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DRAFT REPORT:

Officer Structure Plan: Flora and Fauna Assessment, Officer, Victoria

ON BEHALF OF:

Cardinia Shire Council
June 2008

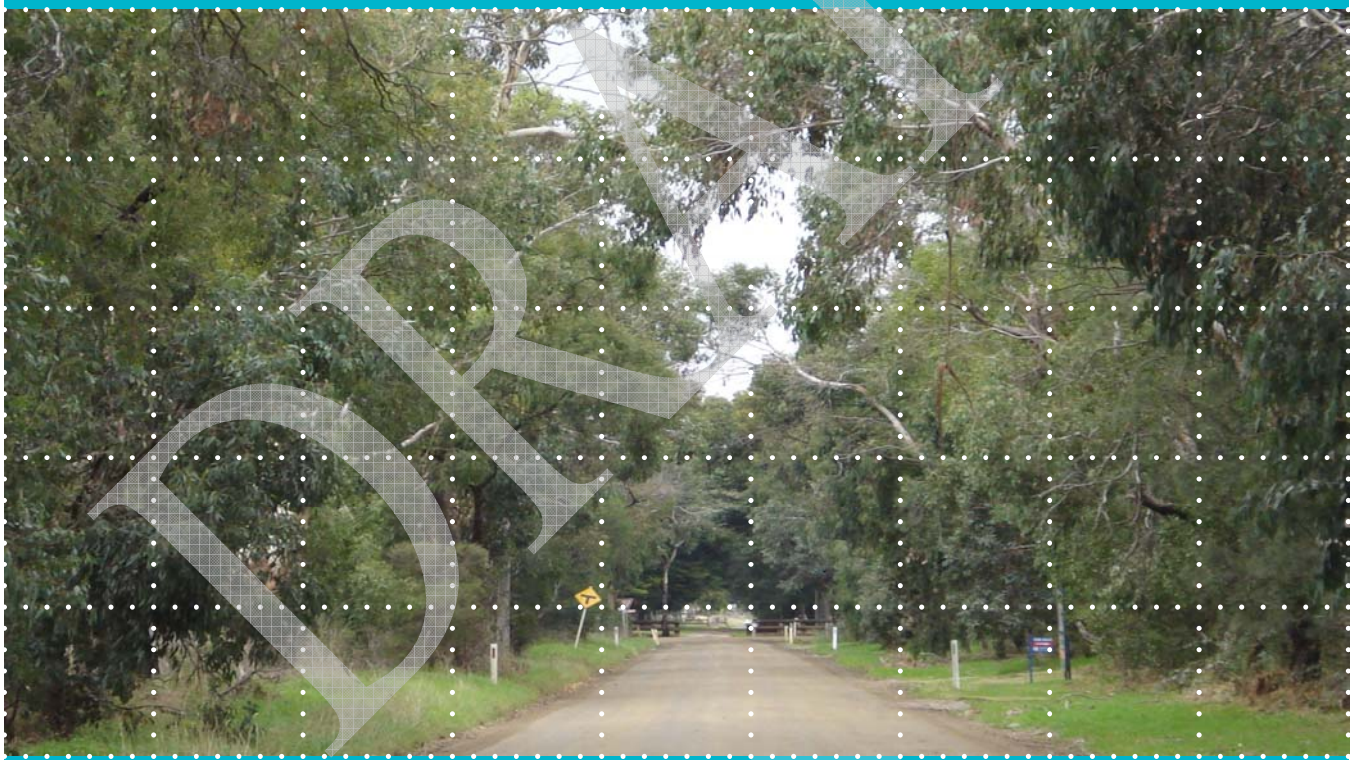

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Table of Contents

Plates

Figures

Tables

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***Cover Photos*:** Habitat corridor along Brunt Road (facing south), Officer (Ecology Partners Pty. Ltd.)

The following staff from Ecology Partners Pty. Ltd. were involved in the project: Aaron Organ, Clio Gates Foale, Anna Foley, Warren Tomlinson and Zed Senbergs

SUMMARY

Introduction

Ecology Partners Pty. Ltd. was engaged by Cardinia Shire Council to undertake a flora and fauna assessment as part of the Officer Structure Plan, Officer, Victoria. The purpose of the assessment is to determine the key ecological values within the study area, to ascertain any potential ecological impacts associated with any future proposed development, and to address any implications under Commonwealth and State legislation and policy. Results of this assessment will assist in formulating the Structure Plans for the Cardinia Employment Corridor. This region is a part of the much larger Casey-Cardinia growth area south-east of Melbourne.

Methods

Biological databases maintained by the Department of Sustainability and Environment (DSE) were reviewed, including the Atlas of Victorian Wildlife (AVW) and Flora Information System (FIS). The presence of Ecological Vegetation Classes (EVCs) within the wider study area was reviewed using DSE's Biodiversity Interactive Map, while information referring to matters (such as listed taxa and ecological communities, Ramsar wetlands, etc) protected under the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999* was obtained from the Department of the Department of the Environment, Water, Heritage and the Arts Protected Matters Search Tool.

Flora

A flora assessment was undertaken on 5 June 2008 with the aim of documenting the flora species and vegetation types within the study area. The entire study area was visually assessed, with all vascular plants recorded and overall vegetation condition noted. A list of flora species observed was compiled and the location of significant species recorded. Vegetation mapping was undertaken during the field survey through aerial photograph interpretation and on-ground observations.

Fauna

A habitat assessment and fauna survey was undertaken 8 May 2008 during warm conditions to obtain information on terrestrial fauna values within the study area.

The study area was visually assessed, with active searching undertaken to locate more cryptic species. A list of fauna species recorded during the present survey was compiled and is presented in the report.

Results

Flora

A total of 103 plant taxa (47 indigenous, two native non-indigenous and 54 exotic) were recorded in the study area during the assessment. Planted trees and shrubs were not recorded unless they were seen to be naturally spreading on site.

The site assessment indicates that there are remnants of two Ecological Vegetation Classes (EVCs) within the study area: Swampy Riparian Woodland (EVC 83) occurs within the southern residential area, along drainage lines and in sparse patches. Grassy Woodland (EVC 175) occurs predominantly as linear patches along the railway line, roadsides and fencelines within the study area. An artificial wetland has been created on Brunt Road adjacent to the railway line, and vegetation planted within this area is regenerating well and naturally expanding.

The majority of the study area is highly modified and dominated by introduced flora species, particularly pasture grasses, particularly the Panorama Estate in the north of the study area. However, indigenous vegetation persists along the railway line, roadside reserves and drainage lines although in most instances the understorey within these areas is highly modified and dominated by a dense cover of introduced pasture grasses.

Detailed information pertaining to EVCs and vegetation condition within the study area are provided in Section 3.

Fauna

The study area currently supports habitat for a range of native fauna species in both modified and natural remnant grassland and woodland habitat. Twenty-three fauna species were recorded, including one native mammal, 21 birds (17 native, four introduced) and one native frog (Appendix 3.1). There is potential habitat for the nationally significant Growling Grass Frog and it would be prudent to undertake a targeted assessment in drainage lines and wetlands within the study area at an optimal time of the year to ascertain its presence.

Fauna habitats within the study area include exotic grassland, drainage lines/depressions, human-made structures, created wetlands, remnant native woodland and scattered remnant trees. Remnant native woodland is largely present as vegetation strips along roads, the railway line and between property boundaries. Such strips are frequently used as wildlife corridors, providing habitat and facilitating the movement of species throughout the landscape.

Legislative and Policy Implications

No EPBC listed flora or fauna species, vegetation communities or any other matters of national significance were recorded within the study area. As such, based on available information (i.e. previous data and information, and the results of the current field

assessments) an EPBC Act referral to the Commonwealth Environment Minister is not required for the proposed development.

No flora species listed as 'protected' under the FFG Act have been recorded in the study area. As such, an FFG permit to disturb or remove protected species is required from DSE prior to any construction works commencing. Potential threatening processes listed under the FFG Act will also need to be addressed prior to any construction works commencing.

There are currently 11 declared noxious weeds and four Weeds of National Significance (WONS) present within the study area. All attempts should be made to control and minimise their spread in accordance with the *Catchment and Land Protection Act 1994*. In addition, increased levels of sediment should not enter any drainage lines or creeks as a result of future development.

In addition there may be further requirements pertaining to the Environmental Significance Overlay (ESO) and Vegetation Protection Overlay (VPO).

Ecological Significance of Study Area

Roadsides and waterways within the study area containing indigenous vegetation are of regional conservation significance due to: i) the presence of at least 26 regionally significant flora species within the Gippsland Plain Bioregion; ii) the presence of two endangered EVCs considered endangered within the Gippsland Plain Bioregion; and iii) the presence of continuous vegetated corridors along roadsides and waterways which provide important habitat for flora and fauna species and which facilitates the movement of fauna across the landscape.

The study area (principally waterbodies suitable for breeding and recruitment) may be of national conservation significance for the Growling Grass Frog.

Potential Impacts and Mitigation Measures

The main impacts to flora and fauna values will arise from the removal or disturbance of indigenous species along roadside reserves and waterways within the study area, and loss of suitable habitat for fauna.

Information relating to potential direct and indirect impacts on ecological values within the study area associated with any proposed works is provided in Section 6, while mitigation measures are outlined in Section 7.

Further Requirements

A referral to the Commonwealth Environment Minister under the EPBC Act may be required if suitable habitat for the nationally significant Growling Grass Frog is proposed to be disturbed or removed as a result of the proposed development.

Depending on the outcome of targeted surveys for significant flora, an FFG permit to disturb or remove listed or protected species may be required from DSE prior to any development works commencing.

As a Native Vegetation Plan is currently being prepared for the Officer Structure Plan, permission to remove vegetation as a clause of a Planning Permit will no longer be applicable within the study area. However, there may be further requirements pertaining to the Environmental Significance Overlay (ESO) and Vegetation Protection Overlay (VPO) that include parts of the study area.

Indigenous vegetation patches and scattered trees that fit the Net Gain criteria have been identified within the study area. A formal Net Gain assessment has been undertaken within the greater Officer Structure Plan area to address requirements as part of the Victorian Government's *Victoria's Native Vegetation Management – A Framework for Action.* The proposed Native Vegetation Precinct Plan will be applied to the study area embedded within the Cardinia Shire Planning Scheme.

In addition, an Environmental Management Plan may be required to address noxious weed and sediment control during any future development activities.

1 INTRODUCTION

1.1 Background

Ecology Partners Pty. Ltd. was engaged by Cardinia Shire Council to undertake a flora and fauna assessment as part of the Officer Structure Plan, Officer, Victoria. The purpose of the assessment is to determine the key ecological values within the study area, to ascertain any potential ecological impacts associated with any future proposed development, and to address any implications under Commonwealth and State legislation and policy. Results of this assessment will assist in formulating the Structure Plans for the Cardinia Employment Corridor. This region is a part of the much larger Casey-Cardinia growth area south-east of Melbourne.

The Casey–Cardinia growth area includes the suburbs of Cranbourne, Pakenham and Officer. Casey–Cardinia has experienced the most residential development of all the growth areas over the past 10 years. It is the most distant growth area from central Melbourne and the only one located to the south or south-east of the city.

Based on recent government estimates, the Casey-Cardinia plan (DSE 2005a) provides enough land with a range of housing choices for new households, identifies the areas where new communities can be built and serviced, properly sets aside plenty of land to encourage businesses and industries to locate in or near the area to promote local job opportunities, and protects important streams and creeks, agricultural land and environmentally valuable areas.

The Minister for Planning has approved changes to the urban growth boundary that have been presented to Parliament for ratification. This will provide Casey-Cardinia with enough suitable land for housing, employment and commercial development and will ensure that environmental features are protected and preserved. In the Casey-Cardinia growth area 1,250 hectares of additional land will provide room for up to 85,000 new homes, while 2,500 additional hectares have been set aside to support industry and commerce, creating potential for up to 50,000 jobs.

1.2 Scope of Assessment

Specifically, the objectives of the flora and fauna assessment were to:

- Review the relevant flora and fauna databases (e.g. Atlas of Victorian Wildlife, Flora Information System) and available literature;
- Conduct a site assessment by a qualified botanist and zoologist to identify flora and fauna habitat values within the study area;
- Identify and provide a figure showing any significant communities or populations of indigenous flora and fauna species and/or important fauna habitat;
- Provide information in relation to any implications of Commonwealth and State environmental legislation and Government policy associated with the future development of the area;
- Recommend if targeted surveys for threatened flora and fauna species are required;

- Determine any potential impacts on ecological values at a national, state, regional and local level;
- Identify and describe measures which may be undertaken to avoid and/or mitigate against potential adverse impacts on flora and fauna values associated with future development of the area; and,
- Liaise with any key stakeholders (e.g. DSE, local government) when required

1.3 Study Area

The study area falls within the Casey-Cardinia Shires' new Urban Growth Boundary (UGB) as specified in the *Melbourne 2030: Casey-Cardinia Growth Area Final Report* recently released by the State Government (DSE 2005a). The report identifies areas within the two municipalities as potential residential and industrial zones for an increasing population. The report also stipulates that land within the UGB must be used as efficiently as possible due to developmental limitations in surrounding environmentally sensitive areas.

The study area is approximately 50 kilometres south-east of the Melbourne CBD (Melways ref. pp. 214 B3). It encompasses the area bounded by the Princes Freeway and Princes Highway to the north, Brunt Road to the east and Thomas Street to the west and roughly by the Pakenham Bypass to the south, (Figure 1). The study area to the north of the Gippsland Railway Line consists of recent Panorama residential development while south of the railway is predominantly privately owned pasture land, homesteads, and low density residential blocks.

While most of the study area is relatively flat, it gently slopes from north to south. There are several dams, ephemeral drainage lines and constructed wetlands and Cardinia Creek runs to the west and south of the study area.

According to DSE's Biodiversity Interactive Map (www.dse.vic.gov.au) the study area is within the Gippsland Plain Bioregion, which extends from Port Phillip Bay in the west to Bairnsdale in the east, between the southern slopes of the Great Dividing Range and Wilsons Promontory, excluding the Strzelecki Ranges.

The study area is within the municipality of Cardinia Shire Council and within the Port Phillip and Westernport catchment.

2 METHODS

2.1 Nomenclature

Common and scientific names of vascular plants follow the FIS (2008) and the Census of Vascular Plants of Victoria (Walsh and Stajsic 2007). Vegetation community names follow the DSE Ecological Vegetation Class (EVC) Benchmarks (www.dse.vic.gov.au).

Terrestrial and aquatic vertebrate fauna (mammals, birds, reptiles, amphibians and fish) follow the AVW (2008), data which is managed by DSE.

2.2 Literature Review

Information relating to EVC benchmarks for the study area was reviewed, and other relevant literature, such as Oates and Taranto (2001), was also referred to.

Aerial photography provided by the proponent was used for mapping purposes, whilst Google Earth (2007) was also accessed.

2.3 Database Searches

Both the FIS (2008) and AVW (2008), biological databases maintained by DSE, were reviewed to obtain a list of species previously recorded within 10 kilometres of the study area. The presence of EVCs within the study area was reviewed using DSE's Biodiversity Interactive Map (www.dse.vic.gov.au).

Information referring to matters (listed taxa and ecological communities, Ramsar wetlands, etc.) protected under the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999* was obtained from the Department of the Environment, Water, Heritage and the Arts (DEWHA) Protected Matters Search Tool: http://www.environment.gov.au/erin/ert/epbc/index.html.

2.4 Vegetation Assessment

A flora assessment was undertaken on 5 June 2008 with the aim of documenting the flora species and vegetation types within the study area. The entire site was assessed by car and on foot, with all vascular plants recorded, and the overall condition of vegetation noted. Planted trees and shrubs were not recorded unless they were seen to be naturally spreading on site.

A list of flora species observed was compiled (Appendix 2.1) and the location of significant species recorded. Vegetation mapping was undertaken during the field survey through aerial photograph interpretation and on-ground observations (Figure 2).

Remnant native vegetation in the study area was classified according to the EVC system by referring to DSE's pre-1750 and extant EVC mapping and their published descriptions (www.dse.vic.gov.au). Classification of native vegetation to EVC level involved matching

officially mapped areas with stands of vegetation observed on the site, and then comparing the observed structural and floristic characteristics with those given in EVC descriptions (e.g. regional reports and EVC Benchmarks). It should be noted that at finer scales EVC mapping becomes less clear and accurate due to the inherently broad environmental and ecological parameters used in the mapping process and as a result of site-specific factors such as disturbance and modification. Vegetation boundaries are rarely clear or distinct on the ground as natural vegetation has diffuse edges and different EVCs blend into each other over various scales (referred to as 'ecotonal boundaries').

The significance assessment criteria of taxa and vegetation communities are presented in Appendix 1.

2.5 Fauna Survey

A habitat assessment and fauna surveys were undertaken 8 May 2008 during warm conditions to obtain information on terrestrial fauna values within the study area.

Binoculars were used to scan the area for birds, and observers also listened for calls and searched for other signs such as nests, feathers, remains of dead animals, droppings and footprints. Active searching, including turning over logs, rocks and artificial cover, was undertaken to locate lizards and other small ground-dwelling fauna. Detailed fauna survey techniques, such as Elliott trapping, pit-fall trapping and roof tiling for ground dwelling species, were not undertaken during this assessment.

Habitat features, including ground cover composition and structure, and the presence of hollows and fallen ground debris was noted. The presence of hollows in isolated trees was also noted, as well as any other features likely to be important for fauna.

An inventory of all fauna species recorded during the survey, and a description of habitats and their overall quality, was also documented.

The significance assessment criteria of taxa are presented in Appendix 1.

2.6 Assessment Qualifications and Limitations

Terrestrial flora and fauna data collected during the field survey and information obtained from relevant sources (e.g. biological databases and relevant literature) were reviewed. This information was considered sufficient to provide an assessment of the ecological values within the study area, to determine the likely presence of significant taxa and communities, and any potential impacts of future proposed development.

Nevertheless, although the objective of the assessment was to document terrestrial flora and fauna species and communities within the study area, and to identify any potential impacts of future proposed development, an assessment of the interaction of species over a longer survey period was beyond the scope of this study. The duration of the survey meant that migratory, transitory or uncommon fauna species are likely to have been missed. Thus, it is possible that

a small number of additional fauna species of conservation significance may have been detected had the fauna assessment been conducted over a greater number of days.

Additionally, plant species cover and diversity varies with each season and across years, depending on the amount and timing of rainfall, on-site grazing pressure and fire events etc., and furthermore, the study area is recovering from severe drought conditions that have prevailed across Victoria during recent years. The winter survey was not optimal for identifying flowering plants, therefore some species may not have been recorded due to a lack of flower material. For these reasons, some species may be have missed, and it is recommended that targeted surveys for significant flora are undertaken during the relevant flowering periods.

3 RESULTS

3.1 Flora Species

Present assessment

A total of 103 plant taxa (47 indigenous, two native non-indigenous and 54 exotic) were recorded in the study area during the assessment (Appendix 2.1).

Planted trees and shrubs were not recorded unless they were seen to be naturally spreading on site.

Database searches and other information

Additional flora species have been recorded within the local area (i.e. within a 10 kilometre radius of the study area), or recorded as potentially occurring, or their habitats as potentially occurring, within the local area (FIS 2007; DEWHA Protected Matters Search Tool).

Significant flora species, as derived from respective Commonwealth and State databases, are listed in Appendix 2.2.

3.2 Ecological Vegetation Classes and Vegetation types

The site assessment indicates that there are remnants of two EVCs within the study area. These include:

- Swampy Riparian Woodland (EVC 83)
- Grassy Woodland (EVC 175)

Swampy Riparian Woodland (EVC 83) in the southern low-density residential part of the study area (Figure 2). This EVC is characterised by a woodland overstorey of Swamp Gum *Eucalyptus ovata* with an understorey dominated by Swamp Paperbark *Melaleuca ericifolia,* together with other shrub species, reeds, sedges, grasses and aquatic herbs (Oates and Taranto 2001). Swampy Riparian Woodland exists in small patches scattered through the southern portion of the study area, closer to Cardinia Creek, consistent with its general occurrence along low gradient streams and wetland systems in the Pakenham-Cardinia area (Oates and Taranto 2001).

Grassy Woodland (EVC 175) occurs predominantly within the south-western area along Gippsland Railway Line, Brunt Road, Rix Road and along property boundaries between Rix Road and Kenilworth Avenue (Figure 2). This EVC is characterised by an overstorey of Narrow-leaf Peppermint *Eucalyptus radiata* with an understorey comprised of grasses and herbs (Oates and Taranto 2001).

Although not a remnant patch of vegetation, an area of native vegetation has been recreated for the constructed artificial wetland on Brunt Road at the railway line, at the perimeter of the Panorama residential estate (Figure 2).

Extant DSE vegetation mapping suggests Swampy Riparian Woodland, Swampy Woodland, and Plains Grassland/Plains Grass Woodland mosaic occur within the study area; mostly along roadsides, creeks and drainage lines (DSE). However, pre-1750 vegetation mapping indicates that the area was once dominated by Swampy Woodland along the creeklines, and Plains Woodland / Plains Grassland mosaic on the higher elevations in the north, with Swampy Riparian Woodland buffering Cardinia Creek (DSE). However, field surveys suggest that the areas of Swampy Riparian Woodland once extended further from Cardinia Creek than the pre-1750 mapping suggests, which then blended into areas of Grassy Woodland. Field surveys also revealed that some areas mapped coarsely as remnant vegetation are planted areas of vegetation.

All of the above EVCs are currently listed as endangered within the Gippsland Plain Bioregion (PPWCMA 2006).

3.3 Vegetation Condition

A majority of the study area is highly modified and dominated by introduced flora species, particularly pasture grasses such as Sweet Vernal-grass *Anthoxanthum odoratum*, Wild Oat *Avena fatua*, Brome *Bromus* spp., Cocksfoot *Dactylis glomerata*, Panic Veldt-grass *Ehrharta erecta*, Paspalum *Paspalum dilatatum*, Kikyuy *Pennisetum clandestinum*, Toowoomba Canary-grass *Phalaris aquatica* and Rat's-tail Grass *Sporobolus africanus*. Other introduced species that are dominant, particularly along roadsides and waterways, include Blackberry *Rubus fruticosus*, and Hawthorn *Crataegus monogyna* and Soursob *Oxalis pes-caprae*.

Indigenous vegetation within the study area predominantly persists along roadside reserves and waterways, and as small scattered stands of remnant woodland on private property (Figure 2), however in most instances the understorey within these areas is highly modified and dominated by a dense groundcover of introduced pasture grasses. Descriptions of indigenous vegetation within sections of the study area are outlined below.

3.3.1 Gippsland Railway Line

The overstorey is dominated by Narrow-leaf Peppermint *Eucalytpus radiata* and Swamp Gum *Eucalyptus ovata*, and the understorey is dominated by Blackwood *Acacia melanoxylon* and Black Wattle *Acacia mearnsii* with occasional Cherry Ballart *Exocarpus cupressiformis* and Swamp Paperbark *Melaleuca ericifolia*. The groundstorey is a mixture of native grasses such as Weeping Grass *Microlaena stipoides var. stipoides*, Spear-grasses *Austrostipa spp.* and Slender Wallaby-grass *Austrodanthonia racemosa var. racemosa*, exotic grasses, Wild Watsonia *Watsonia spp.* and Blackberry *Rubus fruticosus spp. agg.*. However, high gradient areas that have escaped slashing have a higher number of native species, with Small Grass-tree *Xanthorrhea minor ssp. lutea,* Flax-lilies *Dianella spp.* and Spiny-headed Mat-rush *Lomandra longifolia* thriving in these areas.

Plate 1. Remnant Grassy Woodland at the western end of the Gippsland Railway Line, within the study area.

3.3.2 Remnant Swampy Riparian Woodland on private property

The canopy is dominated by Swamp Gum *Eucalyptus ovata*, Narrow-leaf Peppermint *Eucalyptus radiata*, and occasional emergent Manna Gum *Eucalyptus viminalis.* The majority of Swampy Riparian Woodland on private property are patches of trees with a cleared understorey, however with the exclusion of stock, there is a mix of exotic and introduced grasses in the groundstorey, including Weeping Grass *Microlaena stipoides var. stipoides* and Slender Wallaby-grass *Austrodanthonia racemosa var. racemosa.* The landowners have felled some dead trees, therefore expected cover of log and litter is adequate within this area. A small area of Swampy Riparian Woodland occurs in depressions and along drainage lines which are unsuitable for development. These wetter areas are exceptional in that they retain a modified understorey, dominated by Black Wattle *Acacia mearnsii* and Blackwood *Acacia melanoxylon*.

3.3.3 Rix Road

The canopy of Grassy Woodland along Rix Road is dominated by Narrow-leaf Peppermint *Eucalyptus radiata* with occasional Swamp Gum *Eucalyptus ovata*. The understorey is generally mown exotic grasses, with Spiny-headed Mat-rush *Lomandra longifolia* growing at the base of some canopy trees and occasional Black Wattle *Acacia mearnsii.* There is a large stand of planted Monterey Cypress *Cupressus macrocarpa* on the north side of Rix Road adjacent to the junction with Brunt Road.

3.3.4 Brunt Road

Along Brunt Road, the overstorey is dominated by Narrow-leaf Peppermint, and Swamp Gum *Eucalyptus ovata* and the understorey is dominated by Blackwood *Acacia melanoxylon* with

occasional Cherry Ballart *Exocarpus cupressiformis* and Swamp Paperbark *Melaleuca ericifolia*. The groundstorey is dominated by exotic pasture grasses (see cover photo).

The artificial wetland at the junction of Brunt Road and the Gippsland Railway Line has been planted with Swamp Paperbark *Melaleuca ericifolia*, Leafy Twig-sedge *Cladium procerum* and various rushes, which are regenerating prolifically at the eastern end of the wetland. Prostrate herbs growing within the artificial wetland include Blackberry *Rubus fruticosus spp. agg.* and Swamp Crassula *Crassula helmsii*, Slender Knotweed *Persicaria decipiens*.

Plate 2. Artificial wetland within the study area, on Brunt Road adjacent to railway line.

3.3.5 Cardinia Creek buffer

One small patch of Swampy Riparian Woodland trees, and two Very Large and four Large Old Scattered Trees occur on the floodplain of Cardinia Creek, and should be incorporated into the proposed buffer for the Creek. They comprise mature Swamp Gum *Eucalyptus ovata*, Narrow-leaved Peppermint *Eucalyptus radiata* and Manna Gum *Eucalytpus viminalis*.

3.4 Significant Flora Species and Communities

No national or state significant flora was recorded within the study area during the assessment. Significant flora species documented as occurring within the local area (i.e. 10 kilometres surrounding the study area), and their likely occurrence within the study area are listed in Appendix 2.2.

3.4.1 National

No nationally significant flora species are recorded within the study area, from the current assessment or any previous surveys. However, three nationally significant flora species have previously been recorded in the local area – Matted Flax-lily *Dianella amoena* and Clover Glycine *Glycine latrobeana* and Maroon Leek-orchid *Prasophyllum frenchii*. All three species have been recorded within the rail reserve immediately west of the study area (FIS 2007).

Four other nationally significant species not previously documented in the local area have habitat as potentially occurring within a 10 kilometre radius of the study area (DEWHA Protected Matters Search Tool). Due to the highly modified nature of a majority of the study area, it is unlikely that these species will occur. These species and their likelihood of occurrence are listed in Appendix 2.2.

3.4.2 State

One state significant flora species, Leafy Twig-sedge *Cladium procerum* was recorded during the current assessment. It has been planted around the artificial wetland on Brunt Road, and appears to be naturally spreading. Further, 25 state significant flora species have previously been recorded within the local area (Appendix 2.2). This includes the rare Green Scentbark *Eucalyptus fulgens* and the vulnerable Purple Diuris *Diuris punctata* var. *punctata* which have had the highest number of records within the local area (FIS).

In addition, the rare Veined Spear-grass *Austrostipa rudis* subsp. *australis* and Cobra Greenhood *Pterostylis grandiflora* have previously been recorded within close proximity to the study area (Figure 3). However, during the current assessment these species were not recorded within the study area.

State significant species previously recorded within the local area and their likelihood of occurrence are listed in Appendix 2.2.

3.4.3 Regional and local

Twenty-six regionally significant flora species were recorded within the study area during the assessment. All other indigenous species are considered to be of local significance due to the depletion of native vegetation in the local area.

3.4.4 Significant communities

There are no vegetation communities listed as threatened under the EPBC Act within the study area or within 10 kilometres of the study area (DEWHA Protected Matters Search Tool). There is also no vegetation communities listed under the FFG Act within the study area.

3.5 Fauna Species

Present assessment

The study area currently supports habitat for a range of native fauna species in both modified and natural remnant grassland and woodland habitat. Twenty-three fauna species were recorded, including one native mammal, 21 birds (17 native, four introduced) and one native frog (Appendix 3.1).

Database searches

Significant terrestrial fauna species derived from respective Commonwealth and State databases as occurring, or having the potential to occur within the study area is provided in Appendix 3.2.

There has been a high level of documented fauna survey effort in the local area, with over 1100 fauna surveys or incidental records of individual species occurring within a 10 kilometre radius of the study area. From these data there have been over 272 individual species documented, with a high survey sample of birds and a moderate number of species recorded for other fauna groups. Several of the species previously recorded on the AVW, which were not recorded during the present assessment, are likely to use habitats within the study area.

3.6 Faunal Habitats

The study area supports six broad habitat types: exotic grassland, drainage lines/depressions, human-made structures, created wetlands, remnant native woodland and scattered remnant trees. The value of each of these habitats for fauna ranges from low for exotic grassland, to moderate for remnant native woodland. A description of each habitat type and the species likely to occur within them is given below.

Exotic grassland

Description: Introduced, modified grassland is the dominant fauna habitat throughout the study area south of Gippsland Railway. This habitat occurs where remnant native vegetation has been cleared. Introduced grassland supports relatively few fauna species, none of which are dependent on such habitat. Given the extent of the modification of grassland habitat within the study area, and the number of introduced species, the value of this habitat for fauna within the study area is generally low.

Fauna: A number of species common to modified, grassy or open habitats were recorded during the current assessment including the native Australian Magpie, Little Raven, and Welcome Swallow. Introduced species such as Common Starling are common in this type of habitat, as are introduced mammals such as European Rabbit and Red Fox.

Drainage lines/depressions

Description: The drainage line/depression crossing Thomas Street on the western border of the study area varies in habitat quality along its length. The section west of Thomas Street (external to the study area) is grazed by horses; however it is of moderate habitat value with

native aquatic and fringing vegetation. The water is of medium quality and the drainage line appears to be permanent.

The section east of Thomas Street is of low habitat quality and is covered with indigenous and non-indigenous aquatic and semi-aquatic grasses and herbs. The water is quite low and is of medium quality.

Fauna: The section west of Thomas Street may provide habitat for the nationally significant Growling Grass Frog. While this section of the drainage line is technically outside of the study area, the known presence of Growling Grass Frog in the Officer area and the proximity of this potential habitat to the present study area suggest that Growling Grass Frog may be present, or utilise as a corridor, the drainage line east of Thomas Street (i.e. within the study area).

At times of high rainfall the drainage line in the study area could further provide breeding, foraging and refuge habitat for a suite of other native fauna, including waterbirds and a diversity of invertebrate species, as well as at least one frog species heard during the present assessment. However given its overall low habitat quality it is unlikely to support an ecologically important population.

Human made structures

Human made structures such as buildings dominate the northern half of the study area and may provide 'habitat' for some fauna species. Whilst several native and introduced species, such as House Sparrow, Common Turtle Dove and Rock Dove (feral pigeon), may take advantage of these structures for nesting, foraging and shelter purposes, it is of very low overall habitat value for fauna.

Created wetlands

Description: There are two created wetlands in the study area: one on the eastern border, just north of the Gippsland Railway (Wetland 1), the other at the southern-most end of the study area (Wetland 2) (see Figure 2).

Wetland 1 consists of several adjoining waterbodies which vary in habitat quality, east to west from low to high. The eastern-most waterbodies support varying levels of aquatic and semi-aquatic emergent, floating and fringing vegetation (sedges and reeds) and are of high habitat quality for the nationally-listed Growling Grass Frog. The western-most water body is fed by a drain and is quite disturbed. It supports some fringing vegetation however the water is turbid and polluted with rubbish.

Wetland 2 is a permanent waterbody, supporting some fringing, aquatic and semi-aquatic vegetation (sedges and reeds) and is of low to medium habitat quality for Growling Grass Frog.

Fauna: Despite their potential to form high quality habitat for Growling Grass Frog, previous surveys have not recorded the frog in either Wetland 1 or 2 (Aaron Organ *pers. comm.*).

Wetland 1 is unlikely to support populations of Growling Grass Frog in the near future as it is isolated from other waterbodies and recent residential development creates a barrier to dispersal of the species. While there are no recent records of Growling Grass Frog in Wetland 2, it is situated within 200 metres of Cardinia Creek. Furthermore an additional wetland is to be created to the east of Wetland 2 as part of the construction of a service centre along the Pakenham Bypass (Aaron Organ *pers. comm.*). These conditions make Wetland 2 a likely dispersal point for the Growling Grass Frog, provided the wetland is maintained in to the future.

It would be beneficial to the Growling Grass Frog to plant a diversity of emergent (excluding *Typha* spp.), submerged and floating (particularly *Potamogeton* spp.) vegetation in the wetland, while dense areas of low growing shrubs, sedges and grasses be planted around the perimeter of wetlands. If possible several additional wetlands or large permanent waterbodies could be created along Cardinia Creek to further support populations of the nationally listed species. These should be interconnected to each other to assist dispersal.

Wetlands within the study area also provide habitat for native waterbirds such as Pacific Black Duck *Anas superciliosa,* Australian Wood Duck *Chenonetta jubata.* They may provide habitat for the regionally significant Latham's Snipe *Gallinago hardwickii* however they are unlikely to form important or limiting habitat for the species.

Remnant native woodland

Description: Remnant native woodland dominated by eucalypts, acacia and tea-tree is present within the study area. This habitat occurs predominantly in the form of linear vegetation strips along roads, railways and drainage lines, and as windbreaks between adjoining properties. Such vegetation strips are frequently used as wildlife corridors, providing habitat and facilitating the movement of species throughout the landscape. See below for more information on the importance of wildlife corridors

Fauna: Although the majority of these trees do not support hollows, they may provide an important source of food for nectar-feeding woodland birds such as lorikeets, honeyeaters and wattlebirds. Such areas also provide shelter and dispersal habitat for a suite of native fauna, particularly in their role as wildlife corridors. They also provide nesting sites and vantage points for raptors and other open country birds (e.g. Australian Magpie, Brown Goshawk).

Common reptiles and frogs are also expected to use microhabitats under these trees, including leaf litter and coarse woody debris, for protection, breeding and in search of prey.

Species recorded from this habitat include Eastern Yellow Robin, Red Wattlebird, as well as the introduced Common Myna and Common Blackbird.

Scattered remnant trees

Description: Isolated remnant trees (River Red-gum and Grey Box) provide moderate habitat value for fauna. Many mature trees are scattered throughout the study area, several of which

support varying sized hollows. The native understorey vegetation has been totally removed and replaced by exotic grasses and weeds.

Few fauna are likely to use this habitat, primarily woodland birds and birds adapted to cleared landscapes. Tree hollows provide a valuable roosting, nesting and foraging resource for a suite of birds such as Sulphur-crested Cockatoo, and micro-bats. Remnant trees also provide nesting sites and vantage points for raptors and suitable foraging habitat for a range of insectivorous and nectar-feeding birds.

3.6.1 Notable Faunal Habitat Values

Wildlife Corridors

Wildlife corridors and 'stepping stones' of vegetation have numerous benefits to native fauna populations, particularly in modified landscapes where much of the surrounding vegetation is restricted to linear strips along roadsides or streams. They can, and often do constitute valuable habitat in their own right. Some of the key benefits of wildlife corridors associated with the maintenance of biodiversity on a local, and at a landscape level, include:

- protection and ongoing maintenance of ecosystem functionality through the reduction of threatening processes (erosion, weed spread, hydrological alterations);
- provision of habitat (refuge, shelter, breeding opportunities) for a range of fauna either residing within corridors, or moving through the landscape;
- the maintenance of species richness and diversity;
- the immigration of animals to supplement declining populations, thus reducing the likelihood of local extinctions;
- the availability of habitat for reintroduction following extinction events;
- the ability to prevent demographic changes occurring in populations that may result from prolonged isolation from other populations of the same species by aiding gene flow, thus enhancement of genetic variation and prevention of inbreeding, and
- facilitation of fauna movement through modified landscapes to more optimal habitats.

Of particular note as a wildlife corridor is along Brunt Road (the eastern border of the study area), along the Gippsland Railway and along Rix Road. Other corridors occur as strips delineating property boundaries (see Figure 2).

3.7 Significant Fauna

3.7.1 National

No nationally significant fauna species were recorded in the study area during the current assessment.

The AVW lists an additional nine fauna species of national conservation significance as occurring within the local area (Figure 4) (AVW 2007) (Appendix 3.2.).

Nationally listed fauna species include:

- Three mammals: Southern Brown Bandicoot, Grey-headed Flying-Fox and Spot-tailed Quoll;
- Three woodland/forest dependent bird species: Helmeted Honeyeater, Swift Parrot, Superb Parrot;
- One frog species: Growling Grass Frog; and,
- Two fish: Australian Grayling and Dwarf Galaxias.

An additional six species or habitat for these species (not previously documented on the AVW) are identified as potentially occurring within a 10 kilometre radius of the study area (DEWHA Protected Matters Search Tool) (Appendix 3.2).

A description of three nationally significant fauna species (Growling Grass Frog, Southern Brown Bandicoot and Dwarf Galaxias) which have either been recorded within the study area, or which have the potential to use habitats within the study area is provided below.

Growling Grass Frog ***Litoria raniformis***

Growling Grass Frog can often cause confusion as it is known by at least five common names, including the Growling Grass Frog, Warty Bell Frog, Southern Bell Frog, Warty Swamp Frog and Green and Golden Frog. This species is of national conservation significance and has declined markedly across much of its former range.

Conservation Status

Growling Grass Frog is a species of **national** conservation significance and has declined markedly across much of its former range. It is listed as 'vulnerable' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), 'endangered' in Victoria (DSE 2007), and threatened under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act).

An 'Action Statement' under the FFG Act has been developed for this species, which outlines the current threats to the species, and provides specific actions to protect and, where possible, increase populations in the future (Robertson 2003).

Distribution

Although formerly widely distributed across southern eastern Australia, including Tasmania (Littlejohn 1963, 1982; Hero *et al.* 1991), the species has declined markedly across much of its former range.

Historically, the Growling Grass Frog has been recorded from most regions of Victoria, with the exception of Mallee and Alpine areas (Littlejohn 1963, 1982; Hero *et al.* 1991). The known range of this species has contracted dramatically over the past two decades and in

many areas, particularly in south and central Victoria, populations have experienced serious declines and local extinctions (AVW; Organ pers. obs.). However, recent surveys of this species throughout the former Koo Wee Swamp and Pakenham area have revealed that the species is widely distributed throughout the area, with a number of relatively large populations present (principally in farm dams) (A. Organ pers. obs.).

Over recent years the species has received much attention, primarily due to its national significance rating, and several populations throughout the greater Melbourne region have been extensively studied (Williams 2001, 2002; Organ 2002a, 2002b, 2003a, 2003b; Robertson *et al.* 2002; Heard *et al.* 2004a).

Habitat Requirements

Growling Grass Frog is largely associated with permanent or semi-permanent still or slow flowing waterbodies (i.e. streams, lagoons, farm dams and old quarry sites) (Hero *et al.* 1991; Barker *et al.* 1995; Cogger 1996; Ashworth 1998). Frogs can also utilise temporarily inundated waterbodies (i.e. ephemeral waterbodies) for breeding purposes provided they contain water for at least three to four months over the breeding season (Organ 2003a). A detailed review of the current information on the biology and ecology of the Growling Grass Frog is provided by Pyke (2002).

Spatial dynamics

Waterbodies supporting the above mentioned habitat characteristics and which are located within at least 200 - 500 metres of each other are more likely to support a population of the Growling Grass Frog, compared with isolated sites lacking important habitat features.

Indeed, recent studies have revealed that the spatial orientation of waterbodies across the landscape is one of the most important habitat determinants influencing the presence of the species at a given site (Robertson *et al.* 2002; Heard *et al.* 2004a, 2004b). For example, studies have shown there is a positive correlation between the presence of the species and the distance of waterbodies to another occupied site. This is comparable to the spatial dynamics of many amphibian populations, including the closely related Green and Golden Bell Frog *Litoria aurea* (Hamer *et al.* 2002), in which a waterbody is more likely to be occupied if it is in close proximity to an occupied waterbody. This observation, and the highly mobile nature of the Growling Grass Frog, suggests that dispersal among waterbodies is likely to be an important activity in the life history of the species.

It appears that populations are invariably structured as metapopulations (i.e. local populations form a series of discrete sub-populations), whereby movement between waterbodies would occur as habitat conditions change over time (e.g. when waterbodies dry out).

Unhindered movement between and within waterbodies is also likely to be important for the Growling Grass Frog on a spatial and temporal scale, and would be important for the long-term viability of (meta-) populations throughout the Pakenham and Officer area (Organ 2005). The loss of waterbodies of high habitat quality from the landscape not only reduces the

number of potential breeding sites (i.e. sources), but may also increase the distance between occupied sites. This potentially places the remaining occupied sites at greater risk of extinction from stochastic processes (e.g. drought, disease) because such sites cannot be easily recolonised, as frogs have to move further.

Regardless of proximity to other known occupied sites, habitat characteristics at a particular waterbody need to be suitable for the species to occupy the area. Submerged and floating vegetation are considered two important habitat features for *the* Growling Grass Frog (Robertson *et al.* 2002; Pyke 2002). Similarly, emergent vegetation is considered important as they provide suitable sites where frogs can bask or seek refuge during the day. Nevertheless, the key habitat attribute influencing the species at a given site throughout the Pakenham area is the presence of extensive areas of floating vegetation, primarily Blunt Pondweed *Potamogeton ochreatus* and Sago Pondweed *Potamogeton pectinatus*. Habitat complexity such as variation in hydrological processes (water depth, flooding frequency, ephemerality/permanency) and the type and location of refuge sites are also important for this species.

Breeding habitat

Growling Grass Frog is an opportunist in its choice of breeding sites and may use waterbodies of varying permanency (i.e. ephemeral, semi-permanent) to breed, although permanent waterbodies are usually required for successful breeding due to the relatively long larval development times, which may be several months or some tadpoles may over-winter and metamorphose in the following season. However, waterbodies need to contain suitable vegetative structure for the species to breed, including sufficient areas of emergent and submerged vegetation.

The species has been recorded breeding in a variety of ephemeral waterbodies around metropolitan Melbourne, southern New South Wales and Tasmania (AMBS 2000; Organ 2001, 2002a, 2003a; Williams 2001).

Occurrence within the study area

Growling Grass Frog has been recorded throughout the Officer region, with recent records placing the species within three kilometres of the study area (Ecology Partners 2008; Yugovic *et. al.* 2006). There is a concentration of records within the Cardinia Road Employment Precinct, over the past five years and the populations throughout Officer and Pakenham are of **national** conservation significance (Timewell 2003; Organ 2004; Organ 2005; Hamer and Organ 2006) (Figure 4). Ongoing monitoring of populations within the study area and primarily throughout the Cardinia Road Employment Precinct has continued over the 2007/08 breeding period. Preliminary results reveal that populations continue to decline throughout the study area.

Given the close proximity of the species it would be prudent to undertake a targeted Growling Grass Frog assessment in drainage lines and wetlands within the study area at an optimal time of the year to ascertain its presence.

Southern Brown Bandicoot ***Isoodon obesulus obesulus***

Description

Southern Brown Bandicoot has coarse brindled dark grey to yellow-brown fur on its back, with creamy white feet and underbelly. Ears are short and rounded, barely extending above the head. Animals tend to be 28-35 centimetres in length (head-body), with an 8-13 centimetre long tail. Females weigh 400-1000 grams, whilst males weigh 500-1500 grams (Menkhorst and Knight, 2004).

Southern Brown Bandicoots are solitary and nocturnal, usually foraging alone, and their diet consists largely of soil invertebrates, seeds and underground fungi.

Breeding is usually seasonal, with most births occurring between July and December. Young remain in the pouch for two months, and become sexually mature at seven months, with females able to give birth to over eight young per year. The death rate of juveniles is usually high, while adults may live up to 3.5 years (Strahan 2004).

The Southern Brown Bandicoot is listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999*, and is listed as near threatened in Victoria (DSE 2007) and under the *Action Plan for Australian Marsupials and Monotremes* (Maxwell *et al.* 1996). It may be found in most mainland States and Tasmania, but has a very patchy distribution, even in continuous habitat, and occurs in a series of regionally isolated populations.

In Victoria, it has been found on coastal or fluvial plains, rarely more than 50 kilometres from the coast (Menkhorst and Seebeck 1990).

Occurrence within the study area

Despite active searching during the current surveys there was no evidence of this species within the study area.

There have been two documented records of this species within the local area (AVW) however these are at least eight kilometres south-west of the study area with the most recent recorded in 1977 (Figure 4). Habitat (albeit low quality) for the Southern Brown Bandicoot exists along Cardinia Creek to the south of the study area (Ecology Partners 2008) however there is a low likelihood that Southern Brown Bandicoot could occur within the study area.

Dwarf Galaxias ***Galaxiella pusilla***

Description

This relatively small (20-40 millimetres), short-lived fish is often found in shallow water amongst heavy vegetation at the edges of still, or slow flowing water (Allen *et al.* 2002).

Is inhabits a range of waterbody types including small ponds, billabongs, swamps, backwaters and drains. The Dwarf Galaxias rarely occurs in areas where the introduced Plague Minnow *Gambusia holbrooki* has become established, and this species is often only found in

ephemeral wetlands. It has a patchy distribution within its range, and whilst it may be locally abundant in a few areas it has suffered greatly from loss of habitat due to drainage of wetlands and the spread of Plague Minnow.

The species was once widespread throughout southern Victoria in slow flowing creeks, lagoons, swamps and seasonally ephemeral habitats. Because of its decline the species is listed as vulnerable under the EPBC Act and listed as protected under the FFG Act 1988.

Occurrence within the study area:

This species has been recorded in the headwaters of Cardinia Creek and may occur throughout the Cardinia Creek floodplain (Figure 4). Extensive surveys of Toomuc, Gum Scrub and Deep Creeks have not found any evidence of Dwarf Galaxias (John McGuckin pers. comm.). Consequently, this species is also unlikely to occur within the study area.

3.7.2 State

No state significant fauna were recorded within the study area during the current assessment.

Seventeen state significant fauna have previously been documented from within 10 kilometres of the study area on the AVW (Appendix 3.2). Previously recorded state significant species include:

- Three nocturnal raptors: Powerful Owl, Barking Owl and Sooty Owl;
- One diurnal raptor: White-bellied Sea-Eagle;
- Eight wetland dependent birds: Australian Shoveler, Blue-billed Duck, Freckled Duck, Hardhead, Lewin's Rail, Musk Duck, Baillon's Crake and Royal Spoonbill;
- Two egret species: Intermediate Egret and Great Egret;
- One tern species and one migratory shorebird: Caspian Tern and Common Sandpiper;
- One frog species: Southern Toadlet;

There is sub-optimal habitat for very few state significant species. For example, Great Egret may occasionally use farm dams, drainage lines and other low lying areas within the study area. However, there is no important or limiting habitat for these species, or any other species of state conservation significance, within the study area. The likelihood of these species occurring in the study area is provided in Appendix 3.2.

3.7.3 Regional and local

No regionally significant fauna species were recorded during the present assessment however recent assessments have recorded Latham's Snipe in close proximity to the study area (Ecology Partners 2008; Yugovic *et. al.* 2006)

Ten regionally significant fauna species have previously been recorded from within 10 kilometres of the study area on the AVW (Appendix 3.2). Previously recorded state significant species include:

- One mammal: Broad-toothed Rat
- Six wetland dependent birds: Latham's snipe, Whiskered Tern, Pied Cormorant, Cape Barron Goose, Pectoral Sandpiper
- Two woodland dependent birds: Brown Tree creeper, Spotted-Quail Thrush
- One raptor: Spotted Harrier
- One fish: River Blackfish

The likely use of the study area by these species is provided in Appendix 3.2. There is no important or limiting habitat for any species of regional conservation significance within the study area.

All other native fauna (primarily grassland dependent birds) are of local significance, as they are not listed as rare or threatened on a national, state and/or regional level.

4 ECOLOGICAL SIGNIFICANCE OF STUDY AREA

The significance assessment criteria of flora and fauna species and vegetation communities are presented in Appendix 1.

Roadsides and waterways within the study area containing indigenous vegetation are considered to be of **regional** conservation significance due to: i) the presence of at least 26 regionally significant flora species within the Gippsland Plain Bioregion; ii) the presence of two EVCs considered endangered within the Gippsland Plain Bioregion; and iii) the presence of continuous vegetated corridors along roadsides and waterways which provide important habitat for flora and fauna species and which facilitates the movement of fauna across the landscape.

The study area and immediate surrounds could be of **national** conservation significance for the Growling Grass Frog. Key areas of national conservation significance for the species include waterbodies which are known to be, or likely to be suitable for breeding and recruitment, and also creeks and drainage lines which are likely to be used during dispersal. Sites where the Growling Grass Frog has previously been recorded are provided in Figure 4.

4.1 Reasons for Significance

The conservation significance for the study area has been assigned for the following reasons:

- Presence of at least two EVCs considered endangered within the Gippsland Plain Bioregion;
- Presence of at least 26 flora species considered regionally significant within the Gippsland Plain Bioregion, as well as other locally significant indigenous flora species;
- Presence of continuous vegetated corridors along roadsides which provide vital habitat for flora and fauna species and a means of migration across the region;
- The relatively high vegetation depletion rates within the local Pakenham and Officer areas;
- Suitable habitat for a nationally significant population of the Growling Grass Frog; and,
- Suitable habitat for several national, state and regionally significant fauna species, primarily the Dwarf galaxias (Cardinia Creek), Latham's Snipe and several waterbirds which are likely to use farm dams within the study area.

5 ENVIRONMENTAL LEGISLATION AND POLICY

This section identifies the implications of the findings in regards to environmental policy and legislation relevant to the proposed development, principally:

- *Environment Protection and Biodiversity Conservation* (EPBC) (Commonwealth);
- *Flora and Fauna Guarantee* (FFG) (Victoria);
- *Planning and Environment Act 1987* (Victoria);
- *Catchment and Land Protection* (CALP) *Act 1994* (Victoria);
- Melton Shire Council;
- Victoria's Biodiversity Strategy 1997;
- Port Phillip and Westernport Native Vegetation Plan (2006); and,
- Victoria's *Native Vegetation Management Framework* (Net Gain Policy).

5.1 *Environment Protection and Biodiversity Conservation Act 1999*

The EPBC Act establishes a Commonwealth process for assessment of proposed actions that are likely to have a significant impact on matters of national environmental significance, or on Commonwealth land. An action (i.e. project, development, undertaking, activity, or series of activities), unless otherwise exempt, requires approval from the Commonwealth Environment Minister if they are likely to have an impact on any matters of national environmental significance. A referral under the EPBC Act is required if a proposed action is likely to have a 'significant impact' on any of the following seven matters of national conservation significance:

- World Heritage properties
- National heritage places
- Ramsar wetlands of international significance
- Threatened species and ecological communities
- Migratory and marine species
- Commonwealth marine area
- Nuclear actions (including uranium mining)

5.1.1 Relevant Matters of National Environmental Significance

World Heritage properties and national heritage places

The study area is not located within or near a world heritage property or national heritage property.

Ramsar wetlands of international significance

The DEWHA Protected Matters Search Tool (http://www.environment.gov.au/erin/ert/epbc/index.html) identified one wetland of international significance - Edithvale-Seaford Wetlands - as occurring within the same catchment as the study area and one wetland of international significance – Western Port Bay - as occurring within 10 kilometres of the study area. The Edithvale-Seaford Wetlands are unlikely to be impacted by any development within the study area due to their distance from Officer (approx. >30 km) and lack of connection to Officer via waterways.

However, Cardinia Creek and Toomuc Creek flow directly into Western Port Bay and proposed developments within the study area should ensure that no sediments or toxic pollutants enter the creek system and therefore Western Port Bay. Best Practise sedimentation and pollution control measures (to EPA standard) should be carried out and enforced within the study area to ensure this internationally significant wetland system is not adversely affected by upstream development.

Listed flora and fauna species, and ecological communities

An action requires approval from the Commonwealth Environment Minister if it will, or if it is likely to, have a significant impact on an endangered or critically endangered species, or on an 'important population' or critical habitat of a listed vulnerable species.

Flora: No nationally significant flora species were recorded during the current assessment. However three nationally significant flora species have previously been recorded within the local area – Matted Flax-lily *Dianella amoena,* Clover Glycine *Glycine latrobeana* and Maroon Leek-orchid *Prasophyllum frenchii*. No nationally significant species have previously been recorded within the study area (FIS 2007). Four other species, or their habitat(s), are predicted to occur within a 10 kilometre radius of the study area (DEWHA Protected Matters Search Tool). Due to the highly modified nature of much of the study area, it is unlikely that these species will occur.

Communities: The remnant native vegetation within the study area is not part of a listed ecological community under the EPBC Act.

Fauna: No nationally significant fauna was recorded in the study area during the present assessment. There may be suitable habitat for the nationally significant Growling Grass Frog. The region east of the study area, particularly the Cardinia Road Employment Precinct, supports a nationally significant population of this species (Organ 2004).

A small number of additional EPBC Act-listed fauna (e.g. Latham's Snipe, Grey-headed Flying-fox) may use habitats within the study area.

Habitat for additional EPBC Act-listed species is also predicted to occur, either in, or within a 10 kilometre radius of, the study area (DEWHA Protected Matters Search Tool) (Appendix 3.2).

Listed migratory and marine species

Migratory and marine species recorded during the present survey, or that have been recorded within the local area are presented in Appendix 3.1.

No migratory or marine species were recorded from the study area during the present assessment (Appendix 3.2). While a small number of migratory and marine species are likely to occupy habitats within the study area on occasions, the study area does not provide habitat for an ecologically significant proportion of any of these species.

Implications for the proposed development

No EPBC listed flora or fauna species, vegetation communities or any other matters of national significance were recorded within the study area. As such, based on available information (i.e. previous data and information, and the results of the current field assessments) an EPBC Act referral to the Commonwealth Environment Minister is not required for the proposed development.

5.2 *Flora and Fauna Guarantee Act* 1988

The primary legislation for the protection of flora and fauna in Victoria is the FFG Act. The Act builds on broader national and international policy in the conservation of biodiversity.

The broad objectives of the FFG Act are to: 1) ensure native flora and fauna survive, flourish and maintain in situ evolutionary potential; 2) manage threatening processes; 3) encourage the conserving of flora and fauna through cooperative community endeavours; and 4) establish a regulatory structure for the conservation of flora and fauna in Victoria.

The Act contains protection procedures such as the listing of threatened species and/or communities of flora and fauna, and the preparation of action statements to protect the long-term viability of these values.

Flora: No flora species listed under the FFG Act were recorded during the current assessment. However four FFG-listed flora species have previously been recorded within the local area – Clover Glycine, Maroon Leek-orchid, Grey Billy-buttons and Purple Diuris. It is unlikely that Clover Glycine and Grey Billy-buttons occur within the study area due to the highly modified nature of the vegetation present, however targeted surveys should be undertaken for Purple Diuris and Maroon Leek-orchid during their respective flowering periods.

Vegetation Communities: There are no vegetation communities listed under the FFG Act within the study area.

Fauna: No FFG Act listed fauna was recorded within the study area during the assessment. Several FFG Act-listed fauna species have previously been recorded from within the local area (i.e. in a 10 kilometre radial of the study area) (Appendix 3.2). A small number of these species (primarily waterbirds) may use habitat resources within the study area on occasions.

Threatening processes: Threatening processes listed under the FFG Act applicable to future development within the study area include:

- Alteration to the natural flow regimes of rivers and streams (through soil disturbance or increased run-off into waterways within study area);
- Habitat fragmentation as a threatening process for fauna in Victoria (through roadside and waterway vegetation removal and/or disturbance);
- Increase in sediment input into Victorian rivers and streams due to human activities (through construction works and increased run-off in or around waterways);
- Input of toxic substances into Victorian rivers and streams (through construction works in or around waterways);
- Invasion of native vegetation by Blackberry *Rubus fruticosus* L. agg (through increased soil disturbance and potential human dispersal of seed);
- Invasion of native vegetation by "environmental weeds" (through increased soil disturbance and potential dispersal of weed material through increased human trampling and construction machinery);
- Loss of coarse woody debris from Victorian native forests and woodlands (through firewood collection by nearby residents);
- Loss of hollow-bearing trees from Victorian native forests (through increased mortality due to drought conditions, and subsequent felling by landowners);
- Predation of native wildlife by the cat, *Felis catus* (through increased presence of cats due to residential development);
- Predation of native wildlife by the introduced Red Fox *Vulpes vulpes*;
- Reduction in biomass and biodiversity of native vegetation through grazing by the Rabbit *Oryctolagus cuniculus*;
- Removal of wood debris from Victorian streams (through waterways disturbance);
- Spread of *Pittosporum undulatum* in areas outside its natural distribution;

- Use of *Phytophthora*-infected gravel in construction of roads, bridges and reservoirs (through construction works); and,

- Wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing (through alterations and filling in of dams and low-lying areas within study area).

Implications for the proposed development

No flora species, fauna species or vegetation communities listed as 'threatened' under the FFG Act were recorded within the study area, however several flora and fauna species listed as 'protected' under the FFG Act have been previously recorded. Targeted surveys are recommended for Listed species likely to occur within the study area such as Maroon Leek-orchid and Purple Diuris, to determine whether an FFG permit is required from DSE to disturb or remove protected species prior to any construction works commencing on public/crown land. Potential threatening processes listed under the FFG Act (see above) will also need to be considered during the planning and development phases.

5.3 *Planning and Environment Act* 1987

All planning schemes contain native vegetation provisions at Clause 52.17. A planning permit is required under the *Planning and Environment Act 1987* to remove, destroy or lop native vegetation on a site of more than 0.4 hectares and also along roadsides within the study area, unless:

- The application is exempt under the schedule to Clause 52.17
- A Native Vegetation Precinct Plan applies.

Planning schemes may contain other provisions in relation to the removal of native vegetation.

Recent changes to the planning provisions (DSE 2006a, DSE 2006b) have altered the criteria for when DSE is the mandatory referral authority.

A permit must be referred to DSE if there is one or more of the following:

Scattered Trees (may include trees from patches of vegetation)

- Greater than 15 trees with a diameter less than 40 centimetres at 1.3 metres above ground.
- Greater than 5 trees with a diameter more than 40 centimetres at 1.3 metres above ground.

Areas of vegetation (may include trees)

- Greater than 0.5 hectares of vegetation in an Ecological Vegetation Class with Bioregional Conservation Status of Endangered, Vulnerable or Rare.
- Greater than 1 hectare of vegetation in an Ecological Vegetation Class with Bioregional Conservation Status of Depleted or Least Concern.

Other circumstances

- On Crown land managed by the responsible authority.
- Where a property vegetation plan applies to the site.

Implications for the proposed development

The Officer Structure Plan – Native Vegetation Precinct Plan currently being prepared will exclude the need for Planning Permits to clear/disturb native vegetation within the study area.

5.4 Wildlife Act 1975 and Wildlife Regulations 2002

Wildlife Act 1975

The *Wildlife Act 1975* is the primary legislation in Victoria providing for protection and management of wildlife. The Act requires people engaged in wildlife research (e.g. fauna surveys, salvage and translocation activities) to obtain a permit under the Act to ensure that these activities are undertaken in a manner consistent with the appropriate controls.

The *Wildlife Act 1975* has the following objectives:

- To establish procedures for the promotion of protection and conservation of wildlife, the prevention of species extinctions, and the sustainable use and access to wildlife; and,
- To prohibit and regulate the conduct of those involved in wildlife related activities.

Wildlife Regulations 2002

The objectives of the Wildlife Regulations are:

- To make further provision in relation to the licensing system established by section 22 of the *Wildlife Act 1975*;
- To prescribe fees, offences, royalties and various other matters for the purposes of the *Wildlife Act 1975*; and,
- To provide for exemptions from certain provisions of the *Wildlife Act 1975*.

Authorisation for habitat removal may be obtained under the Wildlife Act; through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*.

Implications for the proposed development

While a permit will be required for removal of habitat within the study area, this could be in the form of a permit to remove native vegetation under the *Planning and Environment Act 1987*. Consequently, a separate permit to remove fauna for this project under either the *Wildlife Act 1975* or the *Wildlife Regulations 2002* is unlikely to be required if permission under the *Planning and Environment Act* is obtained.

5.5 *Catchment and Land Protection Act* 1994

The CALP Act contains provisions relating to catchment planning, land management, noxious weeds and pest animals.

This Act also provides a legislative framework for the management of private and public land and sets out the responsibilities of land managers, stating that they must take all reasonable steps to:

- Avoid causing or contributing to land degradation which causes or may cause damage to land of another land owner;
- Protect water resources;
- Conserve soil;
- Eradicate regionally prohibited weeds;
- Prevent the growth and spread of regionally controlled weeds; and
- Prevent the spread of, and as far as possible eradicate, established pest animals

Essentially the Act establishes a framework for the integrated management and protection of catchments, and provides a framework for the integrated and coordinated management, which aims to ensure that the quality of the State's land and water resources and their associated plant and animal life are maintained and enhanced.

Implications for the proposed development

Any infestation of noxious weeds which may become established after the development should be appropriately controlled in areas of native vegetation to minimise their spread and overall impact on ecological values.

There are currently 11 declared noxious weeds and four Weeds of National Significance (WON) present within the study area (Appendix 2.1). All attempts should be made to control and minimise their spread. In addition, increased levels of sediment should not enter any drainage lines or creeks as a result of construction works.

5.6 Cardinia Shire Council Planning Scheme

Under the Cardinia Planning Scheme, the study area north of the railway line is Residential Zone, between the railway line and Rix Road is Low Density Residential Zone, and south of Rix Road to the Pakenham Bypass is Farming Zone. There may be small sections of the Public Conservation and Resource Zone on Cardinia Creek included by the southern boundary of the study area. The Gippsland Railway line is zoned as Public Use Zone 4 – Transport.

Additionally, there are two overlays pertaining to native vegetation within the study area. A Vegetation Protection Overlay (VPO) covers the Low Density Residential Zone. Under Schedule 1 to the VPO, the vegetation projection objective for this area is:

- To protect and conserve existing vegetation as an important element of the character of low density residential areas.

An Environmental Significance Overlay applies to the railway reserve bisecting the study area, the open space at 24 Brunt Road, a large area in the south-east corner of the Low Density Residential Zone, and at the junction of the Pakenham Bypass with the Cardinia Creek corridor. Under Schedule 3 to the ESO, the environmental objectives for these areas are:

- To ensure that the habitat values of the site are not diminished by the incremental removal of vegetation or inappropriate development; and,
- To ensure that any new development is sensitively designed and sited to reinforce the existing environmental characteristics of the area.

Implications for the proposed development

A Vegetation Precinct Plan is currently being prepared for the Officer Structure Plan, therefore a permit will not be required to clear/disturb native vegetation within the study area. There may be further requirements pertaining to the ESO and VPO that may restrict development activities within the study area in the future.

5.7 Victoria's Biodiversity Strategy

The Victorian Government endorses this strategy titled 'Victoria's Biodiversity – Directions in Management (NRE 1997) and represents a benchmark for biodiversity conservation and management throughout the state.

The Biodiversity Strategy encourages Victorians to better understand and appreciate flora and fauna and ecosystems throughout the state, and to take an active part in conservation and management to ensure biodiversity is managed in an ecologically sound and sustainable manner.

5.8 Port Phillip and Westernport Native Vegetation Plan 2006

The Port Phillip and Westernport Native Vegetation Plan (PPWCMA 2006) is a guide for local government in assessing planning applications for vegetation removal and determining permit conditions (Net Gain requirements) to ensure that ecological values across the region are not compromised.

The Plan provides information on biodiversity values across the Region and gives guidance to local municipalities on how clearing applications should be assessed. The document also outlines actions to ensure there is a more strategic and coordinated approach to address ongoing degradation in quantity and quality of native vegetation throughout Victoria.

The recommendations above, made in the *Native Vegetation Plan*, should be taken into consideration in the planning phase of any proposed development within the study area.

Implications for the proposed development

The planning for the proposed Officer Precinct should address the key recommendations outlined under the Port Phillip and Westernport Native Vegetation Plan (PPWCMA 2006).

Vegetation within the study area can be evaluated using the guidelines for conservation significance assessment and application of the Net Gain approach to regional outcomes and local responses (PPWCMA 2006). Management actions pertinent to the proposed development would need to be consistent with the management priorities provided in the Port Phillip and Westernport Native Vegetation Plan, and these actions would need to be articulated in a detailed environmental management plan.

5.9 The Native Vegetation Framework

Since 1989, most proposals to clear native vegetation have required a planning permit from the local Council (Responsible Authority), under the native vegetation provisions of Clause 52.17 of the Victoria Planning Provisions ('VPPs'). In 2002, the Victorian Government released *Victoria's Native Vegetation Management – A Framework for Action* (NRE 2002) ('the Framework'), which establishes a "strategic direction for the protection, enhancement and revegetation of native vegetation across the State".

Amendment (VC19) to Victoria's Planning Provisions introduced the Framework in July 2003 as an incorporated document for all Victorian Planning Schemes. Clauses 11 and 15.09 in the State Planning Policy Framework provide the framework for considering native vegetation issues in the planning system.

These clauses require planning and responsible authorities to have regard to the Framework, which establishes the strategic direction for the protection, enhancement and revegetation of native vegetation across Victoria.

5.9.1 Net Gain

The Framework states that the primary goal is to achieve:

> *"a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a Net Gain" (NRE 2002).*

Net Gain is the overall outcome where native vegetation and habitat gains are greater than the losses and where losses are avoided, where possible.

5.9.2 Applying Net Gain – The Three Step Approach

When Net Gain is considered for potential impacts on native vegetation within all planning schemes, the Framework has defined a three-step approach for applying Net Gain to protection and clearance decisions. The three-step approach is:

1. To avoid adverse impacts, particularly through vegetation clearance.

2. If impacts cannot be avoided, to minimise impacts through appropriate consideration in planning processes and expert input to project design or management.
3. Identify appropriate offset options.

The three-step approach to Net Gain is the first consideration for all planning permit applications and planning scheme amendments, with emphasis placed on the first two steps of avoidance and minimisation. Only after these two steps have been taken should offsets (actions undertaken to achieve commensurate gains in vegetation loss) be considered (NRE 2002).

5.9.3 Measurement of Net Gain outcomes

The Framework introduces a combined quality-quantity measuring system called the 'Habitat Hectare', which can assist with applying Net Gain outcomes for native vegetation (DSE 2004, Parkes *et al.* 2003). Generally this system can 'measure' the native vegetation and be used to calculate potential losses and gains over a specified area and period of time, of both vegetation patches (where the understorey has a greater than 25% benchmark cover of indigenous species) and trees (in patches or parcels).

Once the overall losses are known, then offset objectives can be calculated according to Table 6 of the Framework (NRE 2002) and considering the regional Native Vegetation Plans. Offsets for any permitted vegetation loss can be achieved by improvements in the quality or extent of native vegetation in a selected 'offset area'.

Implications for the proposed development

Indigenous vegetation patches and scattered trees that fit the Net Gain criteria have been identified within the study area. A formal habitat hectare assessment has been undertaken as part of the Officer Structure Plan – Native Vegetation Precinct Plan. This will address the requirements under the Victorian Government's *Victoria's Native Vegetation Management – A Framework for Action*. The Native Vegetation Precinct Plan will be an incorporated document in the Cardinia Shire Planning Scheme.

6 POTENTIAL IMPACTS

Any loss of ecological values should be viewed in the overall context of ongoing loss, fragmentation, and deterioration in the quality of remnant vegetation throughout the local area and beyond.

Any proposed development within the study area is likely to have several impacts on the indigenous flora and fauna species.

Potential direct impacts to ecological values within the study area include:

- Loss and/or disturbance to two EVCs listed as endangered within the Bioregion (Grassy Woodland and Swampy Riparian Woodland);
- Decreases in population sizes of local flora species, including 26 flora species considered significant to the region as well as flora species considered significant to the local area;
- Loss and/or disturbance to remnant scattered trees and planted native vegetation;
- Disturbance and/or modification to the ecological function and habitat of existing waterways and drainage lines within the study area;
- Loss and/or disturbance to moderate to good quality native vegetation in a region that is mostly devoid of remnant native vegetation;
- Removal and isolation of suitable habitat for the nationally threatened Growling Grass Frog;
- Loss of suitable habitat for state significant fauna including Great Egret, Hardhead, Blue-billed Duck and Australasian Shoveler and regionally significant fauna such as Latham's Snipe.
- Increased soil disturbance and compaction which may have a negative impact on remnant native trees (roots) within the study area;
- Loss of hollow-bearing trees and coarse woody debris which are used by a suite of woodland species;
- Ongoing fragmentation and incremental loss of remnant native vegetation, which will lead to the ongoing degradation of surrounding areas supporting remnant native vegetation and fauna habitats; and,
- Decreases in population sizes of local flora and fauna species.

Indirect effects are also possible if construction activities are not appropriately managed, and these include:

- Fragmentation and loss of native vegetation connectivity within the landscape which is vital for flora and fauna survival and migration. There is also a high likelihood that connection of suitable waterbodies used by nationally significant Growling Grass Frog may become compromised, thus increasing the likelihood

of local extinctions of this species;

- An increase in the level of predation by domestic cats and increase level of noise disturbance by residences dogs, which will impact local fauna populations.
- Increases in the area of hard surfacing resulting in increased runoff, nutrient levels and sediment movement, particularly during the construction phase;
- Sedimentation and pollution of waterways which can further affect waterways and Western Port Bay downstream as well as aquatic organisms;
- Soil disturbance and compaction;
- Inappropriate landscape plantings along roadsides, in areas of open space, and as part of residential developments, which could increase the spread of weeds in the study area and beyond;
- Potential for further spread of weeds and soil pathogens from on-site activities and subsequent degradation of remaining native vegetation;
- Disturbance to wildlife from increased human activity, and increased noise during construction;
- Uncontrolled human access to the wetland areas within the study area, which may result in the disturbance to vegetation from trampling and introduction of weeds.
- Increased mortality to fauna during construction and road works through roadkill (i.e. increased traffic); and,
- Trapping of ground dwelling fauna in trenches during construction; this may lead to the subsequent mortality of fauna.

In addition, several positive impacts have the potential to occur as a result of the future development of the study area. For example, the removal of cattle may enable regeneration of indigenous vegetation in areas reserved for open space, parkland, or areas which will be managed sorely for conservation. Implementation of a weed management plan may also improve the quality of indigenous vegetation within the study area, while the overall cover of vegetation (both native and exotic) is likely to provide habitat for fauna, primarily birds adapted to urban areas.

7 MITIGATION MEASURES AND OPPORTUNITIES

7.1 Mitigation Measures

There are several measures that can be incorporated into the proposed development design to reduce the potential adverse impacts on indigenous vegetation that may result from residential and industrial development within the Officer Precinct.

Other amelioration measures can be aimed at minimising the potential impacts of specific construction activities. Measures that can be adopted at the design planning, construction and post-construction phases of the proposal include:

- Minimise the removal of indigenous vegetation within the study area;
- Enhancement of habitat within the study area, including planting indigenous overstorey and understorey species;
- Avoid areas of ecological value when locating and designing proposed development areas; particularly wildlife corridors. These areas contain the highest concentrations of indigenous vegetation in the study area and provide habitat and connectivity for flora and fauna;
- Fence areas of ecological value (riparian zone of drainage lines and wetlands) to discourage trampling and disturbance during proposed construction phase (i.e. to discourage workers, construction machinery, material stockpiles and access routes);
- If development is to proceed in areas, ensure contractors are aware of areas of ecological value within the study area and penalties should be applied if native vegetation no-go zones are damaged;
- Eradicate and/or control weeds appropriately and ensure contractors and machinery are not transferring weed seed or material into the site;
- Ensure that best practice sedimentation and pollution control measures to the satisfaction of EPA are undertaken at all times to prevent onsite and offsite impacts to waterways or drainage lines;
- Develop and implement a Weed Management Plan;
- Develop and implement a detailed Construction Environmental Management Plan to outline measures to ensure ecological values within the site are protected during construction activities;
- Develop and implement an Erosion and Sediment Control Plan to minimise the risk of runoff, especially into creeks within the study area;
- Areas to be protected and conserved within the study area in the long-term should be fenced appropriately to allow regeneration and to deter trampling. Areas that

are particularly devoid of vegetation should be improved through revegetation and weed control works using appropriately sourced local indigenous seed stock and a reputable bushland management team; and,

- Encourage any future landholders to plant / revegetate their properties with plants indigenous to the area and applicable to the correct EVC for the site.

8 CONCLUSION

A majority of the study area is highly modified and dominated by introduced flora species, particularly pasture grasses. Indigenous vegetation, however, persists along the railway line, roadside reserves and drainage lines although often the understorey within these areas is highly modified and dominated by a dense cover of introduced pasture grasses. There are remnants of two Ecological Vegetation Classes (EVCs) within the study area.

Given the presence of suitable habitat for Growling Grass Frog and the close proximity of known populations it would be prudent to undertake a targeted Growling Grass Frog assessment in drainage lines and wetlands within the study area at an optimal time of the year to ascertain its presence. If present, an EPBC Act referral from DEWHA may be required to disturb or remove listed or protected species prior to any development works commencing.

A Vegetation Precinct Plan is currently being prepared for the Officer Structure Plan, therefore a permit will not be required to clear/disturb native vegetation within the study area. There may be further requirements pertaining to the ESO and VPO that may restrict development activities within the study area in the future.

Indigenous vegetation patches and scattered trees that fit the Net Gain criteria have been identified within the study area. A formal habitat hectare assessment has been undertaken as part of the Officer Structure Plan – Native Vegetation Precinct Plan. This will address the requirements under the Victorian Government's *Victoria's Native Vegetation Management – A Framework for Action*. The Native Vegetation Precinct Plan will be an incorporated document in the Cardinia Shire Planning Scheme.

The protection and enhancement of existing flora and fauna values, and the creation of additional habitat will increase the long-term sustainability of ecological values within the study area. For example, the protection of existing areas supporting remnant native vegetation, such as wildlife corridors, and the creation of waterbodies located within 200-500 metres of each other, if designed, constructed and managed appropriately, will contribute to the long-term viability of Growling Grass Frog populations within the study area (i.e. survival of the species in an urban context).

Finally, there are opportunities to protect areas of remnant native vegetation and significant flora species by placing 173 agreements over title, using conservation covenants or by placing them into a permanently protected Council conservation reserve. The proposed buffer along Cardinia Creek south-east of the study site should be widened to maximise the inclusion of the Very Large and Large Old Trees located east of Thomas Road, and south of Rix Road possible.

FIGURES

Study area

N

0 100 200

Meters

ecologypartners

Figure 1
Location of study area, Officer

EP Map Num: 676 Fig 1, Issue Date: 5/10/2007

Remnant trees

- E. radiata
- E. viminalis
- E. ovata

- Grassy Woodland
- Swampy Riparian Woodland
- Wetland
- Study area

N

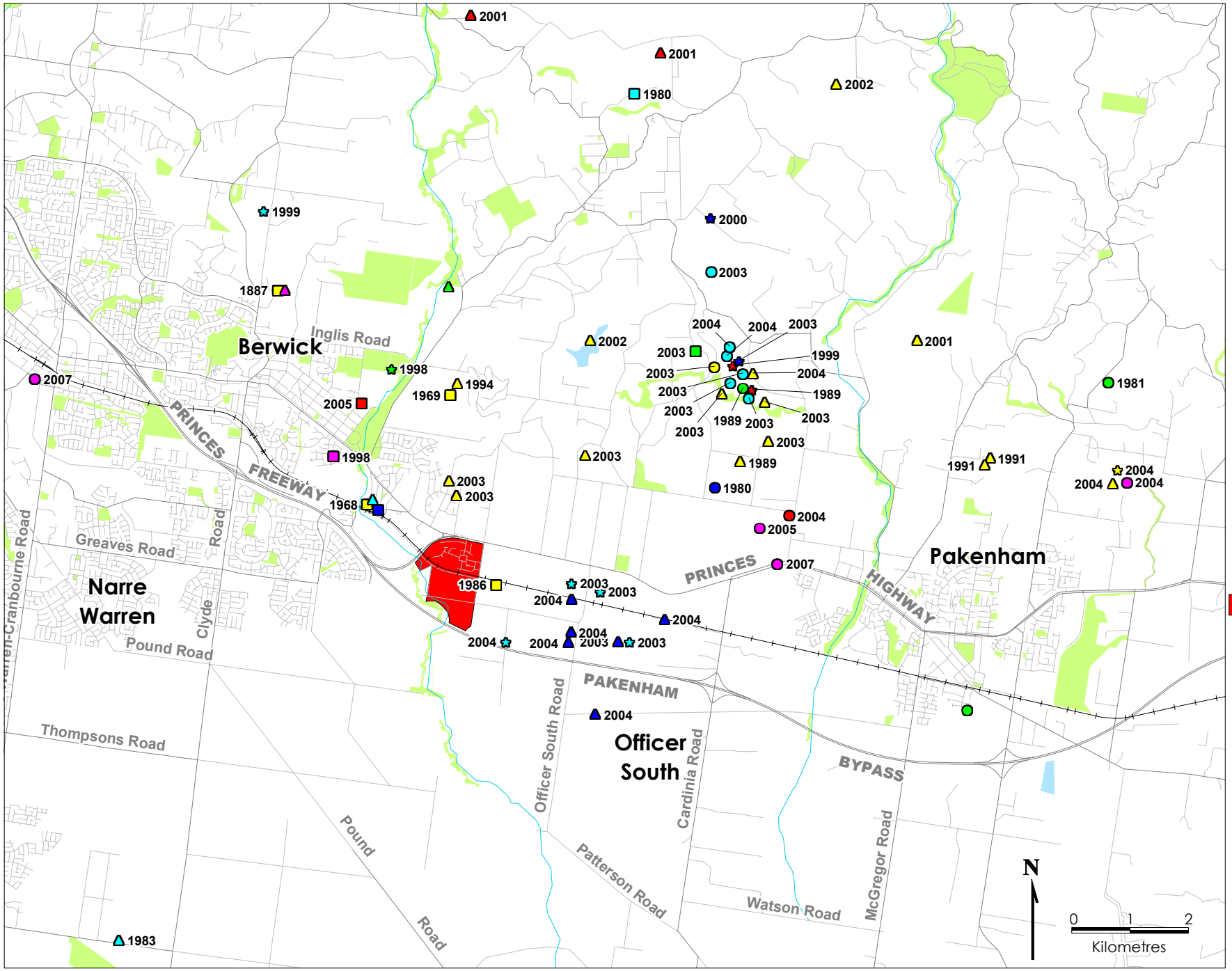
0 100 200

Metres

Figure 2
Ecological features within the study area, Officer Structure Plan

ecologypartners

EP Map Num: 676 Fig 2
Issue Date: 16/6/2008



- Austral Crane's-bill (State)
- Clover Glycine (National)
- Cobra Greenhood (State)
- Dandenong Range Cinnamon Wattle (State)
- Forest Sedge (State)
- Giant Honey-myrtle (State)
- Green Leek-orchid (State)
- Green Scentbark (State)
- Lizard Orchid (State)
- Maroon Leek-orchid (National)
- Matted Flax-lily (National)
- Notched Leionema (State)
- Perfoliate Pondweed (State)
- Purple Diuris (State)
- Red-tip Greenhood (State)
- Rough Daisy-bush (State)
- Sharp Greenhood (State)
- Slender Bitter-cress (State)
- Slender Tick-trefoil (State)
- Southern Blue-gum (State)
- Spurred Helmet-orchid (State)
- Veined Spear-grass (State)
- Wine-lipped Spider-orchid (State)
- Study area

Figure 3
Significant flora records, Officer Structure Plan, Officer

ecologypartners

EP Map Num: 676 Fig 3
Issue Date: 16/6/2007

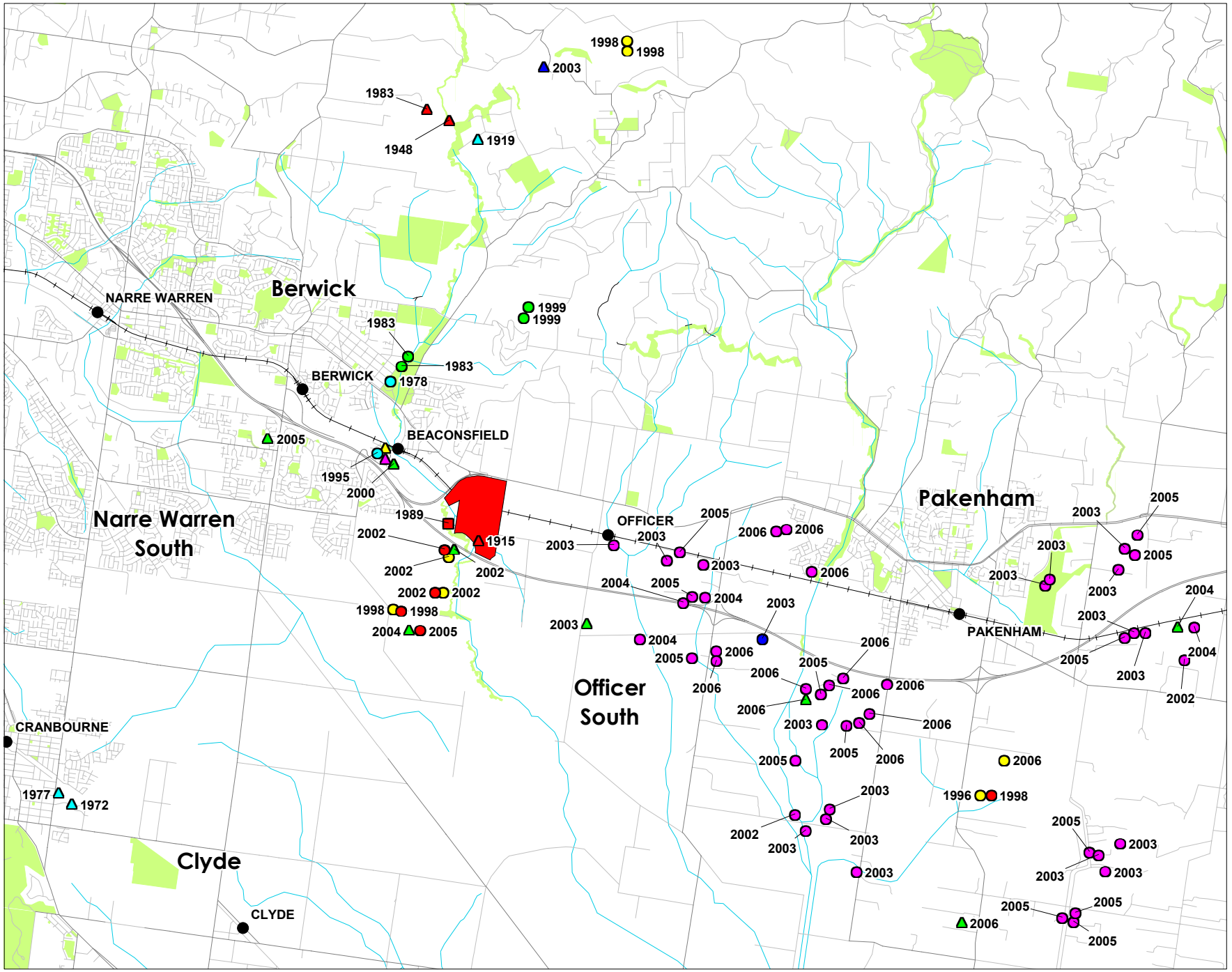


Figure 4
Previous fauna records, Officer Structure Plan

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EP Map Num: 676 Fig 4
Issue Date: 16/6/2008

APPENDICES

Appendix 1 – Significance Assessment

Criteria used by Ecology Partners Pty. Ltd. to define conservation significance, vegetation condition and habitat quality is provided below.

A1.1. Rare or Threatened Categories for Listed Victorian Taxa

Table A1.1. *Rare or Threatened categories for listed Victorian taxa.*

Rare or Threatened Categories
CONSERVATION STATUS IN AUSTRALIA **(Based on the EPBC Act 1999, Briggs and Leigh 1996)**
EX - Extinct: Extinct is when there is no reasonable doubt that the last individual of the species has died.
CR - Critically Endangered: A species is critically endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
EN - Endangered: A species is endangered when it is not critically endangered but is facing a very high risk of extinction in the wild in the near future.
VU - Vulnerable: A species is vulnerable when it is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term future.
R* - Rare: A species is rare but overall is not currently considered critically endangered, endangered or vulnerable.
K* - Poorly Known: A species is suspected, but not definitely known, to belong to any of the categories extinct, critically endangered, endangered, vulnerable or rare.
CONSERVATION STATUS IN VICTORIA **(Based on DSE 2005b, DSE 2007, FIS 2007)**
x - Presumed Extinct in Victoria: not recorded from Victoria during the past 50 years despite field searches specifically for the plant, or, alternatively, intensive field searches (since 1950) at all previously known sites have failed to record the plant.
e - Endangered in Victoria: at risk of disappearing from the wild state if present land use and other causal factors continue to operate.
v - Vulnerable in Victoria: not presently endangered but likely to become so soon due to continued depletion; occurring mainly on sites likely to experience changes in land-use which would threaten the survival of the plant in the wild; or, taxa whose total population is so small that the likelihood of recovery from disturbance, including localised natural events such as drought, fire or landslip, is doubtful.
r - Rare in Victoria: rare but not considered otherwise threatened - there are relatively few known populations or the taxon is restricted to a relatively small area.
k - Poorly Known in Victoria: poorly known and suspected, but not definitely known, to belong to one of the above categories (x, e, v or r) within Victoria. At present, accurate distribution information is inadequate.

A1.2. Defining Ecological Significance

Table A1.2. *Defining Ecological Significance.*

Criteria for defining Ecological Significance	
NATIONAL SIGNIFICANCE	
Flora	National conservation status is based on the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999* list of taxa considered Threatened in Australia (i.e. Extinct, Critically Endangered, Endangered, Vulnerable).
	Flora listed as Rare in Australia in *Rare or Threatened Australian Plants* (Briggs and Leigh 1996).
Fauna	National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. Extinct, Critically Endangered, Endangered, Vulnerable).
	Fauna listed as Extinct, Critically Endangered, Endangered, Vulnerable, or Rare under National Action Plans for terrestrial taxon prepared for the Department of the Environment, Water, Heritage and the Arts: threatened marsupials and monotremes (Maxwell et al. 1996), rodents (Lee 1995), bats (Duncan *et al.* 1999), birds (Garnett and Crowley 2000), reptiles (Cogger *et al.* 1993), amphibians (Tyler 1997) and butterflies (Sands and New 2002).
	Species that have not been included on the *Environment Protection and Biodiversity Conservation* (EBPC) *Act 1999* but listed as significance according to the *IUCN 2006 Red List of Threatened Species* (IUCN 2006).
Communities	Vegetation communities considered Critically Endangered, Endangered or Vulnerable under the EPBC Act and considering vegetation condition.
STATE SIGNIFICANCE	
Flora	Threatened taxa listed under the provisions of the *Flora and Fauna Guarantee* (FFG) *Act 1988*.
	Flora listed as Extinct, Endangered, Vulnerable or Rare in Victoria in the DSE Flora Information System (most recent version).
	Flora listed in the State Government's *Advisory List of Rare or Threatened Plants in Victoria*, 2005 (DSE 2005b).
	Flora listed as Poorly Known in Australia in *Rare or Threatened Australian Plants* (Briggs and Leigh 1996).
Fauna	Threatened taxon listed under Schedule 2 of the FFG Act.
	Fauna listed as Extinct, Critically Endangered, Endangered and Vulnerable on the State Government's *Advisory List of Threatened Vertebrate Fauna in Victoria - 2003* (DSE 2007).
	Listed as Lower Risk (Near Threatened, Conservation Dependent or Least concern) or Data Deficient under National Action Plans for terrestrial species prepared for the Department of the Environment, Water, Heritage and the Arts: threatened marsupials and monotremes (Maxwell *et al.* 1996), rodents (Lee 1995), bats (Duncan *et al.* 1999), birds (Garnett and Crowley 2000), reptiles (Cogger *et al.* 1993), amphibians (Tyler 1997) and butterflies (Sands and New 2002).

Criteria for defining Ecological Significance	
Communities	Ecological communities listed as Threatened under the FFG Act.
	Ecological vegetation class listed as Threatened (i.e. Endangered, Vulnerable) or Rare in a Native Vegetation Plan for a particular bioregion (www.dse.vic.gov.au) and considering vegetation condition.
REGIONAL SIGNIFICANCE	
Flora	Flora considered Rare in any regional native vegetation plan for a particular bioregion.
	Flora considered Rare by the author for a particular bioregion.
Fauna	Fauna with a disjunct distribution, or a small number of documented recorded or naturally rare in the particular bioregion in which the study area occurs in.
	A particular taxon that is has an unusual ecological or biogeographical occurrence or listed as Lower Risk – Near Threatened, Data Deficient or Insufficiently Known on the State Government's *Advisory List of Threatened Vertebrate Fauna in Victoria - 2003* (DSE 2007).
Communities	Ecological vegetation class listed as Depleted or Least Concern in a Native Vegetation Plan for a particular bioregion (www.dse.vic.gov.au) and considering vegetation condition.
	Ecological vegetation class considered Rare by the author for a particular bioregion.
LOCAL SIGNIFICANCE	
Local significance is defined as flora, fauna and ecological communities indigenous to a particular area, which are not considered rare or threatened on a national, state or regional level.	

A1.3 Defining Site Significance

The following geographical areas apply to the overall level of significance with respect to the current survey.

National: Australia

State: Victoria

Regional: Gippsland Plain Bioregion

Local: Within 10 kilometres surrounding the study area

Table A1.3. *Defining Site Significance.*

Criteria for defining Site Significance
NATIONAL SIGNIFICANCE
A site is of National significance if: - It regularly supports, or has a high probability of regularly supporting individuals of a taxon listed as 'Critically Endangered' or 'Endangered' under the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999* and/or under National Action Plans for terrestrial taxon prepared for the Department of the Environment, Water, Heritage and the Arts. - It regularly supports, or has a high probability of supporting, an 'important population' as defined under the EPBC Act of one or more nationally 'Vulnerable' flora and fauna taxon. - It is known to support, or has a high probability of supporting taxon listed as 'Vulnerable' under National Action Plans. - It is known to regularly support a large proportion (i.e. greater than 1%) of a population of a taxon listed as 'Conservation Dependent' under the EPBC Act and/or listed as Rare or Lower Risk (Near Threatened, Conservation Dependent or Least Concern) under National Action Plans. - It contains an area, or part thereof designated as 'critical habitat' under the EPBC Act, or if the site is listed under the Register of National Estate compiled by the Australian Heritage Commission. - It is a site which forms part of, or is connected to a larger area(s) of remnant native vegetation or habitat of national conservation significance such as most National Park, and/or a Ramsar Wetland(s).
STATE SIGNIFICANCE
A site is of State significance if: - It occasionally (i.e. every 1 to 5 years) supports, or has suitable habitat to support taxon listed as 'Critically Endangered' or 'Endangered' under the EPBC Act and/or under National Action Plans. - It regularly supports, or has a high probability of regularly supporting (i.e. high habitat quality) taxon listed as 'Vulnerable', 'Near threatened', 'Data Deficient' or 'Insufficiently Known' in Victoria (DSE 2007, 2005), or species listed as 'Data Deficient' or 'Insufficiently Known' under National Action Plans. - It contains an area, or part thereof designated as 'critical habitat' under the *Flora and Fauna Guarantee* (FFG) *Act 1988*. - It supports, or likely to support a high proportion of any Victorian flora and fauna taxa. - It contains high quality, intact vegetation/habitat supporting a high species richness and diversity in a particular bioregion. - It is a site which forms part of, or connected to a larger area(s) of remnant native vegetation or habitat of state conservation significance such as most State Parks and/or Flora and Fauna Reserves.

Criteria for defining Site Significance
REGIONAL SIGNIFICANCE
A site is of Regional significance if: - It regularly supports, or has a high probability of regularly supporting regionally significant fauna as defined in Table 1.2. - Is contains a large population (i.e. greater than 1% or 5%) of flora considered rare in any regional native vegetation plan for a particular bioregion. - It supports a fauna population with a disjunct distribution, or a particular taxon that has an unusual ecological or biogeographical occurrence. - It is a site which forms part of, or is connected to a larger area(s) of remnant native vegetation or habitat of regional conservation significance such as most Regional Parks and/or Flora and Fauna Reserves.
LOCAL SIGNIFICANCE
Most sites are considered to be of at least local significance for conservation purposes and, in general, a site of local significance can be defined as: - An area which supports indigenous flora species and/or a remnant Ecological Vegetation Class, and habitats used by locally significant fauna species. - An area which currently acts, or has the potential to act as a wildlife corridor linking other areas of higher conservation significance and facilitating fauna movement throughout the landscape.

A1.4. Defining Vegetation Condition

Table A1.4. *Defining Vegetation Condition.*

Criteria for defining Vegetation Condition
Good condition - Vegetation dominated by a diversity of indigenous species, with defined structures (where appropriate), such as canopy layer, shrub layer, and ground cover, with little or few introduced species present.
Moderate condition - Vegetation dominated by a diversity of indigenous species, but is lacking some structures, such as canopy layer, shrub layer or ground cover, and/or there is a greater level of introduced flora species present.
Poor condition - Vegetation dominated by introduced species, but supports low levels of indigenous species present, in the canopy, shrub layer or ground cover.

A1.5. Defining Habitat Quality

Several factors are taken into account when determining the value of habitat. Habitat quality varies on both spatial and temporal scales, with the habitat value varying depending upon a particular fauna species.

Table A1.5. Defining Habitat Quality.

Criteria for defining Habitat Quality
HIGH QUALITY
High degree of intactness (i.e. floristically and structurally diverse), containing several important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.
High species richness and diversity (i.e. represented by a large number of species from a range of fauna groups).
High level of foraging and breeding activity, with the site regularly used by native fauna for refuge and cover.
Habitat that has experienced, or is experiencing low levels of disturbance and/or threatening processes (i.e. weed invasion, introduced animals, soil erosion, salinity).
High contribution to a wildlife corridor, and/or connected to a larger area(s) of high quality habitat.
Provides known, or likely habitat for one or more rare or threatened species listed under the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999*, *Flora and Fauna Guarantee* (FFG) *Act 1988*, or species considered rare or threatened according to DSE 2007.
MODERATE QUALITY
Moderate degree of intactness, containing one or more important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.
Moderate species richness and diversity - represented by a moderate number of species from a range of fauna groups.
Moderate levels of foraging and breeding activity, with the site used by native fauna for refuge and cover.
Habitat that has experienced, or is experiencing moderate levels of disturbance and/or threatening processes.
Moderate contribution to a wildlife corridor, or is connected to area(s) of moderate quality habitat.
Provides potential habitat for a small number of threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DSE 2007.
LOW QUALITY
Low degree of intactness, containing few important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.
Low species richness and diversity (i.e. represented by a small number of species from a range of fauna groups).
Low levels of foraging and breeding activity, with the site used by native fauna for refuge and cover.
Habitat that has experienced, or is experiencing high levels of disturbance and/or threatening processes.
Unlikely to form part of a wildlife corridor, and is not connected to another area(s) of habitat.
Unlikely to provide habitat for rare or threatened species listed under the EPBC Act, FFG Act, or considered rare or threatened according to DSE 2007.

Appendix 2.1 – Flora survey results

Table A2.1. Flora recorded during the present survey (5 June 2008)

Species in **bold** are considered regionally significant in the Gippsland Plain Bioregion (FIS 2007).

Taxa which, since European settlement, occurs outside its original geographic range
* Declared noxious weed within the Port Phillip and Westernport catchment (DPI 2008)
WONS = Weed of National Significance (National Weeds Strategy)

Scientific Name	Common Name
INDIGENOUS SPECIES	
Acacia melanoxylon	Blackwood
Acacia paradoxa	Hedge Wattle
Acaena echinata	**Sheep's Burr**
Acaena novae-zelandiae	Bidgee-widgee
Alisma plantago-aquatica	**Water Plantain**
Allocasuarina verticillata	**Drooping Sheoak**
Austrodanthonia racemosa var. racemosa	Slender Wallaby-grass
Austrostipa spp.	**Spear Grass**
Baumea articulata	**Jointed Twig-sedge**
Bromus spp.	**Brome**
Bursaria spinosa subsp. spinosa	Sweet Bursaria
Carex appressa	**Tall Sedge**
Cladium procerum	**Leafy Twig-sedge**
Crassula helmsii	**Swamp Crassula**
Daviesia latifolia	**Hop Bitter-pea**
Dianella longifolia s.l.	**Pale Flax-lily**
Dianella revoluta var. revoluta s.l.	**Black-anther Flax-lily**
Dichondra repens	Kidney-weed
Epilobium spp.	**Willow Herb**
Eucalyptus ovata	Swamp Gum
Eucalyptus radiata	Narrow-leaf Peppermint
Eucalyptus viminalis	Manna Gum
Euchiton spp.	**Cudweed**
Euphorbia spp.	**Spurge**
Exocarpos cupressiformis	Cherry Ballart
Gahnia radula	Thatch Saw-sedge
Geranium spp.	**Crane's Bill**
Gonocarpus tetragynus	Common Raspwort
Imperata cylindrica	**Blady Grass**
Juncus spp.	**Rush**
Lachnagrostis spp.	**Blown Grass**
Leptospermum continentale	Prickly Tea-tree
Lomandra longifolia	Spiny-headed Mat-rush
Melaleuca ericifolia	Swamp Paperbark
Microlaena stipoides var. stipoides	Weeping Grass
Persicaria decipiens	**Slender Knotweed**
Poa labillardierei	Common Tussock-grass
Poa spp.	**Tussock Grass**
Pteridium esculentum	Austral Bracken

Rubus parvifolius	**Small-leaf Bramble**
Schoenoplectus tabernaemontani	**River Club-sedge**
Senecio quadridentatus	**Cotton Fireweed**
Senecio spp.	Groundsel
Themeda triandra	Kangaroo Grass
Triglochin procera s.s.	**Common Water-ribbons**
Typha orientalis	**Broad-leaf Cumbungi**
Xanthorrhoea minor subsp. lutea	Small Grass-tree
INTRODUCED SPECIES	
#Acacia floribunda	White Sallow-wattle
#Pittosporum undulatum	Sweet Pittosporum
Agrostis capillaris	Brown-top Bent
Allium triquetrum	Angled Onion
Anagallis arvensis	Pimpernel
Anthoxanthum odoratum	Sweet Vernal-grass
Arctotheca calendula	Cape Weed
Arum spp.	Arum
**Asparagus asparagoides (WONS)*	Bridal Creeper
Aster subulatus	Aster-weed
Avena fatua	Wild Oat
Briza maxima	Large Quaking-grass
Bromus catharticus	Prairie Grass
Chamaecytisus palmensis	Tree Lucerne
**Cirsium vulgare*	Spear Thistle
Conyza bonariensis	Flaxleaf Fleabane
Cortaderia selloana	Pampas Grass
**Crataegus monogyna subsp. monogyna*	Hawthorn
Cupressus macrocarpa	Monterey Cypress
Cynodon dactylon var. dactylon	Couch
Cyperus eragrostis	Drain Flat-sedge
Dactylis glomerata	Cocksfoot
Ehrharta erecta var. erecta	Panic Veldt-grass
Ehrharta longiflora	Annual Veldt-grass
Erica lusitanica	Spanish Heath
Erigeron karvinskianus	Seaside Daisy
Festuca rubra	Red Fescue
**Foeniculum vulgare*	Fennel
**Genista monspessulana*	Montpellier Broom
Gladiolus spp.	Gladiolus
Hedera helix	English Ivy
Helminthotheca echioides	Ox-tongue
Hypochoeris radicata	Flatweed
**Oxalis pes-caprae*	Soursob
Paspalum dilatatum	Paspalum
Passiflora tarminiana	Banana Passion-fruit
Pennisetum clandestinum	Kikuyu
Phalaris aquatica	Toowoomba Canary-grass
Plantago coronopus	Buck's-horn Plantain
Plantago lanceolata	Ribwort
Plantago major	Greater Plantain
Poa annua	Annual Meadow-grass

Polygonum arenastrum	Wireweed
Prunella vulgaris	Self-heal
Romulea rosea	Onion Grass
**Rosa rubiginosa (WONS)*	Sweet Briar
**Rubus fruticosus spp. agg. (WONS)*	Blackberry
Rumex crispus	Curled Dock
Salix babylonica s.l.	Weeping Willow
Solanum nigrum sensu Willis (1972)	Black Nightshade
Sporobolus africanus	Rat-tail Grass
Taraxacum officinale spp. agg.	Garden Dandelion
Tragopogon porrifolius	Salsify
Trifolium repens var. repens	White Clover
**Ulex europaeus (WONS)*	Gorse
**Watsonia spp.*	Watsonia

Appendix 2.2 – Flora database results

Table A2.2. Significant flora within 10 kilometres of the study area.

Sources used to determine species status:
EPBC *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
DSE Advisory List of Threatened Flora in Victoria (DSE 2005b)
FFG *Flora and Fauna Guarantee Act 1988* (Victoria)

National status of species (EPBC) is designated by:
CR Critically endangered
EN Endangered
VU Vulnerable
K Poorly Known

EPBC Act Protected Matters Search Tool

State status of species (FFG and DSE) is designated by:
x Extinct
e Endangered
v Vulnerable
r Rare
k Poorly Known
L Listed

Likelihood of occurrence in study area:
1 Present
2 Known occurrence
3 Habitat Present
4 Unlikely
5 No suitable habitat

Scientific Name	Common Name	Total number of records	EPBC Act 1999	DSE 2005	FFG Act 1988	Likelihood of occurrence
NATIONAL SIGNIFICANCE						
#*Amphibromus fluitans*	River Swamp Wallaby-grass	-	VU	-	-	3
#*Caladenia fragrantissima* subsp. *orientalis*	Cream Spider-orchid	-	EN	e	L	4
#*Dianella amoena*	Matted Flax-lily	6	EN	e	-	3
Glycine latrobeana	Clover Glycine	1	VU	v	L	3
#*Prasophyllum frenchii*	Maroon Leek-orchid	9	EN	e	L	3
#*Thelymitra epipactoides*	Metallic Sun-orchid	-	EN	e	L	4
#*Xerochrysum palustre*	Swamp Everlasting	-	VU	v	L	4
STATE SIGNIFICANCE						
Acacia leprosa (Dandenong Range variant)	Dandenong Range CinnamonWattle	11	-	r	-	4
Austrostipa rudis subsp. australis	Veined Spear-grass	5	-	r	-	3
Burnettia cuneata	Lizard Orchid	1	-	r	-	4
Caladenia oenochila	Wine-lipped Spider-orchid	3	-	v	-	4
Cardamine tenuifolia	Slender Bitter-cress	1	-	k	-	4
Carex alsophila	Forest Sedge	1	-	r	-	4
Carex chlorantha	Green-top Sedge	1	-	k	-	4
Corybas aconitiflorus	Spurred Helmet-orchid	1	-	r	-	4
Craspedia canens	Grey Billy-buttons	1	-	e	L	4
Desmodium varians	Slender Tick-trefoil	3	-	k	-	4
Diuris punctata var. punctata	Purple Diuris	15	-	v	L	3
Eucalyptus fulgens	Green Scentbark	14	-	r	-	3

Scientific Name	Common Name	Total number of records	EPBC Act 1999	DSE 2005	FFG Act 1988	Likelihood of occurrence
Geranium solanderi var. solanderi s.s.	Austral Crane's-bill	1	-	v	-	4
Helichrysum aff. rutidolepis (Lowland Swamps)	Pale Swamp Everlasting	1	-	v	-	4
Leionema bilobum	Notched Leionema	1	-	r	-	4
Melaleuca armillaris subsp. armillaris	Giant Honey-myrtle	3	-	r	-	4
Olearia asterotricha	Rough Daisy-bush	2	-	r	-	4
Potamogeton perfoliatus s.l.	Perfoliate Pondweed	1	-	k	-	3
Prasophyllum lindleyanum	Green Leek-orchid	4	-	v	-	4
Prasophyllum pyriforme s.s.	Silurian Leek-orchid	1	-	e	-	4
Pterostylis grandiflora	Cobra Greenhood	4	-	r	-	3
Pterostylis sp. aff. parviflora (Southern Victoria)	Red-tip Greenhood	1	-	r	-	4
Pterostylis X ingens	Sharp Greenhood	1	-	r	-	4
Tetratheca stenocarpa	Long Pink-bells	1	-	r	-	4
Thryptomene calycina	Grampians Thryptomene	1	-	r	-	4

Sources: Flora Information System (DSE 2008) and Protected Matters Search Tool (DEWHA)

Appendix 3.1 – Fauna results

Table A3.1. Fauna recorded during the present survey (8 May 2008).

Type of Record:
H – Heard
S – Seen
T – Trapped/handheld
I – Incidental (identified from feathers, bones or scats, etc)

Mi Migratory (EPBC Act)
Ma Marine (EPBC Act)

Total Totally hollow dependent
Partial Partial hollow dependent

* Introduced species

Common Name	Scientific Name	Last Documented Record (AVW)	Total # of Documented Records (AVW)	Hollow Use	Mi/Ma	Present Survey
MAMMALS						
Common Brushtail Possum	*Trichosurus vulpecula*	2003	21	Total	-	I
BIRDS						
Common Bronzewing	*Phaps chalcoptera*	2001	51	-	-	S
Masked Lapwing	*Vanellus miles*	2006	27	-	Mi	S
Australian Wood Duck	*Chenonetta jubata*	2006	101	Total	Mi	S
Brown Goshawk	*Accipiter fasciatus*	2004	13	-	Mi/Ma	S
Long-billed Corella	*Cacatua tenuirostris*	2002	6	Total	-	S
Rainbow Lorikeet	*Trichoglossus haematodus*	2005	4	Total	-	H
Sulphur-crested Cockatoo	*Cacatua galerita*	2005	74	Total	-	S
Eastern Rosella	*Platycercus eximius*	2005	96	Total	-	S
Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*	2002	11	-	Ma	H
Welcome Swallow	*Hirundo neoxena*	2005	78	Partial	Ma	S
Eastern Yellow Robin	*Eopsaltria australis*	2001	206	-	-	H
Magpie-lark	*Grallina cyanoleuca*	2005	99	-	Ma	S
Noisy Miner	*Manorina melanocephala*	2005	40	-	-	S
Red Wattlebird	*Anthochaera carunculata*	2005	126	-	-	H
Australian Magpie	*Gymnorhina tibicen*	2005	133	-	-	S
Little Raven	*Corvus mellori*	2005	33	-	Ma	S
Crested Pigeon	*Ocyphaps lophotes*	-	-	-	-	S
Spotted Turtle-Dove*	*Streptopelia chinensis*	2005	106	-	-	S
Common Blackbird*	*Turdus merula*	2006	146	-	-	S
Common Myna*	*Acridotheres tristis*	2006	93	-	-	S
Common Starling*	*Sturnus vulgaris*	2006	93	-	-	S
FROGS						
Common Froglet	*Crinia signifera*	2006	83	-	-	H

Source: DSE Atlas of Victorian Wildlife (AVW 2007)

Appendix 3.2 – Significant fauna species

Table A3.2. *Significant fauna within 10 kilometres of the study area.*

Sources used to determine species status:

EPBC *Environment Protection and biodiversity Conservation Act 1999* (Commonwealth)

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

FFG *Flora and Fauna Guarantee Act 1988* (Victoria)

National Action Plan for mammals and monotremes (Maxwell *et al.* 1996), bats (Duncan *et al.* 1999), rodents (Lee 1995), birds (Garnett and Crowley 2000), reptiles (Cogger *et. al.* 1993), and amphibians (Tyler 1997).

Species status:

EX	Extinct
RX	Regionally extinct
CR	Critically endangered
EN	Endangered
VU	Vulnerable
RA	Rare
NT	Near threatened
CD	Conservation dependent
LR	Lower risk (least concern)
DD	Data deficient (insufficiently or poorly known)
L	Listed as threatened under FFG Act
I	Invalid or ineligible for listing under the FFG Act
#	Protected Matters Search Tool (DEWHA)

Use of the study area:

1	Known resident
2	Possible resident
3	Frequent visitor
4	Occasional visitor
5	Rare visitor
6	Vagrant visitor
7	Unlikely/no suitable habitat

Common Name	Scientific Name	Last documented record	Total # of records	EPBC Act	DSE (2003)	FFG Act	National Action Plan	Likely use of study area
NATIONAL SIGNIFICANCE								
Helmeted Honeyeater	*Lichenostomus melanops cassidix*	1983	3	EN	CR	L	CR	7
# Swift Parrot	*Lathamus discolor*	1989	1	EN	EN	L	EN	5
# Spot-tailed Quoll	*Dasyurus maculatus*	2003	1	EN	EN	L	VU	7
# Southern Brown Bandicoot	*Isoodon obesulus obesulus*	1919	2	EN	NT		NT	4
Superb Parrot	*Polytelis swainsonii*	?	1	VU	EN	L	-	6
# Growling Grass Frog	*Litoria raniformis*	2006	159	VU	EN	L	VU	7
# Grey-headed Flying-fox	*Pteropus poliocephalus*	2003	1	VU	VU	L	-	7
# Australian Grayling	*Prototroctes maraena*	1985	2	VU	VU	L	VU	7
# Dwarf Galaxias	*Galaxiella pusilla*	1999	9	VU	VU	L	VU	3
# Australian Painted Snipe	*Rostratula australis*	-	-	VU	CR	L	VU	5
# Regent Honeyeater	*Xanthomyza phrygia*	-	-	EN	CR	L	EN	7
# Golden Sun Moth	*Synemon plana*	-	-	CR	-	L	-	7
# Long-nosed Potoroo	*Potorous tridactylus tridactylus*	-	-	VU	EN	L	VU	7
# Smoky Mouse	*Pseudomys fumeus*	-	-	EN	CR	L	RA	7
STATE SIGNIFICANCE								
Intermediate Egret	*Ardea intermedia*	?	1	-	CR	L	-	5
Freckled Duck	*Stictonetta naevosa*	2002	1	-	EN	L	-	7
Blue-billed Duck	*Oxyura australis*	2006	15	-	EN	L	-	5
Barking Owl	*Ninox connivens*	1999	1	-	EN	L	-	5
Caspian Tern	*Hydroprogne caspia*	1997	1	-	NT	L	-	6
Lewin's Rail	*Lewinia pectoralis*	1988	1	-	VU	L	NT	6
Baillon's Crake	*Porzana pusilla*	2003	2	-	VU	L	-	7
Eastern Great Egret	*Ardea modesta*	1995	2	-	VU	L	-	7
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	?	1	-	VU	L	-	7
Powerful Owl	*Ninox strenua*	2003	6	-	VU	L	-	7
Sooty Owl	*Tyto tenebricosa*	1992	1	-	VU	L	-	7

Common Name	Scientific Name	Last documented record	Total # of records	EPBC Act	DSE (2003)	FFG Act	National Action Plan	Likely use of study area
Common Sandpiper	*Actitis hypoleucos*	1998	1	-	VU	-	-	6
Royal Spoonbill	*Platalea regia*	2005	3	-	VU	-	-	4
Australasian Shoveler	*Anas rhynchotis*	2005	13	-	VU	-	-	6
Hardhead	*Aythya australis*	2006	15	-	VU	-	-	6
Musk Duck	*Biziura lobata*	2006	4	-	VU	-	-	7
Southern Toadlet	*Pseudophryne semimarmorata*	1981	82	-	VU	-	-	6
REGIONAL SIGNIFICANCE								
River Blackfish	*Gadopsis marmoratus*	1985	2	-	DD	-	-	7
Pied Cormorant	*Phalacrocorax varius*	1997	2	-	NT	-	-	5
Whiskered Tern	*Chlidonias hybridus*	2004	2	-	NT	-	-	4
Latham's Snipe	*Gallinago hardwickii*	2006	15	-	NT	-	-	3
Cape Barren Goose	*Cereopsis novaehollandiae*	1998	1	-	NT	-	-	7
Spotted Harrier	*Circus assimilis*	2004	1	-	NT	-	-	7
Spotted Quail-thrush	*Cinclosoma punctatum*	2000	1	-	NT	-	-	6
Brown Treecreeper	*Climacteris picumnus victoriae*	2000	1	-	NT	-	NT	7
Pectoral Sandpiper	*Calidris melanotos*	1998	1	-	NT	-	-	7
Broad-toothed Rat	*Mastacomys fuscus*	1993	1	-	NT	-	-	7

Source: DSE Atlas of Victorian Wildlife (AVW 2007); DEWHA Protected Matters Search Tool (http://www.environment.gov.au/erin/ert/epbc/index.html); and Museum of Victoria Butterfly Database (http://flyaqis.mov.vic.gov.au/cgi-bin/texhtml?form=bio_nvicbio)

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