.1). The Twofold Shelf mesoscale bioregion extends from east of Wilsons Promontory in Victoria north to Tathra, in New South Wales (NSW) and includes the Kent Group of islands. The Region spans approximately 1,632,402 km² from the warm temperate waters in the north to cool temperate waters around Tasmania and the subantarctic Southern Ocean waters surrounding Macquarie Island (Commonwealth of Australia, 2015b). Water temperatures reflect the influence of warmer waters brought into the Bass Strait by the East Australian Current (EAC). The geomorphology of the Twofold Shelf bioregion is largely defined by exposed coastline with long sandy beaches broken by rocky headlands and numerous coastal lagoons (IMCRA Technical Group, 1998).

While the Region is relatively low in nutrients and primary productivity, localised areas of relatively high productivity, combined with complex geomorphology, give rise to Key Ecological Features (KEFs) (Figure 5.2). Areas of localised high productivity include the Bonney Upwelling 475 km West of the Offshore PAA and Upwelling East of Eden 85 km East of the Offshore PAA. The Big Horseshoe Canyon is also located 180 km East of the Offshore PAA. The Bonney Upwelling is a seasonal upwelling of cold, nutrient rich water that supports regionally high productivity and high species diversity. The Bonney Upwelling system is one of twelve widely recognised global areas where Blue Whales are known to feed in relatively high numbers. The Upwelling east of Eden is driven by episodic dynamic eddies of the EAC, producing regionally high primary productivity and supporting fisheries and biodiversity. Significant krill aggregations form as a result of this upwelling that is known to attract Humpback Whales and Blue Whales. The Big Horseshoe Canyon is the easternmost arm of the Bass Canyon systems that provides hard substrate habitat for sessile large megafauna (Commonwealth of Australia, 2015b).

The Bass Strait Water Cascade on the shelf break east of Bass Strait and the flow of the EAC causes upwelling through displacement, in turn concentrating nutrients and leading to aggregations of fish and whales (Commonwealth of Australia, 2015b). As a result of the complex evolutionary, geological, and biological processes, the Region displays a high level of species diversity and endemism.

There are fourteen Commonwealth Marine Reserves located in the Region, with the Beagle Marine Reserve and East Gippsland Marine Reserves located the closest to the Offshore PAA, approximately 50 km and 160 km to the southwest and east, respectively. The State protected Beware Reef Marine Sanctuary and the Point Hicks and Cape Howe Marine National Parks (MNPs), are located within the Twofold Shelf mesoscale bioregion, with the Ninety Mile Beach MNP occurring 0.5 km east of the Offshore PAA.

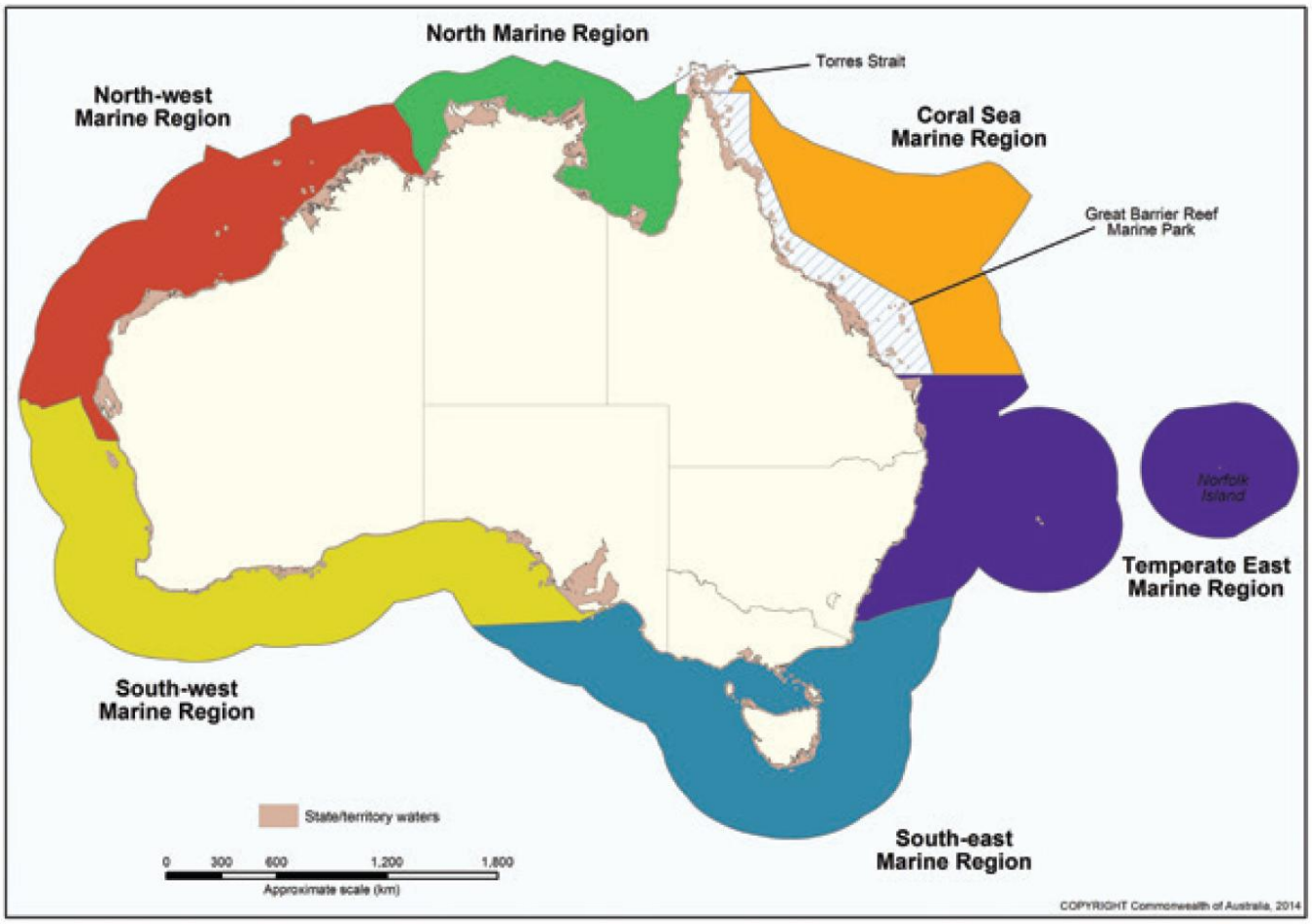
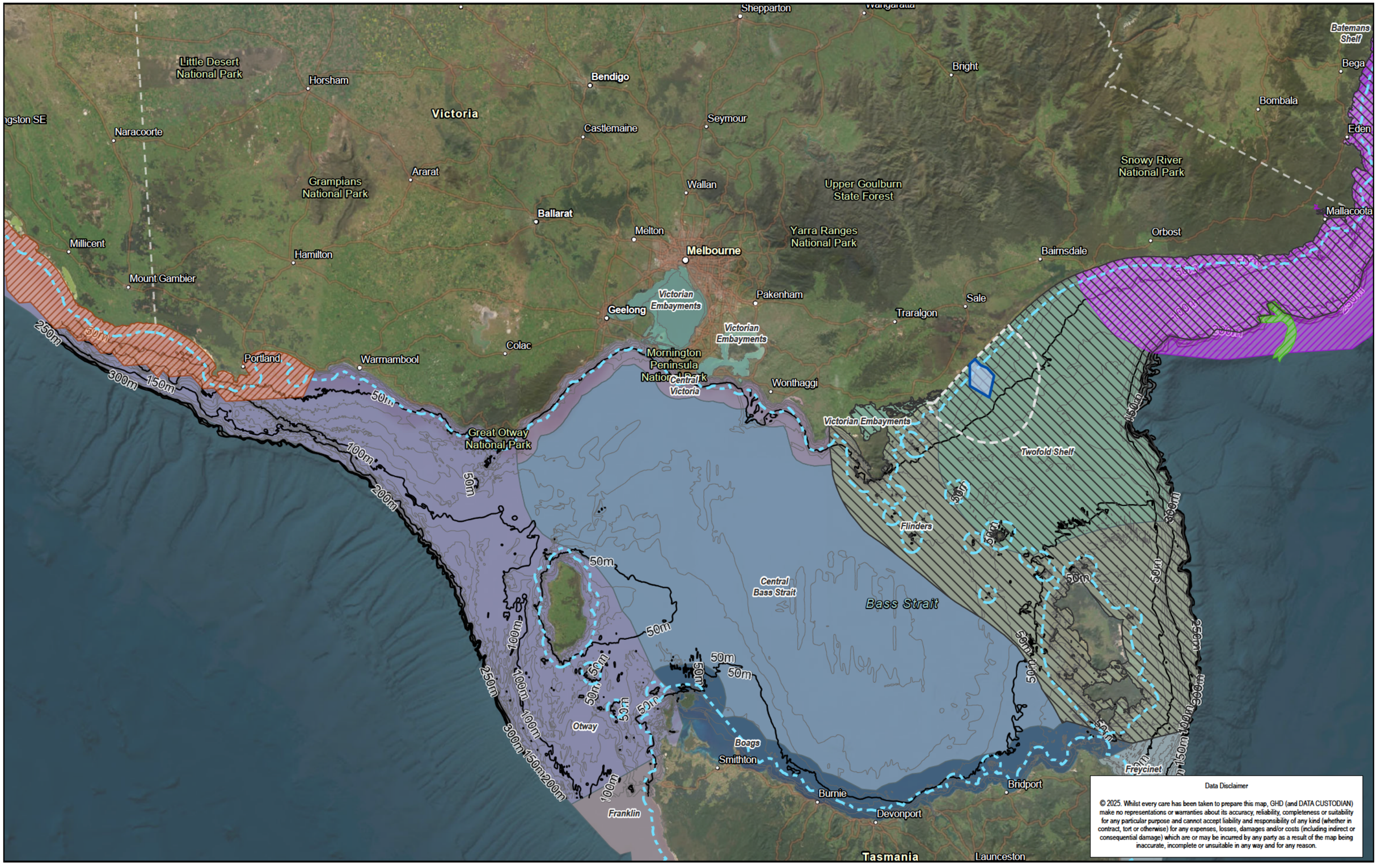


Figure 5.1 Australia's marine regions (Commonwealth of Australia, 2015b)



Data Disclaimer

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Legend

- Coastal Waters Limit
- Bathymetric contours
- offshore Proposed Action Area
- offshore study area

Marine Key Ecological Features

- Bonney Upwelling
- Upwelling East of Eden
- Big Horseshoe Canyon

Mesoscale Bioregions

- Batemans Shelf
- Boags
- Central Bass Strait
- Central Victoria
- Flinders
- Franklin
- Freycinet
- Otway
- Twofold Shelf
- Victorian Embayments

Provincial Bioregion

- Southeast Shelf Transition

Paper Size ISO A3

0 25 50 75 100 Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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GHD

Blue Mackerel North Pty Ltd
Blue Mackerel Offshore Wind Farm
EIA and Approvals

Project No. **12656248**
Revision No. **0**
Date **1/10/2025**

Regional Setting and Key Ecological Features

FIGURE 5.2

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Print date: 01 Oct 2025 - 17:56

Data source: World Imagery: Earthstar Geographics CoastKit/BathyContours:
Hybrid Reference Layer: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community. Created by: bpalm

5.2 Physical characteristics

5.2.1 Geomorphology, seabed geology and bathymetry

Regional

The South-east Marine Region (Figure 5.1) varies significantly in water depth and seabed features, contributing to a high level of species diversity within the Region. The Offshore PAA is located on the Southeast Shelf Transition in the Bass Strait. Sea-floor canyons along the continental margin form important ecological features that provide habitat for sessile invertebrates, these canyon systems are located approximately 180 km from the Offshore PAA.

The Southeast Shelf Transition (Figure 5.2) in the Bass Strait includes areas of rocky reefs and soft sediments. The Offshore PAA is representative of the Gippsland Basin, which comprises a series of massive sediment flats, interspersed with small patches of reef, bedrock, and consolidated sediment. The geology largely comprises hard and dense calcium carbonate substrate with quartzose sands, relict carbonate particles, and Holocene biogenic carbonate (Commonwealth of Australia, 2015b). The complex and biogenic carbonate structures of the region derived from the calcium carbonate substrate contribute to the ecological diversity of the region and provide essential ecosystem services such as shoreline protection, nutrient cycling and fisheries (Arup, 2024).

Local

Bathymetric data indicates that the seabed within the Offshore PAA slowly increases in depth with distance from the coastline to a maximum depth of 40-50 m (below the Lowest Astronomical Tide, LAT) at the southernmost limit of the Offshore PAA. The Offshore PAA is situated within the continental shelf where the morphology includes a mosaic of low profile rocky reefs (Section 5.3) and soft sediments that is characteristic of the region (Arup, 2024).

5.2.2 Currents, waves and tides

Regional

The Oceanography of the South-east Marine Region is complex with subtropical influences from the north and subpolar influences from the south (Hosack & Dambacher, 2012). Warm, subtropical water is transported southward along the Western Australian (WA) coastline by the Leeuwin Current where it is mixed with the cold, nutrient-rich waters of the Zeehan Current off the west coast of Tasmania (Figure 5.3). The eastern parts of the Region, however, are strongly influenced by the warm equatorial waters of the EAC travelling southward adjacent to the east coast of NSW and Victoria (Commonwealth of Australia, 2015b). The interaction of the two current systems gives rise to the creation of a large anticlockwise circulation. The EAC forms ocean eddies that may cross the continental shelf and persist for months. These eddies create isolated areas of upwelling and enhanced productivity 200-300 km in diameter when mixed with shelf break waters (Commonwealth of Australia, 2015b). However, during the Australian winter, the Antarctic Circumpolar Current passes closer to Tasmania and its comparative strength prohibits a weakened EAC from flowing further southward. The interaction of these currents, fronts and sea-floor features influence species composition, distribution and dispersal, controlling the movement of sediments and nutrients and the seasonal variations in salinity and temperature.

The currents of the Southeast Shelf Transition province are typically driven by tides, winds, and density-driven flows through Bass Strait. Waters within the Bass Strait are generally well mixed throughout the year due to tidal action (Hoffman, et al., 2017), however, surface warming sometimes causes weak stratification in calm summer conditions. In the winter, shallow waters are particularly well-mixed through wave action. Wind-driven ocean currents are closely aligned with topographic contours (i.e. alongshore northeast to southwest) (Hoffman, et al., 2017). The tides in the Bass Strait are mainly semidiurnal with small tidal amplitudes (<0.2 m) that are mostly constant throughout the Bass Strait (Wijeratne, Pattiaratchi, Eliot, & Haigh, 2012). Strong tidal currents (>2.5 ms^{-1}) have been recorded at the Bass Strait's south-east and south-west openings, whereas weak tidal currents and long flushing times (~160 days) have been recorded in the central region (Wijeratne, Pattiaratchi, Eliot, & Haigh, 2012).

Local

The high-energy environment of the Bass Strait results in significant wave heights and oceanic wind speeds (Liu, et al., 2022). The predominant wave direction is south-easterly, with wind speed and surface roughness across the Offshore study area being significant and extenuated during storm conditions (Arup, 2024). The predominant wave direction is south-easterly, with an average significant wave height of approximately 1-2 m and average peak wave height of 3-4 m. The wave period is typically in the region of five to 10 seconds depending on the time of year (Arup, 2024).

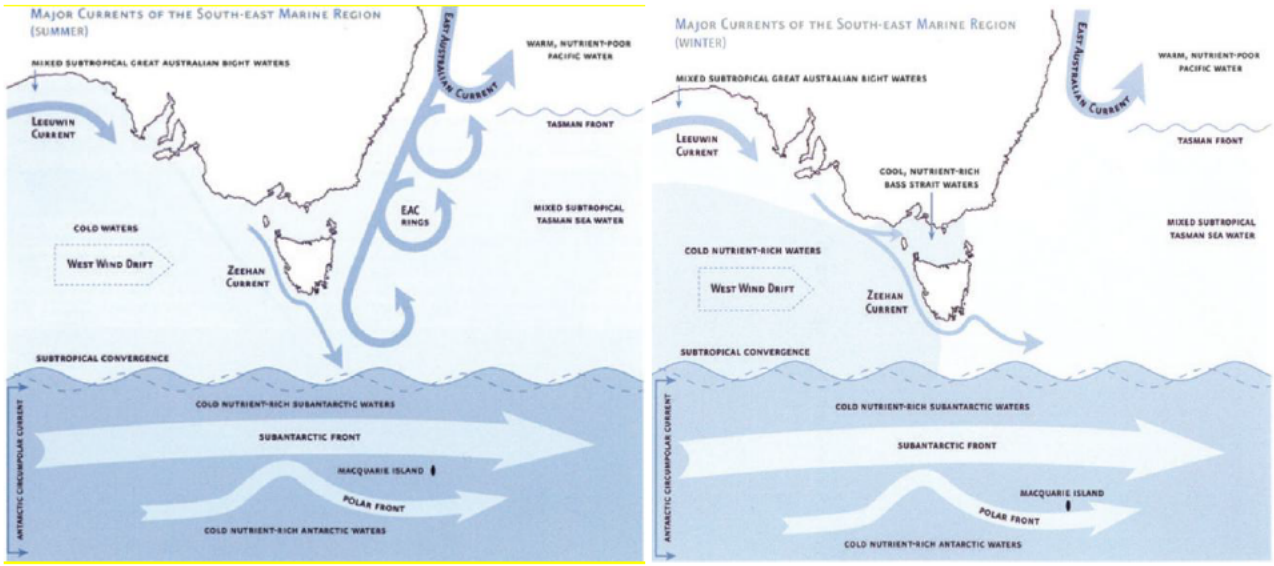


Figure 5.3 Oceanographic setting of the Offshore study area (Commonwealth of Australia, 2015b)

5.2.3 Upwelling and primary production

The metocean conditions of the South-east Marine Region contributes to areas of enhanced primary productivity that are associated with aggregations of pelagic marine life (Hosack & Dambacher, 2012), including:

- Spring and autumn phytoplankton blooms in the Subtropical Convergence Zone (south of Tasmania)
- Primary productivity associated with the Bass Cascade and upwelling of cool nutrient-rich waters along the mainland coast north-east of Bass Strait
- Localised seasonal upwellings along the Bonney Coast (approximately 475 km to the west of the Offshore PAA)
- Localised seasonal upwellings East of Eden (approximately 85 km to the east of the Marine Proposed Action Area)

Upwelling east of Eden

Locally, the Upwelling east of Eden is a KEF (Figure 5.2) for high productivity and the aggregation of marine life. Dynamic eddies of the EAC cause episodic productivity events when they interact with the continental shelf and headlands (Commonwealth of Australia, 2015b). The episodic mixing and nutrient enrichment events drive phytoplankton blooms, the basis of productive food chains including zooplankton, copepods, krill, and small pelagic fish. The upwelling supports regionally high primary productivity, fisheries and biodiversity, including top order predators, marine mammals, and seabirds. This area is one of two feeding areas for Blue Whales (specifically, the Antarctic Blue Whale and Pygmy Blue Whale subspecies that occur within Australian waters) and Humpback Whales, known to arrive when significant krill aggregations form (EARP, 2024a; Commonwealth of Australia, 2015b). The area is also important for seals, other Cetaceans, sharks, and seabirds.

Bonney Upwelling

The Bonney Upwelling is a seasonally predictable zone of upwelling between Portland, Victoria and Cape Jaffa, South Australia. The upwelling generally starts in the eastern part of the Great Australian Bight in November or December and spreads eastwards to the Otway Basin around February as southward migration of the sub-tropical high-pressure cell creates upwelling during favourable winds (CarbonNet, 2018). The region is a major feeding site for Pygmy Blue Whales between December and May (VEAC, 2019) as well a winter breeding ground for Southern Right Whales (NOAA, 2021). The upwelling system creates a hub of productivity in a generally nutrient-poor region, where phytoplankton abundance attracts swarms of krill and in turn Pygmy and Antarctic Blue Whales. The Bonney Upwelling feeding ground also attracts seabirds, fishes, fur seals, penguins, and sustains rich and diverse fisheries (VEAC, 2019).

Big Horseshoe Canyon

The Big Horseshoe Canyon KEF lies south of the coast of eastern Victoria and is the easternmost arm of the Bass Canyon systems. The steep, rocky slopes of the Big Horseshoe Canyon provide hard substrate habitat for attached large megafauna. Sponges and other habitat forming species provide structural refuges for benthic fishes, including the commercially important pink ling. It is the only known temperate location of the stalked crinoid *Metacrinus cyaneu* (Commonwealth of Australia, 2015b). Species of octocoral (especially gold corals) are also present at depths >700 m (Kloser, Williams, & Butler, 2001; EARP, 2024a).

The Bass Cascade along the Bass Canyon System

The Bass Cascade refers to the "underwater waterfall" effect brought about by the northward flow of Bass Strait waters in winter which are more saline and slightly warmer than surrounding Tasman Sea waters. As the water approaches the mainland in the area of the Bass Canyon group it forms an undercurrent that flows down the continental slope. The cascading water has a displacing effect causing nutrient rich waters to rise, which in turn leads to increased primary productivity in those areas. The cascading water also concentrates nutrients and some fish and whales are known to aggregate along its leading edge. The Bass Cascade occurs during winter months only (Commonwealth of Australia, 2015b).

5.3 Marine benthic habitats

Regional

The marine habitats present within the Twofold Shelf bioregion are characterised by rocky reefs, sandy and muddy bottoms, and deep-sea ecosystems (IMCRA Technical Group, 1998). The benthic environment enables the presence of diverse and complex biological communities within the region and supports various lifecycle functions for a range of mobile and sessile species.

Within the Gippsland Basin, soft sediment is composed of a series of massive sediment flats, interspersed with small patches of reef, bedrock, and consolidated sediment. The sandy plains are only occasionally broken by low ribbons of rocky reef (Esso, 2009). Rocky reef habitat occurs either as extensions of intertidal rocky shores or as isolated offshore reefs (EARP, 2024a). The subtidal rocky reefs of southern Australia support a highly endemic marine flora and fauna and are scattered along the Gippsland coast, making up approximately 11% of the south-eastern Australian shelf (Bax, 2001). Rocky reefs primarily consist of large, tabular slabs of low relief (<2 m) reef. However, they can also form as low-lying hard grounds that are colonised by benthic organisms, where they are likely to form mosaics of hard substratum that show little (<20 cm) or no vertical relief (EARP, 2024a). Additionally, there are relatively localised, higher relief (>10 m) outcrops on the inner shelf of the Gippsland coastline. Rocky reef habitats can support rich, diverse communities of attached epifauna (Section 5.5.2.3) and associated algae and other fauna. Further, structures with a higher relief (reef or bank) of several metres high can provide protection and food and attract a diversity of fish and invertebrate species (NOAA, 2010).

Local

The Offshore PAA largely comprises fine to medium sand with a band of patchy rocky substrate running parallel to the coast, while silty sand dominates the substrate further offshore. Other regional surveys (CarbonNet, 2018) (Figure 5.4) have identified intermittent and narrow areas of low-relief rocky reefs (approximately 0.5-1 m above the seabed) running parallel to the coast in water depths ranging from 7-25 m. The Export Cable Area (Figure 3.1) similarly consists of fine to medium sand interspersed with rocky substrate. However, rippled scour depressions of medium to coarse sand are additionally present and oriented perpendicular to the coastline.

Other benthic communities and habitats identified within 30 km east of the Offshore PAA (CarbonNet, 2018) include:

– Sporadic and sparse seagrass beds (species not identified)
– Sporadic occurrences of sponge gardens
– Sporadic occurrences of soft coral *Pseudogorgia godeffroyi*, endemic to Victoria
– Small patch of unmapped, flat low relief offshore rocky reef dominated by reef typical species such as sponges, ascidians, bryozoans, hydroids and occasional red algae and non-commercial scallops
– Live commercial scallops in low abundance and dead scallops

LiDAR (Light Detection and Ranging)-derived data of the nearshore Victorian coastline (DEECA, 2025a) indicates the state waters of the region largely comprise of sandy sediments with a series of sand waves running perpendicular to the coast.

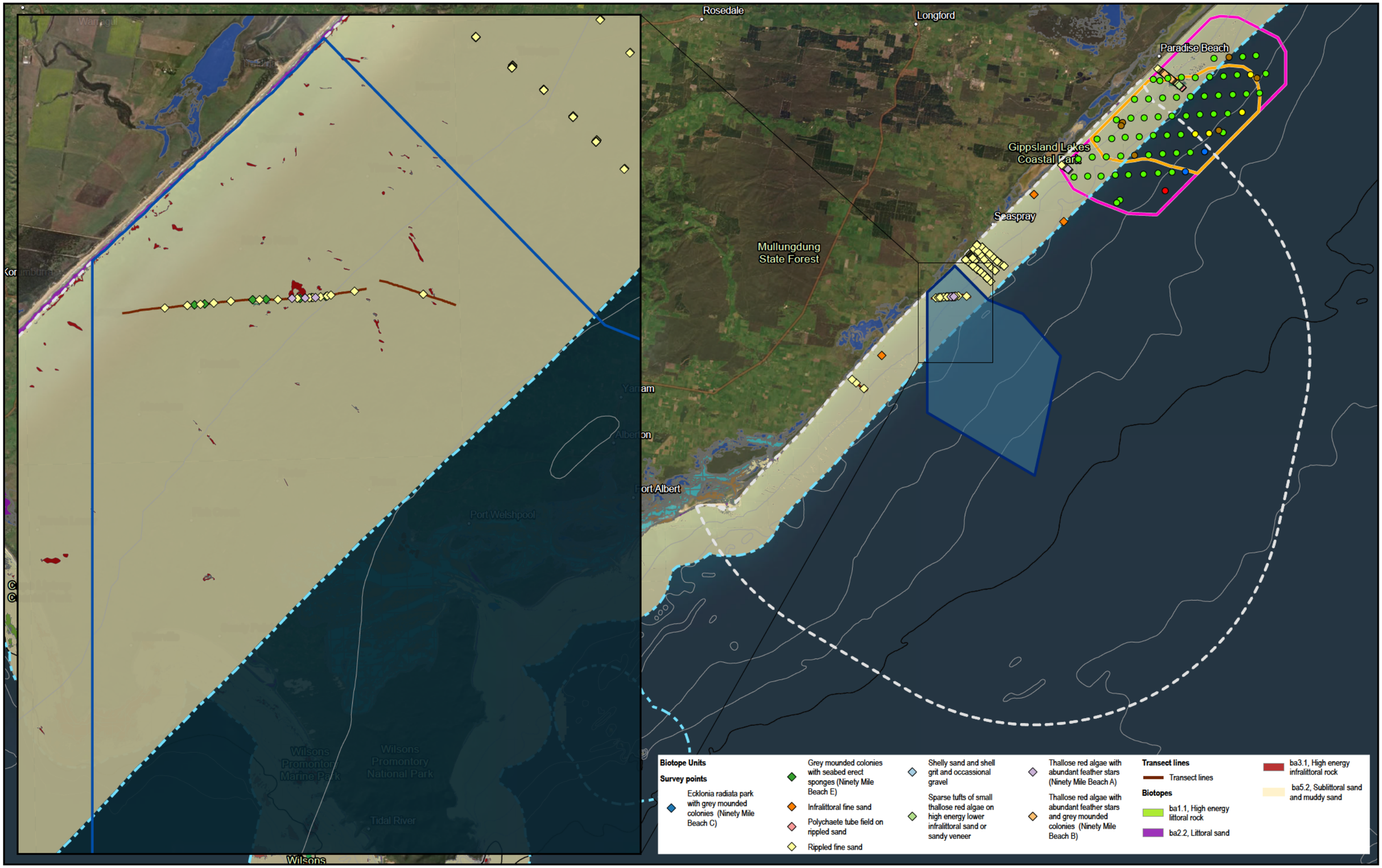
In Victoria, biotopes are classified in a hierarchical catalogue termed the Combined Biotope Classification Scheme or CBiCS (Edmunds, Flynn, & Ferns, 2021). Habitat mapping of towed video survey data on CoastKit (DEECA, 2025a) within the Offshore study area shows the most well represented CBICS Level 3 biotope present is the Sublittoral sand and muddy sand biotope followed by High energy infralittoral rock, Non-reef sediment epibenthos, High energy littoral rock and Littoral sand on the shoreline biotopes (DEECA, 2025a).

Consistent with the findings of CarbonNet (2018), the infralittoral rocky reefs and other hard substrate are disparate and largely run parallel to the coastline, following contours at distances of approximately 0.5 km and 2.5 km offshore. The occurrences of infralittoral reef, however, are commonly orientated north-south, perpendicular to the shoreline. The infralittoral rocky reef within the Offshore PAA features CBICS Levels 4-6 biotopes of rippled fine sand, grey mounded colonies with seabed erect sponges and thallose red algae with abundant feather stars.

5.3.1 Irreplaceable marine biotopes

Victoria's irreplaceable marine biotopes are those which cannot be successfully restored or created, based on difficulty of restoration, rarity and uniqueness of the environment (DEECA, 2025b). Identifying irreplaceable marine biotopes aids in informing decisions surrounding the sensitivity, risk, and consequences associated with disturbances by anthropogenic activities and pressures (DEECA, 2025b).

The 'Irreplaceable' score for each biotope and their statutory protection status, are combined into 4 primary categories: (1) Irreplaceable - Statutory Protected; (2) Irreplaceable - Not Statutory Protected; (3) Not deemed Irreplaceable - Statutory Protected; and (4) Not deemed Irreplaceable - Not Statutory Protected. Each primary category was designated with a subcategory of (A) if the biotope is considered restricted or rare; or (B) if the biotope is not considered restricted or rare. The only irreplaceable marine biotope found within the Offshore study area is the thallose red algae with abundant *Cenolia trichopteran* feather stars (Ninety Mile Beach A biounit) (ba3.19d1). This irreplaceable marine biotope falls under Category 2A as this biotope is not statutory protected and is characterised by a rare or restricted distribution. The ba3.19d1 biotope is only known from high energy infralittoral rock and sandy veneer facies within the 90 Mile Beach biounit.



Legend

CarbonNet Habitat Assessment Data (2018)

Habitat Type

- Sponge habitat
- Soft sediment
- Reef
- Doughboy scallop
- Commercial scallop
- Seismic Survey Acquisition Area
- Seismic Survey Operational Area

Project Data

- Coastal Waters Limit
- offshore Proposed Action Area
- offshore study area
- Bathymetric contours

Paper Size ISO A3

0 5 10

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

GHD

Blue Mackerel North Pty Ltd
Blue Mackerel Offshore Wind Farm
EIA and Approvals

Regional and Local Benthic Habitats

Project No. **12656248**
Revision No. **0**
Date **1/10/2025**

FIGURE 5.4

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Print date: 01 Oct 2025 - 18:15

Data source: World Imagery: Earthstar Geographics
World Imagery: Maxar
Hybrid Reference Layer: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community. Created by: bpalm

5.4 Marine flora

5.4.1 Commonwealth and State listed flora species

The EPBC Act PMST was used to identify listed threatened and migratory species protected under the EPBC Act within the vicinity of the Offshore PAA. The PMST search used a 30 km buffer around the Offshore PAA, referred to in this assessment as the Offshore study area. The VBA search was used to identify listed threatened species under the FFG Act that have been recorded within the Offshore study area.

The PMST and VBA data is summarised in Table 5.1 and the likelihood of occurrence assessment is provided in Appendix A and Appendix B, respectively.

Table 5.1 Listed threatened flora species under the EPBC Act and FFG Act

Scientific name	Common name	EPBC Act	FFG Act	Habitat description and justification	VBA record type (Marine Study Aea)	Likelihood of Occurrence in the Offshore study area	Likelihood of Occurrence in the Offshore PAA
Avicennia marina subsp. australasica	Grey Mangrove	-	Endangered	Locally common on tidal mudflats (bays, estuaries and creek-mouths) from the western half of Port Phillip Bay to Corner Inlet (VicFlora, 2025). One record of the species in the VBA from 1986. Three records of the species in ALA from 1986 located off the coastline of Nooramunga Marine and Coastal Park and far eastern edge of Corner Inlet Ramsar wetland. Habitat within the Offshore study area and the Offshore PAA is not present, however there is potential habitat adjacent to the Offshore study area along the coast, particularly within Corner Inlet.	Recorded	May occur	Unlikely to occur
Lawrencia spicata	Salt Lawrencia	-	Endangered	An occasional component of saltmarsh communities along the coast, rare in saline depressions and around salt lakes of south-western Victoria (VicFlora, 2025). One record of the species in the VBA from 1986. Two records of the species in ALA, from 1986 located off the coastline of Nooramunga Marine and Coastal Park and far eastern edge of Corner Inlet Ramsar wetland. Habitat within the Offshore study area and the Offshore PAA is not present, however there is potential habitat adjacent to the Offshore study area along the coast.	Recorded	May occur	Unlikely to occur
Poa billardierei	Coast Fescue	-	Endangered	Of scattered occurrence on coastal sand dunes from near Nelson in the far south-west to the NSW border (VicFlora, 2025). One record of the species in the VBA in 1989. Two records are within the Offshore study area, along the coastline of the Corner Inlet Ramsar wetland from 1989. Habitat within the Offshore study area and the Offshore PAA is not present, however there is potential habitat adjacent to the Offshore study area along the coast.	Recorded	May occur	Unlikely to occur

Scientific name	Common name	EPBC Act	FFG Act	Habitat description and justification	VBA record type (Marine Study Aea)	Likelihood of Occurrence in the Offshore study area	Likelihood of Occurrence in the Offshore PAA
Lachnagrostis robusta	Salt Blown-grass	-	Endangered	The taxon occurs mostly across the Victorina Volcanic Plain (west of Gippsland, near Tooradin, Seaspray and west of the Grampians) (VicFlora, 2025). The species inhabits margins of salt lakes and saline depressions. One record of the species in the VBA from 1998. Two ALA records of the species within the Offshore study area from 1998. Habitat within the Offshore study area and the Offshore PAA is not present, however, there is potential habitat adjacent to the Offshore study area along the coast.	Recorded	May occur	Unlikely to occur
Pomaderris apetala subsp. maritima	Tasman Pomaderris	-	Endangered	The taxon occurs at Wilsons Promontory, on islands of Coner Inlet, and the western limit of the Ninety Mile Beach (VicFlora, 2025). The species occurs on low dunes and sea-cliffs. One record of the species in the VBA from 1986. Four ALA records of the species within the Offshore study area from 1986. Habitat within the Offshore study area and the Offshore PAA is not present, however, there is potential habitat adjacent to the Offshore study area along the coast.	Recorded	May occur	Unlikely to occur

The presence of listed flora is limited to the offshore study area. The CarbonNet Marine Habitat Surveys (CarbonNet, 2018) undertaken just east of the Offshore study area found that >80% of the area surveyed is dominated by bare sands. Where there is benthic habitat noted, it typically features seagrass, macroalgae, sponges and low-relief rocky reef (Arup, 2024). The CarbonNet Marine Habitat Surveys (CarbonNet, 2018) , as well as more detailed mapping carried out in Victorian waters (DEECA, 2025a), indicates that marine flora is largely concentrated in the benthic habitat of the Ninety Mile Beach patch reefs in the northeast of the Offshore PAA.

No marine flora species protected under the EPBC Act or the FFG Act are known or likely to occur in the Offshore PAA or wider Offshore study area.

5.4.2 Seagrass

Nine (9) species of seagrass are known to occur in Victorian waters (VEAC, 2019) that support a diverse marine community as habitat forming communities. They provide ecosystem services such as sediment stabilisation and nutrient cycling. The species known within Victorian waters, with the distribution and habitat are outlined in Table 5.2.

Table 5.2 Seagrass species in Victoria adapted from the Assessment of the Values of Victoria's Marine Environment (VEAC, 2019)

Scientific name	State (Vic) Flora and Fauna Guarantee Act Status	Common name	Distribution and habitat
Zostera muelleri	-	Eelgrass	Widespread in Victoria, also in South Australia, Tasmania, and NSW Mainly occurs in intertidal areas or very shallow subtidal areas in mud and sand in calm waters
Zostera capricornia	-	Eelgrass	Common from tropical Queensland to the Victoria/NSW border. Recorded in Victoria at Mallacoota
Zostera tasmanica and *Zostera nigricaulis*	*Endangered* (as *Heterozostera tasmanica)* Endangered *(as H. nigricaulis)*	Eelgrass	*Z. nigricaulis* is widespread from Western Australia to New South Wales. Z. tasmanica has not been recorded east of Wilsons Promontory Occurs subtidally to a depth of up to 8 metres (depending on local turbidity and light levels) on mudflats. With *Z. mulleri*, these are the dominant species of seagrass in Port Phillip Bay Morphologically *Z. tasmanica* and *Z. nigricaulis* are very similar and may serve similar ecological functions
Amphibolis antarctica	-	Wireweed/Sea nymph	Widespread Occurs in coarse sandy sediments, rock pools or as patches on flat rock in subtidal waters (to depths of about 20 metres) that are exposed to moderate to strong wave energy. It forms extensive meadows close to the entrance of Port Phillip Bay and in Western Port
Halophila australis	-	Paddlegrass	Usually occurring in calm water, in fine silty and muddy substrates from low tide to depth of about 23 metres. Often in association with Zostera at the deeper margins of Zostera distribution.
Posidonia australis	Endangered	Strap weed	Common in temperate New South Wales waters. Restricted in Victoria to Corner Inlet, Nooramunga, Barwon Heads and Great Glennie Island Most extensive in Corner Inlet. Occurs in shallow, subtidal waters up to about 15 metres deep, in sandy soil
Ruppia megacarpa	-	Estuary grass	Distributed widely across Australia except the Northern Territory. Occurs in brackish to saline coastal lagoons and lakes, estuaries and inland lakes

Scientific name	State (Vic) Flora and Fauna Guarantee Act Status	Common name	Distribution and habitat
Ruppia tuberossa	-	Estuary grass	Distributed widely across Australia except for Queensland. Occurs in small brackish swamps, saline lakes and marshes, or on the tidal flats of sheltered bays
Ruppia polycarpa	-	Estuary grass	Distributed widely across temperate southern Australia Occurs in freshwater dams, ditches and small creeks, as well as in brackish water and saline coastal lakes and lagoons

The Corner Inlet and Gippsland Lakes are located 20 km to the west and 9 km to the east, respectively, of the Offshore PAA and contain extensive seagrass meadows. *Zostera tasmanica* is widespread throughout the Bass Strait on exposed sandy seabed up to 30 m depth, as a sparse and patchy distribution. Morgan (1986) estimated that 11,900 ha of *Posidonia australis* was present within Corner Inlet, as well as *Zostera* spp. and *Heterozostera* spp. The Corner Inlet and Gippsland Lakes contain areas of embayments, inlets, sheltered waters, near coastal areas that are suitable seagrass habitat (Table 5.2).

Seagrasses identified within the CarbonNet Marine Habitat Surveys (CarbonNet, 2018) were limited to sporadic and sparse beds in low densities, with less than 10% of the sites surveyed found to have seagrass. The CarbonNet (2018) findings on seagrass distribution is representative of the Gippsland area, where extensive seagrass meadows are concentrated in the Corner Inlet and Gippsland Lakes. The high energy environment and subsequent increased sediment mobility of the Gippsland coastline is likely to limit light availability and may contribute to the reduced seagrass abundance across sandy sediments that are prominent within the Offshore study area.

5.4.3 Macroalgae

Macroalgae are predominantly associated with hard substrates including rocky reef and unconsolidated substrates such as shell/cobble, yet epiphytes may also occur on other species or as drift. Diversity of macroalgal communities tends to be highest on rocky reefs with good light availability. Barton et al. (2012) found that subtidal nearshore and offshore rocky reefs have low macroalgae abundance that is likely due to levels of sediment resuspension.

Kelps and other brown seaweeds (such as Bubble Kelp *Phyllospra* sp. and Leather Kelp *Ecklonia* sp.) generally dominate Shallow rocky reefs (0-20 m) across southern Australia. Within more sheltered reefs, however, *Sargassum* spp. and *Cystophora* spp. are more prolific. Larger macroalgae (*Ecklonia radiata* and other large brown algae) may be found interspersed with a range of smaller red and green algae. Giant kelp *Macrocystic pyrifera* forests once occurred on many reefs in Bass Strait but their distribution has shrunk considerably (DSEWPC, 2012).

The Ninety Mile Beach patch reefs within the Ninety Mile Beach National Park are characterised by occasional rocky reef habitat and contain sparse floral diversity and communities of red algae (Barton, Pope, & Howe, 2012). In addition to the thallose red algae found at depths between approximately 15 and 25 m within infralittoral rocky reefs of the Offshore study area off McGaurans Beach, the CarbonNet Marine Habitat Surveys (CarbonNet, 2018) noted that large brown kelp and macroalgae (respectively, *Ecklonia radiata* and Sargassum) was observed at an inshore reef area.

5.4.4 Saltmarshes and mangroves

Significant saltmarsh and mangrove communities are present in limited distributions within the Gippsland Lakes and Corner Inlet, designated Ramsar sites that are discussed further under Commonwealth matters (see Section 5.7.1.1). Saltmarsh and mangrove communities are additionally present within the Nooramunga Marine and Coastal Park, approximately 20 km west of the Offshore PAA (Section 5.6.1).

Saltmarshes are terrestrial halophytic (salt-adapted) ecosystems that mostly occur in the upper-intertidal zone and are widespread along the coast of Victoria. Mangrove roots and trunks are also intertidal, where only the lowest leaves are inundated by high tide (EARP, 2024b).

Saltmarsh and mangrove habitats, like seagrass meadows, are important blue carbon ecosystems that are critical to carbon sequestration and climate change mitigation.

Nooramunga Marine and Coastal Park contains the largest stands of white mangrove and saltmarsh areas in Victoria. The saltmarshes are dominated by beaded glasswort (*Sarcocornia quinqueflora*) and shrubby glasswort (*Tecticornia arbuscula*). In the Corner Inlet, saltmarsh communities occur as a band along the landward edge of the mangrove zone and are common along the northern mainland shore within the reserve (DSEWPC, 2011). Corner Inlet is in the world's most southernmost natural population of mangroves, and only one species, *Avicennia marina* spp. *australasica* is known to occur in Victoria (VEAC, 2019).

Saltmarsh and mangrove habitats are not present within the Offshore PAA and are predominantly associated with the Gippsland and Corner Inlet that are overlapped by the Offshore study area, but are not present within the Offshore PAA (Section 5.7.1.1).

5.5 Marine fauna

The South-east Marine Region supports a wide array of species, ranging from commercially important fish to threatened marine mammals, birds, reptiles and invertebrates. The following sections provide an overview of the key marine fauna found in the region.

5.5.1 Commonwealth and State listed fauna species

The EPBC Act PMST was used to identify listed marine, threatened and migratory species under the EPBC Act that are known, likely, may occur or unlikely to occur within the vicinity of the Offshore PAA. The PMST search was performed using a 30-km buffer around the Offshore PAA, referred to as the Offshore study area. The VBA search was used to identify listed Threatened species under the FFG Act that have been recorded within the Offshore study area. An updated version of the FFG species listing was published in September 2025, and the report has been revised to reflect the changes (Victoria State Government , 2025).

A summary of species identified through the PMST and VBA search and a summary of the likelihood of occurrence assessment is outlined in Table 5.3.

The full list of threatened species from the PMST, VBA and the likelihood of occurrence assessment is provided in Appendix A, Appendix B and Table 5.3, respectively.