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Environmental & Social Consultants

GREATER GIPPSLAND OFFSHORE WIND PROJECT

Summary of Impacts Report

FINAL

November 2022

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Prepared by

Umwelt (Australia) Pty Limited

on behalf of

BlueFloat Energy

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This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Final	Caroline Funnell	11 November 2022	David Knight	11 November 2022

Abbreviations

Abbreviation	Description
AAASS	Atlas of Australian Acid Sulfate Soils
AADT	Annual Average Daily Traffic
AEP	Annual Exceedance Probability
ARIS	Australian Soil Resource Information System
AUCHD	Australasian Underwater Cultural Heritage Database
BFE	BlueFloat Energy
BIA	Biologically Important Area
BMO	Bushfire Management Overlay
CASS	Coastal Acid Sulfate Soil
CD	Conservation dependent
CR	Critically endangered
CHL	Commonwealth Heritage List
CHMP	Cultural Heritage Management Plan
CHS	Cultural heritage sensitivity
DAWE	Commonwealth Department of Agriculture, Water and Environment (now DCCEEW)
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DDO	Design Development Overlay
DELWP	Victorian Department of Environment, Land, Water and Planning
DoT	Department of Transport
EE Act	*Environment Effects Act 1978*
EES	Environment Effects Statement
EMF	Electromagnetic field
EN	Endangered
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESO	Environmental Significance Overlay
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988*
FO	Floodway Overlay

Abbreviation	Description
FZ	Farming Zone
GDE	Groundwater Dependent Ecosystem
GLaWAC	Gunaikurnai Land and Waters Aboriginal Corporation
GW	Gigawatts
ha	Hectares
Heritage Act	*Heritage Act 2017*
HV	Heritage Victoria
HVP	Hancock Victorian Plantations
IPA	Indigenous Protected Area
ILUA	Indigenous Land Use Agreement
KEF	Key Ecological Feature
km	Kilometres
kV	Kilovolt
LAT	Lowest Astronomical Tide
LDAD	Low density artefact distribution
LGA	Local Government Area
LUAA	Land Use Activity Agreement
LUAR	Land Use Activity Regime
LSIO	Land Subject to Inundation Overlay
m	Metres
MNES	Matters of National Environmental Significance
MP	Member of Parliament
MW	Megawatt
NHL	National Heritage List
NM	Nautical Mile
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NTV	Native Title Vision
OD	Over dimensional
OEI Act	*Offshore Electricity Infrastructure Act 2021*
PCRZ	Public Conservation and Resource Zone
PMST	Protected Matters Search Tool

Abbreviation	Description
PPRZ	*Public Park and Recreation Zone*
PUZ	*Public Use Zone*
P&E Act	*Planning and Environment Act 1987*
RAP	Registered Aboriginal Party
RE	Renewable Energy
REZ	Renewable Energy Zone
RLZ	Rural Living Zone
RNTBC	Registered Native Title Body Corporate
SCO	Specific Controls Overlay
SRO	State Resource Overlay
SUZ	Special Use Zone
TEC	Threatened Ecological Community
TRZ	Transport Zone
TZ	Township Zone
VAHR	Victorian Aboriginal Heritage Register
VHD	Victorian Heritage Database
VHI	Victorian Heritage Inventory
VHR	Victorian Heritage Register
VU	Vulnerable
UCH Act	*Underwater Cultural Heritage Act 2018*

Glossary

Term	Definition
Aboriginal Places	Aboriginal cultural heritage sites registered on the Victorian Aboriginal Heritage Register.
Area of cultural heritage sensitivity (CHS)	An area in which Aboriginal cultural heritage is or is likely to be present which has not already been subject to significant ground disturbance. A more thorough definition of cultural heritage sensitivity can be found in the Aboriginal Heritage Regulations (2018).
Artefact	Any object made or modified by a human culture, e.g., stone tools, farming equipment.
Artefact Scatter	Artefact scatters are places indicating an occupation site and may be found out in the open landscape or in the topsoil of a rock shelter.
Benthic	Relating to the area at the bottom of a body of water, such as the seabed. Includes surface sediments and organisms that inhabit the area.
Biologically Important Area	A Biologically Important Area (BIA) is an indication that an area has a high level of importance for a species, either threatened or migratory under the EPBC Act. BIAs are typically areas where aggregations of individuals of a species are known to display biologically important behaviour such as breeding, foraging, resting, or migrating.
Bioregion	Bioregions are a landscape-scale approach to classifying the environment using attributes such as climate, geomorphology, geology, soils, and vegetation.
Bottom fixed turbine	A bottom-fixed turbine is mounted on a structure fixed into the seabed.
Coastal upwelling	Coastal upwelling is an oceanographic process involving wind drive motion of dense, cooler, and usually nutrient-rich water from deep water being brought up to the ocean surface.
Commonwealth Waters	Any waters beyond State Waters, between 3 nautical miles and 200 nautical miles from the low water mark of the coastline.
Earth Feature	Aboriginal earth features are a type of Aboriginal Place recorded on ACHRIS, including soil deposits and mounds.
Economic Exclusive Zone	The area beyond the Territorial Sea extending up to 200 nautical miles from the low water mark of the coastline (Commonwealth Waters).
Groundwater dependent ecosystems	Ecosystems that require access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services.
Ichthyofauna	Fish that are indigenous to a particular region.
Indigenous Land Use Agreement	An Indigenous Land Use Agreement (ILUA) is a voluntary agreement between native title parties and other people or bodies about the use and management of areas of land and/or waters.
Hub Height	The distance from the ground to the middle of a wind turbines rotor.
Key ecological feature	Elements of the Commonwealth marine environment that are considered to be of regional important for either a region's biodiversity or its ecosystem function and integrity
Midden	An occupation site where Aboriginal people left the remains of their meals. At some sites, substantial deposits grew over generations of use of the same area and can be many metres deep.
Matters of national environmental significance	There are nine matters of national environmental significance protected under the EPBC Act – world heritage properties, national heritage places, wetlands of international importance (Ramsar wetlands), nationally threatened species and ecological communities, migratory species, Commonwealth marine areas, the Great Barrier Reef Marine Park, nuclear actions and a water resource in relation to coal seam gas development and large coal mining development.

Term	Definition
Native Title	Native title is the legal recognition in Australian law that some Aboriginal and Torres Strait Islander people continue to hold rights and interests in land and water.
Object Collection	An Aboriginal Place recorded on the Victorian Heritage Register consisting of Aboriginal objects located in a safe place.
Remnant vegetation	Natural vegetation that still exists or is representative of the natural ecosystem in an area.
Rotor diameter	The cross-sectional dimension of the circle swept by wind turbine blades
Scarred Tree	A tree that displays evidence that Aboriginal people removed its bark or wood.
Significant ground disturbance	Disturbance of the topsoil or surface rock layer of the ground or waterway by machinery in the course of grading, excavating, digging, dredging or deep ripping (60cm or deeper).
Silcrete	A silica-rich, fine-grained, sedimentary rock that is excellent for the creation of stone tools due to its flaking qualities.
State Waters	Waters from the low water mark along the coastline up to three nautical miles seaward.
Territorial Sea	The belt of water extending up to 12 nautical miles from the low water mark of the coastline (Commonwealth Waters).

Executive Summary

Umwelt (Australia) Pty Ltd (Umwelt) has been engaged by BlueFloat Energy (BFE) to prepare preliminary environmental assessments to characterise the existing conditions of the Project Area, and identify potential impacts associated with the Greater Gippsland Offshore Wind Project (the Project).

This report summarises potential impacts that may result from the construction, operation, and decommissioning of the Project. The following desktop technical assessments have been undertaken to inform this report:

- Preliminary Desktop Marine Environmental Assessment (BMT, 2022)
- Preliminary Desktop Biodiversity Constraints Assessment (Biosis, 2022)
- Social Risks and Opportunities Analysis (Umwelt, 2022)
- Preliminary Desktop Hydrology Constraints Assessment (Umwelt, 2022)
- Preliminary Cultural Heritage Constraints Assessment (Umwelt, 2022).

This report also identifies potential impacts associated with landscape and visual, land use, coastal issues and soils, air quality, noise and vibration and transport.

The outcomes summarised in this report identify a suite of preliminary design constraints which can be used to inform the Project design and assist in avoiding or mitigating potential impacts, as well as informing the Project's planning and environmental approval strategy and identifying recommended 'next steps' for the Project. This includes a list of the further environmental assessments expected to be required to support Project assessments and approvals. Key environmental and planning risks have also been identified that may affect the timing, approvals, design, or other elements critical to the Project viability and delivery success.

For these preliminary assessments, a Study Area has been applied to the Project Area (development footprint) with a distance of 1 km either side of the onshore transmission line and substation, and 5 km around all offshore infrastructure.

It is noted that the transmission line options proposed as part of the Project were identified prior to release of the Victorian State Governments Offshore Wind Implementation Statement 1 (DELWP, October 2022) and accordingly the location of the grid connection may be subject to further review and consideration.

Marine

The report prepared by BMT identified the key marine values within the offshore Study Area and the potential for the Project to impact on these values.

The offshore wind turbines, most of the cabling and the offshore substations are located within Commonwealth Waters (marine area) however there are no key ecological features mapped within the Study Area.

The report identified the Project has potential to impact on the following matters of national environmental significance (MNES) protected under the EPBC Act within the marine environment:

- Nationally listed threatened species
- Migratory species
- Commonwealth marine areas.

The following threatened and migratory marine fauna (listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the *Flora and Fauna Guarantee Act 1988* (FFG Act)) are likely to occur within the Study Area:

- 9 whale, dolphin, and seal species
- 3 turtle species
- 9 shark and fish species
- 13 marine benthic species.

The Ninety Mile Beach Marine National Park is located within the Study Area and is recognised for its sandy environment that supports significant diversity of marine invertebrates. The nearshore environment along the coastline is homogenous and mapped as soft substrate with no visible biota. The marine environment also supports a range of recreational activities including fishing, diving, and boating, as well as commercial fisheries including the eastern rock lobster zone, and the central and eastern abalone zone. There are active petroleum leases with four Esso perch wells located within the Study Area. Two pipelines and the Basslink electricity interconnector and their associated 500m exclusion zone cross the offshore Study Area.

The marine environment within the Study Area is nominated as a Biologically Important Area (BIA) for a number of species, including White Shark *Carcharodon carcharias,* Pygmy Blue Whale *Balaenoptera musculus brevicauda,* Southern Right Whale *Eubalaena australia*, and several Albatross species.

Potential key construction related impacts are associated with pile driving required for installation of the offshore turbine foundations, which has potential to result in noise impacts on listed threatened and migratory marine fauna, as well as remove sensitive habitats and generate sediment plumes and turbidity, impacting on light sensitive habitats or fauna species. Construction works also have the potential to disturb contaminated or acidic sediments, as well as result in spills or uncontrolled release of fuels, oils, or chemicals which could impact on water quality.

Key operation related impacts that have the potential to occur include noise, vibration, electromagnetic interference (EMI) and lighting impacts on marine fauna behaviour, vessel strike with marine fauna (particularly large slow-moving species such as whales), localised changes to hydrodynamic processes and exclusion zones around wind turbines impacting on recreational users of the area.

Biodiversity

The report prepared by Biosis identified the key biodiversity values within the onshore and offshore Study Area and the potential for the Project to impact on these values.

The Project is located within the Gippsland bioregion, which has been significantly cleared for agricultural activities. Such land holds limited ecological value to fauna, however 19 ecological vegetation classes (EVCs) are modelled to occur within the Study Area and patches of remnant vegetation may provide important connections between high quality habitats.

The Biosis report identified the Project has potential to impact on the following matters of National Environmental Significance (MNES) protected under the EPBC Act:

- Nationally listed threatened species and communities
- Migratory Species
- Ramsar wetlands
- Commonwealth marine areas.

The following threatened terrestrial flora and fauna species (includes seabirds) (listed under the EPBC Act and/or the FFG Act) have a medium to high likelihood of occurring within the Study Area:

- 62 threatened flora species
- 18 terrestrial bird species
- 35 shorebird species
- 20 terrestrial and aquatic fauna species
- 16 seabird species.

An additional 30 migratory bird species listed under the EPBC Act were also identified as having a medium to high likelihood of occurring within the Study Area. Eleven threatened ecological communities are also modelled to occur within the Study Area, including four listed under the EPBC Act and seven listed under the FFG Act.

Several wetlands and waterways in the Study Area are of high value to a range of shorebirds and other wetland birds. The Gippsland Lakes Ramsar Wetlands and the Corner Inlet Ramsar Wetlands are located within proximity to the Study Area. The coastal habitat of the Ninety Mile Beach is unlikely to support a high diversity and abundance of shorebirds, however there are several migratory species which are known to utilise this area with the sandy beaches also providing habitat for some resident shorebirds.

Potential key construction related impacts are associated with native vegetation removal and the potential loss or fragmentation of habitat for threatened flora and fauna species. Construction may also result in indirect impacts such as sedimentation from ground disturbance works which may alter habitat conditions in downstream Ramsar wetlands. Operation of the Project has the potential to result in threatened and migratory bird species colliding with turbines resulting in injury or mortality. The construction and operation of the Project also has the potential to impact on the ecological character of the nearby Ramsar Wetlands, and potentially introduce pests or weeds that may impact on native vegetation and/or threatened species and ecological communities.

Social

The report prepared by Umwelt compiled a preliminary social baseline profile for the Project's social locality which included the landholdings within the onshore Study Area, the Wellington and Latrobe local government areas (LGA) and the broader Gippsland region. The Gippsland region has a strong history and existing industry base in traditional fossil fuels, with the Latrobe LGA traditionally recognised as the centre of Victoria's electricity generation industry. Local government and community in the Wellington and Latrobe LGAs show overall support for renewables and the further energy transition but some opposition is evident for transmission lines. Tourism is a key industry along the Ninety Mile Beach, with the Gippsland region identified as a nationally recognised tourist destination for its important environmental and cultural heritage assets such as the Gippsland Lakes.

The Project has potential to result in social impacts during construction, operation, and decommissioning, as well as generate several local and regional benefits. Potential key construction related impacts are associated with disruption to recreational and tourism activities due to reduced access and amenity impacts (visual, noise, traffic) and impacts on availability and affordability of short-term accommodation during construction. Operation of the Project has potential to impact on local tourism due to perceived industrialisation and reduced visitor experience, as well as changes to a sense of place for coastal communities. There is also potential for community opposition to the Project due to concerns about energy transition and a limited understanding of Project design and offshore wind technology.

The Project has potential to generate several local and regional benefits, including local employment generation and procurement of local businesses/services resulting in decreased unemployment rates and local economic benefits, as well as increased energy security and reduced reliance on carbon emitting industries and tourism.

Hydrology

The report prepared by Umwelt identified the key hydrological values within the onshore Study Area and the potential for the Project to impact on these values. The Study Area is located within the Seaspray catchment. Transmission route option 1a and 1b intersect with 13 main watercourses while transmission route option 2 intersects with five main watercourses.

There are low, moderate, and high potential groundwater dependent ecosystems mapped within the Study Area. The most significant flooding within the Study Area is typically limited to along the major channels of Bennetts Creek, Traralgon Creek, Blind Joe Creek, Carr Creek, Flynns Creek, Merriman Creek, and Monkey Creek as floodwater is conveyed through the Study Area.

Soil erosion and sedimentation from construction and decommissioning activities has potential to impact on water quality of nearby watercourses and sensitive waterbodies, such as through trenching or vegetation removal. The location of Project infrastructure during operation, such as access tracks, may increase flood risk or alter drainage flow paths on nearby properties. Discharge of stormwater from the Study Area during operation also has the potential to result in adverse impacts on receiving surface water and groundwater environments.

Cultural heritage

The report prepared by Umwelt identified the key Aboriginal and non-Aboriginal cultural heritage values within the Study Area and the potential for the Project to impact on these values.

A total of 157 registered Aboriginal places are located within the onshore Study Area. The types of sites include artefact scatters, earth features, shell middens, low density artefact distributions (LDADs), Aboriginal ancestral remains (burials), object collections and scarred trees.

There are no registered non-Aboriginal cultural heritage values within the onshore Study Area, however, there are four shipwrecks located offshore. The Study Area is likely to contain a range of non-registered cultural heritage material, both Aboriginal and non-Aboriginal.

Disturbance causing activities associated with construction works have the potential to disturb registered and non-registered Aboriginal places within the onshore and offshore Study Area resulting in significant impacts on cultural heritage values. Offshore construction works also have potential to impact on the identified registered shipwrecks as well as unidentified relics including aircraft.

Land use

Land within the onshore Study Area is predominantly used for agriculture and forestry plantations, with areas of conservation reserves. There are several areas of public land that intersect with the onshore Study Area, comprising parks, reserves, Indigenous protected areas, and streams. The onshore components of the Project are subject to the provisions of the Wellington and Latrobe Planning Schemes, with majority of the Study Area located within the Farming Zone. The Public Conservation and Resource Zone applies to land along the coastline.

The Project has potential to impact on existing land uses within the Study Area during construction, operation and decommissioning. Project works have potential to result in disturbance and/or disruption to existing land uses, including potential disruption (temporary or permanent) to public land uses and public infrastructure such as conservation and recreation reserves. The siting Project infrastructure may result in land use changes that are incompatible or inconsistent with existing land uses and local and/or regional policy, or future land uses for public and private land.

Landscape and visual

Preliminary visual simulations prepared by BFE have considered key viewpoints from Golden Beach, Seaspray, McGaurans Beach, Woodside Beach and McLoughlins Beach. An assessment of these visualisations indicates that the offshore wind farm component of the Project will be visible from a number of public and private viewpoints along the Ninety Mile Beach and other areas along the coastline, which are predominantly associated with recreational activities and uses.

The coastline of the onshore Study Area is affected by the Environmental Significance Overlay (Schedule 1 Coastal and Gippsland Lakes Environs) under the Wellington Planning Scheme, which recognises the environmental significance of the Ninety Mile Beach and Gippsland Lakes and their environs as being some of the most significant environmental, landscape and recreational areas within the State of Victoria.

Views from public open space and/or sensitive receptors have the potential to be temporarily affected during construction and decommissioning of the Project. Views from public open space and/or sensitive receptors have the potential to be permanently affected due to the siting of onshore infrastructure and offshore wind turbines.

Cumulative visual impacts on the Gippsland coastline may also result from the Project and other offshore wind farms in the region.

Coastal issues and soils

There is potential for coastal acid sulfate soils to be present within the onshore Study Area and should be considered in regard to the siting of the subsea cable landing and underground cable route to the onshore substation. Most of the onshore Study Area is used for agriculture and forestry, and is considered to have a low probability of containing acid sulfate soils to be a low risk of contamination.

Construction activities such as excavation and trenching have the potential to disturb acid sulfate soils and/or sediments resulting in potential impacts from the leaching of acidic water into soil and groundwater. Prolonged excavations and stockpiling of acid sulfate soils exposed to rainfall could result in acidic surface water runoff, and inappropriate handling of acid sulfate soils could also impact on human health.

Air quality, noise, and vibration

Most of the onshore Study Area is used for agriculture and forestry purposes. The major source of pollution in the region is the Loy Yang Power Stations and Morwell Opencut Mine which are located within proximity to the western end of the Study Area. Background noise levels are anticipated to be low in areas of agricultural land and reserves, whilst higher levels may be experienced near townships such as Seaspray and areas near the Loy Yang Power Station and Morwell Opencut Mine.

Construction and decommissioning of the Project has the potential to generate air emissions and dust from onshore construction works and exhaust emissions from vehicles, barges, and support vessels resulting in impacts on nearby sensitive receptors and local air quality. Noise and vibration from construction activities that exceeds guidelines/ threshold levels has the potential to impact on sensitive receptors (such as dwellings and public open space). Operation and maintenance activities may also generate air emissions and noise and vibration, resulting in impacts on sensitive receptors.

Transport

The local road network within the onshore Study Area is a combination of State and Council managed roads. Several arterial roads intersect with the Study Area including the South Gippsland Highway, Hyland Highway, Seaspray Road, Rosedale-Longford Road, Hazelwood Road, Firmins Lane and Tramway Road. Two public bus routes also intersect the Study Area.

Construction vehicles have the potential to result in changes to normal traffic and transport conditions, including increased traffic, increased safety risk and impacts on the operation of public transport. Road closures and changes/disruptions to connectivity of the local road network, such as restricted access, may also occur during construction works. Over-dimensional vehicles required to transport infrastructure to site may create ‘pinch points’ requiring road and/or intersection upgrades along the identified over-dimensional vehicle route. Operation and maintenance activities also have potential to result in changes to normal traffic and transport conditions.

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1.0 Introduction

1.1 Background

Umwelt (Australia) Pty Ltd (Umwelt) has been engaged by BlueFloat Energy (BFE) to prepare preliminary environmental assessments to characterise the existing conditions of the Project Area, and identify potential impacts associated with the Greater Gippsland Offshore Wind Project (the Project).

This report summarises potential impacts that may result from the construction, operation, and decommissioning of the Project. The following desktop technical assessments have been undertaken to inform this summary of impacts report:

- Preliminary Desktop Marine Environmental Assessment (BMT, 2022)
- Preliminary Desktop Biodiversity Constraints Assessment (Biosis, 2022)
- Social Risks and Opportunities Analysis (Umwelt, 2022)
- Preliminary Desktop Hydrology Constraints Assessment (Umwelt, 2022)
- Preliminary Cultural Heritage Constraints Assessment (Umwelt, 2022)

This report also identifies potential impacts associated with landscape and visual, land use, coastal issues and soils, air quality, noise and vibration and transport.

The outcomes summarised in this report identify a suite of preliminary design constraints which can be used to inform the Project design and assist in avoiding or mitigating potential impacts, as well as informing the Project's planning and environmental approval strategy and identifying recommended 'next steps'. This includes a list of the further environmental assessments expected to be required to support Project assessments and approvals. Key environmental and planning risks have also been identified that may affect the timing, approvals, design, or other elements related to the Project viability and delivery success.

1.2 Project Description

The Project is located in the Gippsland region of Victoria, to the south west of Sale. **Figure 1.1** shows the Project Area which contains the offshore and onshore components of the Project, including the transmission line route options, associated with its construction, operation, and decommissioning.

The wind turbines and offshore substations are located approximately 10–43 kilometres (km) from the Gippsland coastline between Woodside Beach and Seaspray, in an area of approximately 700 km^2. Within this area, the Project involves 139 'bottom-fixed' turbines[1], two to four offshore substations and associated infrastructure with the capacity to generate up to 2.085 gigawatts (GW) of electricity. The turbines would have a capacity between 15 MW and 20 MW, hub heights between 165 m and 190 m and rotor diameters of between 250 m to 275 m.

[1] A bottom-fixed turbine is mounted on a structure fixed into the seabed.

Route options for the transmission line incorporate 330 kV subsea cables between the offshore substations and McLoughlins Beach – Seaspray Coastal Reserve, with an onshore landing either northeast or west of the Ninety Mile Beach Marine National Park. An underground cable will run approximately 8-16 km from the coast to a new substation. An overhead transmission line will then run approximately 85 km to the Hazelwood Terminal Station (option 1a and 1b) or 65 km to the Loy Yang Power Station (option 2). Consistent with what has been proposed by AusNet for the G-REZ project, the transmission line will be located within an easement approximately 80-100 m wide.

The wind farm component of the Project is located in the Territorial Sea[2] and the Exclusive Economic Zone[3] which constitute Commonwealth Waters. The onshore transmission line is located in the Wellington Local Government Area (LGA) with the grid connection point at the Hazelwood Terminal Station or Loy Yang Power Station in the Latrobe LGA.

Any works associated with Port upgrades or expansions to facilitate construction and operation of the Project are excluded from the scope of this assessment as these would be delivered by a third party and as such will not form part of the Project for referral purposes under the *Environment Effects Act 1978* (EE Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.2.1 Study Area

As shown in **Figure 1.1**, the Study Area extends beyond the Project Area. The purpose of the Study Area is to provide additional context to the existing site conditions and for identification of potential impacts. It provides flexibility in siting and design as a response to the outcomes of Phase 1 and subsequent assessments.

The Study Area includes:

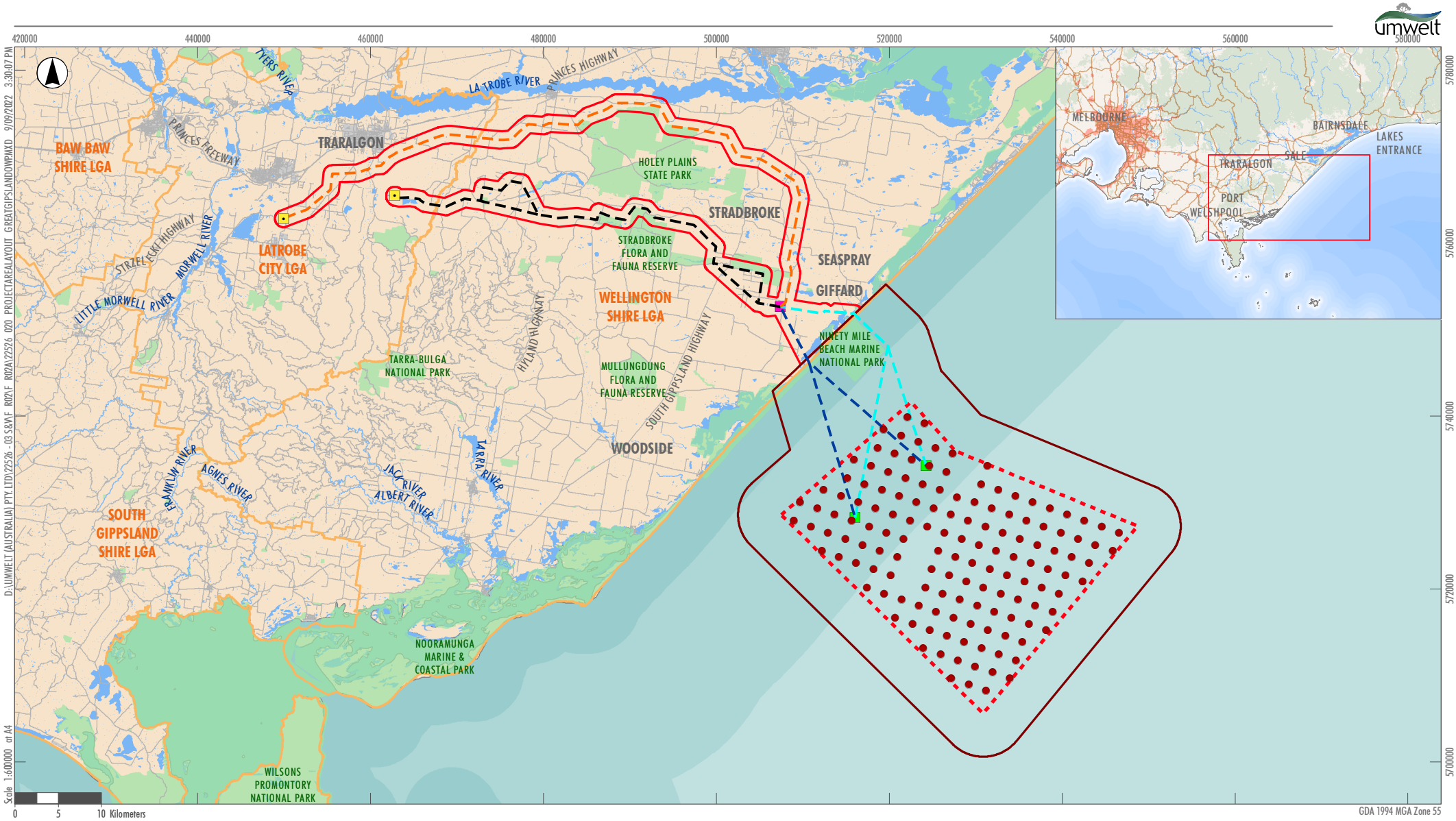
- A 5 km buffer around the offshore wind farm components (wind turbines and offshore substations) and subsea export cable routes up to the shoreline.
- A 1 km buffer around the onshore overhead (or underground where needed) transmission line and the onshore substation (referred to as the transmission line corridor) except where alternatives are considered.

The following definitions apply within the Study Area:

- Offshore refers to all areas from the low water line along the coast out to sea. For the purpose of the Project, the Study Area and Project Area lie in Commonwealth and State Waters.
- Onshore refers to all land-based areas above the low water line.
- State Waters refers to area from the low water line along the coast up to 3 nautical miles seaward.
- Territorial Waters and Contiguous Zone (Commonwealth Waters) refers to land from the State Water boundary up to 12 and 24 nautical miles respectively, from the low water line along to the coast.

Exclusive Economic Zone (Commonwealth Waters) extends from the Territorial Waters and Contiguous Zone up to 200 nautical miles from the low water line along to the coast.

[2] The Territorial Sea is the belt of water extending up to 12 nautical miles from the low water mark of the coastline
[3] The Economic Exclusive Zone is the area beyond the Territorial Sea extending up to 200 nautical miles from the low water mark of the coastline



Legend

- Offshore Study Area boundary
- Onshore Study Area boundary

Greater Gippsland Offshore Wind Project Area consists of:

- Greater Gippsland Offshore Wind Project Area
- Overhead transmission route option 1a and 1b
- Overhead transmission route option 2
- Subsea cabling option 1
- Subsea cabling option 2

- Potential turbine layout
- Offshore substation
- Existing onshore substation
- Indicative onshore substation

- Local Government boundary
- State Forest, National Parks, Reserves
- Road
- Drainage line

- VIC coastal and internal waters
- Territorial Sea
- Exclusive Economic Zone (Amended by Perth Treaty 1997)

Data source: Vic Data (2022)

FIGURE 1.1

Project Area and Study Area

2.0 Impact Screening Methodology

An impact screening has been undertaken through a desktop assessment to identify potential impacts associated with the Project. An 'impact' is any change to an environmental, heritage or social asset, value, or use, that would occur because of the Project's construction, operation, or decommissioning. Potential impacts have been identified for a range of different technical disciplines typically included in an Environment Effects Statement (EES) for a project including wind turbine, transmission line and/or marine aspects, and in consideration of those disciplines whose desktop studies would help inform and identify critical survey requirements and EES / Environmental Impact Statement (EIS) study program content, including marine, biodiversity, social, hydrology, cultural heritage, land use, landscape and visual, coastal issues and soils, air quality, noise and vibration, and transport.

The impact screening process involved the following key steps:

- Establishing the existing conditions or baseline conditions on which to identify and assess potential impacts.
- Considering the Project design, construction, operation, and decommissioning activities in the context of the existing conditions.
- Identifying potential impact pathways between Project elements and environmental receptors.

An overview of this process is shown in **Figure 2.1.**

The desktop assessment included a review of publicly available databases, literature, mapping, and desktop studies previously undertaken by BFE. Based on the outcomes of the desktop assessment and the identification of potential impacts, preliminary design constraints were then identified to inform Project design and assist in avoiding or mitigating potential impacts.

This impact screening process has also been used to inform the Project's planning and environmental approval strategy and inform the recommended 'next steps' for the Project, including further environmental assessments required to inform Project assessments and approvals.

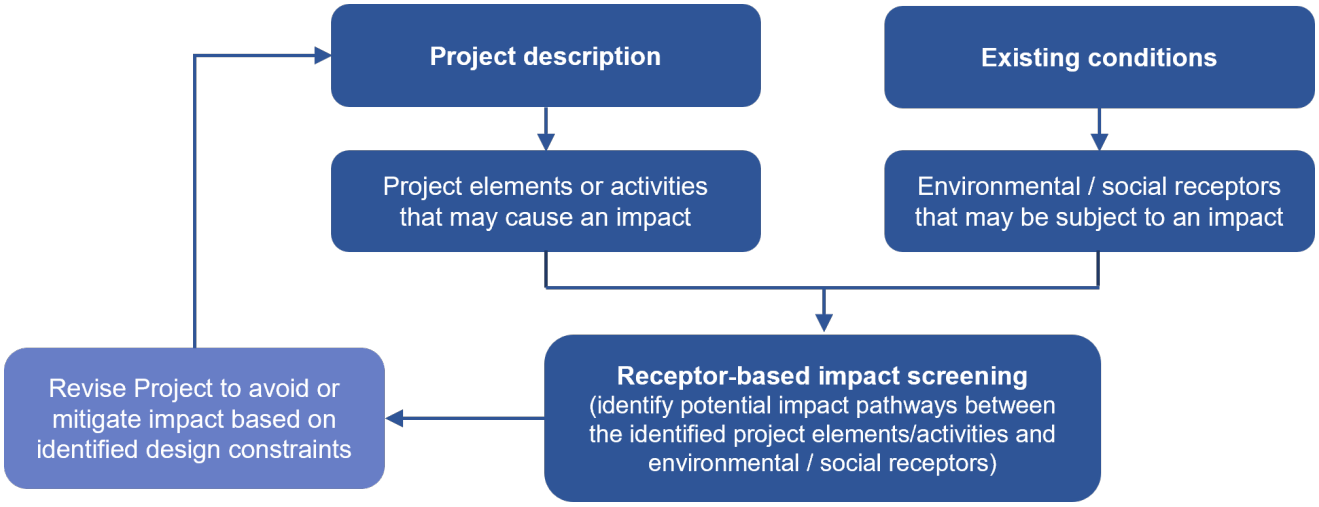


Figure 2.1 Impact Screening Methodology

3.0 Marine

This section provides a summary of the information provided in the Preliminary Desktop Marine Environmental Assessment prepared by BMT (September 2022).

3.1 Existing Conditions

The desktop marine environment assessment has considered the offshore component of the Study Area (see **Figure 1.1**) and does not consider the onshore component of the Study Area.

The offshore components of the Project are located off the Gippsland coastline in Bass Strait, within the south-eastern marine region defined by the Department of Environment (2015). The region is generally considered to have low productivity, except for localised hotspots. Bass Strait is characterised by shallow water and weak tidal currents in comparison to surrounding marine environments. Due to the shallow depths, waters warm and cool more rapidly than surrounding waters of Bass Strait. While there is a slow easterly flow of waters in Bass Strait, there is also a large anti clockwise circulation.

The navigational chart for the Study Area (GPS Nautical Charts) indicates the depth contours range from around 20 m to 50 m and the substrate is a mix of sand and shell. Small areas of coral or reefs are indicated to be located to the north and east of the Study Area.

3.1.1 Protected Areas

The Ninety Mile Beach Marine National Park (National Park) is located within the Study Area. No Project infrastructure will be located within the National Park.

The National Park was declared a marine national park to protect its unique sandy environment, which supports significant diversity of marine invertebrates (reported as one of the highest in the world), which in turn supports marine fauna including white shark. The 'coastal wilderness' amenity of the beach is also a component of its value, particularly its uninterrupted beach and ocean views. In addition, the coast provides habitat for shore birds, including the threatened hooded plover.

All forms of extraction are prohibited within the National Park, including recreational and commercial fishing. The *Ninety Mile Beach Marine National Park Management Plan* states that '*any proposals for new infrastructure such as tidal generators, offshore wind farms or artificial reefs are not permitted*' in the National Park due to the potential to impact on local hydrodynamic processes (Parks Victoria, 2006).

3.1.2 Other Marine Uses

There are active petroleum leases and four Esso Perch wells within the Study Area - two of the perch wells have been decommissioned and two are inactive. Infrastructure remains in place with towers, helicopter pads and pipelines with exclusion zones surrounding the wells.

The Tasmanian Gas Pipeline, the pipeline from the Esso Perch wells to Seaspray and Basslink cross the Study Area and have a 500 m exclusion zone.

The Gippsland marine environment is being investigated by the Victorian Government as a potential carbon storage area (i.e. capturing CO_2 emission below the seafloor, and permanently removing it from the atmosphere). The Project is known as CarbonNet and is proposed to overlap part of the Study Area. If the Project proceeds, it would involve the injection of least 125 million tonnes of carbon approximately 1.25 km beneath the seabed.

There are significant vessel movements from the Port of Corner Inlet and Port Albert[4] and Lakes Entrance through the offshore Study Area (upwards of 35,000 vessels per year). The Port of Corner Inlet and Port Albert cater for amateur and professional fishermen, leisure boating, charter vessels and larger commercial vessels. There are some larger commercial fishing tours catering for game fishers that launch from Lakes Entrance to the north that may occasionally utilise the offshore Study Area.

Offshore recreational activities in the Gippsland region include fishing, diving, and boating. There is a boat ramp at McLoughlins Beach, however most recreational fishers use the lakes and estuaries closer to shore which can be fished from smaller vessels.

There do not appear to be any large rock, reef, kelp, or seagrass habitats within the offshore Study Area that would attract large numbers of recreational fishers.

The distance of the wind farm from shore is assumed to be a deterrent for most recreational users due to the size of vessel required for offshore fishing.

The offshore Study Area contain several commercial fisheries including the eastern rock lobster zone, the central and eastern abalone zone, one Lake Tyers bait licence, scallop fishery and ocean fishery. Several commercial fisheries also exist within the Commonwealth waters of the offshore Study Area and nearby surrounding area including:

- Southern Eastern Scalefish and Shark Fishery
- The Bass Strait Central Zone Scallop Fishery
- The Small Pelagic Fishery
- Eastern Skipjack Tuna Fishery
- Eastern Tuna and Billfish Fishery.

3.1.3 Benthic Environment and Habitats

Seamap Australia mapping shows the nearshore environment along the coastline within the Study Area is homogenous and mapped as soft substrate with no visible biota. There is some seagrass and macroalgae mapped to the south-east of the Study Area within the McLoughlins Beach – Seaspray Reserve and within the Ninety Mile Beach Marine National Park.

[4] The Port encompasses the waters adjacent to Wilsons Promontory in the vicinity of Rabbit Island through to McLoughlins Beach at the western end of Ninety Mile Beach. The Port waters include Barry Beach, Port Welshpool, Port Albert and Port Franklin (Gippsland Ports, 2022)

A detailed marine seismic survey was undertaken for the CarbonNet Pelican project, adjacent to the offshore Study Area in 2018. An area approximately 1.2 km to 15 km offshore was surveyed, with the following findings:

- Isolated and sparse seagrass beds were identified.
- Isolated occurrences of sponge gardens and soft corals were identified.
- A small patch of low-profile reef was identified at around the 30 m contour, which was dominated by sponges and ascidians.
- There is a high diversity of a wide range of invertebrate groups, although these are widely distributed across the Bass Strait.
- The area has very low numbers of scallops (including commercial species) at a density of less than 10 scallops per 100 m.
- Low numbers of southern rock lobsters were identified at likely habitat sites and mapped reefs.
- A total of 43 species of fish were identified with the most abundant being the barber perch (*Caesiaperca razor*).
- Zooplankton species collected were dominated by copepods, cladocerans, salps and the dinoflagellate *Noctiluca scintillans.* Generally, there was a high diversity and abundance of zooplankton which is typical of similar temperate coastal waters.
- No lobster or scallop larvae were present in the samples undertaken.

3.1.4 Biologically Important Areas

The offshore Study Area is nominated to be a Biologically Important Area (BIA) for the following species:

- Sharks: nursery/breeding area for the White Shark (Carcharodon carcharias)
- Whales: foraging habitat for Pygmy Blue Whale (*Balaenoptera musculus brevicauda*), migration and resting areas for Southern Right Whale (*Eubalaena australis*)
- Seabirds: Short-tailed Shearwater (*Ardenna tenuirostris*), Wandering Albatross (*Diomedea exulans*), White-faced Storm-petrel (*Pelagodroma marina*), Common Diving-Petrel (*Pelecanoides urinatrix*), Buller's Albatross (*Thalassarche bulleri*), Shy Albatross (*Thalassarche cauta cauta*), Indian Yellow nosed Albatross (*Thalassarche chlorohynchos bassi*), Black-browed Albatross (*Thalassarche melanophris*) and Campbell Albatross (*Thalassarche melanophris impavida*).

3.1.5 Threatened Marine Fauna Species

This section provides an overview of the listed threatened species and listed migratory marine species that have potential to occur within the offshore Study Area, based on a search of the EPBC Protected Matters Search Tool (PMST). This includes marine fauna (whale, dolphin, seal, turtle, shark and fish and marine benthic species). Threatened bird species and threatened ecological communities are addressed in **Section 4.0 .**

Based on a search of the EPBC PMST, thirty-four (34) listed threatened and migratory marine fauna species are likely to occur within the offshore Study Area. Of these, 15 are listed under the EPBC Act and 22 are listed under the *Flora and Fauna Guarantee Act 1988* (FFG Act). These include:

- 9 whale, dolphin, and seal species
- 3 turtle species
- 9 shark and fish species
- 13 marine benthic species.

3.1.5.1 Whale, Dolphin and Seal Species

Table 3.1 identifies the listed threatened whale, dolphin and seal species that have potential to occur within the offshore Study Area.

Table 3.1 Whale, Dolphin, and Seal species likely to occur within the offshore Study Area

Common Name	Scientific Name	Conservation Status	
		EPBC	FFG
Long-nosed fur-seal	*Arctocephalus forsteri*	Marine	V
Sei Whale	*Balaenoptera borealis*	VU, Migratory	
Blue Whale	*Balaenoptera musculus*	EN, Migratory	Cr
Fin Whale	*Balaenoptera physalus*	VU, Migratory	
Southern Right Whale	*Eubalaena australis*	EN, Migratory	Cr
Humpback Whale	*Megaptera novaeangliae*	Migratory	V
Killer Whale	*Orcinus orca*	Migratory	
Dusky Dolphin	*Lagenorhynchus obscurus*	Migratory	

Table Note: EPBC Status: EN = Endangered, CR = Critically Endangered, VU = Vulnerable. FFG Status: Cr= Critically Endangered, E = Endangered, V = Vulnerable, Cd = Conservation Dependent

The offshore Study Area is within the travel range of several Australian fur seal *Arctocephalis pusillus doriferus* and Long-nosed fur seal *A. fosteri* breeding colonies, with both fur seal species known to forage extensively throughout this area.

Southern right whales (listed as endangered under the EPBC Act) migrate between summer feeding areas in the Southern Ocean to inshore coastal waters off Australia. The offshore Study Area is mapped as a BIA for southern right whales with regular sightings of this species recorded within the offshore Study Area.

The offshore Study Area is also mapped as a possible foraging area and BIA for the pygmy blue whale (listed as endangered under the EPBC Act). This species migrates between feeding aggregation areas in southern Australia and Western Australia to breeding grounds likely in Indonesia. The migratory route for the species along the east coast is not known, although acoustic records indicate that individuals do migrate along the east coast. Foraging tends to occur in high primary productivity areas, such as coastal upwellings, which do not typically occur near the offshore Study Area.

Noise interference (loud noises or long exposure) is cited in the Blue Whale Conservation Plan (Australian Government, 2015) as being a potential threat to the species, causing avoidance behaviour. Potential forms

of noise interference include seismic and drilling operations, mining, some types of dredging, infrastructure construction and operation, vessel noise and low flying planes and chronic vessel noise.

3.1.5.2 Turtles

Table 3.2 identifies the listed threatened turtle species that have potential to occur within the offshore Study Area.

Table 3.2 Turtle species with potential to occur within the offshore Study Area

Common Name	Scientific Name	Conservation Status	
		EPBC	FFG
Loggerhead Turtle	*Caretta caretta*	EN, Migratory	
Green Turtle	*Chelonia mydas*	VU, Migratory	
Leatherback Turtle	*Dermochelys coriacea*	EN, Migratory	Cr

Table Note: EPBC Status: EN = Endangered, CR = Critically Endangered, VU = Vulnerable. FFG Status: Cr= Critically Endangered, E = Endangered, V = Vulnerable, Cd = Conservation Dependent

There are a number of sightings of threatened turtle species along the coastline, including the leatherback and loggerhead turtles. They would be using the nutrient rich waters surrounding the Project Area for feeding purposes, however nesting occurs further northwards. The offshore Study Area is not likely to be considered key habitat for turtles.

3.1.5.3 Sharks and Fish

Table 3.3 identifies the listed threatened shark and fish species that have potential to occur within the offshore Study Area.

Table 3.3 Shark and Fish species with potential to occur within the offshore Study Area

Common Name	Scientific Name	Conservation Status	
		EPBC	FFG
Shortfin mako	*Isurus oxyrinchus*	Migratory	
Australian grayling	*Prototroctes maraena*	VU	E
White shark	*Carcharodon carcharias*	VU, Migratory	E
Porbeagle	*Lamna nasus*	Migratory	
Eastern dwarf galaxias	*Galaxiella pusilla*	VU	
School shark	*Galeorhinus galeus*	CD	
Whale shark	*Rhincodon typus*	VU	
Blue warehou	*Seriolella brama*	CD	Cd
Southern bluefin tuna	*Thunnus maccoyii*	CD	Cd

Table Note: EPBC Status: EN = Endangered, CR = Critically Endangered, VU = Vulnerable. FFG Status: Cr= Critically Endangered, E = Endangered, V = Vulnerable, Cd = Conservation Dependent

The white shark is widely, but not evenly distributed in Australian waters. The coastline to the east of Melbourne is identified as one of two key nursery areas for the species and is mapped as a BIA. The Corner Inlet area is identified as a nursery area for this species. The whale shark occurs mostly in tropical and warm temperate waters in northern Australia although they are occasionally sited in Victoria.

The Australian grayling is a threatened freshwater fish that is known to inhabit rivers in the Gippsland region. The species migrate out to sea for a period during the larvae phase.

3.1.5.4 Marine Benthic Species

Table 3.4 identifies the threatened marine benthic species that have potential to occur within the offshore Study Area.

Table 3.4 Marine benthic species with potential to occur within the offshore Study Area

Common Name	Scientific Name	Conservation Status	
		EPBC	FFG
Ghost shrimp species	*Eucalliax tooradin*		E
Ghost shrimp species	*Michelea microphylla*		V
Brittle star species	*Amphiura trisacantha*		Cr
Sea-cucumber species	*Apsolidium densum*		E
Sea-cucumber species	*Apsolidium handrecki*		E
Brittle star species	*Ophiocomina australis*		Cr
Sea-cucumber species	*Pentocnus bursatus*		Cr
Sea-cucumber species	*Thyone nigra*		E
Sea-cucumber species	*Trochodota shepherdi*		Cr
Stalked hydroid species	*Ralpharia coccinea*		Cr
Chiton species	*Bassethullia glypta*		Cr
Marine opisthobranch species	*Platydoris galbana*		E
Marine opisthobranch species	*Rhodope rousei*		Cr

Table Note: EPBC Status: EN = Endangered, CR = Critically Endangered, VU = Vulnerable. FFG Status: Cr= Critically Endangered, E = Endangered, V = Vulnerable, Cd = Conservation Dependent

3.1.6 Commonwealth Marine Areas

The Commonwealth marine area commences three nautical miles from Lowest Astronomical Tide (LAT) (as defined under the *Seas and Submerged Lands Act 1973* from the coastline). The turbines, most of the subsea cabling and substations are within the Commonwealth marine area; the subsea cabling connecting into the onshore grid system is also located within state waters.

There are no key ecological features mapped within the Commonwealth marine area of the offshore Study Area. The closest feature to the Study Area is the East of Eden Upwelling and Big Horseshoe Canyon approximately 60 km to the north-east of the offshore Study Area.

3.1.7 Matters of National Environmental Significance

Under the EPBC Act, an action may require approval if the action has, will have, or is likely to have, a significant impact on a MNES. Of the nine MNES protected under the EPBC Act, the Preliminary Desktop Marine Environmental Assessment (BMT, 2022) identified the Project has potential to significantly impact on the following three MNES:

- Listed threatened species and ecological communities
- Listed migratory species

- Commonwealth marine areas.

In accordance with the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance, a person who proposes to take an action that will have, or is likely to have, a significant impact on a MNES must refer that action to the Minister for a decision on whether assessment and approval is required under the EPBC Act.

A summary of the marine desktop assessment outcomes is provided in **Table 3.5.**

Table 3.5 Summary of Desktop Assessment Outcomes – Marine

Summary of Assessment Outcomes

• Ninety Mile Beach Marine National Park is located within the offshore Study Area and recognised for its sandy environment which supports significant diversity of marine invertebrates. No Project infrastructure will be located within the National Park.
• Two Ramsar Wetlands are located within proximity to the offshore Study Area: Corner Inlet and Gippsland Lakes which intersects with the Study Area. These sites support a high number of wintering migratory shorebird species.
• There are significant vessel movements from the Port of Corner Inlet, Port Albert and Lakes Entrance through the offshore Study Area (upwards of 35,000 vessels per year), which are mostly recreational and commercial vessels.
• The offshore Study Area supports recreational activities including fishing, diving, and boating. The distance of the wind farm from shore would be assumed to be a deterrent for most recreational users due to the size of vessel required for offshore fishing.
• The nearshore environment along the coastline within the Study Area is homogenous and mapped as soft substrate with no visible biota. There is some seagrass and macroalgae mapped to the south-east of the Study Area.
• Three MNES protected under the EPBC Act have potential to be impact by the offshore component of the Project: Nationally listed threatened species, listed migratory species and Commonwealth marine areas.
• Based on a search of the EPBC PMST, 34 listed threatened and migratory marine species are likely to occur within the offshore Study Area:
  • 9 whales, dolphin and seal species
  • 3 turtle species
  • 9 shark and fish species
  • 13 marine benthic species

3.2 Potential Impacts

Following definition of the existing environmental context of the Project Area and surrounding area, potential marine impacts have been identified with consideration of the Project design, construction, operation, and decommissioning activities in the context of the existing conditions. An overview of these potential impacts is provided in **Table 3.6.**

Table 3.6 Potential Impacts – Marine

Impact	Project Component	Phase
Loss of sensitive marine habitats results in habitat fragmentation for benthic communities and the values they support, as well as displacement of listed threatened/migratory species.	Offshore	Operation

Impact	Project Component	Phase
Pile driving results in noise impacts on marine fauna including threatened and listed migratory species (whales/dolphins, pinnipeds, turtles, sharks) and species of high fishery significance (finfish, rock lobster).	Offshore	Construction Decommissioning
Pile driving and dredging generate sediment plumes and increase turbidity, resulting in impacts on light sensitive habitats or fauna species.	Offshore	Construction Decommissioning
Disturbance of contaminated or acidic sediments impact on water quality within the marine environment.	Offshore	Construction Decommissioning
Vessel movements strike marine fauna, particularly large slow-moving fauna near the water's surface such as whales.	Offshore	Construction Operation Decommissioning
Vessels introduce marine pests into the Study Area through biofouling or the release of ballast water impacting on the marine environment (such as fisheries productivity).	Offshore	Construction Operation
A spill or uncontrolled release of fuels, oils, lubricants, bio-fouling paints, and other chemicals stored and/or used by vessels, turbines and facilities results in lethal and sub-lethal impacts on marine organisms.	Offshore	Construction Operation Decommissioning
Bird species (seabirds, migratory birds, and parrots) collide with wind turbines during operation resulting in injury or mortality.	Offshore	Operation
Wind turbines generate noise and vibration resulting in impacts on marine fauna behaviour, such as changes in avoidance or attraction responses, and masking of fauna sounds.	Offshore	Operation
Electrical cables between the turbines, offshore substation and shore-based facilities produce electromagnetic fields (EMF), impacting on marine invertebrate and vertebrate fauna species.	Offshore	Operation
Presence of marine structures (turbines, offshore substations) alter local hydrodynamic processes resulting in localised changes to sedimentary processes (such as scour and sediment deposit).	Offshore	Operation
Navigational or hazard lighting on wind turbines impact on marine species, including seabird and fish species, through behavioural changes such as avoidance, disorientation or reduced reproductive effort.	Offshore	Operation
Wind turbines become colonised by benthic flora and fauna species and act as fish aggregation devices, which may increase predators to the area and result in localised changes to the marine communities in the vicinity of the turbines.	Offshore	Operation
Temporary exclusion zones around wind turbines during construction (approximately 500 m per turbine) impact on recreational users.	Offshore	Construction
Exclusion zones around wind turbines during operation (approximately 50 m per turbine) impacts on recreational users.	Offshore	Operation

4.0 Biodiversity

This section provides a summary of the information provided in the Preliminary Desktop Biodiversity and Constraints Assessment prepared by Biosis (September 2022).

This section relates to terrestrial, aquatic, and coastal biodiversity values. Marine biodiversity is addressed in **Section 3.0.**

4.1 Existing Conditions

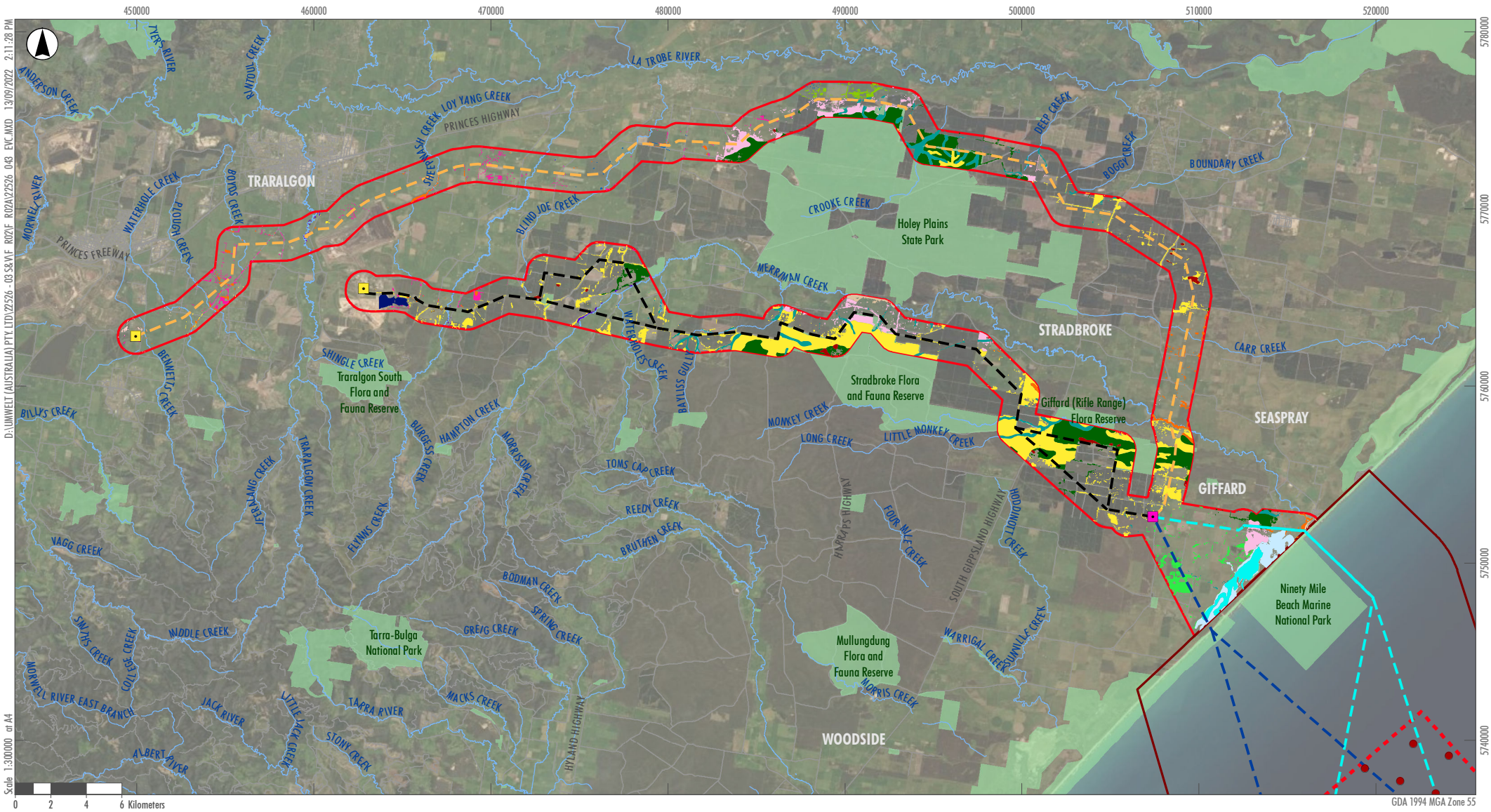
4.1.1 Vegetation

The Project Area is located in the Gippsland Lakes Bioregion. Native vegetation in the bioregion has been significantly cleared, with the highest clearing rates near Melbourne. A total of 19 Ecological Vegetation Classes (EVCs) are modelled to occur within the onshore Study Area (see **Figure 4.1**). These EVCs are listed in **Table 4.1** and include forest, woodland, wetland, scrub and saltmarsh communities.

Table 4.1 Modelled EVCs within the onshore Study Area

EVC	Bioregional Conservation Status	Modelled extent (ha)
EVC 01 – Coastal Dune Scrub/Coastal Dune Grassland Mosaic	Depleted	58.33
EVC 02 – Coast Banksia Woodland	Vulnerable	58.3
EVC 03 – Damp Sands Herb-rich Woodland	Vulnerable	321.37
EVC 09 – Coastal Saltmarsh	Least Concern	9.09
EVC 10 – Estuarine Wetland	Least Concern	519.08
EVC 16 – Lowland Forest	Vulnerable	2268.17
EVC 18 – Riparian Forest	Vulnerable	44.11
EVC 29 – Damp Forest	Endangered	3.70
EVC 48 – Heathy Woodland	Least Concern	866.36
EVC 53 – Swamp Scrub	Endangered	95.10
EVC 55 – Plains Grassy Woodland	Endangered	32.42
EVC 56 – Floodplain Riparian Woodland	Endangered	2.44
EVC 83 – Swampy Riparian Woodland	Endangered	95.10
EVC 132 – Plains Grassland	Endangered	71.40
EVC 136 – Sedge Wetland	Vulnerable	55.47
EVC 151 – Plains Grassy Forest	Vulnerable	10.19
EVC 191 – Riparian Scrub	Vulnerable	374.73
EVC 259 – Plains Grassy Woodland/Gilgai Wetland Mosaic	Endangered	10.55
EVC 698 – Lowland Forest/Heathy Woodland Mosaic	Vulnerable	397.34
Total		**15,293.25**

Table Note: EPBC Status: EN = Endangered, CR = Critically Endangered, VU = Vulnerable. FFG Status: Cr= Critically Endangered, E = Endangered, V = Vulnerable, Cd = Conservation Dependent



Legend

- Offshore Study Area boundary
- Onshore Study Area boundary

Greater Gippsland Offshore Wind Project Area consists of:

- Greater Gippsland Offshore Wind Project Area
- Overhead transmission route option 1a and 1b
- Overhead transmission route option 2
- Subsea cabling option 1
- Subsea cabling option 2

- Potential turbine layout
- Existing onshore substation
- Indicative onshore substation
- State Forest, National Parks, Reserves
- Road
- Drainage line

EVCs within the Study Area

- EVC 01 - Coastal Dune Scrub/Coastal Dune Grassland Mosaic
- EVC 02 - Coast Banksia Woodland
- EVC 03 - Damp Sands Herb-rich Woodland
- EVC 010 - Estuarine Wetland
- EVC 016 - Lowland Forest
- EVC 018 - Riparian Forest
- EVC 029 - Damp Forest
- EVC 048 - Heathy Woodland
- EVC 053 - Swamp Scrub
- EVC 055 - Plains Grassy Woodland
- 56, Floodplain Riparian Woodland
- EVC 083 - Swampy Riparian Woodland
- 132, Plains Grassland
- EVC 136 - Sedge Wetland
- 151, Plains Grassy Forest
- EVC 191 - Riparian Scrub
- 259, Plains Grassy Woodland/Gilgai Wetland Mosaic
- EVC 698 - Lowland Forest/Heathy Woodland Mosaic
- EVC 992 - Water Body - Fresh
- EVC 998 - Water Body - man-made

FIGURE 4.1

EVCs within the Study Area

Image Source: ESRI Basemap (2022) Data source: VIC Data (2022); DELWP (2022)

4.1.2 Ramsar wetlands

A Ramsar wetland is a wetland of international importance that is listed under the Convention on Wetlands of International Importance (Ramsar Convention) or declared by the Minister for Environment and Water to be a declared Ramsar wetland under section 16 of the EPBC Act. Ramsar wetlands are designated sites containing representative, rare, or unique wetlands or wetlands that are considered important in conserving biological diversity. Ramsar wetlands are one of the nine MNES protected under the EPBC Act.

As shown in **Figure 4.2,** the Gippsland Lakes Ramsar Wetlands is located adjacent to the onshore Study Area. An important criterion of the Ramsar listing of this site is the provision of habitat for nationally and internationally threatened flora and fauna. In addition, the Corner Inlet Ramsar Wetlands is located approximately 8 km west of the offshore Study Area and is a wetland of high biogeographical significance due to its geological history and its importance to migratory shorebirds. The wetland also supports several saltmarshes and mangroves.

4.1.3 Fauna habitat

An overview of the key fauna habitats within the on and offshore Study Area is provided in **Table 4.2.**

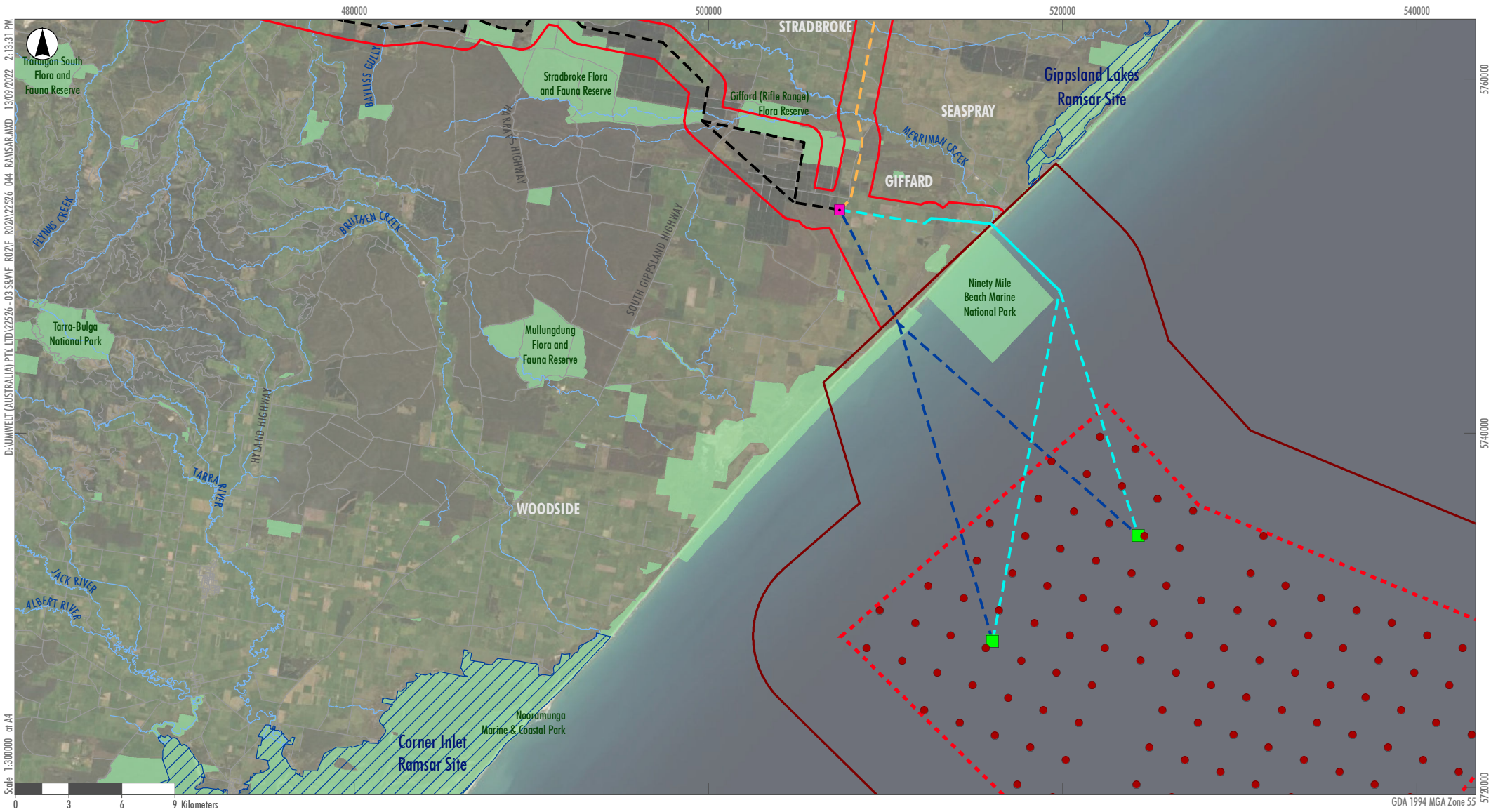
Table 4.2 Fauna habitat within the on and offshore Study Area

Habitat	Description
Terrestrial	Cleared land for agricultural practices within the Study Area holds limited ecological value to fauna. However, patches of remnant vegetation may provide important connections between higher quality habitats. The remaining area comprises a range of forest, scrub, woodland, grassland, wetland, heathland and saltmarsh vegetation which is of high ecological value to fauna.
Freshwater aquatic	Several wetlands and waterways in the Study Area are of high value to a range of shorebirds and other wetland birds. The Ramsar sites provide important habitat for numerous resident and migratory shorebirds. Lake Denison and Jack Smith Lake are areas of regional significance and provide important seasonal habitat for a number of migratory shorebirds. Wetlands and surrounding waterways throughout the Study Area also provide habitat for a range of ichthyofauna and other aquatic species.
Coastal	The coastal habitat of the Ninety Mile Beach is unlikely to support a high diversity and abundance of shorebirds, however there are several migratory species which are known to utilise this area and the sandy beaches provide habitat for some resident shorebirds.
Offshore	Bass Strait is considered to be an area of high importance for a large number of marine predators, particularly for a vast number of seabird species that breed and forage within this area. The Bass Strait Islands around Wilsons Promontory provide breeding habitat for a range of seabird species. The offshore environment is also likely to provide foraging habitat for several threatened and/or migratory seabirds including various albatross and petrel species.

4.1.4 Threatened Flora

A search of the PMST and Victorian biodiversity databases identified 15 flora species listed under the EPBC Act and 58 flora species listed under the FFG Act that have a medium to high likelihood of occurring within the onshore Study Area. An overview of the EPBC Act listed flora species is provided in **Table 4.3.**

Threatened flora records within 10 km of the Study Area are show in **Figure 4.3.**



Legend

- Offshore Study Area boundary
- Onshore Study Area boundary

Greater Gippsland Offshore Wind Project Area consists of:

- Greater Gippsland Offshore Wind Project Area
- Overhead transmission route option 1a and 1b
- Overhead transmission route option 2
- Subsea cabling option 1
- Subsea cabling option 2
- Offshore substation
- Potential turbine layout
- Indicative onshore substation
- Ramsar Site
- State Forest, National Parks, Reserves
- Road
- Drainage line

FIGURE 4.2

Ramsar Wetlands

Image Source: ESRI Basemap (2022) Data source: VIC Data (2022)

Seven of the 15 EPBC Act listed species are terrestrial orchids and include Spider Orchids, Leek-Orchids, Sun orchids and a Greenhood Orchid. Terrestrial orchids are cryptic species, emerging from the ground and flowering for only short periods of time each year. To identify the potential presence and extent of these species throughout the Study Area, targeted assessments will be necessary.

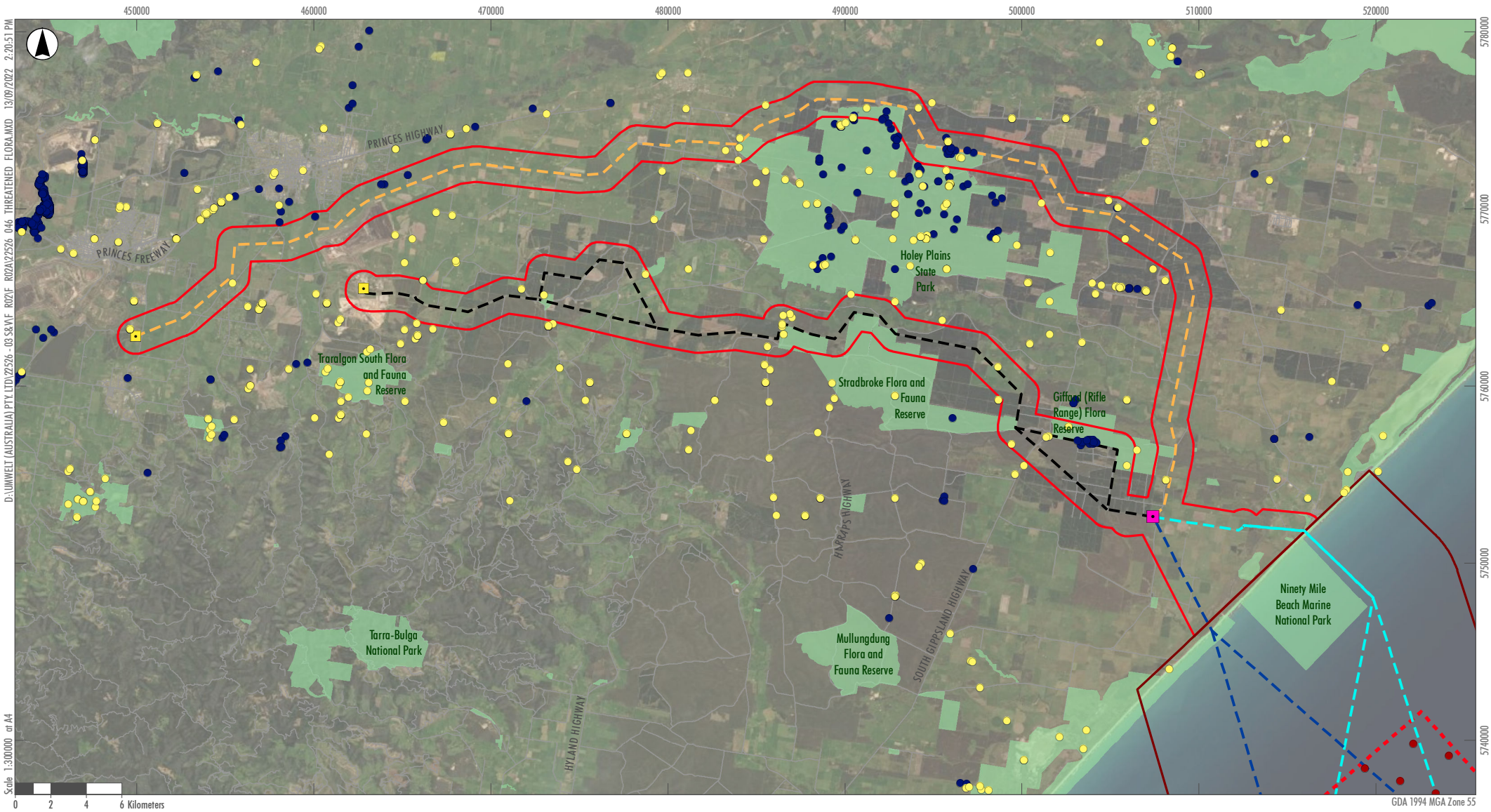
The following areas are of greatest value for threatened flora species within the onshore Study Area:

- Giffard (Rifle Range) Flora Reserve which is known to support populations and/or suitable habitat for several EPBC and FFG listed flora species such as Dwarf Kerrawang *Commersonia prostrata* (EPBC EN)
- Stradbroke Flora Reserve which is known to support populations and/or suitable habitat for several EPBC and FFG listed flora species such as Golden Grevillea *Grevillea chrysophaea* (FFG vu)
- Wetlands, lakes, and waterways, particularly fresh-water creeks and their associated wetlands such as the Merriman Creek, Kangaroo Creek and Monkey Creek, are likely to support suitable habitat for several EPBC and FFG listed flora species such as River Swamp Wallaby-grass *Amphibromus fluitans* (EPBC VU), Yarra Gum *Eucalyptus yarraensis,* Swamp Everlasting *Xerochrysum palustre*.

Table 4.3 EPBC Act listed threatened flora species most likely to occur within the Study Area

Common Name	Species name	Conservation Status	
		EPBC	FFG
River Swamp Wallaby-grass	*Amphibromus fluitans*	VU	
Eastern Spider-orchid	*Caladenia orientalis*	EN	e
Thick-lip Spider-orchid	*Caladenia tessellata*	VU	
Dwarf Kerrawang	*Commersonia prostrata*	EN	e
Matted Flax-lily	*Dianella amoena*	EN	cr
Trailing Hop-bush	*Dodonaea procumbens*	VU	
Strzelecki Gum	*Eucalyptus strzeleckii*	VU	cr
Maroon Leek-orchid	*Prasophyllum frenchii*	EN	e
Dense Leek-orchid	*Prasophyllum spicatum*	VU	cr
Wellington Mint-bush	*Prostanthera galbraithiae*	VU	e
Green-striped Greenhood	*Pterostylis chlorogramma*	VU	e
Swamp Fireweed	*Senecio psilocarpus*	VU	
Metallic Sun-orchid	*Thelymitra epipactoides*	EN	e
Spiral Sun-orchid	*Thelymitra matthewsii*	VU	e
Swamp Everlasting	*Xerochrysum palustre*	VU	cr

Table Note: EPBC Status: EN = Endangered, CR = Critically Endangered, VU = Vulnerable. FFG Status: Cr= Critically Endangered, E = Endangered, V = Vulnerable, Cd = Conservation Dependent



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- Overhead transmission route option 2
- Subsea cabling option 1
- Subsea cabling option 2
- Potential turbine layout
- Existing onshore substation
- Indicative onshore substation
- Road
- EPBC threatened flora species
- FFG threatened flora species

FIGURE 4.3

Threatened flora records

Image Source: ESRI Basemap (2022) Data source: VIC Data (2022); DELWP (2022); Biosis (2022)

4.1.5 Threatened Fauna

A search of the PMST and Victorian biodiversity databases identified 57 EPBC Act listed and 78 FFG Act listed fauna species (excluding marine fauna which are addressed in **Section 3.0**) considered to have a medium or higher likelihood of occurring within the Study Area. These have been categorised as follows:

- Avifauna (terrestrial birds and shorebirds)
- Terrestrial and aquatic fauna
- Seabirds.

Threatened fauna records within 10 km of the Study Area are show in **Figure 4.4**.

4.1.5.1 Avifauna

Terrestrial birds

As listed in **Table 4.4,** eighteen (18) listed terrestrial bird species have a medium or higher likelihood of occurring within the Study Area. Of these, seven are listed under the EPBC Act, and 16 are listed under the FFG Act (these do not equal 18 as some species are listed under both Acts). Orange-bellied Parrot and Swift Parrot are known to traverse Bass Strait at certain times of the year when migrating from Tasmania to mainland Australia. White-throated Needletail is also migratory (a trans-equatorial migrant). These species and other non-listed species are collectively termed Bass Strait migrants.