

# Biodiversity Assessment Report: South East Outfall Pipeline: Jetty Road to Rosebud Avenue, Rosebud



**Prepared for Melbourne Water**

**By Daniel Young and Matt Hatton**

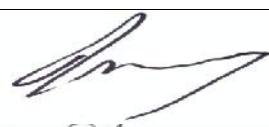
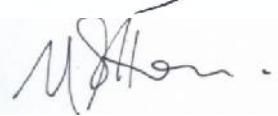
**Report 14072, Version 1.0  
August 2016**

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## Version Control

Version	Responsibility	Name	Date	Signature
1.0	Author	Daniel Young	08 August 2016	
1.0	Reviewer	Matt Hatton	09 August 2016	

# 1 Summary

This Biodiversity Assessment Report provides the results of a review of pre-existing data and a brief assessment of native vegetation and wildlife habitat present within the South East Outfall Pipeline easement, Jetty Road to Rosebud Avenue, Rosebud. The purpose of the report is twofold:

- 1) To inform Melbourne Water of the current extent, type and condition of remnant vegetation throughout the easement in order to assist with the custodial obligations associated with the ongoing management of the vegetation; and,
- 2) To document the ecological features of the site to assist with the proposed rezoning of the study area.

Vegetation and habitat types across the study area are described and the conservation significance of species and vegetation types either present or likely to occur, are briefly discussed.

The study area is divided into four discrete sites based on the surrounding road network. The vegetation across the four distinct sites which make up the study area is dominated by large areas of regularly slashed primarily exotic grass species with patches of modified remnant vegetation dominated by Coast Tea-tree *#Leptospermum laevigatum* and Coast Wattle *Acacia longifolia* subsp. *sophorae*. The primary species of indigenous canopy tree is Coast Manna-gum *Eucalyptus viminalis* subsp. *pryoriana*, which is predominantly restricted to the perimeter of the study area. A total of 130 species of vascular plants were recorded within the study area, of which 45 were indigenous, 8 non-indigenous and 44 exotic. Six introduced species are listed under the Catchment and Land Protection (CaLP) Act 1994.

Remnant vegetation is mostly associated with Murray Anderson Creek which runs through the study area in a north-south direction. Several small patches defined primarily by canopy trees occur around the study area boundaries and Site two also contains a high number of orchid species growing beneath Coast Tea-tree.

No regional, state or nationally listed flora communities were recorded on site. Furthermore, none of the state and / or nationally listed flora or fauna species recorded as occurring within a 5km radius of the site, are considered likely to occur within the site due to its highly modified nature.

## 2 Introduction

Abzeco Pty Ltd was commissioned by Melbourne Water to undertake a Biodiversity Assessment of land associated with the South East Outfall Pipeline, Jetty Road to Rosebud Avenue, Rosebud.

This report provides the results of a pre-existing data search and an assessment of native vegetation currently within the study area. It describes the type, condition and vegetation across the study area and the conservation significance of flora species and fauna habitats present. The purpose of the report is to provide Melbourne Water with an update of the current ecological assets supported within the easement and to assist with the custodial management obligations required for the land.

This report is intended to provide an assessment of potential development implications in accordance with the Biodiversity Assessment Guidelines (DEPI 2013), which is the key document that informs biodiversity regulation under all Victorian Planning Schemes.

The report also provides information on implications of the *Catchment and Land Protection Act 1994*, the Mornington Peninsula Shire Planning Scheme and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

### 2.1 Study Area

The study area covers a total of 5.6 hectares, running from Jetty Road in the west to Rosebud Avenue in the east and is divided into four distinct sites (Figure 1A & B). Site 1 is the westernmost site and is approximately 0.33 hectares in size. The site is located to the east of Jetty Road and north of Cook Avenue, extending westward to an intersection with a north – south easement which appears to be set aside for the unbuilt continuation of Flinders Avenue. Site 2 is approximately 0.4 hectares and is located east of site one, extending further east to Bass Avenue. Site 3 continues from Bass Avenue eastward and covers approximately 0.65 hectares. Site 3 extends for approximately two-thirds of the distance from Bass Avenue to Bayview Road. The largest of the four areas is Site 4 which is approximately 4.3 ha in size and extends from Bayview Road through to Rosebud Avenue in the east. Site 4 is dissected by Murray Anderson Creek running in a north – south direction through the approximate centre of the site with the portion to the east of the creek making up ‘Herman Creek Reserve’.

The study area falls within the Mornington Peninsula Shire and the Gippsland Plain bioregion. The study area lies within the Port Phillip and Westernport Catchment Management Region.

#### *Previous Land Use, Disturbance History and Current Site Condition*

The majority of the study site currently supports mown grassed areas along with areas of indigenous and non-indigenous native vegetation, primarily restricted to the perimeters of the site. Much of this vegetation is regrowth of colonising species and as such is not considered representative of the historical vegetation that would once have occurred on the site. A pipeline easement was installed through the site using the open cut method in 1974 and most of the vegetation on site has regrown since this significant disturbance event. Several scattered remnant trees are present on the site along with small patches of remnant vegetation in poor to moderate condition.

The large grassed area at the eastern end of the site is known as Herman Street Reserve and has been previously utilised by a pony club. The existing tin shed in this approximate area has also once served as a scout hall.

## 2.2 Land use and condition of surrounding area

Surrounding lands were inspected from within the study area, from neighbouring roads and aerial photography. The study site occurs between areas of high-density residential development that support a limited amount of remnant vegetation in modified condition. Maintained, cultivated gardens with exotic vegetation are dominant across the local area, particularly to the north and south of Sites 3 and 4 where the neighbouring properties share a common boundary.

Several areas of extensive native vegetation surround the study sites, the largest of which is Rosebud Bushland Reserve to the west of Site 4. This reserve is associated with Rosebud Park public golf course which backs on to the extensive Arthurs Seat State Park. A narrow strip of linear vegetation extends to the north and south associated with Murray Anderson Creek and another wider strip of vegetation runs south along Bayview Road and then Old Cape Schanck Road connecting with Old Cape Schanck Bushland Reserve and the associated Betty Clift Bushland Reserve. The vegetation within these two strips is characterised by a predominantly continuous cover of indigenous canopy species over an understory of native and exotic shrubs, grasses and herbs.

**Figure 1A. Assessed Vegetation at Site 1, 2, & 3, Jetty Road, Rosebud**



#### Legend

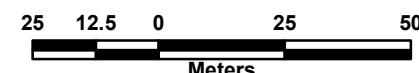
##### Remnant Vegetation

- HZ 1 - Gully Woodland
- HZ 2 - Damp Sands Herb-rich Woodland
- HZ 3 - Damp Sands Herb-rich Woodland
- HZ 4 - Damp Sands Herb-rich Woodland

Note: location of property boundaries, watercourse and topography indicative only

##### Other Vegetation

- Modified remnant
- Remnant Scattered Trees



Study Site

Roads

Cadastre



Survey Date: 19 July 2016

Created by : Kathy Himbeck

Scale 1:1,500 (A4)  
GDA 1994 MGA Zone 55

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**ABZECO**  
Applied Botany, Zoology & Ecological Consulting

**Figure 1B. Assessed Vegetation at Site 4, Jetty Road, Rosebud**



#### Legend

##### Remnant Vegetation

- HZ 1 - Gully Woodland
- HZ 2 - Damp Sands Herb-rich Woodland
- HZ 3 - Damp Sands Herb-rich Woodland
- HZ 4 - Damp Sands Herb-rich Woodland

Note: location of property boundaries, watercourse and topography indicative only

##### Other Vegetation

- Modified Remnant
- Remnant Scattered Trees

30 15 0 30 60  
Meters

Study Site

Creekline

Roads

Cadastre

Scale 1:2,000 (A4)  
GDA 1994 MGA Zone 55



Survey Date: 19 July 2016

Created by : Kathy Himbeck

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### 3 Legislation, regulations and the Mornington Peninsula Planning Scheme

The key biodiversity protection legislation and regulations potentially affecting any proposed works in the study area are the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the *Catchment and Land Protection Act 1994* (CaLP Act), *Planning and Environment Act 1987*, the Mornington Peninsula Planning Scheme and the Victorian Native Vegetation Permitted Clearing Regulations.

#### 3.1 Environment Protection & Biodiversity Conservation Act (1999)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the primary Commonwealth legislation for environment protection. Under the EPBC Act, an action will require approval from the Commonwealth Environment Minister if it has, will have, or is likely to have a significant impact on a matter of 'National environmental significance' and it is not subject to certain specified exceptions.

Matters of National environmental significance trigger the Commonwealth's environmental assessment and approval responsibilities. These matters are: World Heritage properties, Ramsar wetlands of international importance, nationally listed threatened species and ecological communities, migratory species protected under international agreements, the Commonwealth marine environment and nuclear actions.

If a project might impact on a matter of National environmental significance, a 'Referral' to the Commonwealth Minister for the Environment, Heritage and the Arts is required. If the Minister considers it likely that a proposed action will impact on a matter of National environmental significance, the action is considered 'controlled' and requires a detailed assessment and the grant of a permit to proceed.

#### 3.2 Flora and Fauna Guarantee Act (1988)

The *Flora and Fauna Guarantee Act 1988* is the primary State legislation for the protection of native plants, animals and ecological communities on public land and water in Victoria. Species and ecological communities can be listed as threatened under the Act based on determination by an independent Scientific Advisory Committee. Threatening processes may also be listed.

##### *Flora and Fauna listings under the FFG Act*

Vegetation communities, plants, animals and other taxa may be listed under the FFG Act if they are known to be in decline or under the threat of extinction. Listing is intended to protect threatened taxa or communities from further threats to their survival on public land in Victoria. Threatened taxa are listed under Schedule 2 of the Act. Whilst not immediately threatened, a number of species, genera and families of plants are listed under Section 46 of the Act to protect them from unauthorised clearing, harvesting and collection on public land. A permit is required to clear any listed plant or protected flora on public land (including Crown lease land), or to conduct works on public land where there may be impacts on listed fauna species.

### 3.3 Catchment and Land Protection Act (1994)

The *Catchment and Land Protection Act 1994* (the CaLP Act) seeks to protect Victorian land and water resources from degrading processes.

Under the Act, Landowners are required to conserve soil, protect water resources, eradicate ‘Controlled’ and ‘Prohibited’ weeds, eradicate pest animals and avoid actions that may result in land degradation on neighbouring properties. In certain instances, landowners may be served with a Land Management Notice that may prohibit or regulate land use, or specify management actions required to be undertaken on their property.

### 3.4 Native Vegetation Permitted Clearing Regulations

In Victoria, a permit is required to remove, destroy or lop native vegetation. Regulation of planning proposals for which impacts to native vegetation are a possibility is governed by the Victorian Native Vegetation Permitted Clearing Regulations.

In accordance with these regulations, the *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines* (DEPI 2013) seek to ensure permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria’s biodiversity. Assessment of the ‘Risk-based Pathway’ and, where appropriate, a Vegetation Quality Assessment is integral to achieving no net loss. The ‘Habitat Hectare Assessment’ method has been developed to accompany the Biodiversity Assessment Guidelines;

**No net loss** – An outcome where a particular gain in the contribution to Victoria’s biodiversity is equivalent to an associated loss in the contribution to Victoria’s biodiversity from permitted clearing.

**Habitat hectare assessment** – A site-based measure of the condition of native vegetation with reference to the benchmark for the same type of native vegetation. The assessment generates a condition score of between 0 and 1.

Strategic planning plays a primary role in avoiding and minimising the impacts of uses and developments on native vegetation that makes a significant contribution to biodiversity. In Victoria the key strategies for ensuring the objective for permitted clearing of native vegetation is achieved at the permit level are:

- Avoid the removal of native vegetation that makes a significant contribution to Victoria’s biodiversity,
- Minimise impacts on Victoria’s biodiversity from the removal of native vegetation,
- Where native vegetation is permitted to be removed, ensure that an offset is provided in a manner that makes a contribution to Victoria’s biodiversity that is equivalent to the contribution made by the native vegetation to be removed.

Before issuing a planning permit, Responsible Authorities are obligated to refer to Clause 12.01 (Biodiversity) in the Planning Scheme. This refers in turn to the following document and online tool, both incorporated into the Victoria Planning Provisions and all planning schemes in Victoria:

- The Native Vegetation Information Management (NVIM) system (DEPI 2014); and
- Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI 2013a).

### ***Class of Application***

An application to remove, destroy or lop native vegetation must be classified as one of the following risk-based pathways: low, moderate or high, as defined in the *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (DEPI 2013). The application requirements and decision guidelines included in this clause must be applied in accordance with the classified pathway.

No vegetation is proposed to be removed at this stage of the investigation, however should vegetation removal be considered in the future, any proposed losses and offsets would need to be calculated in accordance with the 'Guidelines' (DEPI 2013).

### ***General Application Requirements***

All applications to remove, destroy or lop native vegetation must comply with the General application requirements including:

- The location of the native vegetation to be removed.
- A description of the native vegetation to be removed, including the area of the patch of native vegetation and/or the number of any scattered trees to be removed.
- Maps or plans containing information set out in the Permitted clearing of native vegetation – Biodiversity assessment guidelines, (DEPI 2013).
- Recent dated photographs of the native vegetation to be removed. Topographic information, highlighting ridges, crests and hilltops, streams and waterways, slopes of more than 20 percent, drainage lines, low lying areas, saline discharge areas, and areas of existing erosion.
- A copy of any property vegetation plan that applies to the site. Where the removal, destruction or lopping of vegetation is to create defendable space, a statement explaining why removal, destruction or lopping of native vegetation is required having regard to other available bushfire risk mitigation measures. This does not apply to the creation of defendable space in conjunction with an application under the Bushfire Management Overlay.
- Details of any other native vegetation that was permitted to be removed on the same property with the same ownership in the five year period before the application for a permit to remove native vegetation is lodged.
- The strategic biodiversity score of the native vegetation to be removed.
- The offset requirement if the native vegetation is permitted to be removed.
- An assessment of whether the proposed removal of native vegetation will have a significant impact on Victoria's biodiversity, with specific regard to the proportional impact on habitat for any rare or threatened species;

An offset strategy that details how a compliant offset will be secured to offset the biodiversity impacts of the removal of native vegetation.

### ***Native Vegetation Information Management system (NVIM)***

The online Native Vegetation Information Management system (NVIM) is an interactive mapping tool, incorporated in the planning scheme, which provides some of the information required to accompany a permit to remove native vegetation. It does not replace the application

process. The information provided by NVIM can include the following (described in more detail below):

- The location risk of the native vegetation;
- The condition of the native vegetation – used for the low-risk assessment pathway only;
- The strategic biodiversity score of the native vegetation proposed to be removed; and
- The native vegetation offset requirement – used for the low risk assessment pathway only;
- For applications in the moderate or high risk pathways data are sent to DEPI for analysis and reporting of offset requirements.

### 3.5 Mornington Peninsula Planning Scheme

According to online mapping<sup>1</sup>, the study site and surrounding lands are zoned Public Use Zone 1 (PUZ1). The site is also affected by several planning overlays including: Bushfire Management Overlay (BMO), Design and Development Overlay - Schedule 1 (DDO1), Vegetation Protection Overlay - Schedule 1 (VPO1) and an Environment Significance Overlay - Schedule 1 (ESO1). Due to the linear nature of the study area different sites are covered by differing planning overlays. A breakdown of overlays applicable to each site is provided below:

- Site 1-181-183 Jetty Road is subject to a Design and Development Overlay - Schedule 1 (DDO1), a Vegetation Protection Overlay - Schedule 1 (VPO1) and a Bushfire Management Overlay.
- Site 2-14 Cook Avenue is subject to a Design and Development Overlay - Schedule 1 (DDO1), a Vegetation Protection Overlay - Schedule 1 (VPO1) and a Bushfire Management Overlay.
- Site 3-318 Bayview Road is subject to a Design and Development Overlay - Schedule 1 (DDO1), a Vegetation Protection Overlay - Schedule 1 (VPO1) and a Bushfire Management Overlay.
- Site 4-15 Herman Street is subject to a Design and Development Overlay - Schedule 1 (DDO1), a Vegetation Protection Overlay - Schedule 1 (VPO1), an Environmental Significance Overlay - Schedule 1 (ESO1) and a Bushfire Management Overlay.

Zoning and overlays relating to ecological matters and their relevant objectives for the purposes of this report are outlined below.

#### *Public Use Zone (PUZ)*

##### **Purpose:**

- To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
- To recognise public land use for public utility and community services and facilities.
- To provide for associated uses that are consistent with the intent of the public land reservation or purpose.

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<sup>1</sup> <http://www.dse.vic.gov.au/planningschemes/nillumbik/map.html>

### ***Bushfire Management Overlay (BMO)***

#### **Purpose:**

- To ensure that the development of land prioritises the protection of human life and strengthens community resilience to bushfire.
- To identify areas where the bushfire hazard warrants bushfire protection measures to be implemented.
- To ensure development is only permitted where the risk to life and property from bushfire can be reduced to an acceptable level.

### ***Design and Development Overlay (DDO)***

#### **Purpose:**

- To identify areas which are affected by specific requirements relating to the design and built form of new development.

#### **Decision guidelines**

- Whether the bulk, location and appearance of any proposed buildings and works will be in keeping with the character and appearance of adjacent buildings, the streetscape or the area.
- Whether the design, form, layout, proportion and scale of any proposed buildings and works is compatible with the period, style, form, proportion, and scale of any identified heritage places surrounding the site.
- Whether any proposed landscaping or removal of vegetation will be in keeping with the character and appearance of adjacent buildings, the streetscape or the area.
- The layout and appearance of areas set aside for car parking, access and egress, loading and unloading and the location of any proposed off street car parking.

### ***Schedule 1 to the Design and Development Overlay (DDO1)***

#### **Coast and landscape design**

The following design objectives include but are not limited to the following:

- To ensure that the design of subdivision and housing is responsive to the environment, landform, site conditions and character of coastal villages, hillsides and clifftop areas.
- To avoid higher densities of development in areas subject to instability, erosion or potential fire hazard and to minimise the extent of required earthworks.
- To ensure that development densities are compatible with the environmental and infrastructure capacities of the area, including the capacity of local streets, drainage systems and sewerage systems. Where reticulated sewerage is not available, particular consideration must be given to the ability to contain all waste water onsite and the impact of development on ground water conditions. Particular attention must be given to the impact of development on streamlines, water ways and wetlands and to avoiding the development of land susceptible to stream erosion or flooding.
- To recognise areas where substantial vegetation cover is a dominant visual and environmental feature of the local area by ensuring site areas are large enough to

accommodate development while retaining natural or established vegetation cover and to provide substantial areas for new landscaping and open space.

- To ensure that new development has proper regard for the established streetscape and development pattern in terms of building height, scale and siting.
- To protect shared viewlines where reasonable and practical.
- To ensure that buildings are designed and sited to avoid being visually obtrusive, particularly in terms of creating a silhouette above a skyline or existing tree canopy line when viewed from surrounding streets and properties.
- To ensure that subdivision and development proposals have proper regard to heritage values and coastal landscapes, including those of areas such as the Portsea Clifftop area, the Sorrento Heritage Precinct and the Ranelagh Estate in Mount Eliza.
- To ensure that subdivision proposals will enable new buildings to be integrated with their site and the surrounding area in terms of the relationship to existing buildings, open space areas and the coastal landscape.
- To recognise areas where a lower intensity of residential activity and traffic movement contributes to the amenity of the area.
- To ensure that the design of development has adequate regard to fire risk and includes appropriate fire protection measures.
- To recognise areas, with limited access to infrastructure, services and facilities, including public transport, that are considered inappropriate for higher densities of occupation.

### *Vegetation Protection Overlay (VPO)*

#### **Purpose:**

- To protect areas of significant vegetation.
- To ensure that development minimises loss of vegetation.
- To preserve existing trees and other vegetation.
- To recognise vegetation protection areas as locations of special significance, natural beauty, interest and importance.
- To maintain and enhance habitat and habitat corridors for indigenous fauna.
- To encourage the regeneration of native vegetation.

#### **Decision guidelines**

- The statement of the nature and significance of the vegetation to be protected and the vegetation protection objective contained in a schedule to this overlay.
- The effect of the proposed use, building, works or subdivision on the nature and type of vegetation to be protected.
- The role of native vegetation in conserving flora and fauna.
- The need to retain native or other vegetation if it is rare, supports rare species of flora or fauna or forms part of a wildlife corridor.
- The need to retain vegetation which prevents or limits adverse effects on ground water recharge.
- The need to retain vegetation:
  - Where ground slopes exceed 20 percent.

- Within 30 metres of a waterway or wetland.
- On land where the soil or subsoil may become unstable if cleared.
- On land subject to or which may contribute to soil erosion, slippage or salinisation.
- In areas where the removal, destruction or lopping of vegetation could adversely affect the integrity or long term preservation of an identified site of scientific, nature conservation or cultural significance.
- Which is of heritage or cultural significance.
- The need to remove, destroy or lop vegetation to create a defendable space to reduce the risk of bushfire to life and property.
- Any relevant permit to remove, destroy or lop vegetation in accordance with a land management plan or works program.
- Whether the application includes a land management plan or works program.
- Whether provision is made or is to be made to establish and maintain vegetation elsewhere on the land.
- Any other matters specified in a schedule to this overlay.

#### *Vegetation Protection Overlay – Schedule 1 (VPO1) Township Vegetation*

There are many residential areas within the Mornington Peninsula's where substantial vegetation cover, rather than built form, is the dominant visual and environmental feature. In these areas, the impression is of buildings within a landscape rather than that of landscaping around buildings. This balance between natural or introduced vegetation and built form contributes substantially to local character. The protection objectives to be achieved by Schedule 1 of the overlay include, but are not limited to the following:

- To recognise areas where substantial vegetation cover is the dominant visual and environmental feature.
- To ensure that subdivision and development proposals have proper regard to the landscape character of township areas.
- To ensure that new development has proper regard for the established landscape, streetscape and development pattern in terms of being consistent with the existing balance between vegetation and building form in the local area and contributing to the landscape character of the area.
- To ensure that any removal of natural vegetation and works associated with development in environmentally sensitive areas, including streamline areas, is carried out with proper regard to the physical characteristics of each site and the local area.
- To avoid grazing on the steeper slopes of Arthur's Seat.
- To ensure that any removal of natural vegetation in proximity to the Point Nepean National Park or other public land has proper regard to the impact on these areas.
- To protect and conserve native vegetation, including grasses and ground flora.
- To protect and conserve the habitat value of vegetation within township areas.
- To encourage strategic replanting to provide for the long term maintenance of landscape and environmental values within townships.
- To ensure that the proposed relocation of dwellings, or other buildings, includes measures to minimise the removal of vegetation on site and from road reserves.

- To prevent the premature removal of vegetation from a site prior to consideration of design options for a proposed development.
- To recognise areas where substantial vegetation cover is the dominant visual and environmental feature.

### Decision guidelines

- The vegetation protection objectives of this schedule.
- The value of the native vegetation to be removed in terms of its habitat, landscape and environmental values, age, physical condition, rarity or variety.
- The need for a report, by a properly qualified person and to the satisfaction of the responsible authority, on the vegetation and habitat significance of the vegetation to be removed.
- Whether there is any reasonable alternative means of siting buildings and works in order to conserve the native vegetation of the area.
- The extent of the proposed vegetation removal and its likely effect on the stability of the site, particularly along streamlines or in erosion prone areas.
- The extent to which the removal of vegetation is necessary to achieve proper fire management.
- The benefit of conditions providing for the relocation of significant species prior to development of a site, having particular regard to the occurrence of native orchids.
- The benefit of conditions requiring planting, replanting and other treatment of the land, having regard to the relationship between buildings and the landscape and the maintenance, where possible, of shared view lines.
- The need for replacement vegetation to be of an appropriate species and to exclude environmental weeds.
- The need for a condition requiring the payment of a bond as part of a development approval to ensure that no unauthorised removal of vegetation occurs.
- The comments of any relevant coastal management, fire prevention, land management or soil conservation authority

A permit is required for removal of any Vegetation under VPO 1 including non- indigenous native vegetation and introduced species with the exception of removal of noxious weeds listed under the *Catchment and Land protection Act 1994*, including Bracken *Pteridium esculentum*, dead vegetation and the removal of vegetation that has been established for less than 10 years and which is not required as landscaping under a planning approval. A number of other exemptions apply under the VPO but are not relevant to the study site and the proposed development.

While a permit is required for the removal of some non-indigenous native vegetation and exotic vegetation not listed as a noxious weed, no offsets are required for this vegetation (refer to sections below for a detailed discussion of offsetting requirements under the Native Vegetation Permitted Clearing Regulations).

### *Environmental Significance Overlay (ESO)*

#### **Purpose**

- To identify areas where the development of land may be affected by environmental constraints.
- To ensure that development is compatible with identified environmental values.

#### *Schedule 1 to the Environmental Significance Overlay (ESO1)*

#### **MOOROODUC PLAIN AND BALCOMBE VALLEY**

This area forms the major catchment of Balcombe Creek. It is also an area of strategic landscape importance, defining part of the rural edge to the townships of Mt Eliza, Mornington and Baxter and including the contrasting landforms of the Balcombe Valley and Mt Eliza escarpment. The protection objectives to be achieved by Schedule 1 of the overlay include, but are not limited to the following:

- To protect and conserve the environmental systems, bio diversity, native vegetation, habitat areas, land and soil stability, drainage patterns, and stream quality of this area.
- To promote the sustainable development of rural land and integrated land and catchment management, including the retention and enhancement of habitat corridors and wetlands.
- To ensure that subdivision and development density is compatible with maintaining the long term natural, agricultural and landscape values of this area.
- To promote siting and design of buildings and works which is responsive to the open rural landscape character and vistas of the Moorooduc Plain and the contrasting visual character of the Balcombe Valley and Mt Eliza escarpment, and that maintains the scenic value of roads and recreation routes.
- To protect the landscape values of the area, especially west of Moorooduc Road or north of Baxter Tooradin Road, Moorooduc.

## 4 Flora

### 4.1 Survey Methods

A desktop investigation of pre-existing information and an on-foot field survey were undertaken to determine the flora values of the study area.

#### 4.1.1 Pre-existing information search

The Victorian Biodiversity Atlas (DEPI 2013a) was searched for all flora species of conservation significance recorded within a 5 km radius of the study area. From these results, a list of rare and threatened flora species recorded in the region was created (Appendix 2).

The *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Search Tool on the Commonwealth Department of Environment<sup>2</sup> website was also queried to determine if any protected flora related matters were likely to occur in the vicinity of the study area (Appendix 3).

#### 4.1.2 Field surveys and mapping

A vegetation and habitat assessment of the property was undertaken on 19 July 2016.

The inspections involved an assessment of the property which was traversed on foot. The extent of native vegetation on the land was mapped on ArcPad version 10 using a tablet PC and GPS receiver (Hollux Bluetooth GPS - accuracy ±~5m).

#### 4.1.3 Flora Survey Limitations

Botanical surveys commonly fail to record all species present in a study area. In short studies, survey time constraints, the time of year, and lack of identification features for some plants except during flowering can result in certain species being missed. Some rare and threatened orchids only flower intermittently, and when not in flower may be very inconspicuous.

Due to the time of year and the brevity of the survey, it is likely that some indigenous and exotic species visible at other times of the year were overlooked during the present assessment.

However, it is considered unlikely that flora species of conservation significance were overlooked during the flora assessment due to the significantly modified site condition.

## 4.2 Vegetation results

### 4.2.1 Ecological Vegetation Classes (EVC) in the Study Area

Online mapping produced by the Department of Environment and Primary Industries<sup>3</sup> (DEPI) was queried to assist in determining the EVCs potentially occurring in the study area.

According to State-wide 1750 Ecological Vegetation Classes Mapping, the site once supported Damp Sands Herb-rich Woodland (EVC 3) with Gully Woodland (EVC 902) present along Murray Anderson Creek and Grassy Woodland (EVC 175) occupying the Eastern extent of the site. The 2005 EVC layer suggests that the majority of the sites are no longer expected to support remnant vegetation except for a small area surrounding Murray Anderson Creek, considered to

<sup>2</sup> <http://www.environment.gov.au/topics/about-us/legislation/environment-protection-and-biodiversity-conservation-act-1999/protected>

<sup>3</sup> Biodiversity Interactive Maps (online) produced by the Department of Environment and Primary Industries

retain some Gully Woodland and an area adjacent to Cook Avenue is predicted to support a small amount of Damp Sands Herb-rich Woodland.

#### 4.2.2 Description of Vegetation Present on the Site

A total of 130 species of vascular plants were recorded across the four distinct sites within the study area, including 45 indigenous species, 8 non-indigenous native species and 77 exotic species. Although the majority of the land was found to be significantly modified from its pre-1750 condition, largely as a result of the installation of the South Eastern Outfall Pipe throughout the length of the site in 1974, several areas meet the threshold criteria for the determination of a remnant native vegetation patch. All patches are shown as discreet Habitat Zones (HZ1-HZ4) on Figures 1A and 1B and have been assessed with regard to Habitat Hectare scoring independently (Table 1). Patches with similar habitat scores have been attributed to the same habitat zone number. The vegetation supported by each of the four sites and respective habitat zones is discussed below.

##### Site 1

Site 1 is the most westerly section of the study area and consists predominantly of an open grassy area bordered by indigenous and native scattered canopy trees including, Coast Manna-gum *Eucalyptus viminalis* subsp. *pryoriana* and Swamp Mallet #*Eucalyptus spathulata* subsp *spathulata*. The scattered trees outside the southern property boundary (Figure 1A) have been included in this assessment as the tree protection zones (TPZ's) associated with the trees have the potential to influence any future actions along the southern boundary of this site. A patch of four Coast Manna-gum with interconnected canopy have been attributed to HZ4 and occur in the interior of this zone over a midstorey consisting exclusively of Coast Wattle #*Acacia longifolia* subsp *sophorae* and an understory of primarily exotic pasture species such as Rat-tail Grass \**Sporobolus africanus*, Kikuyu \**Cenchrus clandestinus* and Prairie Grass \**Bromus catharticus*. The north-east section of the property consists of modified remnant midstorey vegetation dominated by species known to strongly colonise after disturbance such as Coast Wattle and Coast Tea-tree #*Leptospermum laevigatum* and has been mapped as 'modified remnant' vegetation (Figure 1A).

##### Site 2

Site 2 is characterised by modified remnant vegetation with almost 100 percent canopy cover of Coast Tea-tree. Almost the entire site falls within HZ3 and is the only site where this habitat zone is represented. The canopy cover has assisted a small number of indigenous groundstorey species to persist including Sandhill Sword-sedge *Lepidosperma concavum*, Pale Sundew *Drosera peltata* and Kidney Weed *Dichondra repens*, as well as a range of native orchids including Tall Greenhood *Pterostylis melagramma*, Nodding Greenhood *Pterostylis nutans* and Sun Orchid *Thelymitra* spp. Due to the brevity of the survey, the challenges associated with identifying orchid species whilst not in flower and the known occurrence of rare and threatened orchid species within the wider landscape, additional orchid surveys through this zone are recommended should any vegetation modification be proposed in the future. This entire zone meets the criteria to be considered a remnant patch in accordance with the Guidelines. However, it should be noted that several native (yet non-indigenous) species such as Coast Tea-tree and Coast Wattle are considered environmental weeds in some ecological contexts' and as such may not require a permit to remove.

### Site 3

Site 3 is structurally similar to Site 1 with the bulk of the open areas dominated by exotic grasses such as Rat-tail Grass, Kikuyu and Couch Grass \**Cynodon dactylon* along with scattered exotic herbaceous species such as Ribwort \**Plantago lanceolata* and White Clover \**Trifolium repens* subsp. *repens*. The midstorey taxa in this zone is dominated non-indigenous native species such as Coast Wattle, Coast Tea-tree, Giant Honey-myrtle #*Malaleuca armillaris* subsp. *armillaris*, Willow Myrtle #*Agonis flexuosa* and Sweet Pittosporum #*Pittosporum undulatum* with exotic species Boneseed \**Chrysanthemoides monilifera* and Blackberry \**Rubus fruticosus* spp. agg. also present within this zone. One patch of classifiable native vegetation attributed to HZ4 occurs in the south-west corner of Site 3 is characterised by a canopy of Coast Manna-gum over a predominantly non-indigenous yet native understorey.

### Site 4

Site 4 is the largest zone and is dissected in two by the north-south running Murray Anderson Creek and associated vegetation. The western section of Site 4 is structurally similar to Sites 1 and 3 with open areas dominated by exotic grasses and herbaceous species, including Rat-tail Grass and Capeweed \**Arctotheca calendula*. An area of modified Damp Sands Herb-rich Woodland extends along the southern boundary from Bayview Road to Murray Anderson Creek (HZ3), joining a large remnant patch of Gully Woodland that extends north encompassing the vegetation on either side of Murray Anderson Creek (HZ4) (Figure 1B). The modified Damp Sands Herb-rich Woodland patch is characterised by an overstorey of indigenous canopy trees including Coast Manna-gum and Broad-leaf Peppermint *Eucalyptus dives*, along with one scattered Swamp Gum *Eucalyptus ovata* var. *ovata* adjacent to the creek. Midstorey vegetation consists of sparse mature Coast Tea-tree, Sweet Pittosporum and Blackwood *Acacia melanoxylon* over a diverse range of native understory species including Austral Bracken *Pteridium esculentum*, Silky Guinea-flower *Hibbertia sericea*, and Variable Glycine *Glycine tabacina*. The vegetation becomes more diverse and structurally complex where this patch intercepts HZ4 associated with Murray Anderson Creek and includes Shiny Cassinia *Cassinia longifolia*, Silver Banksia *Banksia marginata*, Coast Banksia *Banksia integrifolia*, Black Wattle *Acacia mearnsii*, Swamp Paperbark *Malaleuca ericifolia* and Cherry Ballart *Exocarpos cupressiformis*. Additional indigenous semi-aquatic species associated with the creekline are also present such as Tall Sedge *Carex appressa*, Tassel Sedge *Carex fascicularis*, Pale Rush *Juncus pallidus* and Common Reed *Phragmites australis*. Within the creek itself Water Ribbons *Triglochin procera* are common along with Watercress \**Nasturtium officinale* and Slender Knotweed *Persicaria decipiens*. The patch narrows through the centre of the easement, yet continues along the entire length of Murray Anderson Creek, where it is defined in the north primarily by four canopy trees with limited understory.

The eastern end of Site 4 is primarily an open grassed area known as Herman Street Reserve and has a history of recreational use including a former Pony Club and a shed previously used as a Scout Hall. The grassed areas are dominated by exotic species including Rat-tail grass, Prairie Grass and Kikuyu with scattered exotic broadleaf species including Turnip \**Brassica* Spp., Large Flowered Wood-sorrel \**Oxalis purpurea* and Common Sow-thistle \**Sonchus oleraceus*. The northern boundary of Site 4 east of Murray Anderson Creek is bordered by a continuous cover of midstorey vegetation dominated by Sweet Pittosporum, Coast Wattle and Cotoneaster \**Cotoneaster* spp. with the occasional indigenous canopy tree. A patch of Coast Manna Gum and Swamp Gum occurs along this boundary however it is defined by canopy trees only with negligible indigenous understorey. Three additional patches are present along the southern boundary and are also defined primarily by canopy trees over an understory of exotic species. A

total of four patches defined by canopy trees only occur within this site and have been combined and assessed as Habitat Zone 4.

#### 4.2.3 Habitat Hectare Assessments

Habitat Hectare assessments were applied to all 'remnant patch' vegetation. The habitat hectare assessment is a site-based measure of the condition of native vegetation with reference to the benchmark for the relevant Ecological Vegetation Class. The assessment generates a condition score of between 0 and 1. Table 2 details the habitat hectare results for all habitat zones.

**Table 1. Habitat Hectare values for Habitat Zones 1-4, South-East Outfall Pipeline: Jetty Road to Rosebud Ave, Rosebud.**

Habitat Zone.		HZ1	HZ2	HZ3	HZ4
<b>Bioregion</b>		GP	GP	GP	GP
<b>EVC Name</b>		GuW	DSHrW	DSHrW	DSHrW
<b>EVC Number</b>		902	3	3	3
	Max Score	Score	Score	Score	Score
<b>Site Condition</b>	Large Old Trees	10	10	8	0
	Canopy Cover	5	5	3	0
	Under storey	25	10	10	5
	Lack of Weeds	15	6	9	6
	Recruitment	10	6	6	3
	Organic Matter	5	5	5	4
	Logs	5	4	4	0
<b>Treeless EVC Multiplier</b>		Multiplier	x1	x1	x1
		Subtotal	48	45	19
					18
Landscape context		25	8	8	6
Habitat points out of 100		100	54	53	25
Habitat Score (habitat points/100)		0.54	0.53	0.25	0.24
Total Area of Habitat Zone (ha)		0.23	0.421	0.398	0.272
Total habitat hectares		0.1242	0.223	0.1	0.065

Notes: HZ = Habitat Zone; GP = Gippsland Plain; GuW = Gully Woodland; DSHrW = Damp Sands Herb-rich Woodland.

## 5 Fauna

A fauna assessment of the study area consisted of an on-foot field survey of habitat quality and a desktop assessment of the likelihood of fauna species of conservation significance occurring within the study area. A detailed zoological survey comprising a range of techniques over different seasons was not undertaken for this study as it was beyond the scope of works.

### 5.1 Pre-existing information search

The Victorian Biodiversity Atlas (VBA) was queried for threatened fauna species recorded within a 5 km radius of the study area (DSE 2013a). Appendix 4 provides the results of this query.

The *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Search Tool (PMST) on the Commonwealth Department of Environment (DoE), website was queried to determine if any protected fauna related matters not reported in the VBA query are considered likely to occur within the study area. Species identified in the EPBC query are presented in Appendix 5.

### 5.2 Fauna Habitat

Vegetation in the study area is likely to provide suitable foraging and nesting habitat for a range of common fauna species such as common woodland birds and arboreal mammals such as Common Ringtail Possum *Pseudocheirus peregrinus*. However, based on habitat requirements for a range of threatened fauna species that are known to occur locally and the poor site condition and fragmented landscape, it is considered unlikely that the vegetation on the site would serve as critical or limiting habitat for significant fauna species.

The majority of threatened fauna species previously recorded within the 5km search area or predicted to occur are considered unlikely to utilise the study area. The low likelihood rating is based on various factors including, lack of suitable habitat, lack of recent database records or the predicted location being outside of the known habitat range of current species populations. One listed species, Powerful Owl *Ninox strenua* occupies a large home range and as such may utilise sections of the study area for occasional foraging. However vegetation throughout the site is considered unlikely to provide limiting or critical habitat for this species as the site supports few large or hollow bearing trees.

## 6 Biodiversity Assessments under the Native Vegetation Permitted Clearing Regulations

Clause 52.17 of the Victoria Planning Provisions and the Biodiversity Assessment Guidelines (DEPI 2013) are publicly available documents covering regulatory and technical requirements of assessing applications that propose to impact upon native vegetation. Guidelines to assessment of Risk-based Pathways (DEPI 2013) and the Biodiversity Assessment Tools<sup>4</sup> (including the Native vegetation location risk map, Strategic biodiversity map, the Native vegetation condition map, and Habitat importance maps for rare or threatened species) provide additional supporting information to assess applications that may impact native vegetation.

### 6.1 Criteria of the Biodiversity Assessment Guidelines

In accordance with the Biodiversity Assessment Guidelines, native vegetation is defined by two categories; remnant patches and scattered trees, as outlined below.

#### *Remnant patch*

A remnant patch of native vegetation is either:

- an area of vegetation where at least 25 per cent of the total perennial understory plant cover is native
- any area with three or more native canopy trees where the canopy foliage cover is at least 20 per cent of the area.

#### *Scattered tree*

A scattered tree is:

- a native canopy tree that does not form part of a remnant patch.

Indigenous vegetation that is not a remnant patch, scattered tree, or wetland, or is dominated by species not characteristic of the former vegetation type may not necessarily require biodiversity assessment or Bioregional Conservation Status assessment.

#### 6.1.1 Risk-based Pathways of the Biodiversity Assessment Guidelines

Three categories of vegetation are assessed in accordance with the Biodiversity Assessment Guidelines:

##### *Location A*

Locations where the removal of native vegetation needs to be greater than 1 hectare before the removal is likely to have a significant impact on any rare or threatened species, including:

- all locations for dispersed species that are not in Location B or Location C.
- all other locations across Victoria.

##### *Location B*

Locations where the removal of less than 1 hectare, but greater than or equal to 0.5 hectares, of native vegetation could have a significant impact on a dispersed species, including:

- locations of secondary importance for most dispersed species that have less than 10,000 hectares of suitable habitat remaining across Victoria.

<sup>4</sup> <http://mapshare2.dse.vic.gov.au/MapShare2EXT/imf.jsp?site=bim>

- locations of highest importance for some dispersed species that have habitat greater than 10,000 hectares and less than 25,000 hectares of suitable habitat remaining across Victoria.

### ***Location C***

All habitat importance maps for species with highly localised habitat.

Locations where the removal of less than 0.5 hectares of native vegetation could have a significant impact on a dispersed rare or threatened species, including:

- locations of highest importance for all dispersed species that have less than 10,000 hectares of suitable habitat remaining across Victoria.
- locations of highest importance for some dispersed species that have greater than 10,000 hectares of suitable habitat remaining across Victoria.

Table 1 outlines the Risk-based pathways that inform decision guidelines for applications that proposed to ‘remove, destroy or lop’ native vegetation.

**Table 2. Risk-based pathway matrix (DEPI 2013)**

	<b>Location A</b>	<b>Location B</b>	<b>Location C</b>
<b>Extent – remnant patch</b>			
< 0.5 hectares	Low	Low	High
≥ 0.5 hectares and < 1 hectare	Low	Moderate	High
≥ 1 hectare	Moderate	High	High
<b>Extent – scattered trees</b>			
< 15 scattered trees	Low	Moderate	High
≥ 15 scattered trees	Moderate	High	High

## **6.2 Vegetation Assessment Results**

The risk-based pathway determines the application requirements and the decision guidelines for assessment of permit applications. This risk-based approach ensures risks to biodiversity values are identified early in the application process and applicants’ obligations are proportionate to the biodiversity impacts of their proposal to remove native vegetation (DEPI 2013).

### **6.2.1 Risk-based Assessment Pathway**

Biodiversity Interactive Mapping indicated that the study area is located in Location A.

In this instance there are no proposed impacts to either remnant patches or scattered trees, however should impacts to remnant vegetation be proposed in the future, any losses will need to be assessed in accordance with the Biodiversity Assessment Guidelines.

### **6.2.2 Permitted Clearing during the last Five Years**

No permitted clearing has occurred within the same property (subject site) in the last five years.

## 7 Minimise and Offset requirements

The stated purpose of Clause 52.17<sup>5</sup> of the Victoria Planning Provisions is to ensure that permitted clearance of native vegetation does not cause a net loss in the contribution made by native vegetation to Victoria's biodiversity. This is achieved through the following approach:

- Avoid the removal of native vegetation that makes a significant contribution to Victoria's biodiversity.
- Minimise impacts on Victoria's biodiversity from the removal of native vegetation.
- Where native vegetation is permitted to be removed, ensure that an offset is provided in a manner that makes a contribution to Victoria's biodiversity that is equivalent to the contribution made by the native vegetation to be removed.

No vegetation clearance has been assessed as a part of this report as none is proposed at this stage. Should vegetation clearance be proposed in the future, any losses will need to be quantified and the offset requirements assessed.

Table 5 of the Biodiversity Assessment Guidelines (DEPI 2013) details application requirements for the provision of a permit to remove native vegetation.

There may also be opportunities to retain some areas of vegetation to be managed as an offset, in particular the vegetation associated with Site 2 may be appropriate for this purpose.

### 7.1 Assessment of whether proposed removal of native vegetation will have a significant impact on Victoria's biodiversity

Connectivity and habitat available on site and in adjoining properties has been significantly modified as a result of surrounding residential development during previous decades. Although future plans for the study area remain uncertain at this stage of proceedings, it is considered that alternative uses of the land will have only limited impacts on Victoria's biodiversity values and are not expected to have significant impacts on threatened flora or fauna species, due to the lack of critical or limiting habitat within the study area.

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<sup>5</sup> [http://planningschemes.dpcd.vic.gov.au/schemes/vpps/52\\_17.pdf](http://planningschemes.dpcd.vic.gov.au/schemes/vpps/52_17.pdf)

## 8 Conservation significance of the study area

### 8.1 Conservation significance of flora and fauna species found in the study area

#### *EPBC Act listed flora and fauna species*

No EPBC Act listed flora or fauna species or ecological communities were found in the study area during the brief assessment.

Of the EPBC listed species previously recorded within a 5 km radius of the study area or predicted to occur, none are considered likely to either occur within the study area or to rely on it for critical or limiting habitat. Powerful Owl is known to forage across the broader landscape and may visit the study area on occasion to forage, however as the site supports few large hollow bearing trees, this species is considered to have only a low likelihood of occurrence.

#### *FFG Act listed species*

Several flora species including orchids and members of the Asteraceae family found within the study area are protected under the FFG Act. In this instance the study area is private land therefore the FFG Act does not apply. However the objectives of the FFG act should nevertheless be considered with regard to the ongoing management of these species.

#### *Victorian Threatened species advisory lists*

No Victorian rare or threatened flora or fauna species were found in the study area during the assessment. Of the threatened flora and fauna species recorded within a 5 km radius of the study area, none are considered likely to either occur within the study area.

### 8.2 Regulatory implications of conservation significance assessments

#### 8.2.1 Implications due to EPBC Act listed species, FFG Act listed species and Victorian Rare or Threatened species

Given that the site is private land there are no implications under the FFG Act. In addition, the site supports no EPBC Act or State listed flora and fauna species, or other matters of national state or regional environmental significance. Therefore no further consideration is given to these matters.

#### 8.2.2 Implications under the Native Vegetation Permitted Clearing Regulations

As there are no proposed losses as part of this investigation, there are currently no implications under the Biodiversity Assessment Guidelines.

#### 8.2.3 Implications due to *Catchment and Land Protection Act* listings

Seven weeds listed under the CaLP Act were identified during the brief site assessment: Bridal Creeper *\*Asparagus asparagoides*, Spear Thistle *\*Cirsium vulgare*, Boneseed *\*Chrysanthemoides*

*monilifera*, Fennel \**Foeniculum vulgare*, St John's Wort \**Hypericum perforatum*, Soursoy \**Oxalis pes-capre* and Blackberry \**Rubus fruticosus* spp. agg.. Bridal Creeper, Boneseed and Blackberry are also listed as 'Weeds of National Significance'.

Under the Act, Landowners are required to conserve soil, protect water resources, eradicate 'Controlled' and 'Prohibited' weeds, eradicate pest animals and avoid actions that may result in land degradation on neighbouring properties. In certain instances, landowners may be served with a Land Management Notice that may prohibit or regulate land use, or specify management actions required to be undertaken on their property.

## 9 Conclusions and Recommendations

The study area contains only a limited amount of remnant vegetation, which is largely restricted to the Murray Anderson creekline and property boundaries. The native vegetation has been attributed to four main habitat zones consisting of Gully Woodland and Damp Sands Herb-rich Woodland. All of the vegetation has been highly modified with many of the patches characterised by canopy trees only. Further recommendations for the custodial obligations and relating to the proposed rezoning include:

- The Murray Anderson Creek and associated vegetation will require protection with a minimum buffer of 30m applied.
- Targeted orchid surveys should be considered for Habitat Zone 3 given the diversity of orchid species present within this zone and the potential for rare and threatened orchid species to occur within the broader landscape.
- Any future vegetation loses will need to be quantified.
- Control of CaLP act listed weeds will need to be carried out.

## 10 References

DEPI (2013) *Permitted clearing of native vegetation Biodiversity assessment guidelines*. Victorian Government Department of Environment and Primary Industries Melbourne, September 2013

DEPI (2014) *Permitted clearing of native vegetation Biodiversity assessment Handbook Version 2* Victorian Government Department of Environment and Primary Industries Melbourne, 2014

## Appendix 1. Plant species recorded in the study area

Flora species recorded during an on-foot flora survey of the study area in on August 12 2014:

### Key to status and origin symbols

\* – Exotic species

# – Non-indigenous native species

R – Listed as Restricted under the *Catchment and Land Protection Act (1994)*

C – Listed as a Controlled under the *Catchment and Land Protection Act (1994)*

W – Weeds of National Significance

Origin	Common Name	Scientific Name	Status
#	<i>Acacia baileyana</i>	Cootamundra Wattle	
#	<i>Acacia longifolia</i> subsp. <i>sophorae</i>	Coast Wattle	
	<i>Acacia mearnsii</i>	Black Wattle	
	<i>Acacia pycnantha</i>	Golden Wattle	
	<i>Acaena novae-zelandiae</i>	Bidgee-widgee	
*	<i>Acetosella vulgaris</i>	Sheep Sorrel	
*	<i>Agapanthus praecox</i> subsp. <i>orientalis</i>	Agapanthus	
#	<i>Agonis flexuosa</i>	Willow Myrtle	
*	<i>Allium triquetrum</i>	Angled Onion	
	<i>Allocasuarina paludosa</i>	Scrub Sheoak	
#	<i>Allocasuarina torulosa</i>	Forest Oak	
	<i>Amyema pendula</i>	Drooping Mistletoe	
*	<i>Arctotheca calendula</i>	Cape weed	
*	<i>Asparagus asparagooides</i>	Bridal Creeper	R W
*	<i>Asparagus scandens</i>	Asparagus Fern	
	<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia	
	<i>Banksia marginata</i>	Silver Banksia	
	<i>Billardiera mutabilis</i>	Common Apple-berry	
*	<i>Brassica</i> spp.	Turnip	
*	<i>Briza maxima</i>	Large Quaking-grass	
*	<i>Bromus catharticus</i>	Prairie Grass	
	<i>Bursaria spinosa</i>	Sweet Bursaria	
*	<i>Callitricha stagnalis</i>	Common Water-starwort	
*	<i>Canna indica</i>	Indian Shot	
	<i>Carex appressa</i>	Tall Sedge	
	<i>Carex fascicularis</i>	Tassel Sedge	
	<i>Cassinia longifolia</i>	Shiny Cassinia	
	<i>Casuarina</i> spp.	Sheoak	
*	<i>Cenchrus clandestinus</i>	Kikuyu	
*	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed	
*	<i>Chamaecytisus palmensis</i>	Tree Lucerne	
*	<i>Chenopodium murale</i>	Sowbane	
*	<i>Chrysanthemoides monilifera</i>	Boneseed	C W

Origin	Common Name	Scientific Name	Status
*	<i>Cirsium vulgare</i>	Spear Thistle	C
*	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	
*	<i>Coprosma repens</i>	Mirror Bush	
*	<i>Cotoneaster</i> spp.	Cotoneaster	
	<i>Cotula australis</i>	Common Cotula	
*	<i>Crassula tetragona</i> subsp. <i>robusta</i>	Shrubby Crassula	
	<i>Crassula decumbens</i> var. <i>decumbens</i>	Spreading Stonecrop	
*	<i>Crocosmia X crocosmiiflora</i>	Montbretia	
*	<i>Cynodon dactylon</i>	Couch	
*	<i>Cyperus eragrostis</i>	Drain Flat-sedge	
*	<i>Dactylis glomerata</i>	Cocksfoot	
	<i>Dampiera dysantha</i>	Shrubby Dampiera	
*	<i>Delairea odorata</i>	Cape Ivy	
	<i>Dianella admixta</i>	Black-anther Flax-lily	
	<i>Dianella brevicaulis</i>	Small-flower Flax-lily	
	<i>Dichondra repens</i>	Kidney-weed	
*	<i>Dipogon lignosus</i>	Common Dipogon	
	<i>Drosera peltata</i> s.l.	Pale Sundew	
*	<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	
*	<i>Ehrharta longiflora</i>	Annual Veldt-grass	
	<i>Eucalyptus cephalocarpa</i> s.l.	Silver-leaf Stringybark	
	<i>Eucalyptus dives</i>	Broad-leaf Peppermint	
	<i>Eucalyptus ovata</i>	Swamp Gum	
#	<i>Eucalyptus spathulata</i> subsp. <i>spathulata</i>	Swamp Mallet	
	<i>Eucalyptus viminalis</i> subsp. <i>pryoriana</i>	Coast Manna-gum	
*	<i>Euphorbia peplus</i>	Petty Spurge	
	<i>Exocarpos cupressiformis</i>	Cherry Ballart	
*	<i>Foeniculum vulgare</i>	Fennel	R
*	<i>Freesia</i> spp.	Freesia	
*	<i>Fumaria bastardii</i>	Bastard's Fumitory	
*	<i>Galenia</i> spp.	Galenia	
*	<i>Galium aparine</i>	Cleavers	
*	<i>Geranium molle</i>	Dove's Foot	
*	<i>Gladiolus</i> spp.	Gladiolus	
	<i>Glycine tabacina</i> s.l.	Variable Glycine	
*	<i>Hakea drupacea</i>	Sweet Hakea	
#	<i>Hakea salicifolia</i> subsp. <i>salicifolia</i>	Willow-leaf Hakea	
	<i>Hakea</i> spp.	Hakea	
*	<i>Hedera helix</i>	English Ivy	
	<i>Hibbertia sericea</i> s.l.	Silky Guinea-flower	
*	<i>Hypericum perforatum</i> subsp. <i>veronense</i>	St John's Wort	C

Origin	Common Name	Scientific Name	Status
*	<i>Hypochaeris radicata</i>	Flatweed	
*	<i>Jasminum polyanthum</i>	Winter Jasmine	
	<i>Juncus pallidus</i>	Pale Rush	
	<i>Kunzea phyllicoides</i>	Slender Burgan	
*	<i>Lepidium africanum</i>	Common Peppercress	
	<i>Lepidosperma spp.</i>	Sword Sedge	
	<i>Leptospermum laevigatum</i>	Coast Tea-tree	
	<i>Leucopogon parviflorus</i>	Coast Beard-heath	
*	<i>Lolium perenne</i>	Perennial Rye-grass	
	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	
*	<i>Lythrum hyssopifolia</i>	Small Loosestrife	
*	<i>Medicago polymorpha</i>	Burr Medic	
#	<i>Melaleuca armillaris</i> subsp. <i>armillaris</i>	Giant Honey-myrtle	
	<i>Melaleuca ericifolia</i>	Swamp Paperbark	
	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass	
*	<i>Narcissus jonquilla</i>	Jonquil	
*	<i>Nasturtium officinale</i>	Watercress	
*	<i>Oxalis incarnata</i>	Pale Wood-sorrel	
*	<i>Oxalis pes-caprae</i>	Soursob	R
*	<i>Oxalis purpurea</i>	Large-flower Wood-sorrel	
	<i>Pandorea pandorana</i> subsp. <i>pandorana</i>	Wonga Vine	
*	<i>Paspalum dilatatum</i>	Paspalum	
*	<i>Paspalum distichum</i>	Water Couch	
*	<i>Pelargonium</i> spp.	Stork's Bill	
	<i>Persicaria decipiens</i>	Slender Knotweed	
	<i>Phragmites australis</i>	Common Reed	
*	<i>Pittosporum tenuifolium</i>	Kohuhu	
#	<i>Pittosporum undulatum</i>	Sweet Pittosporum	
*	<i>Plantago coronopus</i>	Buck's-horn Plantain	
*	<i>Plantago lanceolata</i>	Ribwort	
*	<i>Polygala myrtifolia</i>	Myrtle-leaf Milkwort	
	<i>Pteridium esculentum</i>	Austral Bracken	
	<i>Pterostylis melagramma</i>	Tall Greenhood	
	<i>Pultenaea gunnii</i>	Golden Bush-pea	
*	<i>Ranunculus repens</i>	Creeping Buttercup	
*	<i>Romulea rosea</i>	Onion Grass	
*	<i>Rubus fruticosus</i> spp. agg.	Blackberry	C W
*	<i>Rumex crispus</i>	Curled Dock	
*	<i>Senecio angulatus</i>	Climbing Groundsel	
	<i>Senecio glomeratus</i>	Annual Fireweed	
*	<i>Senecio pterophorus</i>	African Daisy	

Origin	Common Name	Scientific Name	Status
*	<i>Solanum laxum</i>	Jasmine Nightshade	
*	<i>Solanum lycopersicum</i>	Tomato	
*	<i>Solanum mauritianum</i>	Wild Tobacco Tree	
*	<i>Solanum nigrum</i> s.l.	Black Nightshade	
*	<i>Sonchus oleraceus</i>	Common Sow-thistle	
*	<i>Sporobolus africanus</i>	Rat-tail Grass	
*	<i>Stellaria media</i>	Chickweed	
	<i>Thelymitra</i> spp.	Sun Orchid	
*	<i>Trifolium repens</i> var. <i>repens</i>	White Clover	
*	<i>Trifolium subterraneum</i>	Subterranean Clover	
*	<i>Trifolium vesiculosum</i> var. <i>vesiculosum</i>	Arrowleaf Clover	
	<i>Triglochin procera</i> s.l.	Water Ribbons	
*	<i>Tropaeolum majus</i>	Nasturtium	
*	<i>Vicia sativa</i>	Common Vetch	
*	<i>Zantedeschia aethiopica</i>	White Arum-lily	

## Appendix 2. Rare and threatened flora species previously recorded within 5 km of the study area

The list below provides records for rare and threatened plant species previously recorded within 5 km of the study area (DEPI 2013a) and likelihood of occurrence within the study site.

### Legend:

FFG – Flora and Fauna Guarantee Act 1988

L – Listed

EPBC – Environment Protection & Biodiversity Conservation Act 1999

EN – Endangered

VU – Vulnerable

VICADV – Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2007b)

en – Endangered

k – Poorly Known

r - Rare

vu – Vulnerable

dd – Data Deficient

EPBC 1999 – Environment Protection and Biodiversity Conservation Act 1999

FFG 1988 – Flora and Fauna Guarantee Act 1988

VICADV – Advisory List of Rare or Threatened Plants in Victoria (DSE 2005)

Scientific Name	Common Name	Start Year	FFG	VICADV	EPBC
<i>Acacia uncifolia</i>	Coast Wirilda			r	
<i>Berula erecta</i>	Water Parsnip			k	
<i>Caladenia dilatata s.s.</i>	Green-comb Spider-orchid			k	
<i>Caladenia robinsonii</i>	Frankston Spider-orchid	1997	L	x	EN
<i>Cladium procerum</i>	Leafy Twig-sedge	1997		r	
<i>Desmodium varians</i>	Slender Tick-trefoil	2001		k	
<i>Euphrasia collina subsp. muelleri</i>	Purple Eyebright	1997	L	en	EN
<i>Glycine latrobeana</i>	Clover Glycine	1988	L	vu	VU
<i>Lachnagrostis rufa subsp. rufa</i>	Rough Blown-grass			r	
<i>Morchella esculenta</i>	Common Morel			vu	

Scientific Name	Common Name	Start Year	FFG	VICADV	EPBC
<i>Prasophyllum lindleyanum</i>	Green Leek-orchid	1885		vu	
<i>Rytidosperma dimidiatum</i>	Tasmanian Wallaby-grass			vu	
<i>Salsola tragus subsp. pontica</i>	Coast Saltwort			r	
<i>Thelymitra circumsepta</i>	Naked Sun-orchid			vu	
<i>Thelymitra malvina</i>	Mauve-tuft Sun-orchid			vu	
<i>Thelymitra X irregularis</i>	Crested Sun-orchid			r	
<i>Xanthosia tasmanica</i>	Southern Xanthosia			r	

### Appendix 3. EPBC Protected Matters search tool results - flora

The EPBC Protected Matters search tool was queried for EPBC related matters occurring or likely to occur within 5 km of the study area.

The following EPBC Act listed flora species may occur or have habitat occurring within 5 km of the study area:

Species	EPBC status	Expected occurrence in or near the study area
<i>Caladenia orientalis</i> Eastern Spider Orchid	Endangered	Species or suitable habitat may occur within the search area
<i>Caladenia robinsonii</i> Frankston Spider-Orchid	Endangered	Species or suitable habitat may occur within the search area
<i>Euphrasia collina</i> subsp. Muelleri Purple Eyebright	Endangered	Species or suitable habitat may occur within the search area
<i>Glycine latrobeana</i> Clover Glycine	Vulnerable	Species or suitable habitat may occur within the search area
<i>Prasophyllum frenchii</i> Maroon Leek-orchid	Endangered	Species or suitable habitat likely to occur within the search area
<i>Pterostylis cucullata</i> Swamp Everlasting	Vulnerable	Species or suitable habitat likely to occur within the search area

## Appendix 4. Rare and threatened fauna species previously recorded within 5 km of the study area

The following list shows Victorian Biodiversity Atlas records for rare and threatened fauna species that have previously been recorded within a 5 km radius of the study area (DEPI 2013a). Note: Marine birds and marine mammals have been recorded within the 5km search area but have been excluded from the appendix as there is no suitable habitat for these species in the study area.

### Legend:

#### **FFG – Flora and Fauna Guarantee Act 1988**

L – Listed

#### **EPBC – Environment Protection & Biodiversity Conservation Act 1999**

EN – Endangered

VU – Vulnerable

#### **VICADV – Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2007b)**

en – Endangered

k – Poorly Known

r - Rare

vu – Vulnerable

dd – Data Deficient

EPBC 1999 – *Environment Protection and Biodiversity Conservation Act 1999*

FFG 1988 – *Flora and Fauna Guarantee Act 1988*

VICADV – *Advisory List of Rare or Threatened Plants in Victoria (DSE 2005)*

Scientific Name	Common Name	Start Year	FFG	VICADV	EPBC
Amphibians					
<i>Pseudophryne semimarmorata</i>	Southern Toadlet			vu	
Fish					
Macquaria australasica	Macquarie Perch		L	en	EN
Mammals					
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox				VU
Non-passerine birds					
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant	1989		nt	
<i>Phalacrocorax varius</i>	Pied Cormorant			nt	
<i>Aythya australis</i>	Hardhead	2007		vu	

Scientific Name	Common Name	Start Year	FFG	VICADV	EPBC
<i>Biziura lobata</i>	Musk Duck	2007		vu	
Passerine birds					
<i>Calamanthus pyrrhopygios</i>	Chestnut-rumped Heathwren		L	vu	
<i>Circus assimilis</i>	Spotted Harrier			nt	
<i>Gallinago hardwickii</i>	Latham's Snipe			nt	
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		L	vu	
<i>Hirundapus caudacutus</i>	White-throated Needletail			vu	
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot		L	nt	EN
<i>Lathamus discolor</i>	Swift Parrot	2005	L	e	EN
<i>Lewinia pectoralis pectoralis</i>	Lewin's Rail		L	vu	
<i>Lissolepis coventryi</i>	Swamp Skink		L	vu	
<i>Melanodryas cucullata cucullata</i>	Hooded Robin		L	nt	
<i>Ninox strenua</i>	Powerful Owl		L	vu	
<i>Platalea regia</i>	Royal Spoonbill			nt	
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	1989	L	e	
<i>Porzana pusilla palustris</i>	Baillon's Crake		L	vu	
<i>Pseudemoia rawlinsoni</i>	Glossy Grass Skink			vu	
<i>Sminthopsis leucopus</i>	White-footed Dunnart		L	nt	
<i>Varanus varius</i>	Lace Monitor			en	

## Appendix 5. EPBC Protected Matters search tool records – fauna

The EPBC protected matters search tool was queried for EPBC related matters occurring or likely to occur within 5 km of the study area.

The EPBC Act listed fauna species shown below may occur, have habitat occurring, or migrate within 5 km of the study area. Note: Marine birds and marine mammals have been recorded within the 5km search area but have been excluded from the appendix as there is no suitable habitat for these species in the study area.

Species	EPBC status	Likely occurrence or habitat in the search area (as listed on the EPBC web site)
<b>Birds</b>		
<i>Anthochaera phrygia</i> Regent Honeyeater	Critically Endangered	Species or species habitat may occur within the search area
<i>Botaurus poiciloptilus</i> Australasian Bittern	Endangered	Species or species habitat may occur within the search area
<i>Grantiella picta</i> Painted Honeyeater	Vulnerable	Species or species habitat may occur within the search area
<i>Lathamus discolor</i> Swift Parrot	Critically Endangered	Species or species habitat likely to occur within area
<i>Neophema chrysogaster</i> Orange-bellied Parrot	Critically Endangered	Species or species habitat likely to occur within area
<i>Rostratula australis</i> Australian Painted Snipe	Vulnerable	Species or species habitat may occur within the search area
<i>Sternula nereis nereis</i> Australian Fairy Tern	Vulnerable	Species or species habitat may occur within the search area
<b>Fish</b>		
<i>Galaxiella pusilla</i> Eastern Dwarf Galaxia	Vulnerable	Species or species habitat may occur within the search area
<i>Prototroctes maraena</i> Australian Grayling	Vulnerable	Species or species habitat may occur within the search area
<b>Frogs</b>		
<i>Litoria raniformis</i> Growling Grass Frog	Vulnerable	Species or species habitat known to occur within the search area

Species	EPBC status	Likely occurrence or habitat in the search area (as listed on the EPBC web site)
<b>Insects</b>		
<i>Synemon plana</i> Golden Sun Moth	Critically Endangered	Species or species habitat may occur within area
<b>Mammals</b>		
<i>Antechinus minimus maritimus</i> Swamp Antechinus	Vulnerable	Species or species habitat likely to occur within area
<i>Isoodon obesulus obesulus</i> Southern Brown Bandicoot	Endangered	Species or species habitat likely to occur within the search area
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	Vulnerable	Species or species habitat likely to occur within the search area

## Appendix 6. Photos of the study area.



**Plate 1. Native vegetation associated with Murray Anderson Creek running through Site 4/Habitat Zone 1 looking north from southern boundary.**

**Plate 2. Native vegetation associated with Murray Anderson Creek running through Site 4/Habitat Zone 1 looking south from crossover.**



**Plate 3. Coast Tea-tree vegetation forming a continuous canopy over Site 2/Habitat Zone 3.**



**Plate 4. Understory vegetation present in Site 2/Habitat Zone 3 with Nodding Greenhood *Pterostylis nutans* in the foreground.**



**Plate 5. Patch of four canopy trees in Site 1.**



**Plate 6. Maintained predominantly exotic grassy vegetation in Site 1 however is representative of this vegetation type present within all 4 sites.**



**Plate 7. Non-indigenous native vegetation within site 3 consisting of Coast Tee-tree, Coast Wattle and several exotic species.**



**Plate 8. Native vegetation present within the habitat zone 2.**



**Plate 9. Extensive maintained grassy area characterising the eastern end of site 4.**

**Plate 10. Patch of 4 trees within Site 4 representative of 'Zone 4- Tree Based Patches' vegetation. Characterised by canopy trees with absent or highly modified understory.**

