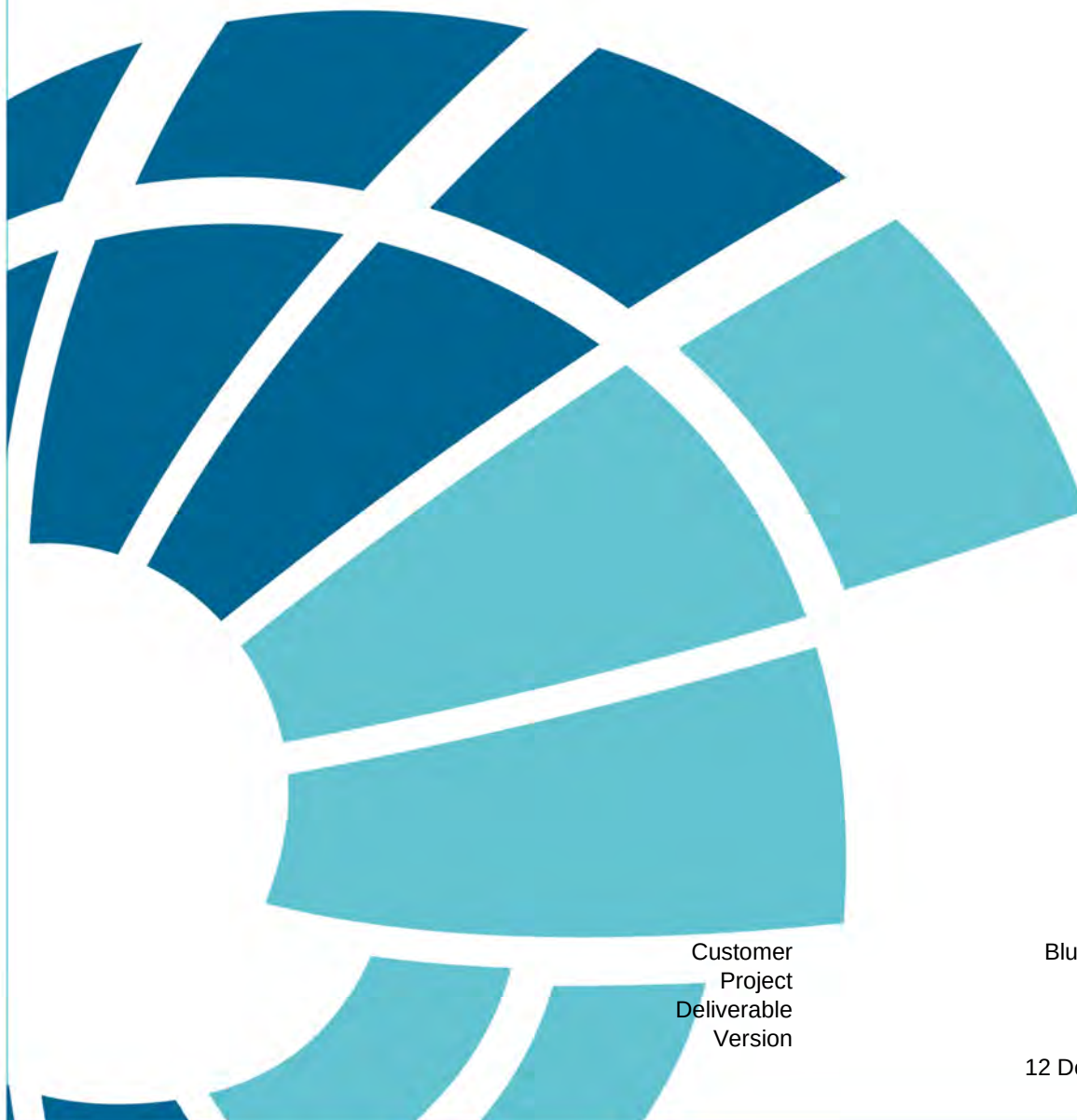


Greater Gippsland Offshore Wind Project

Preliminary Desktop Marine Environmental Assessment



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1 Introduction

1.1 Background

BlueFloat Energy is planning to develop offshore wind energy within Commonwealth marine waters, offshore of the Gippsland area in Victoria, as illustrated in Figure 1.1. This will be known as the Greater Gippsland Offshore Wind Project (OWP). The site sits within the Bass Strait region of the proposed Gippsland Declared Area, which is intended to be the first such offshore wind priority area to be declared under the *Offshore Electricity Infrastructure Act 2021* (Cth).

This preliminary scoping study of the marine environmental attributes and values supports:

- A referral under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) for potential impacts to Matters of National Environmental Significance (MNES)
- A referral under the *Environment Effects Act 1978* (Vic) (EE Act).

1.2 Study Objectives

The objectives of this scoping study are to:

- develop a first-pass assessment of marine environmental, social or economic values and associated constraints for the Study Area
- undertake a first-pass assessment of potential impacts to the marine environment as a result of planning, construction, operation and decommissioning of the project at both a Commonwealth and State level
- inform decision-making about the level of assessment required once the project receives approval to proceed to the next phase
- inform the development of Scoping Requirements for further environmental assessment of the project.

The assessment has been informed by desktop investigations and publicly available information only; no field work, monitoring or modelling has been undertaken to date.

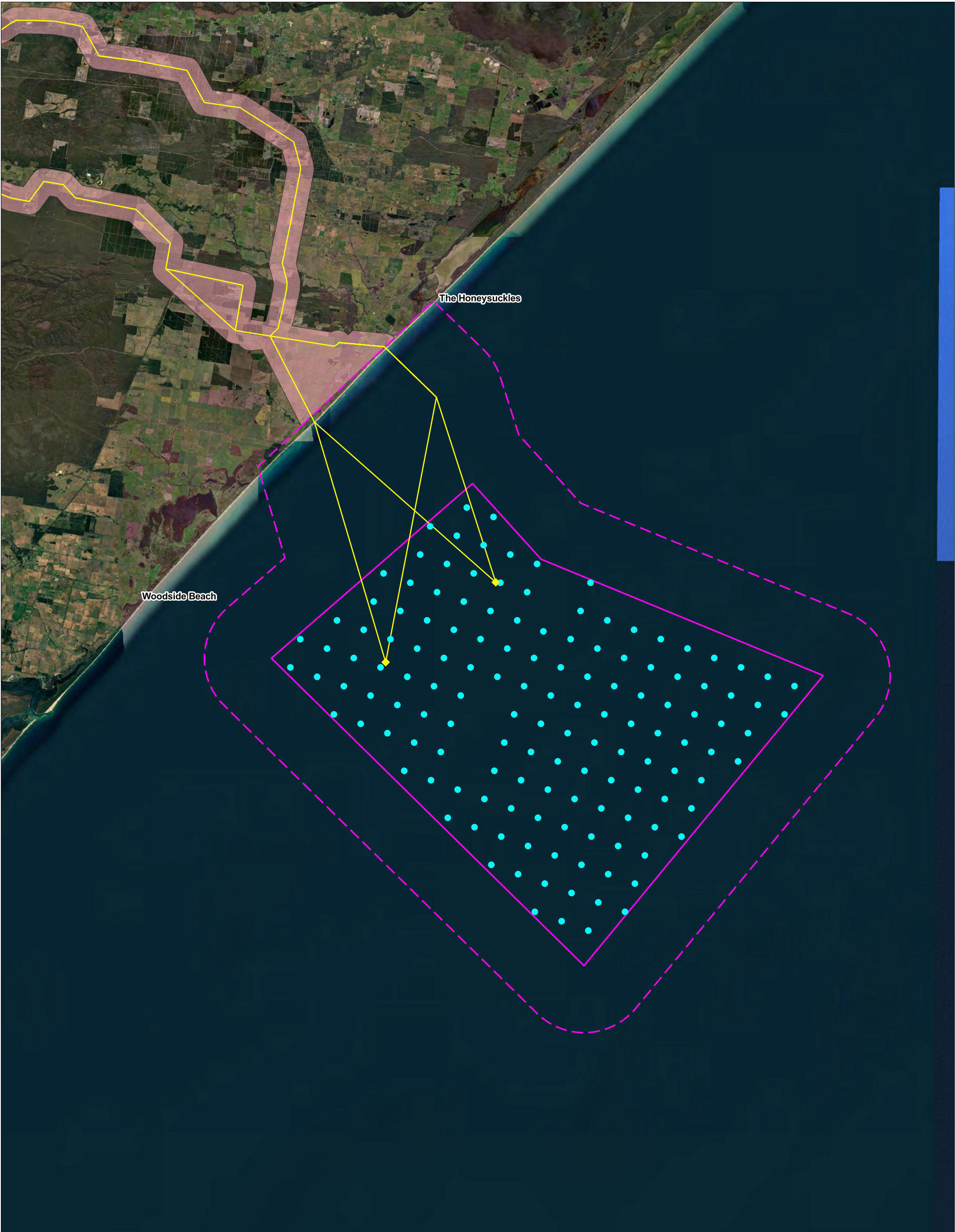
1.3 Terminology

The following terms are used frequently in this report:

The term 'marine environment' is defined as all marine and coastal waters up to the Highest Astronomical Tide (HAT) boundary. This is distinct from 'Commonwealth marine environment' which is the area between 3 and 200 nautical miles from the coast. State waters are defined as those waters from the low tide mark and extending up to 3 nautical miles out to sea.

Within this report, the conservation status of a species is defined in accordance with the provisions of relevant state legislation and its regulations and amendments (i.e. *Flora and Fauna Guarantee Act 1988* (FFG Act)), and/or the EPBC Act. Threatened is a common use term to collectively describe endangered and vulnerable species.

The Project Area is defined as the direct footprint of the offshore wind turbines, substations and subsea cabling routes up to the shoreline; Figure 1.1 shows both the entire Project Area (including terrestrial components e.g. onshore connections) and the marine Study Area.



LEGEND ● Wind Farm Layout ◆ Substation — Connection Routes — State Waters Limit □ Project Boundary □ Marine Study Area □ Terrestrial Study Area	Title: Project Location		Figure: 1-1	Rev: A
	BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.	 	 www.bmt.org	

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The Study Area expands beyond the proposed infrastructure footprint (Project Area) to provide additional context when establishing the existing site conditions and identifying potential impacts for the Project. It also provides flexibility in design and Project location as a response to the outcomes of the Phase 1 and subsequent assessments once key risks and any design constraints are identified. The Study Area applied to the Project includes:

- a 5 km buffer around the offshore wind farm component (turbines and substations) and subsea cabling routes up to the shoreline. A 15 km buffer has also been applied on the seaward side of the Offshore Project Area, to allow flexibility as the design develops for the potential to relocate the offshore infrastructure further out to sea if deemed beneficial for reduced environmental effects.
- a 1 km buffer either side of the onshore overhead transmission line route and the onshore substation (referred to as the transmission line corridor).

2 Relevant Legislation and Planning Advice

As discussed in Section 1, this report provides the preliminary marine environmental assessment for the Greater Gippsland OWP to support referrals under the EPBC and EE Acts. Other relevant legislation specific to the marine environment that will need to be considered as the project (and environmental assessment) progresses are summarised below. As the project is largely within the Commonwealth marine area, this review focuses on Commonwealth legislation, however there are a range of state legislative requirements and policies that also need to be considered for works in state waters.

2.1 Commonwealth Legislation

Australian Maritime Safety Authority Act 1990

The *Australian Maritime Safety Authority Act 1990* (AMSA Act) sets out the processes and procedures for responding to marine pollution events, particularly oil spills. The proponent will be required to work under this act to put procedures in place to both minimise and respond to potential spill events during both construction and operational phases.

Biosecurity Act 2015

The *Biosecurity Act 2015* (BA) manages the introduction of exotic pests and diseases in Australia. Of most relevance is requirements around vessels that enter Australian waters and requirements for ballast exchange offshore and pest inspections. This Act will guide requirements for any incoming vessels (or other goods and services) required for construction or operational purposes.

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the primary piece of legislation for management and assessment of environmental protection in commonwealth waters. It provides for the protection of a range of MNES which include commonwealth waters, threatened and migratory species (for further information on MNES Refer to Section 5.4).

The Act also sets out requirements for activities in the Australian Whale Sanctuary, which protects all cetaceans (whales, dolphins) in Australian waters. Requirements will include ensuring vessels do not cause interference to whales, having monitors in place during construction etc. Any field work associated with whale monitoring may also require a separate approval under the EPBC Act.

Environment Protection (Sea Dumping) Act 1981

The *Environment Protection (Sea Dumping) Act 1981* (Sea Dumping Act) regulates the loading and dumping of waste at sea within Australian Waters. The National Assessment Guidelines for Dredging (NAGD) (2009) set out the assessment framework for dredging activities which informs the suitability of dredge material for offshore placement. Under the Sea Dumping Act, an approval is required for the placement of material within Commonwealth Waters. Commonly, the NAGD are also used to determine the suitability of material for placement in state waters.

If there is a need to undertake dredging either for cabling installation or drilling works, then an assessment against the guidelines will be necessary; this involves consideration of the following:

- Opportunities to beneficially reuse or recycle dredge material (this includes land reclamation, beach nourishment, offshore berms, and capping material, agriculture and product uses (aquaculture, construction material, liners) and environmental enhancement (restoration and establishment of wetlands, upland habitats, nesting islands and fisheries).
- If hazardous, can the material be treated to destroy, reduce or remove the hazardous constituents
- What the comparative risks are to the environment and human health of alternatives
- What the costs and benefits are of proposed alternatives.

Fisheries Administration Act 1991

The *Fisheries Administration Act 1991* is largely responsible for the management of Australian fisheries (i.e. those in Commonwealth waters). Of particular relevance to this project is the allocation of fishing rights and plans of management; refer to Section 5.3 in regards to further information about Commonwealth Fisheries.

Protection of the Sea (Prevention of Pollution from Ships) Act 1938

The *Protection of the Sea (Prevention of Pollution from Ships) Act 1938* largely deals with the management of marine pollution associated with air emissions, water quality and noxious substances such as sewage discharged from ships. Vessels used for construction and operations of the facility will be required to adhere to the requirements of this Act.

Underwater Cultural Heritage Act 2018

The *Underwater Cultural Heritage Act 2018* protects shipwrecks, sunken aircraft and their associated artefacts, that occurred 75 or more years ago, regardless of whether their location is known. A permit may be required to enter and utilise the area within a shipwreck protection zone. The Project must adhere to the following additional requirements:

- Do not disturb or damage underwater heritage and its surrounding environment or remove artefacts, during the course of your visit
- Observe the requirements of protected zones
- Provide authorities with a notification of any new underwater heritage discovery within 21 days
- Report any suspicious or illegal activity that you observe happening around underwater heritage sites.

2.2 State Legislation

Marine and Coastal Act 2018

Victoria's *Marine and Coastal Act 2018* (MaCA) sets objectives and guiding principles for the planning and management of the State's marine and coastal environment. Under the MaCA, the Marine and Coastal Policy 2020 (the Policy) details the policies for achieving these objectives. The MaCA requires a Marine Spatial Planning Framework (MSP Framework) that provides guidance and a process for achieving integrated and coordinated planning and management of the marine environment.

Draft marine planning areas have been released, with the state waters component of the Study Area being with Marine Planning Area 8. It lists the allowable activities within the area as being traditional owner cultural values, recreational leisure and tourism, extraction of living resources, marine transport, coastal infrastructure and energy generation. This would therefore support the use of offshore wind at this location.

3 Project Description

The Greater Gippsland Offshore Wind Project (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 700km². Within this area, the Project involves approximately 139 'bottom-fixed' turbines¹, 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 15MW and 20MW, with hub heights between 165m and 190m and rotor diameters of 250m to 275m.

Route options currently proposed for the transmission line incorporate 330kV 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 5km from the coast to a new substation. An overhead transmission line will then run approximately 65 km to the Loy Yang Power Station or 79km to the Hazelwood Terminal Station. The transmission line will be located within an easement approximately 80m wide.

The wind farm component of the Project (i.e. turbines) is located in Commonwealth Waters (i.e. outside of State 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.

Existing port facilities will be used where possible to support the transport and delivery of equipment and Project components, as well as construction and maintenance vessels for offshore activities. The preferred port location is still to be determined, however the following ports are currently being considered for the Project: Barry Beach Terminal, Port of Hastings, and Port of Geelong. Although part of the current referral, it is likely that ports will undertake their own upgrades and approvals as they may cater to multiple offshore wind proponents.

3.1 Construction Activities

The following activities are likely to be a component of the project:

- Installation of foundations, scour protection, and subsea electrical array cables at WTG and offshore substation locations
- Laying, burying or mechanical protection of the subsea export cables
- Installation and commissioning of the WTGs and offshore substations
- Potential modifications to existing ports, depending on the preferred launch point. This may include changes to onshore hard stand/laydown areas, road upgrades, upgrades to berthing structures or dredging to accommodate vessels.

3.2 Operation

- Operation and maintenance of offshore infrastructure and facilities e.g. defouling, repainting, minor repairs, parts replacement etc.
- Use of port and harbour facilities by maintenance vessels
- Ongoing environmental management and monitoring in accordance with relevant approval conditions

3.3 Decommissioning

At the end of the operation phase of the Project, the wind turbines and the topsides of the offshore substations would be removed. The foundations would either be completely removed, or else cut at a certain agreed height, with the lower part remaining in order to avoid disrupting existing marine habitats. Offshore cabling would likely be left in situ to avoid impacts to the environment. Port and harbour facilities are likely to be repurposed for other offshore activities.

The following project components are located within the marine environment and the study boundary of this report:

- Offshore subsea cables connecting from the shore out to the offshore substations.
Offshore wind turbine generators and associated platform infrastructure.

4 Methodology

Publicly available information relating to the marine environmental features and values for the Study Area (Figure 1.1) was collated and reviewed, specifically:

- MNES, as defined under the EPBC Act
- Threatened and other conservation-dependent species (e.g. rare, protected etc.) listed under the FFG Act.

Primary data sources were as follows:

- EPBC Protected Matters Search Tool, undertaken for the Study Area
- Species sightings records and/or benthic habitat mapping:
 - Victorian Biodiversity Atlas
 - Atlas of Living Australia
- Marine Park, Ramsar Wetland and National Park listing criteria and/or Management Plans, which include descriptions of the values of these areas
- Species Profile and Threats Database (SPRAT) for mapping of the distribution and occurrence of species and/or their habitats, together with life-history information
- Species Recovery Plans for various threatened species prepared under the EPBC Act
- Previous environmental studies within or in proximity to the Study Area; in particular, EPBC Act referrals and assessments for the proposed Star of the South Offshore Wind Farm and CarbonNet projects have been utilised.

An assessment was made of the likelihood of occurrence of listed species in the Study Area¹. Where known, important life-history functions supported by the Study Area (i.e., breeding, foraging, nesting etc.) and other notable values supported were described based on mapping of *Biologically Important Areas for regionally significant marine species* (BIAs) (<https://www.environment.gov.au/marine/marine-species/bias>)² and Important Bird Areas³ (IBAs)

Potential project threats to marine environmental values within the Study Area were identified and an assessment of whether an impact had the potential to be significant, in accordance with the criteria within the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* or relevant State guidance (i.e. Ministerial Guidelines for Assessment of Environmental Effects under the EE Act). This will be further evaluated following comprehensive field investigations and studies as the project progresses.

¹ (i) known to occur = good quality, contemporary records; (ii) habitat/species likely to occur = as defined in SPRAT; (iii) possible occurrence = habitat/species 'may occur', as defined in SPRAT; (iv) unlikely to occur within the Study Area because there are insufficient records or habitat does not exist

² BIAs are defined as areas where aggregations of individuals of a species are known to display biologically important behaviour such as breeding, foraging, resting or migration. BIA's are designed to assist decision-making under the EPBC Act. They are identified using expert scientific knowledge about species distribution, abundance and behaviour in a region.

³ IBA's are defined as places of international significance for birds, and are determined by an internationally agreed set of criteria by BirdLife International.

5 Description of the Existing Environment

5.1 General Description of the Marine Environment

The *South-east marine region profile* (Department of Environment, 2015) describes the ecosystems, conservation values and uses of Commonwealth marine waters in south-eastern Australia, including Bass Strait, as shown in Figure 5.1.

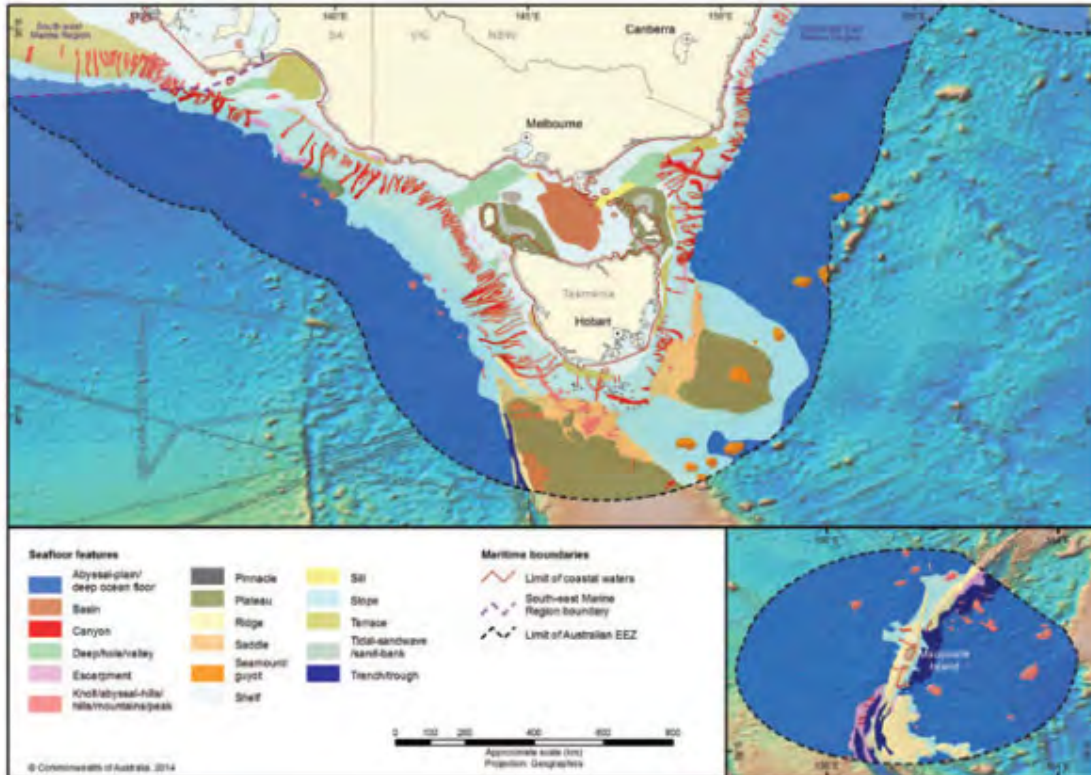


Figure 5.1 South East Marine Region and seabed features (Source: South-east marine region profile (Commonwealth Department of Environment, 2015))

The region is generally considered to have low productivity, with the exception of localised hotspots which include the Bonney Upwelling in south eastern South Australia, the Bass Strait Water Cascade on the shelf break east of Bass Strait and the flow of the East Australian Current along the eastern edge of the Region.

The key ecological features of the marine environment are listed as:

- Bonney coast upwelling
- East Tasmania subtropical convergence zone
- Bass cascade
- Upwelling east of Eden
- Big horseshoe canyon

- West Tasmania canyons
- Seamounts south and east of Tasmania
- Shelf rocky reefs and hard substrates.

There are approximately 46 threatened species that are known to use the region, as described below:

- Bony fishes – there are seven species of bony fish, including the southern bluefin tuna (*Thunnus maccoyii*) which is an apex predator species
- Shark species – these include the white shark (*Carcharodon carcharias*) and porbeagle (*Lamna nasus*)
- Seahorses, pipehorses and seadragons
- Cetaceans – includes the southern right whale (*Eubalaena australis*), humpback whale (*Megaptera novaeangliae*) and blue whale (*Balaenoptera musculus*)
- Pinnipeds – there are 6 piniped species, including the Australian sea lion (*Neophoca cinerea*)
- Seabirds – a large number of seabirds, including albatross and petral species
- Turtles – four species of turtles, including important foraging areas for the leatherback turtle (*Dermochelys coriacea*).

The Assessment of the Values of Victoria's Marine Environment Atlas (Victorian Government, 2019) provides some further information on the nearshore environment in proximity to the Study Area (i.e. in state waters), as shown in Figure 5.2; the proposed transmission lines route options cross over the Ninety Mile Beach biounit (however remains outside of the Ninety Mile Beach Marine National Park).

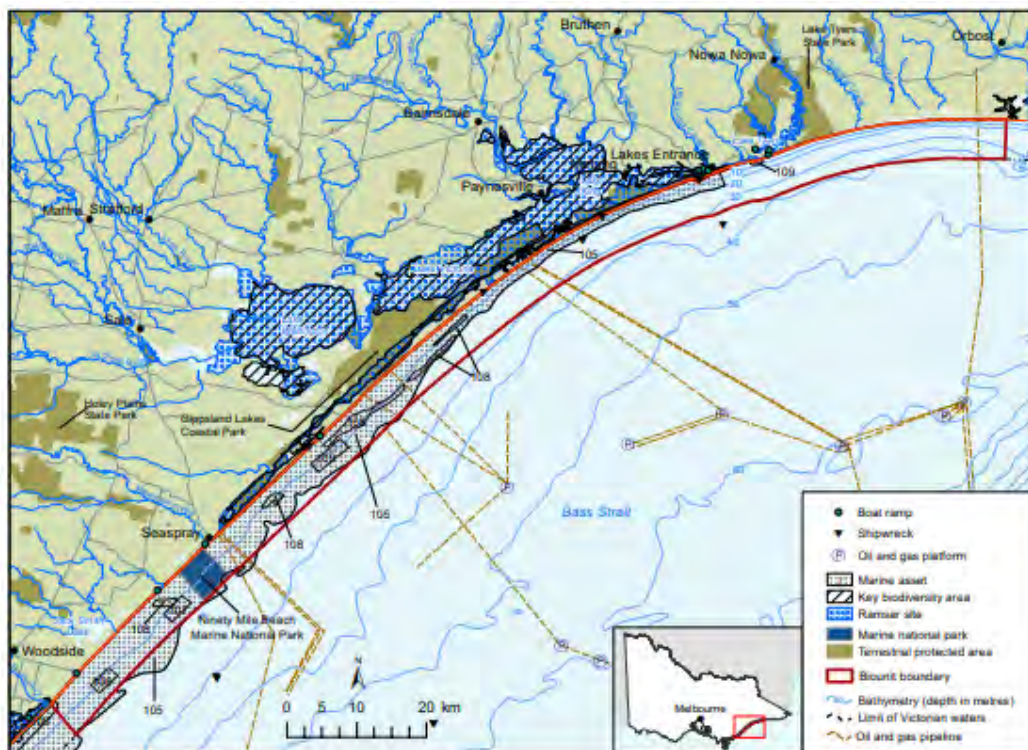


Figure 5.2 Nearshore environmental features of the Gippsland coastline (Ninety Mile Beach biounit)

Unique or rare habitats within the Ninety Mile Beach biounit are highlighted as:

- Seagrass: *Zostera spp.* and *Ruppia spp.* beds
- Invertebrates: high-density feather star (*Cenolia sp.*)
- Sessile invertebrates
- Non-reef forming epibiota assemblages dominated by sponge mounds
- Low complexity circalittoral rock.

The natural features of the biounit are noted as:

- Sandy beaches breeding habitat for hooded plover and other shorebirds and seabirds including Caspian tern, crested tern, fairy tern and pied oystercatcher
- Juvenile great white shark aggregation area, inshore sandy areas east of Wilsons Promontory feeding areas for gummy shark pups
- Port Albert to Lakes Entrance sandy plain (Marine Asset 105, as shown in Figure 5.2) most diverse benthic infauna communities recorded, include ghost shrimp *Biffarius arenosus* and *Trypaea australiensis*
- Scallop and epibiotic communities
- Patchy, low-profile reefs (MA 108) periodically covered by sand dominated by sessile invertebrates
- Endemic seastar (*Coscinasterias muricata*) occurs in large numbers, rare crab *Halicarcinus sp.*, opisthobranch *Platydoris galbana* (Woodside Beach MA 106)
- Soft coral (*Pseudogorgia godeffroyi*) only occurs in Victoria between McGuarans (MA 107) and Delray Beaches (MA 109).

5.2 Oceanography

Bass Strait is characterised by shallow water and weak tidal currents, in comparison to surrounding marine areas. There is a slow easterly flow of waters in Bass Strait, although there is also a large anticlockwise circulation. Due to the shallow depth, waters warm and cool more rapidly than surrounding waters (Environment Australia, 2015).

Wind speeds in the Study Area are in the range of 10 to 30km an hour, with maximum gusts reaching 100km an hour. The wind direction is predominantly westerly during winter and easterly during summer. Temperatures in subsurface waters range from about 13°C in August/September and 16°C in February/March (Esso, 2014). Tidal movements are predominantly in a northeast-southwest orientation. Generally, the area is a high energy environment, exposed to frequent storms and significant wave heights.

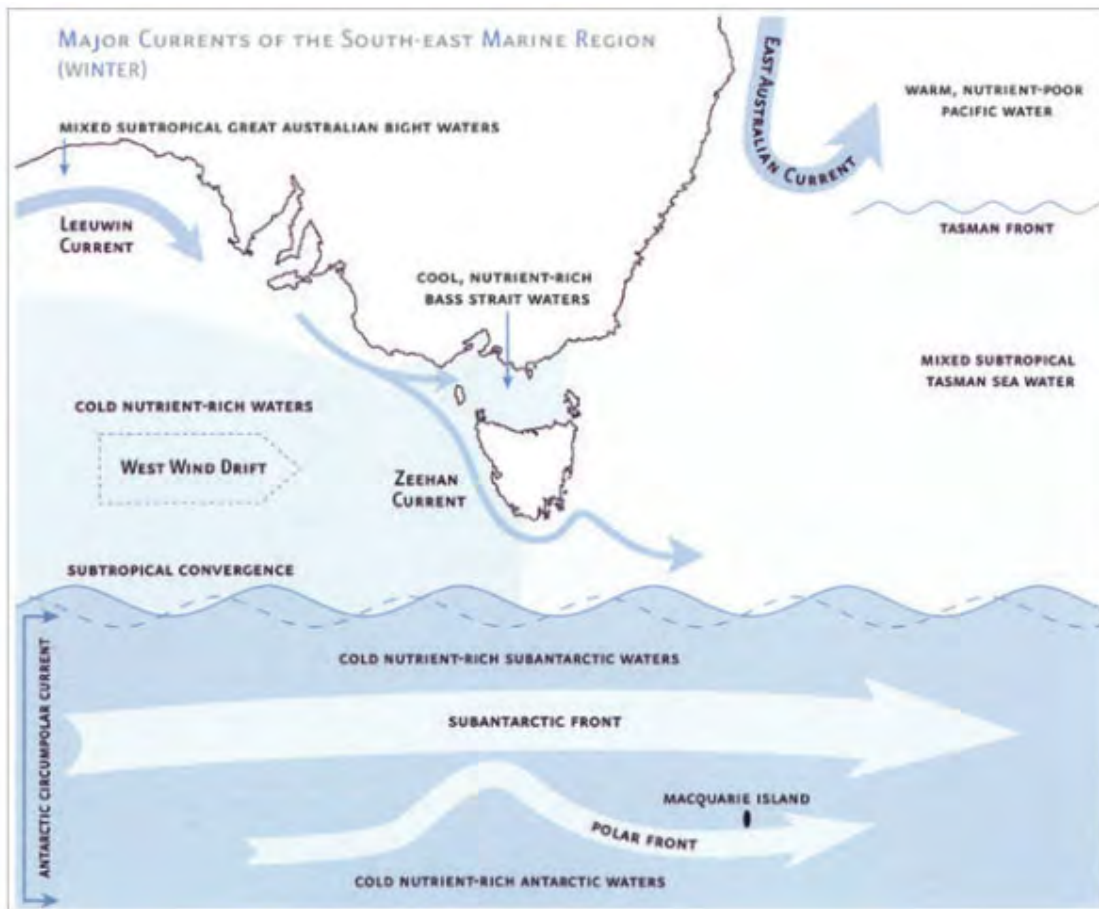


Figure 5.3 Major currents of the south-east region

Bathymetry and Surface Sediment

The navigational chart for the Study Area (refer to Figure 5.4) indicates that the depth contours range from around 20-50 m, and that the substrate encountered is a mix of sand and shell. Small areas of 'coral's or 'reefs' are indicated to the north and east of the Study Area, but not within the site itself.

The chart denotes a number of oil and gas stations to the north-east, their exclusion zones and associated infrastructure. There are two major exclusion zones (shown as yellow circles) around the Perth and Dolphin wells. Existing pipelines are also shown as pink lines, and are further explained in Section 5.3.

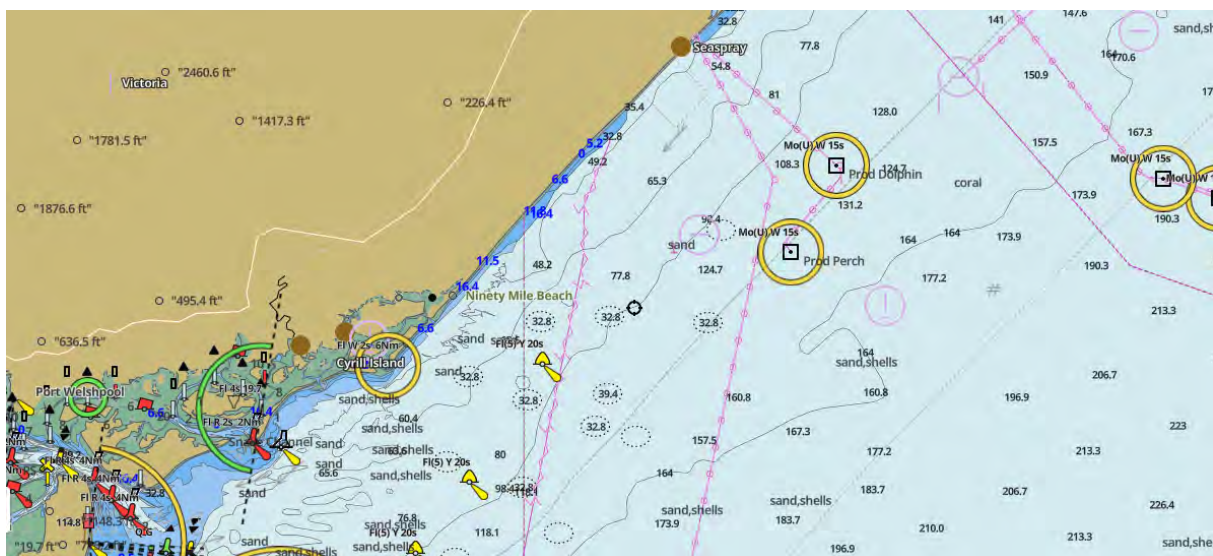


Figure 5.4 Navigational chart for Gippsland Area (Source: GPS Nautical Charts)

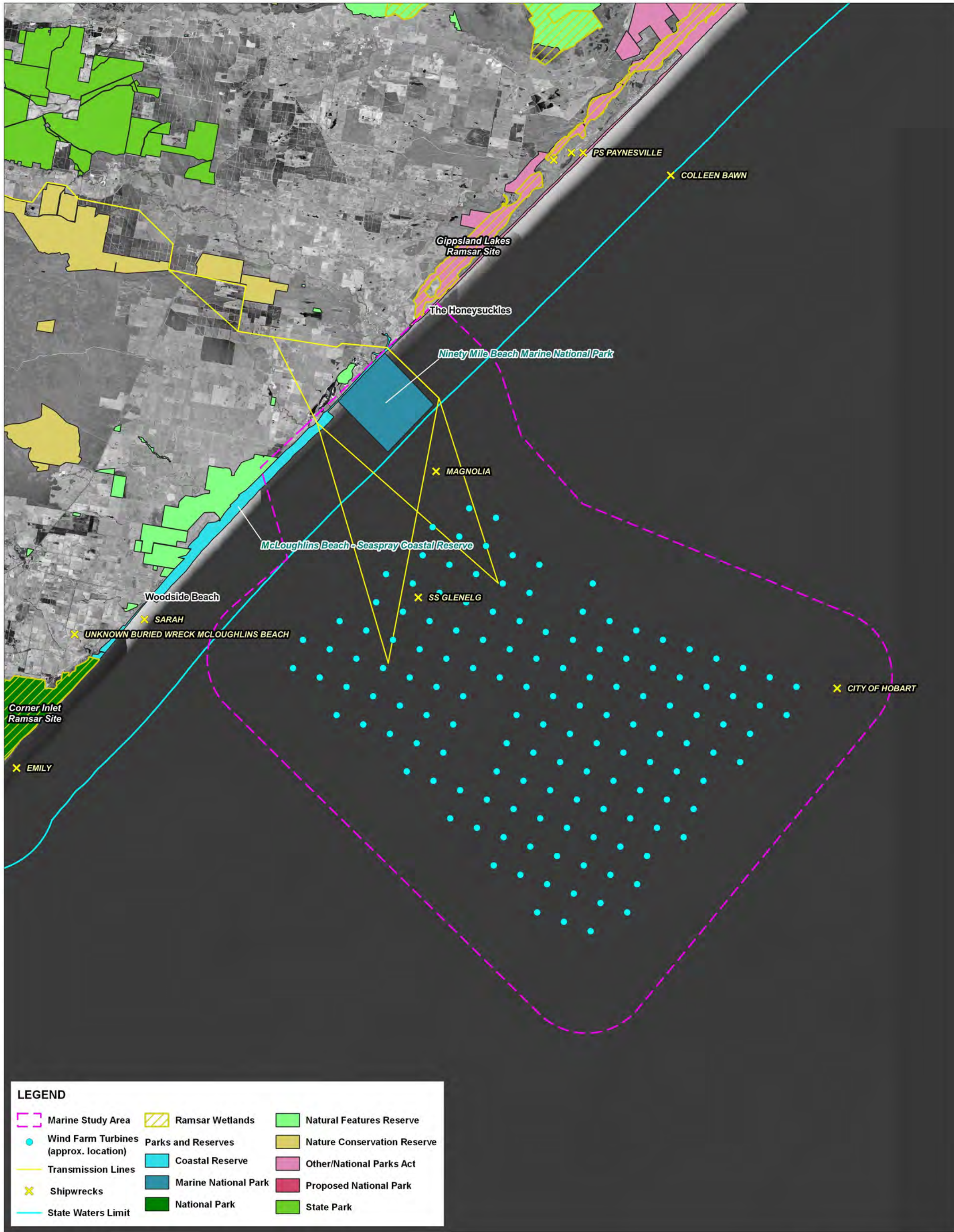
5.3 Land Uses

Protected Areas

Marine Parks

The nearest state marine parks to the Study Area are the Corners Inlet (approximately 40km from the Study Area) and Ninety Mile Beach Marine National Parks (MNP), which is within the Study Area boundary, as shown in Figure 5.5. There is no actual infrastructure to be placed within the Ninety Mile Beach MNP; the proposed transmission line route is currently located approximately 1km from the park boundary.

Ninety Mile Beach MNP has been declared to protect its unique sandy environment, which supports a significant diversity of marine invertebrates (reported as one of the highest in the world), which in turn supports marine fauna including the white shark (Parks Victoria, 2006). Low calcarenite reefs are also found which support invertebrates, including sponge gardens. 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.



Management priorities for the MNP listed in its Management Plan include:

- Protecting natural processes that maintain biodiversity and variety of marine ecological communities
- Protecting feeding and roosting for migratory and threatened shorebirds
- Developing a greater understanding of traditional owner knowledge, interests and rights through strong cooperative working relationships
- Visitor safety and encouraging minimal-impact visitation
- Understanding the impacts of illegal harvesting
- Maintaining water quality.

Barton *et al.* (2012) describe the park as containing reefs that are dominated by sponges, ascidians (sea squirts), smaller bryozoans and hydroids; this is expected to be representative of the broader area.

All forms of extraction are prohibited within the marine park, including recreational and commercial fishing. The Management Plan for the MNP states that 'any proposals for new infrastructure such as tidal generators, offshore wind farms or artificial reefs are not permitted' due to the potential to impact on local hydrodynamic processes.

The closest Commonwealth Marine Park is the Beagle Marine Park, approximately 50 km south-west of the Study Area.

Ramsar Wetlands

There are two large Ramsar wetlands along the coastline to the south and north of the Study Area: the Corner Inlet and Gippsland Lakes, as shown in Figure 5.5. Whilst both wetlands are some distance from the Study Area above ground marine infrastructure (i.e. turbines), they do support a high number of wintering migratory shorebird species that potentially may migrate through the Study Area offshore environment and should therefore be further considered as part of the future marine impact assessment.

Other Land/Sea Uses

Defence Areas

There are no known defence training areas within proximity of the Study Area.

Fisheries

A number of commercial fisheries exist within the Study Area or nearby surrounds, as shown in Figure 5.6. Within Commonwealth waters these include the southern and eastern Scalefish and Shark Fishery, the Bass Strait Central Zone Scallop Fishery and the small pelagic fishery, the Eastern Skipjack Tuna Fishery and the Eastern Tuna and Billfish Fishery.

State waters contain the eastern rock lobster zone, central and eastern abalone zone, a scallop fishery and an octopus fishery. Lakes Entrance is one of the largest commercial fishing fleets in Victoria, with approximately 36 commonwealth licenced fishing vessels, catching over 3000t of seafood per year (roughly 38% of all Victorian landings (AFMA, 2021)). No aquaculture reserves or proposals for aquaculture (Victorian Atlas) are known within the Study Area

Southern and Eastern Scalefish and Shark Fishery

This is a large fishery, that covers most of the Australian Fishing Zone. Target species include flathead, warehou, blue grenadier, flathead, gummy shark and whiting, with an annual fishery value of A\$76 million (2017-18).

Bass Strait Central Zone Scallop Fishery

This fishery (shown in Figure 5.6) has a history of boom and bust cycles, with a number of closures over the years. There were about 43 active licences in 2020 and 9 active vessels operating including vessels based in Lakes Entrance. Harvesting is focused on large and persistent biomass in mapped beds; there are no identified beds at present within the Study Area (ABARES, 2021). A survey undertaken by CarbonNet in 2018 (Advisian, 2018) found only very low numbers of scallops (less than 10 scallops per 100m transects).



Figure 5.6 Bass Strait Central Zone Scallop Fishery (Australian Fisheries Management Authority, 2022)

Small Pelagic Fishery

This is a large fishery extending from southern Queensland to Western Australia, with the key target species being blue mackerel, jack mackerel, redbait and sardines. The majority of fishing effort is focused on the east coast of Tasmania and southern NSW, as shown in Figure 5.7.

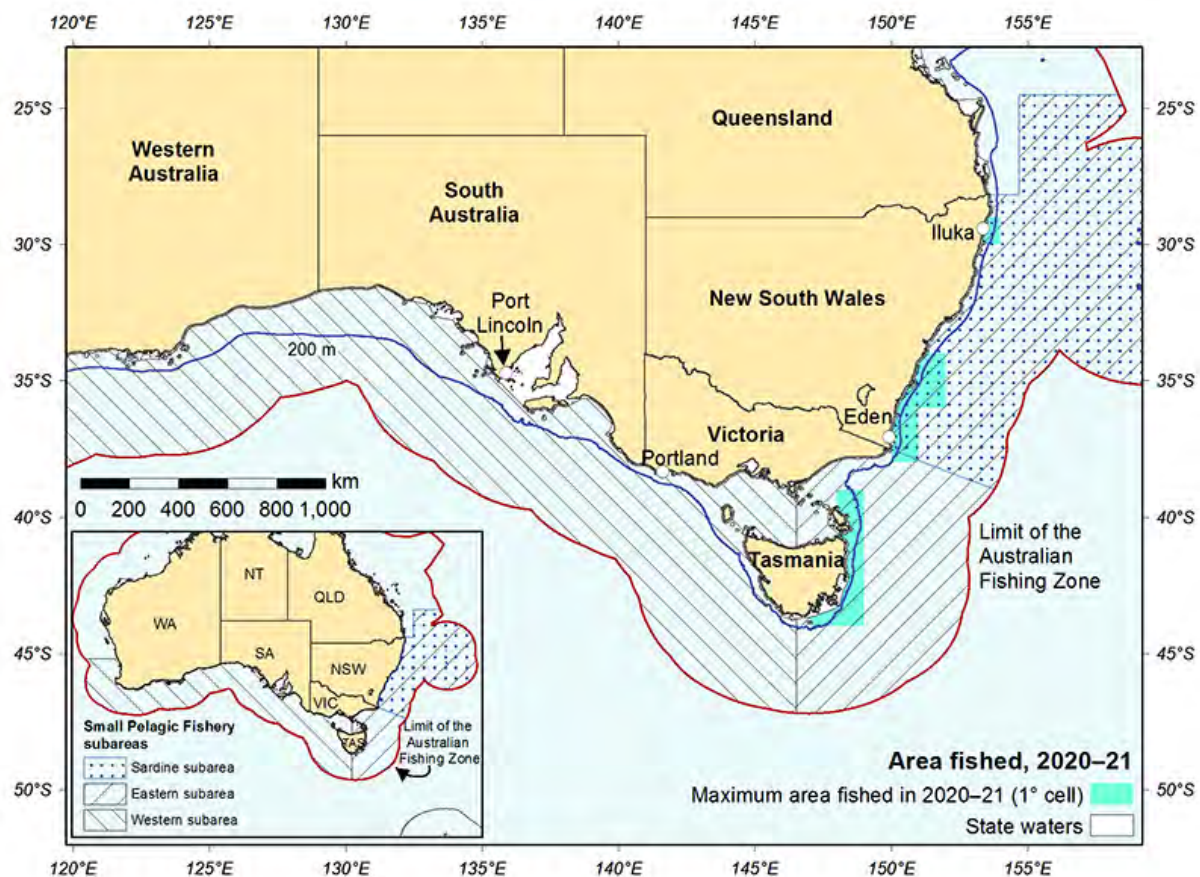


Figure 5.7 Small pelagic fishery catch effort, 2020-21 season (Australian Fisheries Management Authority, 2022)

Rock Lobsters

The CarbonNet fisheries survey undertaken in 2018 (Advisian) undertook extensive surveys of known and potential rock lobster habitat. Only a small number of rock lobsters were located across six sites (81 individuals found).

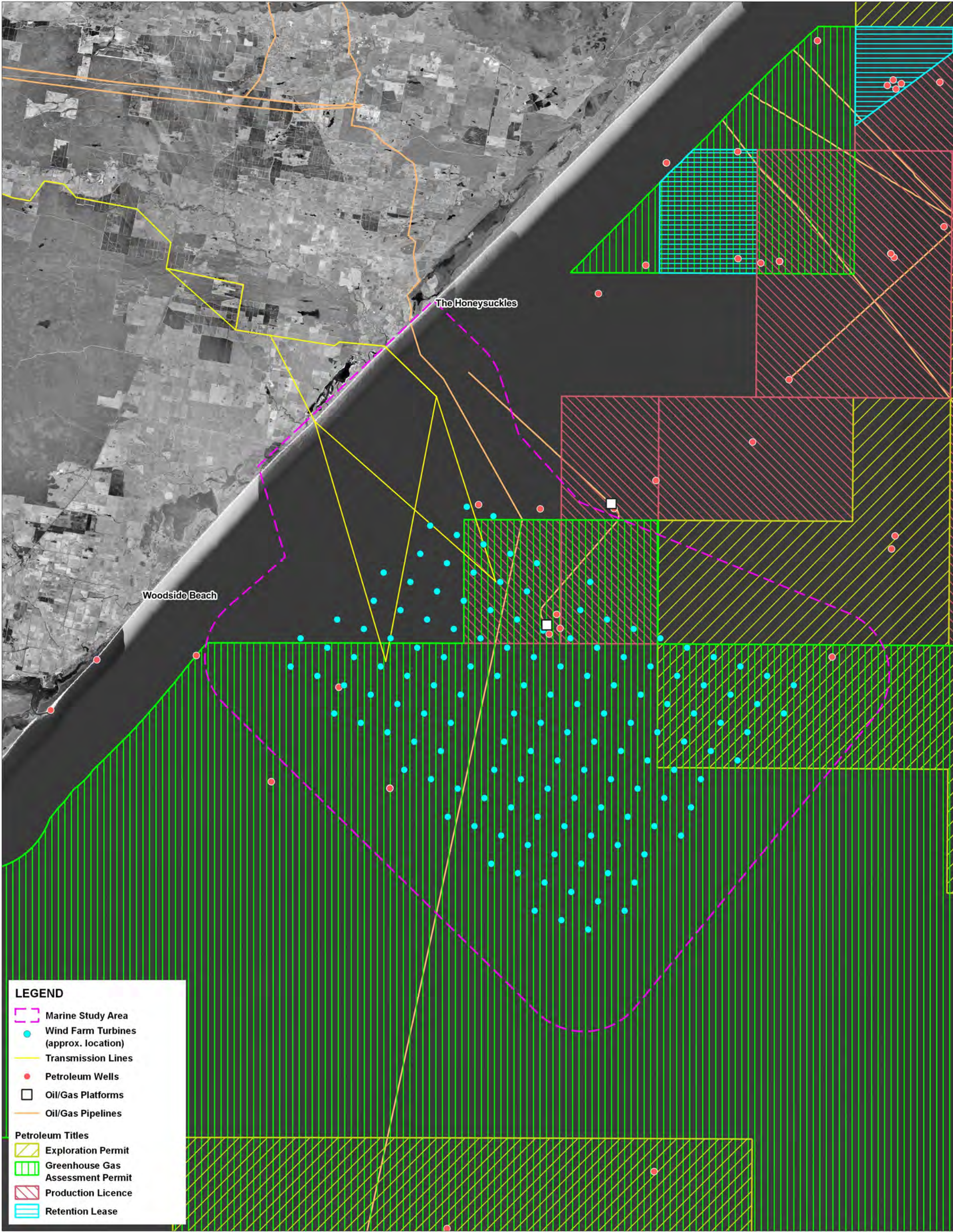
Oil and Gas Leases

Oil and gas have been activity extracted from Bass Strait and the Gippsland basin since 1924. The Perch wells, which sit in the centre of the Study Area (Figure 5.8) are operated by Esso. Currently, two of the wells have been decommissioned, whilst the remaining two are inactive, but are yet to be decommissioned (NOPSEMA, 2022). these wells have a 500m exclusion zone around the platforms currently. Esso's Management Plan lodged with NOPSEMA (Esso Australia Resources Pty Ltd, 2021) indicates that decommissioning is likely to commence in 2025.

A study undertaken by the Carbon Net Project (Victorian Government, 2015) reviewed the integrity of wells in the Gippsland Region. It reports that the Perch wells have two plugged and abandoned wells and two actively producing wells. The two abandoned wells have been fully cased and cemented and abandoned in a secure manner. There is no indication of any major or minor spills having occurred at these wells, however they may be some residual pollutants in surrounding sediment.

Other wells indicated within the Study Area on Figure 5.8 are exploration wells only.

In addition, there are current oil and gas leases over the Study Area, however these are unlikely to grant exclusive use over the area. Further discussions with the Commonwealth (NOPSEMA, NOPTA) will be required to confirm lease arrangements required.



- LEGEND**
- Marine Study Area
 - Wind Farm Turbines (approx. location)
 - Transmission Lines
 - Petroleum Wells
 - Oil/Gas Platforms
 - Oil/Gas Pipelines
- Petroleum Titles**
- Exploration Permit
 - Greenhouse Gas Assessment Permit
 - Production Licence
 - Retention Lease

Title:

Offshore Petroleum Titles and Wells (National Offshore Petroleum Titles Administrator)

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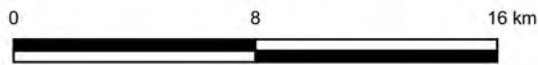


Figure:
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Carbon Sinks

The Victorian Government is investigating the potential to use the Gippsland marine environment as a carbon storage area (i.e. capturing CO₂ emission below the seafloor, and permanently removing it from the atmosphere); this project is known as CarbonNet. The proposed area for CarbonNet is to the north of the Study Area, however it is not yet approved. If the project proceeds, it would involve the injection of least 125 million tonnes of carbon approximately 1.25km beneath the seabed.

Easements

Figure 5.8 shows two major existing pipelines through the Study Area; the Tasmanian Gas Pipeline and the pipeline from the Esso Perch wells to Seaspray. There is a 500m exclusion zone around both pipelines at present; the Esso pipeline is not currently in use and may be either remediated or removed completely over the next 5-10 years. The turbine configuration will take into account appropriate exclusion zones around these pipeline easements. Geophysical Conditions

Extensive geophysical mapping was undertaken for the CarbonNet project in 2019; this is directly adjacent to the Study Area. The approval application under the Commonwealth Offshore Petroleum and Greenhouse Gas Storage Act 2006 (2019, Reference Number G-5-AP) describes the seascape as being largely sandy sediment flats, interspersed with small patches of reef, bedrock and consolidated sediment.

Other earlier surveys within the area (Tasmanian Gas Pipeline (2000), Longtom pipeline (2005), Patricia Baleen Project (2001)) reported similar conditions with the dominance of sandy seabed sediments on the sea surface.

The CSIRO Coastal Unit also provides maps of surface sediments along the Australian coastline (Figure 5.9). This describes the Study Area surface sediments as being composed of sand, gravel and silt.

Benthic Environment and Habitats

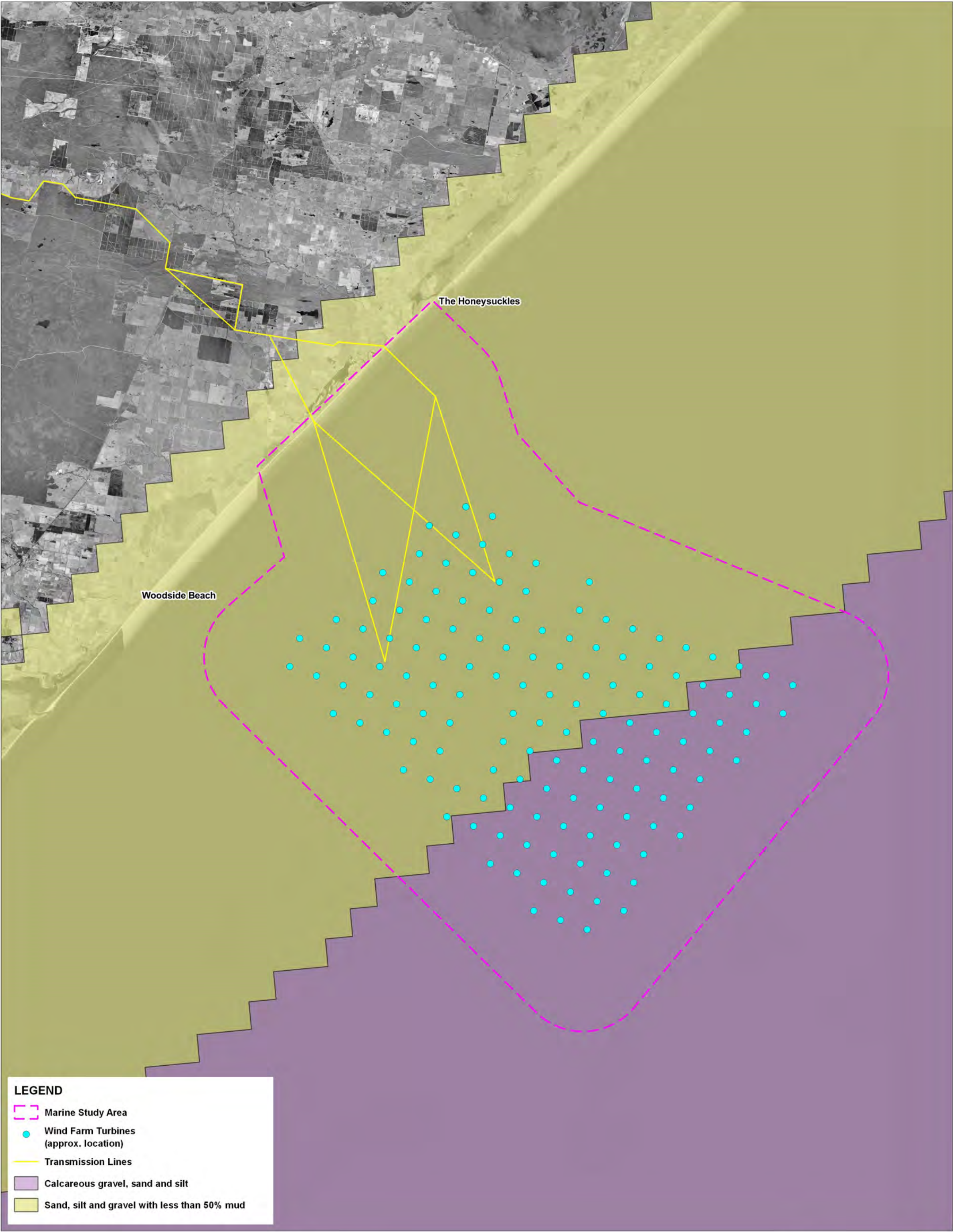
Seamap Australia maps nearshore benthic habitats along the Australian Coast, as shown in Figure 5.10. The nearshore environment along the coastline is homogenous, and is mapped as soft substrate, with no visible biota. There is some seagrass and macroalgae to the south-east of the Study Area, and within the Ninety Mile Beach MNP (although this is not indicated on the Seamap Australia map but described in the Ninety Mile Beach MNP Management Plan).

A detailed marine seismic survey was undertaken for the CarbonNet project, adjacent to the 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 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
- Around 43 species of fish were identified; the most abundant was the barber perch (*Caesiaperca razor*)

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- Zooplankton species collected were dominated by copepods, cladocerans, salps and the dinoflagellate *Noctiluca scintillans*. Generally, there was a high diversity and abundance of zooplankton, typical of similar temperate coastal waters.
- No lobster or scallop larvae were present in samples undertaken.



Title:

Substrates Victoria

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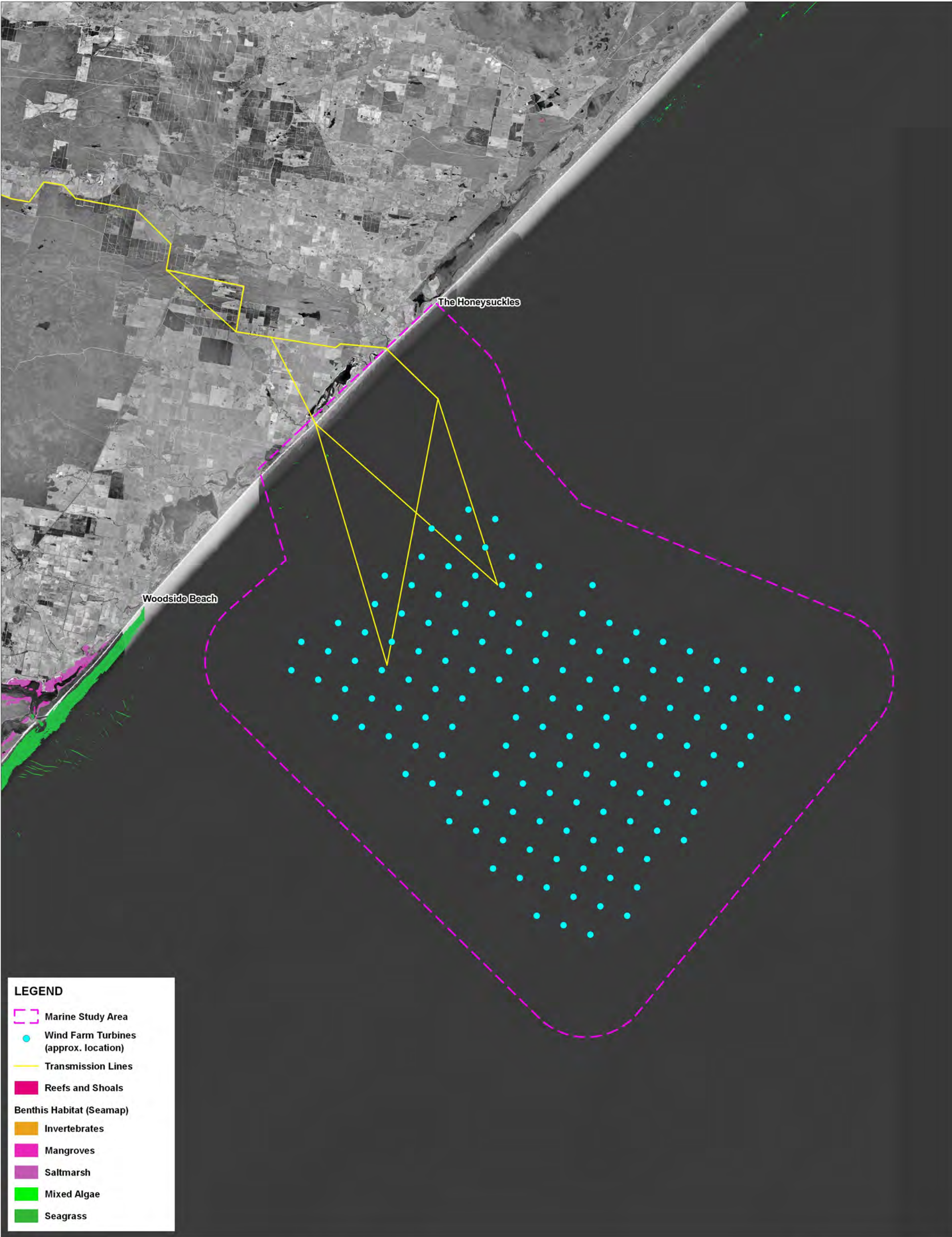
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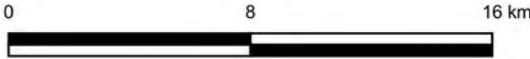


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Benthic Habitats

Figure:
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Other earlier seabed assessments within the vicinity of the Study Area (Tasmanian Gas Pipeline (2000), Longtom pipeline (2005), Patricia Baleen Project (2001)) identified large patches of bivalves and scallops, commonly occurring sea pends (in depths from 22 to 27m), sponge gardens (occurring at about 50m water depth) and screw shell aggregations (in depths greater than 40m) and a variety of small mobile animals such as crustaceans, bivalves, sponges, worm tubes and polychaete worms (at about 20m water depth). Typically, the surveys completed have only identified the presence of sparse marine flora, with no significant flora species (i.e. threatened).

5.4 Matters of National Environmental Significance

Under the EPBC Act, an action will require approval if the action has, will have, or is likely to have, a significant impact on a MNES:

- 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
- A water resource, in relation to coal seam gas development and large coal mining development.

A search using the Protected Matters Search Tool has identified that nationally threatened species, migratory species and commonwealth marine areas occur within the marine Study Area or immediately adjacent. These matters are further described below.

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; also known as the Territorial Sea Baseline (TSB)). The turbines, majority of cabling and sub-stations are all within the Commonwealth marine area; the transmission line route proposed to connect the Project to the grid system is located within state waters.

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

The Protected Matters Search Tool for the Study Area identified 50 listed threatened species as potentially occurring. Table 5.1 lists the threatened species (i.e. Critically Endangered, Endangered or Vulnerable) under either the EPBC or FFG Act that have been recorded as occurring, or potentially occurring, within or adjacent to the Study Area. Species records have been drawn from available databases, including the Victorian Biodiversity Atlas and the Atlas of Living Australia. Table 5.1 includes marine species, or species that may traverse/migrate through the marine environment (e.g. migratory birds travelling to feeding areas).

Biologically Important Areas

The Study Area is nominated to be a Biologically Important Area (BIA) for the following species, as shown in Table 5.1:

- Sharks: nursery/breeding area for the white shark (*Carcharodon carcharias*)
- Whales: foraging habitat for pygmy blue whale (*Balaenoptera musculus breviceauda*), 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 chlorohychnos bassi*), black-browed albatross (*Thalassarche melanophris*) and Campbell albatross (*Thalassarche melanophris impavida*).

A BIA is an indication that an area has a high level of importance for a species, either threatened or migratory under the EPBC Act.

Threatened Species

There are four EPBC-listed Critically Endangered species potentially occurring within the Study Area:

- Curlew sandpiper (*Calidris ferruginea*)
- Orange-bellied parrot (*Neophema chrysogaster*)
- Eastern curlew (*Numenius Madagascariensis*)
- Swift parrot (*Lathamus discolor*).

Further commentary on how these species may utilise the marine environment is provided in the following sections⁴.

⁴ known to occur = good quality, contemporary records; (ii) habitat/species likely to occur = as defined in SPRAT; (iii) possible occurrence = habitat/species 'may occur', as defined in SPRAT; (iv) unlikely to occur within the Study Area because there are insufficient records or habitat does not exist

Table 5.1 Listed Threatened Species for the Gippsland Offshore Wind Project Study Area (Area based on EPBC Protected Matters Search and other information sources described in Section 4)

Scientific Name	Common Name	EPBC Act Status (threatened or migratory species)	FFG Act Status / Victorian Advisory List	Type of presence (EPBC)
Birds				
<i>Actitis hypoleucos</i>	Common sandpiper	Migratory	-	Species or species habitat likely to occur within area
<i>Apus pacificus</i>	Fork-tailed swift	Migratory	-	Species or species habitat likely to occur within area
<i>Ardenna grisea</i>	Sooty shearwater	Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Ardenna carneipes</i>	Flesh-footed shearwater	Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Botaurus poiciloptilus</i>	Australasian bittern	Endangered	Endangered	Species or species habitat likely to occur within area
<i>Calidris acuminata</i>	Sharp-tailed sandpiper	Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Calidris canutus</i>	Red knot	Endangered, Migratory	Endangered	Species or species habitat likely to occur within area
<i>Calidris ferruginea</i>	Curlew sandpiper	Critically Endangered, Migratory	Endangered	Species or species habitat likely to occur within area
<i>Calidris melanotos</i>	Pectoral sandpiper	Migratory	-	Species or species habitat likely to occur within area
<i>Calidris ruficollis</i>	Red-necked Stint	Migratory	-	Species or species habitat likely to occur within area
<i>Charadrius leschenaultii</i>	Greater Sand Plover	Vulnerable, Migratory	Critically endangered	Species or species habitat likely to occur within area
<i>Diomedea antipodensis</i>	Antipodean albatross	Vulnerable, Migratory	-	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Common Name	EPBC Act Status (threatened or migratory species)	FFG Act Status / Victorian Advisory List	Type of presence (EPBC)
<i>Diomedea epomophora</i>	Southern royal albatross	Vulnerable, Migratory	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<i>Diomedea exulans</i>	Wandering albatross	Vulnerable, Migratory	Endangered	Foraging, feeding or related behaviour likely to occur within area
<i>Diomedea antipodensis gibsoni</i>	Gibson's albatross	Vulnerable	-	Foraging, feeding or related behaviour likely to occur within area
<i>Diomedea sanfordi</i>	Northern royal albatross	Endangered, Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Fregetta grallaria grallaria</i>	White-bellied storm-petrel	Vulnerable	-	Foraging, feeding or related behaviour likely to occur within area
<i>Gallinago hardwickii</i>	Latham's snipe	Migratory	-	Species or species habitat likely to occur within area
<i>Gallinago megala</i>	Swinhoe's snipe	Migratory	-	Species or species habitat likely to occur within area
<i>Gallinago stenura</i>	Pin-tailed snipe	Migratory	-	Species or species habitat likely to occur within area
<i>Haliaeetus leucogaster</i>	White bellied sea eagle	-	Threatened	Species or species habitat likely to occur within area
<i>Halobaena caerulea</i>	Blue petrel	Vulnerable	-	Species or species habitat may occur within area
<i>Hirundapus caudacutus</i>	White-throated needletail	Vulnerable	-	Foraging, feeding or related behaviour likely to occur within area
<i>Ixobrychus flavicollis australis</i>	Black bittern	-	Vulnerable	Species or species habitat likely to occur within area
<i>Lathamus discolor</i>	Swift parrot	Critically Endangered	Endangered	Species or species habitat may occur within area
<i>Limosa lapponica baueri</i>	Bar-tailed godwit (baueri),	Vulnerable, Migratory	-	Species or species habitat likely to occur within area

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Scientific Name	Common Name	EPBC Act Status (threatened or migratory species)	FFG Act Status / Victorian Advisory List	Type of presence (EPBC)
<i>Macronectes giganteus</i>	Southern giant petrel	Endangered, Migratory	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<i>Macronectes halli</i>	Northern giant petrel	Vulnerable	Near threatened	Foraging, feeding or related behaviour likely to occur within area
<i>Neophema chrysogaster</i>	Orange-bellied parrot	Critically Endangered	Critically endangered	Species or species habitat may to occur within area
<i>Numenius madagascariensis</i>	Eastern curlew	Critically Endangered, Migratory	Vulnerable	Species or species habitat likely to occur within area
<i>Numenius minutus</i>	Little curlew	Migratory	-	Species or species habitat likely to occur within area
<i>Pachyptila turtur subantarctica</i>	Fairy prion	Vulnerable	Vulnerable	Species or species habitat known to occur within area
<i>Pandion haliaetus</i>	Osprey	Migratory	--	Species or species habitat likely to occur within area
<i>Phoebastria fusca</i>	Sooty albatross	Vulnerable, Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Pterodroma leucoptera leucoptera</i>	Gould's petrel	Endangered	-	Foraging, feeding or related behaviour likely to occur within area
<i>Pycnoptilus floccosus</i>	Pilotbird	Vulnerable	-	Foraging, feeding or related behaviour likely to occur within area
<i>Rostratula australis</i>	Australian painted snipe	Endangered	Critically endangered	Species or species habitat likely to occur within area
<i>Sternula albifrons</i>	Little tern	Migratory	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<i>Sternula nereis nereis</i>	Australian fairy tern	Vulnerable	Endangered	Foraging, feeding or related behaviour likely to occur within area

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Scientific Name	Common Name	EPBC Act Status (threatened or migratory species)	FFG Act Status / Victorian Advisory List	Type of presence (EPBC)
<i>Thalassarche bulleri</i>	Buller's albatross	Vulnerable, Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Thalassarche bulleri platei</i>	Northern Buller's albatross	Vulnerable	-	Foraging, feeding or related behaviour likely to occur within area
<i>Thalassarche cauta</i>	Shy albatross	Endangered, Migratory	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<i>Thalassarche carteri</i>	Indian yellow-nosed albatross	Vulnerable, Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Thalassarche chrysostoma</i>	Grey-headed albatross	Endangered, Migratory	-	Species or species habitat may occur within area
<i>Thalassarche eremita</i>	Chatham albatross	Endangered, Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Thalassarche impavida</i>	Campbell albatross	Vulnerable, Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Thalassarche melanophris</i>	Black-browed albatross	Vulnerable, Migratory	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<i>Thalassarche salvini</i>	Salvin's albatross	Vulnerable, Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Thalassarche steadi</i>	White-capped albatross	Vulnerable, Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Thinornis cucullatus cucullatus</i>	Eastern hooded plover	Vulnerable	-	Species or species habitat likely to occur within area
<i>Thinornis rubricollis</i>	Hooded plover	-	Vulnerable	Breeding or nesting behaviour known to occur within area
<i>Tringa nebularia</i>	Common greenshank	Migratory	-	Species or species habitat likely to occur within area

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Scientific Name	Common Name	EPBC Act Status (threatened or migratory species)	FFG Act Status / Victorian Advisory List	Type of presence (EPBC)
Whales, Dolphins and Seals				
<i>Arctocephalus forsteri</i>	Long-nosed fur-seal	-	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<i>Balaenoptera borealis</i>	Sei whale	Vulnerable, Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Balaenoptera musculus</i>	Blue whale	Endangered, Migratory	Critically endangered	Foraging, feeding or related behaviour known to occur within area
<i>Balaenoptera physalus</i>	Fin whale	Vulnerable, Migratory	Data deficient	Foraging, feeding or related behaviour likely to occur within area
<i>Caperea marginate</i>	Pygmy right whale	Migratory	-	Foraging, feeding or related behaviour likely to occur within area
<i>Eubalaena australis</i>	Southern right whale	Endangered, Migratory	Critically endangered	Foraging, feeding or related behaviour likely to occur within area
<i>Megaptera novaeangliae</i>	Humpback whale	Migratory	Vulnerable	Species or species habitat known occur within area
<i>Orcinus orca</i>	Killer whale	Migratory	-	Species or species habitat likely to occur within area
<i>Lagenorhynchus obscurus</i>	Dusky dolphin	Migratory	-	Species or species habitat possibly occurs within area
Turtles				
<i>Caretta caretta</i>	Loggerhead turtle	Endangered, Migratory	-	Foraging habitat possibly occurs within area
<i>Chelonia mydas</i>	Green turtle	Vulnerable, Migratory	-	area

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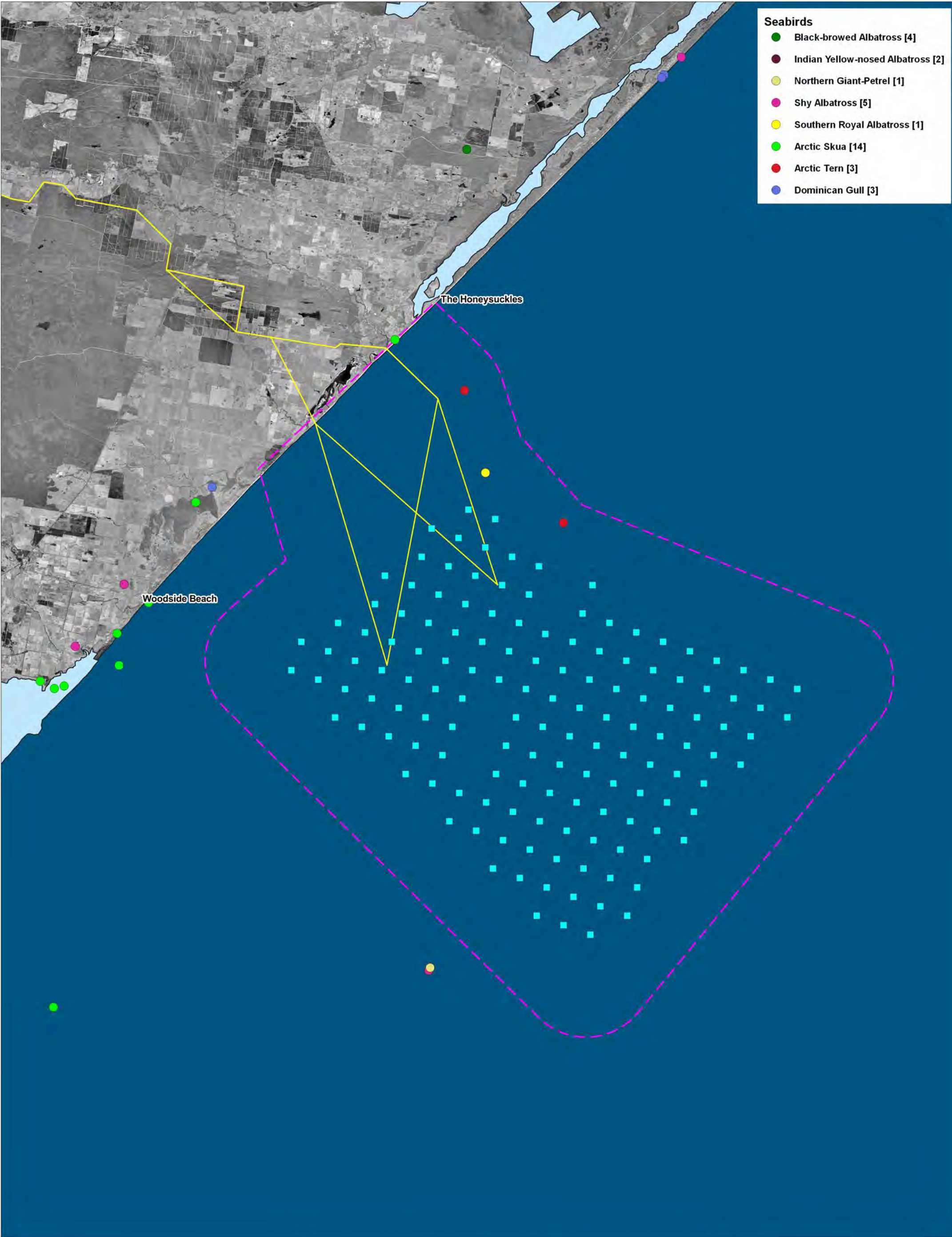
Scientific Name	Common Name	EPBC Act Status (threatened or migratory species)	FFG Act Status / Victorian Advisory List	Type of presence (EPBC)
<i>Dermochelys coriacea</i>	Leatherback turtle	Endangered, Migratory	Critically endangered	Foraging habitat possibly occurs within area
Sharks and Fish				
<i>Isurus oxyrinchus</i>	Shortfin mako	Migratory	-	Species or species habitat known to occur within area
<i>Prototroctes maraena</i>	Australian grayling	Vulnerable	Vulnerable	Species or species habitat unlikely to occur
<i>Carcharodon carcharias</i>	White shark	Vulnerable, Migratory	Threatened	Foraging, feeding or nursery-related behaviour known to occur within area
<i>Lamna nasus</i>	Porbeagle	Migratory	-	Species or species habitat known to occur within area
<i>Galaxiella pusilla</i>	Eastern dwarf galaxias	Vulnerable	-	Species or species habitat unlikely to occur within area
<i>Galeorhinus galeus</i>	School shark	Conservation Dependent		Species or species habitat likely to occur within area
<i>Rhincodon typus</i>	Whale shark	Vulnerable	-	Species or species habitat likely to occur within area
<i>Seriotelella brama</i>	Blue warehou	Conservation Dependent	-	Species or species habitat likely to occur within area
<i>Thunnus maccoyii</i>	Southern bluefin tuna	Conservation dependent	Threatened	Foraging, feeding or related behaviour known to occur within area
Marine Benthic Species				
<i>Eucalliax tooradin</i>	Ghost shrimp species	-	Vulnerable	Species or species habitat possibly occurs within area
<i>Michelea microphylla</i>	Ghost shrimp species	-	Vulnerable	Species or species habitat possibly occurs within area

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Scientific Name	Common Name	EPBC Act Status (threatened or migratory species)	FFG Act Status / Victorian Advisory List	Type of presence (EPBC)
<i>Amphiura trisacantha</i>	Brittle star species	-	Vulnerable	Species or species habitat possibly occurs within area
<i>Apsolidium densum</i>	Sea-cucumber species	-	Vulnerable	Species or species habitat possibly occurs within area
<i>Apsolidium handrecki</i>	Sea-cucumber species	-	Vulnerable	Species or species habitat possibly occurs within area
<i>Ophiocomina australis</i>	Brittle star species	-	Vulnerable	Species or species habitat possibly occurs within area
<i>Pentocnus bursatus</i>	Sea-cucumber species	-	Vulnerable	Species or species habitat possibly occurs within area
<i>Thyone nigra</i>	Sea-cucumber species	-	Vulnerable	Species or species habitat possibly occurs within area
<i>Trochodota shepherdii</i>	Sea-cucumber species	-	Threatened	Species or species habitat possibly occurs within area
<i>Ralpharia coccinea</i>	Stalked hydroid species	-	Threatened	Species or species habitat possibly occurs within area
<i>Bassethullia glypta</i>	Chiton species	-	Vulnerable	Species or species habitat possibly occurs within area
<i>Platydoris galbana</i>	Marine opisthobranch species	-	Vulnerable	Species or species habitat possibly occurs within area
<i>Rhodope genus</i>	Marine opisthobranch species	-	Threatened	Species or species habitat possibly occurs within area
<i>Thyone nigra</i>	Sea-cucumber species	-	Vulnerable	Species or species habitat possibly occurs within area

Seabirds

There are several records of a number of threatened seabirds being present within the Study Area. The Study Area is mapped as a BIA for the black-browed albatross (*Thalassarche melanophris*), bullers albatross, campbell albatross (*Thalassarche impavida*), indian yellow-nose albatross (*Thalassarche carteri*), shy albatross (*Thalassarche cauta*), wandering albatross (*Diomedea chionoptera*) and the antipodean albatross (*Diomedea antipodensis*), as shown in Figure 5.11.



- Seabirds**
- Black-browed Albatross [4]
 - Indian Yellow-nosed Albatross [2]
 - Northern Giant-Petrel [1]
 - Shy Albatross [5]
 - Southern Royal Albatross [1]
 - Arctic Skua [14]
 - Arctic Tern [3]
 - Dominican Gull [3]

- LEGEND**
- Marine Study Area
 - Wind Farm Turbines (approx. location)
 - Transmission Lines
 - BIA Seabirds
 - Foraging zone
 - Important Bird Areas

Title:

EPBC Status Seabird Sightings (Victorian Biodiversity Atlas and Australian Living Atlas)

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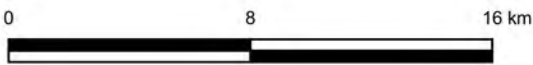


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Albatross and petrel species largely breed in Antarctica and islands south of Australia (Australian Government, 2016). Albatross and giant petrel species exhibit a broad range of diets and foraging behaviours, and hence their at-sea distributions are diverse. Combined with their ability to cover vast oceanic distances, all waters within Australian jurisdiction can be considered foraging habitat, however the most critical foraging habitat is considered to be those waters south of 25 degrees where most species spend the majority of their foraging time.

Fromant *et al.* (2020) reports that the commonest seabirds in the Bass Strait are short-tailed shearwaters (*Ardenna tenuirostris*), fairy prions (*Pachyptila turtur*) and common diving-petrels (*Pelecanoides urinatrix*). Seabirds are known to feed on fish, cephalopod and/or crustaceans within the marine environment, diving to the surface water level or just below. This potentially makes them vulnerable to turbine strike. The following seabird species are known to breed in Bass Strait, although many of the records are incomplete

- Shy albatross
- Short-tailed shearwater
- Common diving petrel
- Fairy prion
- White-faced storm petrel
- Little penguin
- Australasian gannet
- Black-faced cormorant
- Pacific gull
- Silver gull
- Crested tern

Parrots

Orange-bellied parrot

The orange-bellied parrot (*Neophema chrysogaster*) inhabits coastal and surrounding areas including saltmarshes, littoral heathlands and scrublands. The orange-bellied parrot breeds in Tasmania and then migrates to southern mainland Australia for winter; it is considered Critically Endangered, with around 140 birds leaving the nesting site in Tasmania (known as Melaleuca) after the 2020/21 breeding season (Orange-bellied Parrot Recovery Program, 2022). The orange-bellied parrot (Critically Endangered) has been recorded occasionally through the 1980s and 1990s within coastal vegetation adjacent to the Study Area, however the last record was in 1994 (ALA, 2021).

Typically, the birds migrate to Victoria closer to Port Phillip Bay, then disperse east and west, along the Victorian coastline, as shown in Figure 5.13. As part of the Alberton Wind Farm Environmental Assessment, Brett Lane and Associates (2017) analysed records from the Victorian Biodiversity Atlas and Birdlife Australia database; this showed that from 1978 onwards, less than 1% of the total birds recorded was east of Port Phillip Bay.

An analysis of counts of over 13,000 individuals of the species in the Victorian Biodiversity Atlas and from the Birdlife Australia data base showed that from 1978 onwards, the proportion of the counted individuals east of 145°30' longitude (i.e. Port Philip Bay) was one percent of the total (i.e. about 130 individuals over 40 years). The orange-bellied parrot's preference for coastal areas was confirmed in the analysis of the records, which showed that only 2% of individuals in Victoria were recorded greater than two kilometres from the coast and most less than one kilometre from it (see Figure 5.12).

It would appear that although habitat for the species exists within the Study Area, it is not currently utilised by the species.



Figure 5.12 Historical distribution of the orange-bellied parrot (Victorian Biodiversity Atlas, 2021)

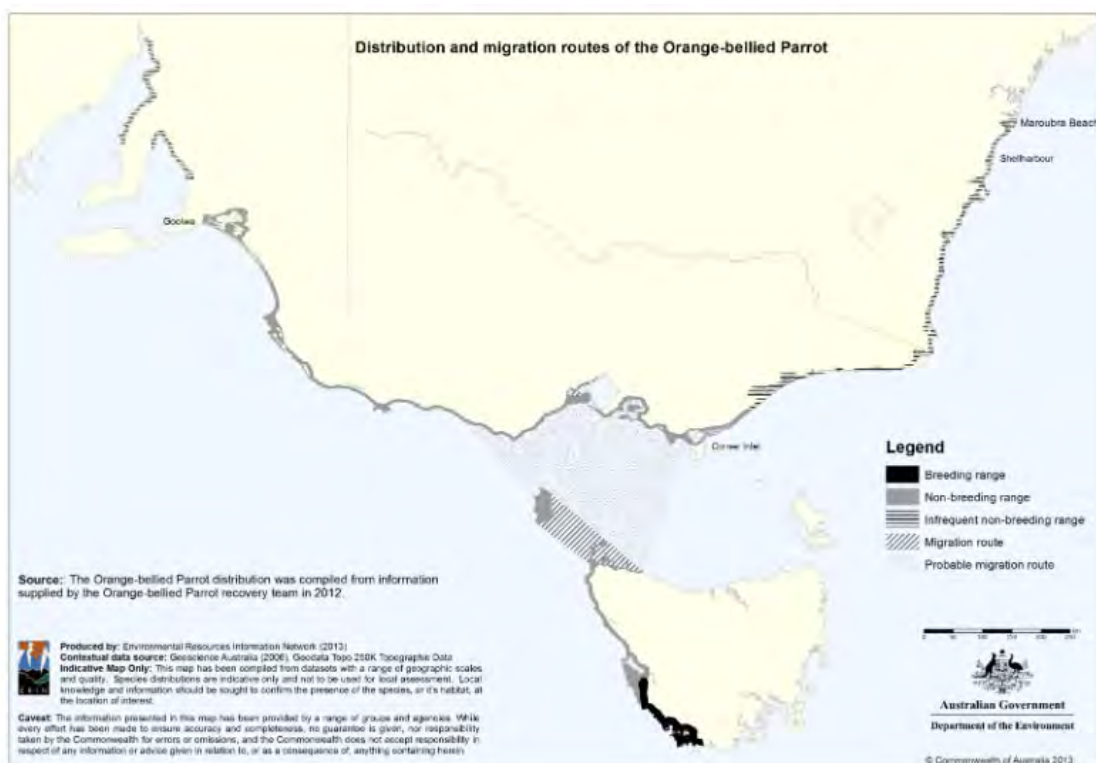


Figure 5.13 Known distribution of the orange-bellied parrot (Australian Government, 2016)

Swift parrot

Similarly, swift parrots (Critically Endangered under the EPBC Act) breed in Tasmania and migrate to mainland Australia in autumn. During winter, the parrots disperse across a broad landscape, foraging on nectar in eucalypt woodlands mainly in inland Victoria and New South Wales. The migratory pathways of the species is not well understood; however it is considered most likely they cross the Victorian coastline around Port Phillip Bay including the Mornington and Bellarine Peninsulas. There are no contemporary records of the species occurring along the coastline of south-eastern Victoria, near the Study Area, however recent mapping (Figure 5.14) does indicate the species may occur. Whilst the Study Area does not contain habitat for the species i.e. eucalypt woodlands, it is possible that individuals pass through the Study Area whilst migrating to their preferred habitat.

The draft Swift Parrot Recovery Plan (Commonwealth of Australia, 2019) lists the construction of wind turbines in south-eastern Australia as a potential threat to survival of the species, if they are poorly sited.

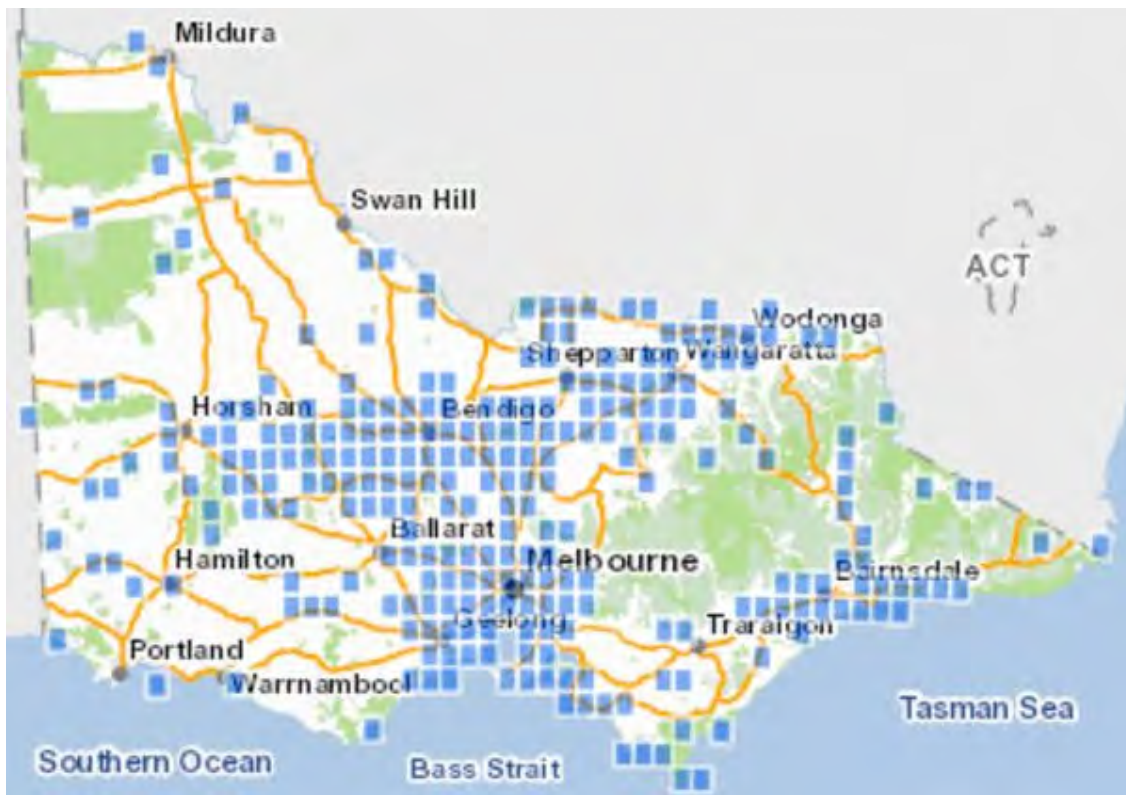


Figure 5.14 All known records of swift parrot in Victoria. (Source: Victorian Biodiversity Atlas, 2019)

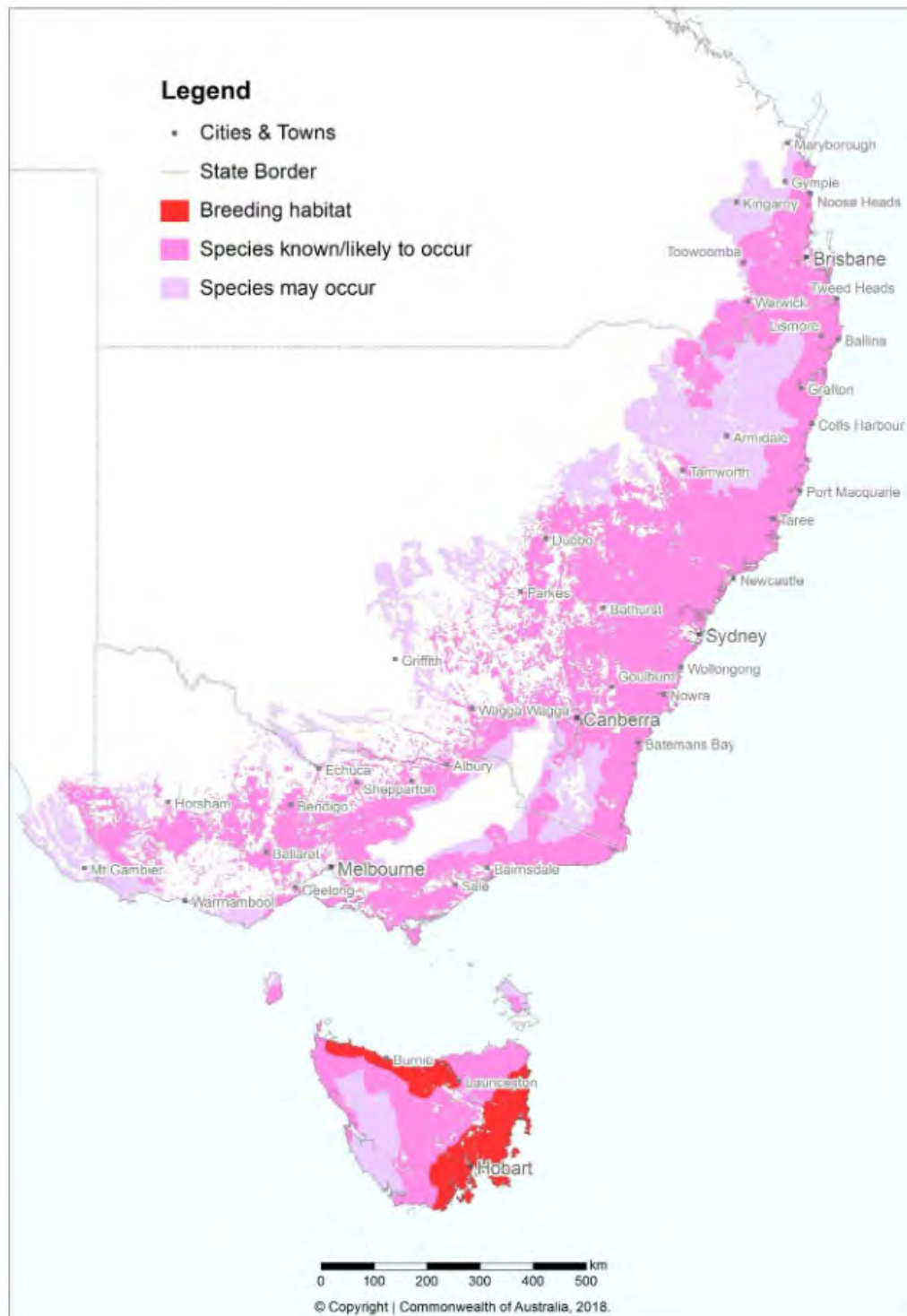


Figure 5.15 Distribution of the Swift Parrot in Australia (Source: *Draft National Recovery plan for the Swift Parrot*, Commonwealth of Australia, 2019)

Migratory Shorebirds

The Gippsland area supports a high number of threatened and migratory shorebird species, with both the Corner Inlet and Gippsland Lake Ramsar sites nearby to the Study Area; Figure 5.16 . A study undertaken for the Alberton Wind Farm (Brett Lane & Associates, 2017) reviewed data records on species and flight paths for the Corner Inlet area. They observed that species utilising the wetland ascended rapidly and steeply, with rates of between 0.7 and 0.92m/s. Altitudes of level migratory flights ranged from 2.5km to 6km, with this height being somewhere about 2-3km from their take off/landing height. Given the distance of the Study Area from coastal wetlands likely to support migratory species habitat, it is likely that shorebirds would be well above the height of turbines should their migratory path cross the Study Area.

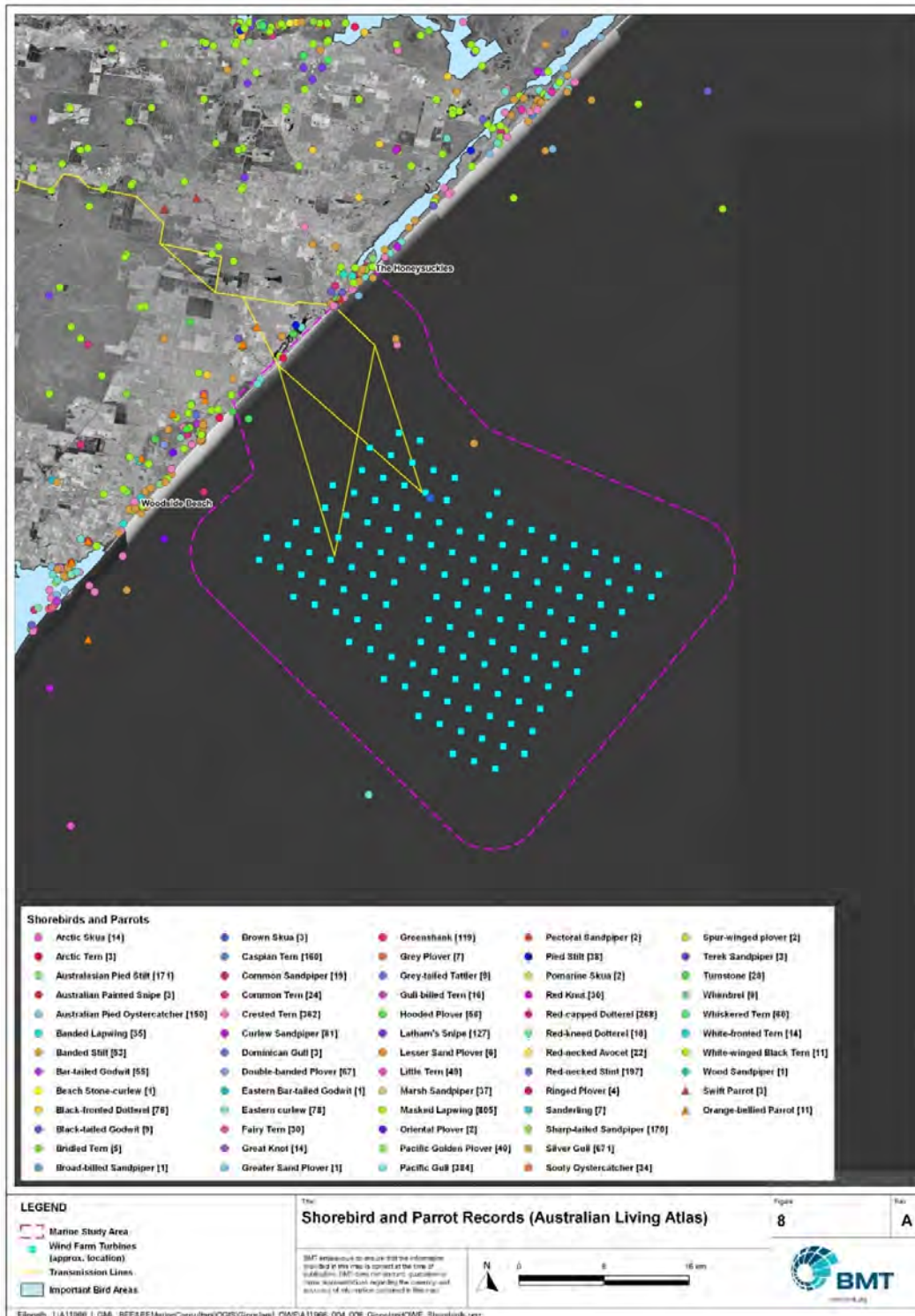


Figure 5.16 Shorebird species records (Victorian Biodiversity Atlas)

Cetaceans

The southern right whale (*Eubalaena australis*), which is listed as Endangered under the EPBC Act, migrates between summer feeding areas in the Southern Ocean to inshore coastal waters off Australia. The eastern coastal area of Victoria is classified as core habitat, but is not a known aggregation area for the species (see Figure 5.17, DSEWPC 2012). The Study Area is mapped as a BIA for these whales. Figure 5.18 shows that SRW's are regularly sighted within the Study Area.

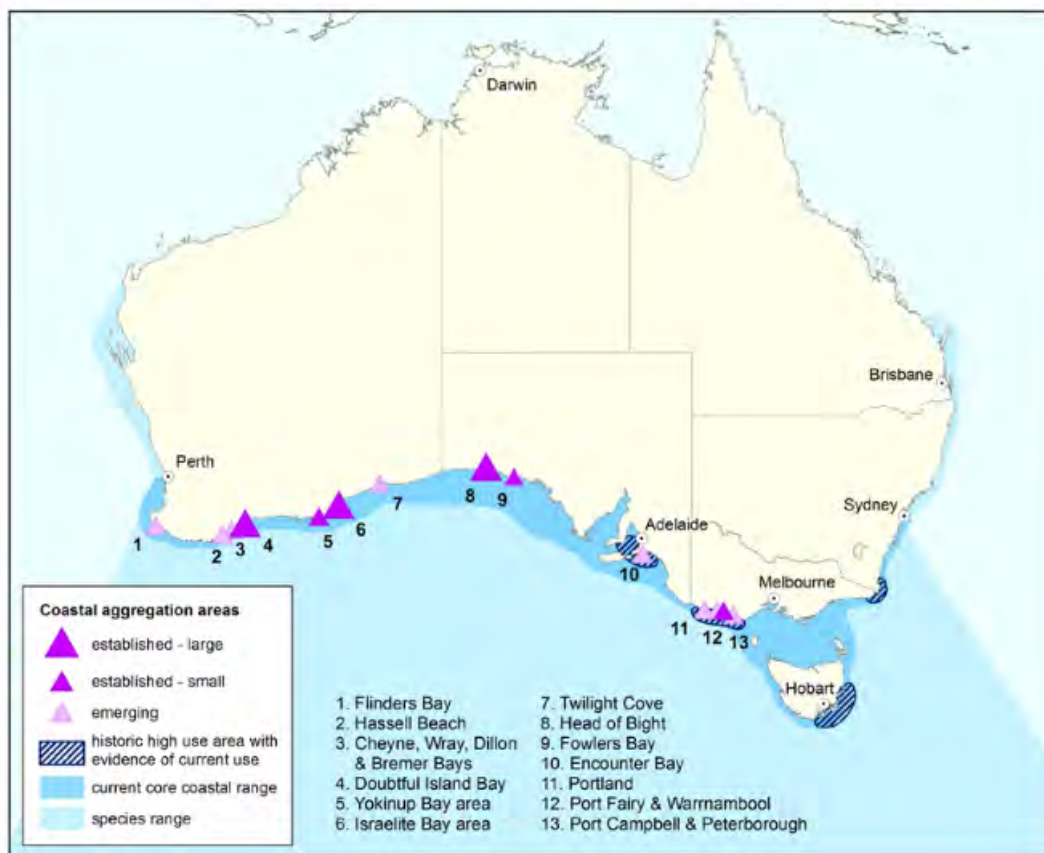
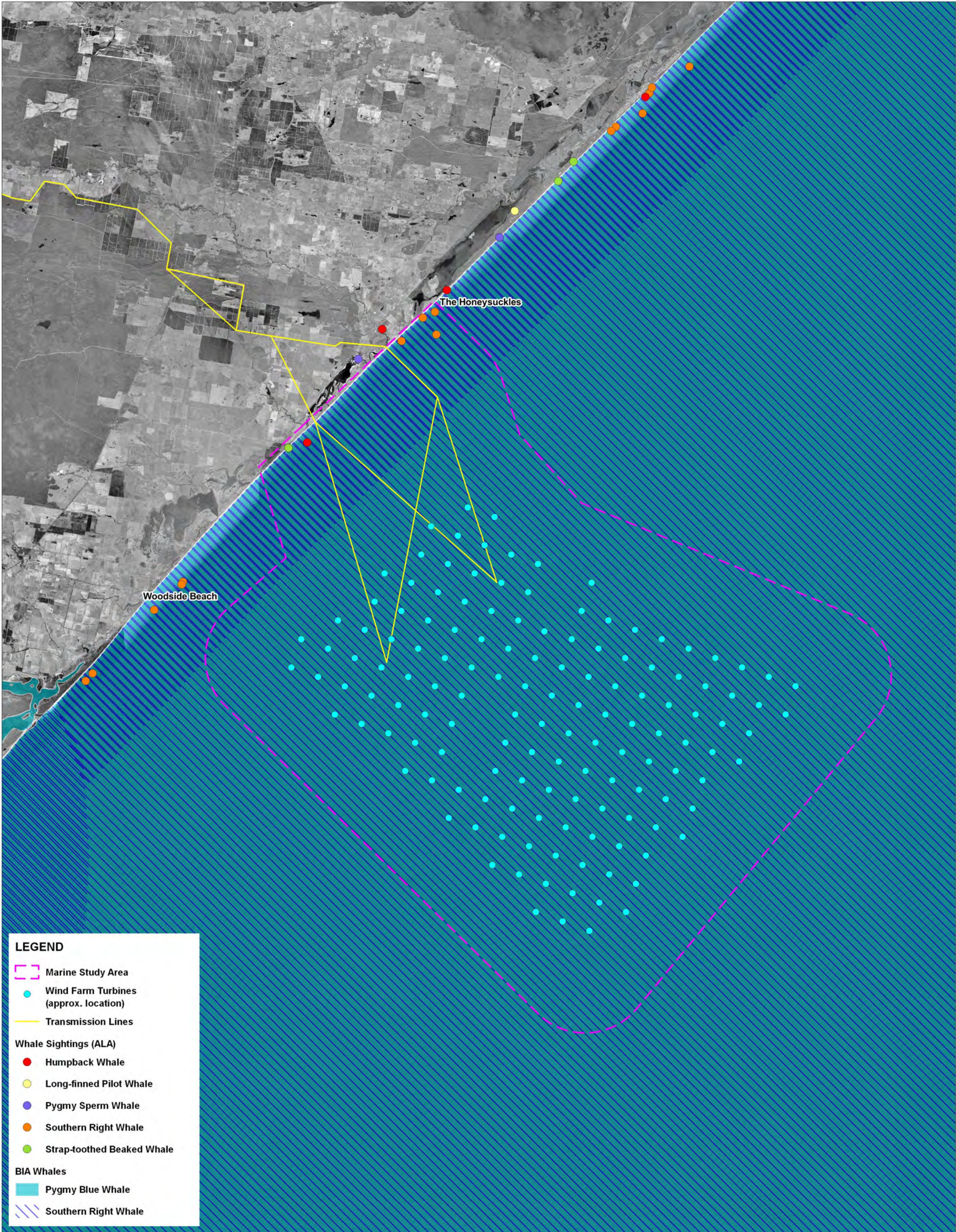


Figure 5.17 Southern Right Whales Coastal Aggregation (DSEWPC 2012)



Title:

Whale Sightings (Atlas of Living Australia) Victoria

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



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The Study Area is mapped as a possible foraging area and BIA for the pygmy blue whale (a sub-species of the EPBC-listed endangered blue whale). The pygmy blue whale is known to aggregate each year during the summer off southern Australia due to seasonal upwellings that concentrate high densities of prey (Attard *et al.* 2010, Gill *et al.* 2011).

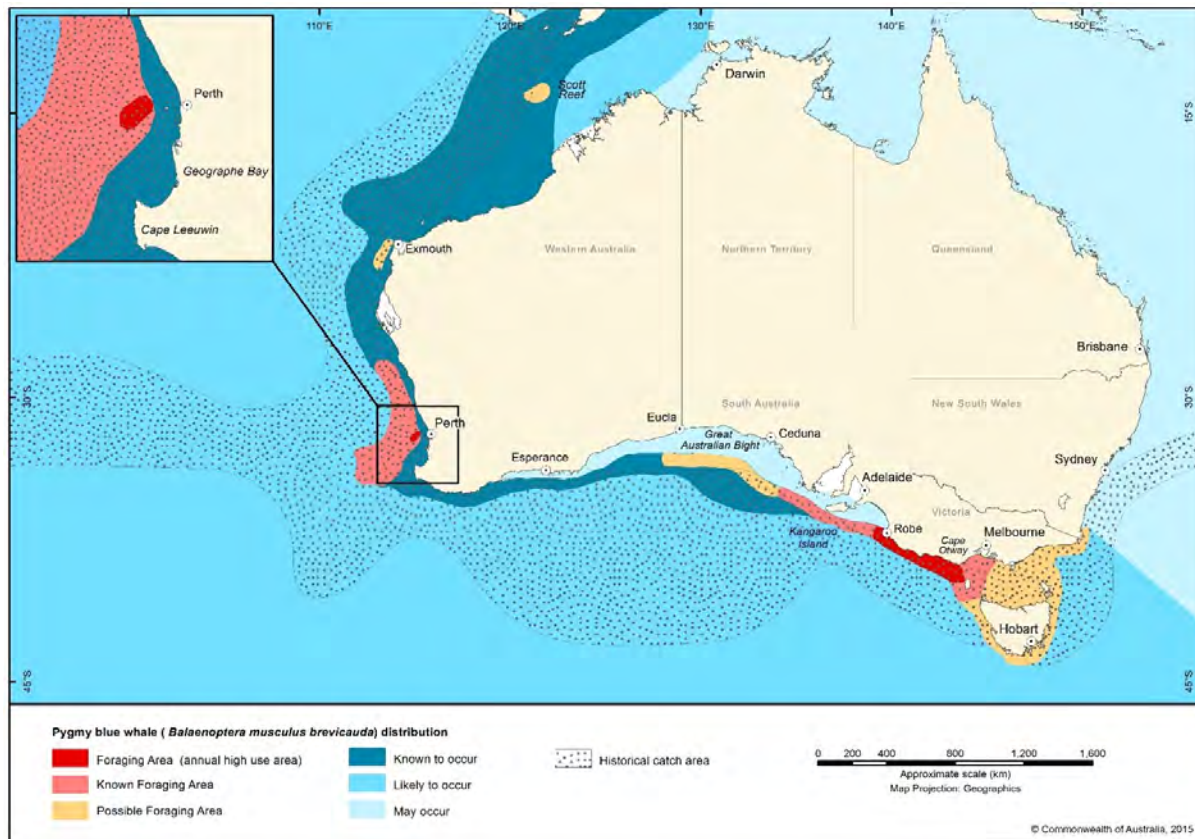


Figure 5.19 Area of distribution for the pygmy blue whale

They migrate between these feeding and aggregation areas in southern Australia and Western Australia, to breeding grounds that are likely to include Indonesia; the West Coast of Australia is their predominant migratory route to and from breeding areas. The migratory route for the species along the east coast is not known, although acoustic records (Stafford *et al.* 2004, 2011) indicate that individuals do migrate along the east coast also. Foraging tends to occur in high primary productivity areas, such as coastal upwellings, which do not typically occur near the Study Area (Australian Government, 2015).

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, chronic vessel noise. The Conservation Plan also states that *'new forms of industry with the potential to create underwater noise include near-shore renewable energy technologies such as wind farms and tidal turbines, and further work on the underwater noise levels produced from these developments is needed'*.

Other threatened whale species may occur occasionally in the Study Area (including fin and sei whales) however these have been infrequently recorded and tend to occur further offshore i.e. 20-60km) (SPRAT, 2021) with no known mating or calving activity in Australian waters.

Turtles

There are a number of sightings of threatened turtle species along the shoreline, including the leatherback and loggerhead Turtles (*Dermochelys coriacea* and *Caretta caretta* respectively); they would be using the nutrient rich waters surrounding the Study Area for feeding purposes, however nesting occurs further northwards. The Study Area is not likely to be considered key habitat for turtles.

Sharks and Fish

The white shark (*Carcharodon carcharias*) is widely, but not evenly, distributed in Australian waters, with observations more frequent in some areas (Australian Government, 2014). These areas include waters in and around some fur seal and Australian sea lion colonies such as: the Neptune Islands (South Australia); areas of the Great Australian Bight as well as the Recherche Archipelago and the islands off the lower west coast of Western Australia (Malcolm *et al.*, 2001; EA, 2002).

The coastline to the east of Melbourne (including east of Corner's inlet) is identified as one of two key nursery area for the species on the east coast of Australia and is mapped as a BIA, as illustrated in Figure 5.21. Sharks are likely to occupy habitat from the shore to approximately 120 m depth (CSIRO, 2022). A study by Hillary *et al.* (2018) tracked white sharks along the east coast of Australia and identified the approximate location of the Corners Inlet nursery area, as shown in Figure 5.21.

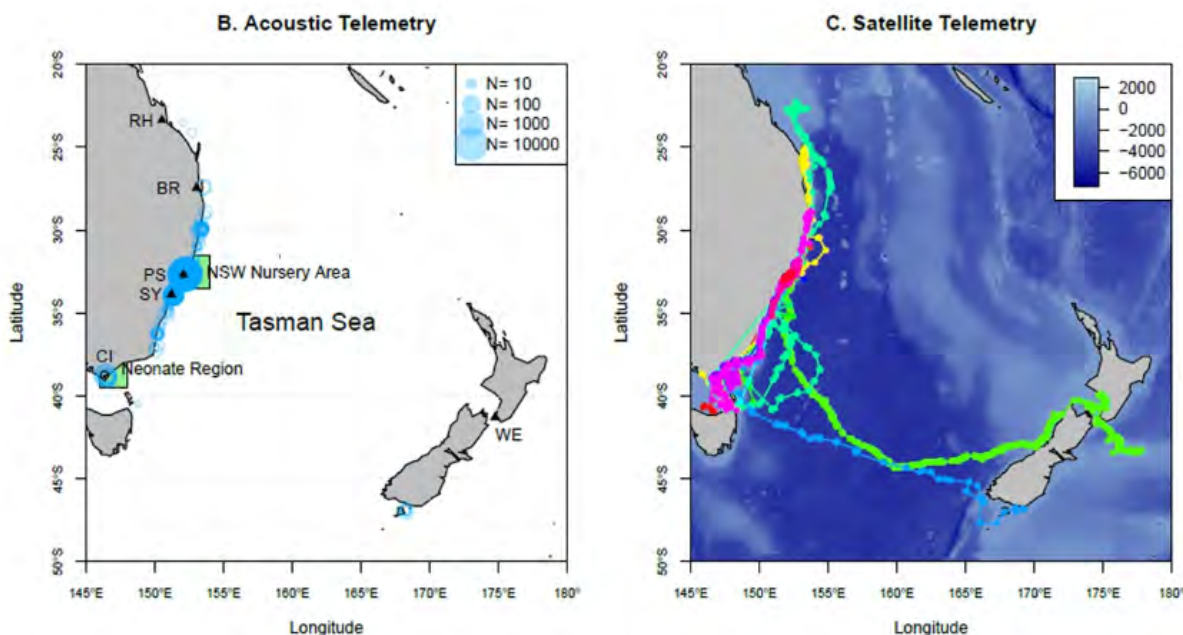


Figure 5.20 Acoustic and satellite tracking of white sharks (Hillary *et al.*, 2018).

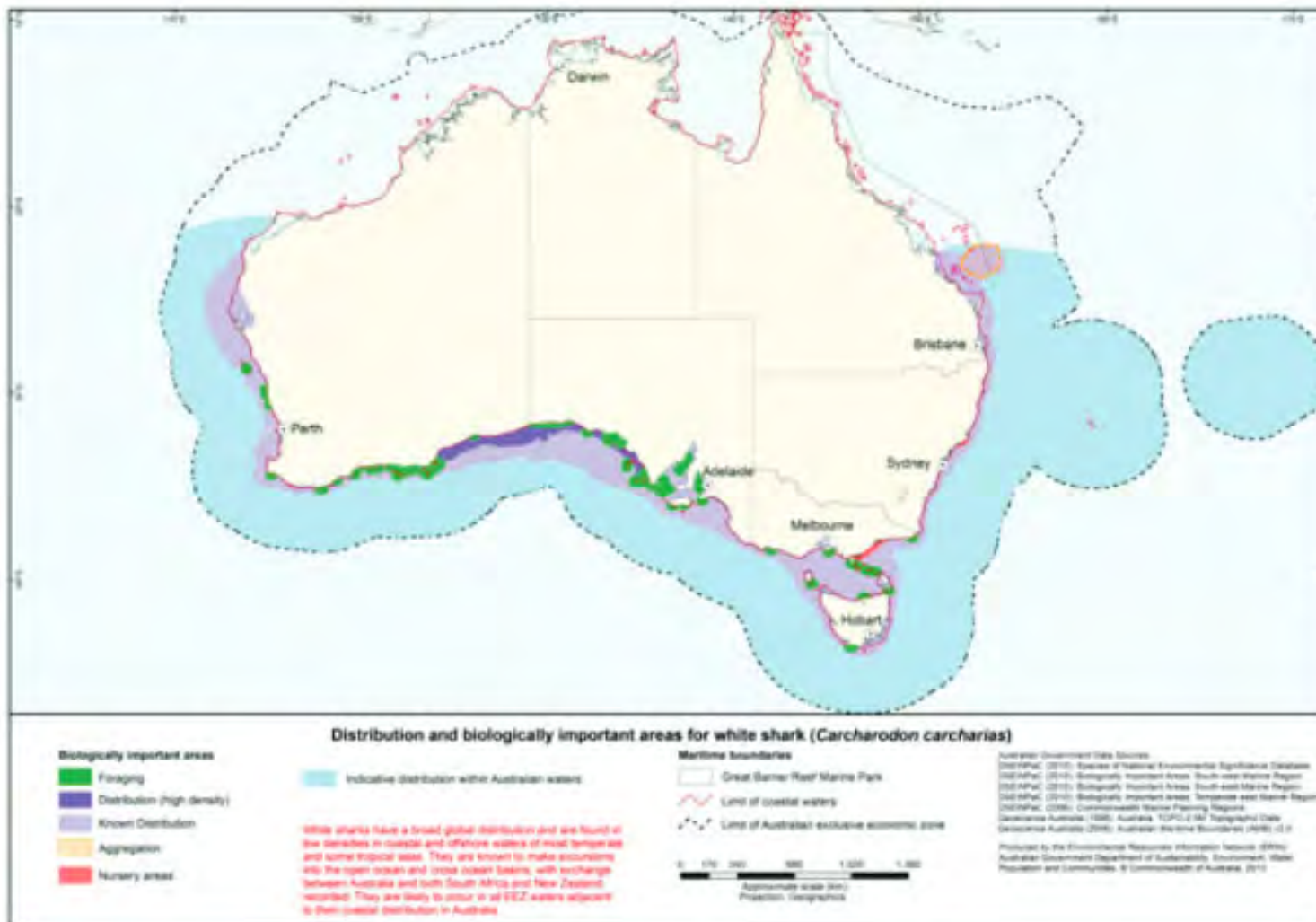


Figure 5.21 Distribution and biologically important areas for the white shark (Australian Government, 2013).

The Australian grayling (*Prototroctes maraena*) is a threatened freshwater fish that is known to inhabit rivers in the Gippsland region, but it does have a marine phase for a period of time (SWIFFT, 2022), where larvae move to the sea. Little is known about the specific habitats the species occupies during its marine phase however, as very few specimens have been collected (NSW DPI, 2015).

The whale shark (*Rhincodon typus*) occurs mostly in tropical and warm temperate waters in northern Australia although they are occasionally sited in Victoria. There are no known aggregation waters in Victoria. Whilst their migratory pathways are not well documented, they are commonly identified along the 200m depth contour in Western Australia (Threatened Species Scientific Committee, 2015).

A number of other fish and Syngnathidae species were recorded in the EPBC Protected Matters Search (27) in total, although none of them are listed as threatened or migratory species. These include pipefishes, seahorses and starfish, however these are normally associated with vegetation in sheltered or exposed reef area at a range of 0 to 50m, but most commonly at depths of between 5 and 25m. Given the lack of potential habitat near turbines, these species are not likely to occur in proximity to the wind farm) but may occur closer to shore.

Migratory Species

Table 5.1 lists species that are considered Migratory under the EPBC Act. There are an additional 13 migratory bird species, two whale species (humpback and killer whales), the dusky dolphin and several fish and shark species that are listed as Migratory but are not considered threatened. These are described briefly below, based on species information in the SPRAT database (Commonwealth of Australia, 2022).

- Humpback whale – the Study Area is considered core habitat for this species, and migration activity is considered likely to occur; it is not an identified breeding, feeding or resting area.
- Killer whale – killer whales are observed in all State Waters in Australia, but more frequently south of 60°; (around the northern limit of the southern ocean and Antarctic Treaty Area) there are no known key localities for the species in continental Australian waters. If found, they are most likely along the continental slope, in deeper waters.
- Dusky dolphin – this species occurs across southern Australia, however sightings are rare. If observed, they tend to be in large pods, in waters less than 20 m in depth.
- Mako shark – Mako sharks are present, however their movements along the Victorian coastline are not well known (SPRAT database, 2022).
- Porbeagle – inhabits oceanic waters around the edge of the continental shelf, moving occasionally into coastal waters.

5.5 State Matters

Within the marine environment, state matters would relate to laying of the main transmission cable that links the turbines to the grid only. Therefore, the description of state matters is confined to the cabling route and potential matters related to its construction, operation and decommissioning. Coastal Processes

The MaCA provides for the protection of the coastline and the ongoing management of long-term challenges to the marine environment, particularly climate change, population growth and coastal structures. The objectives of this Act are to protect marine and coastal ecosystems, acknowledge the role traditional owners play in managing sea country, to protect the coastal environment and promote sustainable use and development of the marine and coastal environment in appropriate areas. Any structures will require approval under this act.

Draft marine planning areas have been released, with the state waters component of the Study Area being with Marine Planning Area 8. It lists the allowable activities within the area as being traditional owner cultural values, recreational leisure and tourism, extraction of living resources, marine transport, coastal infrastructure and energy generation. This would therefore support the use of offshore wind at this location.

The Gippsland Regional Coastal Plan 2015-2020 (Gippsland Coastal Board (2015) described the Gippsland Coast as particularly at risk of erosion, made of soft shorelines such as dunes and sandy beaches. Any structures (including transmission cabling) must take into account the dynamic nature of the environment and account for erosion risks.

The Ninety Mile Beach MNP Management Plan mentions that land subsidence due to oil, gas and groundwater extraction has been a factor in erosion.

Threatened species

In addition to species listed as threatened under the EPBC Act, there are a further 3 shorebirds, 1 fish species, as well as a seal and whale species (as detailed in Table 5.1), that are listed as threatened under the FFG Regulations and/or the FFG Threatened List, and potentially occur within the Study Area. Of particular note is the resident shorebird species, Hooded Plover (*Charadrius rubricollis*), which is known to nest between August and March along Victorian open beaches; the density of birds along the Ninety Mile Beach is less than 1 bird per kilometre (Department of Sustainability and Environment, 2002).

5.6 Other

Visual amenity

At present, there are no visible structures on the horizon when looking out to sea from the coastline. Due to the relative low urban development within the region, the night sky also remains uninterrupted. Umwelt (2022) provides further detail on the existing and potential visual amenity impacts.

Recreational Use

Recreational activities offshore of the East Gippsland region include recreational fishing, diving and boating. There are boat ramps at Seaspray and Woodside, Golden and McLaughlin Beaches however most recreational fishers would likely concentrate in the lakes and estuaries which can be fished from smaller vessels. There would not appear to be any large rock, reef, kelp or seagrass habitats within the Study Area that would attract large numbers of recreational fishers. There are some larger commercial fishing tours catering for game fishers that launch from Lakes Entrance to the north that may occasionally utilise the Study Area. The distance of the site from shore would be assumed to be a deterrent for most recreational users due to the size of vessel required for offshore fishing.

Water and Sediment Quality

DEWLP report annually on water quality within a number of Victorian Bays and lakes, including the Gippsland catchment (EPA Victoria, 2021). For 2020/21, water quality was recorded as Very Good, Good or Fair in the catchment, which would indicate that water quality within the marine environment would also likely be of a similar quality.

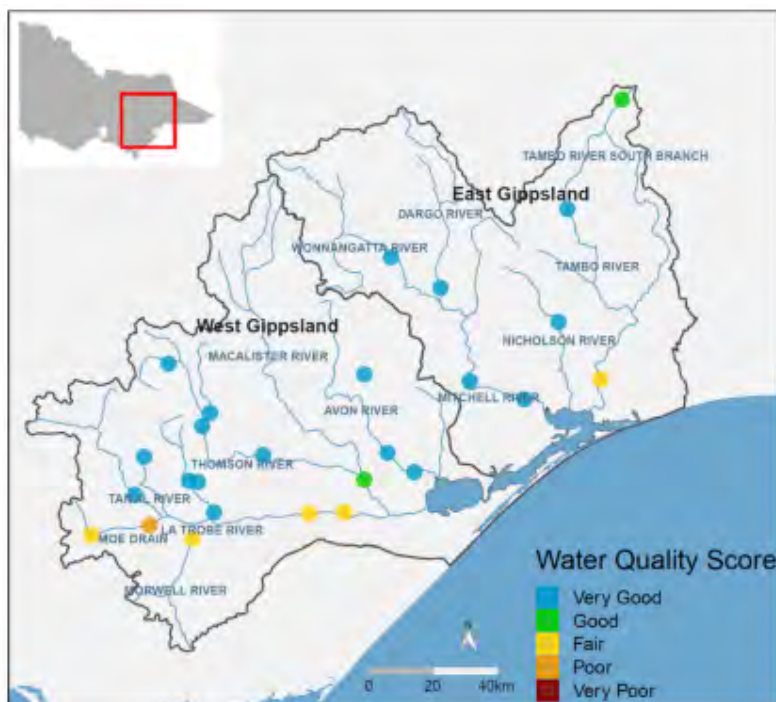


Figure 5.22 Water quality scores for the Gippsland Lakes catchment

The forested areas of the catchment, where vegetation cover has been maintained have Very Good water quality, whereas the mid to lower reaches of major rivers (including the Tambo River), where urbanisation, mining and agriculture occur have poorer water quality. Some reductions in water quality were observed in 2019-20, associated with drought and severe bushfires, however water quality appears to have recovered.

There is no available data on water quality within the marine environment.

Where there are limited catchment sources of pollutants, any contamination of sediment is expected to be minimal. There is potential there have been some minor spills or leaks of petroleum and other fluids from the active oil/gas wells and pipelines that run through the Study Area.

Indigenous Cultural Heritage

The Gippsland region sits within the sea country of the Gunaikurnai people of south-eastern Victoria. The Kooyang Sea Country Plan (Framlingham Aboriginal Trust and Winda Mara Aboriginal Corporation 2004) covers the Study Area and reports on the strong relationship and reliance on food supplies from the ocean environment. This included collecting abalone and crayfish, whales, seals and many other species of marine plants and animals. In particular, the Gournditch-Mara people built permanent systems to harvest oceanic eels that migrate from freshwater to the ocean.

Indigenous peoples' association with the marine environment goes well beyond the current shoreline to the edge of the continental shelf; this association extends back to when sea levels were lower and country was not under water and was accessible.

Non-indigenous cultural heritage

The Commonwealth maintains a register of underwater cultural heritage, (Australasian Underwater Cultural Heritage Database) which includes shipwrecks or other items of maritime historical interest e.g. WW2 plane wrecks. There are three records of a shipwreck within the Study Area:

- the SS Glenelg became shipwrecked in 1900, shortly after leaving Lakes Entrance. 38 lives were lost. It is understood that part of the iron deck is still intact in-situ and is a popular dive site.
- The Magnolia disappeared near the Gippsland Lakes entrance without a trace. The exact location of the wreck or whether there are remains is unknown.
- The City Of Hobart was an iron vessel grounded approximately 60 miles north east of Wilsons Promontory.

Shipwrecks and other underwater cultural heritage are specific to the marine environment (often providing marine habitat and reef) and need to be assessed during field surveys will be required during benthic habitat surveys to understand what habitat they provide.

Navigational Hazards

The 2022 vessel tracking information for the region (Refer to Figure 5.23) shows the main shipping channel from the Port of Melbourne is outside of the Study Area. There are also significant vessel movements from the Port of Corner Inlet and Port Albert and Lakes Entrance through the Study Area (upwards of 35,000 vessels per year). The Port of Corner Inlet and Port Albert caters for amateur and professional fishermen, leisure boating, charter vessels and larger commercial vessels. The hot spots off the coast are potential representations of key fishing spots.

There is also a public boat ramp at Seaspray, which would allow recreational vessels to traverse the Study Area.

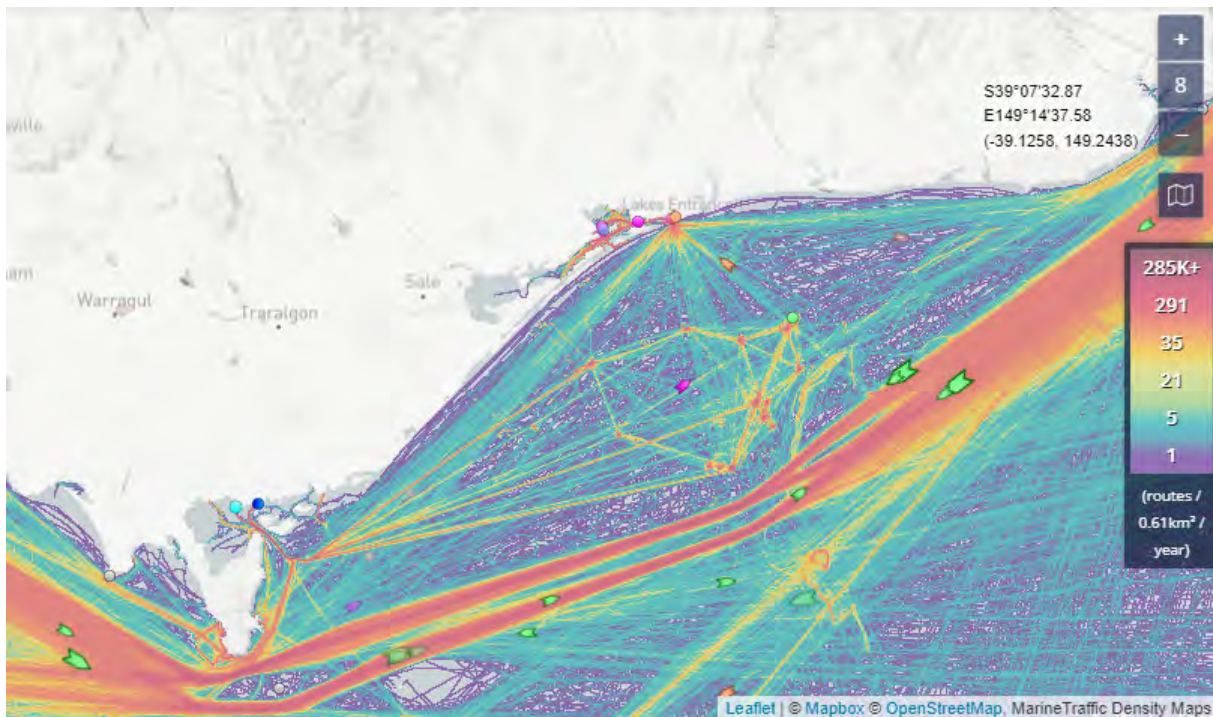


Figure 5.23 Vessel tracking data for 2022 (Marine Traffic, 2022)

5.7 Summary of Baseline Issues

Table 5.2 Summary of values for the Study Area

Attribute	Relevance	Victoria
Marine Park	State	The main transmission cable is adjacent to the Ninety Mile Beach Marine National Park (there are no Commonwealth Marine Parks within the vicinity of the Study Area)
Ramsar Wetland	MNES	The Study Area is within the vicinity of the Gippsland Lakes and Corner Inlet Ramsar Wetlands
Other Protected Areas	State	There are a number of small Coastal Parks along the foreshore within proximity of the Study Area
Commonwealth Water	MNES	The wind turbines, cabling and substations are within Commonwealth Waters. No KEF are identified near the Study Area.
Habitat Types	MNES and State	Whilst there is no detailed mapping of habitat types for the Study Area, previous studies indicate the area is mostly bare sands, with some potential areas of low-profile reef. There may be scattered areas of sparse seagrass in inshore areas.
Threatened Ecological Communities	MNES	Nil
Threatened and Migratory Species	MNES, State	BIA: - Sharks: white shark (<i>Carcharodon carcharias</i>) - Whales: pygmy blue whale (<i>Balaenoptera musculus breviceuda</i>), southern right whale (<i>Eubalaena australis</i>) - Seabirds: short-tailed shearwater (<i>Ardenna tenuirostris</i>), wandering albatross (<i>Diomedea exulans</i>), white-faced storm-petrel (<i>Pelagodroma marina</i>), common diving-petrel (<i>Pelecanoides urinatrix</i>), Buller's albatross (<i>Thalassarche bulleri</i>), shy albatross (<i>Thalassarche cauta cauta</i>), Indian yellow-nosed albatross (<i>Thalassarche chlorohychnos bassi</i>), black-browed albatross (<i>Thalassarche melanophris</i>) and Campbell albatross (<i>Thalassarche melanophris impavida</i>) Study Area is within one of two east coast nursery areas for the white shark. Study Area may be part of migratory pathway of Critically Endangered orange-bellied parrot and swift parrot that migrate from Tasmania, but values undefined. Also supports known and potential habitat for many other threatened and listed migratory species, particularly migratory shorebird species.

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Attribute	Relevance	Victoria
Protected Aquatic Biota	State	A range of protected syngathidae species are likely to occur within the Study Area, as detailed in Table 5.1).
Coastal and Marine Amenity and recreational values	State	The Study Area supports a number of coastal values, including biodiversity, coastal processes, public benefits and coastal landscapes. Its 'naturalness' is a value in itself, with limited development along this section of coastline. It is unlikely that offshore recreational use is high due to the lack of reef, rock, kelp or seagrass habitat that would attract fishers or divers.
Important Fisheries Habitat or Function	State & Commonwealth	There are a number of state and Commonwealth fisheries within the Study Area, and a large number of commercial vessels that are based at Lakes Entrance, to the north of the site. Further catch records verification and consultation is required to understand the fisheries values of the Study Area; the general lack of habitat for fish species is likely to indicate it is not a key fisheries resource area.
Indigenous & non-indigenous Cultural Heritage	State & Commonwealth	The Study Area has a long history of use by first nations people, although there are no known sites or artefacts of indigenous cultural heritage on cultural heritage registers within the marine environment. There are three identified shipwrecks within the Study Area.

6 Potential Impacts

A general description of potential impacts, risks and mitigation measures is provided below. The assessment of risk is preliminary, based on the high-level project concepts (Section 2). Section 7 provides a more detailed risk assessment against Commonwealth and State significance criteria.

6.1 Sensitive Habitat Loss – Construction/Operation

Habitat areas in the construction footprint (turbines, cables etc.) will be likely permanently removed, although if cabling is buried, benthic habitats may recover slowly from disturbance. The Study Area appears to mostly consist of sandy habitats that are common in the region and does not support highly productive habitats such as rocky outcrops, kelp beds, seagrass etc. Some areas of low-profile reef or hard substrate may occur, but these are likely to be isolated.

Activities that may directly impact habitat disturbance are piling activity, installation of inter-turbine cabling and laying of the main transmission cable. Although the exact disturbance footprint within the Study Area is not yet known, it is likely that any areas of sensitive habitat can be avoided.

It is unlikely that habitat loss will physically fragment habitats to the extent that major flow-on impacts to benthic communities and the values they support will occur. It is also unlikely that habitat loss would result in significant displacement of listed threatened/migratory species and high value fisheries species, except at localised scales (i.e. at and directly adjacent to the turbines or cables). Burying cabling will likely assist in habitat recovery.

6.2 Pile Driving – Construction/Decommissioning

Pile driving generates intense pulses of noise and vibration that have the potential to impact marine fauna including threatened and listed migratory species (whales/dolphins, pinnipeds, turtles, sharks), and species of high fisheries significance (finfish, rock lobster etc.).

The Study Area supports potential foraging habitat for a range of threatened/migratory marine species, including cetaceans (whales/dolphin species), pinnipeds, sharks and marine turtles; in particular, the site is a BIA for the pygmy blue whale, southern right whale and white shark. The likely lack of habitat values (i.e. rock outcrops, reefs, kelp forests, seagrass beds or other high productivity features) makes it less likely the Study Area is critical habitat for these species.

Due to the lack of habitat, there do not appear to be any significant fisheries values within the Study Area; this is backed by catch data from the major Commonwealth fisheries (Refer to 5.3), however further consultation is required to confirm this assumption.

Impacts can be permanent (death/injury), long-term (e.g. permanent hearing loss) or short-term (behavioural, including avoidance), depending on exposure and sensitivity of species. The degree of noise exposure depends on the nature of works (i.e. depth of piles, piling methodology, medium into which piling occurs, duration/timing of works, application of mitigation strategies) and local environmental conditions (i.e. bathymetry, physical properties of the water column). Piles will need to be driven deep into the seafloor, which can produce an effects range (hearing loss or displacement) many kilometres from the works site (Madsen *et al.*, 2006; SA DTI 2012; Muller *et al.*, 2019).

Mitigation measures to reduce impacts include 'soft' starts, seasonal construction windows (vary depending on species), safety zones/lookout, pingers etc. (e.g. SA DPTI 2012).

6.3 Turbidity – Construction/Decommissioning

Numerical modelling will be required to assess turbidity generated by construction and decommissioning activities. Pile driving or dredging to install cabling in clean sands is expected to generate short-term, low intensity sediment plumes. It is likely that the plumes would dissipate rapidly and would be unlikely to impact on adjacent light sensitive habitats or impede fauna vision for any length of time.

6.4 Disturbance of Acidic or Contaminated soils - Construction

Given the sandy nature of the material, it is not expected that any acid sulfate soil material would be disturbed through piling or cabling activity, except perhaps in the nearshore environment. Provided this material remains below water, it should not impact water quality. Should piled or dredged material be brought to land, a more detailed investigation of acidity will be required to determine if treatment is necessary. It is possible, but unlikely, given the distance of the site offshore that contaminated material would be disturbed; nor is there a record of any major spills in the area. It is possible that some minor spills or leaks will have occurred from active petroleum wells and pipelines within the Study Area. Soil sampling will be required to confirm whether any hydrocarbons or other contaminants are present in sediment to be disturbed during piling or cabling. If a contaminant does exceed thresholds, it would need to be removed and placed ashore within a contained area/licensed landfill.

6.5 Vessel Strike – Construction/Operation/Decommissioning

Vessel movements pose a risk of fauna strike, especially for large, slow-moving fauna near the surface such as whales. It is likely that a number of whale species utilise the Study Area for either foraging or migration activity, although further studies will be required to confirm this assumption. Whales are vulnerable due to their slow swimming speed and lack of awareness of the threats posed by vessel (DoEE 2017). Pinnipeds and dolphins are also at risk of collision with high speed vessels. Further details will be required to determine vessel traffic intensities, but it would be higher during the construction and decommissioning stages than operations.

Potential mitigation measures include for example, seasonal windows to avoid peak periods for whales, go slow procedures, the use of trained spotters etc.

6.6 Marine Pests – Construction/Operation

Construction and maintenance vessels may introduce marine pests to the Study Area. There are two key vectors for introduced marine pests entering a port: biofouling of the vessel hull, or the release of pests into the marine environment via ballast waters (Hewitt and Campbell, 2010). The turbines also provide a surface for fouling pest species.

Translocation of exotic marine pests into a new environment is a potentially important issue for the project. The environmental and economic impacts due to the introduction of exotic marine pests can be significant. Marine pests, once established, can be difficult to eradicate and can have serious and permanent consequences for the marine environment, fisheries productivity and public health.

In addition to standard statutory measures, additional mitigation measures could be adopted (e.g. hull inspections, local sourcing of vessels etc.).

6.7 Spills – Construction/Operation/Decommissioning

Vessels, turbines and substation facilities will use and store a variety of fuels, oils, lubricants, bio-fouling paints and other chemicals. These substances can have lethal and sub-lethal effects to organisms (Yuewen and Adzighli, 2018) and can persist in the environment for long periods of time. An uncontrolled release could occur from (for example) vessel collision, equipment failure, leaks etc.

A marine pollution risk assessment should be undertaken to inform the development of spill management strategies within contingency plan. The Project is unlikely to involve the storage and handling of large quantities of chemicals, nor generate frequent vessel movements.

Standard chemical storage, handling and maintenance procedures will be required.

6.8 Bird Strike and Avoidance of Rotors – Operation

The Study Area provides potential feeding areas for seabirds. The Study Area is also potentially traversed by migratory bird species utilising either Corner Inlet or Gippsland Lakes Ramsar wetlands. There is a risk of birds colliding with rotors, resulting in injury or mortality. Birds may also avoid areas near the rotors, resulting in habitat displacement and altered movement patterns.

- Migratory species – The turbines are proposed to be located in offshore waters, avoiding nearshore areas commonly frequented by shorebirds for feeding and roosting. Shorebirds may pass through offshore waters when moving to and from other sites. In the case of migrants, flights once underway tend to be at high altitude, well above turbine height (i.e. at 2.5 km to 6 km above ground), Birds ascend relatively quickly (reach maximum flight height within 2-3 km of take off/landing (Brett Lane & Associates, 2017) to maximise flight and energy efficiency. Birds wait for suitable conditions before embarking on migration but may be forced to lower their flight altitude if they encounter bad weather during migration (Newton, 2007). Given the distance of the Study Area from shore it is considered unlikely that migratory shorebirds would be at risk from death or injury from turbine strike.
- Large pelagic seabirds – At most risk are large pelagic seabirds, which feed in offshore waters and, being slow fliers, may be unable to evade the moving rotors. If feeding offshore, they would potentially be within the range for death or damage for turbine strike.
- Orange bellied parrot and the swift parrot migrates from mainland Australia to Tasmania to breed, potentially intersecting the Study Area, although no recent records of the species exist within close proximity to the Study Area. The flight height while on land is just above vegetation height (Shepherd, 1994 in Hokley undated), however their flight height over the ocean is unresolved.

Further assessment will be required, taking into consideration issues raised in EPBC Act Policy Statement 2.3 Wind Farm Industry (DEWHA 2009). This will need to consider design measures to reduce risk (e.g. turbine tower height, bird 'alarms', use of different coloured blades, location relative to any important areas etc.).

6.9 Noise/Vibration Generated by Turbine – Operation

Noise and vibration levels generated by turbines is lower than pile driving and unlikely to cause acute impacts (injury/ mortality) to marine fauna (Madsen *et al.*, 2006; Tougaard *et al.*, 2020). The noise and vibration generated by turbines is persistent (but dependent on wind speeds) which may result in changes to the behaviour of fauna. This may include for example avoidance or attraction responses, increases in intensity of vocal communication, and masking of noises used by fauna (Vella *et al.*, 2001).

The degree of impact is dependent on cumulative noise and vibration levels generated by the windfarm array (varies depending on foundation type), background noise levels, and the sensitivity of fauna (Vella *et al.*, 2001; Madsen *et al.*, 2006). Background noise sources in the study largely relate to vessel traffic (ships, fishing boats etc.), with the major shipping navigational channel being 30km away. Further work will be required to characterise background and project generated noise, and potential impacts to fauna.

6.10 Electromagnetic Fields - Operation

Electrical cables between the turbine, transformer and shore-based facilities will produce electromagnetic fields (EMF). Many marine invertebrate and vertebrate fauna species are sensitive to EMF (reviewed by Francis and Lyon, 2013), which summarised as follows:

- Elasmobranchs (sharks, rays) are sensitive to low frequency electrical fields, which they use for prey detection. Responses to electrical fields can include behavioural changes (attacking on the source of the field), physiological changes, and effects to the ability to orientate.
- Bony fish respond to changes in electrical fields but have less developed detection systems than elasmobranchs.
- Many marine species use magnetic fields for navigation (e.g. seasonal migrations), including many sea turtles, whales, sharks, fishes and crustaceans (Fisher *et al.*, 2010; Hutchinson *et al.*, 2020). Spurious magnetic fields could theoretically interfere with navigation of these species, depending on magnetic field properties and biological traits that determine sensitivity.

While studies indicate that many marine fauna species can respond to EMF, there is little field evidence that EMF emissions from undersea cables cause significant impacts to marine fauna (e.g. avoidance of an area). Impacts will largely depend on cable configuration (e.g. bundled to reduce current, shielding etc.) and whether laid on the seafloor or buried (and burial depth).

6.11 Hydrodynamic Impacts – Operation

The marine structures will alter local hydrodynamic processes. This may result in localised changes to sedimentary processes (i.e. scour and sediment deposition). Numerical modelling will be required to assess hydrodynamic impacts to seafloor habitats and coastal geomorphological processes.

6.12 Light Pollution

Vision is a critical cue for wildlife, including seabird and fish species to orient themselves in terms of finding food, avoiding predation and communicating (Australian Government, 2020). Artificial light is known to adversely affect many species in the marine environment and can result in behavioural changes such as avoidance, disorientation or reduced reproductive effort. It can also attract predators or change the availability of habitat or food resources. Artificial light can disorient flying birds during migration, and potentially will avoid roosting sites in brighter areas. The National Light Pollution Guidelines (Australian Government, 2020) suggest that light mitigation may be necessary within 20 km of a BIA for a listed species.

Navigational or hazard lighting on offshore wind turbines may potentially cause impact to marine species, however mitigation measures such as minimising lighting, the use of lights that appear red to the eye and avoiding lighting the water surface can assist in reducing impacts.

6.13 Artificial Reef Creation and Fishing Exclusion – Operation

The turbine bases will provide hard substrate that will be colonised by a diverse range of benthic flora and fauna species. The structures will also act as fish aggregation devices for fish. A fish 'sanctuary' would also be created if fishing activities are prohibited around the structures (Linley *et al.*, 2007). Cabling between towers could potentially create a navigational hazard, which could exclude trawling activity. It is expected that the windfarm would lead to localised increase in fish biomass in the Study Area. The increase fish biomass could attract predators to the area (pinnipeds, sharks, dolphins). This could lead to localised changes to marine communities in the vicinity of the turbines, including beneficial effects to many reef-associated species, but potential adverse effects to other species due to changes in biological interactions (competition, predation etc.).

6.14 Cultural and Social Access – construction and operations

It is likely there will be some level of temporary exclusion within the Study Area during construction, of approximately 500 m per pylon. During operations, there is likely to be a small exclusion area around the base of each wind tower (approximately 50 m per pylon), otherwise public access will be maintained. This should allow recreational and cultural access to the Study Area to largely remain open.

6.15 Cultural Heritage

The protection of Sea Country will be of importance to the indigenous groups; further consultation will be required to understand how the project will impact on these values and the significance of the Study Area. There are no known shipwrecks or other items of marine cultural heritage significance known within the Study Area. Any such items should be picked up during initial benthic habitat and bathymetry mapping using sonar equipment.

6.16 Navigational Hazards

Provided turbines are appropriately marked and lit, they should not create a navigational hazard, particularly since the Study Area is some distance from the main navigational channel for container vessels. If cabling is not buried, this could create an entanglement risk for recreational or fishing vessels.

7 Preliminary MNES Impact Significance Assessment

Under the EPBC Act, a significant impact is defined as ‘an impact which is important, notable, or of consequence, having regard to its context or intensity’. Whether or not an action is likely to have a significant impact depends on the sensitivity, value and quality of the environment that is impacted, and upon the intensity, duration, magnitude and geographic extent of the impact.

For an impact to be considered ‘likely’, it is not necessary for the impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility.

If there is scientific uncertainty about the impacts of an action, and potential impacts are serious or irreversible, the precautionary principle is applicable. A lack of scientific certainty will not itself justify a decision that an action is not likely to have a significant impact on the environment.

The Commonwealth has provided ‘significant impact criteria’ for each MNES, as described below in the following sections.

7.1 Critically Endangered or Endangered Species

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

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

Critically Endangered or Endangered Species that are likely to occur in the Study Area, and the potential impact of the project on this species is provided in Table 7.1. The assessment herein considers potential impacts related to the marine environment only (i.e. terrestrial infrastructure impacts are not considered). The assessment is preliminary only. Further site-specific studies are required to confirm the use and values of the Study Area by critically endangered or endangered species.

Table 7.1 Critically Endangered and Endangered Species: Potential Significance of Impact

Species	Potential Impacts	Potential Significance of Impact
Albatross and petrel species (Northern royal albatross, Southern giant petrel, Gould's petrel, Shy albatross)	The Study Area is mapped as an area of Biological Importance for albatross and petrel species. These species are known to forage within the Study Area and adjacent marine environments. The foraging behaviour and specific values of the Study Area for these species are not well known. These species spend a large proportion of time at sea for foraging. It is conservatively assumed that bird strike by wind turbines has the potential to cause direct bird mortality, which may lead to a long term decrease in size of a population. Further research into the occupancy area of the species, and the risk of bird strike is required.	Potentially significant
Orange-bellied parrot (<i>Neophema chrysogaster</i>)	This species has utilised coastal terrestrial and wetland communities along the Gippsland coast in the past, and suitable habitats occur. There are historical records of this species in the vicinity of the Study Area, but the absence of contemporary records suggest it may not occur here at present. Records of the species to the east of Port Phillip Bay are rare. Because of the extremely low numbers of orange-bellied parrots individuals in the wild, any impact to an individual is of a significant impact and the risk of turbine strike could have the potential to modify, destroy, remove, isolate or decrease the availability of habitat as a result of bird strike.	Potentially significant
Swift parrot (<i>Lathamus discolor</i>)	Although there are no recent records of the species within the vicinity of the Study Area, recent mapping does indicate that habitat is present and that individuals may exist. The Study Area itself does not contain any breeding or foraging habitat, however migrating parrots may pass through. Wind turbines have the potential to modify, destroy, remove or isolate the availability of habitat as a result of bird strike.	Potentially significant
Blue whale (<i>Balaenoptera musculus</i>)	The Study Area is mapped as BIA for the species for foraging purposes; it is not known as key breeding area. Underwater noise (construction and operation) could lead to avoidance behaviour. This may reduce the area of occupancy available to a population. Further investigation is required to understand the potential for underwater noise to be generated during construction or operation and the potential for this to impact the use of the area by the blue whale.	Potentially significant
Southern right whale (<i>Eubalaena australis</i>)	The Study Area is mapped as a BIA for the species as a core habitat area and also for resting and migration; it is not identified as a key aggregation area. Underwater noise (construction and operation) could lead to avoidance behaviour. This may reduce the area of occupancy available to a population. Further investigation is required to understand the potential for underwater noise to be generated during construction or operation and the potential for this to impact the use of the area by southern right whales.	Potentially significant
Loggerhead and leatherback turtles (<i>Caretta caretta</i> and <i>Dermochelys coriacea</i>)	These species may occasionally forage within the Study Area, however there are no nesting areas within the vicinity or habitat that is likely to attract turtles. Foraging activity could potentially be interrupted by underwater noise. Further investigation is required to understand the potential for underwater noise to be generated during construction or operation and the potential for	Not significant

Species	Potential Impacts	Potential Significance of Impact
	this to impact the use of the area by turtles. The Study Area is not mapped as BIA for turtle species.	
Curlew sandpiper (<i>Calidris ferruginea</i>), eastern curlew (<i>Numenius madagascariensis</i>), Australian bittern (<i>Botaurus poiciloptilus</i>)	Preferred habitat and foraging areas are present within the coastal environs of the Gippsland region, particularly in the Corners Inlet and Gippsland Lakes wetlands. These species may occasionally traverse marine environments of the Study Area, however it is expected that the birds would be flying at a height above the wind turbines and not be subject to bird strike from turbines. Other potential hazards include disorientation from light pollution. The construction, operation and decommissioning of wind turbines in the marine environment are unlikely to lead to a long-term decrease in the population, its area of occupancy or modification of its habitat.	Not Significant

7.2 Vulnerable Species

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

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

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Vulnerable species that are likely to occur in the Study Area, and the potential impact of the project on this species is provided in Table 7.2 these consider potential impacts related to the marine environment only (i.e. terrestrial infrastructure impacts are not considered). The assessment is preliminary only and based on desktop information; further site-specific studies are required to confirm the use of the Study Area by critically endangered or endangered species.

Table 7.2 Potential Impacts to Vulnerable species known to, or likely to occur, within the Study Area

Species	Potential Impacts	Potential Significance of Impact
Albatross and Petrel species (Antipodean albatross, southern royal albatross, wandering albatross, gibson's albatross, white-bellied storm petrel, blue petrel, northern giant petrel, sooty albatross, buller's albatross, northern buller's albatross, fairy prion, campbell albatross, black-browed albatross, salvin's albatross, white-capped albatross)	Whilst these species are known to occasionally forage within the Study Area and are mapped as BIA's for several species, it is unlikely that the site supports an important population or would be critical to the survival of the species. Birds are more likely to occur in more productive waters near the continental shelf area. Nevertheless, further studies are required to understand how seabirds might use this area. Potential impacts to seabirds are bird strike and artificial light.	Not Significant
Shorebird species (greater sand plover, bar tailed godwit, osprey, australian fairy tern, eastern hooded plover)	The nearby Ramsar wetlands and coastal areas would support these species, and there is potential they would migrate through the Study Area. However given the distance of the site from shore and likely take off/landing pathways, it is likely birds would fly above the height of turbines. Potential impacts to shorebirds include bird strike or artificial light.	Not significant
Whale species (Sei, fin)	Whilst these species occasionally utilise the Study Area, it is not identified as a BIA or an area supporting an important population. Potential impacts to whales include underwater noise or artificial light.	Not significant
Green turtle (<i>Chelonia mydas</i>)	Green turtles nest, forage and migrate in northern Australia, although individuals can stray into temperate waters. The Study Area is unlikely to support an important population of the species.	Not significant
Sharks and fish (white shark, Australian grayling, eastern dwarf galaxias, mako shark)	The Study Area is mapped as a BIA for the white shark. The two main nursery areas for the species are Stockon, NSW and the eastern coast of Victoria, possibly within the Study Area. Potential impacts to sharks include underwater noise or loss of foraging habitat. Further research is required to determine if the Study Area would support foraging habitat that is critical to the survival of shark species. Fish species (Australian grayling and eastern dwarf galaxias) are largely freshwater species. Whilst having a marine component of their life cycle they are not expected to travel out to the Study Area.	Potentially significant

7.3 Listed Migratory Species

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

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

An area of 'important habitat' for a migratory species is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- habitat that is of critical importance to the species at particular life-cycle stages, and/or
- habitat utilised by a migratory species which is at the limit of the species range, and/or
- habitat within an area where the species is declining.

Table 5.1 lists migratory species that occur, or are likely to occur in the Study Area. These are mostly critically endangered, endangered or threatened species already considered above including a number of shorebirds and whale species.

Table 7.3 Potential Impacts to migratory species known to, or likely to occur, within the Study Area

Species	Potential Impacts	Potential Significance of Impact
Shorebird species	Whilst these species may forage on the foreshore, they would only occasionally utilise the marine environment; the Study Area is not mapped as an important site for most migratory shorebirds (Bamford et al, 2008). It is expected that shorebirds would fly above turbine height. Potential impacts to shorebirds include bird strike or artificial light.	Not Significant
Whale and dolphin species	The Study Area is likely to be within the migratory pathway of Humpback Whales who may avoid the area. It is not a known aggregation or resting area however. Other whale and dolphin migratory species would be only transient visitors. Potential impacts include underwater noise and artificial light.	Potentially significant
Fish (porbeagle, shortfin mako)	The porbeagle and shortfin mako primarily inhabit oceanic waters, occasionally moving into coastal waters. The Study Area may support these species, but is unlikely to represent an ecologically significant proportion of the population of these species.	Not significant

7.4 Commonwealth Marine Area

An action is likely to have a significant impact on the environment in a Commonwealth marine area if there is a real chance or possibility that the action will:

- result in a known or potential pest species becoming established in the Commonwealth marine area
- modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results
- have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution
- result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity; social amenity or human health
- result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected, or
- have a substantial adverse impact on heritage values of the Commonwealth marine area, including damage or destruction of an historic shipwreck.

There is the potential for indirect impacts to marine waters, as a result of spills, cable laying (or removal), piling activity the introduction of pest species or changes to hydrodynamics. With appropriate controls in place, these impacts are considered to be a low risk, which is localised. They are unlikely to have a 'substantial' or 'persistent' adverse impact on the Commonwealth marine environment. Some impacts such as underwater noise or lighting pollution may cause some avoidance behaviour in individuals, it is unlikely to have a substantial adverse impact on a population. There may be an impact to seabirds that utilise commonwealth waters as a result of turbine strike. As a precautionary measure, the impact to Commonwealth is considered Potentially significant, subject to further investigation.

8 Next Steps

Following acceptance of the referral by the Commonwealth and the Victorian Government, the proponent will commence further detailed investigations, to inform an Environmental Effects Statement. This review will be undertaken in accordance with a scoping document or other requirements provided by the Victorian Environmental Protection Authority and Commonwealth Department of Climate Change, Energy, the Environment and Water.

These marine field studies will likely include the following as a minimum:

- Water quality monitoring – to characterise the existing marine water quality in the Study Area.
- Sediment quality – to characterise contaminant status of bed sediments, and their geotechnical properties that may be disturbed during turbine construction and dredging for cables.
- Metocean studies – to characterise the wave and current environment in the vicinity of the proposed turbines.
- Marine ecology – to characterise existing marine ecology values, including benthic infauna at the proposed turbines, along with presence and biodiversity of fish, sharks and marine mammals.
- Seabird, migratory parrot and shorebird surveys – the study is a BIA for a number of seabird species and a possible migratory pathway for migrating parrots and shorebirds.
- Benthic habitat assessment – to characterise benthic habitats (e.g. hard substrates/reef areas) in vicinity of the proposed turbine/cables and their habitat value.
- Underwater noise Assessment – to gain a greater understanding of background noise, the noise/vibration likely to be generated by the turbines and the potential disturbance this causes to marine megafauna.
- Community engagement – to gain a better understanding of how residents, visitors, user groups (i.e. commercial fishers) and first nation people use the Study Area.

In addition to field work, other additional studies that will be required as a minimum include:

- Underwater noise and vibration modelling to determine the area of impact from piling activity or turbine operations
- Metocean modelling to inform the design process
- Bird strike modelling to understand flight heights of species and the likelihood of turbine interaction
- Water quality modelling to determine the zones of impact for turbid plumes

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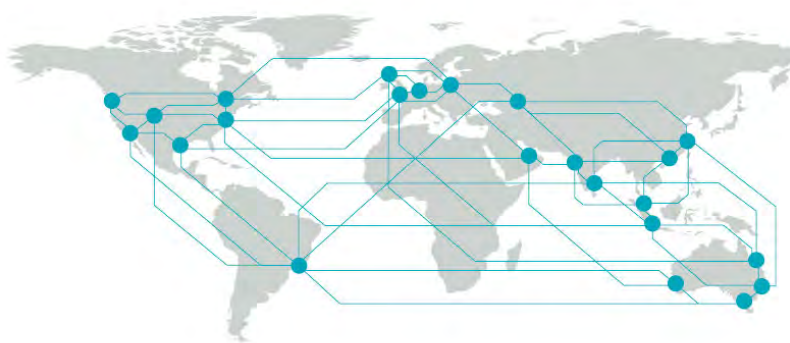
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