San Remo Biodiversity Assessment

Bass Coast Shire Council

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

Project Name	San Remo Biodiversity Assessment
Project Number	5894
Project Managers	James Garden
Prepared by	James Garden, Danielle Woodhams and Rhiannon Myhre
Reviewed by	James Garden, Jonathan Billington, Ellie Madden-Hallett and Sophie Powrie
Approved by	Ellie Madden-Hallett
Status	**Final**
Version Number	**V2**
Last saved on	**2 February 2024**

This report should be cited as 'Eco Logical Australia 2023. *San Remo Biodiversity Assessment*. Prepared for Bass Coast Council Shire.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Austin Cram and Rewa Smith.

Template 2.8.1

Contents

List of Figures

List of Tables

Abbreviations

Term	Definition
CaLP Act	Catchment and Land Protection Act 1994
DCCEEW	Department of Climate Change, Energy, the Environment and Water
Ecotone	A transitional area of vegetation between two different plant communities.
EE Act	Environment Effects Act 1978. Victorian legislation that requires the Environmental Effects of certain Works to be assessed, and for other purposes.

Term	Definition
ELA	Eco Logical Australia Pty Ltd.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*. Key piece of national legislation to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988*. Key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes.
GHU	General Habitat Unit
The 'Guidelines'	The Guidelines for the removal, destruction or lopping of native vegetation
Local vicinity	Up to 5kms from site, often used as a reference area to establish the likely presence of ecological values within the study area
MNES	Matter of National Environmental Significance as defined under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999
National significant	A Matter of National Environmental Significance (MNES) listed as critically endangered, endangered or vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999
NVIM	Native Vegetation Information Management system
P&E Act	Planning and Environment Act 1987
PMST	Protected Matters Search Tool
Project footprint	Area of impact
PSP	Precinct Structure Plan
Study Area	Area in which presence of ecological values is considered
SRSP	San Remo Structure Plan
VBA	Victorian Biodiversity Atlas
VPP	Victorian Planning Provisions

1. Introduction

1.1 Background

Eco Logical Australia (ELA) was engaged by Bass Coast Council Shire (Council) to undertake a Biodiversity Assessment for the proposed San Remo Structure Plan (SRSP). The SRSP seeks to manage change and facilitate growth in San Remo, while protecting the natural environment and cultural elements within the region. The SRSP will focus on providing adequate housing, retail, community services, employment, transport, leisure, open space, entertainment, infrastructure and built form. Three precinct areas will be focused on:

- Marine Parade (designing the existing activity centre and foreshore).
- Existing community (facilities and services and considering areas of change).
- San Remo Growth (planning for new development including residential, community infrastructure, an activity centre and other potential land uses).

This report has been prepared to provide a detailed understanding of San Remo's existing biodiversity values and ways to mitigate direct and indirect impacts of potential urban development. The report builds upon previous assessments undertaken for the Structure plan in 2006 (ABZECO 2006).

1.2 Study area

The study area is located within San Remo (Figure 1), one of the main residential and holiday towns within the Bass Coast Shire. San Remo is situated to the south-east of Metropolitan Melbourne in the Gippsland region. The study area includes the outlined precinct study areas including three growth investigation areas selected by Council (Figure 1), and the surrounding coastal fringes of Western Port and Bass Straight. Land administration details for the study area are provided in Table 1.

Table 1. Land administration details for study area.

Study Site	
Location	San Remo
Proposed works	Urban Development
Current Zones	C1Z, FZ, GRZ1, LDRZ, MUZ, PCRZ, PPRZ, PUZ1, PUZ2, PUZ3, PUZ5, SUZ6, TRZ1, TRZ2
Overlays	Environmental Significance Overlay (ESO1), Significant Landscape Overlay (SLO1)
Bushfire	BPA – Bushfire Prone Areas
Local council	Bass Coast Shire
Bioregion	Gippsland Plain
Catchment	West Gippsland, Port Phillip
Area	Approx. 903 hectares

Location of the Study Area

Bass Coast Shire

- Study Area
- Railway station
- Locality
- Local Government Area
- Minor watercourse
- Water area
- Area subject to inundation
- Wetland swamp
- Rail
- Roads
- Streets
- Minor streets
- Parcels
- Park or Reserve
- Other public land
- National park
- State park
- Commonwealth land
- Coastal reserve

0 4 8
Kilometres

Datum/Projection:
GDA 1994 MGA Zone 55
Project: 5894 Date: 31/01/2024

Source:
Basemap: VICMAP, 2023

N

eco logical AUSTRALIA
A TETRA TECH COMPANY

2. Legislative and policy context

Below is a description of the relevant legislation, both state and federal, that are of relevance to the proposed works.

2.1 Commonwealth

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is Commonwealth legislation that protects MNES. Where a development or activity has the potential to have a significant impact on a MNES, a referral is required to the Department of Climate Change, Energy, the Environment and Water (DCCEEW). The DCCEEW provides guidelines on assessing whether a proposed action is likely to have a significant impact on an MNES and whether a referral is likely to be required. The Minister or delegate determines whether the activity can proceed with no further assessment by the Commonwealth, or whether it will be a controlled action for which assessment is required.

Matters of National Environmental Significance include:

- World Heritage properties.
- National Heritage places.
- Great Barrier Reef marine park.
- Nationally listed threatened species and ecological communities.
- Listed migratory species.
- Ramsar wetlands of international importance.
- Commonwealth marine areas.
- Nuclear actions (including uranium mining).
- A water resource, in relation to coal seam gas development and large coal mining development.

2.2 Victoria

2.2.1.1 Environment Effects Act 1978

The *Environment Effects Act 1978* (EE Act) requires the preparation of an EES for activities considered to have, or to be capable of having, a significant effect on the environment. Triggers for an EES are set out as referral criteria in the *Ministerial Guidelines for Assessment of Environmental Effects under the EE Act* (DSE 2006).

2.2.1.2 Flora and Fauna Guarantee Act 1988

The *Flora and Fauna Guarantee Act 1988* (FFG Act) regulates the protection and management of biodiversity including the conservation of threatened species and communities and the management of threatening processes.

Permits are required to take, remove, or disturb listed and/or protected flora species, listed communities and fish on public land. Listed fauna species are also protected under the *Wildlife Act 1975*.

2.2.1.3 Planning and Environment Act 1987

The *Planning and Environment Act 1987* (P&E Act) governs the use, development, and protection of land in Victoria. The P&E Act provides an integrated framework for planning policies and considerations across local, regional and state levels of governance and land use. These are incorporated through the Victorian Planning Provisions and enacted under the municipal planning scheme through legal instruments such as planning permits and precinct plans.

2.2.1.4 Native vegetation removal (NVR) guidelines

The Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017; the 'Guidelines') describes Victoria's state-wide policies in relation to assessing and compensating for the removal of native vegetation. This includes the assessment of impacts from removing native vegetation, and how offsets are calculated to compensate for the loss of biodiversity values. The Guidelines are incorporated into the Victorian Planning Provisions and all planning schemes in Victoria including local council planning schemes.

2.2.1.5 Wildlife Act 1975

The *Wildlife Act 1975* (Wildlife Act) protects and provides for management of wildlife (fauna) in Victoria. The purpose of the Wildlife Act is to provide procedures for the protection and conservation of wildlife, the prevention of wildlife extinction, sustainable use and access to wildlife, and prohibit and regulate interactions with wildlife.

The Wildlife Act regulates interactions with wildlife including both native and non-native terrestrial species and is the main legislation determining licensing relating to wildlife along with the FFG Act for threatened and protected taxa.

The *Wildlife Regulations 2013* provides for changes in licensing for the possession, use and trade of wildlife and further instruments for protecting wildlife under Part 2 – Protection of Wildlife including that a 'Person not to damage, disturb or destroy any wildlife habitat' under Section 42 of the regulations.

2.2.1.6 Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act 1994* (CaLP Act) is the legislative instrument for preventing land degradation and defining catchment planning and land management responsibilities.

The CaLP act has provisions for pest animals and noxious weeds and sets out requirements for landowners (including the Crown) in relation to these matters and land management practices. Under the CaLP Act, landowners have responsibilities set out for different categories of weeds which are listed by species in a 'declared list of noxious weeds'. These categories include State Prohibited Weeds, Regionally Prohibited Weeds, Regionally Controlled Weeds, and Restricted Weeds.

2.2.1.7 Crown Land (Reserves) Act 1978

Crown Land or State Land are public lands without a specific tenure and may be reserved for particular public uses. Most of the land held by the Victorian Government is Crown land reserved for national parks and state forests.

In Victoria Crown land is managed under the *Crown Land (Reserves) Act 1978*, which provides for the reservation of Crown Land for various public purposes including preserving areas of ecological

significance and the development of public utilities. It also provides for the management of such reserved lands through powers, licences, offences, and penalties.

2.2.1.8 Marine and Coastal Act 2018

The *Marine and Coastal Act 2018* governs the planning and management of the marine and coastal environments in Victoria. The act aims to provide an integrated and coordinated approach in order to protect the coastline and address long-term challenges such as climate change, population growth and ageing coastal structures. The Act outlines particular objectives and guiding principles and contains offences for unauthorised development on coastal land.

2.3 Regional and local

2.3.1.1 Distinctive Areas and Landscapes

The Victorian Government declared the Bass Coast Shire a Distinctive Area and Landscape (DAL) under section 46AO of the Planning and Environment Act 1987 in 2019 (DELWP 2022). A DAL under the Act may include attributes including outstanding environmental, geographical, heritage, cultural, natural resources or productive land, strategic infrastructure or built form significance (DELWP 2022). This declaration is designed to protect and enhance a declared DAL from threats including changes of land use that would affect the environmental, social or economic value of the area (DELWP 2022).

2.3.1.2 Statement of Planning Policy (SPP)

A Statement of Planning Policy is required for a declared DAL under Part 3AAB of the Planning and Environment Act 1987 (DTP 2023). The SPP provides the framework for future use and development of land within the declared area in accordance with the objectives of the DAL for the next 50 years (DTP 2023). A draft Bass Coast SPP has been prepared which was informed by technical studies, public consultation, the Bass Coast planning scheme and strategic planning (DTP 2023).

2.3.1.3 Bass Coast Shire Planning Scheme, Plans and Strategies

The Bass Coast Shire planning scheme is legislated documentation which provides details of how land may be used, developed, protected or conserved (Bass Coast 2023). Multiple local plans and strategies have been prepared to provide guidance and inform the planning scheme while aiming to protect and enhance biodiversity values. A list of the most recent relevant plans and strategies can be found in section 3.1.

2.3.1.4 Land managers

Multiple land managers are responsible for the management of biodiversity values within the San Remo area. Coastal reserves are primarily managed by the Coastal Management Committee (CMC) in conjunction with the Department of Environment, Energy and Climate Action (DEECA) and Bass Coast Shire Council up to Potters Hill Road. Land Administration duties are performed by the CMC and DEECA with Council undertaking the on-ground works. Parks Victoria manage the coastal reserves extending from Potters Hill Road to Inverloch.

3. Methods

3.1 Desktop review

Relevant information sources were reviewed to identify the presence or likely occurrence of biodiversity values across the study area and surrounds. This included online databases, spatial datasets, scientific literature, previous reports and relevant environmental legislation, regulations, and policies. All searches were undertaken on an investigation area centred on the study area and covering a 10km radius.

A summary of the information sources reviewed can be found below:

- Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool (DCCEEW 2023).
- Nature Kit (DEECA 2023b).
- Coast Kit (DEECA 2023c)
- Victorian Biodiversity Atlas (DEECA 2023d).
- Visualising Victoria's Biodiversity (Federation University Australia 2023).
- VicPlan (DTP 2023).
- Publicly available aerial imagery, including current and historical images from Google, DEECA and ESRI.

Relevant reports and scientific literature reviewed during the desktop assessment included:

- Bass Coast Hooded Plover Strategy (Bass Coast Shire Council 2016)
- Biodiversity Biolinks Plan 2018 (Bass Coast Shire Council 2018)
- Council Plan 2021-25 (Bass Coast Shire Council 2021)
- Draft Bass Coast Statement of Planning Policy (DEECA 2022)
- Ecological Character Description Addendum – Western Port Ramsar Site (Hale 2016)
- Flora, Fauna & Ecological Analysis SRNCW Structure Plan (ABZECO 2006)
- San Remo Newhaven Cape Woolamai Structure Plan (Bass Coast Shire Council 2010)
- Urban Forest Strategy (Bass Coast Shire Council 2022)
- Western Port Ramsar Site Boundary Description Technical Report (DEPI 2013)
- Western Port Ramsar Site Management Plan (DEECA 2017b)
- Western Port Ramsar Wetland Ecological Character Description (Kellogg Brown & Root 2010)
- Western Port Welcomes Waterbirds: waterbird usage of Western Port (Hansen et al 2011)
- Marine Invertebrate Conservation at San Remo (O'Hara 1995).

3.2 Stakeholder engagement

ELA liaised with key stakeholders to discuss information about local biodiversity values and their strategic priorities for San Remo.

Key stakeholders engaged included:

- Council Teams: Strategic Planning, Environment Team.
- Department of Energy, Environment and Climate Action (DEECA).
- Parks Victoria.
- San Remo Foreshore Committee of management (DEECA).

Engagement involved:

- 4 x 1 hours meeting with stakeholders.
- Provision of summary information to each stakeholder for review and follow-up as required.

3.3 Field survey

A field survey of the study area, with particular focus on the identified growth areas was undertaken by ELA ecologist James Garden over three days from 15 – 17 August 2023. Features of ecological significance were recorded including remnant and introduced vegetation, fauna habitat and any sightings or evidence of significant species. During the field assessment, the following information was recorded.

- The location and nature of native and introduced vegetation, including its origin and ecological vegetation class.
- Nature and condition of aquatic and coastal habitats.
- Areas of suitable habitat for threatened flora and fauna species.
- Presence of threatened ecological communities, including coastal and marine communities.
- Landscape conservation priorities and functions such as connectivity, including those adjoining the study area.
- Opportunities for avoiding and minimising the biodiversity impacts of future development.

All field data was collected using the ESRI ArcGIS online platform (including Collector and Survey123), which allows direct synchronisation to ELA's Geodatabase for analysis and mapping.

3.4 Likelihood of occurrence

Based on the results of the desktop review and field survey, the likelihood of occurrence was determined for relevant threatened flora, fauna or communities. Likelihood of occurrence is a determination of the potential for threatened species to be present and make significant use of the study area and for the potential occurrence of threatened communities. Species were ranked as having either no, low, medium, or high likelihood of occurrence, or as being present, by accessing information contained in public biological datasets (e.g. past records and species distribution models), considering species habitat requirements (including surrounding habitat connectivity) and field observations. Species ranked as medium, high or present were investigated in further detail for the possibility of targeted surveys. The determinations of a species likelihood provided are not absolute; rather, they represent a species' potential to occur in the study area. Records of threatened species within the nominated search areas

are shown in Appendix A. This table also shows the results the likelihood of occurrence analysis, including a rationale for each value.

3.5 Review of significance and sensitivity

A review of ecological values within the growth areas was undertaken to determine their sensitivity to land use change. Key threats associated with land use change which were considered included the following:

- Habitat loss, modification and fragmentation.
- Population growth and increased human activities.
- Invasive flora and fauna.
- Erosion and sediment runoff.
- Climate variability and extreme events.

The review took into consideration the significance of the value being impacted and the spatial and temporal extent of the potential impact caused by land use change.

3.6 Study limitations

A common limitation of ecological surveys is the short duration and lack of sampling across seasons. The field assessment was undertaken during winter, which is considered a sub optimal time for observing some flowering species and may be insufficient for detecting migratory or cryptic species. As such, a conservative approach has been taken with the determination based on the suitability of the habitat and recent records on or near the study area.

Access to privately owned land within the study areas was limited and vegetation was observed from the roadside on these occasions. As a result, some values have been extrapolated from aerial imagery and based on field observations of similar land around the edge of the study areas. Because of this, some vegetation types and potential suitable microhabitat for fauna may have been missed or are unlikely to be present at the study areas. As such, where uncertainty exists around a species presence or absence, we have taken a conservative approach and assumed that suitable habitat is present where it is known from similar contexts in the local landscape. This assumption has been determined based on previous assessments and recent records on or near the study area.

4. Biodiversity Inventory

4.1 Local and regional setting

The San Remo study area is located approximately 124 km southeast of Melbourne's CBD within the Gippsland Plain bioregion in Bunurong Country. San Remo is the most western locality in Gippsland and is bounded by Western Port Bay to the north and Bass Straight to the South. The Phillip Island Bridge joins San Remo to Phillip Island to the West. Lands to the East of the study area consists of undulating farmlands which rise to the south-western most extent of the Strzelecki Ranges. The region encompasses coastal and rural environments with remnant pockets of native vegetation. The study area has been historically used for farming (grazing) and as a result, much of the vegetation has been cleared and replaced with introduced pasture. Currently, the majority of the landcover is made up of exotic pastures and grasslands, planted native and exotic trees and shrubs, urbanised areas including housing developments and some scattered patches of native vegetation. Paddocks and residential areas boarder right up to the coastal cliffs in some sections of the coastline.

The study area includes multiple reserves, parks, public beaches and walking trails that retain ecological values.

Reserves in the San Remo study area include:

- San Remo Recreation Reserve
- San Remo Coastal Reserve
- Anderson Street Reserve
- Punchbowl Coast Reserve

Parks and public beaches within the study area include:

- San Remo Jetty
- San Remo Park
- Lions Park
- Hilltop Park
- Yallock-bulluk Marine & Coastal Park
- Loc Griffith Point Beach
- Childrens Beach
- San Remo Beach
- Bore Beach
- Back Beach

Several reserves and beaches provide important coastal habitat for a range of native species. Of note is the San Remo Coastal Reserve, Punchbowl Coast Reserve, and the Yallock-bullok Nature & Coastal Park. The southern coastline along the George Bass Walk has significant ecological values, with a stretch of quality native coastal vegetation. The other recreational reserves and Parks such as San Remo Recreation Reserve, Anderson Street Reserve, San Remo Park, Lions Park and Hilltop Park consist of planted vegetation, lawn and sporting grounds which whilst providing important public open space are of limited ecological value.

Other sites of ecological significance in the local area include the Western Port Ramsar site, which is listed as a wetland of international significance (RAMSAR) for migratory shorebirds and is included in

the East Asian-Australasian Shorebird Site Network. Western Port is also listed as an important Bird Area (BirdLife International), supporting over 10,000 shorebirds from 37 species and over 10,000 waterfowl, and provides critical habitat for birds during their non-breeding season (Hansen, Menkhorst and Loyn, 2011).

4.2 Vegetation Communities

4.2.1 Desktop Assessed Native Vegetation

The Department of Energy, Environment and Climate Action's (DEECA) pre-1750 and 2005 Ecological Vegetation Class (EVC) modelling identified nine EVC's in the study area (Table 2).

Table 2. DEECA mapped EVC's

EVC	Pre-1750 ha	2005 ha
EVC 9: Coastal Saltmarsh/ EVC 879: Coastal Dune Grassland/ EVC 160: Coastal Dune Scrub/ EVC 161: Coastal Headland Scrub Mosaic	43	10
EVC 53: Swamp Scrub	131	2
EVC 83: Swampy Riparian Woodland	10	0.5
EVC 160: Coastal Dune Scrub/ EVC 819: Coastal Dune Grassland Mosaic	21	15
EVC 161: Coastal Headland Scrub/ EVC 163: Coastal Tussock Grassland	89	33
EVC 175: Grassy Woodland	589	26
EVC 902: Gully Woodland	3	1

The pre-1750 modelled data indicates that native vegetation in the central area of San Remo would have comprised Grassy Woodland (EVC 175) and Swamp Scrub (EVC 53). The coastal areas to the north along the edge of Western Port would have consisted of a mosaic of Coastal Saltmarsh (EVC 9), Coastal Dune Grassland (EVC 879), Coastal Dune Scrub (EVC 160) and Coastal Headland Scrub (EVC 161). The western coastal areas along Marine Pde, Davis Point and Back Beach would have once supported a mosaic of Coastal Dune Scrub (EVC 160) and Coastal Dune Grassland (EVC 879). The southern coastal areas near Griffith Point to Punchbowl Coastal Reserve would have supported a mosaic Coastal Headland Scrub (EVC 161) and Coastal Tussock Grassland (EVC 163). Additionally, patches of Gully Woodland (EVC 902) and Swampy Riparian Woodland (EVC 83) would have been found adjacent to Punchbowl Coastal Reserve.

Since 1750, much of the study area has been cleared for farming and subsequent development. The majority of the study site is made up of paddocks dominated by exotic pasture and planted native and exotic vegetation along boundaries and windbreaks, and urban residential developments.

4.2.2 Site Assessed Native Vegetation

EVC modelling may not always be reflective of the native vegetation communities that are actually present in an area. Table 3 outlines EVCs identified during field surveys as well as their bioregional

conservation status. Bioregional conservation status is a measure of current EVC extent and quality compared with the pre-1750 modelled extent (DSE, 2004).

Table 3. EVC's identified during field surveys.

EVC number	EVC name	Bioregional Conservation Status
14	Banksia Woodland	Least Concern
53	Swamp Scrub	Endangered
132_62	Plains Grassland - *South Gippsland*	Endangered
160	Coastal Dune Scrub	Depleted
161	Coastal Headland Scrub	Depleted
163	Coastal Tussock Grassland	Vulnerable
858	Coastal Alkaline Scrub	Vulnerable
876	Spray-zone Coastal Shrubland	Endangered
879	Coastal Dune Grassland	Depleted

Grassy Woodland (EVC 175), Coastal Saltmarsh (EVC 9) and Gully Woodland (EVC 902) were modelled as being present in the area, however, were not identified during the field surveys. Additionally, three EVC's were identified during the field survey that were not identified through modelling, including Plains Grassland - *South Gippsland* (EVC 132_62), Coastal Alkaline Scrub (EVC 858) and Banksia Woodland (EVC 14). Other than these remnant patches of native vegetation, the study area comprised of pastures, mixed plantings (native and ornamental), and introduced plants including planted cypress and gardens. The vegetation identified during the field surveys are described below.

Banksia Woodland

Areas of Banksia Woodland were identified in sheltered locations and among the upper slopes/escarpments at the eastern end of the southern coast, near the end of punchbowl road (Plate 1). Banksia Woodlands occur on well-drained sandy soils and consist of open woodland or scrub with a canopy up to 10 m tall dominated by Saw Banksia, *Banksia serrata*. Emergent eucalypts may also be present. The understory is shrub-rich with species such as Common Heath *Epacris impressa*, Prickly Tea-tree *Leptospermum continentale,* Sunshine Wattle *Acacia terminalis*, and Sweet Wattle *Acacia suaveolens*.

Swamp Scrub

Swamp Scrub vegetation has been cleared from the majority of the study area, with a few small remnant patches remaining along the northern coastline, and in some scattered areas in the centre, such as within the San Remo woodland reserve and San Remo recreation reserve (Plate 2). Swamp scrub was also identified during surveys along roadsides, drainage lines and low-lying areas prone to inundation. Swamp Scrub occurs on poorly drained nutrient rich soils and is dominated by Swamp Paperbark *Melaleuca ericifolia,* or sometimes Woolly Tea-tree *Leptospermum lanigerum*. These species form a 50% canopy cover and often occur in dense thickets. Emergent eucalypts may also be present. The ground layer consists of mosses, lichens and liverworts or herbs, or in dryer conditions a more grassy/herbaceous ground layer is found.

Coastal Scrubs and Shrublands

Coastlines in the San Remo area supported various vegetation communities including Coastal Dune Scrub among sand dunes, Coastal Headland scrub and Spray-zone Coastal Shrubland on clifftops/escarpments along the southern coastlines, and Coastal Alkaline scrub on stable dunes at low energy sites (Plate 3). These vegetation communities are subject to high levels of salt spray and disturbance from onshore winds.

Coastal Dune Scrub vegetation occurs on secondary dunes along ocean and bay beaches and shores and was identified on the northern coastlines boarding Western Port Bay. Coastal Headland Scrub occurs on steep, rocky coastal headlands, exposed cliffs or shallow sands along rocky sections of the coast, and was identified along the southern coastlines. These scrub communities lack a tree canopy layer and consist of medium and small shrubs that form approximately 50% cover with a ground layer of salt tolerant sedges, grasses, and herbs. Common shrubs may include Coast Tea-tree *Leptospermum laevigatum*, Coast Wattle A*cacia longifolia* ssp. *sophorae.,* Seaberry Saltbush *Rhagodia candolleana* ssp*. candolleana*, Coast Beard-heath *Leucopogon parviflorus* and Cushion Bush *Leucophyta brownii.* Coastal Scrubs are highly susceptible to weed invasion due to a high level of natural disturbance and presence of sandy soils (ABZECO 2016).

Spray-zone Coastal Shrubland was identified near Bore beach and surrounding embankments/slopes on the southern coastline. This community consists of low laying shrubland which occurs on salt laden exposed coastal areas and crests of sea cliffs. It commonly is associated with Coastal Headland Scrub communities and lacks a tree canopy layer. Common shrub species included Coast Daisy-Bush *Olearia axillaris,* Sea Box *Alyxia buxifolia*, *Leucophyta brownii, Rhagodia candolleana* and White Correa *Correa alba*. The ground layer consists of slat-tolerant herbs, grasses, and sedge.

Coastal Alkaline Scrub was identified along the north-eastern foreshore past the San Remo Jetty. Coastal Alkaline Scrub consists of low woodland or tall shrubland which occurs on large alkaline stable sand dunes and swales. Unlike the previously mentioned scrub communities, Coastal Alkaline Scrub has a tree canopy layer dominated by Moonah *Melaleuca lanceolata* ssp*. Lanceolata*, Drooping Sheoak *Allocasuarina verticillata*, *Leptospermum laevigatum* and Sweet Bursaria *Bursaria spinosa* ssp*. spinosa* (Plate 4). These species form approximately a 30% tree canopy cover. Areas of identified Coastal Alkaline Scrub had a ground layer of introduced species, grasses, and herbs. Common weeds identified include Blanket weed *Spirogyra* sp., Soursob *Oxalis* sp., Kikuyu *Cenchrus clandestinus*, Bridal Creeper *Asparagus asparagoides*, and African Box-thorn *Lycium ferocissimum*. Common shrub species included Coast Banksia *Banksia integrifolia*, Coast Daisy Bush *Olearia axillaris*. Other species that may be present in this community include Coast Wattle, A*cacia longifolia* ssp*. sophorae, Leucopogon parviflorus,* Coast Wrilda A*cacia retinodes* var*. uncifolia,* and Coast Pomaderris *Pomaderris paniculosa*.

Grasslands and Coastal Grasslands

Plains Grassland - *South Gippsland* was identified along the northern coastline boarding Western Port Bay. This is a mostly treeless community with a grassy understory which may be seasonally water-logged. The community consists of a ground layer of native grasses, herbs, sedges and rushes, with few shrubs present. Common grass species include Kangaroo Grass *Themeda triandra*, Common Blown-Grass *Lachnagrostis filiformis*, Smooth Wallaby-grass *Austrodanthonia laevis* and Australian Salt-grass *Distichlis distichopylla*.

Coastal Dune Grasslands were identified along the northern coastlines, amongst beaches and front dunes such as in the surrounds of Bore Beach (Plate 5). Coastal Tussock Grassland were identified on wind exposed cliffs and bluffs in the southern coastal areas of San Remo (Plate 6). In places, degraded/grazed Coastal Tussock Grassland also persisted in paddocks. Saline soils and salt spray that hinder growth of trees in these grassland communities. These communities mostly consist of salt tolerant herbs, sedges, grasses, and halophytes (succulents) that colonise the foredunes of ocean beaches. A relatively low cover of shrub species may be present including Coast Saltbush *Atriplex cinerea*, Austral Seablite *Suaeda australis, Leucopogon parviflorus*, *Correa alba* and Native Violet *Viola hederacea*.

Pastures, introduced plants and mixed plantings.

Large portions of the study area were consisted of pastures with planted introduced vegetation, often Pine or Cyprus, along boundaries and shelterbelts (Plate 7). Older urbanised areas within San Remo had relatively high cover of native shrubs and tree cover associated with backyards and street frontages. Relatively mature planted native vegetation of varying structure including canopy trees and shrubs were also found in several properties around the eastern farmlands such as along Potters Hill Road. Within the township, San Remo cemetery and San Remo Primary school support various vegetation types including planted Pines, Cyprus, Eucalypts and She-oak (Plate 8). These areas provided a contiguous patch of mature native and planted eucalyptus species in an area otherwise largely devoid of large trees.

Plate 1: Banksia Woodland

Plate 2: Swamp Scrub

Plate 3: Coastal Headland Scrub

Plate 4: Coastal Alkaline Scrub

Plate 5: Coastal Dune Grasslands

Plate 6: Coastal Tussock Grasslands

Plate 7: Pastures

Plate 8: Mixed plantings in cemetery

Ecological Values: Overview

Bass Coast Shire

0 400 800
Meters

Study area

Trees
- Large native
- Significant EPBC Act community

Vegetation
- Introduced - planted
- Native - current wetlands
- Native - remnant
- Native (exempt) - planted

Water area
- Minor watercourse
- Current wetland
- Ramsar-listed wetland

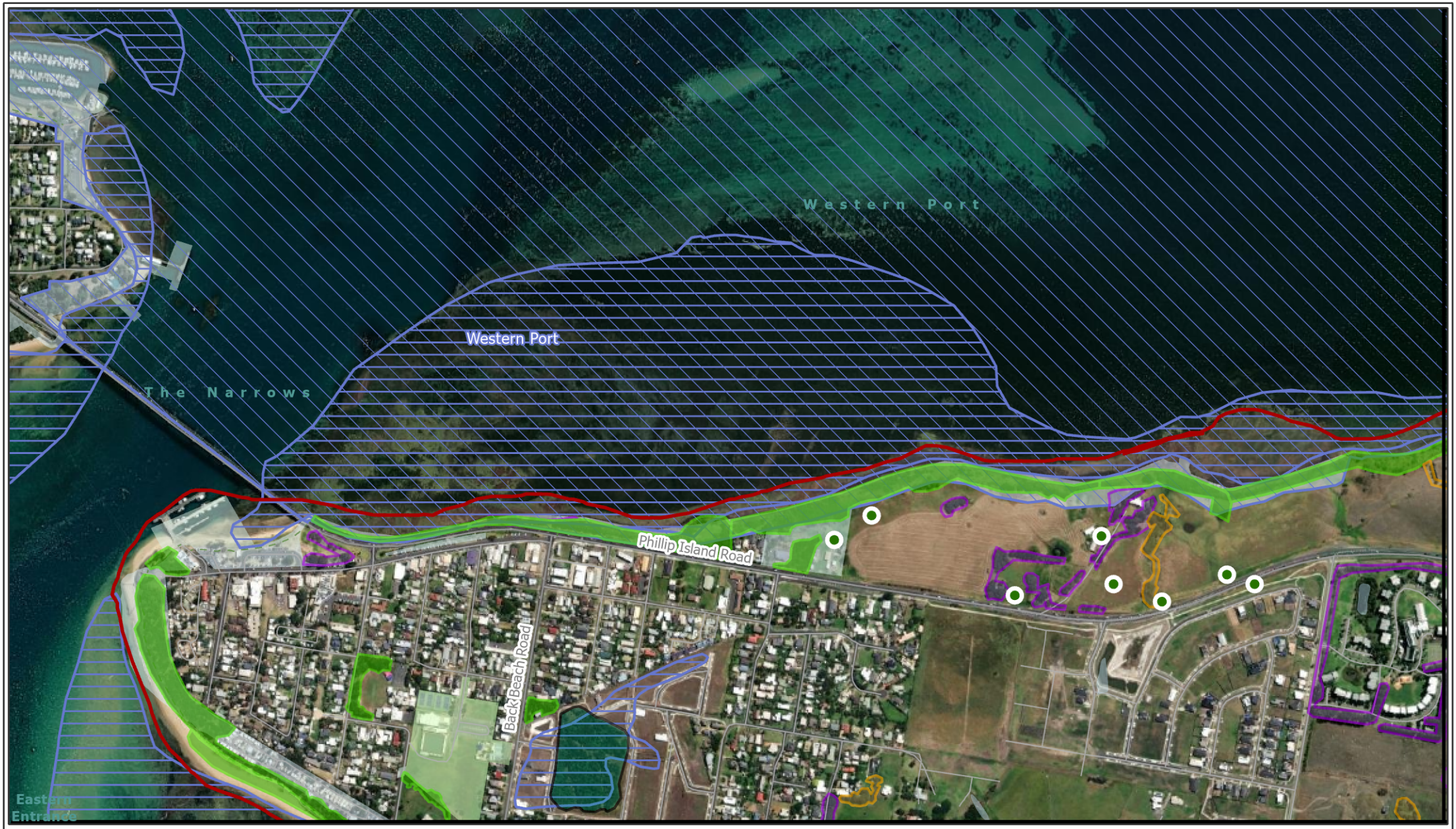
Park or Reserve
- Other public land
- Coastal reserve

Datum/Projection:
GDA 1994 VICGRID94
Project: 5894 Date: 31/01/2024

N

eco logical AUSTRALIA
A TETRA TECH COMPANY

Source: Basemap: VICMAP, 2023; Aerial: ESRI, 2023



Ecological Values: Detail map 1

Bass Coast Shire

0 200 400
Meters

Study area

Trees
- Large native

Vegetation
- Introduced - planted
- Native - current wetlands
- Native - remnant
- Native (exempt) - planted

Water area
- Current wetland
- Ramsar-listed wetland

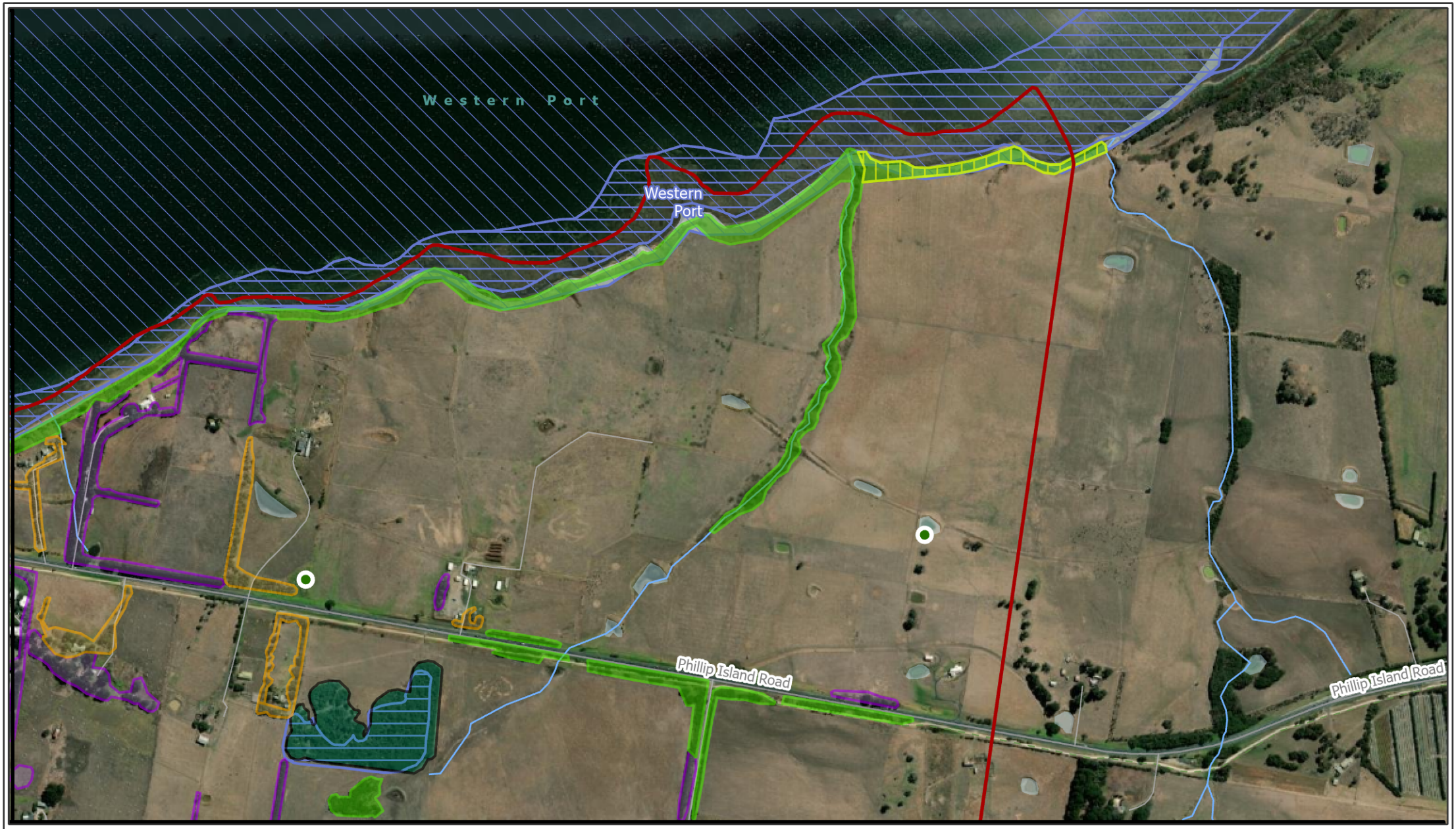
Park or Reserve
- Other public land
- Coastal reserve

Datum/Projection:
GDA 1994 VICGRID94
Project: 5894 Date: 31/01/2024

N

ecological AUSTRALIA
A TETRA TECH COMPANY

Source: Basemap: VICMAP, 2023; Aerial: ESRI, 2023



Ecological Values: Detail map 2

Bass Coast Shire

0 200 400
Meters

Study area

Trees
- Large native
- Significant EPBC Act community

Vegetation
- Introduced - planted
- Native - current wetlands
- Native - remnant
- Native (exempt) - planted

Water area
- Minor watercourse
- Current wetland
- Ramsar-listed wetland

Coastal reserve

Datum/Projection:
GDA 1994 VICGRID94
Project: 5894 Date: 31/01/2024

N

eco logical AUSTRALIA
A TETRA TECH COMPANY

Source: Basemap: VICMAP, 2023; Aerial: ESRI, 2023

Ecological Values: Detail map 3

Bass Coast Shire

0 200 400
Meters

Study area

Trees
- Large native

Vegetation
- Introduced - planted
- Native - current wetlands
- Native - remnant
- Native (exempt) - planted

- Water area
- Minor watercourse
- Current wetland

- Park or Reserve
- Other public land
- Coastal reserve

Datum/Projection:
GDA 1994 VICGRID94
Project: 5894 Date: 31/01/2024

N

ecological AUSTRALIA
A TETRA TECH COMPANY

Source: Basemap: VICMAP, 2023; Aerial: ESRI, 2023

Ecological Values: Detail map 4

Bass Coast Shire

Study area

Vegetation
- Introduced - planted
- Native - remnant
- Native (exempt) - planted

Water area

Minor watercourse

Coastal reserve

0 200 400
Meters

Datum/Projection:
GDA 1994 VICGRID94
Project: 5894 Date: 31/01/2024

N

eco logical AUSTRALIA
A TETRA TECH COMPANY

Source: Basemap: VICMAP, 2023; Aerial: ESRI, 2023

Key Habitats

4.2.3 Pastures and exotic vegetation

Most of the study area consists of exotic pastures or urban areas which are low quality habitat for native species. The habitat value of introduced grassland for fauna is primarily limited to foraging habitat for common, seed-eating birds and when inundated, wading birds that opportunistically forage in introduced grasslands including the EPBC Act (marine) and state (Victorian) significant Eastern Great Egret *Ardea alba modesta*. Birds of prey may also utilise the rural landscapes for foraging. Urban planted areas may also provide habitat for a range of common species.

4.2.4 Woodlands and Swamp Scrubs

Remnant patches of Swamp Scrub and Banksia Woodland may provide suitable habitat for several flora and fauna species. Species that may utilise these areas include the nationally significant, Blue-winged Parrot *Neophema chrysostoma* and Swamp Skink *Lissolepis coventryi.* State significant species that may utilise these habitats include, Marsh Saltbush *Atriplex paludosa* subsp*. Paludosa,* and orchids such as Spurred Helmet-orchid *Corybas aconitiflorus*.

Larger patches of Swamp Scrub while highly fragmented, are likely to provide low-moderate quality foraging, nesting and refuge habitat for common birds, amphibians and small mammals.

4.2.5 Wetlands, waterbodies and drainage lines

The study area includes various wetlands and drainage lines that provide low-moderate quality habitat for a range of birds, amphibians, mammals and other aquatic animals, including Straw-necked Ibis *Threskiornis spinicollis*, White Ibis *Threskiornis moluccus,* Pacific Black Duck *Anas superciliosa*, Common Eastern Froglet *Crinia signifera* and the EPBC Act (marine) and state significant Eastern Great Egret *Ardea alba modesta.*

There are three DEECA mapped wetlands that are all classified as temporary freshwater swamps (Figure 2; DEECA, 2023). The first is located along Back Beach Road, across from San Remo Primary School (4.21 ha). There is another close to Phillip Island Rd across from Punch Bowl Road (2.95 ha) which is surrounded by poor condition native vegetation. The last main wetland is located adjacent to Griffith Point Beach (1.87 ha), which is also surrounded by some native vegetation. A recently created artificial wetland is also present on the southwest coastline beside the San Remo foreshore at the end of Penniwells Drive, which has some drainage issues. This artificial wetland was noted to support some duck species.

A creek line was present near the eastern section of the northern coastline which was in relatively good condition with native vegetation appearing to extend the length of the creek line. However, some sections of the creek line were devoid of shrubs with high levels of degradation. Due to the steep nature of the landscape, disturbance from stock was minimal, with only narrow erosion due to stock around the edges. This creek likely provides medium to good habitat for small mammals, reptiles and potentially small birds, however poor connectivity in the area means these may be unlikely to occur.

Numerous farm dams were identified during the field survey, such as in the eastern farmlands. The farm dams that were visible were in relatively good condition with surrounding fringing vegetation. Frog calls

were audible, suggesting these dams provide good habitat for native amphibians such as Striped Marsh Frog *Limnodynastes peronii*, which were also identified in previous reports of the area (ABZECO 2016).

The study area also includes various drainage lines with mixtures of native and exotic vegetation that may provide important habitat and bioinks for native species. The drainage line to the north of the highway is largely devoid of vegetation at the southern end with several large dams occupying the drain, however, native vegetation cover increases northwards. There are multiple drainage lines along the coastline of Westernport Bay that drain into the beach and foreshore. These drainage lines are surrounded by very wet damp marshy habitats. Despite the degraded nature of some of the drainage lines in the area, they may provide refuge for threatened species such as the EPBC Act and FFG Act listed Swamp Skink and the FFG Act listed Glossy Grass Skink *Pseudemoia rawlinsoni*.

4.2.6 Coastal habitats

Several patches along the coastal fringes of San Remo supported multiple vegetation communities, representing the best quality habitat for fauna within the study area.

The southern coastal fringes of San Remo consisted of steeper cliff habitats and escarpments which have extensive high-quality remnant vegetation and habitat. A mosaic of Coastal Headland Scrub and Coastal Tussock Grassland communities are present, as well as Banksia Woodland which was prominent in sheltered locations and the upper slopes. The high-quality vegetation found in gullies throughout these areas provides habitat for small birds, reptiles, and amphibians. The southern coastline also provides important habitat for a range of shorebirds. For example, there are known nesting locations for Hooded Plover *Thinornis cucullatus* in the southern coastlines of San Remo (Bass Coast Shire 2016). Hooded Plover nests on the ground in open areas along the foredunes and beaches and are particularly vulnerable to human activities.

The northern coastal fringes beside Western Port Bay contains mudflats and areas of native vegetation that provide secondary foraging habitat for a number of threatened and migratory birds species including those listed under international migratory bird agreements (JAMBA, CAMBA and ROKAMBA) (DEWLP 2017). Four potential shorebird roosts were identified during surveys along the Northern coastline (Figure 2). Coastal Dune Grasslands along the San Remo Foreshore may also provide nesting and roosting habitat for shorebirds, however there are large levels of human activity in these areas. The coastal scrub and grassland vegetation present along the northern coastlines and San Remo Foreshore provides excellent habitat for small birds, reptiles and mammals.

San Remo also offers habitat for species of local significance including the Short-tailed Shearwater *Puffinus tenuirostris* which have important nearby breeding grounds of national significance in Cape Woolamai, and the resident group of Pelicans near the Jetty.

4.2.7 Planted native and introduced vegetation

Planted vegetation within the township such as within the San Remo Primary school, as well as in the Eastern farmlands provide good foraging and nesting/roosting resources for common bird species and arboreal mammals such as honeyeaters and Common Ringtail Possum *Pseudocheirus peregrinus*. Parts of the northern coastline contained large areas of introduced and non-native planted vegetation, including large, planted Cypress trees. Although highly modified, these areas may also provide habitat for small birds, reptiles, and mammals.

4.2.8 Important marine areas of Western Port

Coastal and marine habitats around San Remo are significant. The Western Port RAMSAR Site adjacent to San Remo study area provides high quality and highly linked habitat for numerous marine species including important stable Seagrass communities (ABZECO 2016). Western Port is characterised by a wide variety of marine habitats ranging from deep channels to very extensive sea grass flats, fringing mangroves and saltmarsh and wide tidal mudflats (DSE, 2003). It is an important area for waders, supporting 1% of the global population of Eastern Curlew *Numenius madagascariensis*, Red-necked Stint *Calidris ruficollis* and Australian Pied Oystercatcher *Haematopus longirostris* (DSE, 2003). The open waters in the port support larger marine fish species such as Australian salmon *Arripis trutta*, snook *Sphyraena novaehollandiae* and barracouta *Thysites atun* (DEWLP 2017).

The San Remo Marine Community located along the northern coastline, north-east of the Phillip Island Road bridge, is protected under the *Flora and Fauna Guarantee Act* (FFG Act). This small (600 m x 300 m) intertidal and subtidal marine community consists of important sea grass meadows and contains a species rich assemblage of marine biota. These seagrass communities provide habitat for widely diverse assemblage of species considering its small area, including gobies, pipefish and sea dragons, marine invertebrates, and birds. The rare and vulnerable assemblage of marine invertebrates that occupy this area include sponges, cnidarians, worms, byozoans, small crustaceans and molluscs including over 100 species of nudibranchs (O'Hara 1995), two of which are protected under the FFG Act.

4.3 Rare and threatened species

The likelihood of occurrence assessment identified 220 national or state significant species (185 fauna and 35 flora) considered likely to occur within a 10 km radius of the study area including the coastal and marine areas of Western Port Bay and Bass Strait. Considering the results of the field survey, presence of existing records, species habitat requirements and known information about the study area and surrounding landscape, 48 significant species (34 fauna, 14 flora) were determined as being present or likely to occur within the study area (Table 4, Table 5). All other species were considered unlikely to occur within the study area, based on nearby records and level or disturbance within and near the study area. All marine species including fish, turtles, whales, sharks, dolphins, and marine invertebrates were determined to have no likelihood of occurrence in the assessment since marine waters are not included within the defined study areas. The results of the likelihood of occurrence analysis including the rationale for each value are provided in Appendix B.

The Glossy Grass Skink was not picked up during the desktop review, having only one record in a 10 km radius of the study area in 1974. However, records for this species can be limited, and the species may still be present. Potential habitat for this species were identified during surveys including the swampy habitats along drainage lines and has been included in the Table 4.

Significant fauna species recorded during the field survey along the northern coastline included the Eastern Great Egret which was observed grazing in shallow rocky pools and Pacific Gull *Larus pacificus*.

Table 4. Significant fauna species present or likely to occur within the study area.

Species	FFG act Status	EPBC act Status	Likelihood of occurrence	Location of Habitat	Use of study area
Australian Pelican *Pelecanus conspicillatus*		Ma	Present	Coastal areas and beaches	Foraging, refuge, breeding
Bar-tailed Godwit *Limosa lapponica*	VU	Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Black-tailed Godwit *Limosa limosa*	CR	Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Blue-winged Parrot *Neophema chrysostoma*		VU, Ma	Moderate	Grassy Woodlands, Paddocks, Coastal areas.	Foraging, refuge, breeding
Caspian Tern *Hydroprogne caspia*	VU	Ma, Mi	High	Coastal areas and beaches	Foraging, refuge
Cattle Egret *Bubulcus ibis*		Ma	Moderate	Wetlands, Grasslands	Foraging, refuge, breeding
Common Greenshank *Tringa nebularia*	EN	Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Common Sandpiper *Actitis hypoleucos*	VU	Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Curlew Sandpiper *Calidris ferruginea*	CR	CE, Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge

Eastern Curlew *Numenius madagascariensis*	CR	CE, Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Eastern Great Egret *Ardea alba modesta*	VU	Ma	Present	Wetlands, Grasslands	Foraging, refuge, breeding
Fairy Tern *Sternula nereis*	CR	VU	Moderate	Coastal areas and beaches	Foraging, refuge
Glossy Grass Skink *Pseudemoia rawlinsoni*	EN		Moderate	Wetlands, Grasslands	Foraging, refuge, breeding
Great Knot *Calidris tenuirostris*	CR	CE, Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Greater Crested Tern *Thalasseus bergii*		Ma, Mi	High	Coastal areas and beaches	Foraging, refuge
Grey Plover *Pluvialis squatarola*	VU	Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Grey-tailed Tattler *Tringa brevipes*	CR	Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Hooded Plover *Thinornis cucullatus*	VU	Vu, Ma	Present	Coastal areas and beaches	Foraging, refuge, breeding
Intermediate egret *Ardea intermedia plumifera*	CR	Ma	Moderate	Wetlands, Grasslands	Foraging, refuge, breeding
Kelp Gull *Larus dominicanus*		Ma	Moderate	Coastal areas and beaches	Foraging, refuge, breeding
Little Egret *Egretta garzetta*	EN	Ma	Moderate	Wetlands, Grasslands	Foraging, refuge, breeding
Pacific Golden Plover *Pluvialis fulva*	VU	Ma, Mi	High	Coastal areas and beaches	Foraging, refuge
Pacific Gull *Larus pacificus*		Ma	Present	Coastal areas and beaches	Foraging, refuge, breeding
Red Knot *Calidris canutus*	EN	EN, Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Red-necked Avocet *Recurvirostra novaehollandiae*		Ma	Moderate	Coastal areas and beaches	Foraging, refuge, breeding
Ruddy Turnstone *Arenaria interpres*	EN	Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Short-tailed Shearwater *Ardenna tenuirostris*		Ma, Mi	High	Coastal areas and beaches	Foraging, refuge
Shy Albatross *Thalassarche cauta*	EN	En, Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Silver Gull *Chroicocephalus novaehollandiae*		Ma	Present	Coastal areas and beaches	Foraging, refuge, breeding

Swamp Skink *Lissolepis coventryi*	EN	EN	Moderate	Swamp Scrub, wetlands, drainage lines	Foraging, refuge, breeding
Terek Sandpiper *Xenus cinereus*	EN	Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
Whimbrel *Numenius phaeopus*	EN	Ma, Mi	Moderate	Coastal areas and beaches	Foraging, refuge
White-bellied Sea-Eagle *Haliaeetus leucogaster*	EN	Ma	High	Coastal areas and beaches	Foraging, refuge, breeding
White-fronted Tern *Sterna striata*		Ma	Moderate	Coastal areas and beaches	Foraging, refuge, breeding
White-throated Needletail *Hirundapus caudacutus*	VU	VU, Ma, Mi	Moderate	Woodland, Farmland	Foraging, refuge

Table 5. Significant flora species present or likely to occur within the study area.

Species	FFG act Status	EPBC act Status	Likelihood of occurrence	Location of Habitat	Use of study area
River Swamp Wallaby-grass *Amphibromus fluitans*		VU	Moderate	Along drainage lines in wetlands protected from disturbance	Growth and reproduction
Shore Spleenwort *Asplenium obtusatum* subsp. *Northlandicum*	EN		Moderate	Along coastline amongst coastal rocks and scrub	Growth and reproduction
Marsh Saltbush *Atriplex paludosa* subsp. *Paludosa*	EN		High	Along coastal margin, particularly Punchbowl Coastal Reserve	Growth and reproduction
Grey Mangrove *Avicennia marina* subsp. *Australasica*	EN		High	Along coastline of Western Port Bay	Growth and reproduction
Coast Ballart *Exocarpos syrticola*	EN		Moderate	Along coastline	Growth and reproduction
Australian Grass-wrack *Heterozostera nigricaulis*	EN		Moderate	Along coastline of Western Port Bay	Growth and reproduction
Tasman Grass-wack *Heterozostera tasmanica*	EN		Moderate	Along coastline of Western Port Bay	Growth and reproduction
Creeping Rush *Juncus revolutus*	EN		Moderate	Along coastline of Western Port Bay	Growth and reproduction

Species	FFG act Status	EPBC act Status	Likelihood of occurrence	Location of Habitat	Use of study area
Crimson Berry *Leptecophylla oxycedrus*	CR		Moderate	Along coastline, particularly southern sections	Growth and reproduction
Giant Honey-myrtle *Melaleuca armillaris* subsp. *Armillaris*	EN		Moderate	Outside natural range, likely to be present as planted vegetation.	Growth and reproduction
Peninsula Daisy-bush *Olearia* sp. *2*	EN		Moderate	Along coastline	Growth and reproduction
Dune Wood-sorrel *Oxalis rubens*	EN		High	Along coastline	Growth and reproduction
Dune Poa *Poa poiformis* var. *ramifer*	EN		Moderate	Along coastline	Growth and reproduction
Coast Saltwort *Salsola tragus* subsp. *Pontica*	EN		Moderate	Along coastline of Western Port Bay	Growth and reproduction

4.4 Threatened ecological communities

The desktop review identified the following threatened communities that are likely or may occur within the study area:

EPBC Act Listed Communities:

- Natural Damp Grassland of the Victorian Coastal Plains (EPBC Act: Critically Endangered).
- Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community (EPBC Act: Endangered).
- Subtropical and Temperate Coastal Saltmarsh (EPBC Act: Vulnerable).
- Giant Kelp Marine Forests of Southeast Australia (EPBC Act: Endangered).

FFG Act Listed Threatened Communities:

- San Remo Marine Community.

The field assessment identified the potential presence of the EPBC Act listed community Natural Damp Grassland of the Victorian Coastal Plains within sections of South Gippsland Plains Grassland (EVC132_62) vegetation. However, further detailed assessment is required to determine the extent of this ecological community.

The FFG Act listed San Remo Marine Community has been identified as occurring off the northern coast of San Remo.

All other threatened communities were considered unlikely to be present due to an absence of synonymous ecological vegetation classes or comparable floristic compositions being present within the study area.

4.5 Habitat connectivity

Most of the remnant native vegetation within San Remo has been cleared in the past for agriculture and as a result, native remnant vegetation is confined primarily to coastal reserves and roadsides with two larger remnant patches of vegetation associated with the San Remo Recreation Reserve and private property. These patches are functionally connected by smaller remnants and planted shelterbelts that provide potential movement pathways (otherwise called 'biolinks' or wildlife corridors') between areas of suitable habitat in San Remo (Figure 3).

Habitat connectivity shown in Figure 3 is based on:

1. Draft Statement of Planning Policy (SPP) 2022.

2. Bass Coast Biodiversity Biolinks Plan 2018.

3. Western Port Biosphere Biodiversity Plan.

4. 2023 field survey (this study).

Figure 3 shows connectivity features suited to retention (existing native vegetation patches and coastal swales) and areas suited to targeted, voluntary restoration management. Figure 3 provides a spatial strategy to support the following aligned objectives in Bass Coast Draft Statement of Planning Policy: 3.7, 4a.2, 4a.3, 4a.4 and 4a.5.

A review of existing biolinks within San Remo and the broader Distinctive Area and Landscape (DAL) area has been incorporated into the draft Statement of Planning Policy (SPP) and was informed by the Western Port Biosphere biodiversity plan and Bass Coast Biodiversity Biolinks Plan 2018. The 2018 review identified over 200 biolinks within the Distinctive Area and Landscape (DAL) area, with the major biolinks including (Bass Coast 2018):

- The Bass Coast Trail.
- Bass River and significant tributaries.
- Powlette River and significant tributaries.
- Screw Creek.
- Phillip Island.
- Road Reserves.

Within the San Remo area, biolinks are primarily located along the coastal reserves, with only one biolink identified within the township itself (Bass Coast Shire 2022; Figure 3). To the east of San Remo, future biolinks identified within the draft SPP extend from the northern coastline down to the southern coastline towards Kilcunda and link with the Bass Coat Rail Trail (Bass Coast Shire 2022).

Options to establish additional strategic biolinks (Figure 3) which incorporate objectives 4a.2, 4a.4 and 4a.5 of the draft SPP could include the following:

- Expansion of the biolink from the northern coastline to a patch of remnant Swamp Scrub to provide movement pathways through the township towards the coastline.
- North-south connection in east San Remo would provide coastal swales following the creek line and linking to a patch of remnant Swamp Scrub. This would support extended foraging habitat for coastal and woodland birds in the San Remo area (Table 4) and provide future coastal retreat

pathways. In addition, this link may protect habitat for Swamp Skink (FFG & EPBC Acts) if present. Figure 3 shows stepping stone between the northern link through the township, and potential links from the town to the southern coastline.

Recommendations:

- Conserve and enhance existing habitats including core habitat areas identified in Figure 3 irrespective of land tenure or management.
- Improve connectivity to existing habitats and core habitat areas through revegetation and weed control.
- Undertake a detailed connectivity analysis in key locations, such as the Western Port Woodlands, to better understand critical habitat, linkages and 'pinch-points' in the landscape, and inform planning and conservation decisions on both private and public land. This analysis would provide clear priorities based on the current biodiversity values, irrespective of tenure or land use.
- Further study is recommended to identify species requirements specific to the San Remo region and to inform wildlife corridor specifications.

Further detailed recommendations for core habitats and wildlife corridors can be found in section 5.1.

Biolinks and Conservation Management Zones

Bass Coast Shire

- Study area
- 2018 identified biolink
- 2023 identified biolink (ELA)
- Conservation management zones
- Core habitat area

Trees

- Large native

Vegetation

- Introduced - planted
- Native - current wetlands
- Native - remnant
- Native (exempt) - planted

0 400 800
Meters

Datum/Projection:
GDA 1994 VICGRID94
Project: 5894 Date: 31/01/2024

Source:
Basemap: VICMAP, 2023
Aerial: ESRI, 2023

N

eco logical AUSTRALIA
A TETRA TECH COMPANY

4.6 Key Threats

The direct and indirect threats to areas of high biodiversity within the San Remo region are summarised below.

4.6.1 Habitat loss, modification and fragmentation due to urban development

Habitat loss and fragmentation are key threats to biodiversity Australia wide. Vegetation and wetland removal due to development leads to an overall reduction in the extent of habitat for common and threatened species. It also has potential to create smaller, isolated patches of habitat. This increases the susceptibility of flora and fauna to threats such as weed invasion or predation, whilst also reducing habitat connectivity and limiting the ability of species to move through the landscape and access critical resources. Habitat features that are often lost during development include:

- Understorey shrubs and small trees, which provide habitat for small birds and mammals.
- Protective groundcover (primarily tussock grasses, low shrubs and course-woody debris) for small mammals and reptiles.
- Hollow-bearing trees which providing nesting habitat for birds and mammals.
- Nesting sites, including shorebird roosts.
- Food resources including a variety of flowering and seed producing plants and diverse invertebrate assemblages (particularly in wet or damp sites).

Habitat fragmentation and loss of course-woody debris from woodlands are both listed as threatening processes under the FFG Act.

Another example of negative effects often caused by increased urban development, is the reduction in habitat for large ground dwelling mammals such as the Eastern Grey Kangaroo *Macropus giganteus.* When remaining suitable habitat for this species has been removed, the ability for this species to move throughout the landscape is also limited. This can result in Eastern Grey Kangaroos being locked in by development which can lead to individuals or mobs accessing private properties. They are also likely to cross highly trafficked areas and roads, increasing roadkill incidents.

Much of San Remo's vegetation has been cleared, with remnant vegetation limited in extent. The landscape is also highly fragmented, making retaining the remaining remnant vegetation and establishing bioinks in the area essential.

4.6.2 Population growth and increased human activity.

The population in San Remo is increasing due to more development, increased tourism and the aging population retiring into holiday homes. Population growth in San Remo will place increasing pressures on existing coastal reserves, native vegetation communities, and native fauna. Disturbance and further degradation of high biodiversity areas are likely with increased human activity, particularly in coastal areas.

As the beaches along the coastlines become more heavily frequented by people, vegetation particularly on the foreshore (dune grasslands and scrub) may be degraded. Increasing numbers of informal trails and access paths along the coast, particularly in the foreshore may also contribute to further degradation due to removal of native vegetation. Native vegetation removal by landowners along the coastlines is also an issue worth consideration.

Increased human activity along the coastlines are likely to negatively impact birdlife in the area. Pressures of dog walking have the potential to impact threatened bird species such as the population of nesting Hooded Plovers on the southern coastline. Hooded Plover is listed as vulnerable under the *Flora and Fauna Guarantee Act 1988* (FFG Act). Disturbance by human activity may lead to egg crushing or disturbance of eggs, nest abandonments or reductions in fledglings of nesting shorebirds. Waterbirds that make use of the northern coastlines may also be impacted from increased activity from people, their companion animals, and water vessels within the bay. These factors are reported as major threats to the waterbirds of Western Port (Hansen, Menkhorst and Loyn, 2011).

Increased pollution associated with increased human activity is another key threat to biodiversity. Plastic pollution threatens native fauna, particularly sensitive marine species that may get entangled in or ingest the plastic. Light pollution from increasing populated areas can also have major impacts to native fauna. In particular, Short-tailed Shearwater and Little Penguin *Eudyptula minor* colonies. Short-tailed Shearwater occupy nearby Cape Woolamai reserve from late September to late April. Urban lighting and land in exposed areas such as roads, may cause the birds to become confused when navigating back to shore which can also lead to increased mortality from collisions with cars.

4.6.3 Invasive fauna and flora

4.6.3.1 Fauna

Invasive flora and fauna are a major threat to the biodiversity values around San Remo. The main mechanism for management of invasive plants and animals in Victoria is the *Catchment and Land Protection Act 1994* (CaLP Act). Additionally, threatening processes which can involve invasive species are listed under the EPBC Act and FFG Act.

Declared established pest animals under the CaLP Act that were identified within the San Remo area include: Red Fox *Vulpes vulpes*, European Rabbit *Oryctolagus cuniculus* and Domestic Cat (feral) *Felis catus.* Other non-listed invasive species included Black Rat *Rattus rattus,* House Mouse *Mus musculus*, and exotic bird species. During surveys, rabbits were observed and associated grazing pressure and ground disturbance was significant in sections. Competition and land degradation by rabbits is listed as a threatening process under the EPBC Act.

Predation by introduced animals are a major threat to the native fauna in the area including the waterbirds of Western Port (Hansen, Menkhorst and Loyn, 2011). For example, Hooded Plover are highly sensitive to predation by feral animals as they nest on the ground. Foxes are of particular concern since they can have major impacts on populations of Short-tailed Shearwater, Hooded Plover and Little Penguin. Domesticated animals like cats are also likely to be an increasing problem with further development in the area. Predation by both Red Fox and feral cats are listed as a threatening process under the EPBC Act and FFG Act.

Introduction of marine pests (current and potential new invasions) also threaten sensitive marine communities in San Remo's waters, particularly in Western Port. High priority marine pest species include the Pacific oyster, *Crassostrea gigas*, Asian date mussel, *Musculista senhousia*, Japanese kelp, *Undaria pinnatifida*, and Northern Pacific seastar, *Asterias amurensis* (DEECA 2017b).

4.6.3.2 Flora

Weeds have the potential to adversely affect the survival of native flora, fauna or the functioning of ecosystems (White 2022). Weeds may also outcompete native flora species and alter vegetation community structure and function.

The desktop assessment and field survey identified the presence of 74 high-threat or noxious weeds within the study area, including 6 Weeds of National Significance (WoNS) and 12 Noxious weeds (CaLP Act) (Appendix B). High threat species were identified using risk rankings from the Advisory list of environmental weeds in Victoria (White 2022). Rankings reflect a species impact on natural systems, area of potential distribution, potential for invasion, rate of dispersal and their range of susceptible habitat types.

Areas within the township, and sections along the coastlines were notably overrun by weedy species in parts, including some high threat species. The Woodland reserve had a largely weedy understory with *Rubus fruticosus* L. agg. infestations and invading Sweet Pittosporum *Pittosporum undulatum*.

Along the foreshore, high threat weed species such as *Lycium ferocissimum,* and *Asparagus asparagoides* were present. Other weeds within the remnant vegetation along the foreshore include Blanket Weed *Verbascum* sp., *Oxalis* sp., and *Cenchrus clandestinus*. The rehabilitated drainage line at the southern end of foreshore reserve between old and new housing developments also had infestations of *Rubus fruticosus* L. agg. Along the southern coastline weeds such as Mirror-bush *Coprosma repens*, and *Rubus fruticosus* L. agg. were prevalent.

Vegetation along the northern coastline had a mixture of planted and native introduced species observed included *Pittosporum undulatum*, *Cenchrus clandestinus*, *Rhagodia* sp., *Oxalis* sp., *Asparagus asparagoides*, Cyprus, *Lycium ferocissimum, Rubus fruticosus* L. agg , English Broome *Cytisus scoparius*, and Periwinkle *Vinca major*. Cocksfoot *Dactylis glomerata* and other introduced grasses where prevalent in sections. Austral Bracken *Pteridium esculentum* subsp. *esculentum*, although native can become weedy and where observed recolonising in pastures along the coast. Whilst weedy, the vegetation was still high quality in sections of the northern coastline. The Eastern creek line was also weedy with *Rubus fruticosus* L. agg., *Asparagus asparagoides*, *Dactylis glomerata* and other introduced grasses, Thistles and Pampas Grass *Cortaderia selloana*.

Based on the desktop and field assessment, threatening processes listed under the FFG Act which may require consideration include:

- Invasion of native vegetation by *Rubus fruticosus* L. agg.
- Invasion of native vegetation by 'environmental weeds'.
- Spread of *Pittosporum undulatum* in areas outside its natural distribution.

4.6.4 Erosion and sediment runoff

Shoreline and cliff erosion due to loss or degradation of coastal vegetation, and increased magnitude and frequency of weather events, is a major issue affecting the coastal reserves of San Remo. Erosion was particularly present where vegetation was sparse along the northern coastline of Western Port Bay, which resulted in subsidence of the embankment.

Further development and changed land use within the San Remo area may affect stormwater output and sediment runoff from catchments. Increased sediment runoff as well changed stormwater runoffs and pollutant inputs (including nutrient and fertilizer pollutants) into Western Port Bay threaten sensitive marine values, including the state listed San Remo Marine community which houses important seagrass meadows and invertebrate communities. Sediment-laden water discharged into the bay has the potential to smother benthic sediment in intertidal or subtidal coastal zones. Increased agricultural run-off may also result in increased algal growth and cause a decline in seagrass health (DEECA 2017b). Increased pressure from sedimentation and stormwater runoff may also effect threatened and migratory bird species.

4.6.5 Climate variability and extreme events

Within the San Remo, climate change hazards include increased average temperatures and solar radiation, increased extreme weather events, decreased annual rainfall, rising sea levels and ocean acidification. Climate change may impact biodiversity through reduction of rainfall, increased air temperatures, and more unpredictable climatic conditions. Extreme weather events like bushfires or floods may also become more frequent or severe. As sea level rise, flooding from high tides and storm surges may increase in the San Remo area. These factors can put pressure on native flora and fauna and cause shifts in native vegetation communities within the coastal and inland areas of San Remo. Shorebirds and beach nesting seabirds are highly vulnerable to the effects of sea level rise (DEECA 2017b), due to associated habitat loss. Native fauna may also shift their distribution patterns, abundance, behaviour and timing of migration and breeding. Marine communities and associated assemblages such as the FFG listed San Remo marine community are also particularly vulnerable to sea level rise and have a low adaptive capacity (DEECA 2017b).

Additionally, increased development within the built-up areas in the centre of San Remo also has the potential to create urban heat islands, due to the scarcity of large trees. This has implications for the local biodiversity and comfort of San Remo's residents.

5. Discussion and Recommendations

San Remo represents an excellent opportunity to facilitate urban development and conservation outcomes in a coordinated plan. The San Remo Structure Plan (SRSP) may facilitate the retention of existing habitat and support rehabilitation of habitat patches and corridors throughout the landscape, to provide biodiversity conservation outcomes, visual amenity, provide natural recreational spaces and opportunities for San Remo residents to engage and interact with nature. Notable biodiversity values that persist in San Remo occur within the coastal fringe and marine environments.

Based on stakeholder consultation and ecological values mapped for this project, the following recommendations are made:

1. To protect existing habitat connectivity, including a diversity of habitat types and functions.

2. To promote opportunities to facilitate further habitat connectivity.

3. To plan a spatial network across San Remo to support a broad range of species within the landscape.

This study has identified management zones that can support biodiversity conservation outcomes and accommodate a range of complimentary social uses, such as parklands, tracks and other recreational areas alongside habitat for flora and fauna.

The proposed conservation management zones, core habitats and wildlife corridors for San Remo are shown in Figure 3. Further detail on the planning and management recommendations for these areas, and specific regions within the San Remo landscape is provided below.

5.1 Location specific overview and recommendations

5.1.1 San Remo township

San Remo township includes current residential and recreational areas within the main township. Large and small patches of remnant vegetation associated with San Remo woodland reserve (i.e. San Remo recreation reserve) and in land adjacent, provide low-moderate quality habitat in their current form but should be considered for retention and enhancement (Plates 9 and 10). There is potential to link these habitats with the coastline and to the San Remo cemetery which contains a mix of small patches of remnant native vegetation, native plantings and exotic plantings (Plate 11). Plantings in the adjacent vacant land to the south through to the creek corridor could create connectivity through the landscape in this area. The high cover of native, often indigenous, vegetation, primarily as shrubs or planted native trees associated with private properties along Shetland Heights Road (associated with the low-density rural zone), provides limited but still valuable habitat for a range of common species and has the potential to provide connectivity through to the Cemetery and Woodland Reserve (Plate 12).

Plate 9: San Remo Woodland Reserve

Plate 10: San Remo Recreation Reserve

Plate 11: San Remo Cemetery

Plate 12: Shetland Heights Road

Recommendations include:

- Establish woodland and scrub patches/habitat in San Remo Recreation Reserve to provide connectivity between the foreshore, woodland reserve and San Remo primary school (mature trees).
- Increase native tree and shrub plantings along roads, particularly many of the wider roads.
- Investigate options to increase native vegetation cover and habitat structure within San Remo cemetery.
- Establish native plantings in land to south of San Remo cemetery to link with creek corridor.
- Apply planning controls within the low-density rural zone along Shetland Heights Road to limit further subdivision and removal of native vegetation and encourage further plantings of native trees and shrubs species through this corridor.
- Significant management investment in woodland reserve is required to improve vegetation structure, habitat function and address numerous weed threats.

5.1.2 San Remo hinterlands

The eastern farmlands extend from Potters Hill Road eastward to edge of the study area. Farmland to the east of Potter Hill Road is largely cleared land consisting of pastures with planted introduced vegetation along boundaries as shelterbelts, often Pine or Cyprus (Plate 13). Remnant vegetation is restricted to a large patch and numerous linear patches of remnant Swamp Scrub and native plantings around houses (Plate 14). Whilst isolated in the landscape, this vegetation has a range of habitat structures and functions that may be valuable for retention. Retention of existing planted native vegetation would provide key habitats which would be complimented over time through revegetation to woodland/grassland/scrub communities.

Numerous farm dams throughout the area that were visible are in relatively good condition with frogs heard calling and fringing vegetation (Plate 14).

The drainage line to the north of the highway is largely devoid of vegetation at the southern end with several large dams occupying the drain however native vegetation becomes present and cover increases moving northwards towards the northern coastline.

Plate 13: Pastures in the eastern farmlands with farm dam

Plate 14: Remnant Swamp Scrub

Recommendations include:

- Retain planted native vegetation on private land along Potters Hill Road and conservation of surrounding land as part of a large reserve extending through to the Swamp Scrub patch in the northeast and creek line beyond.
- Establish a connection through to the southern coastline along farm property boundaries from the central section utilising proposed walking track corridor. This reserve potential would also connect through the large properties along Shetland Heights Road through to the cemetery and Grassy Woodland reserve beyond.
- Restore the north-south drainage line including establishing native groundcover vegetation in the creek bench zone.
- Promote revegetation of farm dams as wetlands for habitat.
- Establishment of conservation reserves and wildlife corridors as outlined in Figure 2.

5.1.3 Southern coastline

Starting at the southernmost headland at the western end and moving east, large sections of this coastline were not able to be viewed due to access, particularly the large section of vacant farmland at the western end. This farmland is generally undulating and occupies some of the highest aspects in the settlement with the majority sloping towards the southern coastline. Based on observations and aerial imagery it appears there are substantial areas of native coastal scrub and grasslands along the coastal fringe, particularly at the western end (Plate 15). In addition, there remains a few small patches and individual shrubs scattered throughout the farmland area, along with several farm dams. Degraded/grazed Coastal Tussock Grassland persists in some paddocks, particularly where substantial pasture improvement hasn't occurred (this is notable in the section adjoining Punchbowl Road and Potters Hill Road).

Extensive high-quality remnant native vegetation and habitats were identified near Bore beach and the surrounding embankment/slopes, including Coastal Dune Grasslands, Spray-zone Coastal Shrubland, sedge dominated wetlands behind dunes, with adjoining Swamp Scrub, and Coastal Tussock Grassland on slopes (Plate 16 and Plate 17). Weeds such as Mirror-bush, *Coprosma repens*, and *Rubus fruticosus* L. agg. were prevalent on site and will require control in the near future to ensure it does not become an issue.

Coastal areas at the end of Punchbowl Road consisted of very steep tall cliffs and escarpments with a mosaic of Coastal Tussock Grassland, Coastal Headland Scrub and wind-blown scrub, with Banksia Woodland prominent in sheltered locations and the upper slopes (Plate 18). Habitat for roosting birds, small birds, reptiles and frogs in gullies throughout. This area is high quality and considered a priority for conservation.

Plate 15: Native Coastal Scrub and Grasslands at the Western end

Plate 16: Bore Beach stairway

Plate 17: Bore Beach coastal vegetation

Plate 18: Cliffs at end of Punchbowl Road

Recommendations include:

- Establishment of a coastal conservation buffer zone.
- Undertake weed control along the coastal fringe.
- Establish appropriate barriers/fencing to limit access to vegetated sections of the dunes including coastal dune grasslands.
- Undertake surveys to establish baseline data for the presence and use of areas by shorebirds nesting/roosting/feeding to inform planning.

5.1.4 San Remo foreshore

The San Remo foreshore reserve extends to southern most point of the study area. From the Phillip Island Rd bridge southwards, vegetation is limited and is of low habitat value (Plate 19). Where Coastal Alkaline Scrub and Coastal Dune Grassland communities are present, it provides suitable habitat for small birds and ground dwelling reptiles and mammals (Plates 20 and 21). However, this area is heavily frequented by humans, with multiple tracks present, both formal and informal throughout scrub.

Whilst the San Remo foreshore, and coastline around San Remo in general, has relatively intact good quality coastal scrub, it has shifted in structure and composition from Grassy Woodlands which would have once persisted to mature Banksia woodland. Restoration of Grassy Woodland communities along

the coastal fringe should be a priority which would enhance and improve connectivity through a more varied range of ecosystems around the coastal fringe. Opportunity exists to do this in various points along the foreshore and in currently vacant land to the south of the old San Remo Township. It is noted though that this land is currently proposed for development and where possible should be prioritised for retention.

At the southernmost part of the foreshore section, where the point extends out across a rocky headland, the coastal scrub community is largely covered in Coastal Tussock Grassland (Plate 22). This area appears to have high covers of native classic grassland and should be prioritised for conservation.

Plate 19: San Remo Foreshore Reserve, cleared grassed area

Plate 20: Coastal Alkaline Scrub/Buda Woodland communities

Plate 21: Coastal Dune Grassland on the south-eastern end of the reserve.

Plate 22: Foreshore Reserve cliffs at the southern end

Recommendations include:

- Improve fencing of coastal scrub and dune areas to limit creation of informal tracks and restricting access to designated tracks.
- Restoration of Grassy Woodland communities in northern sheltered aspects of San Remo along Westernport Bay, where appropriate.
- Undertake weed control for noxious and high-threat species.
- Additional indigenous plantings in areas with low or introduce cover including road reserves.

- Replacement of exotic plantings with native species over time.
- Encourage local residentials to plant native species in adjoining backyards and properties to expand cover of native community.

5.1.5 Western Port Bay coastline

The Northern coastline of San Remo boarders Western Port Bay and extends from San Remo beach by the Phillip Island Road bridge to the edge of the study area. The section of coastline from the bridge to San Remo police station, consisted of rock beaching along the shoreline and modified embankments with native and exotic planted trees, a sparse shrub layer and exotic grasses (Plates 23 and 24). Vegetation is mature with good structure and may provide good habitat for small birds, reptiles and mammals. It is recommended that this area is retained and progressively transitioned into an indigenous dominated vegetation type consistent with the EVCs, ensuring habitat is not lost during the process.

Extending northwards, rock beaching along the coastal fringes gives way to a natural coarse sand beach intermingled with volcanic rocky outcrops. Vegetation is a mix of native planted and indigenous remnant species, with evidence of erosion in areas where vegetation is sparse, resulting in subsidence of the embankment.

Sections north of Potters Hill Road contained the highest quality vegetation and was largely dominated by Coastal Tussock Grassland (Plate 25). These patches were dominated by *Themeda triandra* in the ground layer. Natural Damp Grassland of the Victorian Coastal Plains was identified at the boundary of the study area in the north and further detailed assessment is required to determine the full extent of this community. This section of coastline represents the highest-quality habitat which should be prioritised for retention. Four potential shorebird roosts were identified during surveys along the Northern coastline (Figure 2; Plate 26).

Farmland areas bordering coastal vegetation provides low-quality habitat and comprised of a mix of pasture with scattered planted native and exotic trees and shrubs. In parts, weedy shrubs and bracken were recolonising pastures. Grazing pressure from rabbits and ground disturbance was also noted to be significant in sections, as was noxious and high-threat weeds.

A creek line extending from the northern coastline south towards Phillip Island Road in the east, is in relatively good condition, however noxious and high-threat weeds were observed. Stock are also able to access the creek, however the steep nature of it has reduced disturbance of the banks.

Plate 23: Coastline from the bridge to San Remo police station

Plate 24: Coastline from the bridge to San Remo police station

Plate 25: Coastal Tussock Grassland

Plate 26: Potential Shorebird feeding/roosting site

Recommendations include:

- Stabilisation of embankments through indigenous plantings to reduce erosion.
- Restoration and revegetation of the north-eastern creek line including establishment of a 30-50+ buffer.
- Undertake weed and pest control.
- Apply planning controls to protect farmland bordering coastal vegetation and promote restoration in the buffer zone between coastal habitats and farmland.

5.2 General recommendations

Core habitats

Management recommendations for 'core habitats' include:

- Protect existing patches of native vegetation and scattered trees, and associated habitats (e.g. hollows). This should include both naturally occurring indigenous vegetation and mature, planted native species which currently provide a diversity of habitats and resources.
- Include a diverse range of habitats in rehabilitation and revegetation works, with a focus on complimenting and improving existing habitats (e.g. plantings within and around existing patches or rehabilitation of drainage lines and farm dams to create wetland and riparian environs).
- Provide habitat structures, such as ground debris (e.g. logs and litter), plants that provide food resources (e.g. nectar producing), and fringing vegetation and in-stream structures in waterbodies.

Wildlife corridors

Management recommendations for 'wildlife corridors' include:

- Protect existing vegetation and habitats (preferentially native however introduced vegetation may also be suitable) which may currently act as 'stepping-stones'.
- Establishsemi-contiguous habitat along corridors through revegetation of a variety of communities (e.g. woodlands, scrubs, grasslands etc). Corridors should be at least 100 metres in width, with habitat present across at least 50% of the area and gaps between habitat no greater than 30 metres.
- Minimise potential 'barriers' to movement, such as busy roads or built structures, within corridors. Such features have the potential to create resistance or impassable barriers that prevent the movement of species.

Management zones

Recommendations for conservation management zones include:

- Protect and restore existing areas of native vegetation and associated habitats. This will involve the establishment of:
  - Areas of 'core habitat' which support a variety of vegetation types and habitat structures.
  - Wildlife corridors which facilitate the movement of species between core habitats and throughout the landscape.
- Apply planning controls to minimise development and land uses in conservation management zones (Figure 3). Controls may include:
  - Dedicated conservation reserves.
  - Multi-use recreational areas that support recreation and conservation outcomes.
  - Low-density development areas, supported by technical specifications to promote the retention and restoration of native vegetation and habitats to maintain high levels of vegetation cover and connectivity across multiple parcels. An example of low-density residential development which has allowed for the persistence of higher than otherwise

expected levels of vegetation cover includes the Low-density Residential Zone along Shetland Heights Road.
    - Future developments required to use local indigenous plant species in accordance with council developed climate resilient species lists.
- Establish coastal buffers to protect marine environments from impacts associated with increased urban development including stormwater run-off pollutants uncontrolled pits and human activity in particular sensitive areas should be prioritised to minimise access with other areas established to provide access to the beachfront.
    - Land within coastal buffers is suitable for restoration of woodland and grassy communities which may facilitate re-establishment of ecological communities. Revegetation should be based on EVC type.

6. References

ABZECO Pty Ltd. 2006. *Findings and Recommendations from Flora, Fauna & Ecological Assessment and Stakeholder Consultation relating to the San Remo, Newhaven and Cape Woolamai Structure Plan, Bass Coast Shire.* Prepared for Hansen Partnership.

Bass Coast Shire. 2016. Bass Coast and Phillip Island Hooded Plover Strategy. Available: https://www.basscoast.vic.gov.au/about-council/strategies-and-policies/strategies

Bass Coast Shire. 2016. Natural Environment Strategy 2016-26. Available: https://www.basscoast.vic.gov.au/about-council/strategies-and-policies/strategies

Bass Coast Shire. 2018. Biodiversity Biolinks Plan. Available: https://www.basscoast.vic.gov.au/about-council/strategies-and-policies/plans

Bass Coast Shire. 2021. Council Plan 2021-25. Available: https://www.basscoast.vic.gov.au/about-council/strategies-and-policies/plans

Bass Coast Shire. 2022. Urban Forest Strategy 2022-40. Available: https://www.basscoast.vic.gov.au/about-council/strategies-and-policies/strategies

Commonwealth Department of the Environment (DoE). 2013a. Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999. Available: https://www.dcceew.gov.au/sites/default/files/documents/nes-guidelines_1.pdf.

Department of Climate Change, Energy, Environment and Water (DCCEEW). nd. 'Species Profiles (SPRAT)'. Available: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl., Commonwealth Department of the Environment, Canberra, ACT

Department of Climate Change, Energy, Environment and Water (DCCEEW). 2023. Protected Matters Search Tool. Available: http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf, Commonwealth Department of the Environment and Energy, Canberra, ACT

Department of Energy, Environment and Climate Action (DECCA). nd. Flora and Fauna Guarantee Act 1988 threatened List Characteristics of Threatened Communities. Victorian Department of Environment, Land, Water and Planning. Melbourne, Victoria Available: FFG-listed community descriptions (environment.vic.gov.au).

Department of Energy, Environment and Climate Action (DECCA). 2017a. Guidelines for the removal, destruction or lopping of native vegetation. Available: https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/91146/Guidelines-for-the-removal,-destruction-or-lopping-of-native-vegetation,-2017.pdf

Department of Energy, Environment and Climate Action (DEECA) 2017b. Western Port Ramsar Site Management Plan. Department of Environment, Land, Water and Planning, East Melbourne.

Department of Energy, Environment and Climate Action (DEECA). 2022. Draft Bass Coast Statement of Planning Policy. State of Victoria, Melbourne.

Department of Energy, Environment and Climate Action (DECCA). 2023a. *Flora and Fauna Guarantee Act 1988 Threatened List – June 2023*. Victorian Department of Environment, Land, Water and Planning, Melbourne, Victoria.

Department of Energy, Environment and Climate Action (DECCA). 2023b. *Nature Kit.* Available: http://www.environment.vic.gov.au/biodiversity/naturekit, Victorian Department of Environment, Energy and Climate Action, Melbourne, Victoria.

Department of Energy, Environment and Climate Action (DECCA). 2023c. *Coast Kit.* Available: http://www.marineandcoasts.vic.gov.au/marine-and-coastal-knowledge/coastkit,Victorian Department of Environment, Energy and Climate Action, Melbourne, Victoria.

Department of Energy, Environment and Climate Action (DECCA). 2023d. Victorian Biodiversity Atlas. Available: https://vba.dse.vic.gov.au/vba/index.jsp, Victorian Department of Environment, Land, Water and Planning, Melbourne, Victoria.

Department of Environment and Primary Industries (DEPI). 2013. Western Port Ramsar Site Boundary Description Technical Report. Department of Environment and Primary Industries, East Melbourne, Victoria

Federation University Australia. 2023. *Visualising Victoria's Biodiversity.* Available: https://vba.biodiversity.vic.gov.au/vba/index.jsp.

Hale, J. 2016. Ecological Character Description Addendum - Western Port Ramsar Site. Department of Energy, Environment and Climate Action. East Melbourne.

Hansen Partnership Pty Ltd. 2010. *San Remo, Newhaven & Cape Woolamai Structure Plan*. Prepared for Bass Coast Shire Council.

Hansen, B., Menkhorst, P. and Loyn, R. 2011. Western Port Welcomes Waterbirds: waterbird usage of Western Port. Arthur Rylah Institute for Environmental Research Technical Report Series No. 222. Department of Sustainability and Environment, Heidelberg, Victoria

Kellogg Brown & Root, 2010. Western Port Ramsar Wetland Ecological Character Description. Report for Department of Sustainability, Environment, Water, Population and Communities, Canberra.

O'Hara, T. 1995. Marine Invertebrate Conservation at San Remo. Victorian Naturalist 112(1): 50-53.

Reef Watch. 2014. Seadragons and their Friends. A guide to Syngnathidae fishes in South Australia. Conservation Council of South Australia.

SWIFFT State Wide Integrated Flora and Fauna Teams 2023. Available: https://www.swifft.net.au/

VicFlora 2023. Flora of Victoria, Royal Botanic Gardens Victoria. Available: https://vicflora.rbg.vic.gov.au.

Victorian Department of Transport and Planning (DTP). 2023. *VicPlan*. Available: https://mapshare.vic.gov.au/vicplan/.

White, M., Cheal, D., Carr, G. W., Adair, R., Blood, K., Muir, A. and Meagher, D. 2022. Advisory list of environmental weeds in Victoria 2022. Arthur Rylah Institute for Environmental Research. Department of Environment, Land, Water and Planning, Heidelberg, Victoria.

Appendix A Likelihood of occurrence assessment

A1 Likelihood Assessment, Terms

Likelihood of occurrence	FFG Act	EPBC Act
FLORA **Present:** Recorded within the study area in the last ten years. **High:** High likelihood of occurrence. Recent records of the species in the local vicinity (i.e. within the last 10 years); and/or, the study area contains high quality suitable habitat. **Moderate:** Moderate likelihood of occurrence. Previous records of the species in the local vicinity; and/or, the study area contains moderate quality suitable habitat. **Low:** Low likelihood of occurrence. Limited previous records of the species in the local vicinity; and/or, the study area contains poor or limited habitat. May also be considered low if other environmental factors, such as the fragmented or isolated nature of the habitat, are present. **None:** No suitable habitat and/or outside species range. FAUNA **Present:** Known resident of the study area based on site observations, recent database records (i.e. within last ten years) or expert advice. **High:** Recent records of the species in the local vicinity (i.e. within the last 10 years); and/or, the study area contains high quality or critical/ preferred habitat. **Moderate:** Previous records of the species in the local vicinity; and/or, the study area contains moderate quality or seasonal habitat. **Low:** Limited previous records of the species in the local vicinity; and/or, the study area contains habitat the species may use opportunistically or en-route to areas of preferred habitat. **None:** No suitable habitat and/or outside species range.	**EX**: Extinct **CR:** Critically endangered **EN**: Endangered **VU**: Vulnerable	**EX**: Extinct **CR**: Critically endangered **EN**: Endangered **VU**: Vulnerable **CD**: Conservation dependent

A2 Likelihood Assessment, Threatened Fauna

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Accipiter novaehollandiae	Grey Goshawk	EN		1	7/01/2008	Low	Mainly tall wet forests and gullies in the Otway Ranges but also woodlands, dry forests, wooded farmland and suburban parks in the Strzelecki Ranges, Gippsland Plains and Otway Plains.	Low quality foraging habitat. Limited records. Unlikely to be present.
Actitis hypoleucos	Common Sandpiper	VU	Ma, Mi	49	26/01/2019	Moderate	Prefers the muddy edges or rocky shores of fresh or saline coastal wetlands. Less often recorded inland on the muddy or sandy edges of lakes, dams, waterholes and bore drains.	Recent records. Some suitable habitat in the study area.
Anseranas semipalmata	Magpie Goose	VU	Ma	14	18/11/2019	Low	Open wetlands, swamps, floodplains and wet grasslands.	No suitable habitat.
Antechinus minimus maritimus	Swamp Antechinus	VU	VU	3	28/10/2021	Low	Mainly occurs in damp areas with dense vegetation at about 1–2 m above ground level, including dense wet heathlands, tussock grasslands, sedgelands, damp gullies, swamps and some shrubby woodlands. Found in Coastal Victoria as far east as Wilson's Promontory.	Some recent records. Limited suitable habitat.
Anthochaera phrygia	Regent Honeyeater	CR	CE	NA	NA	Low	Mainly occurs in box-ironbark forests and woodlands in northern Victoria.	No suitable habitat.
Apus pacificus	Fork-tailed Swift		Ma, Mi	NA	NA	Low	Primarily an aerial species which forages in flight and may occasionally land.	Low-quality habitat present.
Arctocephalus forsteri	Long-nosed Fur-seal, New Zealand Fur-seal		Ma	4	29/10/2016	Low	Coastal and continental shelf waters in southern Australia.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Arctocephalus pusillus	Australian Fur-seal, Australo-African Fur-seal		Ma	NA	NA	No	Found along the coast and continental shelf and slope waters from Victoria, along southern New South Wales, including Tasmania, and the islands of Bass Strait. They range up to 160 km offshore. On land, they have a decided preference for rocky habitat.	Marine species. Records in the San Remo beach area.
Arctophoca tropicalis	Subantarctic Fur Seal		EN, Ma	3	23/07/2019	No	Rocky beaches with abundant boulders and shade. In Australia, the only established breeding colony occurs on Macquarie Island. Some individuals occur at Heard Island, and some wide-ranging (mostly juvenile) vagrants occasionally reach beaches on Tasmania, the Australian mainland and offshore islands.	Marine species.
Ardea alba modesta	Eastern Great Egret	VU	Ma	528	29/07/2019	Present	Widespread in Australia. Inhabits swamps and marshes, grasslands, margins of rivers and lakes, salt pans, estuarine mudflats and other wetland habitats.	Recent records in the study area. Low-quality habitat present.
Ardea intermedia plumifera	Intermediate egret	CR	Ma	41	24/07/2021	Moderate	Mostly an inhabitant of the shallows in terrestrial wetlands, and prefers freshwater swamps, billabongs, floodplains and wet grasslands with dense aquatic vegetation. It is only occasionally seen in estuarine or intertidal habitats.	Recent records, suitable habitat present.
Ardenna carneipes	Flesh-footed Shearwater		Ma, Mi	NA	NA	Low	Is a locally common visitor to waters of the continental shelf and continental slope off southern Australia (south-western Western Australia to south-eastern Queensland) and around Lord Howe Island	Some suitable habitat in the coastal areas around the study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Ardenna grisea	Sooty Shearwater		Ma, Mi	NA	NA	Low	Marine, pelagic birds found in subtropical, subantarctic and Antarctic waters. In Australia, the Sooty Shearwater breeds on islands off New South Wales (NSW) and Tasmania. The species occurs off the coast of south-east Queensland in small numbers and is a moderately common migrant and visitor to Victoria and South Australia	Some suitable habitat in the coastal areas around the study area.
Ardenna tenuirostris	Short-tailed Shearwater		Ma, Mi	NA	NA	High	Observed over continental shelf waters both inshore and offshore but also found in pelagic waters. Enters larger bays and occasionally attracted to fishing vessels. Establishes massive breeding colonies off the southern and south-eastern coasts of Australia each year. Some breeding colonies close to human settlement.	Foraging habitat within the study area.
Arenaria interpres	Ruddy Turnstone	EN	Ma, Mi	248	2/05/2021	Moderate	Widespread within Australia during its non-breeding period of the year. Found in most coastal regions, with occasional records of inland populations. Prefers rocky shores often with shallow pools or beaches where there are large deposits of rotting seaweed.	Recent records. Some suitable habitat in the rocky coastal areas around the study area near Punchbowl Coastal Reserve (HIM score of up to 50)
Aythya australis	Hardhead	VU		59	11/06/2019	Low	Prefers open freshwater swamps and wetlands and occasionally in sheltered estuaries. They are rarely seen on land and tend to roost on low branches and stumps near the water. They prefer deep, fresh open water and densely vegetated wetlands for breeding.	No suitable habitat. Waterbodies within the study area do not support enough tall, dense vegetation.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Balaenoptera acutorostrata	Minke Whale			NA	NA	No	Worldwide distribution, appearing in all oceans and some adjoining seas. Cooler regions seem to be preferred. They rarely venture farther than 169 km from land. They commonly enter estuaries, bays, fjords, and lagoons. They are also known to move farther into polar ice fields than other rorqual species.	Marine species.
Balaenoptera borealis	Sei Whale		VU, Mi	NA	NA	No	Found far from shore in all oceans and adjoining seas, except polar and tropical regions. They occupy temperate and subpolar regions in the summer, but migrate to sub-tropical waters during the winter.	Marine species.
Balaenoptera musculus	Blue Whale	EN	EN, Mi	NA	NA	Low	Blue whales live in the open ocean and are found in all oceans of the world, from the tropics to the drift ice of polar waters.	Marine species.
Balaenoptera physalus	Fin Whale		VU, Mi	1	1/09/1956	No	Fin whales inhabit the temperate and polar zones of all major oceans and open seas and, less commonly, in tropical oceans and seas. They tend to live in coastal and shelf waters but never in water less than 200 meters deep.	Marine species.
Biziura lobata	Musk Duck	VU	Ma	192	22/07/2021	Low	Prefers deep fresh open water and densely vegetated wetlands and swamps. Occasionally found in estuaries and bays.	Recent records. No suitable habitat.
Botaurus poiciloptilus	Australasian Bittern	CR	EN	1	25/11/1999	Low	Prefers permanent freshwater wetlands with tall aquatic vegetation such as bullrushes (Typha spp.) and spike rushes (Eleocharis spp.). Occasionally occurs in rice fields and saltmarshes.	No suitable habitat. Waterbodies within the study area do not support enough tall, dense vegetation.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Bubulcus ibis	Cattle Egret		Ma	NA	NA	Moderate	Occurs in grasslands, woodlands and terrestrial wetlands, often occurring in association with farm animals, particularly cattle. It roosts in trees and ground vegetation nearlakes and swamps.	Low-quality habitat present within the study area.
Calamanthus pyrrhopygius	Chestnut-rumped Heathwren	VU	EN	1	4/03/2017	Low	Prefers heathlands and woodlands with dense shrub and ground-layer vegetation, most commonly found in rocky areas.	No suitable habitat.
Calidris acuminata	Sharp-tailed Sandpiper		Ma, Mi	NA	NA	Low	Widespread in most regions of Victoria, especially in coastal areas. Inhabits shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh, or other low vegetation.	Some suitable habitat in the coastal areas around the study area. No recent records within the study area.
Calidris canutus	Red Knot	EN	EN, Ma, Mi	107	17/04/2021	Moderate	Nonbreeding migratory species that occurs along the coast in sandy estuaries with tidal mudflats, coastal wetlands, sheltered sandy beaches, sewage ponds and saltworks.	Some suitable habitat in the coastal areas around the study area. Relatively low HIM scores between 30-40 in the coastal areas.
Calidris ferruginea	Curlew Sandpiper	CR	CE, Ma, Mi	295	22/04/2019	Moderate	Nonbreeding migratory species that occurs primarily on intertidal mudflats of estuaries, lagoons, mangroves, and less often on beaches, rocky shores and around lakes, dams. Can also occur on suitable inland habitats in the Kerang area, Mildura, and western districts.	Recent records. Some suitable habitat in the coastal areas around the study area. Relatively low HIM score of in the 40's

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Calidris melanotos	Pectoral Sandpiper		Ma, Mi	NA	NA	Low	Nonbreeding migratory species that prefers shallow fresh to saline wetlands with open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. Also occurs in swamps, saltmarshes, lakes and inundated grasslands.	Some suitable habitat in the coastal areas around the study area.
Calidris ruficollis	Red-necked Stint		Ma, Mi	NA	NA	Low	Coastal species which occurs in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores. Occasionally occur in saltworks, sewage farms, saltmarsh, shallow wetlands, lakes, swamps, riverbanks, dams, flooded paddocks or damp grasslands.	Some suitable habitat in the coastal areas around the study area.
Calidris tenuirostris	Great Knot	CR	CE, Ma, Mi	24	29/11/2017	Moderate	Nonbreeding migratory species that occurs in intertidal mudflats and sandflats in sheltered coasts, including bays harbours and estuaries.	Recent records. Some suitable habitat in the coastal areas around the study area.
Callocephalon fimbriatum	Gang-gang Cockatoo	EN	EN	2	7/01/2000	Low	Gang-gang Cockatoos primarily occur within the temperate eucalypt forests and woodlands of mainland south-east Australia. The species is an altitudinal migrant. During summer they primarily inhabit mature, wet sclerophyll forests, typically dominated by eucalypts. During winter months, Gang-gang Cockatoos tend to range beyond montane forests to inhabit woodland assemblages at lower, drier altitudes	No suitable habitat.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Calyptorhynchus banksii graptogyne	Red-tailed Black-Cockatoo (south-eastern)	EN	EN	1	01/01/1800	No	Prefers eucalyptus and casuarina forest and woodland. This subspecies is reliant on the seeds of brown and desert stringybark (*Eucalyptus baxteri* and *E. arenacea*) and buloke trees (*Allocasuarina luehmannii*).	No recent Records. Limited suitable habitat present.
Caperea marginata	Pygmy Right Whale		Mi	NA	NA	No	Pelagic aquatic habitats, in the cool to cold ocean waters surrounding Antarctica. Found only in a narrow band of waters near the South Pole. The band circles Antarctica, covering area in both the Pacific and Atlantic Oceans.	Marine species.
Carcharodon carcharias	Great White Shark	EN	VU, Mi	NA	NA	No	Primarily a coastal and offshore inhabitant of insular and continental shelves. Prefer waters with sea surface temperatures of 59 to 72°F. The geographic range of great white sharks is extremely wide they can be found in all cold temperate and tropical coastal waters.	Marine Species. Distribution (low density) and foraging habitat in marine areas in proximity to the study area
Caretta caretta	Loggerhead Turtle		EN, Ma, Mi	NA	NA	No	In Australia, they occur in coral reefs, bays and estuaries in tropical and warm temperate waters off the coast of Queensland, Northern Territory, Western Australia and New South Wales.	Marine species.
Charadrius bicinctus	Double-banded Plover		Ma, Mi	NA	NA	Low	Found in both coastal and inland areas on coastal beaches, mudflats, sewage farms, riverbanks, fields, dunes, upland tussock grasses and shingle.	Some suitable habitat in the coastal areas around the study area. Found in Western Port from Feburary to September.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Charadrius leschenaultii	Greater Sand Plover	VU	VU, Ma, Mi	7	13/01/2008	Low	In southern Australia it is mostly recorded in Corner Inlet, Western Port and Port Phillip Bay in Victoria. The species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly, or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons, and inshore reefs, rock platforms, small rocky islands or sand cays on coral reef.	Some suitable habitat in the coastal areas around the study area.
Charadrius mongolus	Lesser Sand Plover	EN	EN, Ma, Mi	11	6/01/2008	Low	Entirely coastal species. Prefers intertidal mudflats and sandbanks of estuaries and sheltered bays.	Some suitable habitat in the coastal areas around the study area.
Charadrius ruficapillus	Red-capped Plover		Ma	NA	NA	Low	Widespread throughout Australia. Inhabits sandy beaches, saltmarshes, and saline wetlands and lakes.	Some suitable habitat in the coastal areas around the study area.
Chelonia mydas	Green Turtle		VU, Ma, Mi	NA	NA	No	Occurs in seaweed-rich coral reefs and inshore seagrass pastures in tropical and subtropical areas of the Indo-Pacific region. Australian nesting areas include the southern Great Barrier Reef, the northern Great Barrier Reef, the Coral Sea, the Gulf of Carpentaria, Western Australia's north-west shelf, the Ashmore and Cartier Reefs and Scott Reef.	Marine species.
Chroicocephalus novaehollandiae	Silver Gull		Ma	NA	NA	Present	The most common gull of Australia. It has been found throughout the continent, but particularly at or near coastal areas. It is a common species, having adapted well to urban environments.	Common bird found around coastal areas.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern subspecies)		VU	NA	NA	Low	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	Limited suitable habitat present.
Dasyurus maculatus maculatus	Spot-tailed Quoll	EN	EN	1	14/04/2016	Low	The Spot-tailed Quoll occupies a range of forest habitats, particularly wet eucalypt forests associated with rocky outcrops, extensive riparian vegetation and high levels of ground dwelling prey.	1 record in the past 10 years. Limited suitable habitat.
Delphinus delphis	Common Dolphin, Short-beaked Common Dolphin			NA	NA	No	Common dolphins are fond of coastal waters, but are also found well out to sea. Generally, they prefer surface temperatures greater than 10 degrees Celsius. Common dolphins can be found throughout the Atlantic and Pacific Oceans.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Dermochelys coriacea	Leathery Turtle	CR	EN, Ma	NA	NA	No	Tropical and temperate waters. Leatherback turtles are most commonly reported feeding in coastal waters in central eastern Australia, south-east Australia (from Tasmania, Victoria and eastern South Australia) and in south-western Western Australia. They are also regularly seen in southern Australia.	Marine species.
Diomedea antipodensis	New Zealand Wandering Albatross		VU, Ma, Mi	NA	NA	Low	The Antipodean Albatross is endemic to New Zealand, but forages widely in open water in the south-west Pacific Ocean, Southern Ocean and the Tasman Sea. It is marine, pelagic and aerial.	Marine species.
Diomedea antipodensis gibsoni	Gibson's Albatross		VU, Ma	NA	NA	Low	Gibson's Albatross is marine, pelagic and aerial. In the Antarctic, it occurs in open water, and rarely enters the belt of icebergs region. In late summer, it may approach the edge of the pack-ice. On breeding islands, the Gibson's Albatross nests on coastal or inland ridges, slopes, plateaux and plains, often on marshy ground.	Marine species.
Diomedea epomophora	Southern Royal Albatross	CR	VU, Ma, Mi	NA	NA	Low	Southern royal albatrosses nest almost exclusively on the Chatham Islands, located hundreds of miles east of New Zealand. After breeding, the species may circumnavigate the Southern Ocean, though it is most sighted in New Zealand and South American waters.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Diomedea exulans	Wandering Albatross	CR	VU, Ma, Mi	NA	NA	Low	The Wandering Albatross breeds on Macquarie Island. A single breeding pair has also been recorded on Heard Island. It feeds in Australian portions of the Southern Ocean.	Marine species.
Diomedea sanfordi	Northern Royal Albatross	#N/A	EN, Ma, Mi	NA	NA	Low	The Northern Royal Albatross ranges widely over the Southern Ocean, with individuals seen in Australian waters off south-eastern Australia. The Northern Royal Albatross feeds regularly in Tasmanian and South Australian waters, and less frequently in NSW waters	Marine species.
Egretta garzetta	Little Egret	EN	Ma	126	3/05/2021	Moderate	Prefers swamps, billabongs, floodplain pools, mudflats, mangroves and channels; breeds in trees standing in water.	Recent records. Some suitable habitat in the study area.
Eubalaena australis	Southern Right Whale	EN	EN, Ma	43	13/07/2021	No	A marine species. During winter, Southern Right Whales can be found along most of Victoria's coastline – most commonly in the southwestern Victorian region.	Marine species.
Eudyptula minor	Little Penguin		Ma	NA	NA	Low	Habitats include rocky coastline, savanna, scrub forest or forests. Little penguins are marine seabirds and spend the majority of their lives swimming underwater.	Some suitable habitat in the coastal areas around the study area.
Falco hypoleucos	Grey Falcon	VU	VU	NA	NA	Low	Primarily occurs inland in arid areas but can occur elsewhere in Australia. Prefers lightly timbered woodland and Acacia scrub.	Species rarely recorded, with modelled distribution. Unlikely to utilise study area.
Falco subniger	Black Falcon	CR		2	21/04/2018	Low	Sparsely distributed across Victoria. Occurs in woodland, shrubland and grassland in particularly along wooded watercourses and	Limited records. Low quality foraging habitat. Unlikely to be present or make significant use of study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
							agricultural land with scattered remnant trees.	
Fregetta grallaria grallaria	White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian)		VU	NA	NA	Low	Occurs across sub-tropical and tropical waters in the Tasman Sea, Coral Sea and, possibly, the central Pacific Ocean. In the non-breeding season, it reaches and forages over near-shore waters along the continental shelf of mainland Australia. It breeds, in Australian territory, on offshore islets and rocks in the Lord Howe Island group.	Some suitable habitat in the coastal areas around the study area.
Galaxiella pusilla	Dwarf Galaxis	EN	VU	NA	NA	Low	Occurs from the Mitchell River Basin in Central Gippsland, Victoria, to the Cortina Lakes, near the Coorong in South Australia. Typically occurs in well vegetated slow flowing, still, shallow temporary or permanent freshwater habitats including swamps, drains and backwaters of streams and creeks. Some wetlands be may partially or completely dry during summer.	Limited suitable habitat available. Could use drainage lines as refuge.
Galeorhinus galeus	School Shark		CD	NA	NA	No	Temperate coastal waters of southern Australia. This species is mainly found in demersal waters, over the continental and insular shelves, but also over the upper slopes, in depths from near shore to 550 m. Inshore areas are particularly important as birthing and nursery sites.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Gallinago hardwickii	Latham's Snipe		Ma, Mi	NA	NA	Low	Non-breeding migratory species that occurs in freshwater wetlands with low dense vegetation on or near the coast. Preferred wetland vegetation includes sedges, grasses, lignum, reeds and rushes. Also occurs in saltmarsh and creek edges on migration, drainage ditches along roadsides and railways, crops and pasture.	Limited suitable habitat present.
Gallinago megala	Swinhoe's snipe		Ma, Mi	NA	NA	Low	Few definite records occur in Australia, but potential habitat occurs along much of the coast of Victoria. Occurs around the edges of fresh and brackish wetlands, including swamps, billabongs, river pools, small streams, and sewage ponds. They are also found in drying claypans and inundated plains.	No suitable habitat.
Gallinago stenura	Pin-tailed snipe		Ma, Mi	NA	NA	Low	Cryptic shorebird of wetlands, wet meadows, and both flooded and dry agricultural fields. Looks very similar to other snipe species.	No suitable habitat.
Grampus griseus	Risso's Dolphin, Grampus			NA	NA	No	Recorded from all states except Tasmania and the Northern Territory. Occurs mainly on steep sections of the upper continental slope, usually in waters deeper than 1000 m, in tropical and warm temperate latitudes. They are generally found in waters with temperatures ranging between 15–30 °C.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Grantiella picta	Painted Honeyeater	VU	VU	NA	NA	Low	Prefers forest/woodland, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands with mistletoe a high number of mature trees. Also occurs in acacia-dominated woodlands, paperbarks, casuarinas, Callitris, and trees on farmland or gardens.	No suitable habitat.
Haliaeetus leucogaster	White-bellied Sea-Eagle	EN	Ma	164	7/05/2021	High	Occurs on beaches and estuaries, inland wetlands, lakes, reservoirs, saltmarsh, major inland streams and adjacent terrestrial habitats.	Recent records, suitable habitat.
Halobaena caerulea	Blue Petrel		VU, Ma	4	10/08/1985	Low	Has a global distribution throughout the southern oceans from the pack ice edge up to about 30 degrees south. Individuals are rarely encountered inshore and offshore over the continental shelf and in pelagic waters off the shelf break. It forages in Antarctic and subantarctic waters mainly on pelagic crustaceans, fish, cephalopods and insects.	No recent records. Some suitable habitat in the coastal areas around the study area.
Heraldia nocturna	Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish		Ma	NA	NA	No	If populations across Australia are one species, then the range is broad - from Western Australia to NSW, including Tasmania. Found in caves, crevices, and under ledges on rocky reefs. Recorded depth range to date is about 2 to 30 m deep.	Marine species.
Hieraaetus morphnoides	Little Eagle	VU		6	26/05/2019	Low	Widespread species. Occurs primarily in wooded farmland and dry woodlands.	Few recent records. Some suitable habitat in study area.
Himantopus himantopus	Black-winged Stilt		Ma	NA	NA	Low	Open freshwater wetlands, coastal bays and inlets.	Some records in Newhaven. Some suitable habitat in the surrounding coastal areas.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Hippocampus abdominalis	Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse		Ma	NA	NA	No	Inhabits saltwater coastal regions such as coral reefs, estuaries, harbors, and bays. Found in tropical or temperate waters with temperatures ranging from 8 to 24 °C. They are found at depths of 0 to 104 m below the surface of the water, but are typically found no deeper than 50 m below the surface (more common in shallow waters). They may also be found in open water or deeper water attached to sponges (phylum Porifera), and occasionally in intertidal rock pools.	Marine species.
Hippocampus breviceps	Short-head Seahorse, Short-snouted Seahorse, Knobby seahorse		Ma	NA	NA	No	Sheltered coastal reefs associated with macroalgal beds and seagrasses. Also found on floating macroalgae, rock reefs, jetty habitats, and sponge reefs below depths of 15 metres (49 ft). More commonly, this species occurs at depths near 5 m.	Marine species.
Hippocampus minotaur	Bullneck Seahorse		Ma	NA	NA	No	Little is known about its natural habitat and has never been found in the wild. Only known specimens collected on the coast of Eden, Australia. A benthic species found on the continental shelf, thought to live in sand beds at the bottom of the ocean, possibly wrapping its prehensile tail around gorgonian corals.	Marine species.
Hirundapus caudacutus	White-throated Needletail	VU	VU, Ma, Mi	18	4/03/2020	Moderate	Primarily an aerial species which forages in flight and may 29 ocasionally land. Occurs most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	Some recent records, Low-quality habitat for this species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Histiogamphelus briggsii	Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish		Ma	NA	NA	No	Found in the shallow waters (up to 30 m in depth) surrounding South Australia, New South Wales, and Northern Tasmania. It's habitat can consist of reefs, seagrass beds, and sandy beach and estuarine environments.	Marine species.
Histiogamphelus cristatus	Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish		Ma	NA	NA	No	Generally found in sandy areas, near rocks or rubble, and sparse seagrass.	Marine species.
Hydroprogne caspia	Caspian Tern	VU	Ma, Mi	845	24/07/2021	High	Prefers sheltered coastal environments with sandy or muddy edges including bays, lagoons, inlets and estuaries. Also occurs in open wetlands, including lakes and rivers, reservoirs, sewage ponds and saltworks. Significant regular breeding colonies are located at Corner Inlet, Mud Island in Port Philip Bay and Mallacoota.	Recent records. Some suitable habitat in the coastal areas around the study area.
Hypselognathus rostratus	Knifesnout Pipefish, Knife-snouted Pipefish		Ma	NA	NA	No	Found in Victoria, Bass Strait and South Australia. Mostly found in shallow seagrass beds of Posidonia and Zostera, and on sandy substrates with clumps of seagrass and detritus. Found in a variety of oceanographic conditions, from shallow sheltered bays to more exposed habitats around offshore islands. Depth ranges from less than 1 m to at least 10 m deep.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Isoodon obesulus obesulus	Southern Brown Bandicoot	EN	EN	NA	NA	Low	Prefers heathland, heathy open forest and woodland with dense ground cover up to 1 m tall on sandy and well drained soils. Also occurs in dense Rubus fruticosus L. agg thickets.	Limited suitable habitat present.
Kaupus costatus	Deepbody Pipefish, Deep-bodied Pipefish		Ma	NA	NA	No	Known mainly from South Australia, but there are small populations in Victoria (both major bays, and around some islands in Bass Strait). Found in small aggregations, in low energy, silty-bottomed, clear-water environments that support Zostera seagrass beds, and short, filamentous seaweed. Most records are from low intertidal and shallow subtidal waters.	Marine species.
Lagenorhynchus obscurus	Dusky Dolphin		Mi	NA	NA	No	Dusky dolphins are usually found in warm to cool temperate waters and at coastal region. Dusky dolphins have a circumpolar distribution in Southern Hemisphere. They can be found near the coasts of South America, South Africa, Kerguelen Island, South Australia and New Zealand.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Lamna nasus	Porbeagle, Mackerel Shark		Mi	NA	NA	No	Primarily found in the pelagic and littoral zones and prefer cold, offshore fishing banks. They seldom come inshore and are commonly found swimming along Reykjanes Ridge in the North Atlantic. They often remain in deeper waters during winter and occasionally come inshore during summer. Although they have been documented in waters as deep as 1360 m, average depth of porbeagle inhabited waters is 715 m. Preferred water temperatures range from 1°C to 18°C.	Marine species.
Larus dominicanus	Kelp Gull		Ma	NA	NA	Moderate	Antarctic to subtropical zones, with sea-surface temperatures ranging from 0° to 23°C. In Australia almost exclusively found on the coast. Mostly occur in sheltered parts of coast, such as harbours, bays, inlets and estuaries, sandy or rocky beaches, mudflats and banks, and rock platforms; generally in greater numbers in estuaries rather than on adjacent beaches. Less common on coasts with cliffs. Mostly breed along coasts, often in sheltered places, such as inlets, harbours and estuaries.	Suitable habitat in the coastal areas around the study area. Some recent records.
Larus pacificus	Pacific Gull		Ma	NA	NA	Present	Distributed along the entire coast of Victoria. Prefers sandy estuaries, bays and harbours, and less often rocky coasts.	Suitable habitat in the coastal areas around the study area. Some recent records.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Lathamus discolor	Swift Parrot	CR	CE, Ma	5	27/03/2006	Low	Non-breeding winter migrant. Prefers dry forest and woodland, particularly box-ironbark forest in central and NE Victoria, and eucalptus sp. within greater Melbourne. Feeds on nectar and lerps of winter flowering eucalyptus including Grey Box (*Eucalyptus microcarpa*), Red Ironbark (*Eucalyptus tricarpa*), Mugga Ironbark (*Eucalyptus sideroxylon*) (far north-east Victoria), Yellow Gum (*Eucalyptus leucoxylon*) and White Box (*Eucalyptus albens*).	No suitable habitat.
Leptoichthys fistularius	Brushtail Pipefish		Ma	NA	NA	No	Found across southern Australia, from southern WA through to northern Tasmania. Found mainly in dense seagrass beds, particularly Zostera and Posidonia, in which it is well camouflaged. Juveniles sometimes swim in small groups, near seagrass beds, and some juveniles have also been recorded near macroalgae. Recorded depth range is from about 3 m to 20 m.	Marine species.
Lewinia pectoralis	Lewin's Rail	VU		2	1/03/2010	Low	Occurs in coastal wetlands and swamps with dense riparian vegetation, and saltmarsh.	No suitable habitat.
Lichenostomus melanops cassidix	Helmeted Honeyeater	CR	CE	1	03/10/1867	No	Primarily restricted to riparian and swamp forests associated with Yellingbo Conservation Reserve and Bunyip State Park.	No recent records. No suitable habitat.
Limicola falcinellus	Broad-billed Sandpiper		Ma, Mi	NA	NA	Low	Non-breeding migrant species. Forages and roosts in estuarine mudflats, saltmarshes, and reefs.	Some suitable habitat in the coastal areas around the study area. No recent records in the study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Limosa lapponica	Bar-tailed Godwit	VU	Ma, Mi	277	12/05/2021	Moderate	Widespread along the coast of Victoria. Prefers large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays. Rarely inland.	Recent records. Some suitable habitat in the coastal areas around the study area.
Limosa lapponica baueri	Bar-tailed Godwit (baueri)		VU	NA	NA	Low	Coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt lakes and brackish wetlands, sandy ocean beaches and rock platforms.	No recent records in the study area. Some suitable habitat in the coastal areas around the study area.
Limosa limosa	Black-tailed Godwit	CR	Ma, Mi	15	19/03/2019	Moderate	Occurs along the coast in estuarine mudflats, beaches and mangroves.	Records in the study area. Some suitable habitat in the coastal areas around the study area.
Lissocampus caudalis	Australian Smooth Pipefish, Smooth Pipefish		Ma	NA	NA	No	Found across southern Australia, from Bass Strait and northern Tasmania through to southern WA. Smooth pipefishes are found in a variety of nearshore habitats, including tide pools, shallow seagrass beds (e.g. in Zostera, and Amphibolis), shallow reefs with mixed seaweed, subtidal sand and rubble habitats, and under jetties. Recorded depth range is from less than 1 m to about 10 m deep.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Lissocampus runa	Javelin Pipefish		Ma	NA	NA	No	Found across southern Australia, from northern NSW through to southern WA, including Tasmania. Found in a variety of nearshore habitats, including estuaries, tide pools, shallow seagrass beds (e.g. Zostera), shallow rubble reefs with short seaweed, and subtidal sand habitat. Recorded depth range is from about 1 – 18 m, but most records are from less than 5 m deep.	Marine species.
Lissolepis coventryi	Swamp Skink	EN	EN	1	1/10/1986	Moderate	Occurs in densely vegetated swamps and associated watercourses, and adjacent wet heaths (tea-tree thickets), sedgelands and saltmarshes (Clemann 2000, SAC 2000, Manning 2002).	Swamp scrub present, connects to a drainage line. Road could be a barrier. Some areas with a HIM score in the 60's in the patches of swamp scrub.
Litoria raniformis	Growling Grass Frog	VU	VU	2	01/01/1788	Low	The species persists in isolated populations in the greater Melbourne area, in the south-west of Victoria and a few sites in central Victoria and Gippsland. Occurs in a variety of still or slow-moving permanent and semi-permanent water bodies with abundant submerged and emergent vegetation and minimal tree canopy cover including farm dams, irrigation channels and disused quarries.	Few records over 10 years ago. No suitable habitat. Not reported being sighted in Port Phillip Bay in 20 years.
Macronectes giganteus	Southern Giant-Petrel	EN	EN, Ma, Mi	4	1/01/1981	Low	The Southern Giant-Petrel is a marine species. Over summer, the species nests in small colonies amongst open vegetation on Antarctic and subantarctic islands. It can be seen off the coast of Victoria during the non-breeding season.	Limited records. Some suitable habitat in the coastal areas surrounding the study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Macronectes halli	Northern Giant-Petrel	EN	VU, Ma, Mi	2	17/05/1996	Low	The Northern Giant Petrel breeds in the sub-Antarctic, and visits areas off the Australian mainland mainly during the winter months (May-October). Immature and some adult birds are commonly seen during this period in offshore and inshore waters from around Fremantle (WA) to around Sydney (NSW).	Limited records. Some suitable habitat in the coastal areas surrounding the study area.
Maroubra perserrata	Sawtooth Pipefish		Ma	NA	NA	No	Found across southern Australia, from northern NSW through to southern WA, including Tasmania. A reef-dwelling species, usually found in the back of narrow fissures / crevices in rock, and in caves. Also hides under rocks. Depth ranges from the shallow subtidal to about 15 m deep.	Marine species.
Mastacomys fuscus mordicus	Broad-toothed Rat	VU	VU	NA	NA	Low	Occurs in high rainfall areas containing a moderate to dense ground layer of grasses, sedges, herbs and heaths. Mainly occurs in alpine and sub-alpine heathlands.	No suitable habitat.
Megaptera novaeangliae australis	Southern Humpback Whale	CR	Mi	18	26/07/2020	No	A marine species. The population of Australia's east coast migrates from summer cold-water feeding grounds in Subantarctic waters to warm-water winter breeding grounds in the central Great Barrier Reef.	Marine species.
Melanodryas cucullata cucullata	Hooded Robin	VU	EN	NA	NA	Low	Open woodland and shrubland.	No recent records. Limited suitable habitat present.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Merops ornatus	Rainbow Bee-eater		Ma	NA	NA	Low	Widespread within Australia, although southern populations migrate north from February and return in September. Often occurs in open forest, woodlands and shrublands near water. May also occur in wooded farmland, quarries and orchards.	Limited suitable habitat present.
Miniopterus orianae oceanensis	Eastern Bent-winged Bat	CR		2	19/05/1985	Low	Primarily a cave-dwelling species, but can also be found in rainforests, sclerophyll forests, woodlands, monsoon forests, open grasslands, mangroves, and paperbark forests	No suitable habitat.
Mirounga leonina	Southern Elephant Seal		VU, Ma	1	13/02/1996	No	The Southern Elephant Seal has a nearly circumpolar distribution and visits subantarctic islands to breed and to moult. There are two main populations found in Australian located on Heard and Macquarie Islands. Breeding habitat include sand or cobble stone beaches where it can easily come ashore. When on land, they stay on beaches close to the ocean. They feed in the Pacific, Atlantic, and Indian oceans and can dive up to 1,000 m deep, even reaching the sea floor in areas.	Marine species.
Mitotichthys mollisoni	Mollison's Pipefish		Ma	NA	NA	No	Endemic to temperate waters of Victoria and Tasmania. Known in Victorian waters from Western Port and Port Phillip Bay, and from southeastern Tasmania. Mollisons pipefish live amongst brown macroalgae on rocky reef at 7-45 m.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Mitotichthys semistriatus	Halfbanded Pipefish		Ma	NA	NA	No	Endemic to temperate southern Australian waters from Western Port, Victoria to South Australia, including south-eastern Tasmania. Often aggregate in small groups in shallow seagrass and eelgrass beds in less than 10 m, preferring tall seagrasses in very protected areas, usually just below the intertidal zone. In Port Phillip Bay, the species was found in shallow seagrass beds depths of less than a metre and were present in eelgrass year-round in Western Port, Victoria.	Marine species.
Motacilla flava	Yellow Wagtail		Ma, Mi	NA	NA	Low	Nonbreeding migratory species. Occurs in grassland habitat subject to inundation.	No suitable habitat.
Myiagra cyanoleuca	Satin Flycatcher		Ma, Mi	NA	NA	Low	In Victoria, the species is widespread in the south and east. Prefers tall wetter Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily vegetated gullies.	No suitable habitat.
Neophema chrysogaster	Orange-bellied Parrot	CR	CE, Ma	10	5/07/2000	Low	Non-breeding migratory species. Occurs in sheltered coastal habitats such as bays, lagoons, and estuaries, coastal shrubland and occasionally grassy areas near saltmarsh, sewage ponds and pasture.	Limited suitable habitat present.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Neophema chrysostoma	Blue-winged Parrot		VU, Ma	57	1/05/2010	Moderate	Occurs in range of habitats from coastal, sub-coastal, and inland areas, through to semi-arid zones. Throughout their range they favour grasslands and grassy woodlands and are found near wetlands both by the coast and in semi-arid zones. Can also be found in altered environments like airfields, golf courses, and paddocks	Some recent records from Bird data. Limited suitable habitat but may utilise the vegetation present for foraging.
Neophoca cinerea	Sea-lion	EN	EN, Ma	1	9/06/1998	No	Australian Sea-lions use a wide variety of habitats. Onshore habitats used include exposed islands and reefs, rocky terrain, sandy beaches and vegetated fore dunes and swales. They also use caves and deep cliff overhangs as haul-out sites or breeding habitat. Most colonies occur on islands, however several small colonies occur on the mainland in SA and WA.	Marine species.
Ninox strenua	Powerful Owl	VU		1	22/04/2018	Low	Prefers tall open continuous sclerophyll forest and woodlands with a dense understory but will also occur in more fragmented landscapes particularly if suitable adjacent habitat is present. Requires large, hollow-bearing eucalypts for breeding.	Limited records. No suitable habitat in study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Notiocampus ruber	Red Pipefish		Ma	NA	NA	No	Known from a few locations across southern Australia, ranging from New South Wales through to Western Australia, including Tasmania. Found in a variety of habitats, including filamentous and other red seaweeds and on reefs, amongst sponges in reef crevices, in seagrass beds, and shipwrecks.	Marine species.
Numenius madagascariensis	Eastern Curlew	CR	CE, Ma, Mi	714	19/06/2021	Moderate	Non-breeding migrant. Occurs in sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Also occurs in saltmarsh and on mudflats fringed by mangroves, and sometimes within the mangroves	Recent records. Some suitable habitat in the coastal areas around the study area. Relatively low HIM score of in the 30's
Numenius minutus	Little Curlew		Ma, Mi	NA	NA	Low	Migratory species which is widespread in northern Australia and scattered elsewhere. Occurs in wetlands and inundated grassy areas such as farmland and airfields.	No recent records in the study area. Limited suitable habitat.
Numenius phaeopus	Whimbrel	EN	Ma, Mi	365	17/04/2021	Moderate	Prefers intertidal mudflats of sheltered coasts but is also found in harbours, lagoons, estuaries, often with mangroves, but also open, unvegetated mudflats. Occasionally occurs on sandy or rocky beaches and sewage farms. Commonly found at Corner Inlet, Westernport and Port Phillip Bays.	Recent records. Some suitable habitat in the coastal areas around the study area. HIM scores in the 50's for some areas near Punchbowl Coastal Reserve.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Onychoprion fuscatus	Sooty Tern		Ma	NA	NA	Low	Sooty terns are generally found inland only after severe storms. Sooty terns breed in colonies on rocky or coral islands.	No recent records in the study area. Some suitable habitat in the coastal areas around the study area.
Orcinus orca	Killer Whale		Mi	NA	NA	No	Killer whales are found in all oceans of the world. Normally preferring depths of 20 to 60 m, killer whales also visit shallow waters along coastlines or dive to 300 m in search of food. Killer whales generally occupy the same home range year-round.	Marine species.
Oxyura australis	Blue-billed Duck	VU		26	20/03/2019	Low	Prefers deep permanent well vegetated freshwater swamps, large dams, lakes and open waters. Imporrtant breeding sites are primarily in south-west Victoria but also at a few sites in Port Phillip, north-east Victoria, Gippsland and north-west Victoria.	Some recent records. Limited suitable habitat.
Pachyptila turtur	Fairy Prion		Ma	NA	NA	Low	A marine species. Often beachcast on the south-eastern coast of Australia and are commonly seen offshore over the continental shelf and over pelagic waters. Found in temperate and subantarctic seas. It sometimes forages over continental shelves and the continental slope but can come close inshore in rough weather.	Some suitable habitat in the coastal areas around the study area.
Pandion haliaetus	Osprey		Ma, Mi	NA	NA	Low	Marine bird. The species is a rare vagrant in Victoria. It inhabits rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	Low-quality habitat present within the study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Pelagodroma marina	White-faced Storm-Petrel	EN	Ma	5	1/06/1980	Low	Marine, pelegic birds that fly close above the sea. Uncomon on inshore waters, except on breeding islands. Breeds in Australia on low granite islands covered by sandy loam, sandy limestone islands, steep rocky outcrops or low sand hummocks. Breeding habitat in Port Phillip Bay, VIC.	No Recent records. Some suitable habitat in the coastal areas around the study area.
Pelecanus conspicillatus	Australian Pelican		Ma	173	29/07/2021	Present	The Australian Pelican is found throughout Australia, Papua New Guinea and western Indonesia, with occasional reports in New Zealand and various western Pacific islands. Pelicans are widespread on freshwater, estuarine and marine wetlands and waterways including lakes, swamps, rivers, coastal islands, and shores.	Recent records. Suitable habitat. Known group that resides near the San Remo Jetty.
Perameles gunnii	Eastern Barred Bandicoot	EN	EN	25	24/08/2021	Low	Extinct in the wild. Has been reintroduced in areas along the Bass Coast, in Hamilton and Woodlands Historic Park in Greenvale.	Few recent records. Limited suitable habitat.
Petaurus australis australis	Yellow-bellied Glider (south-eastern)	VU	VU	NA	NA	No	Occurs in tall mature eucalypt forest in areas of high rainfall and nutrient-rich soils. Their forest type preferences change with latitude and elevation; mixed coastal forests to dry escaprments in northern part of range; moist coastal gullies and creek flats to tall mountain forests in southern part of range	No suitable habitat.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Pezoporus wallicus	Ground Parrot	EN		1	25/01/1804	Low	In south-central Victoria, it is found in Wilsons Promontory National Park. Further east, it occurs in Gippsland Lakes Coastal Park and, in the far east, in Croajingalong National Park. In Victoria, it inhabits closed coastal heathland and sedgeland. Heathlands are either dominated by graminoids or support a diversity of shrubs.	No recent records. Limited suitable habitat present.
Phoebetria fusca	Sooty Albatross	CR	VU, Ma, Mi	NA	NA	Low	Is marine and pelagic. During both the breeding and non-breeding seasons, the species occurs widely over pelagic waters, exploiting dispersed sources of food. The species breeds on subtropical and subantarctic islands in the Indian and Atlantic Oceans, on vegetated cliffs and steep slopes that are sheltered from prevailing winds, often amongst tussock grass	Some suitable habitat in the coastal areas around the study area.
Phycodurus eques	Leafy Seadragon		Ma	NA	NA	No	Living at depths of 5 to 15 m, *P. eques* resides in areas with clear water, lower light conditions, and prominent vegetation. Such areas include seagrass meadows, seaweed beds, and rocky reefs. Found only in southern Australian waters, from Wilson's Promontory in Victoria at the eastern end of its range, westward to Jurien Bay, 220 km north of Perth in Western Australia.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Phyllopteryx taeniolatus	Common Seadragon, Weedy Seadragon		Ma	NA	NA	No	Found in rocky reefs, seaweed beds, sea grass meadows, and kelp gardens. The water must be between 12 and 23 degrees Celsius, and 10-50 m deep, although they most often are found between 8 and 12 m deep. Endemic to the waters off of the southern coast of Australia. Found across southern Australia, from New South Wales through to the mid-coast of Western Australia, including Tasmania.	Marine species.
Platydoris galbana	Sea slug	EN		3	8/01/1990	No	This species was described from Phillip Island, Victoria, Australia. It has been reported from New South Wales.	Marine species.
Pluvialis fulva	Pacific Golden Plover	VU	Ma, Mi	170	7/12/2019	High	Non breeding migrant that prefers coastal habitats including, beaches, mudflats and sandflats, estuaries and saltworks. Occasionally occurs in mangroves, low saltmarsh such as Sarcocornia, or beds of seagrass.	Recent records. Some suitable habitat in the coastal areas around the study area.
Pluvialis squatarola	Grey Plover	VU	Ma, Mi	16	7/12/2019	Low	Non breeding migrant that prefers coastal habitats including, beaches, mudflats and sandflats, estuaries. Occasionally occurs on the muddy edges of terrestrial wetlands, saltworks and pasture grass.	Recent records. Some suitable habitat in the coastal areas around the study area.
Pomatostomus temporalis	Grey-crowned Babbler	VU		2	6/05/1905	Low	Prefers timbered waterways and nearby well-watered woodlands, especially in River Red Gums along the Murray and Murrumbidgee Rivers.	No recent records. Limited suitable habitat present.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Potorous tridactylus trisulcatus	Long-nosed Potoroo	VU	VU	7	2/05/2004	Low	In Victoria, the Long-nosed Potoroo (SE Mainland) occurs in six discrete regions (Seebeck 1981), including the South-western region, Grampians, Otways, Western Port, Wilsons Promontory and east Gippsland. Most commonly inhabits heath-woodland grading into heath dominated by *Eucalyptus obliqua* and *E. baxteri*, and sometimes *E. radiata.*	No suitable habitat.
Prototroctes maraena	Australian Grayling	EN	VU	NA	NA	No	Occurs in freshwater rivers and streams with moderate flow, gravel substrate and alternating pools and rifles. The species spends part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas.	No rivers/creeks within the study area.
Pseudomys novaehollandiae	New Holland Mouse	EN	VU	NA	NA	Low	Occurs in isolated sites within coastal plains east of Melbourne and Otway Plains near Anglesea (DSE, 2006). Occurs in heathlands, heathy woodlands, open forests and vegetated sand dunes (DSE, 2006).	Some suitable habitat.
Pseudophryne semimarmorata	Southern Toadlet	EN		2	29/05/1980	Low	Occurs in forests, woodlands, heaths and grasslands at lower elevations. Found under leaf litter, logs or rocks in damp areas and drainage lines but not necessarily near permanent water.	No recent records. Some suitable habitat along drainage lines.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Pterodroma leucoptera	Gould's Petrel		EN	1	26/12/1972	Low	Gould's Petrel is a pelagic marine species, spending much of its time foraging at sea and coming ashore only to breed. The Australian subspecies breeds and roosts on two islands off NSW, Cabbage Tree and Boondelbah Islands, and the at-sea distribution is poorly known, but probably occur in cooler tropical waters. They are rarely observed less than 10km from breeding island. Birds nest in rock crevices, under fallen palm Livistona australis fronds or in hollows in fallen palm trunks and buttresses of figs	Marine species.
Pterodroma mollis	Soft-plumaged Petrel		VU, Ma	NA	NA	Low	A marine, oceanic species, generally found over temperate and subantarctic waters in the South Atlantic, southern Indian and western South Pacific Oceans. Mainly subantarctic but occur over a wide range of sea surface-temperatures. Breed on Maatsuyker Island off southern Tasmania. The birds burrow among tussock grass and ferns on slopes and valleys.	Marine species.
Pteropus poliocephalus	Grey-headed Flying-fox	VU	VU	3	11/07/1966	Low	Wide ranging and highly mobile species that uses a range of habitats where flowering eucalyptus trees, fruit crops and urban gardens are present. Roosts are commonly in gullies, close to water with a dense canopy.	No suitable habitat.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Pugnaso curtirostris	Pugnose Pipefish, Pug-nosed Pipefish		Ma	NA	NA	No	Found across southern Australia, from south-western WA through to Bass Strait and northern Tasmania. Found in a variety of nearshore habitats, including shallow seagrass beds of various types (Zostera, Amphibolis, Posidonia), shallow reefs with short seaweed, and areas of rubble and sand. Most records are from shallow subtidal waters, to less than 15 m deep.	Marine species.
Pycnoptilus floccosus	Pilotbird	VU	VU	NA	NA	Low	Pilotbirds are endemic to south-east Australia. Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the Australian Capital Territory, and in the Snowy Mountains in New South Wales and north-east Victoria. Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne.	No recent records in the study area. No suitable habitat.
Recurvirostra novaehollandiae	Red-necked Avocet		Ma	NA	NA	Moderate	Occurs in a variety of wetland habitats but generally shallow ephemeral inland wetlands. May be Found in intertidal mudflats or shallow tidal water in sheltered or estuarine areas, but generally avoid sea-coast. Often occur in artificial wetlands, particularly salt-fields and sewage farms, which provide suitable habitat year-round.	Recent records on Phillip Island. Some suitable habitat in the coastal areas around the study area. Uses Western Port in late winter and spring.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Rhipidura rufifrons	Rufous Fantail		Ma, Mi	NA	NA	Low	Found in south and central Victoria in wet sclerophyll forests, subtropical and temperate rainforests. It sometimes inhabits drier sclerophyll forests and woodlands.	No suitable habitat.
Rhodope rousei	Marine opisthobranch	CR		1	01/01/1760	No	Intertidal waters and sand habitats	Marine species.
Rostratula australis	Australian Painted-snipe	CR	EN, Ma	NA	NA	Low	Occurs in shallow fresh or brackish wetlands with permanent or semi-permanent water, cover of adjacent grasses and muddy edges. Also occurs in waterlogged grassland, sewage ponds and dams.	No suitable habitat.
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	VU		1	24/04/2006	Low	Occurs in a variety of habitats. Forages above the canopy but can also forage in treeless areas. Requires tree hollows for roosting and nesting.	Limited records. Low-quality habitat for this species.
Seriolella brama	Blue Warehou	CD	NT	NA	NA	Low	Adults inhabit continental shelf and slope waters. They are schooling species, usually aggregating close to the seabed. Small juvenile warehou are pelagic. They inhabit offshore areas and are often associated with jellyfish (Scyphozoa). Older juvenile warehou move inshore and large numbers of them are often found in bays and inlets.	Marine species.
Solegnathus robustus	Robust Pipehorse, Robust Spiny Pipehorse		Ma	NA	NA	No	Most records come from prawn trawls, and the preferred habitat on the continental shelf is not documented. Apparently fairly common within its recorded depth range to date (42 m – 68 m). The full depth distribution is not known, because records are principally from trawl bycatch.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Solegnathus spinosissimus	Spiny Pipehorse, Australian Spiny Pipehorse		Ma	NA	NA	No	Off Caloundra, southern Queensland, to south of Cape Otway, Victoria, including around Tasmania. Inhabits muddy, silty, shelly and rubble substrates, and rocky reefs, and may be washed ashore during storms. In the southern part of their range, Spiny pipehorses are found in relatively shallow waters.	Marine species.
Spatula rhynchotis	Australasian Shoveler	VU		171	21/06/2021	Low	Found throughout much of Victoria. Prefers permanent, well-vegetated wetlands with abundant aquatic vegetation but will use most freshwater habitats.	No suitable habitat. Waterbodies within the study area do not support enough tall, dense vegetation.
Stagonopleura guttata	Diamond Firetail	VU	VU	NA	NA	Low	Found throughout south-eastern mainland Australia. Inhabits grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland.	1 record in the past 10 years on Phillip Island. Limited suitable habitat present.
Stercorarius antarcticus	Brown Skua		Ma	NA	NA	Low	Breeds in the subantarctic and Antarctic zones and moves further north when not breeding.	No recent records in the study area. Some suitable habitat in the coastal areas around the study area.
Sterna striata	White-fronted Tern		Ma	NA	NA	Moderate	Occurs in coastal seas and exposed rocky coasts, often with islands or stacks; sometimes roosts on sandy beaches of sheltered coasts.	1 record adjacent to the study area in Punchbowl Coast Reserve. Some suitable habitat in the coastal areas around the study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Sternula albifrons	Little Tern	CR	Ma, Mi	6	29/12/2019	Low	Prefers sheltered coastal environments, including on mudflats in bays, lagoons, inlets and estuaries, particularly those with exposed sandbanks and beaches.	Some suitable habitat in the coastal areas around the study area.
Sternula nereis	Fairy Tern	CR	VU	102	15/12/2020	Moderate	Occurs in coastal environments including intertidal mudflats, sand flats and beaches. Nests above high-water mark on sandy shell-grit beaches.	Recent records. Some suitable habitat in the coastal areas around the study area.
Sternula nereis nereis	Australian Fairy Tern		VU	NA	NA	Low	Mostly sheltered coasts, on mainland and inshore and offshore islands. In embayment's, such as harbours, inlets, bays, estuaries and lagoons; and on ocean beaches. Rarely out of sight of land. Also fresh or saline near-coastal terrestrial wetlands, including lakes and salt-ponds. Mostly associated with sandy beaches with spits and banks; also on shelly and, sometimes, coralline shores but rarely on muddy spots.	No recent records in the study area. Some suitable habitat in the coastal areas around the study area.
Stictonetta naevosa	Freckled Duck	EN		9	13/06/2019	Low	Prefers large freshwater inland wetlands, generally with dense vegetation. Occasionally recorded in coastal wetlands.	No suitable habitat.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Stigmatopora argus	Spotted Pipefish, Gulf Pipefish, Peacock Pipefish		Ma	NA	NA	No	Found in western and southern Australia, ranging from Shark Bay in WA through to central New South Wales coast, including Tasmania. Large numbers are often found in seagrass beds of various types, such as Posidonia, Amphibolis and Zostera, and mixed beds of any of these. Stigmatopora pipefishes show a strong preference for seagrass habitat from an early juvenile stage.	Marine species.
Stigmatopora nigra	Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish		Ma	NA	NA	No	An abundant species (or possibly a species complex) across the southern half of Australia, including Tasmania. Found in seagrasses. This species mimics strap-like seagrass leaves in its movements, orientation and colour (i.e. often shades of green and brown)	Marine species.
Stipecampus cristatus	Ringback Pipefish, Ring-backed Pipefish		Ma	NA	NA	No	This species is found mainly in Victoria, northern Tasmania and South Australia. Found mainly in sparse seagrass in sandy bays and estuaries, but may also occur in other habitats, such as rubble reef and shell beds with low seaweeds. Depth ranges from the shallow subtidal to at least 15 m deep, and ringback pipefish have been found in deeper waters in Bass Strait.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Synoicus chinensis	King Quail	EN		6	25/07/1987	Low	Patchy distribution, with many historical records likely escapees. Recent records occur on French Island, in the Portland area, Grampians and Gippsland Lakes. Prefers low dense vegetation of Wetland Heath EVC and coastal heath (Swamp Scrub) but can also occur in grasslands and Lucerne crops.	No recent Records. Limited suitable habitat present.
Thalassarche bulleri	Buller's Albatross	EN	VU, Ma, Mi	NA	NA	Low	The Pacific Albatross is a non-breeding visitor to Australian waters. Foraging birds are mostly limited to the Pacific Ocean and the Tasman Sea, although birds do reach the east coast of the Australian mainland. Occurrence within the Australian Fishing Zone is likely, however, the threat from longline injury is considered low.	Some suitable habitat in the coastal areas around the study area.
Thalassarche carteri	Indian Yellow-nosed Albatross	EN	VU, Ma, Mi	3	1/01/1981	Low	A marine bird. Forages mostly in the southern Indian Ocean, but records also occur off the coast of Victoria. Mostly inhabits subtropical and warmer subantarctic waters.	Some suitable habitat in the coastal areas around the study area.
Thalassarche cauta	Shy Albatross	EN	En, Ma, Mi	12	26/05/2019	Moderate	The Shy Albatross is the only albatross species endemic to Australia. The species has breeding colonies on three small islands off Tasmania: Albatross Island in western Bass Strait, the Mewstone and Pedra Branca nsouthern Tasmanian waters	Likely foraging habitat within study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Thalassarche chrysostoma	Grey-headed Albatross	EN	EN, Ma, Mi	3	1/06/1966	Low	The Grey-headed Albatross has a circum-global distribution in the southern hemisphere. The only place that the species breeds within Australian territory is on the southern and western slopes of Petrel Peak in the south-western corner of Macquarie Island.	No recent records. Some suitable habitat in the coastal areas around the study area.
Thalassarche impavida	Campbell Albatross		VU, Ma, Mi	NA	NA	Low	The Campbell Albatross is a marine sea bird inhabiting sub-Antarctic and subtropical waters from pelagic to shelf-break water habitats. In the Antarctic, it occurs through the belt of icebergs to the edge of the consolidated pack-ice. The Campbell Albatross breed on Campbell Island. They make their nests on tussock-covered ledges and terraces of cliffs, slopes and hills, overlooking the sea or valleys, and on the summits of rocky islets.	Some suitable habitat in the coastal areas around the study area.
Thalassarche melanophris	Black-browed Albatross		VU, Ma, Mi	9	26/04/1993	Low	A marine bird. The species is common in the non-breeding period at the continental shelf and shelf-break of Victoria. It can tolerate a broad range of sea-surface temperatures, from 0–24º C. It forages around the breaks of continental and island shelves and across nearby underwater banks.	No recent records. Some suitable habitat in the coastal areas around the study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Thalassarche salvini	Salvin's Albatross		VU, Ma, Mi	NA	NA	Low	Salvin's Albatross is a non-breeding visitor to Australian waters. Salvin's Albatross breeds on Bounty, Snares and Chatham Islands, south of New Zealand, as well as on Crozet Island in the Indian Ocean. The species forages over most of the southern Pacific Ocean, where it is particularly common in the Humboldt Current, off South America.	Some suitable habitat in the coastal areas around the study area.
Thalassarche steadi	White-capped Albatross		VU, Ma, Mi	NA	NA	Low	The White-capped Albatross is probably common off the coast of south-east Australia throughout the year. Whilst there has been no specific study, the species has been caught on longline hooks off Tasmania.	Some suitable habitat in the coastal areas around the study area.
Thalasseus bergii	Greater Crested Tern		Ma, Mi	NA	NA	High	Widespread along the coastlines. Often occurs in estuaries and near-coastal environments. Also occasionally occurs inland in rivers and lakes.	Recent records, suitable habitat in the coastal areas around the study area.
Thinornis cucullatus	Hooded Plover	VU	Vu, Ma	1263	14/08/2021	Present	Usually restricted to wide ocean beaches but have also been recorded near tidal bays and estuaries, rock platforms, rocky or sand-covered reefs, and small beaches in lines of cliffs. The species also uses near-coastal saline and freshwater lakes and lagoons.	Numerous recent records within the study area. Suitable habitat in the study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Thunnus maccoyii	Southern Bluefin Tuna	CD	NT	NA	NA	No	Generally inhabits the epipelagic region, but will occasionally come close to shore. Tolerate a wide temperature range (2 to 30°C), and can inhabit waters from 0 to 550 m deep. Some migration occurs as seasons change and water temperatures change, as they are mostly found in the waters between 18 to 20°C.	Marine species.
Tringa brevipes	Grey-tailed Tattler	CR	Ma, Mi	135	7/12/2019	Moderate	Prefers large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	Recent Records, Some suitable habitat in the coastal areas around the study area.
Tringa glareola	Wood Sandpiper	EN	Ma, Mi	NA	NA	Low	Scattered records near Corner Inlet. Prefers freshwater wetlands, reservoirs, lakes, sewerage ponds and floodplains with grass or aquatic plants protruding above the water, and often with trees and fallen timber. Rarely uses brackish wetlands and saltmarsh.	No suitable habitat.
Tringa incana	Wandering Tattler		Ma, Mi	NA	NA	Low	A vagrant in the East Asian-Australasian Flyway and is uncommon in Australia. Generally found on rocky coasts with reefs and platforms, points, spits, piers, offshore islands and shingle beaches or beds.	No suitable habitat.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Tringa nebularia	Common Greenshank	EN	Ma, Mi	187	17/04/2021	Moderate	Prefers sheltered coastal habitats with large mudflats and saltmarsh, mangroves or seagrass. Can occur inland, in estuaries and mudflats, mangrove swamps and lagoons, billabongs, swamps, sewage farms and flooded crops.	Some suitable habitat in the coastal areas around the study area.
Tringa stagnatilis	Marsh Sandpiper	EN	Ma, Mi	7	1/04/1997	Low	Prefers shallow freshwater and brackish wetlands, rivers, water meadows, sewage farms, drains, lagoons and swamps. Most records are found in Port Phillip Bay, but also in Gippsland	No suitable habitat.
Tursiops aduncus	Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin			NA	NA	No	Indo-Pacific bottlenosed dolphins tend to live in shallow water near the shore at depths of less than 300 m. They inhabit tropical to temperate, coastal waters. The habitat of some Indo-Pacific bottlenosed dolphins is estuarine but spatial distribution of dolphins varies depending on season and tidal state.	Marine species.
Tursiops australis	Burrunan Dolphin	CR		4	8/07/2016	No	The Burrunan dolphin is only found in Victoria, Tasmania and South Australia. In Victoria, Port Phillip Bay and the Gipplsand lakes hosts residents populations of Burrunan dolphins.	Marine species.
Tursiops truncatus	Bottlenose Dolphin			NA	NA	No	Bottlenosed dolphins are found everywhere except polar waters and are found in bays, estuaries, sounds, open shorelines and large, estuarine rivers. They typically occupies waters with surface temperatures between 10 and 32 degrees Celsius.	Marine species.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Urocampus carinirostris	Hairy Pipefish		Ma	NA	NA	No	Has an extremely wide distribution, ranging from tropical Australia and PNG, to as far south as Tasmania. Abundant in NSW and parts of Victoria. Found in the lower reaches of rivers, estuaries and protected inshore marine habitats, often in shallow Zostera eelgrass beds, rarely at depths of more than a few metres.	Marine species.
Vanacampus margaritifer	Mother-of-pearl Pipefish		Ma	NA	NA	No	Found across eastern and south-eastern Australia, excluding Tasmania, from southern Queensland through to SA, with a separate population in south-western WA. Recorded in estuarine areas and coastal lagoons, and in shallow bays. Mostly found amongst seagrass and seaweed over sand, rubble and mud, to depths of about 10 m. Occasionally found in floating seaweed.	Marine species.
Vanacampus phillipi	Port Phillip Pipefish		Ma	NA	NA	No	Mostly found in estuaries and in shallow sandy and muddy bays with seagrass, but also in shallow reefs with seaweed. Recorded depth range is from the shallows to about 25 m deep	Marine species.
Varanus varius	Lace Monitor	EN		1	1/01/1995	Low	Occur in well-timbered areas, from dry woodlands to cool temperate southern forests. Requires tree hollows for nesting.	Low quality foraging habitat within the study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Xenus cinereus	Terek Sandpiper	EN	Ma, Mi	9	8/07/2017	Moderate	Occurs on large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	Some suitable habitat in the coastal areas around the study area.

A3 Likelihood Assessment, Threatened Flora

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Amphibromus fluitans	River Swamp Wallaby-grass		VU	1	25/05/2011	Moderate	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. (Royal Botanic Gardens, 2020).	Potential habitat may occur in along drainage lines in wetlands protected from disturbance.
Amphibromus sinuatus	Wavy Swamp Wallaby-grass	EN		1	12/11/1996	Low	Permanent swamps in cool, sometimes elevated sites	No recent records within the study area.
Asplenium obtusatum subsp. northlandicum	Shore Spleenwort	EN		3	1/10/1980	Moderate	Usually grows among coastal rocks within reach of salt spray, but also sheltered in coastal scrub. Mostly on granite (e.g. Phillip Is., islands near Wilsons Promontory, Rame Head and Gabo Is. in the far east), but also on basalt at Lady Julia Percy Is. in the far west.	Potential habitat along coastline amongst coastal rocks and scrub.
Atriplex paludosa subsp. paludosa	Marsh Saltbush	EN		21	28/06/2019	High	Found on the fringes of coastal salt marsh, west from Wilsons Promontory. Locally common.	Potential habitat along coastal margin, particularly Punchbowl Coastal Reserve
Austrostipa rudis subsp. australis	Veined Spear-grass	EN		1	14/05/2008	Low	Uncommon, mostly in cool areas of southern Victoria. Usually at moderate altitude, in open-forest on sandy or sandstone-derived soils.	No recent records within the study area. Limited suitable habitat within the study area.
Avicennia marina subsp. Australasica	Grey Mangrove	EN		10	21/06/1996	High	Tidal mudflats (bays, estuaries and creek-mouths) (Royal Botanic Gardens, 2020).	Potential habitat along coastline of Western Port bay.
Caladenia insularis	French Island Spider-orchid	EN	VU	NA	NA	Low	Known from three sites on french island, in dense heath and heathy woodland on well-drained soils	No recent records within the study area. Mostly found on French Island.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Caladenia tessellata	Thick-lip Spider-orchid		VU	NA	NA	Low	In Victoria, the orchid grows in heathland, heathy or grassy woodland, and grassy or sedgy open forests in well drained sand and clay loams	Some suitable habitat within the study area.
Caladenia vulgaris	Slender Pink-fingers	VU		4	2/11/2007	Low	Can be locally common in heathland and coastal scrub on moisture-retentive sandy soils.	High-quality scrub or woodland habitats unlikely to occur in the study area.
Enneapogon gracilis	Slender Bottle-washers	VU		1	9/03/2012	Low	Confined in Victoria to dry, sandy soils in the vicinity of the upper reaches of the Snowy River and its tributaries	Outside natural range, record may be incorrect.
Eucalyptus globulus subsp. globulus	Southern Blue-gum	EN		4	14/01/2000	Low	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.	No recent records within the study area. Study area likely outside natural range.
Eucalyptus kitsoniana	Bog Gum	CR		1	10/11/2001	Low	Victorian endemic. Occurring on coastal lowlands from Yarram west to Cape Otway, and Mt Richmond near Portland. It also occurs on top of Mt Oberon (Wilsons Promontory) and on nearby Snake Is. An inland collection from near Woohlpooer (west of the Grampians) requires verification. .	No recent records within the study area. Limited suitable habitat within the study area.
Exocarpos syrticola	Coast Ballart	EN		3	17/09/2015	Moderate	Cosatal dunes and cliffs, west of Wilsons Promontory	No recent records within the study area. Potential habitat along coastline.
Geranium sp. 3	Pale-flower Crane's-bill	EN		1	17/11/1999	Low	Open grassy areas of dry woodlands and forests	No recent records within the study area.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Glycine latrobeana	Clover Glycine	VU	VU	NA	NA	Low	Clover Glycine is found across south-eastern Australia in native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer	Some suitable habitat within the study area.
Heterozostera nigricaulis	Australian Grass-wrack	EN		2	14/02/2008	Moderate	Forms large meadows in shallow coastal water	No recent records within the study area. Potential habitat along coastline of Western Port bay.
Heterozostera tasmanica	Tasman Grass-wrack	EN		1	1/10/1980	Moderate	Locally common in shallow coastal waters	No recent records within the study area. Potential habitat along coastline of Western Port bay.
Juncus revolutus	Creeping Rush	EN		4	30/10/2006	Moderate	Found in damp saline or subsaline communities near the coast	No recent records within the study area. Potential habitat along coastline of Western Port bay.
Lepidium aschersonii	Spiny Peppercress	EN	VU	NA	NA	Low	Mostly on heavy clay soil near salt lakes on volcanic plain, but with outlying records from near Lake Omeo (in 1940 &1981) and the Grampians (in 1893). It occurs around swamps and saltmarshes on heavy soils which are regularly waterlogged or flooded.	No records in the local vicinity. Suitable habitat unlikely to occur within study area.
Leptecophylla oxycedrus	Crimson Berry	CR		7	25/03/2006	Moderate	In Victoria it is restricted to coastal granitic areas of Wilsons Promontory, Corner Inlet and Cape Woolamai (Phillip Is.), where it occurs in coastal shrubland or open-forest.	Potential habitat along coastline, particularly southern sections.
Limonium australe var. australe	Yellow Sea-lavender	EN		4	11/01/2000	Low	Mangrove and saltmarsh communities	Potential habitat along coastline of Western Port bay.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Melaleuca armillaris subsp. armillaris	Giant Honey-myrtle	EN		3	22/05/2020	Moderate	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.	Few recent records. Outside natural range, likely to be present as planted vegetation.
Monotoca glauca	Currant-wood	EN		8	14/02/2008	Low	Open forest, heathy woodland, wet closed scrub and the margins of cool-temperate rainforest	No recent records within the study area.
Olearia sp. 2	Peninsula Daisy-bush	EN		4	1/01/2010	Moderate	Coastal dunes and cliffs near Moonlight Head, Point Franklin, Cape Schanck, St Andrews Beach, Portsea, and Phillip Island.	No recent records within the study area. Potential habitat along coastline.
Oxalis rubens	Dune Wood-sorrel	EN		11	28/12/2009	High	Coastal dunes and scrub, growing on stabilised sand-dunes, in Banksia integrifolia woodland, and beaches among Spinifex sericeus.	Potential habitat along coastline.
Poa poiformis var. ramifer	Dune Poa	EN		4	1/01/2010	Moderate	Known from scattered areas along the coast	Potential habitat along coastline.
Prasophyllum spicatum	Dense Leek-orchid	CR	VU	3	23/09/1991	Low	Coastal heathland and near-coastal heathy forest on sandy soils	No recent records within the study area.
Pterostylis chlorogramma	Green-striped Greenhood	EN	VU	1	9/07/2018	Low	Moist areas of heathy shrubby forest on well-drained soils.	Few recent records.
Pterostylis cucullata	Leafy Greenhood	EN	VU	NA	NA	Low	In Victoria both the coastal and montane forms of the Leafy Greenhood still occur and these are separated according to geographic area and locality. mostly occurring in small groups in coastal areas, sometimes near inland watercourses.	Suitable habitat unlikely to occur within study area.
Salsola tragus subsp. pontica	Coast Saltwort	EN		2	25/03/2006	Moderate	Near-coastal sites on port phillip bay and westernport	Potential habitat along coastline of Western Port bay.

Scientific name	Common name	FFG	EPBC	Number of records	Last record	Likelihood of occurrence	Habitat	Rationale
Senecio campylocarpus	Floodplain Fireweed	EN		1	25/05/2011	Low	In Victoria mostly throughout central Victoria and in the north-east in loam to clay soils in forest and woodland, usually in seasonally inundated areas.	No recent records within the study area. Suitable habitat unlikely to occur within study area.
Senecio psilocarpus	Swamp Fireweed		VU	NA	NA	Low	Restricted to several sites in herb-rich winter-wet swamps throughout the south of the state, to the west of Sale. Grows on volcanic clays and peaty soils	No recent records within the study area. Suitable habitat unlikely to occur within study area.
Thelymitra X merraniae	Merran's Sun-orchid	CR		1	1/10/2007	Low	Heathlands and heathy woodlands	No recent records within the study area. Suitable habitat unlikely to occur within study area.
Wurmbea uniflora	One-flower Early Nancy	VU		3	2/11/2007	Low	Moist heathy lowland sites	No recent records within the study area. Suitable habitat unlikely to occur within study area.
Xerochrysum palustre	Swamp Everlasting	CR	VU	NA	NA	Low	Grows in wetlands including sedge-swamps and shallow freshwater marshes, often on heavy black clay soils. The species will also grow in more marginal wetland habitats such as seasonally wet areas of native grassland and heath communities.	No recent records within the study area. Suitable habitat unlikely to occur within study area.

Appendix B Significant Weeds List

Scientific Name	Common Name	Noxious (CaLP Act 1994)	Risk Ranking (White 2022)	WONS
Acetosella vulgaris	Sheep Sorrel		Moderately High Risk	
Agapanthus praecox subsp. *orientalis*	Agapanthus		Very High Risk	
Agrostis capillaris	Brown-top Bent		High Risk	
Aira caryophyllea subsp. *caryophyllea*	Silvery Hair-grass		Moderately High Risk	
Aira spp.	Hair Grass		Moderately High Risk	
Allium triquetrum	Angled Onion	YES	High Risk	
Anthoxanthum odoratum	Sweet Vernal-grass		High Risk	
Asparagus asparagoides	Bridal Creeper	YES	High Risk	YES
Asparagus scandens	Asparagus Fern	YES	Very High Risk	YES
Briza maxima	Large Quaking-grass		Moderately High Risk	
Briza minor	Lesser Quaking-grass		Moderately High Risk	
Bromus catharticus	Prairie Grass		High Risk	
Calamagrostis arenaria	Marram Grass		Moderately High Risk	
Callitriche stagnalis	Common Water-starwort		Moderately High Risk	
Capsella bursa-pastoris	Shepherd's Purse		Moderately High Risk	
Carduus pycnocephalus	Slender Thistle	YES	Moderately High Risk	
Cenchrus clandestinus	Kikuyu		Very High Risk	
Centaurium tenuiflorum	Slender Centaury		Moderately High Risk	
Cirsium vulgare	Spear Thistle	YES	Moderately High Risk	
Coprosma repens	Mirror Bush		Very High Risk	
Cortaderia selloana	Pampas Grass		High Risk	
Cynodon dactylon var. *dactylon*	Couch		Moderately High Risk	
Cynosurus echinatus	Rough Dog's-tail		High Risk	
Cytisus scoparius	English Broom	YES	High Risk	YES
Dactylis glomerata	Cocksfoot		High Risk	

Scientific Name	Common Name	Noxious (CaLP Act 1994)	Risk Ranking (White 2022)	WONS
Delairea odorata	Cape Ivy		Very High Risk	
Ehrharta erecta	Panic Veldt-grass		Very High Risk	
Erigeron spp.	Fleabane		High Risk	
Euphorbia paralias	Sea Spurge		High Risk	
Euphorbia peplus	Petty Spurge		Moderately High Risk	
Galium aparine	Cleavers		High Risk	
Gaudinia fragilis	Fragile Oat		High Risk	
Gazania linearis	Gazania		Very High Risk	
Genista monspessulana	Montpellier Broom	YES	Very High Risk	YES
Helminthotheca echioides	Ox-tongue		High Risk	
Hesperocyparis macrocarpa	Monterey Cypress		Moderately High Risk	
Holcus lanatus	Yorkshire Fog		High Risk	
Hordeum leporinum	Barley Grass		High Risk	
Hypochaeris glabra	Smooth Cat's-ear		Moderately High Risk	
Hypochaeris radicata	Flatweed		Moderately High Risk	
Lycium ferocissimum	African Box-thorn	YES	High Risk	YES
Lysimachia arvensis var. *arvensis*	Scarlet Pimpernel		Moderately High Risk	
Lysimachia arvensis var. *caerulea*	Blue Pimpernel		Moderately High Risk	
Malva parviflora	Small-flower Mallow		High Risk	
Oxalis pes-caprae	Sour Grass	YES	Very High Risk	
Oxalis sp.			Potentially Very High Risk	
Paspalum distichum	Water Couch		Very High Risk	
Periwinkle	Vinca major		High Risk	
Phalaris aquatica	Toowoomba Canary-grass		High Risk	
Pinus radiata	Radiata Pine		Very High Risk	
Pinus spp.	Pine		Very High Risk	
Pittosporum undulatum	Sweet Pittosporum		Very High Risk	

Scientific Name	Common Name	Noxious (CaLP Act 1994)	Risk Ranking (White 2022)	WONS
Plantago coronopus	Buck's-horn Plantain		High Risk	
Ranunculus muricatus	Sharp Buttercup		Moderately High Risk	
Rhagodia sp.			Very High Risk	
Rosa rubiginosa	Sweet Briar	YES	High Risk	
Rubus fruticosus spp. *agg.*	Blackberry	YES	High Risk	YES
Rumex conglomeratus	Clustered Dock		High Risk	
Rumex crispus	Curled Dock		High Risk	
Sonchus asper s.l.	Rough Sow-thistle		Moderately High Risk	
Sonchus oleraceus	Common Sow-thistle		Moderately High Risk	
Sporobolus africanus	Rat-tail Grass		High Risk	
Sporobolus anglicus	Common Cord-grass		High Risk	
Thinopyrum junceiforme	Sea Wheat-grass		Very High Risk	
Trifolium dubium	Suckling Clover		Moderately High Risk	
Trifolium glomeratum	Cluster Clover		Moderately High Risk	
Trifolium repens var. *repens*	White Clover		High Risk	
Trifolium spp.	Clover		High Risk	
Trifolium striatum	Knotted Clover		High Risk	
Trifolium subterraneum	Subterranean Clover		High Risk	
Verbascum sp.	Blanket Weed	YES	Medium Risk	
Vulpia bromoides	Squirrel-tail Fescue		Moderately High Risk	
Vulpia muralis	Wall Fescue		High Risk	
Vulpia spp.			Potentially High Risk	

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au


SYSTEM CERTIFICATION
ISO 9001
SGS
SYSTEM CERTIFICATION
ISO 14001
SGS
SYSTEM CERTIFICATION
AS 4801
SGS