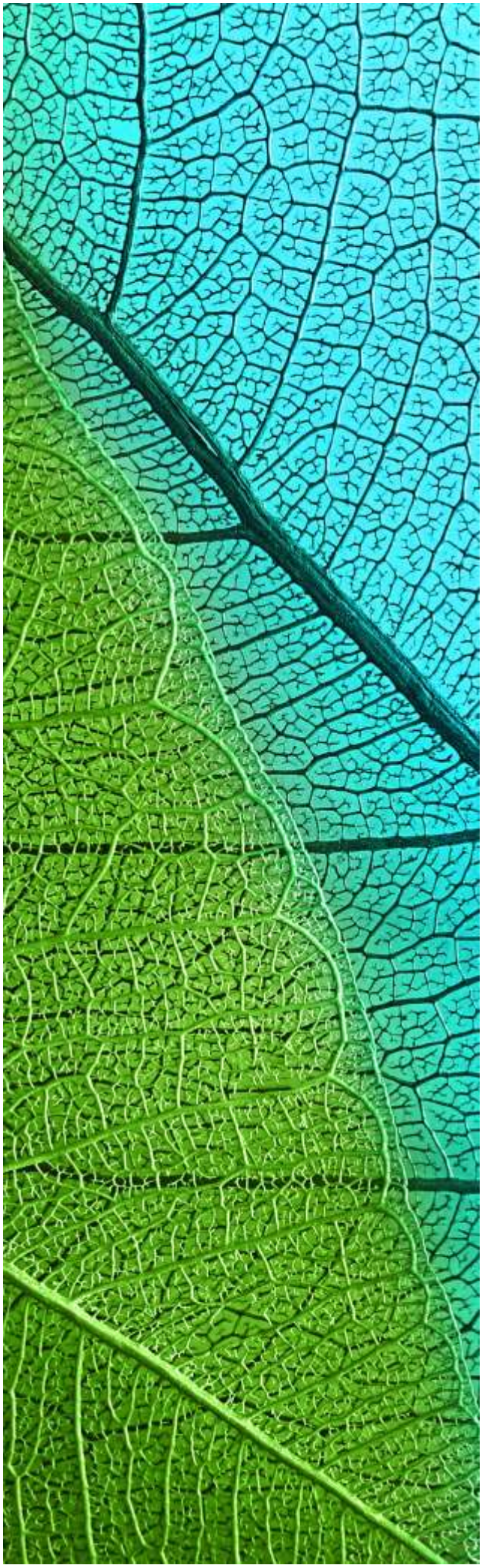

# Surf Beach & Sunderland Bay

## Biodiversity Overview Assessment

**Prepared for Bass Coast Shire Council**

November 2022
Report No. 22236.01 (1.1)

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# Contents

## Tables



## Figures

## Appendices

# 1. Executive summary

Bass Coast Shire Council engaged Nature Advisory Pty Ltd to undertake a biodiversity overview assessment in the Surf Beach and Sunderland Bay area located on Phillip Island, approximately 130 kilometres from Melbourne. The specific area investigated, referred to herein as the 'study area', comprised of the following distinct zones:

- Urban Estate area - townships of Surf Beach and Sunderland Bay
- Outfalls South area– proposed outfalls located within the coastal reserve south of The Esplanade
- Outfalls North area– proposed outfalls and catchment area north of Phillip Island Road.

The entire study area is earmarked for road and drainage upgrades.

The Outfalls South area represented high quality native vegetation, comprising an array of vegetation types, including Bird Colony Succulent Herbland (EVC 155), Spray-zone Coastal Shrubland (EVC 876), Coastal Headland Scrub (EVC 161) and Coastal Tussock Grassland (EVC 163). These vegetation types occurred in a mosaic patchwork throughout the headland and were not able to be discerned as part of the overview assessment. It is understood that infrastructure is required to impact this vegetation, therefore every effort should be made to minimise the footprint and revegetate where practicable.

Patches of Swamp Scrub (EVC 53), Estuarine Wetland (EVC 10) and Brackish Grassland (EVC 934) were identified throughout the Outfalls North area and have established as part of a Landcare revegetation project. This vegetation is continuous with the Coastal Saltmarsh within the Westernport environs and has been established to enhance and protect biodiversity values. It is understood that a retarding basin to trap runoff is to be installed within the property. This provides an opportunity to complement the existing biodiversity values if it is undertaken in an environmentally sensitive manners so as not to compromise the current function of the revegetated area.

Some disjunct areas of Swamp Scrub (EVC 53) have arisen throughout the internal road network of the Urban Estate area. This vegetation is typical of regrowth that has emerged in the absence of regular maintenance of the road reserves. In general, this vegetation is of low quality and comprises of a few dominant native species. However, impacts to this vegetation should still be minimised as these patches of vegetation may function as a bio link for some fauna species to transition between the coastal reserve and to the rural landscape to the north. This is particularly evident along Sunderland Bay Road and to a lesser extent Batman and Seafoam Street. This also identifies an opportunity to enhance these bio links through vegetation of non-vegetated areas and enhancement planting within existing patches to increase structural diversity.

No EPBC Act-listed flora or fauna species were recorded in the study area during the current assessment. However, the following FFG threatened species (DELWP 2022e) were considered to have the potential to occur throughout the coastal reserve:

- Slender Pink-fingers (FFG: Vulnerable);
- Coast Ballart (FFG: Endangered);
- Peninsula Daisy-bush (FFG: Endangered);
- Dune Wood-sorrel (FFG: Endangered); and
- Dune Poa (FFG: Endangered).

As impacts are to occur on public land, there are potentially implications under the FFG Act. Therefore, it is recommended that targeted surveys are undertaken to determine if these species occur within the development footprint and if a protected flora permit is required, or if the footprint can be realigned to avoid these species.

High quality fauna habitat occurred within Outfalls South area as intact remnant coastal dune and headland vegetation between The Esplanade and the coast. Discontinuous patches of swamp scrub and planted indigenous and non-indigenous trees and shrubs occurred along roadsides within the Urban Estate area. Additionally, roadside drainage lines within the estates provided aquatic habitat. Within the Outfalls North area, fauna habitat varied in quality, comprising remnant patches of estuarine and swamp scrub, areas of planted indigenous trees and shrubs, ephemeral wetlands, two farm dams and grazing paddocks.

While no listed fauna species were recorded in the study area during the field assessment, 24 listed fauna species were considered to have the potential to occur. A review of the species occurrence combined with habitat assessments confirmed that two listed fauna species have the potential to be impacted by construction activities associated with drainage and infrastructure upgrades within the Outfalls South area. These species are:

- Hooded Plover (EPBC Act: Vulnerable; FFG Act: Vulnerable)
- Short-tailed Shearwater (EPBC Act: Migratory)

Potential impacts to these species from drainage and infrastructure upgrades within the Outfalls South area include modification of breeding habitat by invasive plant species, erosion of nesting sites; excessive trampling of nesting sites during construction works, artificial lights, and human disturbance. Appropriate mitigation measures can avoid implications under the EPBC Act.

# 2. Introduction

Bass Coast Shire Council engaged Nature Advisory Pty Ltd to conduct a biodiversity overview assessment of an approximately 150-hectare area of land in Surf Beach and Sunderland Bay. This assessment was required as part of due diligence in relation to flora and fauna impacts (excluding Aquatic) for potential road and drainage upgrade works in the Surf Beach and Sunderland Bay townships and associated drainage outfalls to the north and south. The specific area investigated, referred to herein as the 'study area', comprised of the following distinct zones:

- Urban Estate area - townships of Surf Beach and Sunderland Bay
- Outfalls South area– proposed outfalls located within the coastal reserve south of The Esplanade
- Outfalls North area– proposed outfalls and catchment area north of Phillip Island Road.

The entire study area is earmarked for road and drainage upgrades.

This investigation was commissioned to provide general information on the extent and condition of native vegetation in the study area and the potential for the project to impact on flora and fauna matters listed under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This investigation also considers implications under the *Environment Effects Act 1978* (EE Act). This report outlines any implications under relevant national, state and local legislation and policy frameworks.

Specifically, the scope of the investigation included the following:

Reviewing existing information on the flora, fauna and native vegetation of the study area and surrounds was reviewed, including:

- Victorian Biodiversity Atlas administered by the Department of Environment, Land, Water and Planning (DELWP);
- The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool;
- DELWP's *Native Vegetation Information Management* system (NVIM); and
- DELWP's *NatureKit.*

A site survey was undertaken involving:

- Characterisation and broad-scale mapping of native vegetation on the site, as defined in Victoria's *Guidelines for the Removal, Destruction or lopping of Native Vegetation* (the 'Guidelines');
- Overview assessment of native vegetation (as low, moderate or high quality);
- Compilation of flora and fauna species lists for the site;
- Assessment of the nature and quality of native fauna habitat; and
- Assessment of the likelihood of occurrence of FFG Act and EPBC Act listed flora, fauna and communities on the site.

This report is divided into the following sections:

Section 3 provides the legislative background including details of all relevant Commonwealth, State and local legislation and policies.

Section 4 describes the sources of information, including the methods used for the field survey.

Section 5 presents the assessment results, including details of the native vegetation, flora and fauna of the study area.

This investigation was undertaken by a team from Nature Advisory comprising Brett Macdonald (Senior Ecologist), Adam Dzunko (Zoologist), James Bennie (GIS Analyst), and Chris Armstrong (Senior Botanist & Project Manager).

# 3. Planning and legislative considerations

This investigation and report address the application on the site of relevant legislation and planning policies that protect biodiversity. Local, state and Commonwealth controls are summarised below.

## 3.1. Local planning provisions

The study area is located within the Bass Coast local government area and is currently zoned as follows:

- Surf Beach and Sunderland Bay Estates - General Residential Zone - Schedule 1 (GRZ1);
- Phillip Island Nature Park - Public Conservation And Resource Zone (PCRZ); and
- Private land north of Phillip Island Road - Farming Zone (FZ).

The study area is located within a Bushfire-prone Area.

Local planning provisions apply under the *Victorian Planning and Environment Act 1987*.

## 3.2. Overlays

With regards to environment and landscape, the study area is subject to the following three overlays in the Bass Coast Planning Scheme:

- Surf Beach and Sunderland Bay Estates - *Vegetation Protection Overlay - Schedule 2 (VPO2)*.
- Private land north of Phillip Island Road - *Environmental Significance Overlay - Schedule 1 (ESO1)* and;
- Private land north of Phillip Island Road - *Significant Landscape Overlay - Schedule 3 (SLO3)*.

## 3.3. State planning provisions

State planning provisions are established under the *Victorian Planning and Environment Act 1987*.

Clause 52.17 of all Victorian Planning Schemes states the following:

A permit is required to remove, destroy or lop native vegetation, including dead native vegetation.

A permit is not required if any of the following apply:

- An exemption in Table 52.17-7 specifically states that a permit is not required.
- A native vegetation precinct plan corresponding to the land is incorporated into the planning scheme and listed in the schedule to Clause 52.16.
- The native vegetation is specified in a schedule to Clause 52.17.

### *3.3.1. Exemptions*

No exemptions to Clause 52.17 are relevant to this project.

### *3.3.2. Application requirements*

Any application to remove, destroy or lop native vegetation must comply with the application requirements specified in the Guidelines (DELWP 2017a).

When assessing an application, Responsible Authorities are also obligated to refer to Clause 12.01-2 (Native vegetation management) in the Planning Scheme that, in addition to the Guidelines, refers to the following:

- *Assessor's handbook – applications to remove, destroy or lop native vegetation* (Version 1.1) (DELWP 2018a).
- Statewide biodiversity information maintained by DELWP.

The application of the Guidelines (DELWP 2017a) is explained further in Appendix 1.

#### *3.3.3. Referral to DELWP*

Clause 66.02-2 of the planning scheme determines the role of DELWP in the assessment of native vegetation removal permit applications. If an application is referred, DELWP may make certain recommendations to the responsible authority in relation to the permit application.

Any application to remove, destroy or lop native vegetation must be referred to DELWP if any of the following apply:

- The impacts to native vegetation fall within the Detailed Assessment Pathway;
- A property vegetation plan applies to the site; or
- The native vegetation is on Crown land that is occupied or managed by the responsible authority.

### 3.4. EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects a number of threatened species and ecological communities that are considered to be of national conservation significance. Any significant impacts to these species require the approval of the Australian Minister for the Environment.

If there is a possibility of a significant impact on nationally threatened species, communities or listed migratory species, a Referral under the EPBC Act should be considered. The Minister will decide whether the project will be a 'controlled action' under the EPBC Act after 20 business days, in which case the project can only be undertaken with the approval of the Minister. This approval depends on a further assessment and approval process (lasting between three and nine months, depending on the level of assessment).

Implications under the EPBC Act for the current proposal are discussed in Section 7.4.

### 3.5. FFG Act

The Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) lists threatened and protected species and ecological communities (DELWP 2019b, DELWP 2022e). Any removal of protected flora, including threatened flora species and plants that constitute threatened communities listed under the FFG Act from public land, requires a Protected Flora Licence or Permit under the Act that can be obtained from DELWP.

The FFG Act only applies to private land where a license is required to remove grass trees, tree ferns and sphagnum moss for sale or where an Interim Conservation Order has been made to protect critical habitat for a threatened species or community. As no such habitat has ever been declared, this mechanism under the FFG Act has never been implemented.

Implications under the FFG Act for the current proposal are discussed in Section 7.5.

## 3.6. EE Act

One or a combination of several criteria may trigger a requirement for a Referral to the Victorian Minister for Planning who will determine whether an Environmental Effects Statement (EES) will be required according to the *Ministerial Guidelines for Assessment of Environmental Effects under the* Environment Effects Act 1978 (DSE 2006).

The criteria related to flora, fauna and native vegetation that trigger a Referral are listed below.

One or more of the following would trigger a Referral:

- Potential clearing of 10 or more hectares of native vegetation from an area that meets the following criteria:
  - Is of an Ecological Vegetation Class identified as endangered by the Department of Sustainability and Environment (in accordance with Appendix 2 of Victoria's Native Vegetation Management Framework); or
  - Is, or is likely to be, of very high conservation significance (as defined in accordance with Appendix 3 of Victoria's Native Vegetation Management Framework); and
  - Is not authorised under an approved Forest Management Plan or Fire Protection Plan;
- Potential long-term loss of a significant proportion (e.g. 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria;
- Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia'; or
- Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long term.

Two or more of the following would also trigger a Referral:

- Potential clearing of 10 or more hectares of native vegetation, unless authorised under an approved Forest Management Plan or Fire Protection Plan;
- Matters listed under the Flora and Fauna Guarantee Act 1988, including the following:
  - Potential loss of a significant area of a listed ecological community; or
  - Potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or
  - Potential loss of critical habitat; or
  - Potentially significant effects on habitat values of a wetland supporting migratory bird species.

Implications under the *Environment Effects Act 1978* (EE Act) for the current proposal are discussed in Section 7.6.

## 3.7. CaLP Act

The *Catchment and Land Protection Act 1994* (CaLP Act) requires that landowners (or a third party to whom responsibilities have been legally transferred) must eradicate regionally prohibited weeds and prevent the growth and spread of regionally controlled weeds.

Weed species listed under the CaLP Act that have been recorded in the study area are discussed in Section 7.7.

# 4. Existing information and methods

## 4.1. Existing information

Existing information used for this investigation is described below.

### *4.1.1. Existing reporting and documentation*

The existing documentation below, relating to the study, area was reviewed.

- Bass Coast Planning Scheme

### *4.1.2. Native vegetation*

Pre-1750 (pre-European settlement) vegetation mapping administered by DELWP was reviewed to determine the type of native vegetation likely to occur in the study area and surrounds. Information on Ecological Vegetation Classes (EVCs) was obtained from published EVC benchmarks. These sources included the following:

- Relevant EVC benchmarks for the Gippsland Plain bioregion[1] (DSE 2004a); and
- *NatureKit* (DELWP 2022a)

The following source was reviewed for additional information on vegetation in the study area:

- *Surfies Point to Forrest Caves Vegetation Survey and Management Recommendations* (Walker 2020).

### *4.1.3. Listed matters*

Existing flora and fauna species records and information regarding the potential occurrence of listed matters were obtained from an area termed the 'search region', defined here as an area with a radius of 5 kilometres from the approximate centre point of the study area (coordinates: latitude 38˚ 30' 28" S and longitude 145˚ 17' 31" E).

A list of the flora and fauna species recorded in the search region was obtained from the *Victorian Biodiversity Atlas* (VBA), a database administered by DELWP.

The online EPBC Act *Protected Matters Search Tool* (DAWE 2022a) was consulted to determine whether nationally listed species or communities potentially occurred in the search region based on habitat modelling.

[1] A bioregion is defined as "a geographic region that captures the patterns of ecological characteristics in the landscape, providing a natural framework for recognising and responding to biodiversity values". In general, bioregions reflect underlying environmental features of the landscape (DNRE 1997).

## 4.2. Field methods

The field assessment was conducted on 19-20 September 2022. During this assessment, the study area was initially surveyed by vehicle and areas supporting native vegetation and/or fauna habitat were inspected in more detail on foot.

Sites in the study area found to support native vegetation or with potential to support listed matters were mapped through a combination of aerial photograph interpretation and ground-truthing using a hand-held GPS (accurate to approximately five metres). Species and ecological communities listed as threatened under the EPBC Act or FFG Act (where these occurred on public land) were also mapped using the same method.

### *4.2.1. Native vegetation*

Native vegetation is currently defined in Clause 73.01 of all Victorian planning schemes as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'. The Guidelines (DELWP 2017a) further classify native vegetation as belonging to two categories:

- Patch; or
- Scattered tree.

The definitions of these categories are provided below, along with the prescribed DELWP methods of assessment. Further details on definitions of patches and scattered trees are provided in Appendix 1.

#### *Patch*

A patch of native vegetation may be defined as one of the following:

- An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native; or
- Any area with three or more native canopy trees[2] where the drip line[3] of each tree touches the drip line of at least one other tree, forming a continuous canopy; or
- Any mapped wetland included in the *Current wetlands map*, available at *MapShareVic* (DELWP 2022b).

Patch condition is assessed using the habitat hectare method (Parkes *et al.* 2003; DSE 2004b) whereby components of the patch (e.g. tree canopy, understorey and ground cover) are assessed against an EVC benchmark. The score effectively measures the percentage to which the condition of the vegetation resembles the original condition.

The *Native Vegetation Information Management* (NVIM) system (DELWP 2022c) provides modelled condition scores for native vegetation to be used in certain circumstances.

[2] A native canopy tree is a mature tree (i.e. able to flower) that is taller 3 metres and normally found in the upper layer of the relevant vegetation type.
[3] The drip line is the outermost boundary of a tree canopy (leaves and/or branches) where the water drips onto the ground.

*Scattered tree*

A scattered tree may be defined as the following:

- A native canopy tree[2] that does not form part of a patch.

Scattered trees are counted and mapped, the species identified and the circumference at 1.3 m above the ground is recorded.

### 4.2.2. Flora species and habitats

Records of flora species were made in conjunction with sampling methods used to undertake habitat hectare assessments of the native vegetation described above. Specimens requiring identification using laboratory techniques were collected.

Species protected under the FFG Act were determined by crosschecking against the FFG Act *Protected Flora List* (DELWP 2019b).

The potential for habitats to support listed flora species was assessed based on the following criteria:

- The presence of suitable habitat for flora species such as soil type, floristic associations and landscape context; and
- The level of disturbance of suitable habitats by anthropogenic disturbances and invasions by pest plants and animals.

Wherever appropriate, a precautionary approach was adopted in determining the likelihood of occurrence or flora listed under the EPBC Act and/or FFG Act. That is, where insufficient evidence was available regarding the potential occurrence of a listed species, the assumption was made that this could be in an area of suitable habitat.

### 4.2.3. Fauna species and habitats

The techniques below were used to detect fauna species utilising the study area.

- Incidental searches for mammal scats, tracks and signs (e.g. diggings, signs of feeding and nests/burrows).
- Turning over logs/rocks and other ground debris for reptiles, frogs and mammals.
- Daytime bird observations.
- General searches for reptiles and frogs, including identification of frog calls in seasonally wet areas.
- General searches for bat habitat including waterbodies and potential roosting sites such as caves, dead trees with hollows and underneath the bark of trees.

Fauna habitats are described using habitat components that include extent of intact native vegetation, old-growth trees, fallen timber, leaf litter and surface rocks. Fauna habitat quality was assessed based on the following criteria:

- **High quality** habitats are those that closely resemble the original native vegetation of the area and have been subject to comparatively limited changes due to longer term threatening processes, such as timber harvesting, weed invasion, pest animal populations and loss of vegetation species and structural diversity. Old growth trees with hollows are still present.
- **Moderate quality** habitats are those that support some structural diversity but lack hollow-bearing old-growth trees and have significant regrowth (either indigenous or non-indigenous native trees and shrubs) and weed presence.
- **Low quality** habitats are largely altered and lack structural diversity and hollow, old-growth trees; these habitats often comprise farmland or urban areas that no longer resemble the original vegetation of the area.

Habitat connectivity of the study area (i.e. degree of isolation/fragmentation), including linkages to other habitats in the region, was determined using field observations, recent aerial photography and *NatureKit* (DELWP 2022a).

Wherever appropriate, a precautionary approach was adopted in determining the likelihood of occurrence or fauna listed under the EPBC Act and FFG Act. That is, where insufficient evidence was available regarding the potential occurrence of a listed species, the assumption was made that this could be in an area of suitable habitat.

#### *4.2.4. Threatened ecological communities*

The likelihood of listed threatened ecological communities occurring in the study area was determined by checking general field observations against published descriptions of relevant listed ecological communities modelled to potentially occur in the study area.

Reviewed ecological community descriptions comprised identification criteria and condition thresholds from listing advice for EPBC Act communities and FFG Act-listed community descriptions (SAC 2015).

### 4.3. Limitations of field assessment

The site assessment was conducted during early spring. The short duration and seasonal timing of field assessments can result in some species not being detected when these may occur at other times. Additionally, some flora species and lifeforms may be undetectable at the time of survey or unidentifiable due to a lack of flowers or fruit.

These limitations were not considered to compromise the validity of the current investigation that was designed to address the relevant policies and decision guidelines.

# 5. Assessment results

## 5.1. Site description

The study area for this investigation (Figure 1) constituted public land within and south of the Surf Beach and Sunderland Bay townships, located on Phillip Island, approximately 130 kilometres from Melbourne.

More specifically, the 'study area' comprised of the following distinct zones:

- Urban Estate area - townships of Surf Beach and Sunderland Bay
- Outfalls South area– proposed outfalls located within the coastal reserve south of The Esplanade
- Outfalls North area– proposed outfalls and catchment area north of Phillip Island Road.

The study area supported heavy basaltic soils and overlying aeolian sand dunes in some areas along the coastline.

Vegetation within the Urban Estate Area predominantly comprised planted indigenous, planted non-indigenous native and planted introduced trees and shrubs and cultivated lawns comprising introduced species. Some disjunct areas of Swamp Scrub (EVC 53) have arisen throughout the internal road network of these townships. This vegetation is typical of regrowth that has emerged in the absence of regular maintenance of the road reserves. These patches predominantly comprised Swamp Paperbark, Coast Beard-heath, Common Boobialla and Coast Wattle, with the ground layer almost entirely introduced.

Vegetation within the Outfalls South area, was almost entirely intact high quality native vegetation, predominantly comprising a mosaic of Bird Colony Succulent Herbland (EVC 155), Spray-zone Coastal Shrubland (EVC 876), Coastal Headland Scrub (EVC 161) and Coastal Tussock Grassland (EVC 163). The more dominant species in these EVC's were Swamp Paperbark, Coast Beard-heath, Hop Goodenia, Seaberry Saltbush, Coast Tussock-grass, Prickly Spear-grass, Bower Spinach and Coast Wattle. Indigenous forb diversity and cover was generally low overall, but high in some less disturbed areas. Native vegetation in this part of the study area was considered to be of moderate to high quality and introduced weed cover was generally low to very low.

Vegetation within the Outfalls North area predominantly comprised improved introduced pasture for domestic stock grazing, interspersed in wetter areas with large areas of remnant native vegetation, in the form of Swamp Scrub, Estuarine Wetland (EVC 10) and Brackish Grassland (EVC 934). Swamp Paperbark was the dominant species in most areas of native vegetation and understorey vegetation varied considerably; from almost entirely introduced to indigenous species dominance. Inundated areas in the east and west of this land were dominated by Sea Rush and Common Spike-sedge, with a variety of indigenous forbs. Drier open areas of native vegetation in the east were dominated by Common Tussock-grass with scatterings of immature Swamp Paperbark and Common Boobialla. The majority of this vegetation has established as part of a Landcare revegetation project and is continuous with the Coastal Saltmarsh within the Westernport environs.

High quality fauna habitat occurred within the Outfalls South area as intact remnant coastal dune and headland vegetation. Discontinuous patches of swamp scrub and planted indigenous and non-indigenous trees and shrubs occurred within the Urban Estate area, providing habitat for locally common native fauna. Additionally, roadside drainage lines, some with emergent vegetation, provided aquatic habitat for common frog species. Within the Outfalls North area, fauna habitat varied in quality, comprising remnant patches of estuarine/swamp scrub, areas of planted indigenous trees and shrubs, small ephemeral wetlands, two farm dams and grazing paddocks.

The following key fauna habitat areas occurred within the region:

- Phillip Island Nature Park occurred within the study area comprising important coastal dune and headland vegetation south of The Esplanade.
- Western Port Ramsar wetland occurred immediately north of the private land section and was connected to the study area via patches of remnant estuarine wetland/swamp scrub and drainage lines.

The study area lies within the Gippsland Plain bioregion and falls within the Port Phillip and Westernport catchment management area.

## 5.2. Native vegetation

### *5.2.1. Patches of native vegetation*

Pre–European EVC mapping (DELWP 2022a) indicated that the study area and surrounds would have supported Swamp Scrub (EVC 53), Bird Colony Succulent Herbland (EVC 155), Spray-zone Coastal Shrubland (EVC 876), Coastal Headland Scrub (EVC 161), Coastal Tussock Grassland (EVC 163), Estuarine Wetland (EVC 10) and Brackish Grassland (EVC 934) prior to European settlement based on modelling of factors including rainfall, aspect, soils and remaining vegetation. Evidence on site, including floristic composition and soil characteristics, suggested that all of the above EVC's were present in the study area (Figure 1).

Many disjunct areas of native vegetation comprising the abovementioned EVCs were identified in the Urban Estate area. It should be noted that these areas of native vegetation are broadly mapped and are likely to be divided up even further once detailed native vegetation mapping has been undertaken. The field assessment determined there was a high degree of overlap between EVCs resulting in complexes that were difficult to define at the overview assessment stage of the project. The general characteristics of each EVC in the study area have been described in Table 1 below.

**Table 1: Description of native vegetation sites in the study area and habitat quality.**

| EVC | Description |
|---|---|
| Swamp Scrub (EVC 53) | Associated with roadside vegetation within the Urban Estate area and on private land within the Outfalls North area. Dominated by Swamp Paperbark and a varied understory of both indigenous and exotic vegetation. Moderate to low quality due to weedy understorey. |
| Estuarine Wetland (EVC 10) | Inundated areas within the Outfalls North area, dominated by Sea Rush and Common Spike-sedge, with fringing Swamp Paperbark associated with Swamp Scrub (EVC 53). Moderate quality habitat. |

| EVC | Description |
|---|---|
| Bird Colony Succulent Herbland (EVC 155) | Occurred within the Outfalls South area on elevated dune deposits. Comprising predominantly Coast Bower Spinach and Seaberry Saltbush. Considered to be important habitat associated with Short-tailed Shearwater nesting sites. |
| Coastal Headland Scrub (EVC 161) | Mostly dense and heavily wind pruned, characterised by structure and position in the coastal landscape. Comprised a number of species from Swamp Paper-bark, Coast Wattle, Coast Beard-heath and Coast Tea-tree. Important habitat for the Wallaby population within the study area. |
| Coastal Tussock Grassland (EVC 163) | Occurred on basalt soils within the Outfalls South area. Dominated by Coastal Tussock Grass, diverse in some areas with many species of herbs amongst the grasses. Also occurred as mosaic with other EVCs along the coastline. |
| Spray-zone Coastal Shrubland (EVC 876) | Occurred as wind pruned, salt-affected open shrubland on the most exposed coastal areas subject to salt-spray and run-off at the crest of sea cliffs or at the front of the primary dune. In association with taller Coastal Headland Scrub (EVC 161) and dominated by shrubs such as Cushion Bush, Coast Daisy Bush and Coast Everlasting. |
| Brackish Grassland (EVC 934) | Occurred on the damp alluvial soils in the swales behind the primary dune system as well as the eastern section of private land. Dominated by Tussock Grass with sedges and saline tolerant herbs. Moderate to high quality habitat. |

A habitat hectare assessment of native vegetation in the study area has not been undertaken but would be required as part of a permit application to remove native vegetation for future development of the study area.

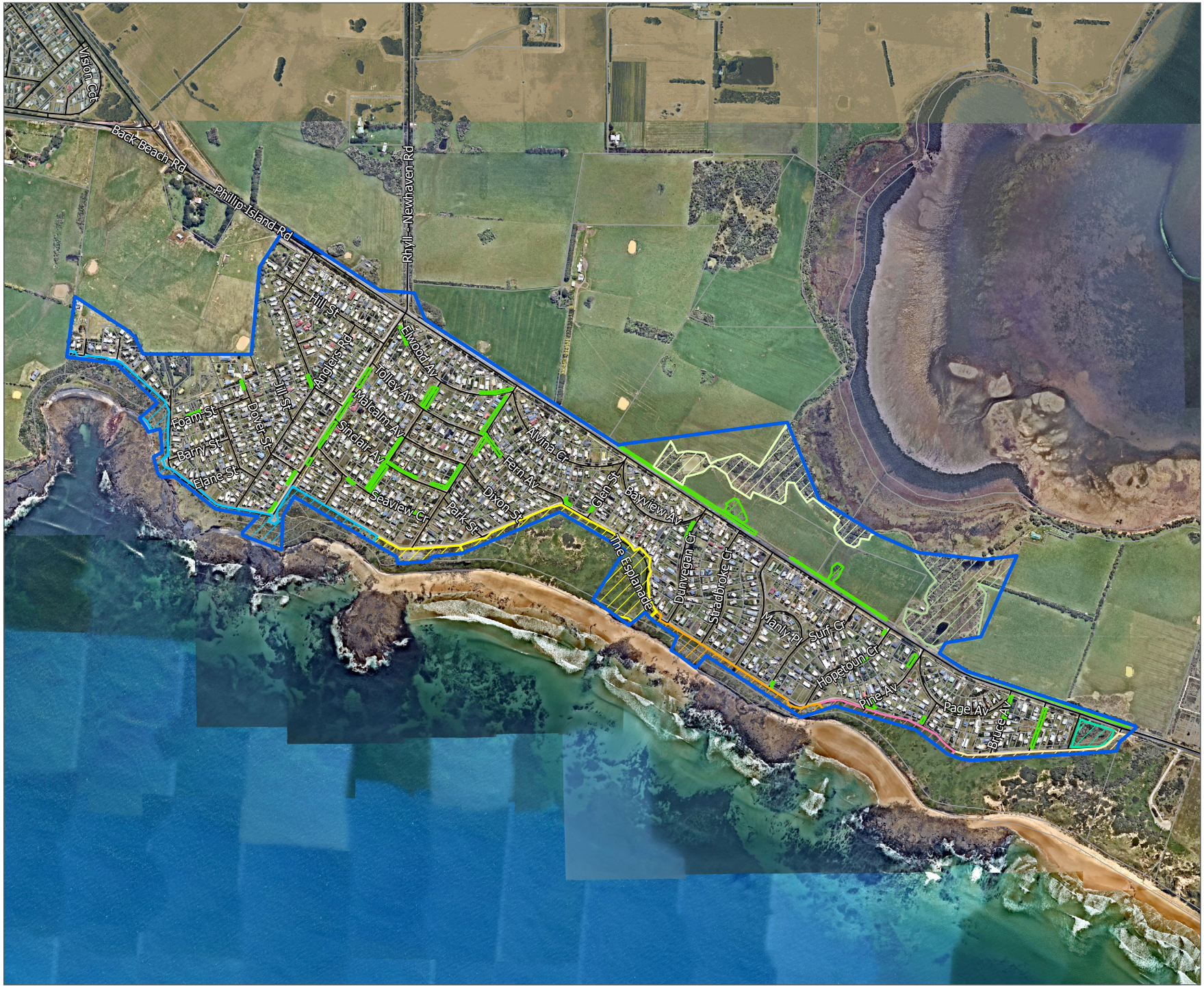


**Figure 1:** Study area and native vegetation

**Project:** Surf Coast and Sunderland Bay
**Client:** Bass Coast Shire Council
**Date:** 29/09/2022

Study area

**Native vegetation**

- Bird Colony Succulent Herbland (EVC 155)
- Bird Colony Succulent Herbland (EVC 155) / Coastal Headland Scrub (EVC 161) / Spray-zone Coastal Shrubland (EVC 876)
- Coastal Headland Scrub (EVC 161) / Coastal Tussock Grassland (EVC 163)
- Coastal Tussock Grassland (EVC 163)
- Coastal Tussock Grassland (EVC 163) / Coastal Headland Scrub (EVC 161) / Spray-zone Coastal Shrubland (EVC 876)
- Swamp Scrub (EVC 53)
- Swamp Scrub (EVC 53) / Estuarine Wetland (EVC 10)
- Swamp Scrub (EVC 53) / Coastal Tussock Grassland (EVC 163)
- Swamp Scrub (EVC 53) / Brackish Grassland (EVC 934)

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#### 5.2.2. Scattered trees

No scattered trees were recorded in the study area.

### 5.3. Flora species

#### 5.3.1. Species recorded

During the field assessment, 47 plant species were recorded, of which 31 (66%) were indigenous and 16 (34%) were introduced or non-indigenous native in origin (Appendix 2).

#### 5.3.2. Listed species

Records from the VBA (DELWP 2022d) and Commonwealth EPBC Protected Matters Search Tool (DAWE 2022a) indicated that within the search region there were records of, or potential suitable habitat occurred for, seven species listed under the Commonwealth EPBC Act and 19 listed under the state FFG Act, including three listed under both Acts. No flora species listed under the EPBC Act were recorded during the field survey.

The likelihood of occurrence of species listed under the EPBC Act and FFG Act in the study area is addressed in Table 2. Species considered 'likely to occur' have very high potential of occurring in the study area based on numerous records in the search region and suitable habitat in the study area. Species considered to have the 'potential to occur' are those for which suitable habitat exists, but recent records are scarce.

This analysis indicates that the following five listed flora species are likely to occur or have the potential to occur within the Outfall South and Outfall North areas:

- Slender Pink-fingers (FFG: Vulnerable);
- Coast Ballart (FFG: Endangered);
- Peninsula Daisy-bush (FFG: Endangered);
- Dune Wood-sorrel (FFG: Endangered); and
- Dune Poa (FFG: Endangered).

The modified nature of the vegetation within the Urban Estate area is not conducive in supporting listed species.

**Table 2: Listed flora species and their likelihood of occurrence in the study area**

| Common Name | Scientific name | Conservation status | | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|
| | | EPBC | FFG | | | | |
| River Swamp Wallaby-grass | *Amphibromus fluitans* | Vulnerable | | River Swamp Wallaby-grass grows mostly in permanent swamps and also lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground; conditions that are caused by seasonally-fluctuating water levels (DAWE 2022). | None | N/A | Very limited & highly degraded suitable habitat present and no historical records in the search region - **unlikely to occur** |
| Wavy Swamp Wallaby-grass | *Amphibromus sinuatus* | | Endangered | Apparently confined to permanent swamps in cool, sometimes elevated sites (Walsh 1994). | 1 | 27/11/2006 | No suitable habitat in study area - **unlikely to occur** |
| Marsh Saltbush | *Atriplex paludosa subsp. paludosa* | | Endangered | Locally common on fringes of coastal and near-coastal saltmarshes west from Wilsons Promontory (where apparently absent): e.g. French Is., Tooradin, Werribee, Queenscliff, Port Fairy (Vicflora 2022). | 2 | 30/10/2006 | No suitable habitat in study area - **unlikely to occur** |
| Grey Mangrove | *Avicennia marina subsp. australasica* | | Endangered | Tidal mudflats in bays, estuaries and creek-mouths (Conn 1999). | 2 | 1/10/1980 | No suitable habitat in study area - **unlikely to occur** |
| Thick-lip Spider-orchid | *Caladenia tessellata* | Vulnerable | | Coastal open woodlands, Lowland forest, heathy woodland (Entwisle 1994). | None | N/A | No suitable habitat in study area - **unlikely to occur** |
| Slender Pink-fingers | *Caladenia vulgaris* | | Vulnerable | Scattered across southern Victoria where sometimes locally common in heathland and coastal scrub on moisture-retentive sandy soils (Vicflora 2022) | 4 | 2/11/2007 | Suitable habitat present occurs in coastal scrub - **potential to occur** |
| Southern Blue-gum | *Eucalyptus globulus subsp. globulus* | | Endangered | Recent studies of variation in Southern Blue-gums (Jordan et al. 1993) suggest that populations of typical subsp. globulus occur in Victoria only in the area south of the Strzelecki Range, e.g. Port Franklin, Wilsons Promontory, and that other populations in south Gippsland and the Otway Ranges probably represent intergrades between subsp. globulus and subsp. pseudoglobulus (Vicflora 2022). | 4 | 14/01/2000 | Based on recent evidence, the study area is beyond the natural range of this species - **unlikely to** occur |
| Coast Ballart | *Exocarpos syrticola* | | Endangered | Confined to coastal dunes and cliffs on and west of Wilsons Promontory, but locally common (Jeanes 1999). | 4 | 17/09/2015 | Suitable habitat present occurs in coastal scrub - **potential to occur** |
| Pale-flower Crane's-bill | *Geranium sp. 3* | | Endangered | Open, grassy areas of dry woodlands and forests (Smith 1999). | 1 | 14/01/2000 | No suitable habitat in study area - **unlikely to occur** |
| Creeping Rush | *Juncus revolutus* | | Endangered | Damp saline or subsaline sites in southern Victoria (Albrecht & Walsh 1994). | 3 | 30/10/2006 | No suitable habitat on public land in study area - **unlikely to occur** |
| Yellow Sea-lavender | *Limonium australe var. australe* | | Endangered | In Victoria apparently confined to mangrove and saltmarsh communities near Point Lonsdale, Western Port, Shallow Inlet and Corner Inlet (Vicflora 2022) | 4 | 11/01/2000 | No suitable habitat on public land in study area - **unlikely to occur** |
| Giant Honey-myrtle | *Melaleuca armillaris subsp. armillaris* | | Endangered | Mainly confined to near-coastal sandy heaths, scrubs slightly raised above saltmarsh, riparian scrubs, rocky coastlines and foothill outcrops eastwards from about Marlo. Occurrences to the west are naturalized from cultivated stock (Vicflora 2022) | 3 | 22/05/2019 | Occurs throughout the study area as planted street trees - **unlikely to occur** as naturalized. |
| Currant-wood | *Monotoca glauca* | | Endangered | Occurs on infertile sandy soils at sea-level or on near-coastal high-rainfall ranges. Grows in open-forest, heathy woodland, wet closed scrub and margins of cool-temperate rainforest (Albrecht 1996). | 8 | 14/02/2008 | No suitable habitat on public land in study area - **unlikely to occur** |
| Peninsula Daisy-bush | *Olearia sp. 2* | | Endangered | Coastal dunes (Walsh & Lander 1999). | 2 | 1/01/2010 | Suitable habitat present occurs in coastal scrub - **potential to occur** |
| Dune Wood-sorrel | *Oxalis rubens* | | Endangered | Near coastal sites on sand dunes (Conn et al. 1999). | 4 | 28/12/2009 | Suitable habitat present occurs in coastal scrub - **potential to occur** |

| Common Name | Scientific name | Conservation status | | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|
| | | EPBC | FFG | | | | |
| Dune Poa | *Poa poiformis var. ramifer* | | Endangered | Sand dunes and sea cliffs (Walsh 1994). | 2 | 1/01/2010 | Suitable habitat present occurs in coastal scrub - **potential to occur** |
| Dense Leek-orchid | *Prasophyllum spicatum* | Vulnerable | Critically Endangered | Occurs in coastal and near-coastal heathland and heathy woodland. Soils are generally sandy, with some sites seasonally waterlogged (Duncan 2010). | None | N/A | No suitable habitat in study area - **unlikely to occur** |
| Green-striped Greenhood | *Pterostylis chlorogramma* | Vulnerable | Endangered | Occurs in mixed Box-Stringybark forest with a shrubby understorey, often with Pteridium esculentum as a major component on sandy or clay loam soils (Duncan et al. 2009). | None | N/A | No suitable habitat in study area - **unlikely to occur** |
| Leafy Greenhood | *Pterostylis cucullata* | Vulnerable | | Tea-tree scrubs on tall sandy and calcareous dunes, in moist, open or even deep shaded locations (Jones 1994). | None | N/A | Marginal habitat present in study area and no historical records in the search region - **unlikely to occur** |
| Swamp Fireweed | *Senecio psilocarpus* | Vulnerable | | Herb-rich winter-wet swamps on volcanic clays or peaty soils (Walsh 1999). Known from approximately 10 sites between Wallan, about 45 km north of Melbourne, and Honans Scrub in south-eastern South Australia (TSSC 2008). | None | N/A | No suitable habitat in study area - **unlikely to occur** |
| Merran's Sun-orchid | *Thelymitra X merraniae* | | Critically Endangered | Heath/woodlands, open forest and moist swampy areas with sand and clay loams (Weber & Entwisle 1994). | 1 | 1/10/2007 | No suitable habitat in study area - **unlikely to occur** |
| One-flower Early Nancy | *Wurmbea uniflora* | | Vulnerable | An uncommon species, mostly from moist, heathy lowland sites (e.g Portland, Halls Gap, Bairnsdale, Wangarabell near Genoa), with an isolated upland record from Mt Hedrick, north of Maffra (Vicflora 2022) | 3 | 2/11/2007 | No suitable habitat in study area - **unlikely to occur** |
| Swamp Everlasting | *Xerochrysum palustre* | Vulnerable | Critically Endangered | Grows in wetlands including sedge-swamps and shallow freshwater marshes, often on heavy black clay soils. Commonly associated genera include *Amphibromus, Baumea, Carex, Chorizandra, Craspedia, Eleocharis, Isolepis, Lachnagrostis, Lepidosperma, Myriophyllum, Phragmites australis, Themea triandra* and *Villarsia* (DAWE 2022). | None | N/A | Marginal habitat present in study area and no historical records in the search region - **unlikely to occur** |

**Notes: EPBC-T** = threatened species status under EPBC Act; **FFG** = threatened species status under the FFG Act.

## 5.4. Fauna habitats

The study area supported the following fauna habitat types:

- Coastal dune and headland vegetation;
- Native scrub vegetation;
- Grazing paddocks; and
- Aquatic habitat.

**Coastal dune and headland vegetation:** This habitat was present in the Outfalls South area and was continuous along the southern side of The Esplanade to the coast. It mostly comprised indigenous shrubs, ground covers and grasses (Swamp Paperbark, Coast Beard Heath, Common Boobialla, Coast Banksia, White Correa, Hop Goodenia, Seaberry Saltbush, Bower Spinach, Nobby Club Rush, and Coast Tussock Grass). This habitat provided high quality nesting and foraging resources for native bird species common to the study area, as well as Swamp Wallaby, which was recorded regularly during the field survey. Additionally, this included Short-tailed Shearwater nesting habitat, primarily in the sandy headlands dominated by bower spinach and tussock grasses. Overall, this was deemed high quality fauna habitat.

**Native scrub vegetation:** This habitat occurred in patches along roadsides within the Urban Estate and was dominated by Swamp Paperbark and various indigenous and non-indigenous understory vegetation. While not contiguous, this habitat provided important nesting and foraging resources for native bird species common to the area, and potentially supported small native mammals and reptiles.

In the Outfalls North area, planted indigenous vegetation occurred in fenced off sections around the farm dams in the eastern and western edges, and the adjacent road reserve along Phillip Island Road. Remnant patches of estuarine/swamp scrub occurred along the northern boundary, providing habitat for native birds and mammals such as Swamp Wallaby, which was seen regularly. Overall, this was deemed low to moderate quality fauna habitat.

**Grazing paddocks:** This habitat covered most of the Outfalls North area and predominantly comprised improved introduced pasture for domestic stock grazing. While most native ground cover and shrubs had been removed, this habitat provided a foraging resource for locally common bird species such as Cape Barren Goose and White-faced Heron. Overall, this was deemed low quality fauna habitat.

**Aquatic habitat:** An aquatic fauna assessment was carried out by a separate contractor (Aquatica Environmental). However, given the significance of aquatic habitat within the Outfalls North section of the study area to native bird species, and the potential for this area to be enhanced by a wetland installation, it was discussed accordingly.

This habitat was represented by two farm dams, one in the east and one in the west of the Outfalls North area. The dam on the western side was connected to remnant estuarine/swamp scrub via a shallow drainage ditch, which contained water at the time of assessment. Additionally, various inundated areas occurred in the form of ephemeral wetlands, which had potential to support listed bird species such as Latham's Snipe. Aquatic habitat areas shared connectivity with remnant swamp scrub and coastal saltmarsh abutting the Western Port Ramsar site to the north and offered important resources for waterbirds and frogs. Bird breeding activity was observed during the site visit, with Purple Swamp Hen nests found in tussocks of planted Spiney-headed Mat-rush fringing the western dam, as well as recently fledged Cape Barren Geese utilising the farm dams. Overall, this was deemed moderate quality fauna habitat with potential for substantial enhancement with regards to biodiversity.

## 5.5. Fauna species

### *5.5.1. Species recorded*

During the field assessment 46 fauna species were recorded. This included 42 bird (five introduced), 2 mammal (1 introduced), and two frog species (Appendix 3).

### *5.5.2. Listed species*

The review of existing information [including VBA records (DELWP 2022d) and the results of the EPBC Protected Matters Search Tool (DAWE 2022a) indicated that within the search region there were records of, or potential suitable habitat occurred for, 105 fauna species listed under the Commonwealth EPBC Act and the state FFG Act. The likelihood of occurrence of these species in the study area was assessed and the results are presented in Table 3.

This analysis of potential occurrence of listed fauna species excludes the following:

- Marine fauna given that the study area is inland;
- Migratory oceanic bird species (with the exception of Short-tailed Shearwater, which are known to breed within the study area); and
- Aquatic fauna (fish and amphibians - assessed by Aquatica Environmental).

Species considered 'likely to occur' are those with very high potential of occurring in the study area given the existence of numerous records in the search region and suitable habitat in the study area. Using the precautionary approach, species considered to have the 'potential to occur' are those for which suitable habitat exists, but recent records are scarce. This analysis indicates that 24 listed fauna species are likely to occur or have the potential to occur. These species are:

- Australasian Shoveler
- Black Falcon
- Blue-billed Duck
- Caspian Tern
- Crested Tern
- Eastern Great Egret
- Fairy Tern
- Fork-tailed Swift
- Freckled Duck
- Glossy Ibis
- Hardhead
- Hooded Plover
- Latham's Snipe
- Little Eagle
- Little Egret
- Little Tern
- Magpie Goose
- Musk Duck
- Orange-bellied Parrot
- Plumed Egret
- Rufous Fantail
- Short-tailed Shearwater
- White-bellied Sea-Eagle
- White-throated Needletail

The susceptibility of fauna species to impacts from development is discussed in Section 5.5.3.

**Table 3: Listed fauna species and their likelihood of occurrence in the study area**

| Common Name | Scientific name | EPBC-T | EPBC-M | FFG | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| **Birds** | | | | | | | | |
| Australasian Bittern | *Botaurus poiciloptilus* | Endangered | | Critically Endangered | Terrestrial wetlands, including a range of wetland types but prefers permanent water bodies with tall dense vegetation, particularly those dominated by sedges, rush, reeds or cutting grass (Marchant & Higgins 1990). | 1 | 25/11/1999 | Lack of suitable habitat and scarcity of recent records - **Unlikely to occur**. |
| Australasian Shoveler | *Spatula rhynchotis* | | | Vulnerable | Large and deep permanent bodies of water and aquatic flora abundant. Also occurs on billabongs, watercourses and flood waters on alluvial plains, freshwater meadows, shallow swamps, reed swamps, wooded lakes, sewage farms and farm dams (Marchant & Higgins 1990). | 174 | 21/06/2021 | **Potential to occur.** |
| Australian Painted-snipe | *Rostratula australis* | Endangered | | Critically Endangered | Generally inhabits shallow terrestrial freshwater wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of *Lignum muehlenbeckia* or canegrass or sometimes tea-tree (Melaleuca). Sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber (DAWE 2020). | None | N/A | Absence of recent records - **Unlikely to occur.** |
| Bar-tailed Godwit | *Limosa lapponica* | Vulnerable | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Vulnerable | Mainly coastal species, usually in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats (Higgins & Davies 1996). | 206 | 19/03/2019 | Absence of suitable habitat - **Unlikely to occur**. |
| Black Falcon | *Falco subniger* | | | Critically Endangered | Woodlands, open country and terrestrial wetlands; in arid and semi-arid zones; mainly over open plains and undulating land with large tracts of low vegetation. It is more commonly found in north-western Victoria and is only occasionally found in southern Victoria. It is a highly mobile species, moving in response to food availability and seasonal conditions (Marchant & Higgins 1993). | 1 | 21/04/2018 | **Potential to occur.** |
| Black-tailed Godwit | *Limosa limosa* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Critically Endangered | Mainly coastal species, usually in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats. In Vic. Found mainly round Port Phillip Bay (Higgins & Davies 1996). | 15 | 19/03/2019 | Absence of suitable habitat - **Unlikely to occur**. |
| Blue-billed Duck | *Oxyura australis* | | | Vulnerable | Terrestrial wetlands and prefers deep permanent, well vegetated water bodies. V (Marchant & Higgins 1990). | 33 | 26/11/2018 | **Potential to occur.** |
| Broad-billed Sandpiper | *Limicola falcinellus* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | | Sheltered coastal embayment, including lagoons. Often near sewerage ponds, saltworks, creeks, swamps, and lakes near coast, usually with bare flats (Marchant & Higgins 1993). | None | N/A | Absence of suitable habitat - **Unlikely to occur**. |
| Caspian Tern | *Hydroprogne caspia* | | M (JAMBA) | Vulnerable | Sheltered coastal embayment, including harbours, lagoons, inlets, estuaries and river deltas, usually with sandy or muddy margins (Higgins & Davies 1996). | 529 | 10/07/2021 | **Potential to occur.** |

| Common Name | Scientific name | EPBC-T | EPBC-M | FFG | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| Birds | | | | | | | | |
| Common Greenshank | *Tringa nebularia* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Endangered | Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins & Davies 1996). | 74 | 14/04/2019 | Absence of suitable habitat - **Unlikely to occur**. |
| Common Sandpiper | *Actitis hypoleucos* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Vulnerable | Inhabits a wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands. In Victoria, mostly found Westernport and Port Phillip Bay (Higgins & Davies 1996). | 39 | 29/12/2017 | Absence of suitable habitat - **Unlikely to occur**. |
| Crested Tern | *Thalasseus bergii* | | M (JAMBA) | | Common along Australian coastlines. Almost always strictly marine, though occasional records do emanate from inland Australia (Marchant & Higgins 1990). | 354 | 11/06/2021 | **Potential to occur.** |
| Curlew Sandpiper | *Calidris ferruginea* | Critically Endangered | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Critically Endangered | Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins & Davies 1996). | 106 | 3/01/2018 | Absence of suitable habitat - **Unlikely to occur**. |
| Double-banded Plover | Charadrius bicinctus | | M (Bonn A2H) | | Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Marchant & Higgins 1993). | 79 | 1/07/2007 | Absence of suitable habitat and recent records - **unlikely to occur.** |
| Eastern Curlew | *Numenius madagascariensis* | Critically Endangered | M (Bonn A1, ROKAMBA, JAMBA, CAMBA) | Critically Endangered | Inhabits sheltered coasts, especially estuaries, embayment, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats, often with beds of sea grass (Higgins & Davies 1996). | 387 | 15/04/2019 | Absence of suitable habitat - **Unlikely to occur**. |
| Eastern Great Egret | *Ardea alba modesta* | | | Vulnerable | | 365 | 30/07/2019 | **Potential to occur.** |
| Eastern Osprey | *Pandion cristatus* | | M (Bonn A2S) | | Rare vagrant to Victoria (Marchant & Higgins 1993). Littoral and coastal habitats and terrestrial wetlands. They are mostly found in coastal areas but occasionally travel inland along major rivers (Johnstone & Storr 1998; Marchant & Higgins 1993; Olsen 1995). They require extensive areas of open fresh, brackish or saline water for foraging (Marchant & Higgins 1993). | 1 | 27/06/2002 | Scarcity of recent records - **Unlikely to occur.** |
| Fairy Tern | *Sternula nereis* | Vulnerable | | Critically Endangered | Generally restricted to sheltered coasts both on the mainland, and inshore and offshore islands. Occurs in embayment, such as harbours, inlets, bays, estuaries, lagoons, and ocean beaches. Also found on lakes and salt ponds (Higgins & Davies 1996). | 31 | 13/11/2017 | **Potential to occur.** |
| Fork-tailed Swift | *Apus pacificus* | | M (CAMBA, ROKAMBA, JAMBA) | | The species can occur in wet sclerophyll forest but mainly prefers open forest or plains. It is almost exclusively aerial and feeds up to hundreds on metres above the ground, but can feed among open forest canopy. The species breeds internationally and seldom roosts in trees (Higgins 1999). | 9 | 30/12/2019 | **Potential to occur.** |

| Common Name | Scientific name | EPBC-T | EPBC-M | FFG | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| | | | | | Birds | | | |
| Freckled Duck | *Stictonetta naevosa* | | | Endangered | Terrestrial wetlands; prefer fresh, densely vegetated waters, particularly floodwater swamps and creeks vegetated with lignum or cane grass. During dry seasons or droughts, move off ephemeral breeding swamps and occupy large permanent waters (Marchant & Higgins 1990). | 7 | 13/06/2019 | **Potential to occur.** |
| Gang-gang Cockatoo | *Callocephalon fimbriatum* | Endangered | | | In summer generally in tall mountain forests and woodlands, particularly in heavily timbered, mature wet sclerophyll forests and woodlands. Prefer Eucalyptus dominated assemblages. Also occurs in subalpine snow gum woodlands and occasionally in temperate rainforests and regenerating forests. In winter occur at lower altitudes in drier, more open Eucalyptus woodland (Higgins 1999). | None | N/A | Absence of suitable habitat and recent records - **Unlikely to occur**. |
| Glossy Ibis | *Plegadis falcinellus* | | M (Bonn A2S) | | Prefer freshwater inland wetlands, in particular, permanent or ephemeral water bodies and swamps with abundant vegetation (Marchant & Higgins 1990). | 6 | 18/11/2018 | **Potential to occur.** |
| Great Knot | *Calidris tenuirostris* | Critically Endangered | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Critically Endangered | In Australasia, the species typically prefers sheltered coastal habitats, with large intertidal mudflats or sandflats. This includes inlets, bays, harbours, estuaries and lagoons. They are occasionally found on exposed reefs or rock platforms, shorelines with mangrove vegetation, ponds in saltworks, at swamps near the coast, saltlakes and non-tidal lagoons. The Great Knot rarely occurs on inland lakes and swamps (DAWE 2020). | 15 | 3/01/2018 | Absence of suitable habitat - **Unlikely to occur**. |
| Greater Sand Plover | *Charadrius leschenaultii* | Vulnerable | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Vulnerable | Entirely coastal; mainly on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks. In Vic. Mostly in Corner inlet, Westernport and Port Phillip Bay (Marchant & Higgins 1993). | None | N/A | Absence of suitable habitat and recent records - **Unlikely to occur**. |
| Grey Falcon | *Falco hypoleucos* | Vulnerable | | Vulnerable | Inhabits arid and semi-arid zones; mainly on sandy and stony plains of inland drainage systems, lightly timbered with acacia. Hunt far into open areas, over spinifex, tussock grasslands and low shrublands. In Victoria, few records mostly in north and northwestern regions (Marchant & Higgins 1993). | None | N/A | Rare vagrant of arid interior - **Unlikely to occur**. |
| Grey Plover | *Pluvialis squatarola* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Vulnerable | Entirely coastal, but occasionally inland. Mainly on marine shores, inlets, estuaries and lagoons where there are nearby large tidal mudflats for feeding and sandy beaches for roosting (Marchant & Higgins 1993). | 1 | 30/11/2019 | Absence of suitable habitat - **Unlikely to occur**. |
| Grey-tailed Tattler | *Tringa brevipes* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Critically Endangered | Often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. It can also be found at intertidal rocky, coral or stony reefs as well as platforms and islets that are exposed at low tide. It has been found around shores of rock, shingle, gravel or shells and also on intertidal mudflats in embayments, estuaries and coastal lagoons, especially fringed with mangroves. The species is rarely recorded in Victoria, however sightings have been reported in Gippsland, and east of McLaughlans Beach. The largest populations in Victoria are located at Corner Inlet, west to Westernport and Port Phillip Bays (DAWE 2020). | 6 | 12/06/1994 | Scarcity of recent records - **Unlikely to occur.** |

| Common Name | Scientific name | EPBC-T | EPBC-M | FFG | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| | | | | Birds | | | | |
| Hardhead | *Aythya australis* | | | Vulnerable | Inhabits large, deep waters where vegetation is abundant; particularly deep swamps and lakes, pools and creeks. Also occur on freshwater meadows, seasonal swamps with abundant aquatic flora, reed swamps, wooded lakes and swamps, rice fields, and sewage ponds (Marchant & Higgins 1990). | 56 | 11/06/2019 | **Potential to occur.** |
| Hooded Plover | *Thinornis cucullatus* | Vulnerable | | Vulnerable | Inhabits sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding. Widespread and scattered across coastal Victoria. Numbers reduced due to disturbance by recreational activities on beaches (Marchant & Higgins 1993). | 992 | 19/04/2021 | **Potential to occur on beach immediately south of study area.** |
| Latham's Snipe | *Gallinago hardwickii* | | M (Bonn A2H, ROKAMBA, JAMBA) | | Occurs in wide variety of permanent and ephemeral wetlands; it prefers open freshwater wetlands with dense cover nearby, such as the edges of rivers and creeks, bogs, swamps, waterholes. The species is wide spread in southeast Australia and most of its population occurs in Victoria, except in the northwest of the state (Naarding 1983; Higgins & Davies 1996). | 15 | 29/09/2020 | Suitable habitat occurs within Outfalls North area - **potential to occur**. |
| Lesser Sand Plover | *Charadrius mongolus* | Endangered | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Endangered | Inhabits beaches of sheltered bays, harbours, and estuaries with large intertidal sandflats or mudflats. Regularly seen in Corner Inlet, Westernport and Port Phillip Bay (Marchant & Higgins 1993). | 5 | 18/02/1989 | Absence of suitable habitat and recent records - **unlikely to occur**. |
| Little Curlew | *Numenius minutus* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | | Occurs in short, dry grasslands and sedgelands with scattered shallow freshwater pools. Occasionally occurs in open woodland with grassy or burn understorey. Can be found in coastal swamps and on sheltered coasts on mudflats or sandflats (Higgins & Davies 1996). | None | N/A | Scarcity of recent records - **unlikely to occur.** |
| Little Eagle | *Hieraaetus morphnoides* | | | Vulnerable | Over wooded and forested lands and open country of Aust. Range extending into arid zone. Most abundant in open forest and woodland (Marchant & Higgins 1993). | 3 | 26/05/2019 | **Potential to occur.** |
| Little Egret | *Egretta garzetta* | | | Endangered | It occurs in a range of coastal and terrestrial wetlands, including freshwater wetlands with vegetation such as bulrush and requires trees for roosting and nesting (Marchant & Higgins 1990). | 96 | 3/05/2021 | **Potential to occur.** |
| Little Tern | *Sternula albifrons* | | M (Bonn A2S, ROKAMBA, JAMBA, CAMBA) | Critically Endangered | Sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand spits. In Victoria, they are found mainly on the east coast between Mallacoota and Corner Inlet, rare elsewhere (Higgins & Davies 1996). | 2 | 23/08/2008 | **Potential to occur.** |
| Magpie Goose | *Anseranas semipalmata* | | | Vulnerable | Terrestrial and aquatic habitats, but activities cantered on wetlands, mainly those on floodplains of rivers (Marchant & Higgins 1990). | 24 | 18/11/2019 | **Potential to occur.** |
| Marsh Sandpiper | *Tringa stagnatilis* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Endangered | Inhabits sandy, muddy or rocky shores, usually coastal, rarely far inland. Often on beaches and mudflats, sandflats and occasionally rock shelves (Higgins & Davies 1996). | 7 | 1/04/1997 | Absence of suitable habitat and recent records - **unlikely to occur**. |

| Common Name | Scientific name | EPBC-T | EPBC-M | FFG | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| | | | | Birds | | | | |
| Musk Duck | *Biziura lobata* | | | Vulnerable | It inhabits terrestrial wetlands, estuarine habitats and sheltered inland waters. Almost entirely aquatic; preferring deep water of large swamps, lakes and estuaries, where conditions are stable and aquatic flora abundant (Marchant & Higgins 1990). | 181 | 22/07/2021 | **Potential to occur.** |
| Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit | *Limosa lapponica baueri* | Vulnerable | | | | None | N/A | Absence of recent records - **unlikely to occur.** |
| Orange-bellied Parrot | *Neophema chrysogaster* | Critically Endangered | | Critically Endangered | The Orange-bellied Parrot is endemic to south-eastern Australia. Its current non-breeding mainland distribution is from the mouth of the Murray River in South Australia, along the coast, to the east of Jack Smith Lake in South Gippsland, Victoria, covering approximately 1000 km of coastline. The most used sites in Victoria are around Port Phillip Bay and Bellarine Peninsula. In South Australia, Carpenter Rocks is the main site. During winter on the mainland, found mostly within 3 km of the coast. In Victoria, they mostly occur in sheltered coastal habitats, such as bays, lagoons and estuaries, or, rarely, saltworks. They are also found in low samphire herbland dominated by Beaded Glasswort *Sarcocornia quinqueflora*, Sea Heath *Frankenia pauciflora* or Sea-blite *Suaeda australis*, and in taller shrubland dominated by Shrubby Glasswort *Sclerostegia arbuscula*. They are sometimes found in low samphire dominated by Grey Glasswort *Halosarcia halocnemoides* or in Chenopodium herbfields. Breeds at Melaleuca in Tasmania during spring/summer months (DAWE 2020). | 2 | 5/07/2000 | **Potential to occur.** |
| Pacific Golden Plover | *Pluvialis fulva* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Vulnerable | Inhabits sandy, muddy or rocky shores, usually coastal, rarely far inland. Often on beaches and mudflats, sandflats and occasionally rock shelves (Marchant & Higgins 1993). | 5 | 19/10/2001 | Absence of suitable habitat and recent records - **unlikely to occur.** |
| Painted Honeyeater | *Grantiella picta* | Vulnerable | | Vulnerable | Inhabits box-ironbark forests and woodlands and mainly feeds on the fruits of mistletoe. Strongly associated with mistletoe around the margins of open forests and woodlands. Can also be found in farmland containing remnant treed vegetation. Occurs at few localities. Uncommon breeding migrant from further north, arriving in October and leaving in February (Higgins et al. 2001; Tzaros 2005). | None | N/A | Absence of suitable habitat and recent records - **unlikely to occur.** |
| Pilotbird | *Pycnoptilus floccosus* | Vulnerable | | | Occurs in wet sclerophyll forests, occasionally in dry sclerophyll forests and woodlands. Usually inhabits moist gullies but also dry slopes and ridges with dense undergrowth (Higgins & Peter 2002). | None | N/A | Absence of suitable habitat and recent records - **unlikely to occur.** |
| Pin-tailed Snipe | *Gallinago stenura* | | M (Bonn A2H, CAMBA, JAMBA, ROKAMBA) | | | None | N/A | Absence of suitable habitat and recent records - **unlikely to occur.** |

| Common Name | Scientific name | EPBC-T | EPBC-M | FFG | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| Birds | | | | | | | | |
| Plumed Egret | *Ardea intermedia plumifera* | | | Critically Endangered | It mainly inhabits terrestrial wetlands; only occasionally visit coastal wetlands and forages amongst aquatic vegetation in shallow water and requires trees for roosting and nesting. It often occurs in wetlands that contain vegetation, including bulrush (Marchant & Higgins 1990). | 29 | 24/05/2021 | **Potential to occur.** |
| Red Knot | *Calidris canutus* | Endangered | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Endangered | In Australasia, the Red Knot mainly inhabits intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps. They rarely use inland lakes or swamps (DAWE 2020). | 62 | 31/01/2018 | Absence of suitable habitat - **unlikely to occur**. |
| Red-necked Stint | *Calidris ruficollis* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | | Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins & Davies 1996). | 169 | 11/12/2008 | Absence of suitable habitat - **unlikely to occur**. |
| Regent Honeyeater | *Anthochaera phrygia* | Critically Endangered | | Critically Endangered | Inhabits dry box-ironbark eucalypt forests near rivers and creeks on inland slopes of the Great Dividing Range. Can also occur in small remnant patches or in mature trees in farmland or partly cleared agricultural land (Higgins et al. 2001). | None | N/A | Absence of suitable habitat and recent records - **unlikely to occur**. |
| Ruddy Turnstone | *Arenaria interpres* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Endangered | Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins & Davies 1996). | 10 | 3/07/2018 | Absence of suitable habitat - **unlikely to occur**. |
| Rufous Fantail | *Rhipidura rufifrons* | | M (Bonn A2H) | | In east and south-east Australia, mainly inhabits tall wet sclerophyll forests, often in gullies. When on passage in warmer months, they are sometimes recorded in drier sclerophyll forests and woodlands, as well as parks and gardens (Higgins et al. 2006). Virtually absent from south-eastern Australia during winter (Higgins et al. 2006). | 2 | 20/12/2020 | **Potential to occur.** |
| Sanderling | *Calidris alba* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | | Inhabits open sandy beaches exposed to sea-swells; also on exposed sandbars and spits (Higgins & Davies 1996). | 4 | 25/03/2007 | Absence of suitable habitat - **unlikely to occur**. |
| Satin Flycatcher | *Myiagra cyanoleuca* | | M (Bonn A2H) | | Mostly found in eucalypt forest, particularly tall wet forests and woodland within gullies (Higgins et al. 2006). Also inhabits eucalypt woodland comprising an open understorey and a grassy ground layer (Higgins et al. 2006). Generally absent from rainforest (Higgins et al. 2006). | 11 | 31/12/2020 | Absence of suitable habitat - **unlikely to occur**. |

| Common Name | Scientific name | EPBC-T | EPBC-M | FFG | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| | | | | | Birds | | | |
| Sharp-tailed Sandpiper | *Calidris acuminata* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | | Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins & Davies 1996). | 22 | 27/10/2007 | Absence of suitable habitat - **unlikely to occur**. |
| Short-tailed Shearwater | *Ardenna tenuirostris* | | M (JAMBA, CAMBA, ROKAMBA) | | Marine, pelagic seabird that migrates from subantarctic and antarctic waters to breed in Australia, most notably on mainland Victoria and Bass Strait (Marchant & Higgins 1990). Breeds in large colonies, with nests constructed within burrows in the ground. Known to cover great distances to forage, with feeding locations sometimes hundreds of kilometres from the coast (Einoder & Goldsworthy 2005). | 32 | 21/03/2019 | **Known to occur in study area.** |
| Sooty Shearwater | *Ardenna grisea* | | M (JAMBA) | | | None | N/A | Absence of suitable habitat and recent records - **unlikely to occur**. |
| South Polar Skua | *Catharacta maccormicki* | | M (Bonn A2H, ROKAMBA, JAMBA) | | Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins & Davies 1996). | None | N/A | Absence of recent records - **unlikely to occur.** |
| Swift Parrot | *Lathamus discolor* | Critically Endangered | | Critically Endangered | Prefers a select range of eucalypts in Victoria, including Yellow Gum, Grey Box, White Box, Red Ironbark and Yellow Box, as well as River Red-gum when this species supports abundant 'lerp' (Saunders & Tzaros 2011). The species is also known to forage within planted stands of Spotted Gum and Sugar Gum (Nature Advisory; unpublished data). Breeds in Tasmania and migrates to the mainland of Australia for the autumn, winter and early spring months. It lives mostly north of the Great Dividing Range, passing through two areas of Victoria on migration: the Port Phillip district and Gippsland (Emison et al. 1987; Higgins 1999; Kennedy & Tzaros 2005). Though it is also not uncommonly sighted in urban areas (Nature Advisory; unpublished data). Occurrence of this species on the mainland can substantially change from year to year depending on food availability, giving potential for this species to occur almost anywhere throughout its range (Emison et al. 1987). | 1 | 27/03/2006 | Absence of suitable habitat and scarcity of recent records - **unlikely to occur**. |
| Swinhoe's Snipe | *Gallinago megala* | | M (Bonn A2H, CAMBA, JAMBA, ROKAMBA) | | | None | N/A | Absence of recent records - **unlikely to occur.** |
| Terek Sandpiper | *Xenus cinereus* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Endangered | Inhabits saline intertidal mudflats in sheltered estuaries, harbours and lagoons; on islets, mudbanks, sandbanks or spits. In Victoria, they occur in Corner Inlet, Westernport Bay and Port Phillip Bay (Higgins & Davies 1996). | None | N/A | Absence of recent records - **unlikely to occur.** |
| Wandering Tattler | *Tringa incana* | | M (Bonn A2H, JAMBA) | | Essentially rocky coasts with reef and platforms, spits, piers, offshore islands and shingle beaches (Higgins & Davies 1996). | None | N/A | Absence of recent records - **unlikely to occur.** |

| Common Name | Scientific name | EPBC-T | EPBC-M | FFG | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| **Birds** | | | | | | | | |
| Whimbrel | *Numenius phaeopus* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Endangered | Inhabit intertidal mudflats of sheltered coasts, harbours, lagoons, estuaries and river deltas. Prefer mudflats with mangrove, but also occur on open, unvegetated mudflats. In Victoria, small numbers occur at Gippsland lakes; most from Corner Inlet, Westernport and Port Phillip Bays (Higgins & Davies 1996). | 272 | 15/04/2019 | Absence of suitable habitat - **unlikely to occur**. |
| White-bellied Sea-Eagle | *Haliaeetus leucogaster* | | | Endangered | Maritime habitats, terrestrial large wetlands and coastal lands of tropical and temperate Australia and offshore islands, ranging far inland only over large rivers and wetlands. The eagles usually breed on coast and offshore islands and inland beside large lakes or rivers, usually in tall trees in or near water, also in cliffs, rock pinnacles and escarpments (Marchant & Higgins 1993). | 131 | 24/08/2020 | **Potential to occur.** |
| White-throated Needletail | *Hirundapus caudacutus* | Vulnerable | M (CAMBA, ROKAMBA, JAMBA) | Vulnerable | Aerial, over all habitats, but probably more over wooded areas, including open forest and rainforest. Often over heathland and less often above treeless areas such as grassland and swamps or farmland (Higgins 1999). | 9 | 25/01/2019 | **Potential to occur.** |
| Wood Sandpiper | *Tringa glareola* | | M (Bonn A2H, ROKAMBA, JAMBA, CAMBA) | Endangered | Inhabits well vegetated, shallow, freshwater wetlands, such as swamps, lakes, pools, and waterholes; typically with emergent, aquatic plants or grass, and dominated by taller fringing vegetation, such as dense stands of rushes or reed. In Victoria, they are mostly from Port Phillip bay and in mid-Murray valley (Higgins & Davies 1996). | None | N/A | Absence of recent records - **unlikely to occur.** |
| Yellow Wagtail | *Motacilla flava* | | M (CAMBA, JAMBA, ROKAMBA) | | Regular non-breeding visitor in northern Australia mainly spring-summer, vagrant to the south. Occupies a wide range of habitats, usually open areas with low vegetation such as crop, grassland and even parkland. Often recorded near water (Higgins, Peter & Cowling 1999) | None | N/A | Absence of recent records - **unlikely to occur.** |
| **Mammals** | | | | | | | | |
| Eastern Barred Bandicoot | *Perameles gunnii* | Endangered | | Endangered | The habitat of the Eastern Barred Bandicoot (mainland) is perennial tussock grassland and eucalypt woodland with a grassy ground layer (Dufty 1994b; Seebeck 1995a, 2001). Drainage lines and areas of high vegetative cover have been identified as prime habitat. The key determining factor for persistence of this species appears to be high structural complexity and heterogeneity within the environment, reflected in its absence from agricultural areas but persistence in rubbish dumps and other variable habitats. | 25 | 24/08/2021 | Species released onto the Summerland Peninsula, at western tip of Phillip Island in 2017 ~ 20 km from study area, as well as Churchill Island in 2015. Lack of suitable habitat connectivity - **unlikely to occur.** |
| Eastern Bent-winged Bat | *Miniopterus orianae oceanensis* | | | Critically Endangered | Roosts in caves during the day, dispersing over a range of habitats at night. Its feeding areas tend to be associated with major drainage systems (Menkhorst 1995). | 3 | 21/05/1985 | Scarcity of recent records - **unlikely to occur.** |

| Common Name | Scientific name | EPBC-T | EPBC-M | FFG | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| Birds | | | | | | | | |
| Grey-headed Flying-fox | *Pteropus poliocephalus* | Vulnerable | | Vulnerable | Brisbane, Newcastle, Sydney and Melbourne are occupied continuously. Elsewhere, during spring, they are uncommon south of Nowra and widespread in other areas of their range. Roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation, but colonies also use highly modified vegetation in urban and suburban areas (DAWE 2020). | None | N/A | Absence of recent records - **unlikely to occur.** |
| Long-nosed Potoroo | *Potorous tridactylus trisulcatus* | Vulnerable | | Vulnerable | In Victoria, the species occupies a wide variety of wet forest and wet scrub, usually occuring on sandy loam soils where rainfall exceeds 750mm annually (Menkhorst 1995); In Tasmania, moist forest with dense shrub layer; in the north edge of rainforest (Menkhorst 1995). Dense understorey vegetation is an essential component for the species persistence, which can consist of grass trees, sedges, ferns, heath, tea-tree or melaleucas (Menkhorst 1995). | 5 | 2/05/2004 | Absence suitable habitat and scarcity of recent records - **unlikely to occur.** |
| Southern Brown Bandicoot | *Isoodon obesulus obesulus* | Endangered | | Endangered | Suitable habitat for Southern Brown Bandicoots (eastern) is defined to be any patches of native or exotic vegetation, within their distribution, which contains understorey vegetation structure with 50–80% average foliage density in the 0.2–1 m height range. In areas where native habitats have been degraded or diminished, exotic vegetation, such as Blackberry (Rubus spp.), can and often does, provide important habitat (DAWE 2020). | None | N/A | Absence of recent records - **unlikely to occur.** |
| Spot-tailed Quoll | *Dasyurus maculatus maculatus* | Endangered | | Endangered | Rainforest, wet and dry forest, coastal heath and scrub and River Red-gum woodlands along inland rivers (Menkhorst 1995). | None | N/A | Absence of recent records - **unlikely to occur.** |
| Swamp Antechinus | *Antechinus minimus maritimus* | Vulnerable | | Vulnerable | Dense wet heath, tussock grassland, sedgeland heathy woodland and coastal heath and scrub (Menkhorst 1995). Requires mature, dense vegetation with thick ground cover (DAWE 2020). Shelters in short burrows or underneath dense leaf litter. Rarely occurs more than 200m above sea level. Though this species has also previously been detected at sites which had experienced some structural disturbance in the South Gippsland region (Nature Advisory; unpublished data). | None | N/A | Absence of recent records - **unlikely to occur.** |
| Yellow-bellied Glider | *Petaurus australis* | Vulnerable | | | Forests with a predominance of smooth-barked eucalypts, as well as a mixture of eucalypt species. Uncommon in wet forests dominated by single tree species; a mixture of tree species is preferred (Menkhorst 1995). Inhabits a range of forest types, depending on the location in Victoria - western populations use dry woodland and forest, whereas southern, eastern and northeastern populations use a variety of wet forest types (Menkhorst 1995). Require large hollows in large, old trees. In Mountain Ash forest dependent on extensive stands of old-growth forest - rare in young forest even when scattered old trees are available (Menkhorst 1995). Will persist in corridors as narrow as 200 m (Menkhorst 1995). | None | N/A | Absence of suitable habitat and recent records - **unlikely to occur**. |
| Yellow-bellied Sheathtail Bat | *Saccolaimus flaviventris* | | | Vulnerable | Known to occur from urban, agricultural semi-arid and tall wet forest habitats (Menkhorst 1995). | 1 | 24/04/2006 | Scarcity of recent records - **unlikely to occur.** |

| Common Name | Scientific name | EPBC-T | EPBC-M | FFG | Habitat | Number of records | Date of last record | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| **Birds** | | | | | | | | |
| **Reptiles** | | | | | | | | |
| Green Turtle | *Chelonia mydas* | Vulnerable | M (Bonn A1, A2H) | | Tropical and warm waters, occasionally ventures south to cooler waters (Wilson & Swan 2003). | None | N/A | Absence of suitable habitat and recent records - **unlikely to occur.** |
| Leathery Turtle | *Dermochelys coriacea* | Endangered | M (Bonn A1, A2H) | Critically Endangered | Found in all coastal waters though less frequently in southern Australia (Wilson & Swan 2003). | None | N/A | Absence of suitable habitat and recent records - **unlikely to occur.** |
| Loggerhead Turtle | *Caretta caretta* | Endangered | M (Bonn A1, A2H) | | Sea turtle which occasionally occurs in southern Australian waters (Cogger 2000). | None | N/A | Absence of suitable habitat and recent records - **unlikely to occur.** |
| **Fish** | | | | | | | | |
| Australian Grayling | *Prototroctes maraena* | Vulnerable | | Endangered | Large and small coastal streams and rivers with cool, clear waters with a gravel substrate and altering pools and riffles (Cadwallader & Backhouse 1983). | None | N/A | **Aquatic fauna assessment undertaken by Aquatica Environmental.** |
| Dwarf Galaxias | *Galaxiella pusilla* | Vulnerable | | Endangered | Ranges from the far west of the state through to the Mitchell River basin in central Gippsland. Vegetated margins of still water, ditches, swamps and backwaters of creeks, both ephemeral and permanent (Allen et al. 2002). Some wetlands where it occurs may partially or completely dry up during summer, with such wetlands reliant on seasonal flooding plus linkages to other sites where the species occurs, for habitat and population replenishment (Saddlier, Jackson & Hammer 2010). Dwarf Galaxias is also often found in association with burrowing freshwater crayfish (Engaeus spp.), with the crayfish burrows reportedly providing refuge from predators and dry conditions for the species (Saddlier, Jackson & Hammer 2010). | None | N/A | **Aquatic fauna assessment undertaken by Aquatica Environmental.** |
| Flatback Mangrovegoby | *Mugilogobius platynotus* | | | Endangered | Usually found in estuaries, often among mangroves over soft silt bottoms. Can tolerate a high percentage of fresh water, but basically a marine species (Allen et al. 2002). | 1 | 3/05/2007 | **Aquatic fauna assessment undertaken by Aquatica Environmental.** |
| **Frogs** | | | | | | | | |
| Growling Grass Frog | *Litoria raniformis* | Vulnerable | | Vulnerable | Permanent, still or slow flowing water with fringing and emergent vegetation in streams, swamps, lagoons and artificial wetlands such as farm dams and abandoned quarries (Clemann & Gillespie 2004). | 1 | 01/01/1788 | **Aquatic fauna assessment undertaken by Aquatica Environmental.** |

**Notes: EPBC-T** = threatened species status under EPBC Act; **EPBC-M =** migratory status under the EPBC Act (M = listed migratory taxa; Bonn Convention (A2H) - Convention on the Conservation of Migratory Species of Wild Animals – listed as a member of a family; Bonn Convention (A2S) - Convention on the Conservation of Migratory Species of Wild Animals - species listed explicitly; CAMBA - China- Australia Migratory Birds Agreement; JAMBA - Japan-Australia Migratory Birds Agreement; ROKAMBA - Republic of Korea Australia Migratory Birds Agreement); **FFG** = threatened species status under the FFG Act.

### *5.5.3. Susceptibility of listed fauna to impacts*

The following analysis identifies the susceptibility of listed fauna species that may utilise the study area to potential development. This analysis includes consideration of the following factors:

- Mobility of the species; and
- Availability and extent of other suitable habitat in the region and degree to which each species may rely on habitat in the study area.

Targeted surveys may be required to determine the presence or absence of any listed fauna species considered to be susceptible to impacts from development once a proposal has been established.

The evaluation of likelihood of occurrence in Table 4 resulted in a short-list of 24 listed species that may occur in the study area. These include:

**Wetland Birds and Waterbirds:**

- Australasian Shoveler
- Blue-billed Duck
- Eastern Great Egret
- Freckled Duck
- Glossy Ibis
- Hardhead
- Little Egret
- Magpie Goose
- Musk Duck
- Plumed Egret

These species may occur occasionally while moving through rather than being exclusively reliant on habitat within the study. The Outfalls North area provided low and medium quality habitat for most of these species, but they are not likely to be reliant on this area given the extent and proximity of high-quality habitat in the adjacent Western Port Ramsar wetland and nearby areas of Phillip Island Nature Park. It should be noted that most of these species have the potential to benefit from a sensitive urban design for wetlands in this area.

**Seabirds:**

- Caspian Tern
- Crested Tern
- Fairy Tern
- Little Tern

These species may occur in coastal environments adjacent to the study area but are unlikely to be susceptible to development in the form of drainage and infrastructure upgrades.

**Raptors:**

- Black Falcon
- Little Eagle
- White-bellied Sea-Eagle

These highly mobile species may occasionally forage within the study area but are unlikely to be susceptible to development in the form of drainage and infrastructure upgrades.

**Migratory Birds:**

- Fork-tailed Swift
- Latham's Snipe
- Orange-bellied Parrot
- Rufous Fantail
- Short-tailed Shearwater
- White-throated Needletail

Both White-throated Needletail and Fork-tailed Swift are almost exclusively aerial and are unlikely to be susceptible to impacts from drainage and infrastructure upgrades within the study area.

Latham's Snipe may occasionally utilise the ephemeral wetlands in the Outfalls North area but is not likely to be reliant on this area.

Orange-bellied Parrot migrates to the mainland during winter and prefers sheltered coastal habitats and low samphire herbland (DAWE 2022b). There is potential for Orange-bellied Parrot to occur within the study area given the proximity to suitable habitat in the Western Port Ramsar wetland. Any drainage and infrastructure upgrades should avoid indirect impacts to this important habitat through appropriate mitigation measures.

Rufous Fantail prefers forested habitats but may infrequently occur within the study area while on passage during the warmer months. This species is unlikely to be susceptible to impacts from drainage and infrastructure upgrades within the study area.

Susceptibility of Short-tailed Shearwater to potential development within the study is discussed in detail below.

**Shorebirds:**

- Hooded Plover

Susceptibility of Hooded Plover to potential development within the study area is discussed in detail below.

A review of the species occurrence combined with the above habitat assessment confirmed that two listed fauna species are likely to occur within or adjacent to the Outfalls South area and have the potential to be impacted by construction activities associated with drainage and infrastructure upgrades. The susceptibility of these species to possible impacts from any development in the Outfalls South area is discussed below.

*Birds (non-migratory)*

- **Hooded Plover** (EPBC Act: Vulnerable; FFG Act: Vulnerable)

Hooded Plover has been recorded on the beach and dune system immediately south of the Outfalls South area in the last five years (pers. comm Daniel Lees, BirdLife Australia). This species prefers sandy ocean beaches with a wide wave-wash zone for feeding and sparsely vegetated sand dunes for shelter and nesting (Marchant & Higgins 1993). In Victoria, Hooded Plover breed form August to March, usually on or near beaches or in sand dunes. Breeding success may be impacted by human disturbance which may cause nests to be abandoned (Marchant & Higgins 1993). Additionally, nesting habitat is susceptible to trampling and erosion.

### *Migratory Birds*

- **Short-tailed Shearwater** (EPBC Act: Migratory)

This species is known to breed within the Outfalls South area from November to April. Short-tailed Shearwaters create burrows in the sandy headlands dominated by low-lying vegetation, such as bower spinach and tussock grasses. Breeding colonies have been mapped on Phillip Island (pers. comm. Duncan Sutherland, Phillip Island Nature Parks) and a general overview of important habitat within the Outfalls South area is shown in Figure 2 below. The main threats to this species with regards to drainage and infrastructure upgrades within study area include: modification of breeding habitat by invasive plant species, which can leave areas susceptible to erosion and collapse of burrows; excessive trampling of burrows during construction works (Marchant & Higgins 1990); and artificial lights, which have been recognised as a contributor to fledgeling mortality (Rodriguez *et al.* 2014).

### *Mammals*

No listed mammal species are considered to have the potential to occur in the study area.

### *Reptiles*

No listed reptile species are considered to have the potential to occur in the study area.

### *Frogs*

An aquatic fauna assessment was undertaken separately by Aquatica Environmental.

### *Fish*

An aquatic fauna assessment was undertaken separately by Aquatica Environmental.

### *Invertebrates*

No listed invertebrate species are considered to have the potential to occur in the study area.

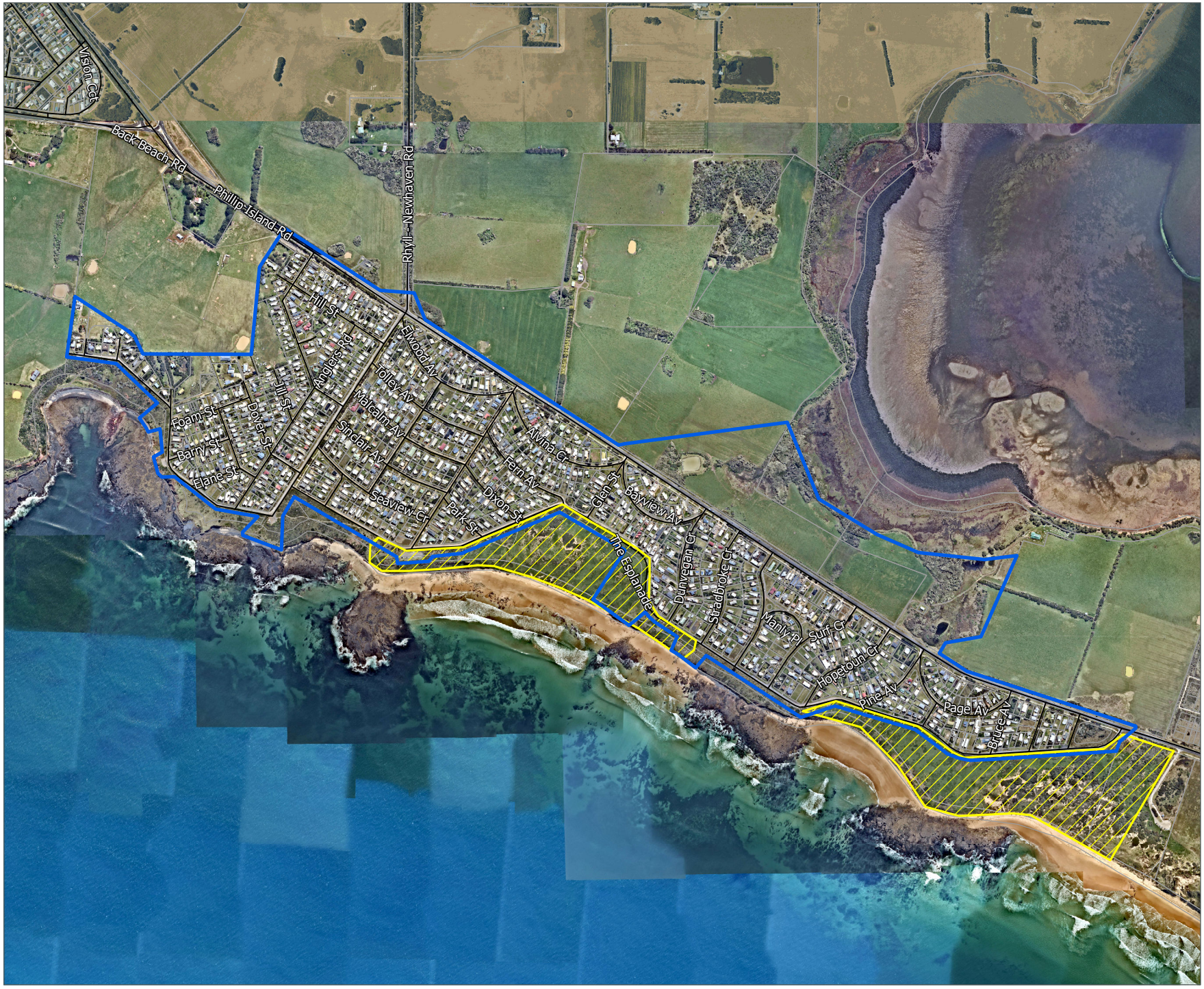


**Figure 2:** Short-tailed Shearwater Habitat

**Project:** Surf Coast and Sunderland Bay
**Client:** Bass Coast Shire Council
**Date:** 29/09/2022

Study area

Short-tailed Shearwater Habitat

N

Metres
0 200

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## 5.6. Listed ecological communities

The EPBC Protected Matters Search Tool (DAWE 2020a) indicated that no ecological communities listed under the EPBC Act had the potential to occur in the search region (Table 4).

**Table 4: EPBC Act-listed ecological communities and likelihood of occurrence in the study area**

| Ecological Community | EPBC Status | Occurrence in the study area |
|---|---|---|
| Giant Kelp Marine Forests of South East Australia | Endangered | Does not occur in the study area |
| Subtropical and Temperate Coastal Saltmarsh | Vulnerable | Does not occur in the study area |
| Natural Damp Grassland of the Victorian Coastal Plains | Critically Endangered | Although grassland areas do occur within the study area, this is associated with calcareous sands on dune swales which is contra-indicative to the community. Therefore, it does not occur in the study area. |

**Notes: EPBC** = status under the EPBC Act.

# 6. Proposed development and recommendations

## 6.1. Proposed development

It is understood that concept design plans for road and drainage improvements are still being developed, but works may involve the installation of kerb and channel, footpaths, underground drainage, upgrade of carparks, underground service modifications and construction / sealing of road pavement. There may also be drainage improvements at the outfalls such as drainage channels, pipes, gross pollutant traps, erosion control devices and wetlands. It is also likely that there will be three separate wetlands installed north of Phillip Island Road as part of the potential project and these will be located in existing drainage outfalls so catchment areas remain the same and some natural wetlands vegetation can be re-utilised as part of the project.

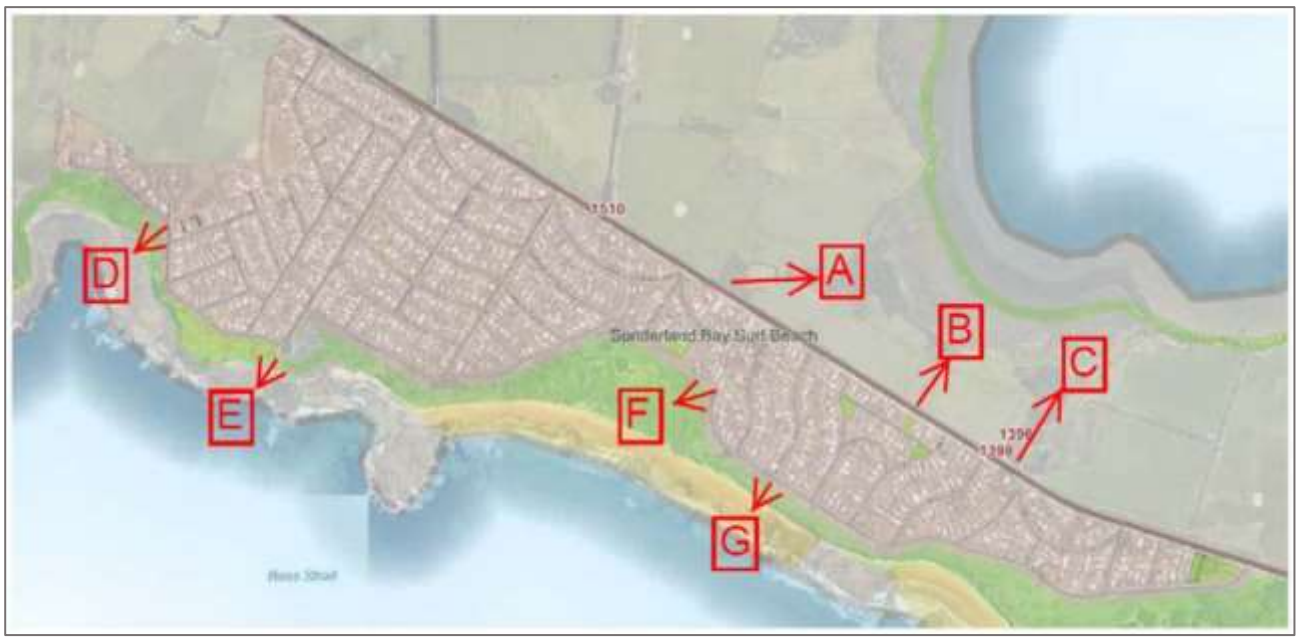



**Figure 3. Existing and proposed drainage outfall locations provided by Bass Coast Shire Council.**

## 6.2. Design and construction recommendations

The following design recommendations are provided to avoid/minimise impacts to native vegetation, and flora and fauna habitats:

### *6.2.1. Protection and avoidance of native vegetation*

- A separate ecological survey of the study area (Walker 2020) highlighted that erosion, and in some cases weed invasion, is being facilitated by insensitive drainage measures. This was also noted during the field assessment. It is recommended that each drain is assessed prior to any infrastructure works and appropriate remediation measures such as revegetation, sediment traps and soil stabilisation (i.e. jute matting) are adopted.
- Prior to the commencement of works, vegetation protection zones should be established around any remnant vegetation to be retained.
- Any disturbance to remnant native vegetation related to outfall modifications south of The Esplanade should be to the absolute minimal possible extent due to the high-quality habitat. Weed control measures should be implemented regularly within disturbance areas and supplementary plantings should also considered. Species selection should comprise indigenous

species that are relevant to the historical EVCs and will rapidly colonise and establish in these disturbance areas.

- The installation of infrastructure should utilise existing outfalls and drainage as these are areas of historical disturbance and generally colonised by high-threat weeds
- It is understood that a combination of existing drainage infrastructure (outfalls A, B and C in Fig. 3) and a series of constructed wetlands will be utilised to ensure no additional hydrological pressures will be added to the saltmarsh vegetation along Westernport by this proposal. It is recommended that a detailed hydrological assessment is undertaken to ensure that the constructed wetland system has an appropriate capacity to store the increased volumes of stormwater generated by the proposed infrastructure. An increase in freshwater runoff has the capacity to alter the saltwater dependent ecosystem over time.

### *6.2.2. Protection of native fauna*

- Construction works for the Outfalls South area should not be carried out during the breeding seasons for the following listed bird species:
  - Hooded Plover (August to March)
  - Short-tailed Shearwater (November to April)
- Therefore, the only suitable time to construct the outfalls south of The Esplanade to avoid impacts to these species occurs between May-July (see Table 5).
- Consideration should also be made to relocate the locations of outfalls 'F' and 'G' to avoid known Short-tailed Shearwater nesting habitat, if practical.
- Artificial lights have been recognised as a contributor to Short-tailed Shearwater fledgeling mortality (Rodriguez *et al.* 2014) and other migratory bird species. Mitigation measures should be consistent with light mitigation requirements detailed within the National Light Pollution Guidelines for Wildlife (DEE 2020). This includes minimising the number of lights, installation of light baffling, restricting construction work to daylight hours and avoid construction during the Shearwater fledgeling season from March to April.

### *6.2.3. Opportunities for habitat enhancement*

- In recognition of historical revegetation work undertaken by Landcare, the construction of the wetland system should not only avoid the existing vegetation, but also complement it. The design should adhere to the requirements for best-practice constructed wetlands (Melbourne Water, 2020) to inform a wetland design that would mitigate any potential impacts to the Western Port Ramsar wetland. Planting design should aim to create structure diversity and include dense scrub vegetation, open tussock areas, emergent aquatic and fringing vegetation and treed areas around the periphery. The variety of lifeforms will provide suitable habitat for an array of species, including the threatened species identified in Section 5.5.2.
- The existing patches of vegetation throughout the Urban Estate area may function as a bio link for some fauna species to transition between the coastal reserve and to the rural landscape to the north. This is particularly evident along Sunderland Bay Road and to a lesser extent Batman and Seafoam Street. There is an opportunity to enhance these bio links through vegetation of non-vegetated areas and enhancement planting within existing patches to increase structural diversity.

# 7. Implications under legislation and policy

## 7.1. Clause 52.17 of the Planning Scheme

A permit for the proposed removal of native vegetation is required under Cl. 52.17 of the State Planning Provisions.

### *7.1.1. Exemptions*

The following exemptions listed in Cl. 52.17-7 may be relevant to the study area:

- *Dead native vegetation:* Native vegetation that is dead is exempt and does not require a planning permit. This does not apply to a standing dead tree with a trunk diameter of 40 centimetres or more at a height of 1.3 metres above ground level. As such, any dead trees with DBH of 40 centimetres or more have been included in the tree data collected for this investigation.
- *Planted vegetation:* Native vegetation that is to be removed, destroyed or lopped that was either planted or grown as a result of direct seeding. This exemption does not apply to native vegetation planted or managed with public funding for the purpose of land protection or enhancing biodiversity.
- *Regrowth:* Native vegetation that is to be removed, destroyed or lopped that has naturally established or regenerated on land lawfully cleared of naturally established native vegetation, and may be classified as one of the following:
    - Less than 10 years old.

These exemptions may be overridden by specific requirements under relevant overlays, as detailed below.

## 7.2. Implications under relevant overlays

The following overlays were considered relevant to this investigation due to biodiversity implications. Any application must consider the objectives and decision guidelines of these overlays, where relevant.

**Vegetation Protection Overlay - Schedule 2 (VPO2)**

The following decision guidelines apply to an application for a permit under Clause 42.02, in addition to those specified in Clause 42.02 and elsewhere in the scheme which must be considered, as appropriate, by the responsible authority:

- The effect on the habitat value and long term viability of remnant vegetation in the locality.
- The significance of the vegetation, particularly if it forms part of a recognised wildlife corridor.
- The reason for any removal of native vegetation and whether an alternative option can be developed which conserves the vegetation.
- The effect any removal of vegetation will have on groundwater recharge and discharge areas.
- The purpose of the underlying zone.

Under this overlay, a permit is required to remove, destroy or lop any tree or shrub with a girth greater than 30 centimetres (when measured 30 centimetres above ground level) or a height of at least two metres.

This does not apply to introduced species of ornamental shrubs or fruit trees or to species identified as being weeds; or to pruning.

A permit is not required for:

- The pruning of vegetation for maintenance.
- The removal, destruction or lopping of dead vegetation.

### Environmental Significance Overlay - Schedule 1 (ESO1)

The following decision guidelines apply to an application for a permit under Clause 42.01, in addition to those specified in Clause 42.01 and elsewhere in the scheme which must be considered, as appropriate, by the responsible authority:

- The maintenance and improvement in the stability of coastal wetlands, dunes and coastlines.
- The impact of the proposal on coastal processes and the need to protect and enhance environmentally sensitive coastlines.
- The conservation of any areas of environmental importance or significance
- Potential threats to the quality, life cycle processes or functioning of aquatic and terrestrial ecosystems or native plant and animal species.
- The function of the wetland, watercourse or habitat area as part of a broader natural system.
- The preservation of any existing native vegetation including measures to rejuvenate degraded areas and areas abutting watercourses with indigenous plant species.
- The extent of any proposed removal of native vegetation.
- The necessity of retaining a buffer strip of vegetation in the vicinity of water courses, roads and property boundaries.
- Control of noxious and environmental weeds and pest animals, including the need to minimise the spread of weeds and soil pathogens.
- The capacity of the soil and water to absorb wastes and the design of any effluent disposal system.
- The works to prevent and control drainage and stormwater run-off from any building, works, access road or driveway.
- The need to maintain the seasonality, quantity and quality of water flows through the area and through other areas with a common system of drainage.
- The need to minimise water pollution through the establishment of best practice performance standards and monitoring regimes for stormwater.
- The location, dimension and level of any excavation or alteration to the natural surface that may impact on the drainage function of the wetland, including works to stabilise buffers in areas of fill or excavation.
- Any comments from the Department of Environment, Land, Water and Planning.

Under this overlay, a permit is required to remove, destroy or lop any vegetation, including dead vegetation.

## Significant Landscape Overlay - Schedule 3 (SLO3).

The following decision guidelines apply to an application for a permit under Clause 42.03, in addition to those specified in Clause 42.03 and elsewhere in the scheme which must be considered, as appropriate, by the responsible authority:

Before deciding on an application, the responsible authority must consider, where appropriate:

- The key objectives and strategies at Clause 21.08-1, Landscape.

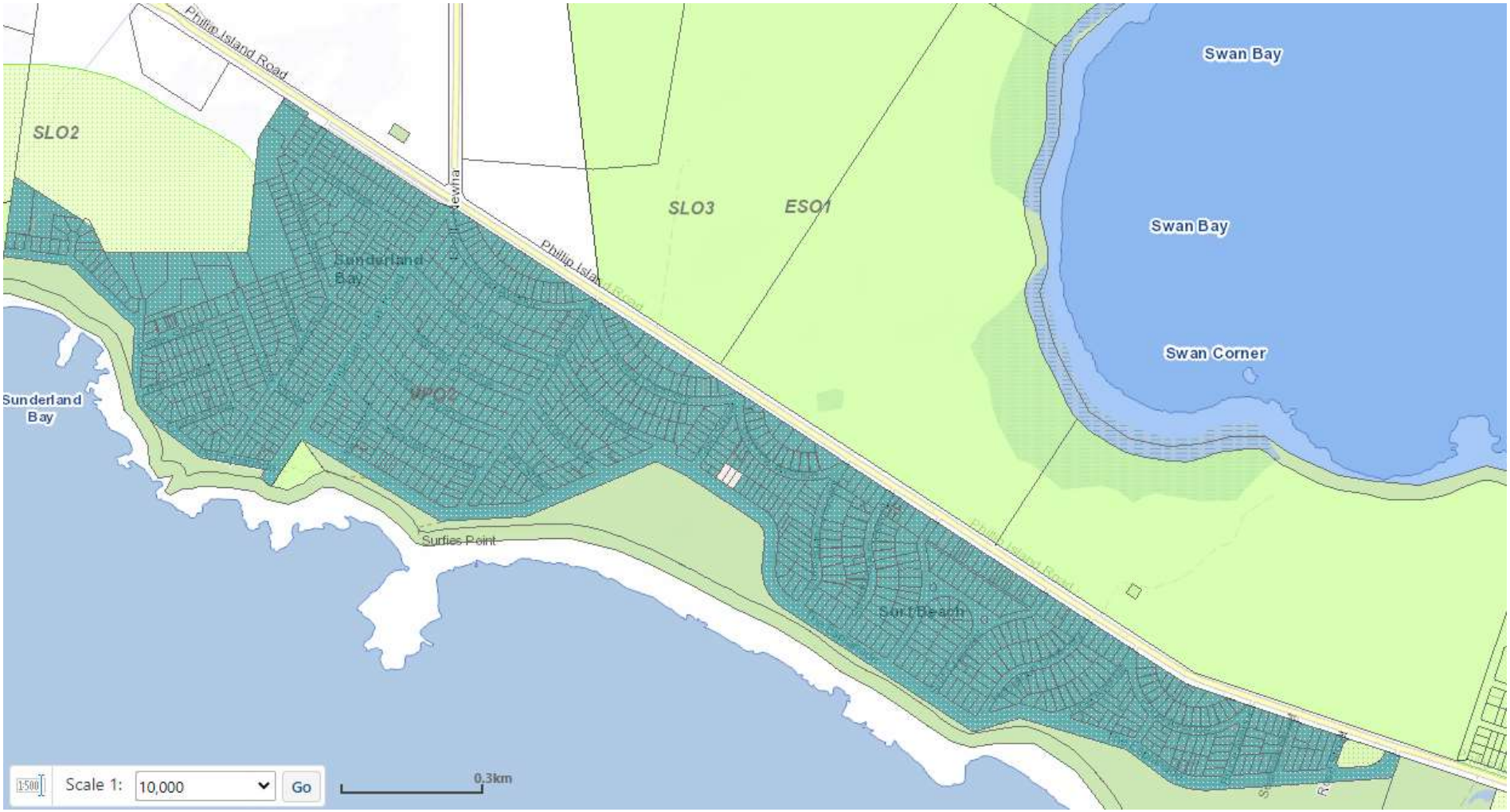
*Native Vegetation*

- The impact of the vegetation removal on the valued character of the State significant Phillip Island Western and Southern Coast.
- The species of vegetation, its age, health and growth characteristics.
- Whether the vegetation is isolated or part of a vegetation patch.
- The availability of sufficient unencumbered land to provide for offset planting.
- The impact of maintenance activities on the retained vegetation, for example, maintenance of a structure or infrastructure.
- The impact of the vegetation on the structural integrity of existing or future buildings, including foundations. Whether the buildings and works have been located to avoid or minimise impacts on vegetation.
- Vegetation management requirements to reduce fire hazard, prevent erosion and maintain flood control measures.

Under this overlay, a permit is required to remove, destroy or lop native vegetation. This does not apply in the following circumstances (relevant to the application):

- Dead Vegetation
- Planted vegetation - The native vegetation is a tree or shrub within a garden area

**Figure 3: Relevant overlays within the study area**



## 7.3. Implications under the Guidelines

### *7.3.1. Avoid and minimise statement*

In accordance with the Guidelines, all applications to remove native vegetation must provide an avoid and minimise statement that describes any efforts undertaken to avoid the removal of, and minimise the impacts to biodiversity and other values of native vegetation, and how these efforts were focused on areas of native vegetation with the highest value. Opportunities to avoid and minimise impacts to native vegetation in the current application are provided in the design recommendations (Section 6.2).

## 7.4. Implications under the EPBC Act

The EPBC Act protects a number of threatened species and ecological communities that are considered to be of national conservation significance. Any significant impacts on these species require the approval of the Australian Minister for the Environment.

Based on the relevant guidelines, drainage and infrastructure upgrades in the Outfalls South area have the potential to result in a significant impact on EPBC Act-listed values presented below.

- Hooded Plover (EPBC Act – Vulnerable)
- Short-tailed Shearwater (EPBC Act – Migratory)

The breeding seasons are shown in the table below, which demonstrates that the only suitable construction time for the outfalls south of The Esplanade occurs between May-July.

**Table 5: Breeding season of identified EPBC listed species**

| Species | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Short-tailed Shearwater | X | X | X | X | | | | | | | X | X |
| Hooded Plover | X | X | X | | | | | X | X | X | X | X |

If construction is to occur outside of these times, a referral under the EPBC Act is recommended or additional mitigation measures will be required to demonstrate how the construction process does not have the potential to impact on these species.

## 7.5. Implications under the FFG Act

The Victorian FFG Act lists threatened and protected species and ecological communities (DELWP 2019b, DELWP 2022e). Any removal of threatened flora species or communities (or protected flora) listed under the FFG Act from public land requires a Protected Flora Permit under the Act, obtained from DELWP.

Given that the majority of the project occurs on public land, there will likely be many protected flora species impacted by this proposal. Therefore, it is recommended that a survey for these species is only taken once a detailed design has been confirmed. Protected species include ferns, daises, heaths and orchids (DELWP 2019b).

However, it is recommended that a targeted survey is undertaken for the FFG threatened species (DELWP 2022e), determined to have the potential to occur within the study area. This should be undertaken prior to finalising the development plan. In recognition of their threatened status at a state level, every effort should be made to avoid impacting these species if they occur within the study area.

The following FFG threatened species have the potential to occur in the Outfall North and Outfall South area:

- Slender Pink-fingers (FFG: Vulnerable);
- Coast Ballart (FFG: Endangered);
- Peninsula Daisy-bush (FFG: Endangered);
- Dune Wood-sorrel (FFG: Endangered); and
- Dune Poa (FFG: Endangered).

The table below provides a timeline for when it is a suitable month to conduct targeted surveys for each of these species. This is based on when the species is readily identifiable, due to the presence of distinguishing features such as inflorescence or fruit.

**Table 6: FFG threatened flora suitable timing for targeted surveys**

| Species | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Slender Pink-fingers | X | | | | | | | | | X | X | X |
| Coast Ballart | | | | | | | | | X | X | X | X |
| Peninsula Daisy-bush | X | X | X | | | | | | | | | |
| Dune Wood-sorrel | X | X | X | X | X | X | X | X | X | X | X | X |
| Dune Poa | X | | | | | | | | X | X | X | X |

A Protected Flora Permit would be required from DELWP to remove the plant taxa comprising the abovementioned listed threatened community, listed threatened flora species (DELWP 2022e) or otherwise protected flora (DELWP 2019b) from public land. Application forms for Protected Flora Permits can be obtained from DELWP offices or from the customer service centre.

## 7.6. EE Act

The *Ministerial Guidelines for Assessment of Environmental Effects under the* Environment Effects Act 1978 (DSE 2006) identifies criteria that trigger a Referral to the State Minister for Planning.

The following criteria should be considered as part of this proposal;

*<u>One or more</u> of the following would trigger a Referral:*

- *Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia.*

Given the proposal is nearby to the Western Port Ramsar site, consideration must be given to the potential for development or works to lead to a long-term change to the ecological character of the wetland.

The ecological character of a Ramsar Wetland is based on '*The combination of the ecosystem components, processes, and benefits and services that characterise the wetland at a given point in time''* (DEWHA 2008).

The ecological characteristics of the Western Port Ramsar wetland is '*recognised for its diversity of native flora and fauna, particularly for its ability to support diverse assemblages of waterbirds and wetland vegetation, including seagrass, saltmarsh and mangroves'* (Kellogg Brown & Root 2010).

*Response*

The Outfall North area lies immediately south of the Western Port Ramsar Wetland site. It is connected via vegetated areas and drainage lines, which were discharging into the wetland site at the time of field assessment. Drainage and infrastructure upgrades within the townships are likely to result in increased stormwater discharge volumes which could lead to long-term change to the ecological character of a wetland listed under the Ramsar Convention. Appropriate waste management and stormwater treatment must be undertaken to ensure any impacts from drainage and infrastructure upgrades are adequately managed prior to the point of discharge into the Western Port system. Recommendations for the protection of key biodiversity values and ecological characteristics of the Western Port Ramsar wetland are provided in Section 6.2. This includes undertaking a hydrological assessment to ensure that the constructed wetland system has an appropriate capacity to store the increased volumes of stormwater generated by the proposed infrastructure.

### 7.7. CaLP Act

The *Catchment and Land Protection Act 1994* (CaLP Act) requires that landowners (or a third party to whom responsibilities have been legally transferred) must eradicate regionally prohibited weeds and prevent the growth and spread of regionally controlled weeds.

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## Appendix 1: Details of the assessment process in accordance with the Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017a)

### *Purpose and objective*

Policies and strategies relating to the protection and management of native vegetation in Victoria are defined in the State Planning Policy Framework (SPPF). The objective of all Victorian Planning Schemes, as identified in Clause 12.01, is 'To ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

This is to be achieved through the following three-step approach, as described in the Guidelines:

1. Avoid the removal, destruction or lopping of native vegetation.
2. Minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.
3. Provide an offset to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation.

**Note:** While a planning permit may still be required, if native vegetation does not meet the definition of either a patch or a scattered tree, an offset under the Guidelines is not required.

### *Assessment pathways*

The first step in determining the type of assessment required for any site in Victoria is to determine the assessment pathway for the proposed native vegetation removal. The three possible assessment pathways for applications to remove native vegetation in Victoria are the following:

- Basic;
- Intermediate; or
- Detailed.

This assessment pathway is determined by the following two factors:

- **Location Category**, as determined using the Location Map of Victoria. The location category indicates the potential risk to biodiversity from removing a small amount of native vegetation. The three location categories are defined as follows:
  - Location 1 – shown in light blue-green on the Location Map; occurring over most of Victoria.
  - Location 2 – shown in dark blue-green on the Location Map; includes areas mapped as endangered EVCs and/or sensitive wetlands and coastal areas.
  - Location 3 – shown in brown on the Location Map; includes areas where the removal of less than 0.5 hectares of native vegetation could have a significant impact on habitat for rare and threatened species.
- **Extent of native vegetation** – The extent of any patches and scattered trees proposed to be removed (and the extent of any past native vegetation removal), with consideration as to whether the proposed removal includes any large trees. Extent of native vegetation is determined as follows:
  - **Patch** – the area of the patch in hectares.
  - **Scattered Tree** – the extent of a scattered tree is dependent on whether the scattered tree is small or large. A tree is considered to be a large tree if the DBH is greater than or equal to the large tree benchmark DBH for the relevant bioregional EVC. Any scattered tree that is not a

large tree is a small scattered tree. The extent of large and small scattered trees is determined as follows:

- **Large scattered tree** – the area of a circle with a 15 metre radius, with the trunk of the tree at the centre.
- **Small scattered tree** – the area of a circle with a ten-metre radius, with the trunk of the tree at the centre.

The assessment pathway for assessing an application to remove native vegetation is subsequently determined as shown in the following matrix table:

| Extent of native vegetation | Location Category | | |
|---|---|---|---|
| | Location 1 | Location 2 | Location 3 |
| < 0.5 hectares and not including any large trees | Basic | Intermediate | Detailed |
| < 0.5 hectares and including one or more large trees | Intermediate | Intermediate | Detailed |
| ≥ 0.5 hectares | Detailed | Detailed | Detailed |

**Note:** If the native vegetation to be removed includes more than one location category, the higher location category is used to determine the assessment pathway.

### *Landscape scale information – strategic biodiversity value*

The strategic biodiversity value (SBV) is a measure of a location's importance to Victoria's biodiversity, relative to other locations across the state. This is represented as a score between 0 and 1, and determined from the SBV map, available from *NVIM* (DELWP 2022c).

### *Landscape scale information – habitat for rare or threatened species*

Habitat importance for rare or threatened species is a measure of the importance of a location in the landscape as habitat for a particular rare or threatened species, in relation to other habitat available for that species. This is represented as a score between 0 and 1 and determined from the Habitat importance maps, administered by DELWP.

This includes two groups of habitat:

- **Highly localised habitats** – Limited in area and considered to be equally important, therefore having the same habitat importance score.
- **Dispersed habitats** – Less limited in area and based on habitat distribution models.

Habitat for rare or threatened species is used to determine the type of offset required in the detailed assessment pathway.

### *Biodiversity value*

A combination of site-based and landscape scale information is used to calculate the biodiversity value of native vegetation to be removed. Biodiversity value is represented by a general or species habitat score, as determined below.

Firstly, the extent and condition of native vegetation to be removed are combined to determine the habitat hectares as follows:

*Habitat hectares* = extent of native vegetation × condition score

Secondly, the habitat hectare score is combined with a landscape factor to obtain an overall measure of biodiversity value. Two landscape factors exist as follows:

- **General landscape factor** – determined using an adjusted strategic biodiversity score and relevant when no habitat importance scores are applicable;
- **Species landscape factor** – determined using an adjusted habitat importance score for each rare or threatened species habitat mapped at a site in the Habitat importance map.

These factors are subsequently used as follows to determine the biodiversity value of a site:

*General habitat score* = habitat hectares × general landscape factor

*Species habitat score* = habitat hectares × species landscape factor

### *Offset requirements*

A native vegetation offset is required for the approved removal of native vegetation. Offsets conform to one of two types and each type incorporates a multiplier to address the risk of offset:

- A **general offset** is required when the removal of native vegetation does not have a significant impact on any habitat for rare or threatened species (i.e. the proportional impact is below the species offset threshold). In this case a multiplier of 1.5 applies to determine the general offset amount.

*General offset* (amount of general habitat units) = general habitat score × 1.5

- A **species offset** is required when the removal of native vegetation has a significant impact on habitat for a rare or threatened species (i.e. the proportional impact is above the species offset threshold). In this case a multiplier of 2 applies to determine the species offset amount.

*Species offset* (amount of species habitat units) = Species habitat score × 2

**Note:** If native vegetation does not meet the definition of either a patch or scattered tree, an offset is not required.

### *Offset attributes*

Offsets must meet the following attribute requirements, as relevant:

- General offsets

- **Offset amount** – general offset = general habitat score × 1.5
- **Strategic biodiversity value (SBV)** – the offset has at least 80% of the SBV of the native vegetation removed
- **Vicinity** – the offset is in the same CMA boundary or municipal district as the native vegetation removed
- Habitat for rare and threatened species – N/A
- **Large trees** – the offset includes the protection of at least one large tree for every large tree to be removed

- Species offsets
  - **Offset amount** – species offset = species habitat score × 2
  - Strategic biodiversity value (SBV): N/A
  - Vicinity: N/A
  - **Habitat for rare and threatened species** – the offset comprises mapped habitat according to the Habitat importance map for the relevant species
  - **Large trees** – the offset includes the protection of at least one large tree for every large tree to be removed

## Appendix 2: Flora species recorded in the study area

| Origin | Common name | Scientific name | Conservation status | | | CaLP Act |
|---|---|---|---|---|---|---|
| | | | EPBC | FFG-T | FFG-P | |
| | Coast Wattle | *Acacia longifolia subsp. sophorae* | | | p | |
| | Prickly Spear-grass | *Austrostipa stipoides* | | | | |
| | Coast Banksia | *Banksia integrifolia subsp. integrifolia* | | | | |
| * | Prairie Grass | *Bromus catharticus* | | | | |
| * | Kikuyu | *Cenchrus clandestinus* | | | | |
| | Small-leaved Clematis | *Clematis microphylla s.l.* | | | | |
| | White Correa | *Correa alba* | | | p | |
| * | Water Buttons | *Cotula coronopifolia* | | | | |
| * | Couch | *Cynodon dactylon var. dactylon* | | | | |
| | Small-flower Flax-lily | *Dianella brevicaulis* | | | | |
| | Rounded Noon-flower | *Disphyma crassifolium subsp. clavellatum* | | | | |
| | Australian Salt-grass | *Distichlis distichophylla* | | | | |
| | Common Spike-sedge | *Eleocharis acuta* | | | | |
| | Knobby Club-sedge | *Ficinia nodosa* | | | | |
| * | Wall Fumitory | *Fumaria muralis subsp. muralis* | | | | |
| | Saw Sedge | *Gahnia spp.* | | | | |
| | Hop Goodenia | *Goodenia ovata* | | | | |
| | Shiny Swamp-mat | *Goodenia radicans* | | | | |
| * | Smooth Cat's-ear | *Hypochaeris glabra* | | | | |
| | Sea Rush | *Juncus kraussii subsp. australiensis* | | | | |
| | Rush | *Juncus spp.* | | | | |
| | Running Postman | *Kennedia prostrata* | | | | |
| * | Hare's-tail Grass | *Lagurus ovatus* | | | | |
| * | Hairy Hawkbit | *Leontodon saxatilis subsp. saxatilis* | | | | |
| | Sword Sedge | *Lepidosperma spp.* | | | | |
| | Coast Tea-tree | *Leptospermum laevigatum* | | | | |
| | Cushion Bush | *Leucophyta brownii* | | | p | |
| | Coast Beard-heath | *Leucopogon parviflorus* | | | p | |
| * | Rye Grass | *Lolium spp.* | | | | |
| # Pl | Giant Honey-myrtle | *Melaleuca armillaris subsp. armillaris* | | Endangered | | |
| | Swamp Paperbark | *Melaleuca ericifolia* | | | | |
| | Common Boobialla | *Myoporum insulare* | | | | |
| * | Soursob | *Oxalis pes-caprae* | | | | R |
| | Wood Sorrel | *Oxalis spp.* | | | | |
| | Coast Everlasting | *Ozothamnus turbinatus* | | | p | |
| * | Paspalum | *Paspalum dilatatum* | | | | |
| | Common Tussock-grass | *Poa labillardierei* | | | | |
| | Coast Tussock-grass | *Poa poiformis* | | | | |
| | Seaberry Saltbush | *Rhagodia candolleana subsp. candolleana* | | | | |
| | Wallaby Grass | *Rytidosperma spp.* | | | | |
| | Groundsel | *Senecio spp.* | | | p | |

| Origin | Common name | Scientific name | Conservation status | | | CaLP Act |
|---|---|---|---|---|---|---|
| | | | EPBC | FFG-T | FFG-P | |
| | Kangaroo Apple | *Solanum aviculare* | | | | |
| * | Rat-tail Grass | *Sporobolus africanus* | | | | |
| * | Garden Dandelion | *Taraxacum officinale spp. agg.* | | | | |
| | Spinach | *Tetragonia spp.* | | | | |
| * | Clover | *Trifolium spp.* | | | | |
| * | Common Vetch | *Vicia sativa* | | | | |

**Notes: EPBC =** Threatened species status under the EPBC Act; **FFG-T** = Threatened species status under the FFG Act; **FFG-P =** Listed as protected (P) under the FFG Act; **CaLP Act**: Declared noxious weeds under the CaLP Act (S = State Prohibited Weeds – any infestations must be reported to DELWP that is responsible for control of these; P = Regionally Prohibited Weeds – landowners must eradicate these; C = Regionally Controlled Weeds – landowners must prevent the growth and spread of these; R = Restricted Weeds – trade in these weeds and propagules, either as plants, seeds or contaminants in other materials is prohibited).

* = introduced to Victoria

# = Victorian native taxa occurring outside the natural range

PI = Planted

## Appendix 3: Fauna species recorded in the study area

| Origin | Common name | Scientific name |
|---|---|---|
| | Fan-tailed Cuckoo | *Cacomantis flabelliformis* |
| | Welcome Swallow | *Hirundo neoxena* |
| | Little Raven | *Corvus mellori* |
| | New Holland Honeyeater | *Phylidonyris novaehollandiae* |
| | Rainbow Lorikeet | *Trichoglossus haematodus* |
| * | Common Blackbird | *Turdus merula* |
| | Little Wattlebird | *Anthochaera chrysoptera* |
| | Red Wattlebird | *Anthochaera carunculata* |
| * | Common Starling | *Sturnus vulgaris* |
| | Australian White Ibis | *Threskiornis molucca* |
| | Grey Fantail | *Rhipidura albiscapa* |
| | Straw-necked Ibis | *Threskiornis spinicollis* |
| | Red-browed Finch | *Neochmia temporalis* |
| | Superb Fairy-wren | *Malurus cyaneus* |
| | Masked Lapwing | *Vanellus miles* |
| | Silver Gull | *Chroicocephalus novaehollandiae* |
| | White-browed Scrubwren | *Sericornis frontalis* |
| * | Common Myna | *Sturnus tristis* |
| * | Spotted Dove | *Streptopelia chinensis* |
| | Grew Shrike-thrush | *Colluricincla harmonica* |
| | Brown Falcon | *Falco berigora* |
| | Willy Wagtail | *Rhipidura leucophrys* |
| | Magpie-lark | *Grallina cyanoleuca* |
| | Galah | *Eolophus roseicapillus* |
| | Australian Magpie | *Cracticus tibicen* |
| * | House Sparrow | *Passer domesticus* |
| | Pacific Gull | *Larus pacificus* |
| | Australian Pied Oystercatcher | *Haematopus longirostris* |
| | Sulphur-crested Cockatoo | *Cacatua galerita* |
| | Laughing Kookaburra | *Dacelo novaeguineae* |
| | Cape Barren Goose | *Cereopsis novaehollandiae* |
| | Purple Swamphen | *Porphyrio porphyrio* |
| | White-faced Heron | *Egretta novaehollandiae* |
| | Pacific Black Duck | *Anas superciliosa* |
| | Australian Shelduck | *Tadorna tadornoides* |
| | Shining Bronze-Cuckoo | *Chrysococcyx lucidus* |
| | Yellow-faced Honeyeater | *Lichenostomus chrysops* |
| | Silvereye | *Zosterops lateralis* |
| | Brown Thornbill | *Acanthiza pusilla* |

| Origin | Common name | Scientific name |
|---|---|---|
| | Whistling Kite | *Haliastur sphenurus* |
| | Australian Pelican | *Pelecanus conspicillatus* |
| | Swamp Wallaby | *Wallabia bicolor* |
| * | European Rabbit | *Oryctolagus cuniculus* |
| | Common Eastern Froglet | *Crinea signerfera* |
| | Eastern Banjo Frog | *Limnodynastes dumerilii* |

* = introduced to Victoria