



Southern Winds Offshore Wind Project Preliminary Desktop Biodiversity and Constraints Assessment

Prepared for Umwelt (Australia) Pty Limited

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Summary

Biosis Pty Ltd was commissioned by Umwelt (Australia) Pty Limited to complete a preliminary desktop biodiversity and constraints assessment of the Study Area proposed for the development of the Southern Winds Offshore Wind Project. The objectives of this assessment were to identify potential ecological values and constraints, assess risks and potential impacts to ecological values and identify possible mitigations. This assessment has been conducted with a view to inform project referrals under both the Commonwealth of Australia's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Victoria's *Environment Effects Act 1978* (EE Act).

Ecological values

Key ecological values identified within the study area are as follows:

- Extensive areas of native vegetation contained primarily within public land including:
 - Cape Nelson State Park
 - Cobboboonee National Park
 - Discovery Bay Coastal Park
 - Discovery Bay Marine National Park
 - Mount Richmond National Park
- 26 Ecological Vegetation Classes (EVCs) within the three bioregions including:
 - Nine EVCs with a Bioregional Conservation Status (BCS) of Endangered
 - Ten EVCs with a BCS of Vulnerable
 - Two EVCs with a BCS of Depleted
- Over 50 wetlands are modelled within the search area (Study Area buffered by 10 kilometres) including:
 - Two internationally important (Ramsar) wetlands - Glenelg Estuary and Discovery Bay wetlands complex and Piccanninnie Ponds Karst wetland.
 - Other waterbodies of state and local significance – Bridgewater Lakes and Fawthrop Lagoon.
- Populations and / or suitable habitat for 138 threatened flora species of which 99 have been identified as likely to occur within the study area and will likely warrant further consideration. This includes:
 - Five (5) flora species listed under the EPBC Act only
 - 12 flora species listed under the EPBC Act and FFG Act
 - 82 flora species listed under the FFG Act only
- Populations and / or suitable habitat for 142 threatened fauna species of which 105 have been identified as likely to occur within the study area and will likely warrant further consideration. This includes:
 - 14 fauna species listed under the EPBC Act only

- 41 fauna species listed under both the EPBC Act and FFG Act
- 50 fauna species listed under the FFG Act only
- Suitable habitat for 86 migratory species listed under the EPBC Act including:
 - Eight (8) terrestrial birds
 - Thirty four (34) shorebirds, wetland birds and terns
 - Forty four (44) marine species (including 27 seabirds)
- Six nationally (EPBC Act) listed and two state (FFG Act) listed threatened ecological communities.

Government legislation and policy

An assessment of the project in relation to key biodiversity legislation and policy is summarised below.

Potential impacts to MNES under the EPBC Act

Our preliminary assessment of the project's potential impacts to biodiversity against the Matters of National Environmental Significance, Significant Impact Criteria Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2013) indicate that the Project could significantly impact the following MNES:

- EPBC listed species and communities
- Migratory species
- Wetlands of international importance (Ramsar sites)
- Commonwealth marine areas

Further details are provided in Section 5.1 and 5.2.

Potential environmental effects under the EE Act

Our preliminary assessment of the project's potential impacts to biodiversity against the individual and combined referral criteria outlined in the *Ministerial Guidelines for assessment of environmental effects under the Environment Effects Act 1978* (DSE 2006) indicate that the Project could satisfy up to four of the individual potential environmental effects criteria and up to five of the combination of potential environmental effects criteria.

Recommendations

The primary measure to reduce impacts to biodiversity values within the Study Area is to avoid and minimise removal of native vegetation and terrestrial and aquatic habitat. It is critical that this be considered during the design phase of the project, when key decisions are made about the location of project components such as built infrastructure / site compounds / access roads / temporary material storage etc.

This could be achieved by:

- Avoiding / minimising unnecessary duplication of infrastructure e.g. utilise existing easements to connect to existing transmission network, co-locate project components with other infrastructure.
- Aligning the impact footprint through existing cleared land including agricultural land and plantations.

- Strategic use of horizontal directional drilling (HDD) / boring rather than open trenching methods for underground cables, particularly in sensitive areas such as beach landings and when crossing waterways.
- Further assessment to identify which avifauna species are likely to be at risk of collisions with wind turbines, to allow further exploration of mitigation options and design reconfiguration.
- Careful timing of activities around periods or areas of ecological significance (e.g. breeding sites and breeding seasons) to further minimise and/or avoid impacts.
- The development of a project specific Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP).
- General project area and design refinement may be required to further avoid and minimise impacts following this preliminary assessment (Phase 1) and further environmental assessments including potential targeted surveys to identify potential impacts.

The results of this assessment should be:

- Used to inform the referrals process under both the EPBC Act and EE Act to develop an appropriate scope for the environmental impact assessment of the project.
- Integrated into project design to avoid and minimise impacts to biodiversity.
- Used to inform development of a project specific CEMP and OEMP.
- Used to inform development of an offset strategy for potential impacts to biodiversity.

It is important to note that for all species and ecological communities, this current assessment is preliminary and is subject to confirmation and/or change based on the results of detailed field based assessment of the study area.

1. Introduction

1.1 Project overview

BlueFloat Energy is proposing the development of the Southern Winds Offshore Wind Project (the project). The offshore component of the project will be located approximately 8-20 kilometres off the coastline between Nelson (Victoria) and Cape Douglas (South Australia).

The key proposed components of the project are:

- A total of 77, “bottom-fixed” offshore wind turbines and associated platform infrastructure including two offshore substations.
- Offshore subsea cables connecting the substations to the shore landing.
- Onshore transition joint bay and underground cabling linking to the shore landing.
- An onshore overhead or underground transmission line connecting the Project to the national electricity market (NEM) with two options under consideration, as detailed below.

There are currently two proposed options for cable routing from the offshore substations to the grid connection (Figure 1):

- The first option proposes that undersea cables from the offshore substations would travel southeast from the offshore substation for approximately 72 km and land onshore near the northwest corner of the Narrawong Coastal Reserve, approximately 1.5km from the Portland Aluminium Smelter. From here it would connect into a transition joint bay and then continue to the existing switchyard at the Portland Aluminium Smelter. While the existing Portland-Heywood transmission line is located within the Study Area for the Project, no works are currently expected to be required to upgrade this infrastructure.
- The second option proposes a new project-dedicated transmission line. Undersea cables from the offshore substations would travel east for approximately 42 km, landing in the south-eastern section of the Glenelg Estuary and Discovery Bay Ramsar Wetlands site, at Cape Bridgewater (avoiding the Discovery Bay Marine National Park). The subsea cables would connect to onshore cables in a transition joint bay and then continue underground or overhead travelling approximately 29 km to the north-east through Gorae West to the Heywood Terminal Station.

The grid connection point is located within the Glenelg Local Government Area (LGA).

Umwelt (Australia) Pty Limited has engaged Biosis to complete a preliminary desktop biodiversity and constraints assessment of the study area proposed for development (Figure 1). The report aims to identify the key potential biodiversity values and constraints, assess risks and potential impacts to ecological values and identify possible mitigations. This assessment of ecological values and constraints has been conducted with a view to informing project referrals under both the Commonwealth of Australia's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Victoria's *Environment Effects Act 1978* (EE Act).

1.2 Scope of assessment

The objectives of this preliminary desktop biodiversity and constraints assessment are to:

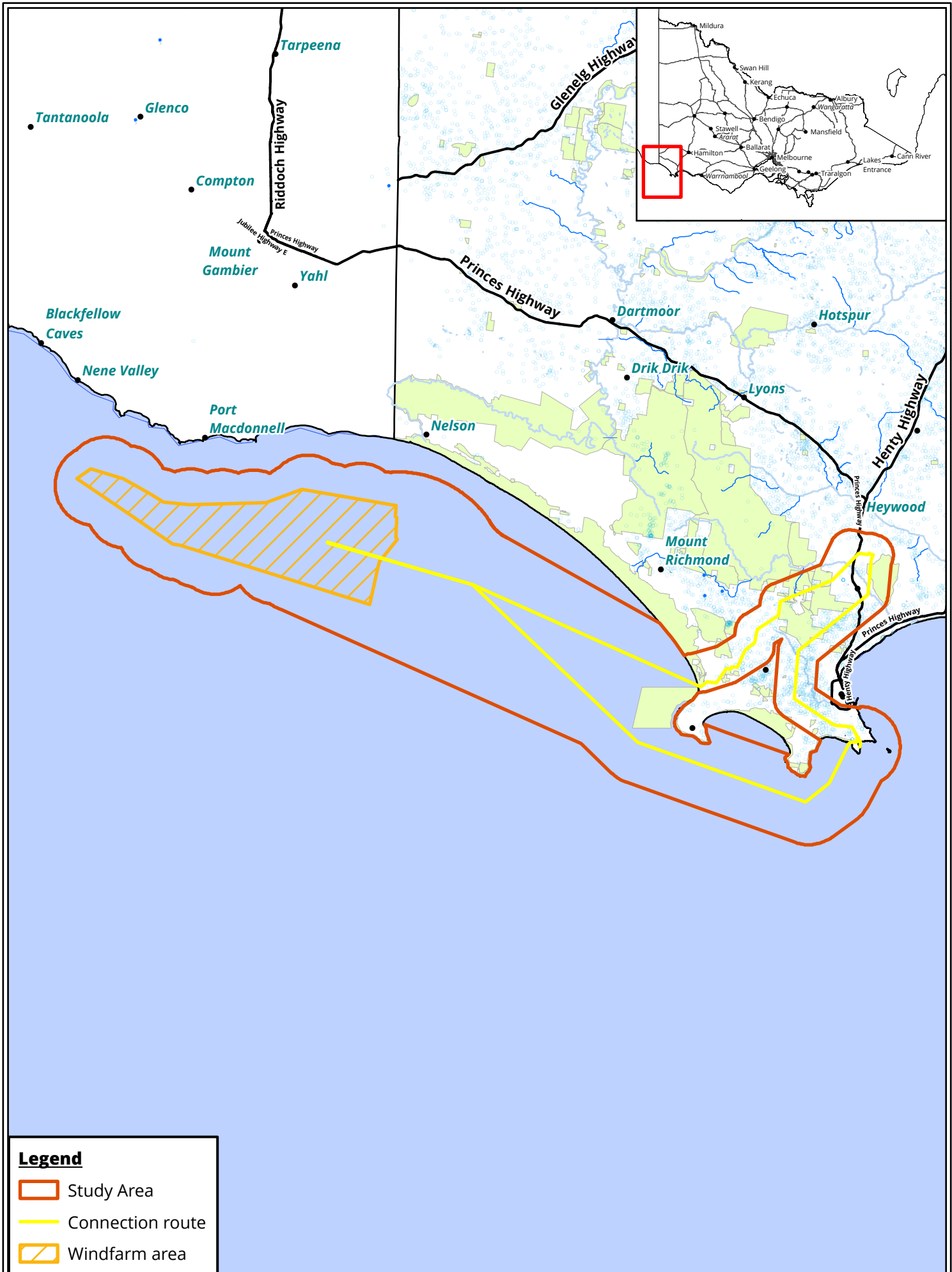
- Undertake biodiversity database searches and spatial dataset analysis if the search area (the on shore and offshore study area buffered by 10 km) to identify potential ecological values, including:
 - Listed threatened species and communities, listed migratory species and Wetlands of International Importance (MNES) protected by the Commonwealth EPBC Act.
 - Biodiversity values protected under the Flora and Fauna Guarantee Act 1988 (Vic) (FFG Act).
 - Other relevant matters including non-listed species that may be affected by the Project and that would require further investigation.
- Carry out a high-level assessment of potential impacts to ecological values and mitigation measures with regard to the EPBC Act and EE Act
- Provide a report documenting this assessment to inform EPBC Act and EE Act project referrals.
- Recommend any further assessments of the site that may be required (such as a vegetation impact assessment or targeted searches for threatened species).

1.3 Location of the study area

The study area includes both an offshore and onshore component (Figure 1). The onshore component is within three bioregions, namely the Bridgewater, Glenelg Plain and the Victorian Volcanic Plain. It encompasses an area of approximately 40,309 hectares of private and public land, the adjacent road reserves and approximately 58 kilometres of coastline.

The study area has been designed to allow flexibility as the design develops for the potential to refine the location of infrastructure if deemed beneficial for reduced environmental effects. Specifically:

- A 5 km buffer has been applied to the offshore infrastructure (turbines, substations and subsea cabling routes up to the shoreline).
- An additional 12 km buffer has been applied to the eastern side of the offshore infrastructure to allow for the potential to relocate the infrastructure.
- A 2.5 km buffer has been applied to the onshore infrastructure, including the overhead transmission line and the onshore substation options (referred to as the transmission line corridor).



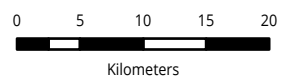
Legend

- Study Area
- Connection route
- Windfarm area

Figure 1 Location of the Study Area - Portland, Victoria



Matter: 37594.
 Date: 10 October 2022,
 Prepared for: JB, Prepared by: MK, Last edited by: mknudsen
 Layout: 37594_F1Locality
 Project: P:\37500s\37594\Mapping\37594_WP_OffshoreWind_MapProduction.aprx



Scale: 1:600,000 @ A4
 Coordinate System GDA 1994 MGA Zone 54

2. Approach

This section outlines the approach taken by the project team to deliver the preliminary ecological assessment. Our approach includes:

- Background review of databases and literature to identify ecological values and constraints.
- Assessment of potential impacts to ecological values against:
 - Potential for significant impacts to Matters of National Environmental Significance (MNES) listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) against the Matters of National Environmental Significance, Significant Impact Criteria Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2013),
 - Potential to satisfy criteria for referral under the EE Act as outlined in *Ministerial Guidelines for assessment of environmental effects under the Environment Effects Act 1978* (the ‘ministerial guidelines’) (DSE 2006).

2.1 Background review

2.1.1 Database searches

In order to provide a context for the study area, information about flora and fauna from within 10 km of the study area (the ‘search area’) was obtained from relevant biodiversity databases, many of which are maintained by the Victorian Department of Environment, Land, Water and Planning (DELWP) or the Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW). Records from the following databases were collated and reviewed:

- DELWP’s Victorian Biodiversity Atlas (VBA), including the ‘VBA_FLORA25, FLORA100 & FLORA Restricted’ and ‘VBA_FAUNA25, FAUNA100 & FAUNA Restricted’ datasets
- DCCEEW’s Protected Matters Search Tool for matters protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

Other sources of biodiversity information were examined including:

- DELWP’s NatureKit mapping tool
- DELWP’s Habitat Importance maps

2.1.2 Spatial datasets

The following spatial datasets have been accessed and used to understand existing conditions and to identify opportunities and constraints when undertaking further design:

- Topographic data including roads, waterways, contours, cadastre,
- Land tenure (public and private),
- Ecological Vegetation Classes (EVC) (NV2005_EVCBCS) (DELWP 2018a),
- Flora and Fauna Guarantee Act Listed Communities (NV2005_FFG_COMM) (DELWP 2018b),
- Ecological Communities of National Environmental Significance Distributions (Public Grids) (DAWE 2020),

- Victorian Biodiversity Atlas (VBA) flora and fauna records,
- Ramsar Wetlands of Australia (DoEE 2018),
- Victorian Wetland Inventory (Current) (WETLAND_CURRENT) (DELWP 2021).

2.2 Definitions of threatened species or communities

Threatened species or communities include those species or communities that are listed under the EPBC Act and FFG Act. The conservation status of a species or ecological community is determined by its listing status under Commonwealth or State legislation / policy (Table 1).

Table 1 Conservation status of threatened species and ecological communities

Conservation status	
National	Listed as nationally critically endangered, endangered or vulnerable under the EPBC Act
State	Listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable or conservation dependent in Victoria under the FFG Act

Lists of threatened species generated from the databases are provided in Appendix 1 (flora) and Appendix 2 (fauna) and the species have been assessed to determine their likelihood of occurrence based on the process outlined below.

2.3 Determining likelihood of occurrence of threatened species

Likelihood of occurrence indicates the potential for a species or ecological community to occur regularly within the study area. It is based on expert opinion, information in relevant biodiversity databases and reports, and an assessment of the habitats on site. Likelihood of occurrence is ranked as negligible, low, medium, high or recorded. The rationale for the rank assigned is provided for each species in Appendix 1 (flora) and Appendix 2 (fauna). Those species for which there is little or no suitable habitat within the study area are assigned a likelihood of low or negligible and are not considered further.

Only those species listed under the EPBC Act or the FFG Act (hereafter referred to as 'threatened species') are assessed to determine their likelihood of occurrence. Threatened species which have at least medium likelihood of occurrence are given further consideration in this report.

2.4 Legislation and policy

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- Matters listed under the EPBC Act, associated policy statements, significant impacts guidelines, listing advice and key threatening processes
- Threatened taxa, communities and threatening processes listed under Section 10 of the FFG Act and associated action statements and listing advice
- *Planning and Environment Act 1987* as it relates to referral criteria under the EE Act ministerial guidelines (DSE 2006).
- Noxious weeds and pest animals lists under the *Catchment and Land Protection Act 1994* (CaLP Act)
- *Environment Effects Act 1978*, particularly the EE Act ministerial guidelines (DSE 2006).

-
- *National Parks Act 1975* as it relates to referral criteria under the EE Act ministerial guidelines (DSE 2006).

2.5 Mapping

Umwelt (Australia) Pty Limited supplied spatial data files outlining the location and extent of the study area.

3. Biodiversity legislation and government policy

This section provides an overview of the key biodiversity legislation relevant to the development of the project to the next approval stage. This section does not describe the legislation and policy in detail.

3.1 Commonwealth

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (MNES) protected under the Act. Guidance on the potential for significant impacts is provided in the *Matters of National Environmental Significance, Significant Impact Criteria Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999* (the 'SIC guidelines') (Commonwealth of Australia 2013).

MNES relevant to the project are:

- Listed threatened species and ecological communities
- Listed migratory species
- Wetlands of International Importance (Ramsar sites)
- Commonwealth marine waters

An assessment of the project's potential to trigger significant impacts to MNES under the EPBC Act is provided in Table 11 (Section 5)

3.2 State

3.2.1 Flora and Fauna Guarantee Act 1988 (FFG Act)

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. Matters listed under the FFG Act are specifically mentioned in referral criteria under the EE Act ministerial guidelines (DSE 2006).

3.2.2 Planning and Environment Act 1987 (incl. Planning Schemes)

The Planning and Environment Act 1987 controls the planning and development of land in Victoria and provides for the development of planning schemes for all municipalities.

Of particular relevance to the proposal are controls relating to the removal, destruction or lopping of native vegetation contained within the Wellington Planning Scheme (the Scheme), including permit requirements. The Scheme (Clause 73.01) defines 'native vegetation' as 'Plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses'. It is an objective of Clause 12.01-2 of the Planning Policy Framework (Native Vegetation Management) that removal of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity.

Under Clause 66.02, a permit application to remove, destroy or lop native vegetation is required to be referred to DELWP as a recommending referral authority if any of the following apply:

- the class of application is on the detailed assessment pathway
- a property vegetation precinct plan applies to the site or

- the native vegetation is on Crown land occupied or managed by the Responsible Authority.

Victoria's Guidelines for the removal, destruction or lopping of native vegetation (the Guidelines)

The Guidelines are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria (DELWP 2017a).

The purpose of the Guidelines is to guide how impacts to biodiversity should be considered when assessing a permit application to remove, destroy or lop native vegetation. The objective for the Guidelines in Victoria is 'No net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

Under the Guidelines, there are three assessment pathways for assessing an application for a permit to remove native vegetation: basic, intermediate and detailed.

The assessment pathway will be determined following an onsite assessment of the proposed impact area.

3.2.3 Environment Effects Act 1978

The *Environment Effects Act 1978* establishes a process to assess the environmental impacts of a project. If applicable, the Act requires that an Environment Effects Statement (EES) be prepared by the proponent. The EES is submitted to the Minister for Planning and enables them to assess the potential environmental effects of the proposed development. The general objective of the assessment process is *to provide for the transparent, integrated and timely assessment of the environmental effects of projects capable of having a significant effect on the environment* (DSE 2005).

The 'Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978' (DSE 2005) provide a range of criteria that can be used to determine whether an EES may be required for a project. These criteria relate to individual potential environmental effects and a combination of (two or more) potential environmental effects.

An assessment of the project against the individual potential effects criteria and against the combination of potential effects criteria is provided in Preliminary MNES Significant Impact Assessment

A preliminary assessment of potential significant impact to each MNES is provided below. Note that we provide an assessment for terrestrial species, shorebirds and seabirds. An assessment for other marine species is beyond the scope of our report and has not been included here.

3.2.4 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, or
- interfere with the recovery of the species.

Table 12 Preliminary assessment of significant impacts to Critically Endangered or Endangered species with a medium or higher likelihood of occurrence within the study area

Species/Species Group	Potential Impacts	Likelihood of Significant Impact
<p>Flora: Colourful Spider-orchid, Mellblom's Spider-orchid, Maroon Leek-orchid, Metallic Sun-orchid.</p>	<p>Threatened flora are at risk of impact during the development stage, particularly in the proposed shore landing area. However, to determine the presence of threatened flora within the impact area will require an on-site assessment, and potentially targeted surveys for more cryptic species.</p>	<p>Likely (to be determined following an on-site assessment)</p>
<p>Terrestrial Birds: Red-tailed Black-Cockatoo, Gang-gang Cockatoo</p>	<p>Terrestrial birds are likely to be impacted during the construction phase, only if on-shore works result in destruction to important habitat for these species. However, an on-site assessment is required to assess the availability of habitat for terrestrial birds.</p>	<p>Unlikely (to be determined following an on-site assessment)</p>
<p>Bass Strait Migrants: Orange-bellied Parrot, Swift Parrot</p>	<p>Terrestrial birds which traverse the marine environment between mainland Australia and Tasmania are at risk of collision with offshore wind turbines if they pass through the study area. In addition, there is a potential for the on-shore component of the study area to support suitable habitat for these species. These species are therefore also likely to be impacted by onshore works during the construction phase. For species such as Orange-bellied Parrot, where population numbers are extremely low, any impact to the population (such as additional mortality) should be considered significant.</p>	<p>Likely (to be determined following a more detailed assessment)</p>

Species/Species Group	Potential Impacts	Likelihood of Significant Impact
<p>Shorebirds and Waterbirds: Australian Painted-snipe, Australasian Bittern, Eastern Curlew, Curlew Sandpiper, Red Knot, Great Knot.</p>	<p>Impacts to these species are most likely to occur during the construction phase, particularly if works impact the integrity of surrounding wetland environments. In addition to resident shorebirds, the onshore environment also supports large numbers of trans-equatorial migrants. It is likely that offshore impact area will be well beyond the range of these species. Furthermore, although flight heights during migration are still poorly understood for most species, available evidence suggests that migrating shorebirds travel at great heights and will likely be beyond the rotor-swept area should they traverse the offshore area. Uncertainty still exists with regard to the movements of shorebird species between Victoria and Tasmania and as such, impact to shorebirds may warrant further investigation.</p>	<p>Unlikely (to be determined following a more detailed assessment of the onshore habitat within the study area and surveys within the offshore area)</p>
<p>Seabirds: Gould's Petrel, Grey-headed Albatross, Shy Albatross, Southern Giant Petrel</p>	<p>The marine environment off Portland supports recognized areas of high marine productivity and provides foraging opportunities for a range of seabird species. While, none of the Critically Endangered or Endangered seabird species breed within close proximity to the study area, most are known to forage within these waters and the productive waters of the shelf-edge, particularly during the non-breeding period. However, given that the at-sea distribution of these species is still relatively poorly understood, it is possible that large numbers of individuals may occur within the offshore component of the study area and be at risk of collision with wind turbines.</p>	<p>Likely</p>
<p>Terrestrial Mammals: Spotted-tailed Quoll, Heath Mouse, Southern Brown Bandicoot, Southern Bent-winged Bat.</p>	<p>Terrestrial mammals are likely to be impacted during the construction phase, if on-shore works result in destruction to important habitat for these species. However, an on-site assessment is required to assess the availability of habitat for these species and targeted surveys may be required for cryptic species, to fully assess potential impacts.</p>	<p>Likely (to be determined following an on-site assessment)</p>

Species/Species Group	Potential Impacts	Likelihood of Significant Impact
Ichthyofauna and Aquatic Invertebrates: Glenelg Spiny Crayfish	Impacts to ichthyofauna and aquatic invertebrates are only expected to occur if onshore works impact the integrity of waterbodies.	Unlikely (to be determined following an on-site assessment)

3.2.5 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.

Table 13 Preliminary assessment of significant impacts to Vulnerable species with a medium or higher likelihood of occurrence within the study area

Species/Species Group	Potential Impacts	Likelihood of Significant Impact
Flora: River Swamp Wallaby-grass, Limestone Spider-orchid, Ornate Pink-fingers, Wrinkled Cassinia, Clover Glycine, Coast Ixodia, Dense Leek-orchid, Green-striped Greenhood, Leafy Greenhood, Swamp Greenhood, Swamp Fireweed, Coast Dandelion.	Threatened flora are at risk of impact during the development stage, particularly in the proposed shore landing area. However, to determine the presence of threatened flora within the impact area will require an on-site assessment, and potentially targeted surveys for more cryptic species.	Likely (to be determined following an on-site assessment)

Species/Species Group	Potential Impacts	Likelihood of Significant Impact
Terrestrial Birds: Pilot Bird, Painted Honeyeater	Terrestrial birds are likely to be impacted during the construction phase, only if on-shore works result in destruction to important habitat for these species. However, an on-site assessment is required to assess the availability of habitat for terrestrial birds.	Unlikely (to be determined following an on-site assessment)
Bass Strait Migrants: White-throated Needletail	Terrestrial birds which traverse the marine environment between mainland Australia and Tasmania are at risk of collision with offshore wind turbines if they pass through the study area. In addition, there is a potential for the on-shore component of the study area to support suitable habitat for these species. White-throated Needletail in particular may warrant further consideration as this species is known to traverse Bass Strait more regularly than other migrants and wind turbines have been identified as a risk to the species.	Likely (to be determined following a more detailed assessment)
Shorebirds and Waterbirds: Australian Fairy Tern, Bar-tailed Godwit, Hooded Plover.	Impacts to these species are most likely to occur during the construction phase, particularly if works impact the integrity of surrounding wetland environments. In addition to resident shorebirds, the onshore environment also supports large numbers of trans-equatorial migrants. It is likely that offshore impact area will be well beyond the range of these species. Furthermore, although flight heights during migration are still poorly understood for most species, available evidence suggests that migrating shorebirds travel at great heights and will likely be beyond the rotor-swept area should they traverse the offshore area. Uncertainty still exists with regard to the movements of shorebird species between Victoria and Tasmania and as such, impact to shorebirds may warrant further investigation.	Unlikely (to be determined following a more detailed assessment of the onshore habitat within the study area and surveys within the offshore area)

Species/Species Group	Potential Impacts	Likelihood of Significant Impact
Seabirds: Fairy Prion (subantarctic subspecies), Soft-plumaged Petrel, Blue Petrel, Wandering Albatross, Black-browed Albatross, Indian Yellow-nosed Albatross, Sooty Albatross, Buller's Albatross, Northern Giant-Petrel, Southern Royal Albatross, White-capped Albatross.	The marine environment off Portland supports recognized areas of high marine productivity and provides foraging opportunities for a range of seabird species. While, none of the Vulnerable seabirds species breed within close proximity to the study area, most are known to forage within these waters and the productive waters of the shelf-edge, particularly during the non-breeding period. However, given that the at-sea distribution of these species is still relatively poorly understood, it is possible that likely that large numbers of individuals may occur within the offshore component of the study area and be at risk of collision with wind turbines.	Likely
Terrestrial Mammals: Swamp Antechinus, Long-nosed Potoroo, Grey-headed Flying-fox.	Terrestrial mammals are likely to be impacted during the construction phase, if on-shore works result in destruction to important habitat for these species. However, an on-site assessment is required to assess the availability of habitat for these species and targeted surveys may be required for cryptic species, to fully assess potential impacts.	Likely (to be determined following and on-site assessment)
Amphibians: Growling Grass Frog.	Amphibians are likely to be impacted during the onshore works impact the integrity of waterbodies and aquatic habitat suitable for these species. It is likely that the study area will support suitable habitat for these species, although an on-site assessment is required to determine the extent of this habitat and assess potential impacts.	Likely (to be determined following an on-site assessment)
Ichthyofauna and Aquatic Invertebrates: Australian Grayling, Dwarf Galaxias, Yarra Pygmy Perch, Variegated Pygmy Perch.	Impacts to ichthyofauna are only expected to occur if onshore works impact the integrity of waterbodies.	Unlikely (to be determined following an on-site assessment)

3.2.6 Critically Endangered or Endangered Ecological Communities

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

- reduce the extent of an ecological community
- fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

- adversely affect habitat critical to the survival of an ecological community
- modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
- cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
 - assisting invasive species, that are harmful to the listed ecological community, to become established, or
 - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or
- interfere with the recovery of an ecological community.

The results of this preliminary desktop review suggest that the study area may contain up to two EPBC Act listed TECs with a conservation status of Critically Endangered which makes them eligible for significant impact assessment against SIC guidelines. In addition, the study area may also contain up to three EPBC Act listed TECs with a conservation status of Endangered. Depending on the terrestrial impacts associated with the project, namely the onshore cable route, there is the potential for significant impacts to TECs. However, an on-site assessment is required to determine the occurrence and extent of these threatened communities and fully assess the potential for significant impact.

3.2.7 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.

Table 14 Preliminary assessment of significant impacts to Migratory species expected to occur within the study area

Species/Species Group	Potential Impacts	Likelihood of Significant Impact
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Migratory Shorebirds	It is likely that the offshore impact area will be well beyond the range of migratory shorebird species. Furthermore, although flight heights during migration are still poorly understood for most species, available evidence suggests that migrating shorebirds travel at great heights and will likely be beyond the rotor-swept area should they traverse the offshore area. However, further assessment may be required to determine the likelihood of migratory shorebirds to occur within the study area.	Unlikely (to be determined following a more detailed assessment of the onshore habitat within the study area and surveys within the offshore area).
Migratory Seabirds	Several species of migratory seabirds are expected to occur within the offshore area, including 14 species of albatross, two species of Giant-Petrel and three species of Shearwater. This includes Short-tailed Shearwater, the most numerically abundant seabird in south-eastern Australia.	Likely
Migratory Terrestrial Birds	Migratory terrestrial birds are likely to be impacted during the construction phase, only if on-shore works result in destruction to important habitat for these species. However, an on-site assessment is required to assess the availability of habitat for terrestrial birds. It is unlikely that migratory terrestrial birds will traverse the offshore marine area and be at risk of collision with wind turbines.	Unlikely (to be determined following an on-site assessment)
Bass Strait Migrants	Terrestrial birds which traverse the marine environment between mainland Australia and Tasmania are at risk of collision with offshore wind turbines if they pass through the study area. In addition, there is a potential for the on-shore component of the study area to support suitable habitat for these species.	Likely (to be determined following a more detailed assessment)

3.2.8 Wetlands of international importance (Ramsar sites)

An action is likely to have a significant impact on the ecological character of a declared Ramsar wetland if there is a real chance or possibility that it will result in:

- areas of the wetland being destroyed or substantially modified
- a substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland
- the habitat or lifecycle of native species, including invertebrate fauna and fish species dependant upon the wetland being seriously affected
- a substantial and measurable change in the water quality of the wetland – for example, a substantial change in the level of salinity, pollutants, or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health, or

- an invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland.

Depending on the terrestrial impacts associated with the project, namely the construction of the onshore cable route, it is possible that the project may significantly impact these Ramsar sites through:

- Impacts to the lifecycles and potentially the survival of native species inhabiting the wetland (including migratory species). Impacts to the ecological integrity of the wetland through habitat loss or destruction.
- Indirect impacts through the introduction of pollutants, nutrients, disease and invasive species.

3.2.9 Commonwealth marine waters

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 quality⁴ 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.

Assessment of the impacts to Commonwealth marine waters is beyond the scope of this assessment. However, it is noteworthy that the marine environment off Portland provides foraging habitat for numerous land-based marine predators including a range of seabird species and at least two seal species. In addition, breeding colonies of Australasian Gannet and Short-tailed Shearwater are located within close proximity to the offshore wind farm area and these species are likely to forage extensively throughout this range. It is highly likely that the at-sea distribution of these species will overlap with the offshore wind turbine area and that volant species may be at risk of collision with wind turbines.

Given the high mobility and dispersal capabilities of seabirds, particularly outside of the breeding period, it is also highly likely that species which overwinter within the marine environment of south-eastern Australia may overlap with the study area.

3.3 Potential to satisfy criteria for referral under the EE Act

An assessment of the potential for the project to satisfy criteria for referral under the EE Act as outlined in the *Ministerial guidelines for assessment of environmental effects* (DSE 2006) is provided in Table 15.

The preliminary assessment of the project's potential impacts to biodiversity against the individual and combined referral criteria outlined in the *Ministerial Guidelines for Assessment of Environmental Effects under the*

Environment Effects Act 1978 (DSE 2006) indicate that the project could satisfy up to four of the individual potential environmental effects criteria and up to five of the combination of potential environmental effects criteria.

3.4 Potential mitigation measures

The primary measure to reduce impacts to biodiversity values within the study area is to avoid and minimise removal of native vegetation and terrestrial and aquatic habitat. In addition, impacts to avifauna (including migratory species), specifically related to collision risks with wind turbines should be taken into account.

Preliminary mitigation measure which should be considered include:

- Avoiding / minimising unnecessary duplication of infrastructure e.g. utilise existing easements to connect to existing transmission network, co-locate project components with other infrastructure.
- Aligning the impact footprint through existing cleared land including agricultural land and plantations.
- Strategic use of horizontal directional drilling (HDD) / boring rather than open trenching methods for underground cables, particularly in sensitive areas such as beach landings and when crossing waterways.
- Further assessment to identify which avifauna species are likely to be at risk of collisions with wind turbines, to allow further exploration of mitigation options and design reconfiguration.
- Careful timing of activities around periods or areas of ecological significance (e.g. breeding sites and breeding seasons) to further minimise and/or avoid impacts.
- The development of a project specific Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP).
- Following this preliminary assessment (Phase 1) and further environmental assessments including potential targeted surveys, general project area and design refinement may be required to further avoid and minimise impacts.

Given the proximity of the project to the proposed VIC Offshore Windfarm Project as well as several other onshore windfarm projects, the potential for cumulative impacts also needs to be considered as the development approvals process proceeds.

Table 15 (Section 5). However, the guidelines are not binding, and the decision as to whether an EES is required is ultimately at the discretion of the Minister for Planning.

3.4.1 National Parks Act 1975

The *National Parks Act 1975* (NP Act) concerns the creation and management of national parks, State parks, marine national parks and marine sanctuaries in Victoria. Land relating to the NP Act is included within the referral criteria under the EE Act ministerial guidelines (DSE 2006). Several parks within the study area are included under this Act.

4. Results

The ecological features of the study area are described below and mapped in Figure 2 - 6.

Flora and fauna species previously recorded or predicted to occur within the local area along with an assessment of the likelihood of the species occurring within the study area are listed in Appendix 1(flora) and Appendix 2 (fauna).

4.1 Landscape context

The study area is approximately 203,730 hectares west to south-west of Portland, Victoria. The onshore component of the study area is approximately 29,684 hectares, incorporating Point Danger in the south-east, Bridgewater Lakes in the south-west, and stretching to about 2.5 km south of Heywood. The study area includes approximately 11,000 ha from Cape Bridgewater to Cape Nelson and as far north as Bothes Road, Gorae West.

The study area encompasses three Bioregions: Bridgewater, Glenelg Plain and the Victorian Volcanic Plain. The majority of the study area falls within the Glenelg Plain bioregion. This bioregion is characterised by a series of long narrow ridges running parallel to the coastline in the south west of the state (DELWP 2021). It is dominated by Damp Sands Herb-rich Woodland, Heathy woodland and Herb-rich Heathy Woodland. The Victorian Volcanic Plain bioregion occurs further in-land occurring on extensive, flat volcanic deposits. Several grassland, woodland, shrubland and wetland communities occur within the bioregion (DELWP 2021). The Bridgewater bioregion consists of a thin coastal plain dominated by deep freshwater marsh and coastal dune scrub communities (DELWP 2021). The Bridgewater Bioregion covers a small, highly diverse section of land in the south of the study area. This bioregion is characterised by dune capped sand-ridges that stretch along the coastline with lagoonal systems behind. It supports a series of Coastal Dune Scrub and Deep Freshwater Marsh communities (DELWP 2021).

The study area is characterised by a cool, moist temperate climate with annual rainfall of about 850mm towards the coast. The summer months are dry and warm and most rain falls in the winter months (VicFlora n.d.). Land within the study area consists of a variety of landforms and land uses. Majority of the study area is being used for wool, livestock and dairy production (VicFlora n.d.), although, there are several small plantations as well. Cobboboonee National Park, Mount Richmond National Park and Discovery Bay Coastal Park all occur within the study area in addition to several small coastal reserves. Landforms that occur within the study area include coastal and dune complexes, coastal cliffs, plains, low hills and the freshwater lakes system, Bridgewater Lakes.

4.2 Vegetation

A total of 26 Ecological Vegetation classes (EVCs) across the Bridgewater, Glenelg Plain and Victorian Volcanic Plain Bioregions are modelled to occur within the study area according to DELWP's Native Vegetation – Modelled 2005 Ecological Vegetation Classes (with Bioregional Conservation Status) dataset (Figure 2). These EVCs are presented along with bioregional conservation status (BCS) in Table 2 and include a range of forest, woodland, wetland and scrub communities. It should be noted that there are some EVCs, primarily wetland communities, which are not modelled within the NV2005_EVCBCS dataset. Such EVCs may also be present within the study area but have not been captured in this desktop assessment.

- A quarter of the modelled vegetation within the study area is EVC 858 – Coastal Alkaline scrub (25.1%) followed by EVC 16 – Lowland Forest (23.45%), EVC 23 – Herb-rich Foothill Forest (14.34%) and EVC 650 – Heathy Woodland/Damp heathy woodland/Damp heathland Mosaic (11.22%). The modelled area of these four EVCs makes up 74% of modelled native vegetation extent within the study area.
- EVC 858 – Coastal Alkaline Scrub is a low woodland or tall heathland ecosystem that occurs on stable dunes and swales close to the coast. Typically dominated by a medium to small shrub layer and an over storey of Moonah *Melaleuca lanceolata ssp. Lanceolata* and Drooping Sheoak *Allocasuarina verticillata*.
- EVC 16 – Lowland Forest is a diverse ecosystem that occurs on relatively fertile, moderately well-drained soils in areas of relatively high rainfall. Characteristic canopy species include Jimmy's Shining Peppermint *Eucalyptus willisii*, Messmate Stringybark *Eucalyptus obliqua*, Brown Stringybark *Eucalyptus baxteri s.l.*.
- EVC 23 – Herb-rich Foothill forest is a medium to tall open forest or woodland that occurs on relatively fertile, well-drained soils. The understorey is characterised by a high cover and diversity of herbs and grasses.

Of the EVCs modelled to occur within the study area; seven have a BCS of vulnerable and eight have a BCS of Endangered. Consideration of avoiding endangered or vulnerable, sensitive or isolated vegetation types will be important through detailed design to reduce the project's overall impacts and to locate the majority of impacts in more resilient and / or plentiful (e.g. Least Concern) vegetation types.

It should be noted some EVCs that are expected to be present within the study area have not been captured in this desktop assessment due to the scale at which vegetation modelling is undertaken by DELWP.

Table 2 DELWP 2005 modelled EVCs within the study area and their Bioregional Conservation Status (BCS)

EVC	BCS	Modelled extent within the study area (ha)
EVC 03 - Damp Sands Herb-rich Woodland	Vulnerable	2,508.6
EVC 05 – Coastal Sand Heathland	Rare	32.74
EVC 06 – Sand Heathland	Rare	89.42
EVC 10 - Estuarine Wetland	Endangered	19.49
EVC 16 - Lowland Forest	Least Concern	7,257.46
EVC 23 – Herb-rich Foothill Forest	Vulnerable	4,436.69
EVC 48 - Heathy Woodland	Least Concern	1,169.72
EVC 53 - Swamp Scrub	Vulnerable and Endangered	175.81
EVC 132 – Plains Grassland	Endangered	4.75
EVC 160 – Coastal Dune Scrub	Least Concern	1,295.01
EVC 161 – Coastal Headland Scrub	Vulnerable and Endangered	605.33
EVC 198 – Sedgy Riparian Woodland	Vulnerable	0.52
EVC 200 – Shallow Freshwater Marsh	Endangered	59.65
EVC 650 – Heathy Woodland/Damp Heathy Woodland/Damp Heathland Mosaic	Vulnerable	3,472.62
EVC 651 – Plains Swampy Woodland	Endangered	7.08
EVC 664 – Limestone Ridge Woodland	Vulnerable	4.9

EVC	BCS	Modelled extent within the study area (ha)
EVC 680 – Freshwater Meadow	Endangered	57.35
EVC 681 – Deep Freshwater Marsh	Vulnerable	219.73
EVC 682 – Permanent Open Freshwater	N/A	70.71
EVC 684 – Permanent Saline	N/A	17.09
EVC 713 – Damp Sands Herb-rich Woodland/Damp Heathland/Damp Heathy Woodland Mosaic	Vulnerable	982.13
EVC 746 – Damp Heathland/Damp Heathy Woodland Mosaic	Depleted and Vulnerable	459.37
EVC 762 – Damp Heathland/Sand Heathland Mosaic	Depleted	97.22
EVC 797 – Coastal Landfill/Sand Accretion	N/A	36.58
EVC 858 – Coastal Alkaline Scrub	Endangered and Least Concern	7,762.69
EVC 876 – Spray-zone Coastal Shrubland	Rare and Endangered	101.85

4.3 Wetlands and waterways

As shown in Figure 3, over 50 wetlands occur within the study area based on DELWP's Victorian Wetland Inventory dataset (DELWP 2021). Two of the wetlands within the search area (study area buffered by 10 kilometres) are recognized as Ramsar sites. A Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention and is a MNES under the EPBC Act.

The first of these Ramsar sites, the Glenelg Estuary and Discovery Bay Wetlands complex, is located within the study area and includes three main systems comprising (DEPI 2017):

- The Long Swamp wetlands, Bridgewater Lakes and other freshwater systems within the Discovery Bay Coastal Park.
- The Glenelg Estuary and associated Oxbow Lake and streamside reserve at the Nelson township.
- The dune fields and beach along the Discovery Bay Coastal Park.

An important criterion of the Ramsar listing of the Glenelg Estuary and Discovery Bay Wetlands is the provision of habitat for nationally and internationally threatened flora and fauna. This includes over 90 waterbird species as well as 14 species of native fish which have diadromous life cycles and which are dependent on the system as a migratory route. The *Baumea* sedgelands within the wetland area also support more than 1 % of the Ancient greenling *Hemiphysalis mirabilis* population.

There is potential that the project will indirectly impact the ecological values of the Glenelg Estuary and Discovery Bay Wetlands Ramsar site. In particular this relates to the potential for impacts on avifauna, including listed threatened and migratory species that utilise these systems and may cross the onshore cable area and the offshore wind turbine area, which may result in collisions. However, additional impacts associated with cable routing and in particular, boring or trenching activities should also be taken into account.

In addition, the Piccanninnie Ponds Karst Wetland, another Ramsar wetland, is within 10 km of the study area (within the search area), specifically within 10 km north of the South Australian offshore component. The Piccanninnie Ponds is a unique karst wetland system and provides habitat for diverse assemblages of native flora and fauna many of which are of conservation significance. Given that the site is over 50 km from the onshore (terrestrial) component of the study area, potential impacts to the ecological value of this wetland system is considered unlikely. However, the site is a known winter roosting and foraging location for Orange-bellied Parrot. This species is known to traverse the marine environment between Tasmania and mainland Australia and may therefore be at risk of impact from the offshore component.

Other major natural hydrological features within the search area include:

- Bridgewater Lakes
 - In addition to forming part of the Glenelg Estuary and Discovery Bay wetlands complex, the Bridgewater Lakes is also considered a site of state significance as they comprise one of the longest freshwater coastal lake systems in Victoria. Furthermore, the lakes are not stream fed and as such, annual variation in the level of the lake indicates the influence of groundwater drainage.
- Fawthrop Lagoon
 - Considered a site of local significance (VRO n.d.). Although highly disturbed, the lagoon is an indicator of former estuarine conditions and still provides some habitat for rare and threatened waterbirds species.

Impacts to aquatic, estuarine or marine ecosystems are relevant to both the Commonwealth and State biodiversity legislation. Avoiding wetlands and waterways should be a focus at the design stage to reduce the project's overall impacts by locating as much of the terrestrial impact footprint as possible within existing cleared land including plantations and through utilising existing transmission infrastructure.

4.4 Other ecological values

The study area contains 20 pieces of public land considered likely to be of significant ecological value including flora reserves, bushland reserves, wildlife reserves, flora & fauna reserves, natural features reserves, nature conservation reserves and state forests (Figure 3). Five of these are included within the *National Parks Act 1975*, including:

- Cape Nelson State Park
- Cobboboonee National Park
- Discovery Bay Coastal Park
- Discovery Bay Marine National Park
- Mount Richmond National Park

Other pieces of public land likely to be of significance include:

- Bolwarra H43 and H44 Bushland Reserve
- Cape Nelson Lighthouse Reserve
- Cobboboonee Forest Park
- Gorae Bushland Reserve
- Heywood Bushland Reserve
- Lawrence Rocks Wildlife Reserve
- Narrawong Flora Reserve
- Nelson Bay Coastal Reserve
- Nine Mile Flora and Fauna Reserve
- Portland H46 and H47 Bushland Reserve
- Tarragal Education Area
- Trewalla H48 and H49 Bushland Reserve

4.5 Fauna habitat (Terrestrial, freshwater aquatic, coastal and offshore)

4.5.1 Terrestrial, freshwater aquatic and coastal fauna habitat

Land cleared for the purpose of agricultural practices within the study area holds limited ecological value to most fauna, with exceptions being some species of wetland birds and amphibians. However, patches of remnant vegetation may provide important connections between higher quality habitats. The remaining area comprises a range of forest, scrub, woodland, grassland, wetland, heathland and saltmarsh vegetation which is of high ecological value to fauna.

Woodland and forest vegetation may provide suitable habitats for various terrestrial bird species including some that are threatened. In addition, these vegetation types provide habitat for arboreal mammals and reptiles. Scrub and heathland vegetation provides further habitat to a range of ground-dwelling fauna including small mammals, reptiles and birds.

Several wetlands and waterways in the area are of high value to a range of shorebirds and other wetland birds. In particular, the Glenelg Estuary and Discovery Bay Wetlands, is listed as a Ramsar site and provides important habitat for numerous resident and migratory shorebirds and waterbirds. In addition, the Piccaninnie Ponds Karst Wetlands supports a winter roosting population of Orange-bellied Parrot *Neophema chrysogaster*. Fawthrop Lagoon, although disturbed, also provides some habitat for rare and threatened waterbirds species. Wetlands and surrounding waterways throughout the study area also provide habitat for a range of ichthyofauna and other aquatic species.

The coastal habitat throughout the study area may provide habitat for both migratory and resident shorebirds.

4.5.2 Offshore fauna habitat

Although an assessment of marine species is beyond the scope of this report, we include a description of offshore habitat for a complete assessment of the existing environment. The marine environment off south-eastern Australia is considered to be an area of high importance for a large number of marine predators, particularly for a vast number of seabird species that breed and forage within this area (Chambers et al. 2015).

The offshore environment is also likely to provide foraging habitat for several threatened and/or migratory seabirds including various albatross and petrel species. In addition, the offshore environment associated with the study area may also serve as a movement passage and foraging ground for several other marine megafauna, including fur seals, whales, dolphins, sea turtles and sharks.

4.6 Threatened flora

Threatened flora are at a heightened risk of impact during works due to their sedentary nature. Furthermore, important identification characters for many threatened grass and dormant herb species are not present year-round. In general, the risk of significantly impacting threatened flora can be reduced through a combination of detailed assessment and subsequent design response, as well as works controls at the construction stage. Thus, consideration will need to be given to potential habitat for threatened flora species at the detailed design and assessment phase for all works associated with the project.

A 10 kilometre buffered search of the PMST and Victorian biodiversity databases indicates 138 threatened flora species occur, or are predicted to occur, within the search area. These species are provided with likelihood rankings in Appendix 1 (Table A1.2). A total of 99 of these listed flora species are considered to have a medium to high likelihood of occurring within the study area (Table 3). This includes:

- Five (5) flora species listed under the EPBC Act only
- Twelve (12) flora species listed under both the EPBC Act and FFG Act
- Eighty-two (82) flora species listed under the FFG Act only.

Threatened flora records within the study area are shown in Figure 4.

Areas of greatest value for threatened flora species within the study area are:

- Bridgewater Lakes and the surrounding Discovery Bay Coastal Park vegetation. Known to support populations of Coast Ballart *Exocarpus syrticola* (FFG e), Leafy Greenhood *Pterostylis cucullata* subsp. *cucullata* (FFG e) and Coast Helmet Orchid *Corybas despectans* (FFG e).
- Point Danger Coastal Reserve. Known to support populations of Mellblom's Spider Orchid *Caladenia hastata* (EPBC EN, FFG cr), Shiny Tea-tree *Leptospermum turbinatum* (FFG e) and Oval-leaf *Logania ovata* (FFG e).
- Cobboboonee National Park. Known to support populations of Swamp Fireweed *Senecio psilocarpus* (EPBC VU) and Western Peppermint *Eucalyptus falciformis* (FFG v).

Table 3 Summary of EPBC and FFG Act listed flora species most likely to occur in the study area

Common name	Scientific name	Conservation status	
		EPBC	FFG
River Swamp Wallaby-grass	<i>Amphibromus fluitans</i>	VU	
Limestone Spider-orchid	<i>Caladenia calcicole</i>	VU	cr
Colourful Spider-orchid	<i>Caladenia colorata</i>	EN	cr
Mellblom's Spider-orchid	<i>Caladenia hastata</i>	EN	cr
Ornate Pink-fingers	<i>Caladenia ornate</i>	VU	e
Wrinkled Cassinia	<i>Cassinia rugata</i>	VU	cr
Clover Glycine	<i>Glycine latrobeana</i>	VU	v
Coast Ixodia	<i>Ixodia achillaeoides</i> subsp. <i>arenicola</i>	VU	
Maroon Leek-orchid	<i>Prasophyllum frenchii</i>	EN	e
Dense Leek-orchid	<i>Prasophyllum spicatum</i>	VU	cr
Green-striped Greenhood	<i>Pterostylis chlorogramma</i>	VU	e
Leafy Greenhood	<i>Pterostylis cucullata</i> subsp. <i>cucullata</i>	VU	
Swamp Greenhood	<i>Pterostylis tenuissima</i>	VU	
Swamp Fireweed	<i>Senecio psilocarpus</i>	VU	
Coast Dandelion	<i>Taraxacum cygnorum</i>	VU	cr
Metallic Sun-orchid	<i>Thelymitra epipactoides</i>	EN	e
Swamp Everlasting	<i>Xerochrysum palustre</i>	VU	cr
Broad-leaf Prickly Moses	<i>Acacia verticillata</i> subsp. <i>ruscifolia</i>		e
Coast Ground-berry	<i>Acrotriche cordata</i>		e
Coast Bitter-bush	<i>Adriana quadripartite</i>		e
Silver Everlasting	<i>Argentipallium dealbatum</i>		e
Glistening Saltbush	<i>Atriplex billardierei</i>		x
Neat Spear-grass	<i>Austrostipa mundula</i>		e
Velvet Apple-berry	<i>Billardiera scandens</i> s.s.		e
Hairy Boronia	<i>Boronia pilosa</i> subsp. <i>torquata</i>		e
Wiry Bossiaea	<i>Bossiaea cordigera</i>		e
Lizard Orchid	<i>Burnettia cuneata</i>		e
Limestone Ridge Spider-orchid	<i>Caladenia bicalliata</i> subsp. <i>bicalliata</i>		e
Christmas Spider-orchid	<i>Caladenia flavovirens</i>		cr
Scented Spider-orchid	<i>Caladenia fragrantissima</i>		cr
Robust Spider-orchid	<i>Caladenia valida</i>		cr
Large White Spider-orchid	<i>Caladenia venusta</i>		e

Common name	Scientific name	Conservation status	
		EPBC	FFG
Slender Pink-fingers	<i>Caladenia vulgaris</i>		v
Forest Bitter-cress	<i>Cardamine papillata</i>		e
Curly Sedge	<i>Carex tasmanica</i>		e
Leafy Twig-sedge	<i>Cladium procerum</i>		e
Coast Colobanth	<i>Colobanthus apetalus</i> var. <i>apetalus</i>		e
Pale Swamp Everlasting	<i>Coronidium gunnianum</i>		cr
Velvet White Correa	<i>Correa alba</i> var. <i>pannosa</i>		e
Tiny Midge-orchid	<i>Corunastylis nuda</i>		v
Coast Helmet-orchid	<i>Corybas despectans</i>		e
Late Helmet-orchid	<i>Corybas</i> sp. aff. <i>diemenicus</i> (Coastal)		cr
Spotted Hyacinth-orchid	<i>Dipodium pardalinum</i>		e
Swamp Diuris	<i>Diuris palustris</i>		e
Coast Gum	<i>Eucalyptus diversifolia</i> subsp. <i>megacarpa</i>		v
Western Peppermint	<i>Eucalyptus falciformis</i>		v
Bog Gum	<i>Eucalyptus kitsoniana</i>		cr
Apple Jack	<i>Eucalyptus splendens</i>		cr
Coast Ballart	<i>Exocarpos syrticola</i>		e
Tight Bedstraw	<i>Galium curvihirtum</i>		v
Western Golden-tip	<i>Goodia medicaginea</i>		e
Silky Golden-tip	<i>Goodia pubescens</i>		e
Dwarf Brooklime	<i>Gratiola pumilo</i>		e
Small-flower Grevillea	<i>Grevillea micrantha</i>		cr
Eichler's Raspwort	<i>Haloragis eichleri</i>		v
Prickly Raspwort	<i>Haloragis myriocarpa</i>		e
Pale Guinea-flower	<i>Hibbertia pallidiflora</i>		e
Tufted Club-sedge	<i>Isolepis wakefieldiana</i>		e
Rough Blown-grass	<i>Lachnagrostis rudis</i> subsp. <i>rudis</i>		e
Drooping Velvet-bush	<i>Lasiopetalum schulzenii</i>		cr
Hoary Rapier-sedge	<i>Lepidosperma canescens</i>		e
Shiny Tea-tree	<i>Leptospermum turbinatum</i>		e
Slender Stylewort	<i>Levenhookia sonderi</i>		e
Showy Lobelia	<i>Lobelia beaugleholei</i>		v
Oval-leaf Logania	<i>Logania ovata</i>		e
Lax Twig-sedge	<i>Machaerina laxa</i>		e
Salt Paperbark	<i>Melaleuca halmaturorum</i>		e
Hairy Shepherd's Purse	<i>Microlepidium pilosulum</i>		cr
Swamp Onion-orchid	<i>Microtis orbicularis</i>		e
Coastal Lignum	<i>Muehlenbeckia gunnii</i>		e
Rough Daisy-bush	<i>Olearia asterotricha</i>		e
Lax Marsh-flower	<i>Ornduffia umbricola</i> var. <i>umbricola</i>		e
Forked Rice-flower	<i>Pimelea hewardiana</i>		e
Lime Fern	<i>Pneumatopteris pennigera</i>		e

Common name	Scientific name	Conservation status	
		EPBC	FFG
Coast Fescue	<i>Poa billardierei</i>		e
Scaly Poa	<i>Poa fax</i>		e
Dwarf Coast Poa	<i>Poa halmaturina</i>		e
Dune Poa	<i>Poa poiformis</i> var. <i>ramifer</i>		e
Coastal Leek-orchid	<i>Prasophyllum littorale</i>		cr
Leafy Greenhood	<i>Pterostylis cucullata</i> subsp. <i>cucullata</i>		e
Long-tongue Shell-orchid	<i>Pterostylis dolichochila</i>		cr
Small Sickle Greenhood	<i>Pterostylis lustra</i>		e
Coast Bush-pea	<i>Pultenaea canaliculata</i>		e
Otway Bush-pea	<i>Pultenaea prolifera</i>		e
Coast Twin-leaf	<i>Roepera billardierei</i>		e
Coast Saltwort	<i>Salsola tragus</i> subsp. <i>pontica</i>		e
Dune Fan-flower	<i>Scaevola calendulacea</i>		e
Wiry Bog-sedge	<i>Schoenus carsei</i>		e
Small Bog-sedge	<i>Schoenus deformis</i>		v
Branching Scale-rush	<i>Sporadanthus tasmanicus</i>		e
Clustered Lily	<i>Thelionema umbellatum</i>		v
Blotched Sun-orchid	<i>Thelymitra benthamiana</i>		e
Winter Sun-orchid	<i>Thelymitra hiemalis</i>		cr
Inflated Sun-orchid	<i>Thelymitra inflata</i>		e
Coast Speedwell	<i>Veronica hillebrandii</i>		e
Tiny Violet	<i>Viola sieberiana</i> s.s.		e
One-flower Early Nancy	<i>Wurmbea uniflora</i>		v
Parsley Xanthosia	<i>Xanthosia leiophylla</i>		e
Southern Xanthosia	<i>Xanthosia tasmanica</i>		e

4.6.1 Nationally significant flora

The 17 nationally listed species considered most likely to occur within the search area occupy a range of habitats.

Ten of the 17 nationally listed species most likely to occur are terrestrial orchids; including Spider Orchids *Caledinia* spp., Leek-Orchids *Prasophyllum* spp., Greenhood Orchids *Pterostylis* spp. and Sun Orchids *Thelymitra* sp. Terrestrial orchids are cryptic species, emerging from the ground and flowering for only short periods of time each year (if climate conditions are suitable). To identify the extent of these species throughout the study area, highly targeted and well-timed assessments are necessary. Where this is not possible, proposed impacts should avoid areas with recent and historic records and all suitable habitat (as determined by field validation of existing vegetation).

Amongst the species most likely to occur in the study area are Swamp Fireweed *Senecio psilocarpus* and River Swamp Wallaby-grass *Amphibromus fluitans*. Correct identification to species is difficult and relies on the presence of characters that may appear for only a short period of time.

Wrinkled Cassinia *Cassinia rugata* is a nationally listed species with a restricted distribution in Victoria. It can be found in just a few heathland and riparian woodland sites near Portland. Similarly Coast Ixodia *Ixodia*

achillaeoides arenicola is restricted to the coast near Portland. Given the restricted nature of this distribution, impacts on this species should be avoided wherever possible.

Where impacts within suitable habitat for any EPBC Act listed species is unavoidable it is highly likely that targeted surveys will be required to support an assessment of the potential for significant impact on matters of national environmental significance (MNES).

4.6.2 State significant flora

The FFG Act listed flora modelled to occur within the study area cover a range of lifeforms including Orchids, Graminoids, Shrubs and trees species and occur in a range of habitat throughout the study area. Of the 82 FFG listed flora that are most likely to occur within the study area, 13 are listed as critically endangered and are facing a high risk of extinction in Victoria.

Proposed works should be planned / altered to avoid impacting all threatened species where possible, and to mitigate the impacts where they cannot be avoided. Particular attention should be paid to critically endangered flora, given they are at the highest risk of extinction in Victoria.

Due to the large number of FFG Act listed flora species and the breadth of habitats that these species occupy, it is likely that several of these species will need to be considered further. This will require detailed flora assessments to determine the extent of each species throughout the study area.

4.7 Threatened fauna

A 10 kilometre buffered search of the PMST and Victorian databases indicates 141 threatened fauna species occur, or are predicted to occur, in the search area (the study area buffered by 10 kilometres) (Appendix B). A total of 105 of these fauna species are considered to have a medium or higher likelihood of occurring within the study area (Appendix B). This includes:

- Fourteen (14) fauna species listed under the EPBC Act only
- Forty-one (41) fauna species listed under the EPBC Act and FFG Act
- Fifty (50) fauna species listed under the FFG Act only.

Threatened fauna records within the study area are shown in Figure 5.

Threatened fauna have the potential to be impacted during both construction and operational phases of the project. Hollow-dependent fauna, sedentary fauna or fauna with relatively defined ecological niches and / or small home ranges are considered most likely to be impacted during on shore works during the construction phase of the project due to their ecology and habitat requirements and the nature of the proposed activities, which may involve habitat loss and disturbance. Highly mobile and/or volant marine fauna (i.e. species that primarily fly or glide) such as seabirds and potentially shorebirds, are most likely to be impacted during the operational phase as their aerial movements place them at risk of collision with wind turbines. In addition, mobile terrestrial species may also be impacted during the construction phase if foraging or roosting/nesting habitat is directly or indirectly affected.

Threatened fauna which are considered likely to occur within the study area may warrant further consideration during the detailed designs, assessment and approvals phase of the project. These species occupy a variety of habitats ranging from wetlands, saltmarshes and coastal dunes, to forests, woodlands and heathlands as well as open ocean environments. This also places species at different levels of risk in relation to the various aspects of the proposed development. As such, further discussion of threatened fauna considered likely to occur within the study area, is provided under the following sub-headings:

- Avifauna (including terrestrial birds and shorebirds)

- Other terrestrial and aquatic fauna
- Marine fauna (including seabirds, marine mammals, sea fishes and marine reptiles)

4.7.1 Avifauna

For the purpose of this report, avifauna are discussed separately as, terrestrial birds (all species occupying terrestrial habitats) and shorebirds (marine and freshwaters waders, wetland birds and terns).

Terrestrial birds

A total of five nationally listed and 11 state listed terrestrial avifauna species are considered to have a medium or higher likelihood of occurring within the study area (Table 4). Four of the national listed species are also state listed.

Impacts to terrestrial birds are likely to arise during the construction stage, particularly if the construction of transmission line infrastructure results in the disturbance of, or the removal of suitable habitat. Threatened terrestrial birds in the study area occupy a range of habitat types, and careful consideration should be given to the impacts on individual species, associated with habitat loss.

On and offshore wind energy projects usually pose a particular threat to avifauna given the risk of collisions with turbines. The positioning of wind turbines offshore places them well outside of the flight range of many terrestrial birds and as such collision risks during the operational phase may be considered negligible for most of these species.

However, there is a concern for terrestrial birds which are known to traverse the marine environment when migrating between mainland Australia and Tasmania. Species of particular concern include Orange-bellied Parrot *Neophema chrysogaster*, Swift Parrot *Lathamus discolor* and White-throated Needletail *Hirundapus caudacutus*. Although, rough timelines for arrival and departure have been documented, there is still a paucity of information on the migratory routes taken across the marine environment, and the flight heights during these large-scale movements. As such, it is not possible to discount the effects of an offshore wind project on these species, and further consideration is warranted.

These and other non-listed species are collectively termed Bass Strait migrants and are discussed further in Section 4.8 Migratory fauna.

Table 4 Threatened terrestrial bird species most likely to occur within the on and offshore study area

Common name	Species name	Conservation status	
		EPBC	FFG
Red-tailed Black-Cockatoo (south-eastern)	<i>Calyptorhynchus banksii graptogyne</i>	EN	e
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	EN	
Orange-bellied Parrot	<i>Neophema chrysogaster</i>	CR	cr
Swift Parrot	<i>Lathamus discolor</i>	CR	cr
White-throated Needletail	<i>Hirundapus caudacutus</i>	VU	v
Grey Goshawk	<i>Accipiter novaehollandiae</i>		e
Little Eagle	<i>Hieraetus morphnoides</i>		v
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>		e
Black Falcon	<i>Falco subniger</i>		cr
Barking Owl	<i>Ninox connivens</i>		cr
Powerful Owl	<i>Ninox strenua</i>		v

Common name	Species name	Conservation status	
		EPBC	FFG
Masked Owl	<i>Tyto novaehollandiae</i>		cr
Ground Parrot	<i>Pezoporus wallicus</i>		e
Chestnut-rumped Heathwren	<i>Calamanthus pyrrhopygius</i>		v
Diamond Firetail	<i>Stagonopleura guttata</i>		v
Rufous Bristlebird (Coorong)	<i>Dasyornis broadbenti broadbenti</i>		e

Shorebirds, wetland birds and terns

For the purposes of this report, marine waders, wetland birds and terns are discussed under one section, considering that many of the species often overlap in their use of coastal and freshwater aquatic habitats.

A total of nine nationally listed and 25 state listed shorebird species are considered to have a medium or higher likelihood of occurring within the study area (Table 5). Of the nine nationally listed species, seven are also state listed. Eighteen of these threatened shorebird and tern species are also listed as migratory.

Impacts to most of these birds are likely to occur during the construction stage, particularly if the construction of infrastructure impacts the integrity of surrounding wetlands and waterways which provide critical habitat for a number of these species. Onshore cable routing may also pose a threat to shorebird species that are known to occur along the coastal regions of the study area. Particular shorebird hotspots within the study area include Glenelg Estuary and Discovery Bay wetlands complex which is a Ramsar site and globally recognised as an important habitat for resident and migratory shorebirds.

Impacts to migratory shorebirds during the operational phase of the wind project is an important consideration. Migratory shorebirds may be at risk of collisions with wind turbines, especially during their departure and arrival. The offshore location of wind turbines may place them well beyond the departure and arrival ranges of migratory shorebirds. However, given their mobility and our relatively poor understanding of migration routes and flight heights, migratory shorebirds cannot be discounted from occurring within the study area and may require further consideration during the detailed design and assessment stage of the project.

Table 5 Threatened shorebird, wetland bird and tern species most likely to occur within the study area

Common name	Species name	Conservation status	
		EPBC	FFG
Australian Painted-snipe	<i>Rostratula australis</i>	EN	cr
Australasian Bittern	<i>Botaurus poiciloptilus</i>	EN	cr
Australian Fairy Tern	<i>Sternula nereis nereis</i>	VU	
Bar-tailed Godwit (baueri)	<i>Limosa lapponica baueri</i>	VU, Migratory	
Hooded Plover	<i>Thinornis cucullatus</i>	VU	v
Eastern Curlew	<i>Numenius madagascariensis</i>	CR, Migratory	cr
Curlew Sandpiper	<i>Calidris ferruginea</i>	CR, Migratory	cr
Red Knot	<i>Calidris canutus</i>	EN, Migratory	e
Great Knot	<i>Calidris tenuirostris</i>	CR, Migratory	cr
Lewin's Rail	<i>Lewinia pectoralis</i>		v
Brolga	<i>Antigone rubicunda</i>		e
Little Egret	<i>Egretta garzetta</i>		e

Common name	Species name	Conservation status	
		EPBC	FFG
Eastern Great Egret	<i>Ardea alba modesta</i>		v
Australian Little Bittern	<i>Ixobrychus dubius</i>		e
Magpie Goose	<i>Anseranas semipalmata</i>		v
Australasian Shoveler	<i>Spatula rhynchotis</i>		v
Freckled Duck	<i>Stictonetta naevosa</i>		e
Hardhead	<i>Aythya australis</i>		v
Blue-billed Duck	<i>Oxyura australis</i>		v
Musk Duck	<i>Biziura lobata</i>		v
Australian Gull-billed Tern	<i>Gelochelidon macrotarsa</i>		e
Caspian Tern	<i>Hydroprogne caspia</i>	Migratory	v
Little Tern	<i>Sternula albifrons</i>	Migratory	cr
Ruddy Turnstone	<i>Arenaria interpres</i>	Migratory	e
Grey Plover	<i>Pluvialis squatarola</i>	Migratory	v
Pacific Golden Plover	<i>Pluvialis fulva</i>	Migratory	v
Whimbrel	<i>Numenius phaeopus</i>	Migratory	e
Wood Sandpiper	<i>Tringa glareola</i>	Migratory	e
Grey-tailed Tattler	<i>Tringa brevipes</i>	Migratory	cr
Common Sandpiper	<i>Actitis hypoleucos</i>	Migratory	v
Common Greenshank	<i>Tringa nebularia</i>	Migratory	e
Marsh Sandpiper	<i>Tringa stagnatilis</i>	Migratory	e
Terek Sandpiper	<i>Xenus cinereus</i>	Migratory	e
Black-tailed Godwit	<i>Limosa limosa</i>	Migratory	cr

4.7.2 Other terrestrial and aquatic fauna

A total of 13 nationally listed and 11 state listed, non-avian fauna are considered to have a medium of higher likelihood of occurring within the study area (Table 6). All 13 nationally listed species are also state listed. These species include terrestrial ground-dwelling and arboreal species, and species inhabiting freshwater streams and waterbodies throughout the study area.

The construction and operation of offshore wind turbines is unlikely to pose any inherent risk to these terrestrial fauna. However, impacts to the terrestrial environment and waterbodies throughout the local area associated with the construction of a substation and routing of transmission lines is likely to warrant consideration. Removal and impact to large trees and native vegetation may impact roosting and foraging habitat for arboreal species such as Grey-headed Flying-fox *Pteropus poliocephalus* and Southern Bent-winged Bat *Miniopterus orianae bassanii*.

In addition, under boring or trenching activities associated with cable routing may impact the habitat of ground-dwelling fauna such as Swamp Antechinus *Antechinus minimus maritimus*, Long-nosed Potoroo *Potorous tridactylus trisulcatus*, Heath Mouse *Pseudomys shortridgei* and Southern Brown Bandicoot *Isodon obesulus obesulus* potentially through habitat removal or fragmentation.

Wetlands and waterways within the study area and surrounds are likely to provide important habitat for the nationally listed Growling Grass Frog *Litoria raniformis* as well as several EPBC listed ichthyofauna and aquatic invertebrate species. In addition to habitat removal and possible fragmentation, any indirect impacts to

aquatic habitats associated with the works during the developmental phase (e.g. runoff, altering of the natural course of waterways, etc.) should also be taken into consideration.

Consistent with nationally significant terrestrial and aquatic fauna, some state listed species, particularly those which are sedentary or have specific habitat requirements have the potential to be impacted during the development phase of the project. On public land, DELWP has a duty under the FFG Act to consider the objectives of FFG Act, Biodiversity 2037 targets (DELWP 2017), action statements, potentially threatening processes (i.e. loss of hollow-bearing trees or coarse woody debris), critical habitat determinations and management plans made under the Act. Whilst approvals for impacts to FFG Act fauna habitat and communities are currently not required under the FFG Act, impacts will be considered by DELWP and the Responsible Authority in determining a response to any application for vegetation removal under Clause 52.17 (Native Vegetation) of the relevant planning scheme as part of any approval for future development of the site.

Table 6 Other threatened, non-avian terrestrial and freshwater aquatic species most likely to occur within the onshore study area

Common name	Species name	Conservation status	
		EPBC	FFG
Spot-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	EN	e
Swamp Antechinus	<i>Antechinus minimus maritimus</i>	VU	v
Long-nosed Potoroo	<i>Potorous tridactylus trisulcatus</i>	VU	v
Heath Mouse	<i>Pseudomys shortridgei</i>	EN	e
Southern Brown Bandicoot	<i>Isodon obesulus obesulus</i>	EN	e
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	VU	v
Southern Bent-winged Bat (southern ssp.)	<i>Miniopterus orianae bassanii</i>	CR	cr
Growling Grass Frog	<i>Litoria raniformis</i>	VU	v
Australian Grayling	<i>Prototroctes maraena</i>	VU	e
Dwarf Galaxias	<i>Galaxiella pusilla</i>	VU	e
Yarra Pygmy Perch	<i>Nannoperca obscura</i>	VU	v
Variiegated Pygmy Perch	<i>Nannoperca variegata</i>	VU	e
Glenelg Spiny Crayfish	<i>Euastacus bispinosus</i>	EN	e
White-footed Dunnart	<i>Sminthopsis leucopus</i>		v
Platypus	<i>Ornithorhynchus anatinus</i>		v
Striped Worm-Lizard	<i>Aprasia striolata</i>		e
Bearded Dragon	<i>Pogona barbata</i>		v
Swamp Skink	<i>Lissolepis coventryi</i>		e
Southern Toadlet	<i>Pseudophryne semimarmorata</i>		e
Little Galaxias	<i>Galaxiella toourtkoourt</i>		e
Ancient Greenling Damselfly	<i>Hemiphysalia mirabilis</i>		e
Southern Hooded Shrimp	<i>Athanopsis australis</i>		e
Portland Burrowing Crayfish	<i>Engaeus strictifrons</i>		e
Hairy Burrowing Crayfish	<i>Engaeus sericatus</i>		v

4.7.3 Marine fauna

Database searches identified a total of 28 nationally listed and three state listed marine fauna which are considered to have a medium or higher likelihood of occurrence within the proposed offshore area. Potential impacts to marine fauna, including seabirds, marine mammals, marine reptiles and fishes are beyond the scope of this report and these assessments have been undertaken by BMT. However, to provide a more complete assessment of the existing environment, marine species are briefly discussed below.

Seabirds are of particular concern as there is a risk of collision with wind turbines. A total of 15 nationally listed and two state listed seabird species are considered likely to occur within the study area (Table 7). Of the 15 nationally listed species, nine are also state listed. Of these 17 seabird species, 12 are also listed as migratory. The proposed area thus has the potential to overlap with the at-sea distributions of 12 threatened Albatross species and five threatened Procellariidae (Petrels and Shearwaters) that are EPBC Act listed.

The marine environment off Portland is known to provide productive foraging habitats for a number of seabird species. In addition to the listed threatened seabird species, additional seabirds that may warrant further attention include:

- Australasian Gannet *Morus serrator* – The species breeds has breeding colonies at Point Danger and Lawrence Rocks, both of which are located within the search area.
- Short-tailed shearwater *Ardenna tenuirostris* – The most numerically abundant seabird species in south-eastern Australia which has a breeding colony at Griffith Island in Port Fairy, approximately 50 kilometres from the search area

Given the high mobility and dispersal capabilities of seabirds, particularly outside of the breeding period, it is highly likely that range of these and other species may overlap with the offshore component of the study area.

Table 7 Threatened seabird species most likely to occur within the offshore study area

Common name	Species name	Conservation status	
		EPBC	FFG
Fairy Prion (southern)	<i>Pachyptila turtur subantarctica</i>	VU	
Soft-plumaged Petrel	<i>Pterodroma mollis</i>	VU	
Gould's Petrel	<i>Pterodroma leucoptera</i>	EN	
Blue Petrel	<i>Halobaena caerulea</i>	VU	
Wandering Albatross	<i>Diomedea exulans</i>	VU, Migratory	cr
Black-browed Albatross	<i>Thalassarche melanophris</i>	VU, Migratory	
Indian Yellow-nosed Albatross	<i>Thalassarche carteri</i>	VU, Migratory	e
Grey-headed Albatross	<i>Thalassarche chrysostoma</i>	EN, Migratory	e
Shy Albatross	<i>Thalassarche cauta</i>	EN, Migratory	e
Sooty Albatross	<i>Phoebetria fusca</i>	VU, Migratory	cr
Southern Giant-Petrel	<i>Macronectes giganteus</i>	EN, Migratory	e
Buller's Albatross	<i>Thalassarche bulleri</i>	VU, Migratory	e
Northern Giant-Petrel	<i>Macronectes halli</i>	VU, Migratory	e
Southern Royal Albatross	<i>Diomedea epomophora</i>	VU, Migratory	cr
White-capped Albatross	<i>Thalassarche steadi</i>	VU, Migratory	
White-faced Storm-Petrel	<i>Pelagodroma marina</i>		e
Light-mantled Sooty Albatross	<i>Phoebetria palpebrata</i>	Migratory	cr

Database searches also identified a number of other threatened marine megafauna species with the potential to occur within the proposed study area. These species are outside the scope of this report but are included in Table 8 and Appendix 2, along with likelihood estimations.

Of relevance to the proposed study area is the movement patterns of whale species, including Blue Whale *Balaenoptera musculus*, Southern Right Whales *Eubalaena australis* and Southern Humpback Whale *Megaptera novaeangliae*. In addition, the study area may overlap with the distributions of EPBC listed marine fishes such as the Southern Bluefin Tuna *Thunnus maccoyii*, Blue Warehouse *Seriolella brama*, Great White Shark *Carcharodon carcharias* and School Shark *Galeorhinus galeus*. It is also noteworthy that the study area is within travel range of Australian Sea-lion *Neophoca cinerea*, Australian fur seal *Arctocephalus pusillus doriferus* and Long-nosed fur seal *A. forsteri* breeding colonies, with these fur seal species known to forage throughout this area.

Table 8 Threatened marine species most likely to occur within the offshore study area

Common name	Species name	Conservation status	
		EPBC	FFG
Australian Sea-lion	<i>Neophoca cinerea</i>	EN	e
Southern Elephant Seal	<i>Mirounga leonina</i>	VU	
Southern Right Whale	<i>Eubalaena australis</i>	EN	e
Blue Whale	<i>Balaenoptera musculus</i>	EN	e
Southern Humpback Whale	<i>Megaptera novaeangliae australis</i>	VU	cr
Subantarctic Fur Seal	<i>Arctophoca tropicalis</i>	EN	
Green Turtle	<i>Chelonia mydas</i>	VU	
Leathery Turtle	<i>Dermochelys coriacea</i>	EN	cr
Loggerhead Turtle	<i>Caretta caretta</i>	EN	
Southern Bluefin Tuna	<i>Thunnus maccoyii</i>	CD	cd
Great White Shark	<i>Carcharodon carcharias</i>	VU	e
Blue Warehouse	<i>Seriolella brama</i>	CD	cd
School Shark	<i>Galeorhinus galeus</i>	CD	
Long-nosed Fur Seal	<i>Arctophoca forsteri</i>		v

4.8 Migratory species

A 10 km buffered search of the PMST and Victorian databases indicates 86 migratory species that occur or are predicted to occur, within the search area (Appendix 2). In total, 26 of these species are also listed as threatened under national legislation, while a further 14 are listed under state legislation.

Eight of these species are terrestrial avifauna, three of which are known to migrate across the marine environment between Victoria and Tasmania. These three species include White-throated Needletail *Hirundapus caudacutus*, Fork-tailed Swift *Apus pacificus* and Satin Flycatcher *Myiagra cyanoleuca*. Thirty two (32) of the listed migratory species are grouped as shorebirds, wetland birds and terns, which utilise a variety of freshwater aquatic, coastal and offshore habitats (in the case of most tern species).

The remaining migratory fauna are marine species which typically travel extensive distances and are likely to occur within the study area. This includes 27 seabirds, primarily comprising 14 species. Noteworthy is that this includes Short-tailed shearwater *Ardenna tenuirostris*, the most numerically abundant seabird in south-eastern Australia which is known to breed in large numbers at colonies within 50 km of the study area. The 17 remaining migratory fauna are all marine species, comprising various mammals, sharks and sea turtles.

Further assessment of these species is outside the scope of this report, but it is likely that their distributions will overlap with the proposed study area.

4.9 Threatened ecological communities

A 10 km buffered search of the PMST and Victorian databases indicates six nationally listed and two Victorian FFG Act listed threatened ecological communities (TECs) occur, or are predicted to occur, in the search area. Based on the available desktop data all eight TECs are considered likely to occur within the study area. Descriptions of each TEC are provided in Table 9. Modelled occurrences of these TECs are presented in Figure 6.

The EPBC Act listed TECs, Subtropical and Temperate Coastal Saltmarsh and Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological communities typically occur at estuaries. While they are broadly modelled throughout large swathes of the study area, no estuaries occur within the study area. These communities are, therefore, less likely to occur within the study area.

Coastal Moonah Woodland and Western Basalt Plains Grasslands are the only FFG Act listed TECs modelled to occur within the study area. The Coastal Moonah Woodlands are modelled to occur along the coastline near Bridgewater Lakes and further inland, north of Cape Nelson. The extent of Western Basalt Plains Grasslands throughout the study area is restricted to a 20 hectare patch made up of several small, disjunct patches.

Table 9 TECs considered likely to occur within the on and offshore study area

Community Name	Conservation status	Source	Description
National significance			
Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community	Endangered	PMST	An ecological community that encompasses 25 estuaries between the South Australian border and Wilsons Promontory. The community is dominated by obligate estuarine species, but often supports other coastal, estuarine, freshwater and brackish species. The exact species list depends on the estuarine in question and the current hydrological phase (which has an effect on the salinity of water).
Giant Kelp Marine Forests of South East Australia	Endangered	PMST	Giant Kelp are the largest and fastest growing marine plants. The Giant Kelp forests of Australia are predominantly found in temperate south eastern waters. Giant Kelp populations are considered a forest where they form a closed or semi-closed canopy at or below the surface and the water is 8 m or deeper.
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	PMST	A type of Eucalyptus woodland that is restricted to basalt soils on flat to gently undulating terrain. It is typically dominated by a River Red Gum <i>Eucalyptus camaldulensis</i> overstorey and an understorey of sparse shrubs and many species of grasses and herbs. The community also includes areas of derived grassland where the tree canopy has been removed but the diverse understorey remains. This community provides habitat for several EPBC Act listed species including flora and fauna. Changes to hydrology impact the flora species present. For example, prolonged increased water levels may push woody spp. further out and extended dry periods may encourage woody encroachment.

Community Name	Conservation status	Source	Description
Karst springs and associated alkaline fens of the Naracoorte Coastal Plain Bioregion	Endangered	PMST	This is a groundwater dependent ecosystem that occurs in association with tertiary limestone on low lying areas of the Western Victoria and Eastern South Australia coast. Common features include springs, soaks or streams with associated fringing habitat that can support herblands, sedgelands, peatlands and/or shrublands. These systems typically consist of three zones; An open water zone, a submergent zone and a fringe zone. Each zone supports a different suite of aquatic, semi aquatic or terrestrial flora and fauna species.
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	PMST	A part of the lowland temperate grassland of the VVP. This is a geographically limited community, occurring on the basalt plain of Victoria. It is dominated by a ground layer of native tussock-forming perennial grasses and a diverse mix of herb spp. Trees and large shrubs are largely missing from this community. While it appears similar to other, Kangaroo grass <i>Themeda triandra</i> dominated grasslands, it is differentiated by the occurrence of semi-arid elements such as Chenopods. The extent of this community has severely declined from pre 1750s levels and has suffered persistent detrimental change as a result of weed invasion and land clearance. The community is highly variable and species composition can change dramatically depending on the season and climate.
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	PMST	This ecological community occurs in coastal areas under regular or intermittent tidal influence. In southern latitudes (e.g. Victoria) saltmarsh is often the main vegetation-type in the intertidal zone and commonly occurs in association with estuaries. The ecological community consists mainly of salt-tolerant vegetation (halophytes) including: grasses, herbs, sedges, rushes and shrubs. Succulent herbs, shrubs and grasses generally dominate and vegetation is generally of less than 0.5 m height. Many species of non-vascular plants are also found in saltmarsh, including epiphytic algae, diatoms and cyanobacterial mats (DSEWPC 2013).

Community Name	Conservation status	Source	Description
State significance			
Coastal Moonah (<i>Melaleuca lanceolata</i> subsp. <i>lanceolata</i>) Woodland Community	Threatened		This community is an open grassy woodland that is dominated by Moonah and found along parts of the Victorian coastline. Coastal Moonah Woodlands tend to occur on high-level dunes along the coast where soils are strongly alkaline and developed on moderately organic aeolian sands or on dune calcarenites (SAC 2013).
Western (Basalt) Plains Grasslands Community	Threatened		Open grassland community typically found on heavy, winter waterlogged-summer dry, soils. The vegetation is typically dominated by perennial grasses and very few tree or shrub species. Very little of the pre-1750s extent of these communities remains today. What remains is typically highly degraded by weed invasion, clearance and poor management.

4.10 Threatening processes

High-level assessments of the potential of the project to contribute to the listed potentially threatening processes under the FFG Act and listed key threatening processes under the EPBC Act are provided below (DELWP 2016, DAWE 2021). Many of these threatening processes may already be operating in the study area and nearby public land, but will need to be considered in more detail during project design and planning, especially processes that are likely to lead to the spread of weeds and pathogens, and cause habitat fragmentation. The contribution of the project to these threatening processes is primarily associated with:

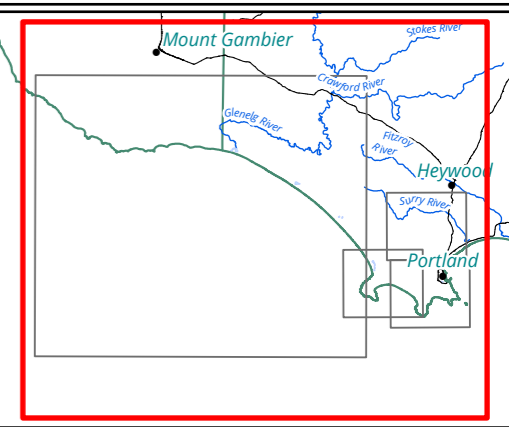
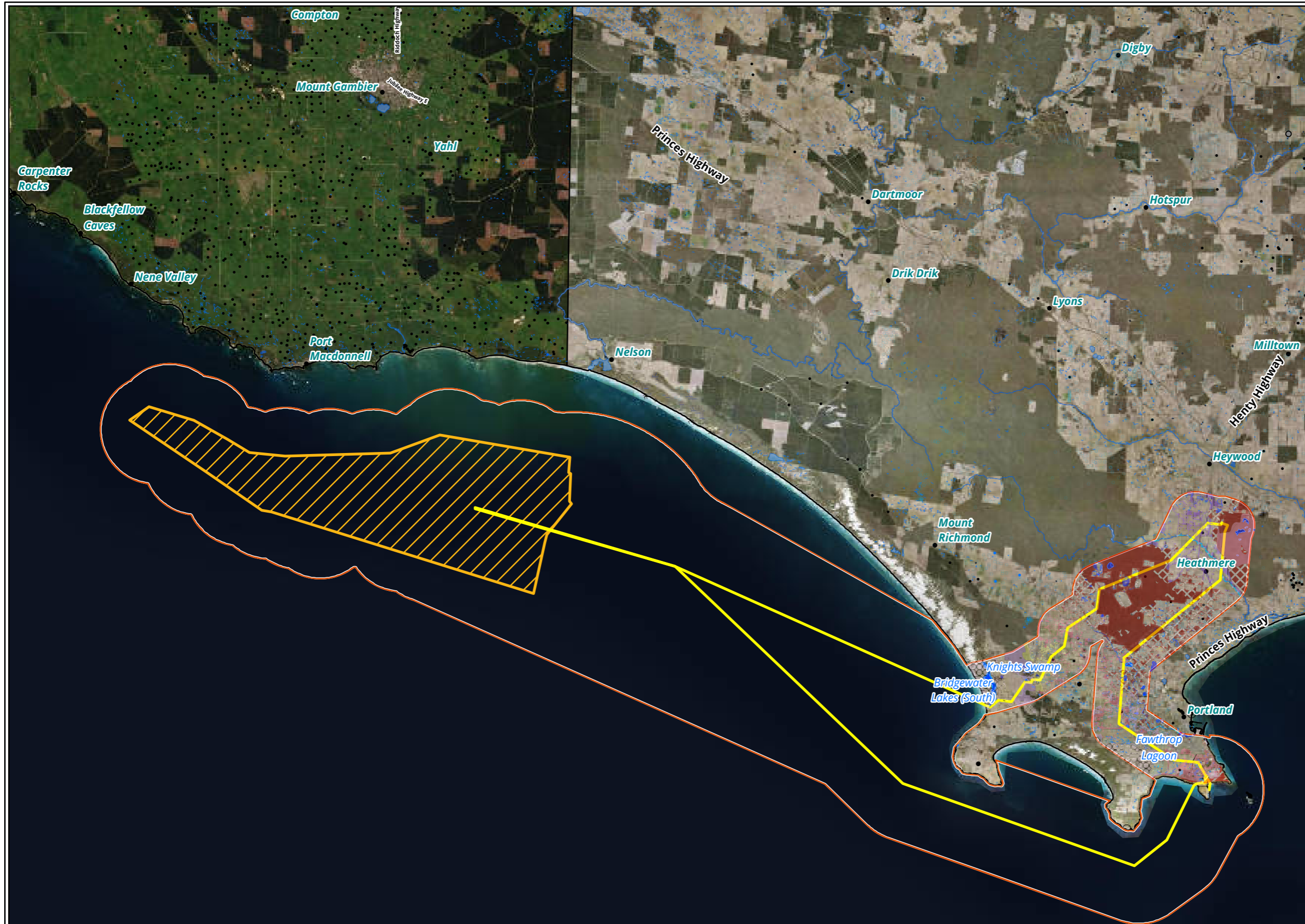
- Potential impacts to terrestrial ecosystems from onshore works including the spread of viruses / diseases and impacts from introduced species.
- Potential impacts to aquatic, estuarine and marine ecosystems from onshore and offshore works in and / or adjacent to these areas.

Potentially threatening processes listed under the EPBC Act (DAWE 2021) and potentially threatening processes, as defined in the FFG Processes List (DELWP 2016), that are either already present or likely to be present within the project area are shown in Table 10:

Table 10 EPBC and FFG threatening processes either already present or likely to be present within the study area

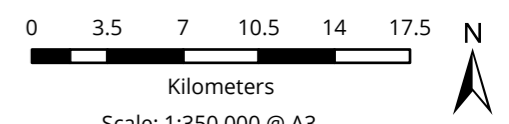
EPBC threatening processes	FFG threatening processes
Aggressive exclusion of birds from potential woodland and forest habitat by over-abundant noisy miners (<i>Manorina melanoccephala</i>)	Alteration to the natural flow regimes of rivers and streams
Competition and land degradation by rabbits	Alteration to the natural temperature regimes of rivers and streams
Competition and land degradation by unmanaged goats	Degradation of native riparian vegetation along Victorian rivers and streams
Dieback caused by the root-rot fungus (<i>Phytophthora cinnamomi</i>)	Habitat fragmentation as a threatening process for fauna in Victoria
Infection of amphibians with chytrid fungus resulting in chytridiomycosis	Increase in sediment input into Victorian rivers and streams due to human activities
Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris	Input of petroleum and related products into Victorian marine and estuarine environments
Land clearance	Input of toxic substances into Victorian rivers and streams
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	Invasion of native vegetation by 'environmental weeds'
Novel biota and their impact on biodiversity	Loss of hollow-bearing trees from Victorian native forests

EPBC threatening processes	FFG threatening processes
Predation by European red fox	Spread of <i>Pittosporum undulatum</i> in areas outside its natural distribution
Predation by feral cats	The discharge of human-generated marine debris into Victorian marine or estuarine waters
Predation, habitat degradation, competition and disease transmission by Feral Pigs	The introduction of exotic organisms into Victorian marine waters
	The spread of <i>Phytophthora cinnamomi</i> from infected sites into parks and reserves, including roadsides, under the control of a state or local government authority
	Use of <i>Phytophthora</i> -infected gravel in construction of roads, bridges and reservoirs
	Wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing



- Legend**
- Study Area
 - Cable route
 - Windfarm area

Figure 2. Overview Modelled EVCs in the Study Area

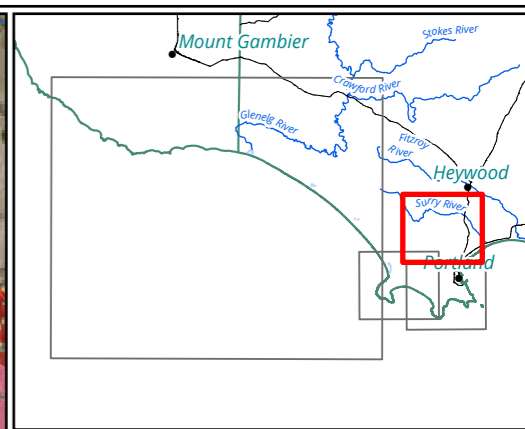
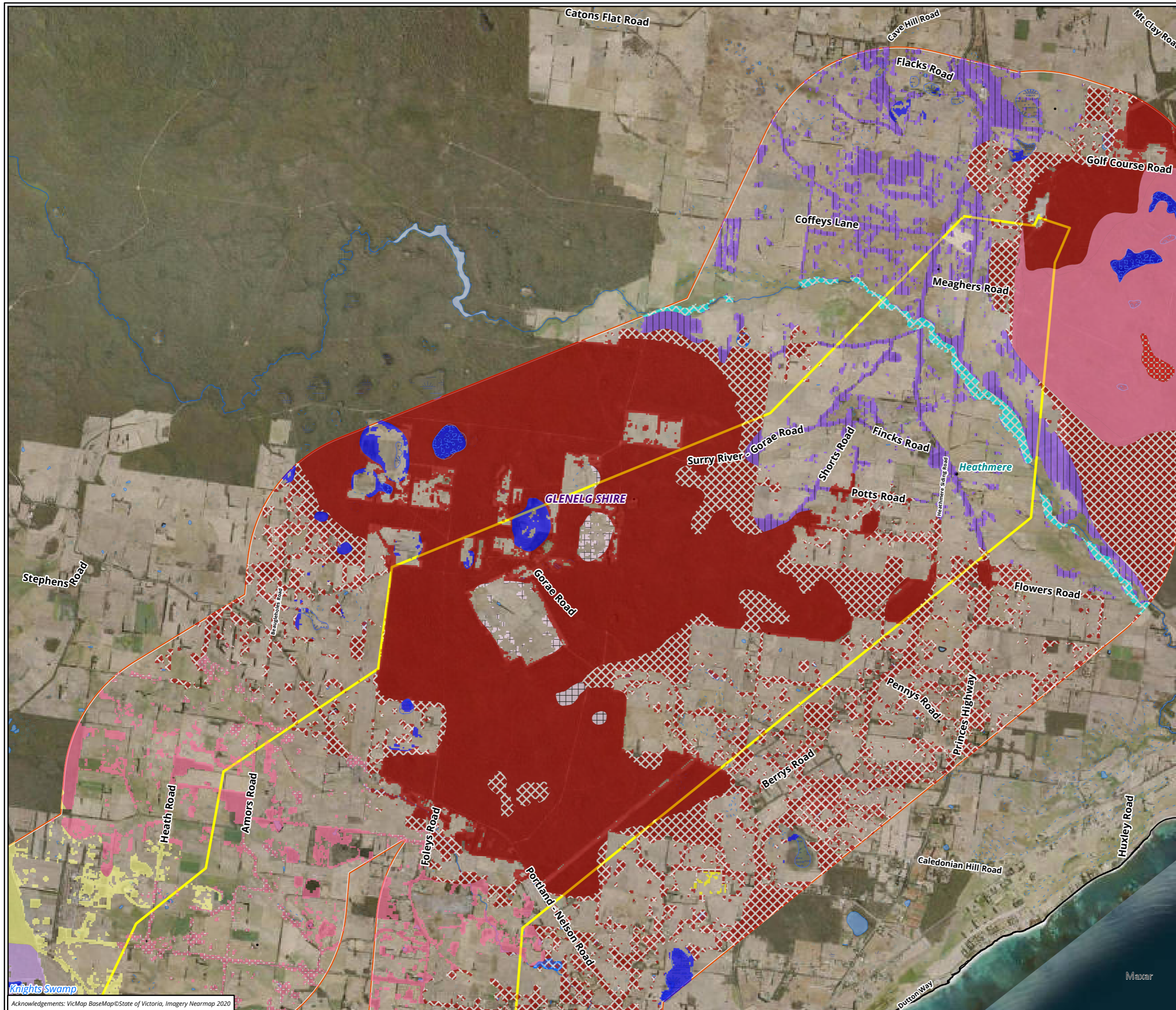


Scale: 1:350,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 54



Matter: 37594,
 Date: 10 October 2022,
 Prepared for: JB, Prepared by: MK, Last edited by: mknudsen
 Layout: 37594_F2_EVC
 Project: P:\37500s\37594\Mapping\
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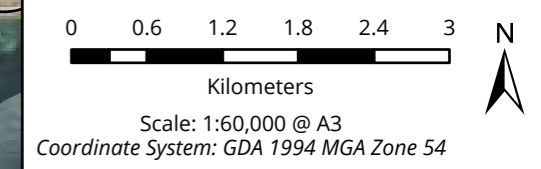
Earthstar Geographics



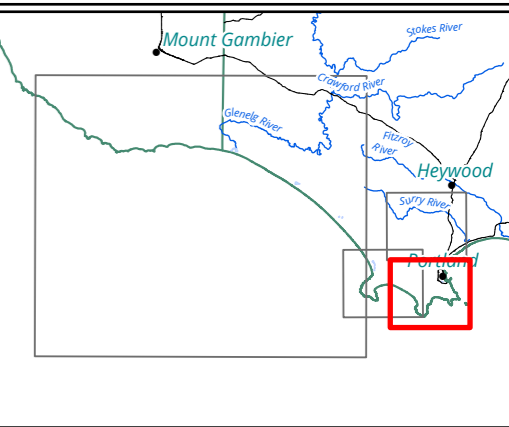
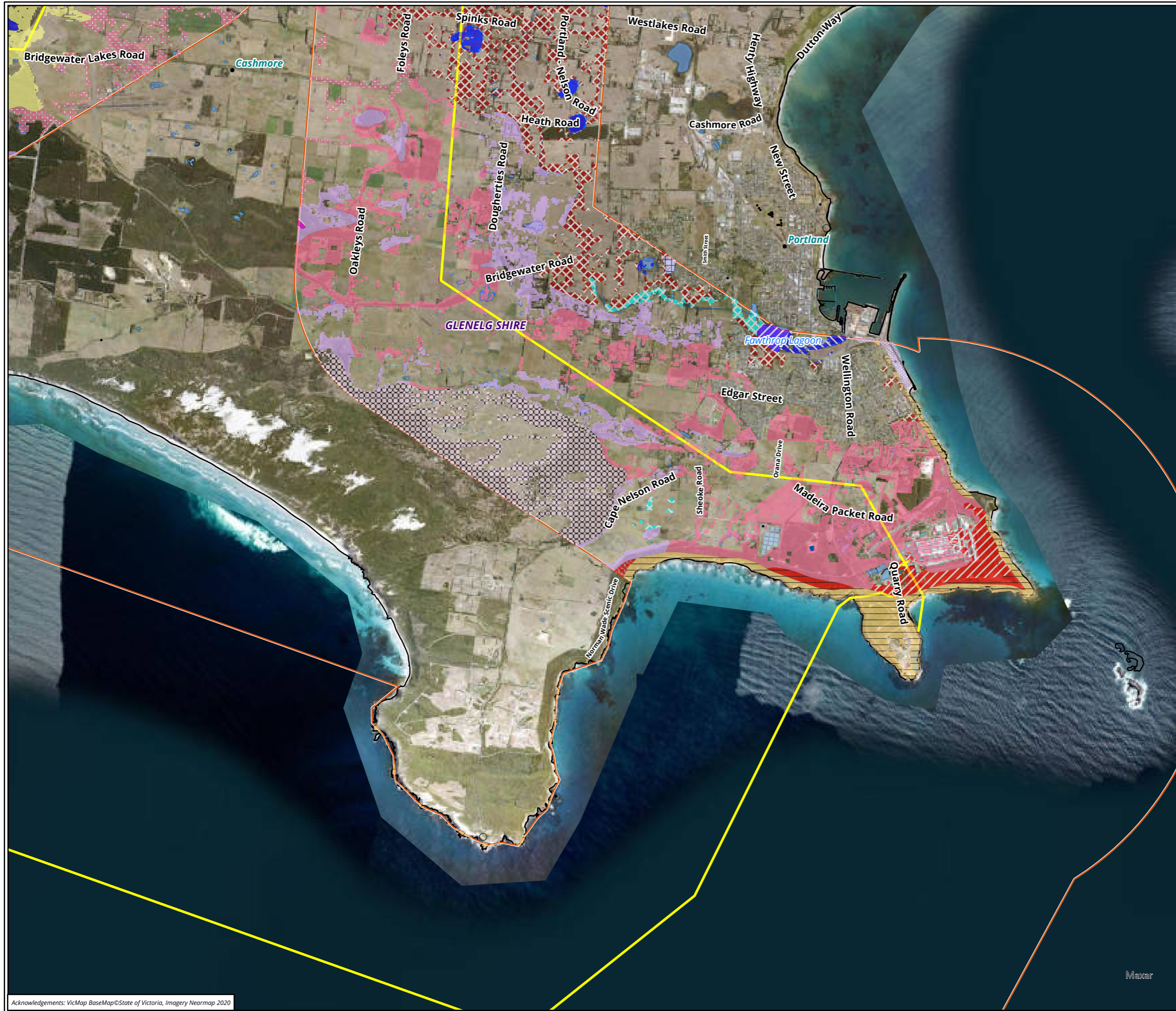
Legend

-  Study Area
-  Cable route
-  Windfarm area
- Ecological vegetation class**
-  132 Plains Grassland
-  16 Lowland Forest
-  198 Sedgy Riparian Woodland
-  200 Shallow Freshwater Marsh
-  23 Herb-rich Foothill Forest
-  3 Damp Sands Herb-rich Woodland
-  48 Heathy Woodland
-  53 Swamp Scrub
-  6 Sand Heathland
-  650 Heathy Woodland/Damp Heathy Woodland/Damp Heathland Mosaic
-  651 Plains Swampy Woodland
-  680 Freshwater Meadow
-  681 Deep Freshwater Marsh
-  713 Damp Sands Herb-rich Woodland/Damp Heathland/Damp Heathy Woodland Mosaic
-  746 Damp Heathland/Damp Heathy Woodland Mosaic

Figure 2.1 Modelled EVCs in the Study Area



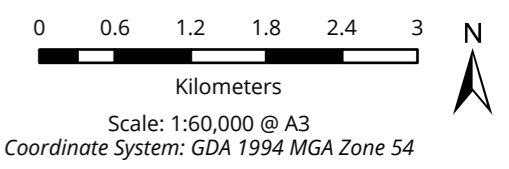
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Legend

- Study Area
- Cable route
- Windfarm area
- Ecological vegetation class**
- 10 Estuarine Wetland
- 161 Coastal Headland Scrub
- 200 Shallow Freshwater Marsh
- 23 Herb-rich Foothill Forest
- 3 Damp Sands Herb-rich Woodland
- 48 Heathy Woodland
- 5 Coastal Sand Heathland
- 53 Swamp Scrub
- 6 Sand Heathland
- 650 Heathy Woodland/Damp Heathy Woodland/Damp Heathland Mosaic
- 664 Limestone Ridge Woodland
- 680 Freshwater Meadow
- 681 Deep Freshwater Marsh
- 684 Permanent Saline
- 746 Damp Heathland/Damp Heathy Woodland Mosaic
- 762 Damp Heathland/Sand Heathland Mosaic
- 797 Coastal Landfill/Sand Accretion
- 858 Coastal Alkaline Scrub
- 876 Spray-zone Coastal Shrubland

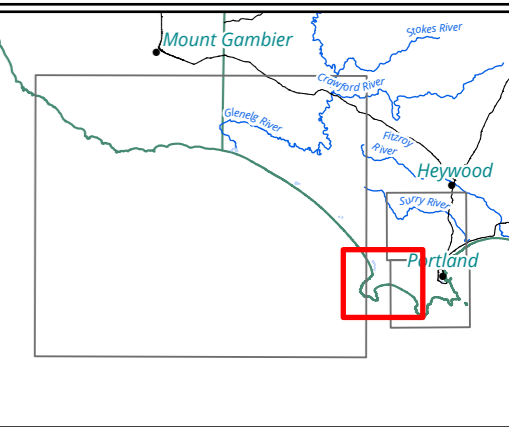
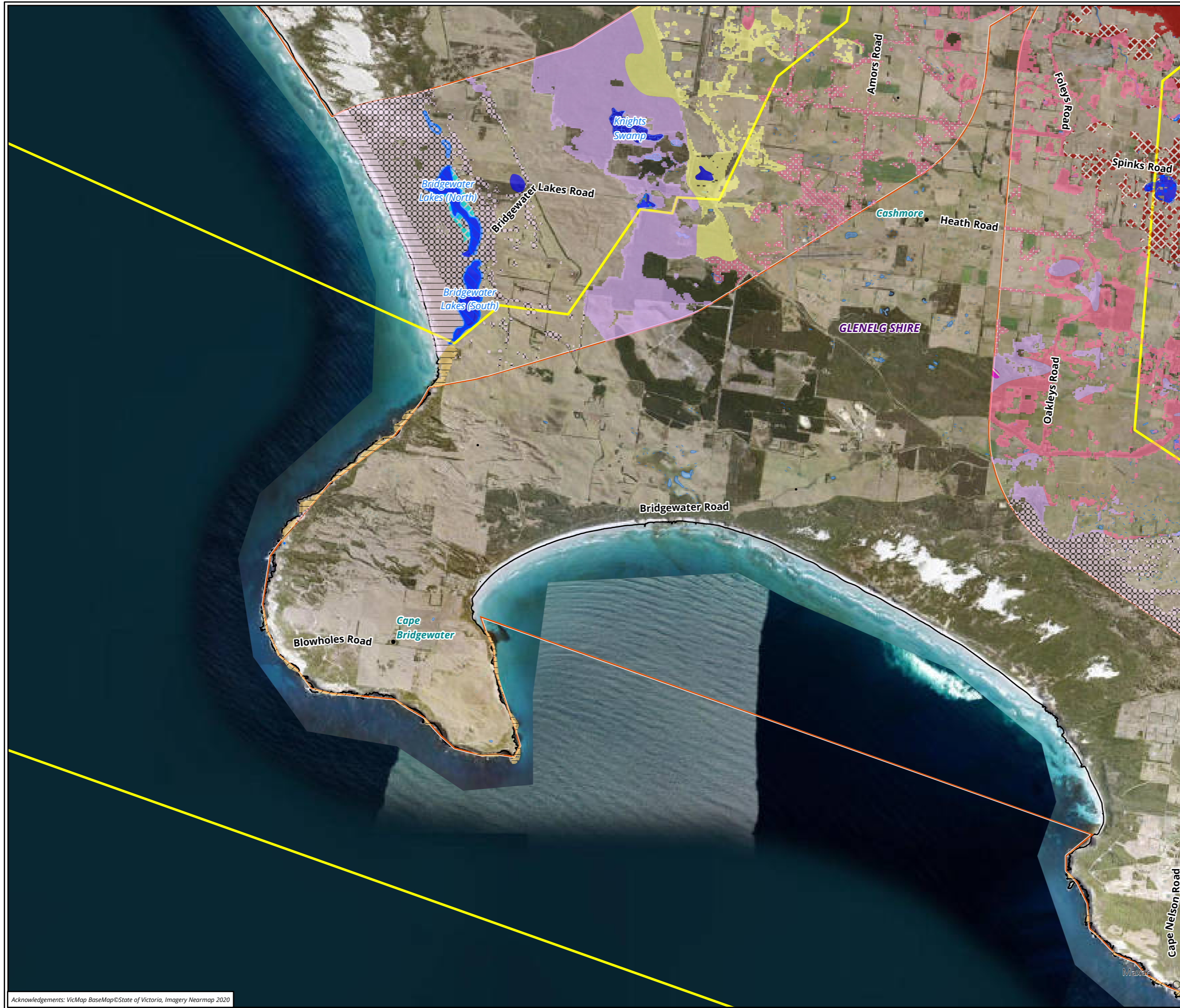
Figure 2.2 Modelled EVCs in the Study Area



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 Layout: 37594_F2_EVC
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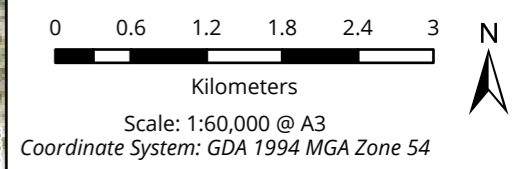
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Legend

- Study Area
 - Cable route
 - Windfarm area
- Ecological vegetation class**
- 16 Lowland Forest
 - 160 Coastal Dune Scrub
 - 161 Coastal Headland Scrub
 - 200 Shallow Freshwater Marsh
 - 23 Herb-rich Foothill Forest
 - 3 Damp Sands Herb-rich Woodland
 - 48 Heathy Woodland
 - 53 Swamp Scrub
 - 650 Heathy Woodland/Damp Heathy Woodland/Damp Heathland Mosaic
 - 664 Limestone Ridge Woodland
 - 681 Deep Freshwater Marsh
 - 682 Permanent Open Freshwater
 - 746 Damp Heathland/Damp Heathy Woodland Mosaic
 - 858 Coastal Alkaline Scrub
 - 876 Spray-zone Coastal Shrubland

Figure 2.3 Modelled EVCs in the Study Area



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