ecology & heritage partners

Final Report

Flora and Fauna Assessment and Biodiversity Offset Analysis, Palmers Road Corridor: Western Freeway to Calder Freeway

Prepared for

VicRoads

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GLOSSARY

Acronym	Definition
BCS	Biodiversity Conservation Strategy
BIOR	Biodiversity Impacts and Offset Requirements Report
CaLP Act	*Catchment and Land Protection Act 1994*
CAMBA	China-Australia Migratory Bird Agreement
CMA	Catchment Management Authority
DEPI	Department of Environment and Primary Industries
DEWHA	Department of Environment, Water, Heritage and the Arts (now DoE)
DoE	Commonwealth Department of the Environment
DPCD	Department of Planning and Community Development
DSE	Department of Sustainability and Environment (now DEPI)
DTPLI	Department of Transport, Planning and Local Infrastructure
EE Act	*Environment Effects Act 1978*
EES	Environment Effects Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988*
FIS	Flora Information System
GIS	Geographical Information System
JAMBA	Japan-Australia Migratory Bird Agreement
NES	National Environmental Significance
NTGVVP	Natural Temperate Grassland of the Victorian Volcanic Plain
NVPP	Native Vegetation Precinct Plan
OTC	Over-the-Counter Offsets Scheme
P&E Act	*Planning and Environment Act 1987*
PMST	Protected Matters Search Tool
PSP	Precinct Structure Plan
RHI	River Health Index
RoKAMBA	Republic of Korea – Australia Migratory Bird Agreement
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DoE)
SHW	Seasonal Herbaceous Wetlands
VBA	Victorian Biodiversity Atlas
VFD	Victorian Fauna Database
VVP	Victorian Volcanic Plain
WoNS	Weeds of National Significance

SUMMARY

Introduction

The Palmers Road Corridor Project will alleviate pressure on existing transport infrastructure within the western suburbs of Melbourne by creating a major north-south arterial road, linking Point Cook and Calder Park. The entire Palmers Road Corridor extends approximately 25 kilometres from Dunnings Road in Point Cook to the Calder Park Freeway. The southern corridor section between Dunnings Road and the Western Freeway has undergone a Planning Scheme Amendment process which has been approved. In November 2009, the Minister for Planning determined that an Environment Effects Statement (EES) under the *Environment Effects Act 1978* (EE Act) was required for the remaining northern section, between the Western Freeway and Calder Freeway. In July 2013, The Victorian Department of Transport, Planning and Local Infrastructure (DTPLI) released the Final EES Scoping Requirements. The loss of habitat for threatened species and the removal or degradation of ecological communities is identified as a key issue for consideration. The document provides the following evaluation objective for biodiversity:

> *'To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.'*

A Flora and Fauna Assessment, and Biodiversity Offset Analysis was completed for the northern alignment to support the project EES and specifically, to determine the key ecological values within the Project Area, potential impacts to these values, and the biodiversity offset requirements. The assessed activity comprised the reservation of land under the Melton City Council and Brimbank City Council Planning Schemes and project construction, which will potentially be finalised by 2046. The project includes the development of the Westwood Drive Bridge over Kororoit Creek.

The assessment incorporated the results of a large number of technical studies previously completed for the project, which included targeted flora and fauna surveys and detailed habitat hectare assessments.

Methods

The completed scope of work supplemented the previous assessments, particularly the 2009 Flora and Fauna Assessment and Net Gain Analysis of the entire Palmers Road Corridor (Ecology Partners Pty Ltd 2009). Desk-based and field surveys were undertaken to provide an updated review of ecological values within the Project Area. Surveys completed on 30 – 31 May and 02 July 2013 assessed new areas within the corridor based on a revised Functional Design Footprint and ground-truthed the results of previous site assessments.

Results

The assessment found that while much of the Project Area has been modified through historic agricultural land use and urbanisation, many ecological values persist. Values of ecological significance identified within and adjoining the Project Area are summarised in the table below.

Ecological value	Findings
Significant sites	• BioSites of national and state significance • Managed conservation reserves including Ravenhall Nature Conservation Reserve, Banchory Grove Grassland Nature Conservation Reserve and Organ Pipes National Park The Functional Design Footprint includes a small area of the Banchory Grove Grasslands and Pioneer Park, and adjoins both the Ravenhall Reserve and Organ Pipes National Park.
Native vegetation	The current survey identified that the Functional Design Footprint contains 2.64 habitat hectares (11.19 hectares) of remnant vegetation and two Scattered Trees, including: • 11.16 hectares of Plains Grassland (EVC 132_61) represented by 32 Remnant Patches and nine Habitat Zones (excluding patches within the Biodiversity Conservation Strategy [BCS] area); • 0.03 hectares of Plains Grassy Wetland (EVC 125) represented by two Remnant Patches and Habitat Zones; and, • Two Scattered Trees located in the riparian zone of Kororoit Creek
Matters of National Environmental Significance (NES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)	• Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) ecological community. The Functional Design Footprint contains 3.27 hectares of this ecological community (including 0.16 hectares within the BCS area). • Seasonal Herbaceous Wetlands (SHW) (Freshwater) of the Temperate Lowland Plains ecological community. The Functional Design Footprint contains 0.03 hectares of this ecological community. • One EPBC Act listed plant, Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*, was recorded in the Project Area in 2007. It is noted that the Functional Design Footprint excludes the area where Spiny Rice-flower has been previously recorded. • The Project Area provides habitat for the Spiny Rice-flower and potential habitat for five EPBC Act listed species of fauna, including Golden Sun Moth *Synemon plana*, Striped Legless Lizard *Delma impar*, Growling Grass Frog *Litoria raniformis*, Grey-headed Flying-fox *Pteropus poliocephalus* and Swift Parrot *Lathamus discolor*. The six EPBC Act listed species are considered to inhabit or use habitat resources within the Project Area and Functional Design Footprint.
Matters of state significance	• *Flora and Fauna Guarantee Act 1988* (FFG Act) listed Western (Basalt) Plains Grasslands Community. The Functional Design Footprint contains 11.16 hectares of this ecological community. • Four state significant flora species have been previously recorded within the Project Area, including Spiny Rice-flower, Basalt Podolepis *Podolepis* sp. 1, Tough Scurf-pea *Cullen tenax* and Fragrant Saltbush *Rhagodia parabolica*. • The Project Area provides habitat for four state significant species of flora and potential habitat for 15 species of fauna. The 19 state significant species are considered to have a moderate-high likelihood of occurrence within the Functional Design Footprint.
Matters of regional significance	• One regionally significant flora species - Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis,* was recorded during the current field survey. It is noted that there are no legislative implications associated with the known or potential presence of regionally significant flora and fauna species.

Biodiversity Offsets

Mitigated impacts on biodiversity will be offset under the EPBC Act at the Commonwealth level and under the Guidelines (DEPI 2013c) and BCS (DEPI 2013a) at the State level.

Biodiversity offsets under the EPBC Act are likely to be required to compensate for the removal of 3.27 hectares of the NTGVVP ecological community and potentially other impacts on MNES (i.e. Growling Grass Frog habitat). The Commonwealth approvals process is ongoing and offsetting arrangements under the EPBC Act will be made separate the State EES process. At the State level, biodiversity targets for the small section of the Functional Design Footprint sited within the Ravenhall (Quarry Site) Precinct (PSP 1084) will be secured in accordance with the BCS (DEPI 2013a). Native vegetation losses within the remaining areas of the footprint will be offset in accordance with the Guidelines (DEPI 2013c).

In order to inform the EES process, indicative offset requirements under both policies have been calculated. As construction of the project is unlikely to occur for a number of years, offset obligations will be reassessed closer to the construction phase, following detailed design.

Offset requirements for native vegetation losses in land subject to the Guidelines (DEPI 2013c) have been determined through a through a five step process:

1) Establish whether or not the vegetation to be removed provides habitat for rare or threatened species;
2) Determine the relevant biodiversity equivalence score;
3) Determine whether the offset required is general or specific;
4) Apply the offset factor to calculate the required offset amount; and
5) Determine the attributes of the offset.

Using this methodology, (Ecology and Heritage Partners, 2014) indicate that a General Offset of 2.425 Biodiversity Equivalence Units is required to compensate for the 2.64 habitat hectares to be removed under the Guidelines.

Offset obligations for the area subject to the provisions of the BCS have been calculated by DEPI and provided in a BCS Statement. The applicable offset targets under the BCS (DEPI 2013a) are:

- 0.047 hectares of native vegetation at a cost of $4,468.53;
- 0.047 hectares of Spiny Rice-flower habitat at a cost of $373.03; and
- 0.990 hectares of Golden Sun Moth habitat at a cost of $7,834.86.

Legislative and Policy Implications

The project is classified as a controlled action under the EPBC Act. Approval by the Commonwealth Minister will be based on preliminary documentation, which will be exhibited independently of the Victorian environmental assessment process (EE Act). It is recommended that the Commonwealth Department of the Environment (DoE) are consulted regarding the differences between the action referred in 2009 and the current activity, and also during revision of the Conservation Management Plan for Matters of National Environmental Significance (NES) previously prepared in 2011.

The completed Flora and Fauna Assessment, and Biodiversity Offset Analysis supports the project EES, which will be reviewed by a Technical Reference Group, released for public exhibition and assessed by the Victorian Minister for Planning. It is considered that the completed assessment addresses the Final EES Scoping Requirements released by the Department of Transport, Planning and Local Infrastructure (DTPLI) in July 2013.

The Project Area supports a number of state significant values protected under the FFG Act, including the listed ecological community Western (Basalt) Plains Grassland and habitat for listed species of flora and fauna. A permit from DEPI would be required to remove or modify these values, where this occurs on public land (i.e. road reserves).

Amendment of the Melton City Council and Brimbank City Council Planning Schemes will be undertaken under Section 53.03 – Specific Sites and Exclusions. This process allows the application of specific controls for significant land use and development outcomes. The amendment process negates the need for VicRoads to apply for permits to remove, destroy or lop native vegetation. Where there is residual loss or degradation of vegetation and habitat after detailed design and the implementation of mitigation measures, compensation in the form of biodiversity offsets will be required. As the majority of construction works associated with the project are unlikely to occur for at least another 30 years, the bulk of offset obligations will be reassessed closer to each construction stage, following final project design.

Potential Impacts and Mitigation Measures

In the absence of mitigation measures, the project has the potential to impact upon ecological values within the Project Area and surrounding landscape. Potential impacts associated with the construction and operation of the project include noise and dust pollution, increased shadowing, increases in fauna mortality, the introduction and spread of weed and pest species and aquatic disturbance (Kororoit Creek). Known and potential impacts on matters of NES will be managed in accordance with a revised Conservation Management Plan developed specifically to manage these values. As part of future project planning, detailed mitigation measures will be developed and presented in a Construction Environmental Management Plan (or similar document/s) and incorporated into the project Environmental Management Framework.

Project Performance

It is considered that this Flora and Fauna Assessment and Biodiversity Offset Analysis addresses the Final EES Scoping Requirements and the evaluation objective for biodiversity stipulated by DTPLI. The performance of the Palmers Road Project in meeting the evaluation objective for biodiversity was reviewed with reference to the criteria provided in the table below. In order to demonstrate the outcomes of applying the hierarchy of control (avoid, minimise and offset), the review focussed on the predicted consequences of two scenarios - the unmitigated action contrasted with the proposed mitigated action. The ratings designated in the table below reflect the high level of effort completed during the planning and design phase to avoid and minimise adverse impacts on ecological values. In addition to incorporating the findings of detailed assessments into project design and meeting offset obligations, known and potential impacts during construction will be managed in accordance with a Construction Environmental Management Plan (or equivalent document) and Conservation Management Plan for Matters of NES.

The findings presented in the table below demonstrate that the proposed action meets the evaluation objective for biodiversity and provides an outcome which balances the need for project development with the conservation of ecological values within the Project Area and broader landscape.

Ecological Values		Unmitigated Rating	Mitigation Notes	Mitigated Impacts	Mitigated Rating
Significant sites	• BioSites of national and state significance • Managed conservation reserves including Ravenhall Nature Conservation Reserve, Banchory Grove Grassland Nature Conservation Reserve and Organ Pipes National Park • Pioneer Park, a Council managed reserve	Poor	Impacts on significant sites have been avoided where possible, with reference to the findings of detailed ecological assessments. Indirect impacts on reserves /BioSites adjoining the Functional Design Footprint will be managed in accordance with a Construction Environmental Management Plan (or equivalent document).	• The Functional Design Footprint includes a small area (0.13ha) of the Banchory Grove Grassland Nature Conservation Reserve and a small area of Pioneer Park. The Functional Design Footprint adjoins both the Ravenhall Nature Conservation Reserve and Organ Pipes National Park.	Well
Native vegetation	• Plains Grassland (EVC 132_61) • Plains Grassy Wetland (EVC 125) • Scattered Trees	Very Poor	Impacts on native vegetation have been avoided and minimised throughout the planning and design process. The Functional Design Footprint contains 11.19 hectares of remnant vegetation and two scattered trees. It is noted that the affected vegetation predominately consists of relatively low quality maintained grassland within existing road reserves. Furthermore, the extent of native vegetation present is augmented under The Guidelines (DEPI 2013d), which do not recognise 'Modified Treeless Vegetation'. Impacts on native vegetation will be managed in accordance with a Construction Environmental Management Plan. Offset obligations under the Guidelines and BCS (DEPI 2013a) will be met prior to works commencing. The biodiversity offsets will meet the key objective of the Guidelines (DEPI 2013c), being no net loss.	• The Functional Design Footprint contains 2.64 habitat hectares (11.19 hectares) of remnant vegetation and two Scattered Trees, including: o 11.16 hectares of Plains Grassland (EVC 132_61) represented by 32 Remnant Patches and nine Habitat Zones (excluding patches within the Biodiversity Conservation Strategy [BCS] area); o 0.03 hectares of Plains Grassy Wetland (EVC 125) represented by two Remnant Patches and Habitat Zones; and, o Two Scattered Trees located in the riparian zone of Kororoit Creek.	Neutral
Matters of NES listed under the EPBC Act	• Threatened flora species (Spiny Rice-flower) • Threatened fauna species (Golden Sun Moth, Striped Legless Lizard, Growling Grass Frog, Swift Parrot and Grey-headed Flying-fox) • Migratory species (Section 3.2.1.3) • Threatened ecological communities, including: o Natural Temperate Grassland of the Victorian Volcanic Plain [NTGVVP] ecological community o Seasonal Herbaceous Wetlands (SHW) (Freshwater) of the Temperate Lowland Plains ecological community	Poor	Impacts on matters of NES have been avoided and minimised throughout the planning and design process (e.g. completion of targeted surveys). Matters of NES will be managed in accordance with the Conservation Management Plan, which will be revised to reflect the findings of this assessment. The revised plan will be developed in consultation with DoE to specifically manage Matters of NES during development of the Palmers Road Corridor Project.	• The Functional Design Footprint contains 3.27 hectares of the NTGVVP ecological community and 0.03 hectares of the SHW ecological community. • One EPBC Act listed plant, Spiny Rice-flower, was recorded in the Project Area in 2007. It is noted that the Functional Design Footprint excludes the area where Spiny Rice-flower has been previously recorded. • The Project Area provides habitat for the Spiny Rice-flower and potential habitat for five EPBC Act listed species of fauna, including Golden Sun Moth, Striped Legless Lizard, Growling Grass Frog, Grey-headed Flying-fox and Swift Parrot. The six EPBC Act listed species are considered to inhabit or use habitat resources within the Project Area and Functional Design Footprint.	Well
Matters of State significance	• Threatened flora species (Section 3.2.2.2) • Threatened fauna species (Section 3.2.2.2) • Threatened ecological communities (Western [Basalt] Plains Grasslands Community)	Poor	Impacts on matters of State significance have been avoided and minimised throughout the planning and design process. State significant values will be managed in accordance with a Construction Environmental Management Plan.	• The Functional Design Footprint contains 11.16 hectares of the Western [Basalt] Plains Grasslands Community (including 3.27 hectares also classified as NTGVVP). • The Project Area provides habitat for four state significant species of flora and potential habitat for 15 species of fauna. The 19 state significant species are considered to have a moderate-high likelihood of occurrence within the Functional Design Footprint.	Well

Notes:

Very Well - High level of compliance, major positive impacts or negligible impacts

Well - Good policy compliance, mostly positive impacts or minor negative impacts

Neutral - Some policy compliance, equal positive and negative impacts

Poor - Policy non-compliance, mostly negative impacts or minor positive impacts

Very Poor - Major policy non-compliance, major negative impacts or negligible positive impacts

CONTENTS

1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by VicRoads to conduct a Flora and Fauna Assessment and Biodiversity Offset Analysis of the Palmers Road Corridor between the Western Freeway and Calder Freeway. The objective of the Palmers Road Corridor Project is to create a north-south arterial road in the west of Melbourne.

The following relevant studies have been completed for the Palmers Road Corridor Project to date:

- *Palmers Road Corridor Upgrade: Conservation Management Plan for Matters of National Ecological Significance* (Ecology Partners Pty Ltd 2011);
- *Flora and Fauna Assessment and Net Gain Analysis of the Palmers Road Corridor; Sayers Road to Western Freeway, Truganina* (Ecology and Heritage Partners Pty Ltd 2011) (Dunnings Road to Western Freeway);
- *Palmers Road Corridor and Calder Park Interchange: Targeted Surveys for Spiny Rice-flower, Sunshine Diuris and Small Golden Moths Orchid, West Melbourne* (Ecology Partners Pty Ltd 2010);
- *Palmers Road Corridor and Calder Park Interchange: Flora and Fauna Assessment, and Net Gain Analysis, West Melbourne, Victoria* (Ecology Partners Pty Ltd 2009);
- *Palmers Road Corridor and Calder Park Interchange: Flora and Fauna Assessment and Net Gain Analysis for the Palmers Road Corridor* (Ecology Partners Pty Ltd 2007); and,
- *Palmers Road Corridor - Desktop Flora and Fauna Review* (Ecology Australia Pty Ltd 2004).

The 2009 Flora and Fauna Assessment, and Net Gain Analysis assessed the entire Palmers Road Corridor from Dunnings Road Point Cook to the Calder Freeway and Calder Park Interchange. The current study aims to provide an up to date assessment of ecological values and offset requirements associated with a revised Functional Design Footprint for the Palmers Road Corridor Project between the Western Freeway and Calder Freeway. This assessment will support an Environment Effects Statement (EES) as required under the Victorian *Environment Effects Act 1978* (EE Act).

1.2 Scope of Assessment

The purpose of this assessment is to determine the key ecological values within the Project Area, potential impacts to these values, and the biodiversity offset requirements to ensure that the project is undertaken in a manner that is consistent with the principles of Ecologically Sustainable Development and relevant state and Commonwealth legislation.

Specifically, this assessment aims to:

- Review previous studies completed for the Palmers Road Corridor Project and undertake desk-based and field assessments to identify ecological values and offset requirements associated with the adopted Project Area;
- Characterise the native vegetation and terrestrial and aquatic habitat located in the Project Area;
- Identify and assess potential effects of the project on existing native vegetation, habitat (quality and continuity), listed flora and fauna species and ecological communities;
- Identify potential effects of the project on the dispersion and distribution of weeds and pathogens;
- Specify any measures to avoid, minimise and mitigate biodiversity impacts, especially on threatened species; and,
- Summarise offset requirements under the '*Permitted clearing of native vegetation - Biodiversity assessment guidelines*' (The Guidelines) (DEPI 2013d), the Biodiversity Conservation Strategy (BCS) (DEPI 2013a) and the relevant planning scheme provisions.

It is noted that the development of the arterial road is a long-term project and while vegetation clearance for the extension of Westwood Drive and construction of Westwood Drive Bridge is scheduled in the short-term, the majority of works are not expected to take place within the next 30 years. Owing to this disparity in project development and staging, the overall approach to offsetting ecological values described in this report, including offset targets, will require revision prior to each stage of development. In order to meet the Final EES Scoping Requirements issued by the Department of Transport, Planning and Local Infrastructure (DTPLI) in July 2013 (Section 6.1.2), this report presents the current offset requirements associated with the entire Functional Design Footprint, with reference to The Guidelines (DEPI 2013d) and BCS (DEPI 2013a).

1.3 Project Area

The Palmers Road Corridor is located in the west of Melbourne, approximately 20 kilometres from the central business district (CBD). The assessed corridor includes the 15 kilometre north-south route of the Robinsons Road/Westwood Drive/Calder Park Drive alignment from the Western Freeway in Derrimut to the Calder Freeway in Calder Park.

The Project Area focusses on the northern section of the Palmers Road Corridor (Western Freeway to Calder Freeway) and is illustrated in Figure 1. The previous assessments refer to the entire Palmers Road Corridor in six sections. The Project Area encompasses five of these sub-corridors (1-5).

According to the Department of Environment and Primary Industries' (DEPI) Biodiversity Interactive Map (DEPI 2013b) the Project Area lies within the Victorian Volcanic Plain (VVP) Bioregion. This bioregion extends from Portland in the west to Craigieburn in the east and from Clunes in the north to Colac in the south. The Project Area is included within the management boundaries of Melton City Council, Brimbank City Council and the Port Philip and Westernport Catchment Management Authority (CMA).

The following conservation reserves are located within, or adjacent to the Project Area (Figure 1):

- Ravenhall Nature Conservation Reserve;
- Banchory Grove Grassland Nature Conservation Reserve; and,
- Organ Pipes National Park.

The Functional Design Footprint includes a small area of the Banchory Grove Grasslands and adjoins both the Ravenhall Reserve and Organ Pipes National Park. In addition to managed conservation reserves, the Functional Design Footprint includes a small section of Pioneer Park (State significant BioSite 5270), a council managed reserve. The area included in the footprint is zoned General Residential Zone (GRZ3) under the Brimbank City Council Planning Scheme.

1.4 Project Description

The Palmers Road Corridor Project will reserve land for the development of suitable transport infrastructure required to meet the increasing needs of the expanding western suburbs of Melbourne. The upgrade works will involve the augmentation and linking of existing local roads and creation of a six-lane major arterial road. The project will lead to the following improvements to the road network:

- Ultimate six lane divided road (three lanes each way);
- Off road shared bicycle and pedestrian lanes on both sides of the road;
- Upgrade of intersections of Palmers Road and Robinsons Road at Boundary Road, Dohertys Road, Leakes Road and Sayers Road;
- Improved landscaping; and,
- Improved drainage.

In the short term, the Palmers Road Corridor - Western Freeway to Calder Freeway project involves reserving the land for future development, through amendments to the Brimbank and Melton Planning Schemes. The complete development of the route is expected to be a long term project which would result in the arterial road being constructed potentially by 2046.

The project includes the development of the Westwood Drive Bridge over Kororoit Creek. Melton City Council has commenced the following works, which are currently on hold pending approval of the broader Palmers Road Corridor Project:

- Construction of approximately 780 meters of two lane road and an additional 70 meters of bridge over Kororoit Creek;
- Construction of a footpath, provision of landscaping, installation of public lighting and bicycle lanes along the full length of the works;
- Completion of the existing footpath between Tenterfield Drive and Commercial Road; and,
- Provision of landscaping between Tenterfield Drive and Taylors Road.

The Westwood Drive works were originally considered separate to the Palmers Road Corridor Project, and as such, a separate ecological assessment and approvals process was completed, including the submission of an *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral (2011/5909) in April 2011 and the development of a Translocation and Conservation Management Plan for a small population of Tough Scurf-pea *Cullen tenax* - a state significant plant recorded within the bridge construction footprint (Native Vegetation Management Services 2012). Following direction from DTPLI, the Westwood Drive bridge development works have been put on hold and included in the EES assessment process. Prior to construction works ceasing, the majority of the Westwood Drive development zone had been disturbed.

This report incorporates the findings of the assessments completed for the Westwood Drive works, which are encompassed in the assessed Project Area.

The Palmers Road Corridor Project was referred under the EE Act to the (then) Department of Planning and Community Development (DPCD) on 30 June 2009 and included the entire Palmers Road Corridor. The southern alignment section (Dunnings Road to Western Freeway) has undergone a Planning Scheme Amendment process which has been approved. For the northern section (Western Freeway to Calder Freeway) which forms the subject of this assessment, the Minister for Planning decided that an EES was required. Final scoping requirements for the EES were released by DTPLI in July 2013 (Section 6.1.2).

The proposed upgrade of the entire Palmers Road Corridor is classified as a 'Controlled Action' under the EPBC Act and requires approval by the Commonwealth Minister prior to the commencement of construction. A decision by the Minister will be made based on 'preliminary documentation' as stated in correspondence to VicRoads dated 29 May 2009. This preliminary documentation is due to be exhibited independently of any Victorian environmental assessment process.

1.5 Summary of Relevant Previous Assessments

Previous biodiversity assessments completed for the Palmers Road Corridor Project are listed in Section 1.1. The scope of assessments relevant to the current Project Area are summarised in the following sections.

1.5.1 2007 – Flora, Fauna and Net Gain Assessment

The 2007 assessment (Ecology Partners Pty Ltd 2007) focussed on the entire Palmers Road Corridor. It is however noted that the adopted study area excluded land between the Western Highway and the southern end of Westwood Drive and between the southern and northern ends of Calder Park Drive. The assessment included a desk-based review of information sources and reported the findings of the following field surveys:

- Flora assessments completed 26 and 30 October 2006;
- Habitat-based fauna assessments completed 02 and 03 October 2006;
- Targeted Growling Grass Frog *Litoria raniformis* surveys of Kororoit Creek completed 11 and 14 December 2006;
- Establishment of tile grids for Striped Legless Lizard *Delma impar* and inspections completed in 2006 and 2007; and,
- Targeted Golden Sun Moth *Synemon plana* surveys completed 13 and 18 December 2006, and 05 January 2007.

The findings of the 2007 study have been incorporated into the current assessment.

1.5.2 2009 - Flora, Fauna and Net Gain Assessment

The 2009 assessment (Ecology Partners Pty Ltd 2009) provided a detailed study of the entire Palmers Road Corridor, including corridor areas not assessed in the 2007 report. The assessment included a revised desk-based review and reported the results of habitat-based flora and fauna surveys completed on 22 December 2008 and 14 January 2009. The findings of the 2009 study have been incorporated into the current assessment.

1.5.3 2010 - Targeted Surveys for EPBC Act Listed Plants

Following referral of the project under the EPBC Act, the (then) Department of Environment, Water, Heritage and the Arts (DEWHA) requested further information regarding the potential for a number of listed plants to occur on site. These species included Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*, Maroon Leek Orchid *Prasophyllum frenchii*, Sunshine Diuris *Diuris fragrantissima* and Small Golden Moths *Diuris basaltica*.

In response to this request, Ecology Partners Pty Ltd completed targeted surveys of the entire Palmers Road Corridor over six days between October and December 2009. These surveys focussed on seven areas of potential habitat for these species:

- North of the Calder Freeway, near Calder Park Drive;
- Adjacent to the Bendigo railway line on Calder Park Drive;
- Kororoit Creek reserve and associated areas, near Westwood Drive;
- Areas near the railway line south of the Western Highway;
- Between Riding Boundary Road and the Deer Park Bypass, Palmers Road, Derrimut;
- Between Doherty's Road and Boundary Road, Palmers Road, Truganina; and,
- Between Sayers Road and Doherty's Road, Truganina.

The 2010 report (Ecology Partners Pty Ltd 2010) summarised the results of these surveys, which have been incorporated into the current assessment.

1.5.4 2011 – Conservation Management Plan for Matters of NES

The Conservation Management Plan (Ecology Partners Pty Ltd 2011) was prepared to address an information request by (the then) DEWHA following submission of the project referral. The plan provides a framework for managing potential impacts of the project on EPBC Act listed ecological values prior to, during, and post-construction. The plan provides specific prescriptions for the following ecological values protected under the EPBC Act:

- Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) ecological community;
- Spiny Rice-flower;
- Growling Grass Frog;
- Golden Sun Moth; and,
- Striped Legless Lizard.

Prior to the submission of preliminary documentation to the Commonwealth Department of the Environment (DoE), the Conservation Management Plan will be amended to reflect the findings of this assessment.

1.5.5 Assessments Completed for the Westwood Drive Works

The following reports have been completed to assess and manage potential ecological impacts associated with the Westwood Drive works:

- *Flora and Fauna Assessment of the Westwood Drive Extension, Burnside Heights, Victoria* (Ecology Partners Pty Ltd 2009);
- *Growling Grass Frog Litoria raniformis Conservation Management Plan for the Westwood Drive Extension, Burnside Heights, Victoria* (Ecology and Heritage Partners 2011a); and,
- *Westwood Drive, Burnside Heights: Translocation and Conservation Management Plan for Tough Scurf-pea Cullen tenax* (Native Vegetation Management Services 2012).

The 2009 Flora and Fauna Assessment indicated that no patches of remnant native vegetation or scattered trees were present within the adopted study area. The report noted a moderate-high potential for the nationally significant Growling Grass Frog *Litoria raniformis* to inhabit the adjoining section of Kororoit Creek and nine state significant Tough Scurf-pea plants were recorded within the bridge construction zone.

The findings of this assessment were incorporated into the EPBC Act referral (2011/5909) submitted by Melton Shire Council in April 2011 and the project was designated a Non-controlled Action (if undertaken in a particular manner) in January 2012 by the (then) Department of Sustainability, Environment, Water, Population and Communities (SEWPaC). Conditions attached to the approval included the requirement to prepare the Growling Grass Frog Conservation Management Plan listed above. The *Translocation and Conservation Management Plan for Tough Scurf-pea* was prepared and implemented as part of the state planning process, in order to meet the expectations of the (then) Department of Sustainability and Environment (DSE).

1.6 Structure of the report

This Flora and Fauna Report is structured as follows:

Section 2: Methods - details the desk and field based methods used in surveying the existing environment;

Section 3: Results - describes the Project Area and locality in terms of the existing environment, including vegetation communities, ecological communities and flora and fauna, based on the results of the desk-based and field assessments;

Section 4: Ecological Significance of the Project Area - summarises the ecological values of the Project Area, with reference to significant sites (BioSites, reserves) native vegetation and known or potential habitat for threatened species;

Section 5: Permitted Clearing Assessment - outlines the biodiversity offset requirements associated with the project, based on revised data collected through field surveys;

Section 6: Legislation and Policy - provides a summary of legislative implications associated with the project, as they relate to biodiversity;

Section 7: Potential Impacts and Mitigation Measures - describes the potential impacts of the project on the biological environment and provides recommended mitigation measures for reference during the final design and construction program as well as during operation of the project; and,

Section 8: Conclusion - presents conclusions relating to ecological impacts and associated biodiversity offset requirements.

2 METHODS

This chapter details the desk and field based methods used in surveying the current environment.

2.1 Definitions

For the purpose of this report the following definitions apply:

- Project Area: A broad area encompassing the extent of the 2009 study area (Ecology Partners Pty Ltd 2009), the Westwood Drive works and the Functional Design Footprint to assess potential direct and indirect impacts of the project. The Project Area is illustrated in Figure 1.
- Functional Design Footprint: The area nominated by VicRoads as encompassing the likely extent of direct impacts associated with the project. It is noted that biodiversity offset targets in Section 5 have been calculated based on this footprint (Figure 5).
- Study Area: The area within 10 kilometres of the Project Area. This is consistent with the extent of database searches (Section 2.3).

2.2 Nomenclature

Common and scientific names (including accepted synonyms where appropriate) of vascular plants follow the Victorian Biodiversity Atlas (VBA) (DSE 2011a), the Flora Information System (FIS) (Viridans 2012a) and the *Census of Vascular Plants of Victoria* (Walsh and Stajsic 2007). Vegetation community names follow the DEPI Ecological Vegetation Classes (EVC) benchmarks. Terrestrial and aquatic vertebrate fauna (mammals, birds, reptiles, amphibians and fish) follow the VBA (DSE 2011b). Introduced species for flora and fauna are identified in the text with an asterisk following the name, for example *Arctotheca calendula**.

2.3 Literature and Database Review

Relevant literature, online-resources and numerous databases were reviewed to provide an up to date assessment of ecological values associated with the Project Area, including:

- The VBA (DSE 2011a; 2011b), FIS (Viridans 2012a) and Victorian Fauna Database (VFD) (Viridans 2012b) for documented flora and fauna records within the Study Area;
- The Biodiversity Interactive Map (DEPI 2013b) for the extent of historic and current EVCs, and the location of sites of biological significance within the region;
- The (former) SEWPaC Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES), including flora and fauna species and ecological communities listed under the EPBC Act within the Study Area (SEWPaC 2013);
- Relevant federal and state legislation and policies, including the EPBC Act, EE Act and *Flora and Fauna Guarantee Act 1988* (FFG Act);
- The Planning Schemes Online maps (DPCD 2013) for current zones and overlays applicable to the Project Area;

- Relevant reports, documents and literature, including the *Port Phillip and Westernport Native Vegetation Plan* (PPWCMA 2006) and previous reports listed in Sections 1.1 and 1.5; and,
- Aerial photography of the Project Area.

A list of threatened flora and fauna species previously recorded, or predicted to occur within the Study Area is provided in Appendix A2 and B2, respectively.

2.4 Field Survey

Prior to undertaking the current survey, information regarding ecological values within the Project Area and locality was requested from DEPI, Melton City Council and Brimbank City Council. Feedback provided confirmed the findings of the literature and database review and identified a number of additional sites for consideration, including a reference site for Spiny Rice-flower located nearby Burnside Shopping Centre, immediately adjacent to the Project Area (Figure 3).

2.4.1 Flora survey

This assessment, including the calculation of biodiversity offset requirements, is based on the results of a field survey completed on 30 - 31 May and 02 July 2013. The survey assessed new areas within the corridor associated with the Functional Design Footprint and ground-truthed the results of previous site assessments, particularly those reported in *Palmers Road Corridor and Calder Park Interchange: Flora and Fauna Assessment, and Net Gain Analysis* (Ecology Partners Pty Ltd 2009). General and targeted flora surveys reported in the 2009 assessment (Ecology Partners Pty Ltd 2009) were undertaken along the entire Palmers Road Corridor. During these surveys the adopted Project Area was visually assessed, with all vascular plants recorded and the overall condition of vegetation noted. Habitat hectare assessments were completed for all areas of remnant vegetation within the Project Area, as detailed in Section 5.

During the current survey (30 - 31 May and 02 July 2013), a list of dominant flora species was compiled and the location of significant species recorded. Vegetation mapping was undertaken through aerial photograph interpretation and in-field using a computer tablet with ArcPad software. EVCs within the Project Area were determined with reference to DEPI pre-1750 and extant EVC mapping (DEPI 2013b). Detailed habitat hectare assessments were completed for new areas associated with the Functional Design Footprint (i.e. land not assessed by previous surveys). These areas were identified using a Geographical Information System (GIS) to overlay the current design with the previous survey extents. Previously mapped native vegetation boundaries were refined and where required, habitat condition scores were adjusted.

A list of plants recorded during current and previous surveys is presented in Table A1, Appendix A and threatened flora species previously recorded or predicted to occur within the Study Area are listed in Table A2, Appendix A.

2.4.2 Fauna Survey

A habitat-based assessment of the Project Area was undertaken during the current survey (30 - 31 May and 02 July 2013), in conjunction with ground-truthing and detailed flora surveys described in Section 2.4.1. The current survey supplements previous studies undertaken for the entire Palmers Road Corridor and Westwood Drive works, including targeted surveys for Striped Legless Lizard, Golden Sun Moth and Growling Grass Frog (Section 1.5).

Prior to undertaking the current survey, discussions were held with Government authorities regarding local records of Striped Legless Lizard, Golden Sun Moth and Growling Grass Frog in the vicinity of the Project Area. The survey included a visual assessment of the site, with all fauna species recorded and the overall habitat condition noted. Binoculars were used to scan the area for birds, and observers also listened for calls and searched for other signs of fauna such as nests, remains of dead animals, droppings and footprints. Habitat features including ground cover and vegetation composition and structure, and the presence of hollows and fallen ground debris were also noted. Areas of indigenous grasses were identified as they are considered potential habitat for the Striped Legless Lizard and Golden Sun Moth.

In addition, as fauna species are mobile, a visual assessment of the adjoining areas outside of the Project Area was made to determine whether there was suitable habitat (principally for threatened species) in the immediate area, and to determine the likelihood that any of these species would either reside within the Project Area for extended periods of time, or whether the site contributes to a larger home range of a significant species.

The following sections outline the survey effort relating to targeted fauna surveys previously completed within the Project Area for the Palmers Road Corridor Project. The surveys targeted three listed species known or considered likely to occur on site (Figure 2).

Striped Legless Lizard Survey

Targeted surveys for Striped Legless Lizard were previously completed for the entire Palmers Road Corridor, comprising the establishment of tile grids at nine locations, eight of which are included in the Project Area. Table 1 summarises the survey effort for this species completed specifically for the Palmers Road Corridor Project. Grid locations previously surveyed within the Project Area are illustrated in Figure 2.

Table 1 Targeted surveys for Striped Legless Lizard

Tile grid	Date established	Date inspected
Grid 1[1]	2 October 2006	27 and 30 October, 14 November, 12 December 2006
Grid 2	2 October 2006	26 and 30 October, 14 November, 12 December 2006
Grid 3	2 October 2006	26 and 30 October, 14 November, 12 December 2006
Grid 4	2 October 2006	27 and 30 October, 14 November, 12 December 2006
Grid 5	2 October 2006	26 and 30 October, 14 November, 12 December 2006
Grid 6	2 October 2006	26 and 30 October, 14 November, 12 December 2006
Grid 7	25 November 2006	14 November, 12 December 2006
Grids 8 & 9	6 November 2006	5 January, 29 February 2007

Note: 1) Tile grid outside of the Project Area

The targeted surveys involved the establishment of rectangular tile grids (each 5 x 10 tiles) in areas that supported higher quality indigenous grassland (i.e. potential habitat). Tiles were regularly checked for the presence of the Striped Legless Lizard and other species early to mid-morning on warm sunny days when reptiles are most likely to utilise them for protection and warming in the morning. Active searching under rocks and ground debris, such as tin and other hard litter, was also undertaken to survey for Striped Legless Lizard at the time the tiles were inspected.

Active searches at each grid location and other areas of potential habitat were completed during the current survey. This involved looking for active specimens; turning over suitable ground shelter, such as fallen timber, sheets of iron and exposed rocks. Inspections confirmed that the previously laid tiles are no longer in place, with a number of surveyed grassland patches (e.g. Grid 2) subsequently cleared for development.

Golden Sun Moth Survey

Targeted surveys for Golden Sun Moth have been completed at three locations along the Palmers Road Corridor, two of which are within the Project Area. Table 2 summarises the survey effort for this species completed specifically for the Palmers Road Corridor Project. Sites previously surveyed within the Project Area are illustrated in Figure 2.

Table 2 Targeted surveys for Golden Sun Moth

Survey site	Date surveyed
1	13 and 18 December 2007
2	05 January 2007
31	13 and 18 December 2007

Note: 1) Site outside of the Project Area

Targeted surveys for the Golden Sun Moth were undertaken by suitably qualified zoologists, experienced in the identification of the species in the field and those who are familiar with the key habitat requirements of this species. Golden Sun Moths are generally found in areas of remnant indigenous grassland, particularly where Wallaby Grass *Rytidosperma* spp. dominates the ground layer. Surveys were conducted at times considered to be optimal to observe the male moths flying in search of females. That is, on warm, calm sunny days, generally in the middle of the day. Previous surveys comprised one zoologist walking linear transects through grassland between 1100 – 1400 hours Daylight Savings Time while searching for male moths as they fly within one metre above the grasses.

As the current survey (30 - 31 May and 02 July 2013) was completed outside the optimum detection period for this species (October – December), habitat-based assessments were undertaken throughout the Project Area to supplement the previous targeted surveys and determine the distribution and extent of potential habitat.

Growling Grass Frog Survey

Targeted surveys for Growling Grass Frog were completed on 11 and 14 December 2006 at two small ponds located several hundred metres north of the Kororoit Creek crossing, and in-stream pools along Kororoit Creek (Figure 2).

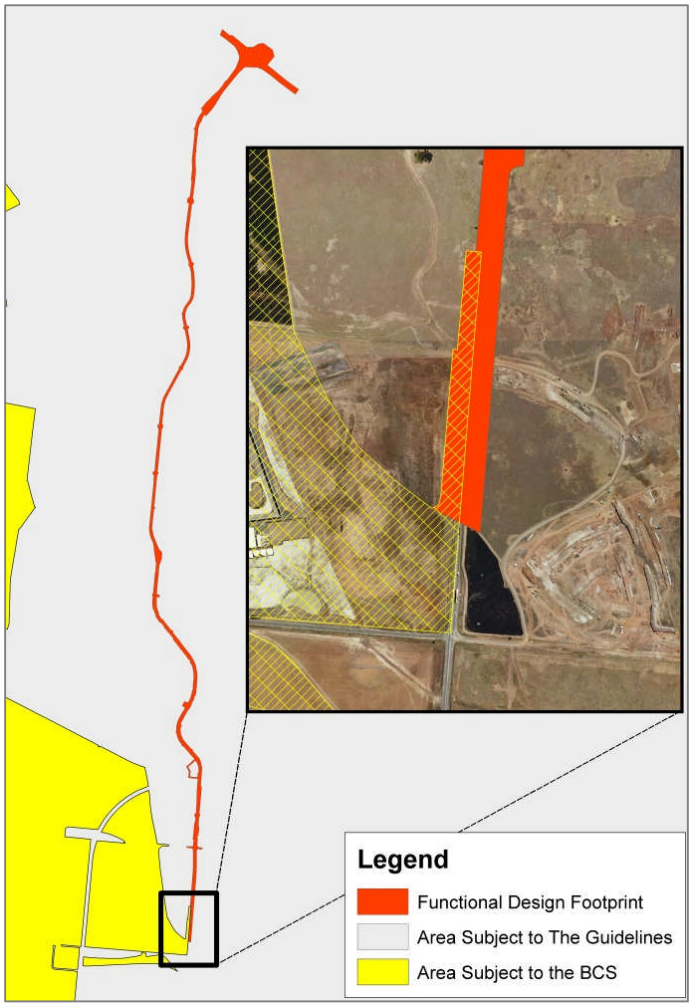
Two personnel experienced in amphibian surveys, including significant species such as the Growling Grass Frog conducted nocturnal surveys during mild (approximately 16°C) conditions. Previous surveys were completed during the active period of the species, at a time when males are most likely to respond to call play-back (i.e. during the core breeding period). Spotlighting and active searching were undertaken during the survey, both of which are reliable techniques used to detect the species. The margins of the waterbodies and shallow drainage lines were carefully searched for active frogs using 30 watt 12 volt hand-held spotlights. The advertisement call of male Growling Grass Frogs was imitated to elicit a response from any adult males present. Suitable refuge sites such as logs, rocks and other ground debris were lifted opportunistically to locate inactive frogs.

Despite previous surveys being undertaken at an appropriate time of the year there was no evidence of the species within or immediately adjacent to the survey sites. Nevertheless, the Growling Grass Frog is a highly mobile species and is known to be present within Kororoit Creek and associated terrestrial habitats (DSE 2011b, Organ pers. obs.). Furthermore, Kororoit Creek is considered to be of national conservation significance for this species (Costello and Organ 2000; Costello and Kimber 2000, 2004).

As the current survey (30 - 31 May and 02 July 2013) was completed outside the optimum detection period for this species, habitat-based assessments were undertaken throughout the Project Area to supplement the previous targeted surveys and determine the distribution and extent of potential habitat.

2.5 Identification of Offset Obligations

The calculation of offset obligations for this project references both The Guidelines (DEPI 2013d) which apply to the majority of the Functional Design Footprint, and the BCS which applies to a small area (~500 metres) included in the boundaries of the Ravenhall (Quarry Site) Precinct (Precinct Structure Plan [PSP] 1084). Following final project design and at a stage closer to construction, the offset requirements for the project are required to be reassessed with reference to The Guidelines and BCS (Section 6.1.6). The jurisdiction of each policy is illustrated in Inset 1 and further details are provided in the following sections.



Inset 1 Areas subject to The Guidelines and BCS

2.5.1 Permitted Clearing Assessment (The Guidelines)

The Guidelines apply to the majority of the Functional Design Footprint (Inset 1). This assessment has been completed during a phase of vegetation policy reform in Victoria, during which The Framework (NRE 2003) was replaced by The Guidelines (DEPI 2013d) in late December 2013.

Under The Guidelines, the impacts on biodiversity from clearing proposals are assessed using a risk-based approach. Two factors – extent risk and location risk – are used to determine the risk associated with an application for a permit to remove native vegetation (Table 3). The extent risk is determined by the amount of native vegetation (in hectares) or the number of Scattered Trees that are proposed to be removed. The location risk (A, B or C) has been determined for all areas in Victoria and is available on DEPI's NVIM Tool (DEPI 2014). The applicable risk-based pathway is determined by combining the extent risk and the location risk of the vegetation to be removed (Table 3).

Table 3 Risk-based pathways under The Guidelines (DEPI 2013d)

Extent		Location		
		A	B	C
Remnant Patch	< 0.5 hectares	Low	Low	High
	≥ 0.5 hectares and < 1 hectare	Low	Moderate	High
	≥ 1 hectare	Moderate	High	High
Scattered Trees	< 15 scattered trees	Low	Moderate	High
	≥ 15 scattered trees	Moderate	High	High

Owing to the location and extent of vegetation removal proposed (C [partial] and > one hectare), the project falls under the High Risk pathway. In accordance with The Guidelines, the extent (in hectares) and condition score of vegetation proposed for removal has been calculated based on the results of a habitat hectare assessment (Section 2.4.1). The methodology for undertaking the habitat hectare assessment is described in the Vegetation Quality Assessment Manual (DSE 2004). Under The Guidelines, native vegetation is classified into two categories, Remnant Patches and Scattered Trees (Table 4).

Table 4 Assessment of remnant native vegetation under the High Risk Pathway (DEPI 2013d)

Category	Definition	Extent	Condition
Remnant Patch of native vegetation	An area of native vegetation, with or without trees, where at least 25 per cent of the total perennial understorey plant cover is native plants. OR An area with three or more native canopy trees[1] where the canopy foliage cover is at least 20 per cent of the area.	Measured in hectares. Based on hectare area of the Remnant Patch.	Vegetation Quality Assessment Manual (DSE 2004).
Scattered Trees	Native canopy trees over three metres in height that do not form part of a Remnant Patch of native vegetation.	Measured in hectares. Each Scattered Tree is assigned an extent of 0.071 hectares (30m diameter).	In accordance with The Guidelines, Scattered Trees are assigned a default condition score of 0.2.

Notes: 1) A canopy tree is a mature tree that is greater than three meters in height and is normally found in the upper layer of the relevant vegetation type.

In accordance with the DEPI guideline *Transitional Guidance to Support Reforms to Victoria's Native Vegetation Permitted Clearing Regulations* (DEPI 2013e), the offset obligations reported in Section 5.2.2 are derived from the Biodiversity Impact and Offset Requirements Report (BIOR) provided by DEPI on 15 August 2014. The report is based on spatial data captured during the field assessments and references the results of the habitat hectare assessment.

Under The Guidelines, vegetation formerly classified as Modified Treeless Vegetation (MTV) under the Framework now meets the classification of a Remnant Patch and must be accounted for in offset calculations. As the habitat hectare surveys were completed prior to this amendment, areas of MTV within the Project Area were not attributed habitat hectare scores. In order to avoid re-surveying these relatively degraded patches dominated by early colonising native grass species, DEPI have confirmed that a site condition score of 0.2 should be adopted for each converted Habitat Zone.

The results of the permitted clearing assessment are summarised in Section 5 and the BIOR is provided in Appendix C. Table 5 outlines the minimum application requirements for a permit to remove native vegetation under the High Risk pathway (DEPI 2013d).

Table 5 Application requirements for High Risk Pathway projects

Application Requirement	Reference
1. The location of the site of native vegetation to be removed. This includes the address of the property.	Section 1.3 and Figure 1
2. A description of the native vegetation to be removed including: • Whether the native vegetation is a remnant patch, or scattered trees, in accordance with the definitions of the guidelines • The area of any remnant patches of native vegetation • The number of any scattered trees.	Sections 3.1.1 and 5, and Figure 5
3. Maps or plans containing the following information: • North point and property boundaries • All areas of native vegetation, clearly showing the native vegetation to be removed (including any area that the Country Fire Authority has recommended for removal or management for fire protection purposes) • All scattered trees to be removed • Location where photographs were taken, and the direction from which they were taken.	Figure 5
4. Recent photographs (dated) of the native vegetation to be removed	Appendix E
5. The risk-based pathway of the application to remove native vegetation.	Sections 2.5.1 and 5
6. Where the purpose of removal, destruction or lopping of native vegetation is to create defendable space, a statement is required that explains why removal, destruction or lopping of native vegetation is necessary. The statement must have regard to other available bushfire risk mitigation measures. This requirement does not apply to the creation of defendable space in conjunction with an application under the Bushfire Management Overlay.	N/A
7. A copy of any property vegetation plan that applies to the site.	N/A
8. Details of any other native vegetation that was permitted to be removed on the same contiguous parcel of land with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before the application to remove native vegetation is lodged.	N/A
9. The strategic biodiversity score of the native vegetation to be removed.	Section 5 and Appendix C
10. The offset requirements should a permit be granted to remove native vegetation.	Section 5.2.2 and Appendix C
11. A habitat hectare assessment report of the native vegetation that is to be removed.	Section 5
12. A statement outlining what steps have been taken to ensure that impacts on biodiversity from the removal of native vegetation have been minimised. The steps taken should have regard to the contribution the native vegetation to be removed and the native vegetation to be retained makes to biodiversity. The statement should include either: • Details of any strategic planning process the site has been subject to that has minimised impacts on biodiversity from the proposed use or development, or • A description of the opportunities taken to locate, design and manage the proposed use or development to minimise impacts on biodiversity from the removal of native vegetation. If the applicant considers no further opportunities exist to minimise impacts on biodiversity from the removal of native vegetation, then provide an explanation of the potential impacts on the proposed use or development if further minimisation was required.	Sections 5.2 and 7

Application Requirement	Reference
13. An assessment of whether the proposed removal of native vegetation will have a significant impact on Victoria's biodiversity, with specific regard to the proportional impact on habitat for any rare or threatened species.	Section 7
14. An offset strategy that details how a compliant offset will be secured to offset the biodiversity impacts of the removal of native vegetation.	Section 5.2.2.3

2.5.2 Biodiversity Conservation Strategy

A small portion of the Functional Design Footprint included in PSP 1084 - Ravenhall (Quarry Site) is subject to the offset requirements of the BCS (DEPI 2013a), which are calculated based on time-stamped biodiversity data (Inset 1).

In June 2009 the Victorian Government entered into an agreement with the (former) SEWPaC to undertake a Strategic Impact Assessment (SIA) under the EPBC Act. The SIA Program Report (DSE 2009a) is the primary document identifying potential impacts of the proposed program of urban development on matters of NES. The Program Report includes a commitment to develop and implement a strategy for Melbourne's Growth Corridors which would inform the preparation of Growth Corridor Plans and PSPs. The BCS (DEPI 2013a) and associated sub-regional species' strategies (DEPI 2013f; 2013g) identify conservation outcomes and offset consolidation strategies for Victoria's native vegetation and matters of NES, including mechanisms for how these outcomes will be delivered. The draft BCS was released in November 2011, was finalised in May 2013, and approved by the Commonwealth on 05 September 2013.

The section of the Functional Design Footprint subject to the BCS is located within the Western Growth Corridor and as such, the following matters of ecological significance considered under the BCS apply to this area: Native vegetation (including Scattered Trees), Spiny Rice-flower, Golden Sun Moth, Growling Grass Frog and Striped Legless Lizard. Within the Western Growth Corridor, the removal of any time-stamped native vegetation or designated habitat for the above noted species triggers the requirement to pay a habitat compensation fee to DEPI to account for the loss. Compensation fees fund the securement and management of the proposed Western Grasslands Reserve (a future reserve between Werribee and Melton) and other Conservation Areas. A proponent is required to pay this fee regardless of whether the native vegetation or threatened species habitat in question occurs at the site. A summary of offset requirements under the BCS is provided in Section 5 and the Habitat Compensation Statement supplied by DEPI on 22 August 2014 is provided in Appendix D.

2.6 Assessment Qualifications and Limitations

Data and information held within the ecological databases and mapping programs reviewed in the desk-based assessment (e.g. VBA, EPBC Act PMST, Biodiversity Interactive Maps etc.) are unlikely to represent all flora and fauna observations within the Project Area and Study Area. It is therefore important to acknowledge that a lack of documented records does not necessarily indicate that a species or community is absent; rather it may reflect a lack of previous survey effort or data confirmation.

The timing of the current survey in late-autumn is outside the optimal flowering period for most native grasses and herbs; however sufficient diagnostic material, such as dry grass panicles, were available to determine the dominant species present in the Project Area. Due to the extent of weed infestations throughout much of the Project Area, some seasonally emergent or transient plant species may not have been detected.

The 'snap shot' nature of standard flora and fauna site assessments reduces the likelihood of mobile, migratory, seasonal, cryptic, nocturnal or uncommon fauna species being detected. Therefore, an absence of such species from the results does not necessarily mean that these species are not present or do not use the Project Area. Habitat-based assessments have been undertaken to determine the likelihood of threatened flora and fauna occurring.

The limitations noted above are lessened by the extent and timing of surveys previously completed within the Project Area for the Palmers Road Corridor Project. The completed survey effort is considered sufficient to document many of the ecological values present within the Project Area and inform the likelihood of significant species and communities being impacted by the project.

3 RESULTS

3.1 Existing Environment

3.1.1 Vegetation Communities

A review of the DEPI Biodiversity Interactive Map (DEPI 2013b) indicated that prior to European settlement the Project Area is likely to have supported three EVCs. Current EVC mapping indicates that the three EVCs remain within the Project Area, comprising small, fragmented Remnant Patches, which can be attributed to historic land clearing and on-going land use activities.

Table 6 DEPI mapped and field verified EVCs within the Project Area

Mapped EVC[1]	Bioregional Conservation Status	Present pre-1750	Mapped in 2005	Present
Heavier-soils Plains Grassland – EVC 132_61	EN	✓	✓	✓
Creekline Grassy Woodland – EVC 68	EN	✓	✓	-
Aquatic Herbland – EVC 653	EN	✓	✓	-
Plains Grassy Wetland - EVC 125	EN	-	-	✓

Notes: 1) Based on DEPI modelling

The current survey identified two EVCs within the Project Area – Heavier-soils Plains Grassland (EVC 132_61) and Plains Grassy Wetland (EVC 125). Areas mapped by DEPI as Aquatic Herbland (EVC 653) are now referable to the Plains Grassy Wetland community and Creekline Grassy Woodland (EVC 68) mapped along Kororoit Creek no longer meets the condition thresholds of an EVC, comprising scattered River Red-gum *Eucalyptus camaldulensis* trees with an understorey dominated by exotic weeds.

Descriptions of each vegetation community within the Project Area are provided in the following sections and photographs of each Habitat Zone are provided in Appendix E.

3.1.1.1 Heavier-soils Plains Grassland EVC 132_61

Heavier-soils Plains Grassland is a treeless vegetation community dominated by native grasses and herbs (DEPI 2013c). It occupies fertile but poorly drained cracking soils throughout the Victorian Volcanic Plain. Plains Grassland was widespread within the Project Area, varying in condition from very poor quality vegetation occupying roadside reserves, to high quality vegetation within conservation areas.

The Project Area supports 43 Remnant Patches of Plains Grassland (Photograph 1). This EVC is represented by 11 Habitat Zones (PG1 – PG11), as illustrated in Figure 5.

Photograph 1 Plains Grassland within the Project Area

3.1.1.2 Plains Grassy Wetland EVC 125

Plains Grassy Wetland is a usually treeless wetland vegetation community dominated by water logging-tolerant grasses, sedges and, following inundation, herbs. The community is typically species-rich on the outer verges, but species-poor in the wetter central areas. It occurs in small depressions across the Victorian Volcanic Plain. Areas mapped by DEPI as Aquatic Herbland (EVC 653) within Ravenhall Nature Conservation Reserve are now referable to Plains Grassy Wetland, which is dominated by water logging-tolerant native grasses and reflects the drier hydrological regime now experienced by these areas. Plains Grassy Wetland occurs within the Project Area as small, relatively weed-free patches within a larger Plains Grassland remnant (Photograph 2). These patches were dominated by Common Nardoo *Marsilea drummondii*, Common Tussock-grass *Poa labillardierei* and Finger Rush *Juncus subsecundus*.

The Project Area supports two Remnant Patches of Plains Grassy Wetland. This EVC is represented by Habitat Zones PGWe1 and PGWe2, as illustrated in Figure 5.

Photograph 2 Plains Grassy Wetland (EVC 125) within the Project Area

3.1.2 Species of Flora

Collectively, the surveys reported in the 2009 assessment (Ecology Partners Pty Ltd 2009) and the current field surveys (30 – 31 May and 02 July 2013) recorded a total of 165 species of flora, of which 71 were native (approximately 43%) (Table A1, Appendix A). The most species rich families included Poaceae, Asteraceae and Chenopodiaceae. It is noted that planted trees and shrubs were not recorded unless they were seen to be naturally spreading within the Project Area.

Flora species recorded within the Project Area include noxious weeds listed under the Victorian *Catchment and Land Protection Act 1994* (CaLP Act) for the Port Phillip and Westernport CMA area and environmental weeds listed on the *Advisory List of Environmental Weeds for the Inlands Plains Bioregions of Australia* (DSE 2009b). The following Weeds of National Significance (WoNS) were recorded in the Project Area:

- Montpellier Broom *Genista monspessulana**
- African Boxthorn *Lycium ferocissimum**
- Chilean Needle-grass *Nassella neesiana**
- Serrated Tussock *Nassella trichotoma**
- Blackberry *Rubus fruticosus spp. agg.**

Threatened flora species recorded or predicted to occur within the Project Area and Study Area are discussed in Sections 3.2.1.2, 3.2.2.2 and 3.2.3.

3.1.3 Fauna Habitats

The cleared nature of much of the Project Area, large areas dominated by introduced grasses and weed species, and a paucity of mature native trees are evidence of a long history of agricultural land use and more recent urbanisation. Although the Project Area contained sufficient habitat characteristics to support a moderate diversity of common fauna species, the general scarcity of structural diversity and density within most vegetation patches represented limited niche availability for supporting a high diversity of animals.

Habitat features recorded in the Project Area generally include those associated with remnant indigenous grassland, exotic dominated grassland, planted vegetation, aquatic habitat and developed areas. The habitats and species associations are discussed in the following sections.

Table 7 Fauna habitat with corresponding vegetation description

Fauna habitat description	Corresponding vegetation community (Section 3.1.1)
Remnant indigenous grassland	Plains Grassland EVC 132_61
Exotic dominated grassland	N/A – Degraded Treeless Vegetation
Planted vegetation	N/A – Degraded Treeless Vegetation
Aquatic vegetation and habitat	Plains Grassy Wetland EVC 125
Developed areas	N/A – Degraded Treeless Vegetation

3.1.3.1 Remnant Indigenous Grassland

This habitat type is characterised by a dense sward of native grasses (Kangaroo Grass *Themeda triandra* and Wallaby grasses (*Rytidosperma* sp.)), interspersed with exotic grasses up one metre high (Photograph 1). Many of these areas contain a moderate to high level of embedded and loose surface rocks throughout. Grassland remnants in the Project Area are relatively isolated from other indigenous grassland patches in the local area, limiting contribution to local habitat corridors for grassland dependant fauna.

This habitat is likely to support a diversity of native fauna, including the threatened Striped Legless Lizard *Delma impar* and Golden Sun Moth *Synemon plana*, and a diversity of grassland birds and ground dwelling fauna such as Eastern Brown Snake *Pseudonaja textilis* and Little Whip Snake *Suta flagellum*.

3.1.3.2 Exotic Dominated Grassland

Large areas of exotic dominated grassland are common throughout the Project Area and have been classified as Degraded Treeless Vegetation (Photograph 3). These grasslands range from maintained exotic lawns and road reserves, to unmaintained areas of open space dominated by opportunistic weed species. The grasslands are composed of exotic plant species commonly associated with urban environments.

Overall, the condition of fauna habitats in these areas was low. Generally, this vegetation provides little fauna habitat and is suitable for common urban-adapted native birds such as the Willie Wagtail, Magpie-lark, Australian Magpie, and Noisy Miner and introduced birds such as the Rock Dove, Spotted Dove and Common Myna.

Photograph 3 Exotic dominated grassland within the Project Area

3.1.3.3 Planted Vegetation

As much of the Project Area has been cleared for agricultural land use and development, a large proportion of vegetated land remaining comprises planted trees and shrubs. These plantings range from mature trees within road reserves to newly established and landscaped garden beds, the majority of which contain species not indigenous to the Study Area.

Overall, the condition of fauna habitats in these areas was low. Generally, this vegetation provides little fauna habitat and is suitable for common urban-adapted native birds such as the Noisy Miner, Rainbow Lorikeet, Musk Lorikeet, Red Wattlebird, Willie Wagtail, Magpie-lark, Australian Magpie, and introduced birds such as the Rock Dove, Spotted Dove and Common Myna.

Photograph 4 Planted vegetation within the Project Area

3.1.3.4 Aquatic Vegetation and Habitat

Aquatic habitats within the Project Area include Kororoit Creek, drainage lines and low-lying areas subject to inundation following heavy rainfall events.

Kororoit Creek begins in the rural foothills of the Great Divide around Gisborne and Sunbury and comprises two main branches (East and West), which join above Melton, approximately 10 kilometres upstream of the Project Area. The creek has a long history of disturbance, with the reach located in the vicinity of the Project Area classified as having a River Health Index (RHI) rating of Poor due to the degradation of riparian vegetation and catchment urbanisation (Melbourne Water 2013).

Kororoit Creek is known to support a range of native and exotic species of fish including Spotted Galaxiid *Galaxias truttaceus*, Common Galaxiid *Galaxias maculatus*, Australian Smelt *Retropinna* sp., Tupong/Congoli *Pseudaphritis urvillii,* Flat-headed Gudgeon *Philypnodon grandiceps*, Southern Pygmy Perch *Nannoperca australis* (state significant), Redfin *Perca fluviatilis**, Mosquito Fish *Gambusia holbro**, Oriental Weatherloach *Misgurnus anguillicaudatus**, Tench *Tinca tinca** and Carp *Cyprinus carpio** (Melbourne Water 2011).

Within the Project Area, vegetation along the banks of Kororoit Creek comprises scattered River Red-gum trees with an understorey dominated by exotic weeds (Photograph 5). At the time of assessment, this area was subject to disturbance associated with the construction of Westwood Drive Bridge over the creek (Section 1.4).

Photograph 5 Kororoit Creek within the Project Area

3.1.3.5 Developed Areas

The Project Area is highly urbanised and as such, developed areas are prevalent. The developed residential, commercial and industrial portions of the Project Area contain street plantings and gardens which include a range of common garden plants and trees not indigenous to the Study Area (Photograph 6).

These areas generally provide little habitat for native animals, except those species adapted to exploit urbanised environments. The developed areas are suitable for a range of common native bird species including the Silver Gull, Red Wattlebird, Willie Wagtail, Australian Magpie and Noisy Miner. Introduced birds including the Rock Dove, Spotted Dove and Common Myna are also prevalent.

Photograph 6 Developed areas within the Project Area

3.1.4 Species of Fauna

A review of the DEPI VFD (Viridans 2012b) indicated that 399 fauna species have been recorded during field surveys undertaken within the Study Area. Of these species, 366 (approximately 92%) are native, with birds being the most recorded group. Collectively, the surveys reported in the 2009 assessment (Ecology Partners Pty Ltd 2009) and the current field surveys (30 – 31 May and 02 July 2013) recorded a total of 43 fauna species, of which 31 were native (approximately 72%) (Table B1, Appendix B).

Although not recorded during field surveys, a population of Eastern Grey Kangaroos is known to utilise undeveloped areas along the Kororoit Creek corridor. This population has been observed by VicRoads personal and was noted during preliminary consultation with the local community.

Three of the 12 introduced species recorded on site are declared pests under the CaLP Act (Red Fox *Vulpes vulpes**, European Hare *Lepus capensis**, European Rabbit *Oryctolagus cuniculus**). All three declared pests are classified as Category 4 – Established Animals, indicating that they are established in Victoria and pose a serious threat to primary production, crown land, the environment or community health.

Threatened fauna recorded or predicted to occur within the Project Area and Study Area are discussed in Sections 3.2.1.2, 3.2.2.2 and 3.2.3.

3.2 Threatened Biodiversity and Other Matters of Significance

This section outlines biodiversity matters of national and state significance. Table 8 outlines the significance criteria adopted for this assessment.

Table 8 Criteria for defining ecological significance

National Significance
Flora and Fauna: National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. Extinct, Critically Endangered, Endangered and Vulnerable).
State Significance
Flora: Species listed as threatened under the FFG Act. Species listed on the DSE Advisory List (DSE 2005) as Endangered, Vulnerable or Rare. Fauna: Species listed as threatened under the FFG Act. Species listed on the DSE Advisory List (DSE 2013) as Critically Endangered, Endangered or Vulnerable.
Regional Significance
Flora: Species listed on the DSE Advisory List (DSE 2005) as Poorly Known in Victoria. Fauna: Species listed on the DSE Advisory List (DSE 2013) as Near Threatened of Data Deficient.

3.2.1 Matters of National Environmental Significance

Matters of NES are listed and protected under the EPBC Act. Matters of NES relating to biodiversity are discussed below in relation to the Project Area based on the results of the EPBC Act PMST (SEWPaC 2013), the desk-based assessment and field surveys completed for the project. A summary of legislative implications relating to the EPBC Act is provided in Section 6.1.1.

3.2.1.1 Threatened Ecological Communities

Five threatened ecological communities listed under the EPBC Act are known or predicted to occur in the Study Area:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Critically Endangered);
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Endangered);
- Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) (Critically Endangered);
- Seasonal Herbaceous Wetlands (SHW) (Freshwater) of the Temperate Lowland Plains (Critically Endangered); and,
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered).

Of these, the NTGVVP and SHW ecological communities were recorded in the Project Area during current surveys. Habitat Zones representative of Plains Grassland (PG1, PG4, PG6 [in part], PG7 [in part] and PG9) meet the condition thresholds and are considered part of the NTGVVP ecological community (Table 9 and Figure 5). There are 3.27 hectares of the NTGVVP ecological community within the Functional Design Footprint, including 0.16 hectares within the BCS Area (PG1). The remaining patches of Plains Grassland do not qualify as NTGVVP as they are either too small or contain an insufficient cover (<50%) of perennial native grasses and a high (>30%) non-grassy weed cover (Table 9).

Habitat Zones representative of Plains Grassy Wetland (PGWe1 and PGWe2) meet the condition thresholds and are considered part of the SHW ecological community (Table 10 and Figure 5). There are 0.03 hectares of the SHW ecological community within the Functional Design Footprint (Table 16).

Table 9 Condition thresholds for the NTGVVP ecological community

Criteria		NTGVVP patches (PG1, PG4, PG6 [in part], PG7 [in part] and PG9 (Figure 5))
EVC	The grassland is either Plains Grassland (EVC 132) or Creekline Tussock Grassland (EVC 654)	Criteria Met
Bioregion	Grassland is in the Victorian Volcanic Plain or near to the Victorian Volcanic Plain (Central Victorian Uplands, Dundas Tablelands and Otway Plain Bioregions)	Criteria Met
Size of patch	If grassland remnant is ≤1 hectare, grassland patch needs to be at least 0.05 hectare in size with no more than 5% canopy cover of trees or shrubs.	Criteria Met
	If grassland remnant is >1 hectare, grassland patch needs to be at least 0.5 hectare in size with no more than 2 trees per hectare.	Criteria Met
Condition thresholds	The native grasses Kangaroo-grass, Wallaby-grass, Spear-grass, or Tussock-grass account for 50% or more of the perennial tussock cover of the grassland patch. OR	Criteria Met
	Native wildflowers account for 50% or more of the total vegetation from September to February. OR	Criteria not met, low cover of native wildflowers.
	Non-grassy weeds account for less than 30% of the total vegetation cover at any time of the year.	Criteria Met
Additional characteristics	The conservation value of a patch of the Natural Temperate Grassland of the Victorian Volcanic Plain ecological community is enhanced if it shows any of the following features: • A high native plant species richness; • Large patch size; • Minimal weed invasion; • Presence of threatened plant and/or animal species; • Presence of natural exposed rock platforms and outcrops; or • Presence of mosses, lichens or a soil crust on the soil surface.	Sites are of high conservation value due to; • Association with threatened taxa (PG 1) • Large patch size (PG 1 – outside of the Project Area)

Table 10 Condition thresholds for the SHW ecological community

Criteria		SHW patches (PGWe1 and PGWe2 (Figure 5))
Physical environment	Lowland plains of Victoria, southeastern South Australia and southern New South Wales	Criteria Met
	On flat plains grading into slopes, below 500 m asl	Criteria Met
	Associated soils are generally fertile but poorly draining clays derived from a range of geologies	Criteria Met
	Typically in rainfall zones with a Winter seasonal rainfall pattern, extending into a Uniform seasonal rainfall pattern at the edge of its range. The mean annual rainfall is usually 400 to 800 mm/year but can be lower at the northern edge of its range.	Criteria Met
Hydrology	On isolated drainage lines or depressions which are seasonally inundated (typically during winter-spring) and subsequently dry (typically by late summer).	Criteria Met
	Rainfall is the main water source. These wetlands are not dependent on overbank flooding from riverine systems.	Criteria Met
	Salinity of the water is fresh to slightly brackish. Salinity mostly lies within the range, 0 to 1000 mg/L but can be up to 3000 mg/L, typically exhibiting a progressive increase in salinity as wetlands dry.	Criteria Met
Biota	Trees and shrubs are sparse to absent. When present, they mostly occur as fringing or scattered individuals. The cover of woody species accounts for no more than 10% projective foliage cover across the wetland.	Criteria Met
	The vegetative cover of the ecological community is dominated by a ground layer of native wetland graminoids and/or native wetland forbs.	Criteria Met
	A range of graminoids is often present and typically includes one or more of the following taxa: *Amphibromus* spp., *Carex tereticaulis*, *Deyeuxia* spp., *Glyceria* spp., *Lachnagrostis* spp., *Poa labillardieri*, and *Rytidosperma duttonianum*. Note that other graminoid taxa may also occur, though are not necessarily common.	Criteria Met – *Poa labillardierei* and *Rytidosperma duttoniamum* present.
	At least one native wetland forb species must be present (preferably more) after the ecological community is inundated. The suite of forbs that may occur within the ecological community's range is variable and potentially large. Refer to Appendix A for a plant species list.	Criteria Met – *Marsilea drummondii, Eryngium vesiculosum* and *Brachyscome basaltica* var. *gracilis* present.
Condition thresholds	Part A: Condition during 'typical' wet cycles. A1: The wetland is consistent with the key diagnostic characteristics (Physical Environment, Hydrology, Biota) noted above.	Criteria Met Go to Part A2

Criteria		SHW patches (PGWe1 and PGWe2 (Figure 5))
	Part A: Condition during 'typical' wet cycles. A2: 50% or more of the total cover of plants in the ground layer of the wetland is dominated by native species characteristic of the Seasonal Herbaceous Wetlands ecological community.	Criteria Met Go to Part C
Size thresholds	Part C: Minimum wetland size If the wetland is a single isolated wetland, it must be 0.5 ha or larger; OR If the wetland occurs as a cluster of many small wetlands in reasonably close proximity, then the cluster effectively functions as a single unit. The wetlands within the cluster must total at least 0.5 ha and this area of wetland must lie across a polygon (i.e. total area of wetland plus non-wetland in the cluster site) of at least 5ha. This means the area of wetland proper accounts for 10% or more of the total cluster area; OR If an individual wetland or wetland cluster is smaller than 0.5 ha, it may be included as part of the national ecological community if: i) the actual wetland or wetland cluster is 0.1 ha or more in size; AND ii) the wetland is contiguous with a native vegetation remnant (as defined in footnote 12); AND iii) the total area of the wetland plus other native vegetation remnant or type of natural wetland is 1 ha or more (Figure 1C).	Criteria Met The wetlands (PGWe1 and PGWe2) function as a cluster and total 0.03 ha. The wetland cluster is contiguous with the Plains Grassland (NTGVVP) within Ravenhall Nature Conservation Reserve. The Plains Grassland (NTGVVP) remnant is greater than 1 ha in size.
Additional characteristics	The wetland is considered Very High Quality if three or more of the native plant taxa listed in Table 1 of the Listing Advice (SEWPaC 2012) are present within the wetland.	Criteria Met – *Marsilea drummondii, Eryngium vesiculosum* and *Brachyscome basaltica* var. *gracilis* present.

3.2.1.2 Threatened Species

Flora

Based on a review of the VBA (DSE 2011a) and FIS (Viridans 2012a), 11 EPBC Act listed flora species have been recorded in the Study Area. The EPBC Act PMST (SEWPaC 2013) nominated an additional two species which have not been recorded in the locality but have the potential to occur (Table A2, Appendix A). A summary of EPBC Act listed flora species recorded or predicted to occur in the Project Area and the likelihood of occurrence assessment is provided in Table 11.

The conservation reserves adjoining, or included within the Functional Design Footprint are known to support a range of significant flora species. Threatened flora species known to occur within the Banchory Grove Grasslands include Spiny Rice-flower, Clover Glycine *Glycine latrobeana* and Rye Beetle-grass *Tripogon loliiformis*, and the Ravenhall Reserve is known to support Spiny Rice-flower, Pale Swamp Everlasting *Coronidium aff. rutidolepis* and Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis*.

Table 11 Summary of flora search results within a 10 kilometre radius of the Project Area (see Table A2, Appendix A for a comprehensive list of species)

Nationally significant flora within the Project Area	
Likelihood of occurrence	Number of species
Known occurrence	1
High Likelihood	0
Moderate Likelihood	0
Low Likelihood	11
Unlikely	1
Total species	**13**

Field surveys completed for the project in 2007 (Section 1.5.1) recorded two Spiny Rice-flower plants within remnant grassland now classified as Habitat Zone PG1 (Figure 5). Subsequent targeted surveys completed between October and December 2009 (outside the flowering period) did not detect this species, nor did targeted surveys completed as part of the current assessment, although the thick sward of Kangaroo Grass limited the probability of detection. The flowering of this species during the current survey period was confirmed by inspecting a reference site located nearby Burnside Shopping Centre, adjacent to the Project Area (Photograph 7).

During surveys completed in 2009 and 2013, the Spiny Rice-flower plants may have been covered by the thick sward of Kangaroo Grass, only persisted as underground lignotubers or were potentially no longer present due to natural processes or disturbance in the local area associated with construction of the Deer Park Bypass and surrounding urban development. Based on the precautionary approach, Spiny Rice-flower is considered to still occur within the Project Area due to the previous survey records and the persistence of suitable habitat (PG1).

It is noted that the Functional Design Footprint excludes the area where Spiny Rice-flower has been previously recorded (Figure 5).

Photograph 7 Flowering Spiny Rice-flower identified off-site

Fauna

Based on a review of the VFD (Viridans 2012b), 19 EPBC Act listed species of fauna have been recorded in the Study Area. The EPBC Act PMST (SEWPaC 2013) nominated an additional eight nationally significant species which have not been recorded in the locality but have the potential to occur (Table B2, Appendix B). EPBC Act listed species identified through database searches include:

- Five mammals (Spot-tailed Quoll *Dasyurus maculatus maculatus*, Brush-tailed Rock-wallaby *Petrogale penicillata*, New Holland Mouse *Pseudomys novaehollandiae*, Eastern Barred Bandicoot *Perameles gunnii* and Grey-headed Flying-fox *Pteropus poliocephalus*);
- Ten birds (Australasian Bittern *Botaurus poiciloptilus*, Plains-wanderer *Pedionomus torquatus*, Australian Painted Snipe *Rostratula benghalensis australis*, Fairy Tern *Sternula nereis nereis*, Superb Parrot *Polytelis swainsonii*, Red-tailed Black-Cockatoo *Calyptorhynchus banksii graptogyne*, Swift Parrot *Lathamus discolor*, Orange-bellied Parrot *Neophema chrysogaster*, Regent Honeyeater *Anthochaera phrygia* and Malleefowl *Leipoa ocellata*);
- Six reptiles (Pink-tailed Worm-Lizard *Aprasia parapulchella*, Striped Legless Lizard *Delma impar*, Grassland Earless Dragon *Tympanocryptis pinguicolla*, Green Turtle *Chelonia mydas*, Leathery Turtle *Dermochelys coriacea* and Loggerhead Turtle *Caretta caretta* [search area includes parts of Port Phillip Bay]);
- One frog (Growling Grass Frog);
- Three fish (Dwarf Galaxias *Galaxiella pusilla*, Australian Grayling *Prototroctes maraena* and Macquarie Perch *Macquaria australasica*); and,
- Two invertebrates (Golden Sun Moth *Synemon plana* and Eltham Copper Butterfly *Paralucia pyrodiscus lucida*).

A summary of EPBC Act-listed fauna recorded or predicted to occur in the Project Area and the likelihood of occurrence assessment is provided in Table 12.

Table 12 Summary of fauna search results within a 10 kilometre radius of the Project Area (see Table B2, Appendix B for a comprehensive list of species)

Nationally significant fauna within the Project Area	
Likelihood of occurrence	Number of species
High Likelihood	3
Moderate Likelihood	2
Low Likelihood	3
Unlikely	19
Total species	**27**

Based on the likelihood-of-occurrence assessment, five fauna species listed under the EPBC Act are considered to have a moderate-high likelihood of occurring in the Project Area. Several nationally listed species may occur in the Project Area as vagrant visitors such as the Australian Painted Snipe. All other nominated species are unlikely to occur as there is no suitable habitat in the Project Area or they are presumed to be extinct in the Study Area (e.g. Grassland Earless Dragon or Eastern Barred Bandicoot).

Field surveys reported in the 2009 assessment (Ecology Partners Pty Ltd 2009) and the current field survey (30 – 31 May and 02 July 2013) did not record any fauna species listed under the EPBC Act. The following sections address those nationally listed species with a moderate-high likelihood of occurring in the Project Area (Table B2, Appendix B).

Golden Sun Moth

Golden Sun Moth generally occurs in native grassland dominated by greater than 40% cover of wallaby grass, in particular Short Wallaby-grass *Rytidosperma carphoides* (DSE 2004b) but may also inhabit areas dominated by Kangaroo Grass (Endersby and Koehler 2006) and introduced grassland (A. Organ, pers obs.). Prior to European settlement, the Golden Sun Moth was widespread and relatively continuous throughout its range, inhabiting grassy open woodlands and grassland, although it currently inhabits small isolated sites (DSE 2004b).

The VBA contains 31 records of the Golden Sun Moth in the Study Area, the most recent being recorded in 2008, approximately 3.5 kilometres east of the Project Area (Figure 4). The Golden Sun Moth was not detected during targeted surveys reported in the 2009 Assessment (Ecology Partners Pty Ltd 2009); however this species is considered likely to occur based on the extent of previous records in the Study Area and the presence of suitable habitat. Within the Project Area and Functional Design Footprint, the Golden Sun Moth is most likely to utilise higher quality interconnected patches of indigenous grassland. Habitat Zones PG1, PG2, PG3 and PG8 are considered most likely to support this species (Figure 5).

Striped Legless Lizard

The Striped Legless Lizard inhabits lowland native grasslands, typically dominated by native tussock forming grass species such as Kangaroo Grass and spear grasses *Austrostipa* spp. Before European settlement the species was probably quite common across the Victorian Volcanic Plains, although subsequent loss and modification of native grassland areas have reduced the available habitat for this species. In Victoria, the species primarily occurs around the basalt plains to the west of Melbourne, and areas around Ballarat and Bendigo (DSE 2011b, Hadden 1995).

The VBA contains 114 records of the Striped Legless Lizard in the Study Area, the most recent being recorded in 2008 within the Project Area (Figure 4). In addition to the historical records, previous consultation with DEPI indicated that 203 Striped Legless Lizards have been released into grassland within the Organ Pipes National Park between 2001 and 2006, immediately north of the Calder Park Interchange. It is understood that 148 of these individuals were released in 2006 and that monitoring in 2005 was still recording individuals released in 2001 (A. Webster, DSE, pers. comm.). Based on this information, it is likely that a resident population is now established in the vicinity of the Calder Park Interchange. Furthermore, consultation with Parks Victoria indicated that a Striped Legless Lizard was recorded in the interchange area during surveys completed in 2008 and 2013. Parks Victoria also advised during consultation that this species has been recorded in the Banchory Grove Grasslands in 2012 and the Ravenhall Reserve in 2007.

The Striped Legless Lizard was not detected during targeted surveys reported in the 2009 assessment (Ecology Partners Pty Ltd 2009); however it is noted that the Striped Legless Lizard is cryptic by nature and their absence within a given site cannot be confirmed through short-term field surveys. Based on the availability of suitable habitat, this species is considered likely to occur on site. Within the Project Area and Functional Design Footprint, the Striped Legless Lizard is most likely to occur in remnant indigenous grassland dominated by Kangaroo Grass, with scattered basalt rocks. Habitat Zones PG8, PG1, PG2, PG3 and PG6 are considered most likely to support this species (Figure 5).

Growling Grass Frog

The 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), supporting an extensive cover of emergent, submerged and floating vegetation (Robertson et al. 2002; Organ 2004). This species is also known to inhabit temporarily inundated waterbodies for breeding purposes providing they contain water over the breeding season (Organ 2003).

The VBA contains 149 records of the Growling Grass Frog in the Study Area, the most recent being recorded in 2007, approximately 20 metres from the Project Area (Figure 4).

Although targeted surveys reported in the 2009 assessment (Ecology Partners Pty Ltd 2009) did not record any individuals, Kororoit Creek is considered to be of national conservation significance for the Growling Grass Frog (Costello and Organ 2000). The section of Kororoit Creek within the Project Area and Functional Design Footprint constitutes high quality breeding habitat for this species, which is assumed present. Consultation with Parks Victoria indicated that this species has also been recorded in the Banchory Grove Grasslands during recent fauna surveys (2011 or 2012). Ephemeral waterbodies in the Project Area and Functional Design Footprint, including drainage lines and depressions, are unlikely to provide suitable habitat for the Growling Grass Frog due to their isolation from permanent waterbodies, high ephemerality and lack of suitable vegetation structure (i.e. emergent, submerged, fringing and floating vegetation).

Swift Parrot

The VBA contains eight records of the Swift Parrot in the Study Area, the most recent being recorded in 2006, approximately 3.8 kilometres east of the Project Area. The Swift Parrot may fly over the Project Area and Functional Design Footprint on route to central and northern Victoria, although there is limited foraging habitat for the species on site. This medium-sized parrot breeds in Tasmania from September to April and then migrates to the mainland during April. On mainland Australia, Swift Parrots largely inhabit dry open eucalypt forests and woodlands, especially box-ironbark forests. This species is also regularly recorded in urban areas during late autumn and over the winter months feeding on flowering street trees particularly planted eucalypts such as Red Ironbark *Eucalyptus tricarpa* and Spotted Gum *Eucalyptus maculata*.

Grey-headed Flying-fox

The VBA contains one record of the Grey-headed Flying Fox in the Study Area, recorded in 2006, approximately 3.9 kilometres east of the Project Area (Figure 4). This large frugivorous bat was formerly an autumn-winter visitor to areas throughout Victoria; however, it has now established permanent colonies throughout the state. Of the 16 significant roost sites known in Victoria, none occur within the Study Area. This species can travel long distances at night in search of food, and small aggregations are known to forage widely throughout the state (i.e. quite nomadic).

Owing to the large foraging range and nomadic nature of this species, individuals are likely to utilise foraging resources within the Project Area and Functional Design Footprint. Potential resources include the Kororoit Creek corridor (River Red-gum blossom) and all areas containing planted trees, particularly introduced fruit species. The Project Area does not provide suitable roosting habitat for this species.

3.2.1.3 Migratory Species

Migratory species are protected under the international agreements to which Australia are a signatory, including JAMBA, CAMBA, RoKAMBA and the Bonn Convention on the Conservation of Migratory Species of Wild Animals.

A review of the VFD (Viridans 2012b) and EPBC Act PMST (SEWPaC 2013) indicated that several Migratory species have been previously recorded or are predicted to occur within the Study Area (Table B2, Appendix B). While Migratory species of bird are likely to inhabit the Study Area, the Project Area is not classed as 'important habitat' as defined under the *EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines* (Department of the Environment Water Heritage and the Arts 2009), in that it does not contain:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species;
- Habitat utilised by a migratory species which is at the limit of the species range; or,
- Habitat within an area where the species is declining.

3.2.2 Matters of State Significance

Ecological values present or likely to occur within the Project Area that are considered of significance to the state of Victoria are outlined below. The criteria adopted to assess the significance of taxa are presented in Table 8.

3.2.2.1 Threatened Ecological Communities

A review of the Modelled FFG Act Communities data layer contained on the DEPI Interactive Map (DEPI 2013b) indicated the potential for one state significant ecological community to occur in the Project Area, namely the Western (Basalt) Plains Grasslands Community. This ecological community corresponds with the Plains Grassland (EVC 132_61) vegetation type and can include grasslands classified as NTGVVP (refer Section 3.2.1.1). It is noted that the state listings do not specify condition thresholds and therefore, can include degraded patches such as Modified Treeless Vegetation and Plains Grassland that do not meet condition thresholds to be considered the nationally significant NTGVVP community.

The current field survey (30 – 31 May and 02 July 2013) confirmed the presence of this ecological community within the Project Area. All Plains Grassland (EVC 132_61) (approximately 11.16 hectares) within the Functional Design Footprint corresponds with this community.

3.2.2.2 Threatened Species

Flora

Based on a review of the VBA (DSE 2011a), 47 state significant flora species have been recorded in the Study Area (including 10 EPBC Act listed species). The EPBC Act PMST (SEWPaC 2013) nominated an additional two state significant species which have not been recorded in the locality but have the potential to occur (Table A2, Appendix A).

Field surveys reported in the 2009 Assessment (Ecology Partners Pty Ltd 2009) recorded three state significant flora species (including the EPBC Act listed Spiny Rice-flower – refer to Section 3.2.1.2). Nine specimens of Tough Scurf-pea *Cullen tenax* were recorded on the southern side of Kororoit Creek at the top of a stony rise amongst basalt rock and Serrated Tussock *Nassella trichotoma* (Figure 3). This species is a slender, often trailing perennial herb with five to seven leaflets and spikes of small blue pea flowers (Walsh and Entwisle 1996). One specimen of Basalt Podolepis *Podolepis sp. 1* was recorded on the eastern side of the assessed corridor, between Riding Boundary and Middle Road in good condition Kangaroo Grass dominated Plains Grassland (Figure 3). Basalt Podolepis is an erect perennial, which dies down to a lignotuber during autumn and winter (Walsh and Entwistle 1999). It has sparsely woolly leaves and bright yellow florets and is found mainly on the plains to the north and west of Melbourne (Walsh and Entwistle 1999).

The current field survey (30 – 31 May and 02 July 2013) recorded one state-significant species within the Project Area, namely Fragrant Saltbush *Rhagodia parabolica*. Twelve (12) specimens of Fragrant Saltbush were recorded in Plains Grassland and Degraded Treeless Vegetation (Figures 3 and 5) throughout the Project Area. Fragrant saltbush is a small shrub to one metre tall with fragrant, silver, semi-succulent leaves and very small, nondescript flowers.

Despite targeted searches, the current survey did not record the three state significant species previously recorded within the Project Area. The area previously supporting Basalt Podolepis has been disturbed by adjoining residential development (Photograph 6) and the site previously supporting Tough Scurf-pea has been disturbed by works associated with construction of the Westwood Drive Bridge over Kororoit Creek. Consultation with Melton City Council indicated that recent ecological surveys (supplementing the 2009 assessment [Ecology Partners Pty Ltd 2009]) completed for construction of the Westwood Drive Bridge recorded 11 Tough Scurf-pea plants in the previous record location; with all plants lying within Council's construction footprint. In response to the known impact, Council commissioned the preparation of a Translocation and Conservation Management Plan (Native Vegetation Management Services 2012) (Section 1.5.5) involving the collection and propagation of seeds from the existing population and translocation to a recipient site located on the northern banks of Kororoit Creek, approximately 150 metres north-east of the collection site and approximately 100 metres east of the Functional Design Footprint (Figure 5). Seed collection and removal of the 11 Tough Scurf-pea plants had been undertaken prior to the current field survey (30 – 31 May and 02 July 2013). While not recorded at any other location in the Project Area, the Tough Scurf-pea is considered likely to occur based on the presence of suitable habitat.

Based on the likelihood-of-occurrence assessment, four state significant species of plant are considered to occur in the Project Area, including:

- Spiny Rice-flower;
- Basalt Podolepis;
- Tough Scurf-pea; and,
- Fragrant Saltbush.

Given the high level of survey effort in recent years and the relatively small area of suitable habitat remaining in the Project Area, it is unlikely that any other threatened flora species occur. A summary of state significant species recorded or predicted to occur in the Project Area and the likelihood of occurrence assessment is provided in Table 13.

Table 13 Summary of flora search results within a 10 kilometre radius of the Project Area (see Table A2, Appendix A for a comprehensive list of species)

State significant flora within the Project Area	
Likelihood of occurrence	Number of species
Known occurrence	4
High Likelihood	0
Moderate Likelihood	0
Low Likelihood	30
Unlikely	15
Total species	**49**

Fauna

Based on a review of the VBA (DSE 2011b), 67 state significant fauna species have been recorded in the Study Area (including 18 EPBC Act listed species). The EPBC Act PMST (SEWPaC 2013) nominated an additional six state significant species which have not been recorded in the locality but have the potential to occur (Table B2, Appendix B).

Field surveys reported in the 2009 Assessment (Ecology Partners Pty Ltd 2009) and the current field survey (30 – 31 May and 02 July 2013) did not record any state significant fauna species.

Based on the likelihood-of-occurrence assessment, 15 state significant fauna species are considered to have a moderate-high likelihood of occurring in the Project Area, including:

- Eight birds (Swift Parrot, Hardhead, Blue-billed Duck, Eastern Great Egret, Black Falcon, Lewin's Rail, Baillon's Crake and Diamond Firetail);
- One mammal (Grey-headed Flying-fox);
- Three reptiles (Striped Legless Lizard, Bearded Dragon and Tussock Skink);
- One frog (Growling Grass Frog);
- One fish (Southern Pygmy Perch); and,
- One invertebrate (Golden Sun Moth).

A summary of state significant species recorded or predicted to occur in the Project Area and the likelihood of occurrence assessment is provided in Table 12.

Table 14 Summary of fauna search results within a 10 kilometre radius of the Project Area (see Table AB2, Appendix B for a comprehensive list of species)

State significant fauna within the Project Area	
Likelihood of occurrence	Number of species
High Likelihood	4
Moderate Likelihood	11
Low Likelihood	21
Unlikely	37
Total species	**73**

3.2.3 Matters of Regional Significance

One regionally significant flora species - Slender Bindweed, was recorded during the current field survey (30 – 31 May and 02 July 2013) on the eastern side of the assessed corridor, between Riding Boundary and Middle Road in good condition Kangaroo Grass dominated Plains Grassland (Figure 3). Slender Bindweed is listed as 'Status Poorly Known' on the Victorian Advisory List (DSE 2005) and comprises a trailing perennial herb with narrow, pinnatifid leaves and bright pink circular flowers.

4 ECOLOGICAL SIGNIFICANCE OF PROJECT AREA

The Project Area is located in a highly developed setting, with the impact of urbanisation evidenced by the current survey findings. While much of the Project Area is of negligible ecological significance due to the direct and indirect effects of urbanisation, a number of important values are present.

The DEPI BioSite dataset maps physical areas of land or water containing biological assets with particular attributes, such as the presence of threatened flora and fauna or habitat required for their survival and/or significant vegetation communities. BioSites are intended for use by DEPI and other relevant government agencies as a strategic guide for future investment in biodiversity conservation. The Project Area contains or immediately adjoins several BioSites of national and state significance. These BioSites and other areas of ecological significance within and adjoining the Project Area include:

National Significance

- Nationally significant BioSites [BioSite 4609 – Kororoit Creek – Deer Park to Rockbank, BioSite 3551 - Sydenham Rail Reserve 1 (Grass PPKE011) and BioSite 3545 - Organ Pipes National Park (Grass PPKE005)].
- Habitat Zones PG1, PG2, PG3 and PG8 provide potential habitat for the EPBC Act listed Striped Legless Lizard (and PG6) and Golden Sun Moth. Additionally the Spiny Rice-flower has been previously recorded in PG1, which retains habitat for this species.
- Kororoit Creek is considered to be of national conservation significance for the EPBC Act listed Growling Grass Frog (Costello and Organ 2000; Costello and Kimber 2000, 2004).
- Remnant patches of native vegetation corresponding with the EPBC Act listed NTGVVP and SHW ecological communities (Figure 5).

State Significance

- State significant BioSites [BioSite 4205 - Ravenhall Grasslands NCR (Women's Prison Surrounds Grass VPME20), BioSite 3549 - Banchory Grove Grassland (Grass PPKE009) and BioSite 5270 – Pioneer Park (Sydenham Township Reserve)].
- Remnant patches of native vegetation corresponding with the FFG Act listed Western (Basalt) Plains Grasslands Community (Figure 5).

Local significance

All remnant vegetation not classified as either nationally or state significant is at least of high local conservation significance.

5 PERMITTED CLEARING ASSESSMENT

5.1 Vegetation within the Study Area and Functional Development Footprint

The habitat hectare assessment identified 43 Remnant Patches/ 11 Habitat Zones (18.82 hectares) of Plains Grassland and two Remnant Patches (0.17 hectares) of Plains Grassy Wetland (PGWe1 and PGWe2) within the Project Area. The current survey identified that the Functional Design Footprint contains **2.64 habitat hectares** (11.19 hectares) of remnant vegetation and two Scattered Trees, including:

- 11.16 hectares of Plains Grassland (EVC 132_61) represented by 32 Remnant Patches and nine Habitat Zones (excluding PG2 and two remnant patches of PG1 which lie inside the BCS area [Section 5.2.2.2]);
- 0.03 hectares of Plains Grassy Wetland (EVC 125) represented by two Remnant Patches and Habitat Zones; and
- Two Scattered Trees located in the riparian zone of Kororoit Creek

The calculations of the habitat hectare assessment are presented in Table 16 and the location and extent of Habitat Zones is illustrated in Figure 5. It is noted that PG10 and PG11 were formally assessed and classified as Vegetation Colonising Artificial Substrate and Modified Treeless Vegetation, respectively. Habitat Zone PG11 occurs on an overflow car park for the Calder Park Raceway, and consists of Wallaby-grass, Windmill Grass and occasional Red-leg Grass *Bothriochloa macra* and Berry Saltbush *Atriplex semibaccata*. This area has been previously disturbed to develop a series of roads, drains and parking areas. Habitat Zone PG10 is located on a table drain on the northern side of the Calder Freeway (Figure 5) and contains Wallaby-grass and Windmill Grass (Figure 5). Both areas have been included in the offset calculations in accordance with The Guidelines (DEPI 2013a) (Section 2.5.1).

The current survey identified additional Remnant Patches of Plains Grassland within the Project Area that were not previously reported in the 2009 Assessment (Ecology Partners Pty Ltd 2009). It is considered that identification of these patches during previous surveys may have been prevented due to the areas being maintained (i.e. slashed roadside reserves) or by the timing of surveys. A comparison of the EVC extents recorded during the previous and current surveys, based on the 2009 Project Area is provided below (Table 15). The increase in overall extent is attributed to the identification of new Remnant Patches (i.e. PG10 and 11 - previously classified as Modified Treeless Vegetation) and extensions to Habitat Zones PG4, PG5, PG6, PG7 and PG8.

Table 15 Comparison of EVC extents recorded during previous and current surveys

EVC	Extent reported in the 2009 assessment (ha)[1]	Current extent (ha)1	Difference (ha)
Plains Grassland (EVC 32_61)	4.99	18.48	+ 13.49
Plains Grassy Wetland (EVC 125)	0.20	0.16	- 0.04

Note: 1) Based on the study area adopted for the 2009 assessment

Table 16 Quantity and significance of losses in Remnant Patches

Habitat Zone			PG1	PG2	PGWe1	PGWe2	PG3	PG4	PG5	PG6	PG7	PG8	PG9	*PG10*	*PG11*
Original Habitat Zone (Ecology Partners Pty Ltd 2009)			3b, 2a	-	6	6	1B	9a, 9b, 9c, 9d	7, CIA, CIB, CID	-	9a, 9b, 9c, 9d	7, CIA, CIB, CID	CIC	-	-
Bioregion[1]			VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP
EVC Name [2]			PG	PG	PGWe	PGWe	PG	PG	PG	PG	PG	PG	PG	PG	PG
EVC Number			132_61	132_61	125	125	132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score
Site Condition	Large Old Trees	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA - a default condition score has been applied (Section 2.5)	
	Canopy Cover	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
	Understorey	25	5	5	15	15	5	5	5	5	5	5	5		
	Lack of Weeds	15	7	0	4	9	0	6	2	7	6	2	7		
	Recruitment	10	3	0	3	3	3	6	6	3	6	6	3		
	Organic Litter	5	5	4	5	5	2	3	2	5	3	2	5		
	Logs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Treeless EVC Multiplier		Multiplier	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36		
		Subtotal	27.20	12.24	36.72	43.52	13.60	27.20	20.40	27.20	27.20	20.40	27.20		
Landscape value	Patch Size	10	8	8	8	8	1	1	1	8	1	1	1		
	Neighbourhood	10	0	1	1	0	0	0	0	0	0	0	0		
	Distance to Core	5	3	3	3	3	3	1	1	1	3	3	3		
Habitat points out of 100		100	38.2	24.24	48.72	54.52	17.60	29.2	22.4	36.2	31.2	24.4	31.2		
Habitat Score (habitat points/100)			0.38	0.24	0.49	0.55	0.18	0.29	0.22	0.36	0.31	0.24	0.31	0.2	*0.2*
Total Area of Habitat Zone within the Project Area (ha)			0.37	0.02	0.06	0.11	0.04	2.58	2.52	0.80	0.54	1.77	0.37	0.04	9.77
Total area of Habitat Zone within the Functional Design Footprint (ha) (excluding patches subject to the BCS)			-[4]	-[4]	0.01	0.02	0.01	2.52	0.87	0.32	0.21	1.76	0.12	0.04	5.31

Habitat Zone	PG1	PG2	PGWe1	PGWe2	PG3	PG4	PG5	PG6	PG7	PG8	PG9	*PG10*	*PG11*
Original Habitat Zone (Ecology Partners Pty Ltd 2009)	3b, 2a	-	6	6	1B	9a, 9b, 9c, 9d	7, CIA, CIB, CID	-	9a, 9b, 9c, 9d	7, CIA, CIB, CID	CIC	-	-
Total habitat hectares within the Functional Design Footprint	-	-	0.00	0.01	0.00	0.73	0.19	0.12	0.07	0.42	0.04	0.00	1.06
EPBC Act listed ecological community	NTGVVP	-	SHW	SHW	-	NTGVVP	-	NTGVVP (in part – Figure 5)		-	NTGVVP	-	-

Notes:

1) VVP – Victorian Volcanic Plain Bioregion

2) PG – Plains Grassland (EVC 132_61), PGWe – Plains Grassy Wetland (EVC 125)

3) En – Endangered on the Victorian Advisory list (DSE 2013c)

4) Excluded - PG2 and two remnant patches of PG1 lie inside the BCS area (Section 5.2.2.2)

5.2 Demonstration of the Hierarchy of Control

A summary of the three-step approach taken by VicRoads to manage known impacts on native vegetation is provided in the following sections.

5.2.1 Avoidance and Minimisation (First two steps)

Native vegetation avoidance entails avoiding adverse impacts at the outset of a project, and avoiding subsequent native vegetation loss post-development (NRE 2002). If vegetation avoidance is legitimately unfeasible, then appropriate measures to minimise the impacts of vegetation removal must be considered.

The revised functional design has been developed with reference to the findings of numerous technical studies completed for the project, including those summarised in Section 1.5. These studies identified ecological constraints and opportunities to avoid and minimise impacts on ecological values. As development of the arterial road is a long-term project (potentially completed by 2046); further opportunities for avoidance and minimisation will arise during the detailed design and construction planning phase. Avoidance and minimisation measures undertaken may include:

- Retaining Scattered Trees and Remnant Patches where possible, including the potential inclusion of Habitat Zones in landscaping;
- Revegetating disturbed areas with an assortment of locally indigenous species and the implementation of direct seeding if natural regeneration is poor; and,
- Managing risks during construction such as the introduction or spread of weed and pest species.

Detailed amelioration and mitigation measures recommended for the project are provided in Section 7.2.

5.2.2 Quantification of Offsets (Step three)

Following the implementation of Steps 1 and 2, biodiversity offsets can be calculated for any permitted vegetation clearance. As noted in Section 2.5, the calculation of offset obligations for this project references both The Guidelines (DEPI 2013d) and BCS (DEPI 2013a). Offset obligations under each policy are detailed in the following sections.

5.2.2.1 The Guidelines

The offset requirements for native vegetation removal, as prescribed by The Guidelines (DEPI 2013a), have been calculated by DEPI, based on the habitat hectare scores (Table 16). The resulting BIOR produced by DEPI is presented in Appendix C. The report identifies that a General Offset of 2.425 Biodiversity Equivalence Units is required to compensate for the removal of 11.19 hectares of native vegetation and two scattered trees. This excludes offset obligations associated with the removal of Habitat Zones PG1 and PG2, which are subject to the BCS (Section 5.2.2.2).

Table 17 Offset requirements under The Guidelines (DEPI 2013d)

Risk Pathway		High
Vegetation to be removed	Location	B
	Remnant Patch (ha)	11.19
	Scattered Trees (no)	2
	Total Hectares (incl. Scattered Tree buffer)	11.33
	Total Habitat Hectares (incl. Scattered Trees)	2.675
Offsets	**General Biodiversity Equivalence Units (BEUs)**	**1.617**
	General Risk Factor	1.5
	General Offsets Required (BEUs)	**2.425**
Offset Criteria	Vicinity (catchment / LGA)	Port Philip and Westernport CMA / Brimbank City Council and Melton City Council Area
	Minimum Strategic Biodiversity Score*	0.511

5.2.2.2 Biodiversity Conservation Strategy

Offsets and habitat compensation fees associated with the removal of native vegetation and fauna habitat within the BCS area (Inset 1) are based on the DEPI document *Habitat Compensation under the Biodiversity Conservation Strategy* (DEPI 2013h). The following offset obligations apply to the section of the Functional Design Footprint within the BCS area (Inset 1):

Native vegetation:

- Offsets for patches of native vegetation are based on time-stamped data, with all native vegetation considered to be Very High conservation significance. The area of Functional Design Footprint subject to the BCS contains one time-stamped native vegetation polygon, comprising 0.047 hectares of Plains Grassland (EVC 132_61). The field assessment confirmed that no Scattered Trees are present in this area.

  Under the BCS, the clearance of native vegetation invokes an offset fee of $95,075.00 per hectare cleared ($4,468.53).

Spiny Rice-flower:

- All time-stamped native vegetation patches within the Western Growth Corridor invoke a compensatory habitat fee of $7,937.00 (per hectare cleared) to cover the cost of securing and managing conservation reserves for Spiny Rice-flower. This is additional to the abovementioned offset for clearance of native vegetation.

Within the BCS Area offsets for Spiny Rice-flower will be required for the removal of 0.047 hectares of time-stamped native vegetation (Spiny Rice-flower habitat) ($373.03).

Golden Sun Moth:

- All habitat within the Western Growth Corridor (native and non-native grassland and woodlands) and excluding any areas identified as Growling Grass Frog habitat are deemed to be "confirmed habitat". However only non-native habitat invokes a compensatory habitat fee, as fees for native habitat have been built in to the price of native vegetation offsets. All non-native habitat cleared invokes a compensatory habitat fee of $7,914.00 per hectare cleared.

Within the BCS Area offsets for Golden Sun Moth will be required for the removal of 0.990 hectares of time-stamped non-native habitat ($7,834.86).

5.2.2.3 Offset Management Strategy

In accordance with The Guidelines (DEPI 2013d), the biodiversity offsets prescribed in Table 17 must be within the Port Phillip and Westernport CMA or the same Municipal District as the vegetation removal. The required offsets will be sourced by VicRoads prior to vegetation removal using one of the following mechanisms:

- BushBroker: BushBroker maintains a register of landowners who are willing to sell offset credits. Offsets secured by Bushbroker are done so via a Section 69 Agreement under the *Conservation, Forest and Lands Act 1987*.
- Trust for Nature: Trust for Nature holds a list of landowners who are willing to sell vegetation offsets. Offsets secured by Trust for Nature are done so under the Victorian Conservation Trust Act 1972.
- Local Councils: The proponent may contact local councils to seek availability of offsets.
- Over-the-Counter Offsets Scheme: The Guidelines include the expansion of the "Over-the-Counter" (OTC) Offsets Scheme, allowing non-government agencies to establish themselves as OTC Facilities. OTC Facilities will broker native vegetation offsets (credits) between landholders (with offset sites) and permit holders (with offset requirements). The OTC Offsets Scheme differs from other third party offsets (Bushbroker, Trust for Nature) as permit holders will not be required to negotiate directly with landholders. Instead, they can review available credits and relevant sale prices at each private OTC Facility, and purchase their required credits through them. Following payment, the permit holder will receive a Credit Extract as proof that they have satisfied their offset requirements.

All offsets under the BCS are required to be secured before any physical disturbance to native vegetation or threatened species. This requirement is usually stipulated as a planning permit condition, where evidence of habitat compensation payments to DEPI is required. Upon formal application to DEPI, an invoice for total offset costs is provided (usually within five days) and upon payment, DEPI supply a Native Vegetation Credit extract which can be presented to the relevant authority (Council) as evidence that offsets have been secured.

6 LEGISLATION AND POLICY

6.1 Legislative and Policy Implications

This section identifies biodiversity policy and legislation relevant to the Project Area, and principally addresses the following:

- *Environment Protection and Biodiversity Conservation Act 1999*;
- *Environment Effects Act 1978*;
- *Flora and Fauna Guarantee Act 1988*;
- *Planning and Environment Act 1987*;
- Biodiversity Assessment Guidelines;
- Biodiversity Conservation Strategy;
- *Catchment and Land Protection Act 1994*; and,
- *Wildlife Act 1975* and *Wildlife Regulations 2002*.

6.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act establishes a Commonwealth process for the assessment of proposed actions (i.e. project, development, undertaking, activity, or series of activities) likely to have a significant impact on matters of NES, or those that are undertaken on Commonwealth Land. An action, unless otherwise exempt, requires approval from the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities if it is likely to have an impact on any of the following matters of NES:

- World Heritage properties
- National Heritage places
- Ramsar wetlands of international significance
- Nationally listed threatened species and ecological communities
- Migratory species protected under international agreements
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mining)
- Water resources (for coal seam gas and large coal mining projects).

A referral for the entire Palmers Road Corridor Project was submitted by VicRoads in April 2009 (reference number 2009/4867). The (then) DEWHA determined that the project was a 'controlled action' and required approval by the Commonwealth Minister prior to the commencement of construction. In reviewing the referral, DEWHA requested further information regarding the potential for listed plants to occur on site and mitigation strategies for matters of NES. To address these requirements, VicRoads commissioned Ecology Partners to prepare the following reports:

- *Targeted Flora Surveys for Palmers Road corridor and Calder Park Interchange* (Ecology Partners Pty Ltd 2011a)
- *Palmers Road Corridor Upgrade Conservation Management Plan* (Ecology Partners Pty Ltd 2011b).

DEWHA determined that a decision would be made based on 'preliminary documentation'. This preliminary documentation is due to be exhibited independently of the Victorian environmental assessment process (EE Act).

Recommendation

Biodiversity and other matters of national significance are dealt with specifically in Section 3.2.1.2 of this report. Matters of NES relevant to the Project Area include the NTGVPP and SHW threatened ecological communities and the known or likely occurrence of EPBC Act listed species (Section 3.2.1.2).

It is recommended that the current assessment is provided to DoE with a letter outlining the key differences between the referred and current activity (noting that the 2009 referral covered the entire Palmers Road Corridor). The primary difference between the referred and current activity relates to the extent of NTGVVP potentially proposed for removal. The referral states that 2.5 hectares of NTGVVP would be lost, whereas the current assessment identified 3.27 hectares of this community within the Functional Design Footprint (including 0.16 hectares within the BCS Area). Additionally, the SHW ecological community was not listed under the EPBC Act at the time of referral.

During consultation with DoE, expectations regarding environmental offsets should also be confirmed. It is likely that removal of the ecological communities and habitat for EPBC Act listed flora and fauna will trigger the requirement to secure offsets additional to those required under state regulations. Offsetting matters of NES would be undertaken in accordance with the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (SEWPaC 2012).

6.1.2 Environment Effects Act 1978

The EE Act provides for an assessment of proposed activities that are capable of having a significant impact on the environment at a state level. The Act allows the Victorian Minister for Planning to decide whether an EES is required to be completed. This is likely to happen if:

- There is a likelihood of regionally or state significant adverse effects on the environment;
- There is a need for integrated assessment of potential environmental effects (including economic and social effect) of a project and assessment of possible alternatives; or,
- Normal statutory processes would not provide a sufficiently comprehensive, integrated and transparent assessment.

The "*Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978*" provides triggers for which an EES is required, such as the removal of 10 or more hectares of native vegetation.

On 30 June 2009, VicRoads submitted a referral for the project to the (then) DPCD in accordance with the EE Act. The project was referred to in three stages. For the project stage subject to this assessment (Western Freeway to Calder Freeway), the Minister for Planning decided that an EES was required. It is understood that the triggers for preparation of an EES generally relate to social issues, rather than biodiversity.

This assessment forms part of the project EES and will be reviewed by the Technical Reference Group, consisting of representatives from Council, DEPI, Parks Victoria and Melbourne Water. Following initial acceptance by the Minister for Planning, the EES will be released for public comment. In considering the EES document, supporting information and public submissions, the Minister will make one of the following declarations:

- The project will have an acceptable level of environmental effects;
- The project will not have an acceptable level of environmental effects; or,
- The project will need major modifications and/or further investigations to establish that acceptable outcomes would be achieved.

In July 2013, DTPLI released the Final EES Scoping Requirements. The loss of habitat for threatened species and the removal or degradation of ecological communities is identified as a key issue for consideration. The document provides the following evaluation objective for biodiversity:

> *'To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.'*

Table 18 lists the final scoping requirements relevant to biodiversity and this assessment.

Table 18 Final scoping requirements (biodiversity)

Issue/ theme	Requirement
Priorities for characterising the existing environment	• Characterise the distribution and quality of native vegetation, terrestrial and aquatic habitat and any wildlife movement in the area that could be impacted by the project. • Identify the existence or likely existence of any species or communities listed under the FFG Act, as well as any declared weeds or pathogens. • This characterisation is to be informed by relevant databases, literature and appropriate seasonal or targeted surveys.
Assessment of likely effects	Identify and assess likely direct and indirect effects on native vegetation, ecological communities and the habitat of any listed species of flora and fauna along the arterial corridor.
Design and mitigation measures	Identify potential and proposed design options and mitigation measures which could avoid or minimise significant effects on native vegetation and any listed ecological communities or flora and fauna species.
Approach to management of residual risks of effects	Identify proposed measures to further mitigate and manage residual effects of the project, including addressing the offset requirements of Victoria's native vegetation permitted clearing regulations and relevant provisions of planning schemes. Identify in the EES any further methods proposed to manage risks of effects on other biodiversity values and native vegetation, including as part of the Environmental Management Framework (EMF).

Recommendation

Ecological values relevant to the project and the EE Act include the FFG Act listed ecological community Western (Basalt) Plains Grassland (Section 3.2.2.1) and the known or likely occurrence of state significant species and their habitat (Section 3.2.2.2).

It is considered that this assessment addresses the Final EES Scoping Requirements noted in Table 18. As the majority of construction works associated with the project are unlikely to occur for at least another 30 years, it is proposed that offset obligations are reassessed closer to each construction stage, following final project design.

6.1.3 Flora and Fauna Guarantee Act 1988

The FFG Act is the primary legislation dealing with biodiversity conservation and the sustainable use of native flora and fauna in Victoria. The provisions of the FFG Act bind all public agencies, public landowners and land managers. If an area of public land supports an FFG Act listed species or community then the management and development of that land must be consistent with the objectives of the Act. In addition, actions taken on the land must be consistent with any Action Statement prepared for the relevant species or community. Removal of listed flora species, flora species that are members of listed communities or protected flora requires a permit from DEPI, where this occurs on public land (i.e. road reserves). An FFG Act permit is generally not required for the removal of protected values on private land.

Recommendation

The Project Area supports matters protected under the FFG Act including the listed ecological community Western (Basalt) Plains Grassland (Section 3.2.2.1) and habitat for four listed flora species and ten fauna species (Section 3.2.2.2).

A permit under the FFG Act would be required to remove any areas of the listed ecological community or protected/ listed plants. A permit would also be required for the removal or temporary holding of any listed fish species. Where works are likely to require the salvage and translocation or general handling of FFG Act-listed terrestrial fauna species, DEPI is the relevant referral authority, and management authorisation under the *Wildlife Act 1975* will need to be granted prior to the commencement of any works.

6.1.4 Planning and Environment Act 1987

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of Planning Schemes. All Planning Schemes contain biodiversity provisions at Clause 12.01 to assist the protection and conservation of Victoria's biodiversity, including important habitat for Victoria's flora and fauna and other strategically valuable biodiversity sites. The biodiversity provisions require Councils to ensure that permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity. Where the clearing of native vegetation is permitted, the quantity and type of vegetation to be offset is determined in accordance with The Guidelines (DEPI 2013d), which replaced The Framework (NRE 2003) on 20 December 2013, or the BCS.

Recommendation

The proposed amendment to the Melton City Council and Brimbank City Council Planning Schemes will be undertaken under Section 53.03 – Specific Sites and Exclusions. This process allows the application of specific controls for significant land use and development outcomes. The amendment process negates the need for VicRoads to apply for permits to remove, destroy or lop native vegetation under each Planning Scheme.

6.1.5 The Guidelines

The Victorian Planning Provisions relating to biodiversity protection and native vegetation management was amended in December 2013 to reflect the new permitted clearing of native vegetation and biodiversity policy encapsulated in The Guidelines (DEPI 2013d). The primary objective of the regulations is "no net loss in the contribution made by native vegetation to Victoria's biodiversity". The State Planning Policy Framework and the decision guidelines at Clause 52.17 (Native Vegetation) and Clause 12.01 require Planning and Responsible Authorities to have regard for The Guidelines (DEPI 2013d).

Recommendation

Areas of Plains Grassland and Plains Grassy Wetland must be offset in accordance with The Guidelines (DEPI 2013d), excluding vegetation within the BCS Area. Section 5 summarises the offset obligations prescribed in the BIOR provided in Appendix C.

6.1.6 Biodiversity Conservation Strategy

In June 2009 the Victorian Government entered into an agreement with the Commonwealth Government to undertake a Strategic Impact Assessment (SIA) under the EPBC Act. The *Biodiversity Conservation Strategy for Melbourne's Growth Corridors* (DEPI 2013a) provides details of potential impacts of the proposed program of urban development on matters of NES. The strategy covers Melbourne's four growth areas within the expanded 2010 Urban Growth Boundary, as well as the previous 28 precincts, except where a planning scheme amendment to introduce a Precinct Structure Plan has been approved prior to 1 March 2012.

To facilitate the planning approvals process for Melbourne's growth areas, the Victorian Government has introduced the 'Time Stamping' project. This project captures, and 'time stamps' native vegetation information within the new urban growth areas. This data can then be used to calculate native vegetation offsets for future development, and to prepare Native Vegetation Precinct Plans (NVPP) for these areas.

Recommendation

The section of the Functional Design Footprint subject to the BCS is located within the Western Growth Corridor and as such, the following matters of ecological significance considered under the BCS apply to this area: Native vegetation, Spiny Rice-flower, Golden Sun Moth, Growling Grass Frog and Striped Legless Lizard. A summary of offset requirements under the BCS is provided in Section 5 and the Habitat Compensation Statement is provided in Appendix D.

6.1.7 Catchment and Land Protection Act 1994

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

Recommendation

A number of weeds listed as noxious under the CaLP Act have been recorded in the Project Area. To meet CaLP Act requirements listed noxious weeds should be appropriately controlled throughout the Project Area during construction and operation of the project to minimise their spread and overall impact on ecological values.

6.1.8 Wildlife Act 1975 and Wildlife Regulations 2002

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.

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 P&E Act.

Recommendation

A permit to remove fauna will be required under either the *Wildlife Act 1975* or the *Wildlife Regulations 2002*. Following completion of the final design and confirmation of project clearing requirements, DEPI should be contacted regarding the permit process.

7 POTENTIAL IMPACTS AND MITIGATION MEASURES

7.1 Potential Impacts on Biodiversity

Potential impacts to biodiversity resulting from the construction and operation phases of the project are considered in this section and summarised in Table 19.

Table 19 Potential impacts associated with the project

Potential impact	Project phase	
	Construction	Operation
Loss of vegetation/ habitats	•	
Habitat fragmentation and edge effects	•	
Noise and dust pollution	•	•
Increased shadowing		•
Increase in fauna mortality	•	•
Introduction and spread of weed and pest species	•	•
Aquatic disturbance	•	

7.1.1 Loss of Vegetation/ Habitats

Clearing of native and exotic vegetation (land clearing) would comprise a direct impact on biodiversity within the Project Area. Clearing is known to affect threatened species of flora and fauna and is recognised as a Key Threatening Process under the EPBC Act. Loss of vegetation and habitats result in a range of direct and indirect impacts to vegetation communities and species of flora and fauna including:

- Reduction in the extent of vegetation communities and associated habitats;
- Loss of local populations of species;
- Fragmentation of remnants of vegetation communities or local populations of individual species;
- Increased edge effects and habitat for invasive species;
- Reduction in the viability of ecological communities resulting from loss or disruption of ecological functions (e.g. weed invasion, predation, parasitism);
- Riparian zone degradation; and,
- Soil exposure and altered water flow patterns resulting in increased erosion and sedimentation.

Whilst a large proportion of the Project Area comprises developed land, habitat resources are present in the form of remnant and exotic vegetation. This assessment aims to inform the future detailed design and assist in reducing the clearing footprint to avoid significant areas of native vegetation and fauna habitats where possible.

7.1.2 Habitat Fragmentation and Edge Effects

7.1.2.1 Habitat Fragmentation

Habitat fragmentation relates to the dividing up of once continuous habitats into separate smaller 'fragments' (Fahrig 2002). The habitat fragments created by fragmentation tend to be smaller and separated from each other by a matrix of less suitable habitat. The new dividing habitat type between fragments is often artificial and less suitable to the species remaining within these newly created fragments (Bennett 1990), or is generally only used by adaptive and aggressive generalist species (e.g. Noisy Miners (Grey et al. 1998)). Consequently, the inadvertent selection for aggressive generalist species through habitat fragmentation further decreases population levels of other species remaining in the fragments.

Whilst the Project Area lies within a highly urbanised setting and is not considered to significantly contribute to local connectivity, the project has the potential to fragment small areas of remnant grassland. The species most likely to be adversely affected by fragmentation are those that are less mobile. Potential habitat fragmentation associated with the project is unlikely to affect highly mobile flying species such as the Grey-headed Flying-fox and Swift Parrot.

7.1.2.2 Edge Effects

Edge effects are zones of changed environmental conditions (e.g. altered light levels, wind speed, temperature) occurring along the edges of habitat fragments. Within the Project Area, vegetation and habitat is already fragmented by existing development and land use, and as a result is already subject to significant edge effects.

7.1.3 Noise and Dust Pollution

7.1.3.1 Noise Pollution

Many animals detect and depend on sound to communicate, navigate, evade danger and find food. Anthropogenic noise can alter the behaviour of animals or interfere with their normal functioning (Bowles 1997). During construction there would be increased noise levels in the Project Area and locality due to ground disturbance and machinery and vehicle movements. The Project Area is situated in a highly urbanised environment, which is already subject to significant and perpetual noise pollution from traffic, both day and night, and construction activities during daylight hours. As such, animals inhabiting and utilising habitat resources within the Project Area are likely to have habituated somewhat to this noise and the increased noise from the project is unlikely to cause a significant impact.

7.1.3.2 Dust Pollution

The construction phase of the project has the potential to generate significant levels of dust if appropriate mitigation measures are not employed. Elevated levels of dust deposited onto the foliage of vegetation has the potential to reduce photosynthesis, which reduces growth rates and decreases the overall health of the vegetation adjacent to construction activities. Through the implementation of appropriate mitigation controls, the deposition of dust on foliage is not considered to be a significant impact of the project.

7.1.4 Increased Shadowing

The development of major infrastructure, such as rail overpasses, has the potential to reduce the photoperiod for adjoining native vegetation. Shadowing can decrease vegetation quality and in some instances completely alter the composition and density of plant species. Detailed design should consider the effects of shadowing on native vegetation, particularly in the Ravenhall Reserve and conservation areas adjoining the Functional Design Footprint.

7.1.5 Increase in Fauna Mortality

Fauna injury or death could occur as a result of construction activities, such as:

- Vegetation (fauna habitat) clearing;
- Collision with vehicles, fences or plant; and,
- Incidental trapping or drowning in trenches or other earthworks.

While some mobile species, such as birds, have the potential to move away from the path of clearing, other species that are less mobile may have difficulty moving over relatively large distances. Fauna injury or death has the greatest potential to occur during the break-out phase of construction when vegetation and habitats are being cleared. Through the implementation of appropriate mitigation measures, activities associated with the construction phase are unlikely to cause a significant impact. Owing to the relatively small extent of vegetation proposed to be removed and the limited habitat within the Project Area, it is considered that vehicle strike during construction and maintenance works would not be significantly greater than that which already exists. The project is unlikely to significantly increase the risk of wildlife colliding with vehicles.

7.1.6 Introduction and Spread of Weed and Pest Species

Weed species are well established throughout the Project Area, including many noxious species (Section 3.1.2). Without appropriate management strategies, project activities have the potential to disperse weeds into the locality including into adjoining patches of native vegetation that are not currently dominated by these species.

The most likely causes of weed dispersal associated with the project include earthworks (i.e. trenching), movement of soil, and the attachment of seed (and other propagules) to vehicles and machinery.

This is an indirect impact that may reduce the habitat quality of native vegetation. However, it should be recognised that much of native vegetation within the Project Area is disturbed and already has considerable weed growth. Therefore, the overall extent of habitat modification from weed invasion is not likely to increase extensively. Introduced birds are well established within the Project Area and other pest species, such as Red Fox, Feral Cat and European Rabbit are known to occur throughout the Study Area. The project is not likely to result in the establishment of these pest species in areas where they are currently absent or lead to significant increases in pest populations.

7.1.7 Aquatic Disturbance

The project would require works to be completed within the vicinity of Kororoit Creek. Works within the creek and riparian zone have the potential to affect fish passage, increase sedimentation, decrease water quality and damage or remove aquatic and riparian vegetation. Areas of riparian vegetation likely to be damaged or removed during construction should be replanted on the completion of works. In addition, appropriate erosion and sediment control measures should be put in place around Kororoit Creek prior to construction, to ensure minimal change in water quality due to run-off. Section 7.2 provides recommended mitigation measures for consideration during the construction planning phase.

7.2 Amelioration and Mitigation Measures

Matters of NES should be managed in accordance with the Conservation Management Plan (Ecology Partners Pty Ltd 2011), which will be revised to reflect the findings of this assessment. The revised plan will be developed in consultation with DoE to specifically manage Matters of NES during the Palmers Road Corridor Project. Recommended mitigation measures to reduce biodiversity impacts associated with the project are discussed below in general terms. As part of future project planning it is recommended that detailed mitigation measures be developed and presented in a Construction Environmental Management Plan (or similar document/s) relating to the construction and operation of the project. This plan would form part of the Environmental Management Framework, which is further detailed in the primary EES document.

The Construction Environmental Management Plan or other equivalent management document should include, where appropriate, procedures for:

- Detailed design of mitigation measures;
- Staff and contractor inductions to address the location of sensitive ecological values and their roles and responsibilities regarding the protection and/or minimisation of impacts to all ecological values;
- Pre-clearing surveys and fauna salvage/ translocation where practical;
- Vegetation clearing protocols; and,
- Rehabilitation and restoration, including:
  - Establishing rehabilitation protocols
  - Establishing weed control measures
  - Establishing pest management measures.

The management plan would be important for enacting the 'avoid and mitigate' principles during the construction and operational phases. Specific mitigation measures relating to potential impacts are provided in the sections below.

7.2.1 Specific Mitigation Measures

Table 20 outlines specific mitigation measures recommended for implementation to alleviate impacts to biodiversity that may arise from the project. Each known or potential impact is assigned mitigating measures.

Table 20 Recommended mitigation measures

Impact	Proposed mitigation measure	Implementation phase		
		Design	Construction	Operation
Loss of vegetation/ habitats	Detailed design should seek to avoid areas of vegetation where possible to minimise the need for vegetation clearing.	✓		
	Implementation of measures consistent with the '*Environmental Guidelines for Major Construction Sites*' (EPA 1996).	✓	✓	
	Designated areas for stockpiles and equipment lay-down should be placed in areas of Degraded Treeless Vegetation to avoid or minimise impact to native vegetation and habitat.	✓	✓	
	In order to avoid further disturbance to areas outside of those necessary for the operation of the project, ecologically sensitive areas (such as adjoining conservation reserves) should be clearly identified and managed in accordance with a Construction Environmental Management Plan (or other equivalent management document) so as to avoid, remedy or mitigate potential impacts. Ecologically sensitive areas would include the following: • Areas of native vegetation in moderate to good condition; • Any vegetation that provides suitable habitat for threatened species; and, • Large remnant trees that provide direct fauna habitat. These important biodiversity elements should be provided to staff and fenced to prevent vehicle or machinery access and damage. No direct disturbance should occur in these areas.	✓	✓	
	Ancillary infrastructure should be designed and located to minimise further impacts to the ecological values of the Project Area. The design, location and construction of such infrastructure should meet the following performance criteria: • No native vegetation communities in moderate to good condition will be affected, where suitable alternatives exist (i.e. Degraded Treeless Vegetation); • No large remnant trees that provide direct fauna habitat will be removed, where they can be practically retained; and, • The Australian Standard for protection trees on development sites (AS 4970-2009), particularly the establishment of appropriate Tree Protection Zones (TPZs), should be adhered to for successful management of trees within and adjoining the Project Area during construction.	✓	✓	

Impact	Proposed mitigation measure	Implementation phase		
	Where possible, revegetation of disturbed areas to recreate pre-existing vegetation communities should be undertaken, thereby increasing the habitat value and visual amenity of affected areas while reducing the likelihood for establishment and proliferation of weeds or risks associated with soil erosion. Revegetation of areas should include: • Planting of a range of locally occurring native shrubs, trees and groundcover plants in consultation with DEPI to recreate the target vegetation community; and, • Weed and pest control measures.		✓	✓
Habitat fragmentation and edge effects	Detailed design should be undertaken to avoid dissecting areas of native vegetation where possible.	✓		
Noise and dust pollution	Works should be undertaken in accordance with relevant EPA standards, including the '*Environmental Guidelines for Major Construction Sites'* (EPA 1996) and '*Construction Techniques for Sediment Pollution Control*' (EPA 1991).		✓	
Increased shadowing	Detailed design should consider the effects of shadowing on native vegetation and where possible reduce impacts.	✓		
Increase in fauna mortality	Where possible, remove native vegetation which contains potential roosting/nesting resources for birds and/or arboreal mammals outside known breeding/hibernation periods, preferably during late summer or early autumn. Scheduling for the clearing of potential habitat for threatened species should consider the ecology of the subject species (Striped Legless Lizard, Golden Sun Moth and Growling Grass Frog).		✓	
	Staff/contractor inductions on site should be conducted by an appropriately qualified ecologist or environmental officer.		✓	
	Sensitive areas, such as those containing fauna habitat, should be cleared of fauna prior to construction and operational activities commencing by a trained ecologist or other qualified environmental specialist. The limits of clearing in sensitive areas (e.g. threatened species habitat) should be marked to avoid unnecessary vegetation and habitat removal. Habitat clearing works should be supervised by a qualified environmental specialist and any animals disturbed during the works relocated.		✓	
	Any trenches should be covered at night to prevent animals from entering and becoming trapped. Sides of the trenches should be graded to allow for animal escape. Trenches should be checked in the morning prior to the start of works to identify trapped animals. Trapped animals should be removed before works commence.		✓	

Impact	Proposed mitigation measure	Implementation phase		
	Free passage along the Kororoit Creek should be maintained where possible during construction to avoid restricting fauna movement, particularly with respect to kangaroos, which are known to utilise the riparian corridor and adjoining areas of undeveloped land. Fencing should be installed in specific areas to prevent terrestrial mammals from entering construction zones.		✓	
	Within the vicinity of the Kororoit Creek corridor, permanent fauna fencing should be installed to reduce the risk of kangaroos and other mobile fauna species from entering the road. The fencing should be sited and designed to maintain free passage along the creek corridor.		✓	✓
Proliferation of weed and pest species	A weed and pest animal management strategy should be prepared and implemented.		✓	
	Appropriate weed hygiene measures should be implemented to avoid spread into unaffected vegetation areas.		✓	✓
	Weed infested topsoil should be removed from site and disposed of at an appropriate waste disposal facility and should not be reused on site to minimise the spread of weeds.		✓	
Aquatic disturbance	Bridge piers should be sited outside of the waterway area of Kororoit Creek on the creek banks, thereby limiting impact on habitat and waterway function.	✓		
	Appropriate erosion and sediment control strategies should be implemented to prevent erosion and sedimentation in accordance with EPA guidelines (EPA 1996;1991).		✓	✓
	Construction in the vicinity of Kororoit Creek during rainfall events should be avoided and ensure that fish passage is maintained at all stages of construction.		✓	
	Free passage between upstream and downstream habitats should be maintained during construction to ensure free passage for aquatic fauna.		✓	
	Measures to reduce aquatic disturbance should be incorporated into detailed design, in accordance with best practice guidelines.	✓		

8 CONCLUSION

The Study Area has a long history of agricultural land use and has been substantially modified through livestock grazing and cropping activities. As the population of Melbourne expands west, agricultural land is being replaced with high density development, placing further pressure on residual ecological values. The Project Area is representative of many areas within this region as it has been significantly modified and contains large tracts of maintained exotic grassland, very few mature remnant trees, highly modified aquatic habitats and isolated native grasslands characterised by low species diversity and significant edge effects.

Whilst much of the Project Area has been modified through historic land use and urbanisation, many ecological values persist. The following features of ecological significance have been identified through previous studies and the current desk-based and field assessments:

- A number of significant sites lie within or adjacent to the Project Area including BioSites of national and state significance and designated conservation areas (Figure 1). Managed conservation reserves within the vicinity of the Project Area include Ravenhall Nature Conservation Reserve, Banchory Grove Grassland Nature Conservation Reserve and Organ Pipes National Park. Of the three conservation areas, only a small area of the Banchory Grove Grasslands is included in the Functional Design Footprint.
- The current survey identified that the Functional Design Footprint contains 2.64 habitat hectares (11.19 hectares) of remnant vegetation and two Scattered Trees, including:
  - 11.16 hectares of Plains Grassland (EVC 132_61) represented by 32 Remnant Patches and nine Habitat Zones (excluding PG2 and two remnant patches of PG1 which lie inside the BCS area [Section 5.2.2.2]);
  - 0.03 hectares of Plains Grassy Wetland (EVC 125) represented by two Remnant Patches and Habitat Zones; and,
  - Two Scattered Trees located in the riparian zone of Kororoit Creek
- A number of Remnant Patches within the Project Area correspond with threatened ecological communities listed under the EPBC Act and FFG Act. The Functional Design Footprint contains:
  - 3.27 hectares of the EPBC Act listed NTGVVP ecological community (including 0.16 hectares within the BCS area);
  - 0.03 hectares of the EPBC Act listed SHW ecological community; and,
  - 11.16 hectares of the FFG Act listed Western (Basalt) Plains Grasslands Community.
- One EPBC Act listed flora species, Spiny Rice-flower, was recorded during field surveys completed in 2007. Targeted surveys undertaken in 2009 and the current survey failed to detect this species, however based on the precautionary principal it is considered to still occur within the Project Area due to the previous survey records and the persistence of suitable habitat (PG1). It is noted that the Functional Design Footprint excludes the area where Spiny Rice-flower has been previously recorded (Figure 5).

- No other nationally significant species of flora or fauna have been recorded during field surveys undertaken for the project. Based on the likelihood of occurrence assessment, five EPBC Act listed species of fauna are considered to occur within the Project Area with a moderate or greater likelihood, including:
  - Golden Sun Moth (Potential Habitat - PG1, PG2, PG3 and PG8);
  - Striped Legless Lizard (Potential Habitat - PG8, PG1, PG2 and PG3);
  - Growling Grass Frog (Potential Habitat - Kororoit Creek corridor);
  - Swift Parrot (Potential occasional visitor); and,
  - Grey-headed Flying Fox (Potential occasional visitor).
- Four state significant flora species have been recorded in the Project Area during field surveys undertaken for the project (Figure 3), including Spiny Rice-flower, Basalt Podolepis, Tough Scurf-pea and Fragrant Saltbush. Only the Fragrant Saltbush was recorded during the current surveys. No other state significant species of flora or fauna has been recorded during field surveys undertaken for the project. Based on the likelihood of occurrence assessment, four state significant flora species and 15 species of fauna are considered to occur within the Project Area with a moderate or greater likelihood (Section 3.2.2.2). Eleven Tough-Scurf Pea Plants were removed during the Westwood Drive works (Section 1.5.5). Prior to clearing, seed was collected from this population to enable the propagation and translocation works prescribed in the *Translocation and Conservation Management Plan for Tough Scurf-pea Cullen tenax* (Native Vegetation Management Services 2012).
- One regionally significant flora species - Slender Bindweed, was recorded during the current field survey on the eastern side of the assessed corridor, between Riding Boundary and Middle Road. It is noted that there are no legislative implications associated with the known or potential presence of regionally significant flora and fauna species.

In the absence of mitigation measures, the project has the potential to impact upon ecological values within the Project Area and surrounding landscape. Potential impacts include noise and dust pollution, increased shadowing, increases in fauna mortality, the introduction and spread of weed and pest species and aquatic disturbance. Detailed mitigation measures for the project are recommended in Section 7.2.

Where there is residual loss or degradation of vegetation and habitat after detailed design and the implementation of mitigation measures, compensation in the form of biodiversity offsets will be required. Offset obligations are discussed in Section 5.2.2 and summarised below:

- The Guidelines: The BIOR (Appendix C) identifies that a **General Offset** of **2.425 Biodiversity Equivalence Units** is required to compensate for the removal of 11.19 hectares of native vegetation and two Scattered Trees.
- The BCS: The Habitat Compensation Statement (Appendix D) identifies the following offset obligations associated with the BCS area (Inset 1):
  - Native vegetation: 0.047 ha ($4,468.53)
  - Spiny Rice-flower: 0.047 ha ($373.03)
  - Golden Sun Moth: 0.990 ha ($7,834.86)

It is recommended that DoE are consulted regarding the differences between the referred and proposed activity and potential environmental offset requirements under the EPBC Act. While the Planning Scheme amendment process negates the need to apply to the relevant Councils to remove, destroy or lop native vegetation, a permit from DEPI would be required under the FFG Act to remove any areas classified as the Western (Basalt) Plains Grasslands Community or listed/ protected plants.

It is considered that this Flora and Fauna Assessment and Biodiversity Offset Analysis addresses the Final EES Scoping Requirements and the following evaluation objective for biodiversity provided by DTPLI in July 2013:

> *'To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.'*

The performance of the Palmers Road Project in meeting the evaluation objective for biodiversity has been reviewed with reference to the criteria listed in Table 21. In order to demonstrate the outcomes of applying the hierarchy of control (Section 5.2), the review focussed on the predicted consequences of two scenarios - the unmitigated action contrasted with the proposed mitigated action. The ratings designated in Table 21 reflect the high level of effort completed during the planning and design phase to avoid and minimise adverse impacts on ecological values. In addition to incorporating the findings of detailed assessments into project design and meeting offset obligations, known and potential impacts during construction will be managed in accordance with a Construction Environmental Management Plan (or equivalent document) and Conservation Management Plan for Matters of NES (Section 7.2).

The findings presented in Table 21 demonstrate that the proposed action meets the evaluation objective for biodiversity and provides an outcome which balances the need for project development with the conservation of ecological values within the Project Area and broader landscape.

Table 21 Project performance review

Ecological Values		Unmitigated Rating	Mitigation Notes	Mitigated Impacts	Mitigated Rating
Significant sites	• BioSites of national and state significance • Managed conservation reserves including Ravenhall Nature Conservation Reserve, Banchory Grove Grassland Nature Conservation Reserve and Organ Pipes National Park • Pioneer Park, a Council managed reserve	Poor	Impacts on significant sites have been avoided where possible, with reference to the findings of detailed ecological assessments. Indirect impacts on reserves /BioSites adjoining the Functional Design Footprint will be managed in accordance with a Construction Environmental Management Plan (or equivalent document).	• The Functional Design Footprint includes a small area (0.13ha) of the Banchory Grove Grassland Nature Conservation Reserve and a small area of Pioneer Park. The Functional Design Footprint adjoins both the Ravenhall Nature Conservation Reserve and Organ Pipes National Park.	Well
Native vegetation	• Plains Grassland (EVC 132_61) • Plains Grassy Wetland (EVC 125) • Scattered Trees	Very Poor	Impacts on native vegetation have been avoided and minimised throughout the planning and design process. The Functional Design Footprint contains 11.19 hectares of remnant vegetation and two scattered trees. It is noted that the affected vegetation predominately consists of relatively low quality maintained grassland within existing road reserves. Furthermore, the extent of native vegetation present is augmented under The Guidelines (DEPI 2013d), which do not recognise 'Modified Treeless Vegetation'. Impacts on native vegetation will be managed in accordance with a Construction Environmental Management Plan. Offset obligations under the Guidelines and BCS (DEPI 2013a) will be met prior to works commencing. The biodiversity offsets will meet the key objective of the Guidelines (DEPI 2013c), being no net loss.	• The Functional Design Footprint contains 2.64 habitat hectares (11.19 hectares) of remnant vegetation and two Scattered Trees, including: o 11.16 hectares of Plains Grassland (EVC 132_61) represented by 32 Remnant Patches and nine Habitat Zones (excluding patches within the Biodiversity Conservation Strategy [BCS] area); o 0.03 hectares of Plains Grassy Wetland (EVC 125) represented by two Remnant Patches and Habitat Zones; and, o Two Scattered Trees located in the riparian zone of Kororoit Creek.	Neutral
Matters of NES listed under the EPBC Act	• Threatened flora species (Spiny Rice-flower) • Threatened fauna species (Golden Sun Moth, Striped Legless Lizard, Growling Grass Frog, Swift Parrot and Grey-headed Flying-fox) • Migratory species (Section 3.2.1.3) • Threatened ecological communities, including: o Natural Temperate Grassland of the Victorian Volcanic Plain [NTGVVP] ecological community o Seasonal Herbaceous Wetlands (SHW) (Freshwater) of the Temperate Lowland Plains ecological community	Poor	Impacts on matters of NES have been avoided and minimised throughout the planning and design process (e.g. completion of targeted surveys). Matters of NES will be managed in accordance with the Conservation Management Plan (Ecology Partners Pty Ltd 2011), which will be revised to reflect the findings of this assessment. The revised plan will be developed in consultation with DoE to specifically manage Matters of NES during development of the Palmers Road Corridor Project.	• The Functional Design Footprint contains 3.27 hectares of the NTGVVP ecological community and 0.03 hectares of the SHW ecological community. • One EPBC Act listed plant, Spiny Rice-flower, was recorded in the Project Area in 2007. It is noted that the Functional Design Footprint excludes the area where Spiny Rice-flower has been previously recorded. • The Project Area provides habitat for the Spiny Rice-flower and potential habitat for five EPBC Act listed species of fauna, including Golden Sun Moth, Striped Legless Lizard, Growling Grass Frog, Grey-headed Flying-fox and Swift Parrot. The six EPBC Act listed species are considered to inhabit or use habitat resources within the Project Area and Functional Design Footprint.	Well
Matters of State significance	• Threatened flora species (Section 3.2.2.2) • Threatened fauna species (Section 3.2.2.2) • Threatened ecological communities (Western [Basalt] Plains Grasslands Community)	Poor	Impacts on matters of State significance have been avoided and minimised throughout the planning and design process. State significant values will be managed in accordance with a Construction Environmental Management Plan.	• The Functional Design Footprint contains 11.16 hectares of the Western [Basalt] Plains Grasslands Community (including 3.27 hectares also classified as NTGVVP). • The Project Area provides habitat for four state significant species of flora and potential habitat for 15 species of fauna. The 19 state significant species are considered to have a moderate-high likelihood of occurrence within the Functional Design Footprint.	Well

Notes:

Very Well - High level of compliance, major positive impacts or negligible impacts

Well - Good policy compliance, mostly positive impacts or minor negative impacts

Neutral - Some policy compliance, equal positive and negative impacts

Poor - Policy non-compliance, mostly negative impacts or minor positive impacts

Very Poor - Major policy non-compliance, major negative impacts or negligible positive impacts

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10 FIGURES

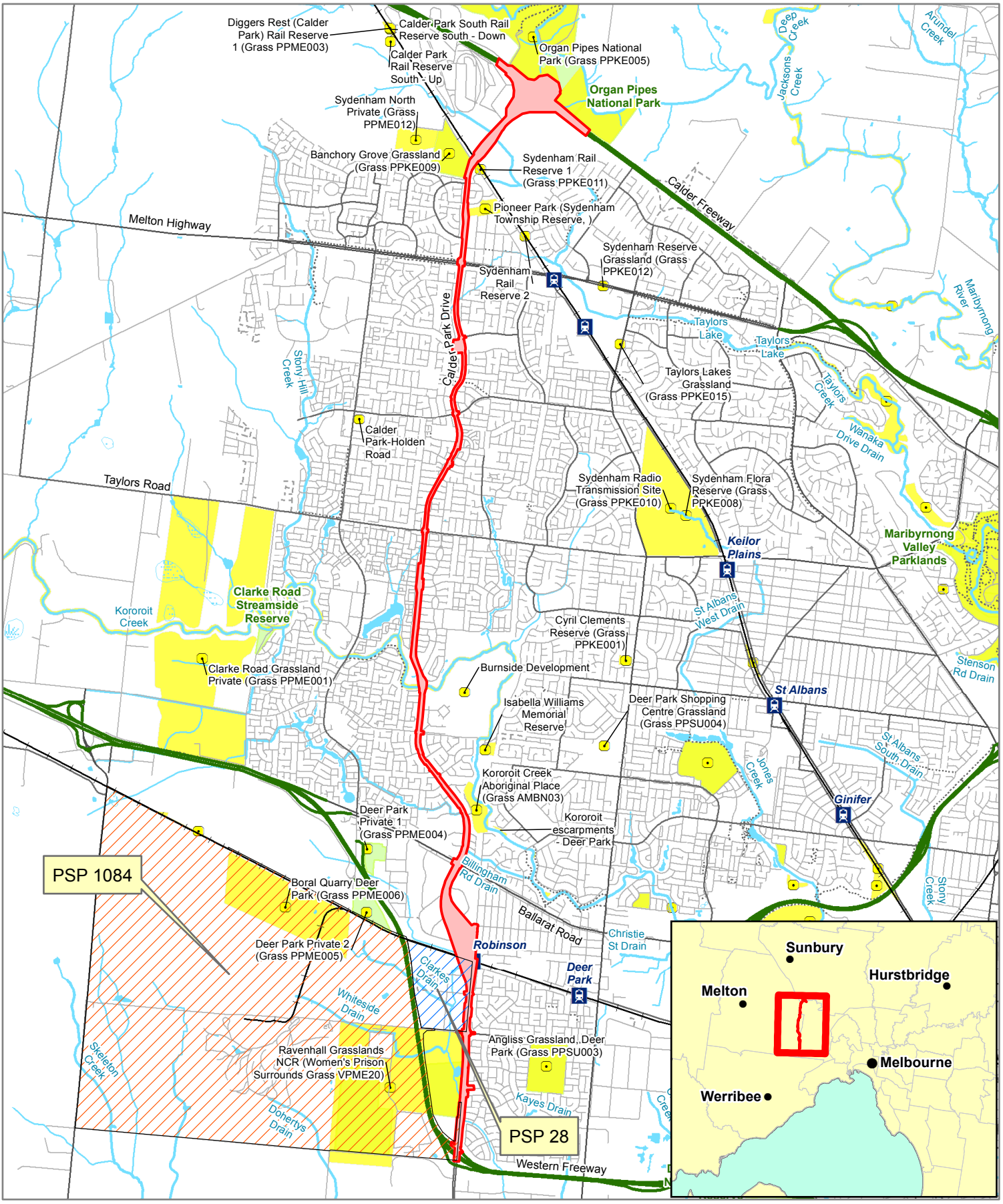

Figure 1
Project Area Location
Palmers Road Corridor

Legend

- Project Area
- Parks and Reserves
- PSP 1084 - Ravenhall (Quarry Site)
- PSP 28 - Robinsons Road Employment Area North
- BioSite Boundaries
- BioSites

N

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Kilometres

ecology & heritage partners

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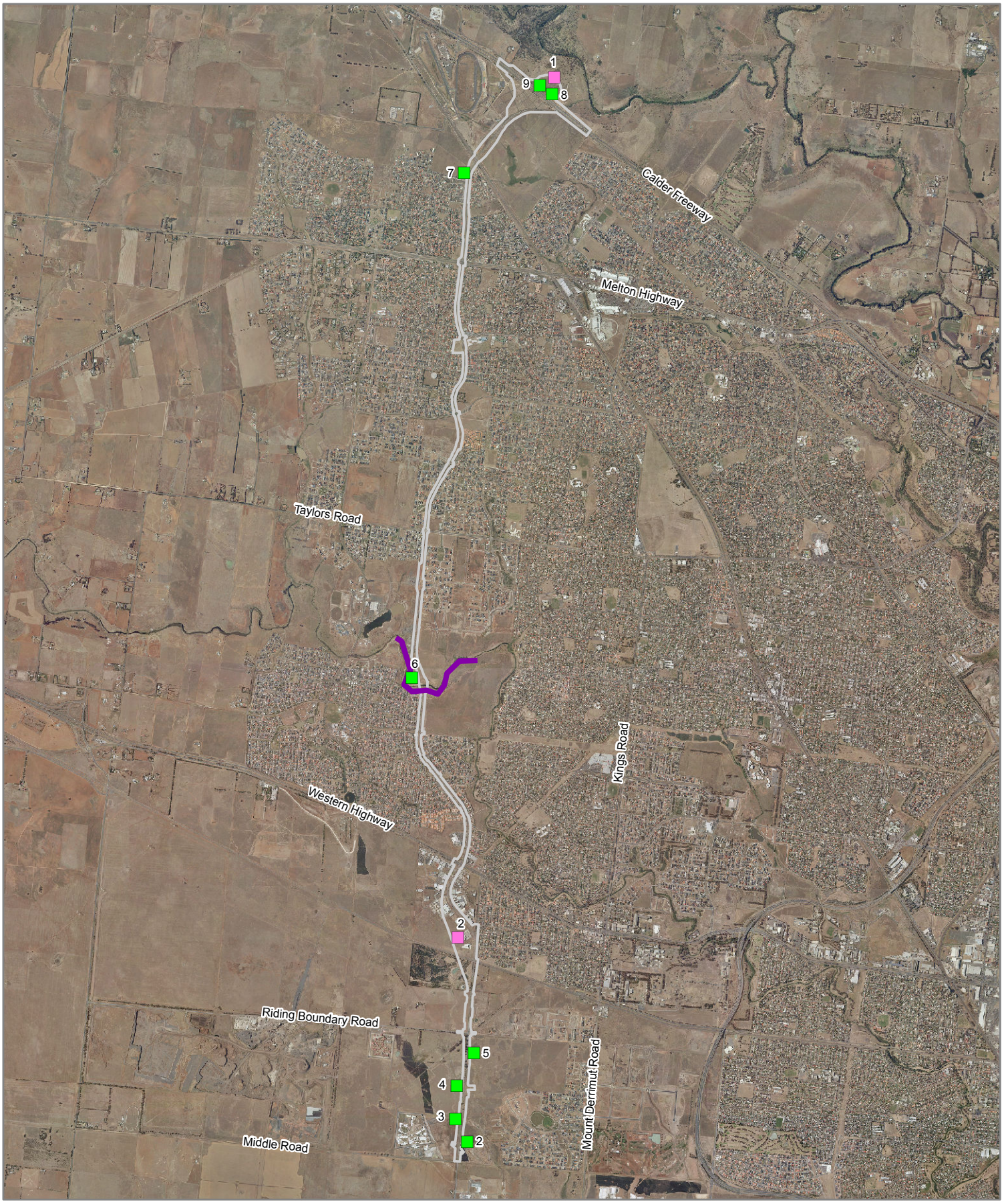

Figure 2
Survey Effort
Palmers Road Corridor

Legend

- Project Area
- Golden Sun Moth Survey Locations
- Striped Legless Lizard Survey Locations
- Growling Grass Frog Survey Location

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Kilometres

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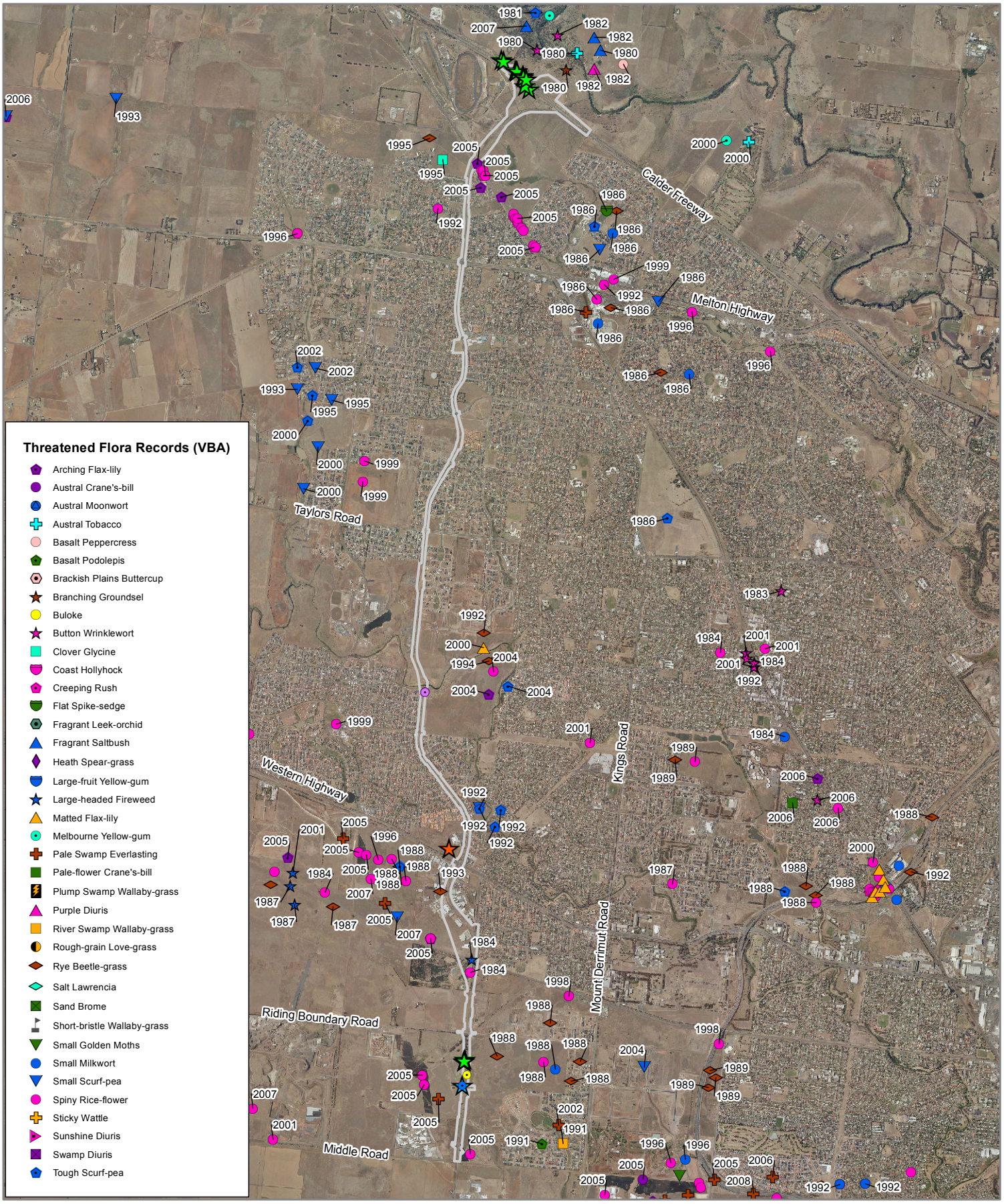

Figure 3

Threat-listed Flora Recorded Within and Surrounding the Project Area

Palmers Road Corridor

ecology & heritage partners

Legend

Project Area

Threatened species recorded during current asseesment

Fragrant Saltbush

Slender Bindweed

Spiny Rice-flower - Reference Site

Threatened species reported in the 2009 assessment

Basalt Podolepis

Spiny Rice-flower

Tough Scurf-pea

N

0 1 2

Kilometres

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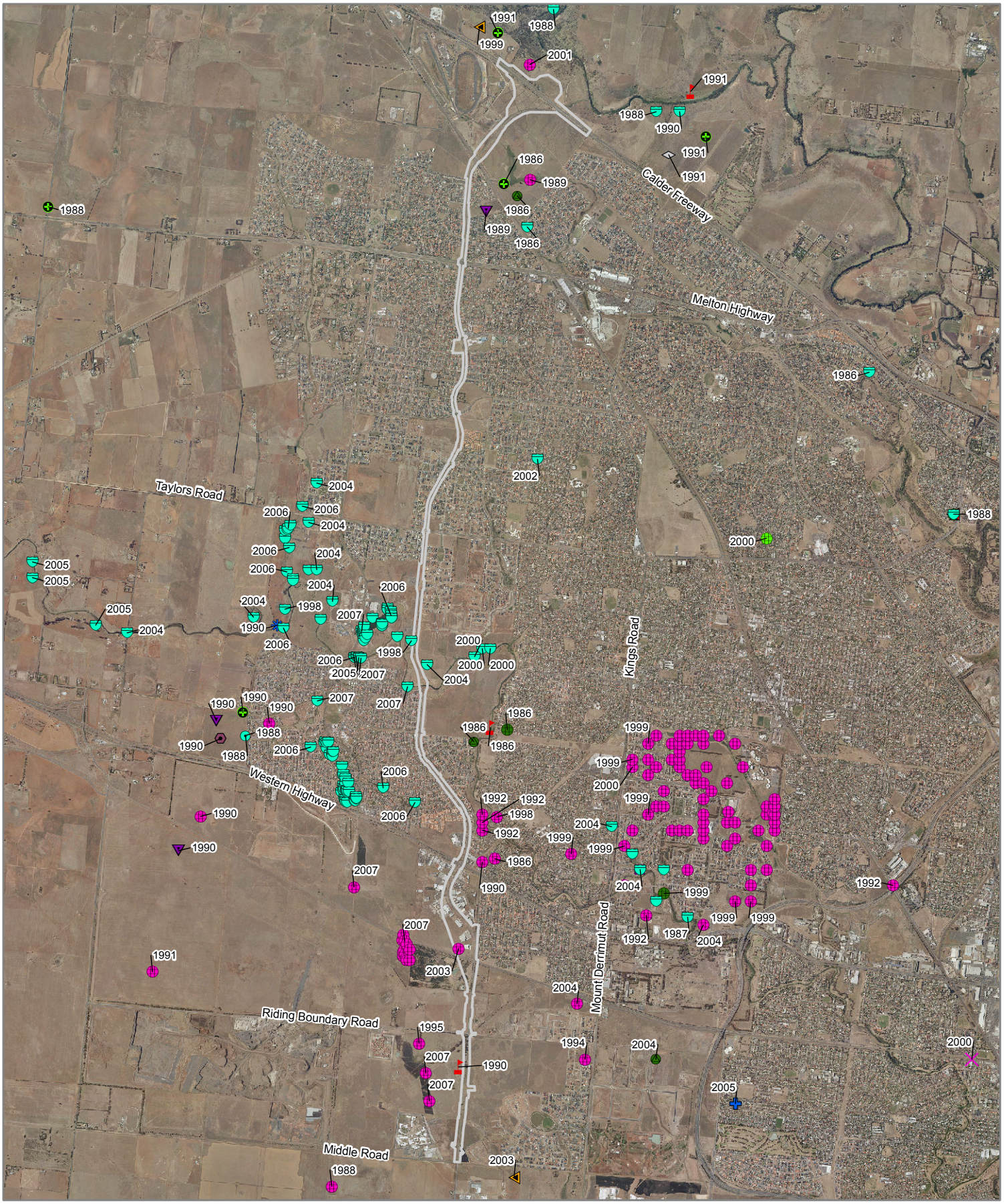

Figure 4

Threat-listed Fauna Recorded Within and Surrounding the Project Area (VBA)

Palmers Road Corridor

ecology & heritage partners

Legend

- Project Area
- Australasian Bittern
- Australasian Shoveler
- Australian Grayling
- Australian Painted Snipe
- Australian Pratincole
- Baillon's Crake
- Black Falcon
- Black-chinned Honeyeater
- Black-eared Cuckoo
- Black-faced Cormorant
- Blue-billed Duck
- Brolga
- Brown Quail
- Brown Toadlet
- Brown Treecreeper (south-eastern ssp.)
- Cape Barren Goose
- Caspian Tern
- Diamond Dove
- Diamond Firetail
- Eastern Barred Bandicoot
- Eastern Curlew
- Eastern Great Egret
- Fat-tailed Dunnart
- Freckled Duck
- Glossy Ibis
- Golden Sun Moth
- Grassland Earless Dragon
- Great Knot
- Grey-headed Flying-fox
- Growling Grass Frog
- Gull-billed Tern
- Hardhead
- Hooded Robin
- Intermediate Egret
- Latham's Snipe
- Lewin's Rail
- Little Bittern
- Little Egret
- Little Tern
- Long-toed Stint
- Masked Owl
- Musk Duck
- Nankeen Night Heron
- Pacific Golden Plover
- Pacific Gull
- Pectoral Sandpiper
- Pied Cormorant
- Plains-wanderer
- Red-chested Button-quail
- Royal Spoonbill
- Sanderling
- Silver Perch
- Sooty Oystercatcher
- Southern Myotis
- Speckled Warbler
- Spotted Harrier
- Striped Legless Lizard
- Swift Parrot
- Terek Sandpiper
- Whiskered Tern
- White-winged Black Tern
- Wood Sandpiper
- Yellow Sedge-skipper
- Yellow-bellied Sheathtail Bat

N

0 1 2

Kilometres

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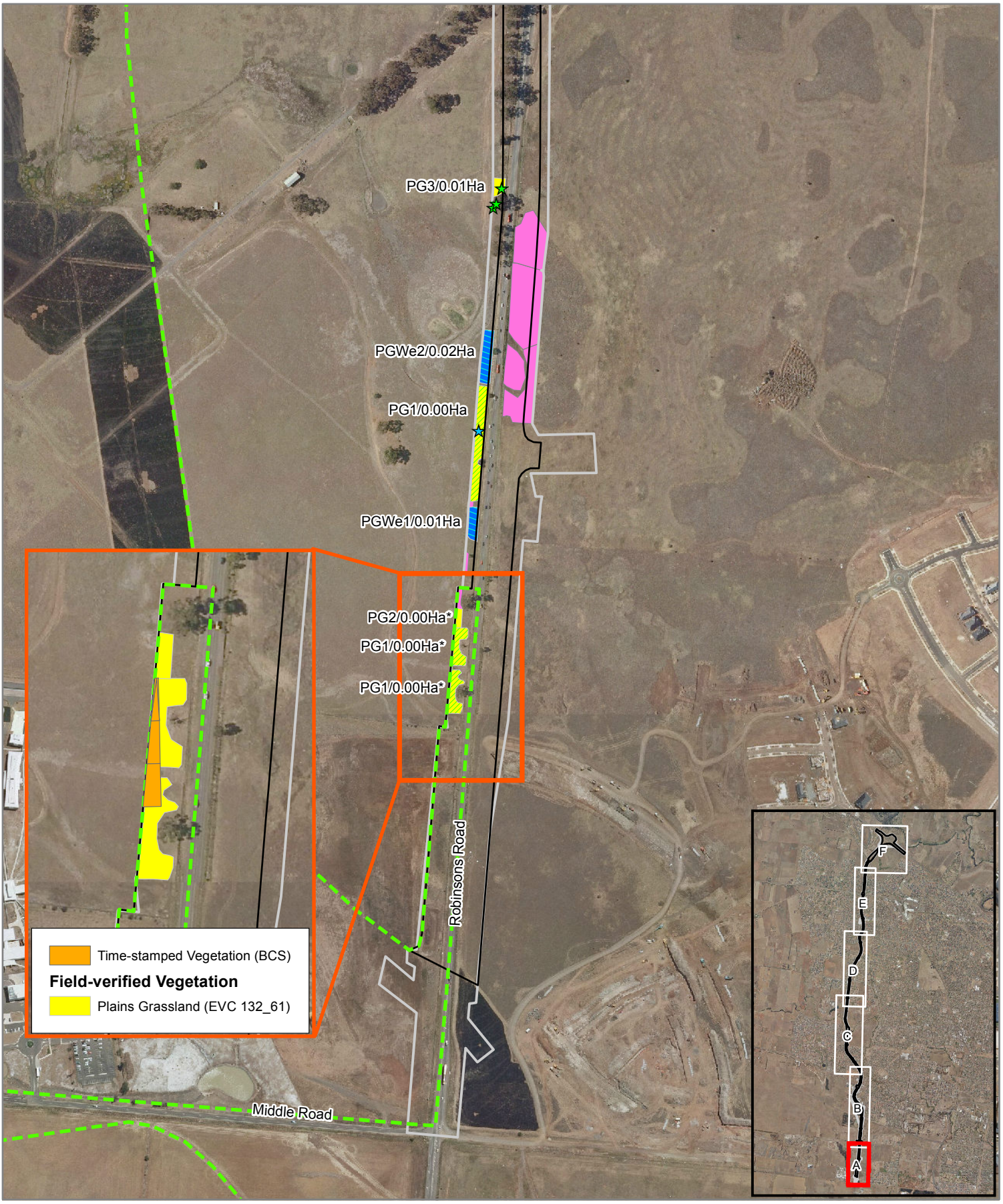

Figure 5

Field-mapped Vegetation within the Study area

Palmers Road Corridor

Legend

- Project Area
- Functional Design Footprint
- Area Subject to the BCS

EVC

- Plains Grassland (EVC 132_61)
- Plains Wetland (EVC 125)
- Scattered Trees
- Previous EVC Extents (2009 Assessment)

HZ Label - Habitat Zone/Area within Footprint (combined)

EPBC Act Listed Ecological Communities

- NTGVVP
- SHW

Threatened Flora (Current Assessment)

- Fragrant Saltbush
- Slender Bindweed
- Spiny Rice-flower - Reference Site

N

0 0.1 0.2

Kilometres

ecology & heritage partners

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Field-mapped Vegetation within the Study area

Palmers Road Corridor

ecology & heritage partners

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- Previous EVC Extents (2009 Assessment)

HZ Label - Habitat Zone/Area within Footprint (combined)

EPBC Act Listed Ecological Communities

- NTGVVP
- SHW

Threatened Flora (Current Assessment)

- Fragrant Saltbush
- Slender Bindweed
- Spiny Rice-flower - Reference Site

N

0 0.2 0.4

Kilometres

2997_Fig02_Eco_Features.mxd 15/09/2011 ALF

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Field-mapped Vegetation within the Study area

Palmers Road Corridor

Legend

- Project Area
- Functional Design Footprint
- Area Subject to the BCS

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EPBC Act Listed Ecological Communities

- NTGVVP
- SHW

Threatened Flora (Current Assessment)

- Fragrant Saltbush
- Slender Bindweed
- Spiny Rice-flower - Reference Site

N

0 0.2 0.4

Kilometres

ecology & heritage partners

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Field-mapped Vegetation within the Study area

Palmers Road Corridor

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- SHW

Threatened Flora (Current Assessment)

- Fragrant Saltbush
- Slender Bindweed
- Spiny Rice-flower - Reference Site

N

0 0.2 0.4

Kilometres

ecology & heritage partners

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Field-mapped Vegetation within the Study area

Palmers Road Corridor

Legend

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- Functional Design Footprint
- Area Subject to the BCS

EVC

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- Plains Wetland (EVC 125)
- Scattered Trees
- Previous EVC Extents (2009 Assessment)

HZ Label - Habitat Zone/Area within Footprint (combined)

EPBC Act Listed Ecological Communities

- NTGVVP
- SHW

Threatened Flora (Current Assessment)

- Fragrant Saltbush
- Slender Bindweed
- Spiny Rice-flower - Reference Site

N

0 0.175 0.35

Kilometres

ecology & heritage partners

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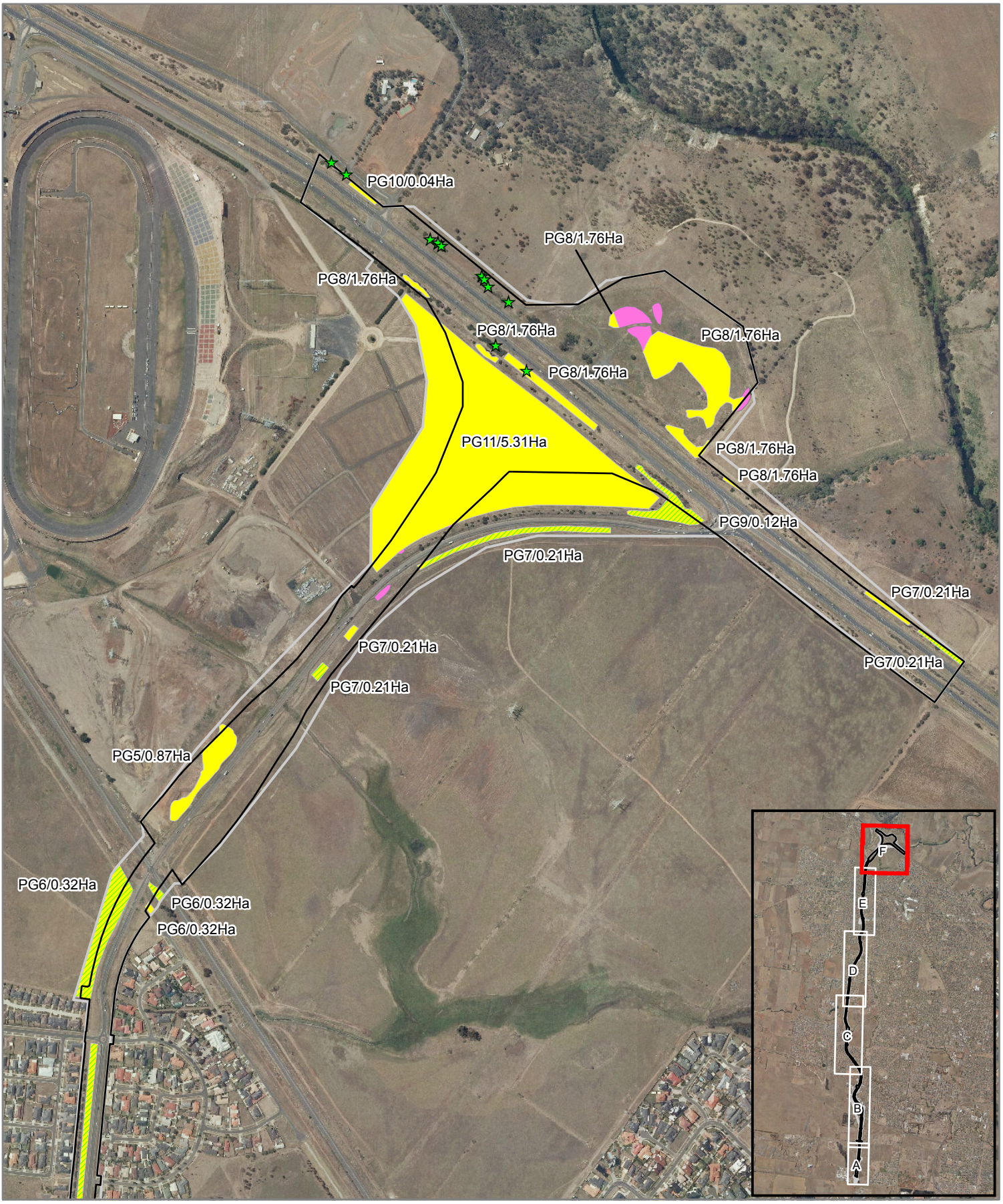

Figure 5

Field-mapped Vegetation within the Study area

Palmers Road Corridor

ecology & heritage partners

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- Scattered Trees
- Previous EVC Extents (2009 Assessment)

HZ Label - Habitat Zone/Area within Footprint (combined)

EPBC Act Listed Ecological Communities

- NTGVVP
- SHW

Threatened Flora (Current Assessment)

- Fragrant Saltbush
- Slender Bindweed
- Spiny Rice-flower - Reference Site

N

0 0.15 0.3

Kilometres

2997_Fig02_Eco_Features.mxd 15/09/2011 ALF

11 APPENDIX A - FLORA

11.1 Appendix A1 Flora Species Recorded

Table A1. Flora recorded during the previous (2009 report) and current surveys

Scientific name	Common name	Conservation status	2009 report (entire alignment)1	Current survey1
INDIGENOUS SPECIES				
Acacia mearnsii	Black Wattle	-	✓	✓
Acaena echinata	Sheep's Burr	-	✓	✓
Asperula conferta	Common Woodruff	-	✓	✓
Atriplex semibaccata	Berry Saltbush	-	✓	✓
Austrostipa bigeniculata	Kneed Spear-grass	-	✓	✓
Austrostipa sp.	Spear-grass	-	✓	✓
Brachyscome basaltica subsp. gracilis	Woodland Swamp-daisy	-	-	✓
Brachyscome sp.	Daisy	-	✓	-
Bolboschoenus medianus	Marsh Club-sedge	-	✓	-
Bothriochloa macra	Red-leg Grass	-	-	✓
Calocephalus citreus	Lemon Beauty-heads	-	✓	-
Calotis scapigera	Tufted Burr-daisy	-	✓	-
Carpobrotus modestus	Inland Pigface	-	✓	-
Centipeda cunninghamii	Common Sneezeweed	-	✓	-
Chloris truncata	Windmill Grass	-	✓	✓
Chrysocephalum apiculatum s.l.	Common Everlasting	-	✓	-
Convolvulus angustissimus	Slender Bindweed	k	-	✓
Convolvulus erubescens spp. agg.	Pink Bindweed	-	✓	✓
Convolvulus remotus	Grassy Bindweed	-	✓	-
Cullen tenax	Tough Scurf-pea	L, e	✓	-
Dianella longifolia s.l.	Pale Flax-lily	-	✓	-
Dianella revoluta var. *revoluta* s.l.	Black-anther Flax-lily	-	✓	✓
Dichondra repens	Kidney-weed	-	✓	✓
Einadia nutans subsp. nutans	Nodding Saltbush	-	✓	✓
Eleocharis acuta	Common Spike-sedge	-	✓	✓
Enchylaena tomentosa var. *tomentosa*	Ruby Saltbush	-	✓	✓
Epilobium hirtigerum	Hairy Willow-herb	-	✓	-
Erodium sp.	Heron's Bill	-	✓	-
Eryngium ovinum	Blue Devil	-	✓	-
Eryngium vesiculosum	Prickfoot	-	✓	✓
Eucalyptus camaldulensis	River Red-gum	-	✓	✓
Geranium sp.	Crane's Bill	-	✓	✓
Haloragis heterophylla	Varied Raspwort	-	✓	✓
Helichrysum rutidolepis s.l.	Pale Everlasting	-	✓	-
Hypericum gramineum	Small St John's Wort	-	✓	-
Juncus subsecundus	Finger Rush	-	✓	✓
Lachnagrostis filiformis	Common Blown-grass	-	✓	-
Leptorhynchos squamatus	Scaly Buttons	-	✓	-
Lomandra filiformis	Wattle Mat-rush	-	✓	-
Lythrum hyssopifolia	Small Loosestrife	-	✓	✓

Scientific name	Common name	Conservation status	2009 report (entire alignment)1	Current survey1
Marsilea drummondii	Common Nardoo	-	✓	✓
Maireana enchylaenoides	Wingless Bluebush	-	✓	-
Melicytus dentatus s.l.	Tree Violet	-	✓	✓
Phragmites australis	Common Reed	-	✓	✓
Pimelea curviflora s.l.	Curved Rice-flower	-	✓	-
Pimelea glauca	Smooth Rice-flower	-	✓	-
CR *Pimelea spinescens* subsp. *spinescens*	Spiny Rice-flower	CR, L, e	✓	-
Plantago gaudichaudii	Narrow Plantain	-	✓	-
Poa labillardierei	CommonTussock-grass	-	✓	✓
Podolepis sp. 1	Basalt Podolepis	e	✓	-
Portulaca oleracea	Pigweed	-	✓	✓
Pseudognaphalium luteoalbum	Jersey Cudweed	-	✓	✓
Ptilotus spathulatus f. spathulatus	Pussy Tails	-	✓	-
Rhagodia parabolica	Fragrant Saltbush	r	-	✓
Rumex brownii	Slender Dock	-	✓	
Rumex dumosus	Wiry Dock	-	✓	
Rumex sp.	Dock	-	-	✓
Rytidosperma caespitosum	Common Wallaby-grass	-	✓	✓
Rytidosperma duttonianum	Brown-backed Wallaby-grass	-	✓	✓
Rytidosperma fulvum	Copper-awned Wallaby-grass	-	✓	✓
Rytidosperma racemosum var. *racemosum*	Stiped Wallaby-grass	-	✓	-
Rytidosperma setacaum	Bristly Wallaby-grass	-	✓	✓
Sclerostegia arbuscula	Shrubby Glasswort	-	✓	-
Sclerolaena muricata var. *villosa*	Grey Roly-poly	-	✓	✓
Senecio quadridentatus	Cotton Fireweed	-	✓	✓
Solenogyne dominii	Smooth Solenogyne	-	✓	-
Themeda triandra	Kangaroo Grass	-	✓	✓
Typha sp.	Bulrush	-	✓	-
Veronica gracilis	Slender Speedwell	-	✓	-
Vittadinia cuneata	Fuzzy New Holland Daisy	-	✓	-
Whalleya proluta	Rigid Panic	-	✓	✓
INTRODUCED SPECIES				
*Acacia saligna**	Golden Wreath Wattle	-	✓	-
*Agrostis capillaris**	Brown top Bent	-	✓	✓
*Aira sp.**	Hair Grass	-	✓	-
*Aloe maculata**	Common Soap Aloe	-	✓	-
*Anagallis arvensis**	Pimpernel	-	✓	✓
*Anthoxanthum odoratum**	Sweet Vernal-grass	-	✓	✓
*Arctotheca calendula**	Cape Weed	-	✓	✓
*Aster subulatus**	Aster-weed	-	✓	✓
*Avena fatua**	Wild Oat	-	✓	✓
*Brassica sp.**	Turnip	-	✓	✓
*Briza maxima**	Large Quaking-grass	-	✓	✓
*Briza minor**	Lesser Quaking-grass	-	✓	✓
*Bromus catharticus**	Prairie Grass	-	✓	✓
*Bromus diandrus**	Great Brome	-	✓	-
*Bromus hordeaceus subsp. hordeaceus**	Soft Brome	-	✓	✓

Scientific name	Common name	Conservation status	2009 report (entire alignment)1	Current survey1
Cerastium glomeratum s.l.*	Common Mouse-ear Chickweed	-	✓	-
*Chenopodium album**	Fat Hen	-	✓	-
*Cirsium vulgare**	Spear Thistle	-	✓	✓
*Convolvulus arvensis**	Common Bindweed	-	✓	✓
Crassula multicava subsp. *multicava**	Shade Crassula	-	✓	-
*Cynara cardunculus**	Spanish Artichoke	-	✓	✓
*Cynodon dactylon**	Couch	-	✓	✓
*Cyperus eragrostis**	Drain Flat-sedge	-	✓	✓
*Dactylis glomerata**	Cocksfoot	-	✓	✓
*Daucus carota**	Wild Carrot	-	✓	-
*Echium plantagineum**	Paterson's Curse	-	✓	✓
Ehrharta erecta var. *erecta**	Panic Veldt-grass	-	✓	✓
*Ehrharta longiflora**	Annual Veldt-grass	-	✓	-
*Eragrostis curvula**	African Love-grass	-	✓	-
*Festuca arundinacea**	Tall Fescue	-	✓	-
*Foeniculum vulgare**	Fennel	-	✓	✓
*Fraxinus angustifolia**	Desert Ash	-	✓	✓
Galenia pubescens var. *pubescens**	Galenia	-	✓	✓
*Gaudinia fragilis**	Fragile oat	-	✓	-
*Genista monspessulana**	Montpellier Broom	-	✓	-
*Helminthotheca echioides**	Ox-tongue	-	✓	✓
*Holcus lanatus**	Yorkshire Fog	-	✓	✓
Hordeum vulgare s.l.*	Barley	-	✓	-
Juncus acutus subsp. *acutus**	Sharp Rush	-	✓	✓
*Lactuca serriola**	Prickly Lettuce	-	✓	✓
*Leontodon taraxacoides subsp. taraxacoides**	Hairy Hawkbit	-	✓	✓
*Lepidium africanum**	Field Peppercress	-	✓	✓
*Lepidium draba**	Hoary Cress	-	✓	-
*Lolium perenne**	Perennial Rye-grass	-	✓	✓
*Lycium ferocissimum**	African Box-thorn	-	✓	✓
*Malva parviflora**	Small-flower Mallow	-	✓	✓
*Marrubium vulgare**	Horehound	-	✓	-
*Medicago polymorpha**	Burr Medic	-	✓	✓
Medicago sativa subsp. *sativa**	Lucerne	-	✓	-
*Melilotus indicus**	Sweet Melilot	-	✓	-
*Mesembryanthemum crystallinum**	Common Ice-plant	-	✓	-
*Modiola caroliniana**	Red-flower Mallow	-	✓	-
*Nassella hyalina**	Cane Needle-grass	-	✓	✓
*Nassella neesiana**	Chilean Needle-grass	-	✓	✓
*Nassella trichotoma**	Serrated Tussock	-	✓	✓
*Oxalis pes-caprae**	Sour sob	-	✓	✓
*Paspalum distichum**	Water Couch	-	✓	✓
*Panicum capillare**	Common Millet	-	✓	-
*Pennisetum clandestinum**	Kikuyu	-	✓	✓
*Phalaris aquatica**	Toowoomba Canary-grass	-	✓	✓
*Phalaris minor**	Lesser Canary-grass	-	✓	-
*Phalaris paradoxa**	Paradoxical Canary-grass	-	✓	-
*Physalis viscosa**	Sticky Ground-cherry	-	✓	-

Scientific name	Common name	Conservation status	2009 report (entire alignment)1	Current survey1
*Plantago coronopus**	Buck's-horn Plantain	-	✓	✓
*Plantago lanceolata**	Ribwort	-	✓	✓
*Polycarpon tetraphyllum**	Four-leaved Allseed	-	✓	-
Polygonum aviculare s.l.*	Prostrate Knotweed	-	✓	-
*Polypogon monspeliensis**	Annual Beard-grass	-	✓	-
*Romulea rosea**	Onion Grass	-	✓	✓
*Rosa rubiginosa**	Sweet Briar	-	✓	✓
Rubus fruticosus spp. agg.*	Blackberry	-	✓	✓
*Rumex crispus**	Curled Dock	-	✓	✓
*Salvia verbenaca**	Wild Sage	-	✓	-
*Schinus molle**	Pepper Tree	-	✓	-
*Solanum nigrum**	Nightshade	-	✓	✓
*Sonchus oleraceus **	Common Sow-thistle	-	✓	✓
*Tragopogon porrifolius**	Salsify	-	✓	-
Tribolium acutiflorum s.l. *	Desmazaria	-	✓	-
Trifolium arvense var. *arvense**	Hare's-foot Clover	-	✓	-
Trifolium campestre var. *campestre**	Hop Clover	-	✓	-
Trifolium fragiferum var. *fragiferum**	Strawberry Clover	-	✓	-
*Trifolium pratense**	Red Clover	-	✓	-
Trifolium repens var. *repens**	White Clover	-	✓	-
*Trifolium sp.**	Clover	-	-	✓
*Trifolium striatum**	Knotted Clover	-	✓	-
*Trifolium subterraneum**	Subterranean Clover	-	✓	-
*Triticum aestivum**	Wheat	-	✓	-
Ulmus sp.*	Elm	-	✓	-
*Vicia sativa**	Common Vetch	-	✓	✓
*Vinca major**	Blue Periwinkle	-	✓	-
*Vulpia bromoides**	Squirrel-tail Fescue	-	✓	-
*Vulpia myuros**	Rat's-tail Fescue	-	✓	-
Vulpia sp.*	Fescue	-	✓	✓
Watsonia spp.*	Watsonia	-	✓	-

Notes:
* Declared noxious weed within the Port Phillip and Westernport Catchment.

11.2 Appendix A2 – Significant Flora Species

Table A2 Threatened Flora Recorded in the Project Locality

Scientific name	Common name	Total number of documented records (FIS)	Last documented record	EPBC Act	VIC	FFG Act	Likely occurrence within the Project Area
NATIONALLY SIGNIFICANT							
Asteraceae							
#Rutidosis leptorhynchoides	Button Wrinklewort	32	2006	EN	e	L	4
#Senecio macrocarpus	Large-headed Fireweed	23	2006	VU	e	L	4
Brassicaceae							
#Lepidium hyssopifolium	Basalt Peppercress	3	1982	EN	e	L	4
Cyperaceae							
#Carex tasmanica	Curly Sedge	-	-	VU	v	L	4
Fabaceae							
#Glycine latrobeana	Clover Glycine	1	1995	VU	v	L	4
Orchidaceae							
#Diuris basaltica	Small Golden Moths	23	2009	EN	v	L	4
#Diuris fragrantissima	Sunshine Diuris	22	2006	EN	e	L	4
#Prasophyllum frenchii	Maroon Leek-orchid	-	-	EN	e	L	4
Prasophyllum suaveolens	Fragrant Leek-orchid	15	1978	EN	e	L	4
Poaceae							
#Amphibromus fluitans	River Swamp Wallaby-grass	2	1991	VU	-	-	4
Santalaceae							
Thesium australe	Austral Toad-flax	2	1906	VU	v	L	5
Thymelaeaceae							
#Pimelea spinescens subsp. spinescens	Spiny Rice-flower	242	2008	CR	e	L	1
Xanthorroeaceae							
#Dianella amoena	Matted Flax-lily	26	2008	EN	e	L	4
STATE SIGNIFICANT							
Acanthaceae							
Avicennia marina subsp. australasica	Grey Mangrove	1	1770	-	r	-	5

Scientific name	Common name	Total number of documented records (FIS)	Last documented record	EPBC Act	VIC	FFG Act	Likely occurrence within the Project Area
Asteraceae							
Coronidium aff. rutidolepis (Lowland Swamps)	Pale Swamp Everlasting	20	2008	-	v	-	4
Leiocarpa leptolepis	Pale Plover-daisy	1	1912	-	e	L	5
Podolepis sp. 1	Basalt Podolepis	18	2006	-	e	-	1
Senecio campylocarpus	Floodplain Fireweed	1	1905	-	r	-	5
Senecio cunninghamii var. cunninghamii	Branching Groundsel	5	1981	-	r	-	4
Casuarinaceae							
Allocasuarina luehmannii	Buloke	4	1996	-	-	L	5
Chenopodiaceae							
Rhagodia parabolica	Fragrant Saltbush	14	2008	-	r	-	1
Cyperaceae							
Eleocharis plana	Flat Spike-sedge	1	1986	-	v	-	4
Fabaceae							
Acacia howittii	Sticky Wattle	1	1996	-	r	-	5
Cullen parvum	Small Scurf-pea	21	2007	-	e	L	4
Cullen tenax	Tough Scurf-pea	28	2008	-	e	L	1
Geraniaceae							
Geranium solanderi var. solanderi s.s.	Austral Crane's-bill	5	2005	-	v	-	4
Geranium sp. 3	Pale-flower Crane's-bill	6	2006	-	r	-	4
Juncaceae							
Juncus revolutus	Creeping Rush	5	1988	-	r	-	4
Malvaceae							
Lawrencia spicata	Salt Lawrencia	6	2007	-	r	-	5
Malva preissiana s.s. (white-flowered coastal form)	Coast Hollyhock	1	2007	-	v	-	5
Myrtaceae							
Eucalyptus leucoxylon subsp. connata	Melbourne Yellow-gum	5	2000	-	v	-	5
Eucalyptus leucoxylon subsp. megalocarpa	Large-fruit Yellow-gum	1	1996	-	e	L	5
Ophioglossaceae							

Scientific name	Common name	Total number of documented records (FIS)	Last documented record	EPBC Act	VIC	FFG Act	Likely occurrence within the Project Area
Botrychium australe	Austral Moonwort	1	1983	-	v	L	4
Orchidaceae							
Diuris behrii	Golden Cowslips	1	1900	-	v	-	4
Diuris palustris	Swamp Diuris	10	1973	-	v	L	4
Diuris punctata var. punctata	Purple Diuris	4	1982	-	v	L	4
Diuris X fastidiosa	Proud Diuris	1	1926	-	e	-	4
Pterostylis pedoglossa	Prawn Greenhood	1	1932	-	v	-	5
Pterostylis truncata	Brittle Greenhood	2	1928	-	e	L	5
Thelymitra gregaria	Basalt Sun-orchid	1	1929	-	e	L	4
Poaceae							
Amphibromus pithogastrus	Plump Swamp Wallaby-grass	3	2004	-	e	L	4
Austrostipa exilis	Heath Spear-grass	1	1992	-	r	-	5
Bromus arenarius	Sand Brome	1	1984	-	r	-	5
Eragrostis trachycarpa	Rough-grain Love-grass	1	1994	-	r	-	4
Rytidosperma setaceum var. brevisetum	Short-bristle Wallaby-grass	2	1996	-	r	-	4
Tripogon loliiformis	Rye Beetle-grass	44	2009	-	r	-	4
Polygalaceae							
Comesperma polygaloides	Small Milkwort	27	2002	-	v	L	4
Ranunculaceae							
Ranunculus diminutus	Brackish Plains Buttercup	1	1990	-	r	-	4
Solanaceae							
Nicotiana suaveolens	Austral Tobacco	16	2000	-	r	-	5
Xanthorroeaceae							
Dianella sp. aff. longifolia (Benambra)	Arching Flax-lily	24	2008	-	v	-	4
REGIONALLY SIGNIFICANT							
Amaranthaceae							
Alternanthera sp. 1 (Plains)	Plains Joyweed	15	2008	-	k	-	4
Brassicaceae							
Lepidium pseudohyssopifolium	Native Peppercress	3	1995	-	k	-	4
Callitrichaceae							
Callitriche palustris var. palustris	Swamp Water-starwort	3	1978	-	k	-	4

Scientific name	Common name	Total number of documented records (FIS)	Last documented record	EPBC Act	VIC	FFG Act	Likely occurrence within the Project Area
Chenopodiaceae							
Maireana aphylla	Leafless Bluebush	5	2002	-	k	-	4
Sclerolaena muricata var. muricata	Black Roly-poly	4	1987	-	k	-	4
Convolvulaceae							
Convolvulus angustissimus subsp. omnigracilis	Slender Bindweed	46	2008	-	k	-	1
Cyperaceae							
Eleocharis macbarronii	Grey Spike-sedge	7	2006	-	k	-	4
Eleocharis pallens	Pale Spike-sedge	4	1999	-	k	-	4
Fabaceae							
Desmodium varians	Slender Tick-trefoil	17	2008	-	k	-	4
Orchidaceae							
Thelymitra exigua	Short Sun-orchid	1	2000	-	k	-	4
Poaceae							
Lachnagrostis perennis spp. agg.	Perennial Blown-grass	7	1997	-	k	-	4

Notes:

1) Listed as Critically Endangered (CR), Endangered (E) or Vulnerable (V) under the EPBC Act

2) Listed (L) under the FFG Act.

3) Listed as Endangered (e), Vulnerable (v), Rare (r) or Status Poorly Known (k) on the Victoria Advisory List (DSE 2005)

4) Likelihood of occurrence: 1 Known Occurrence - Recorded within the Project Area recently (i.e. within ten years), 2 High Likelihood - Previous records of the species in the local vicinity; and/or, the Project Area contains areas of high quality habitat, 3 Moderate Likelihood - Limited previous records of the species in the local vicinity; and/or, the Project Area contains poor or limited habitat, 4 Low Likelihood - Poor or limited habitat for the species however other evidence (such as a lack of records or environmental factors) indicates there is a very low likelihood of presence, 5 Unlikely - No suitable habitat and/or outside the species range.

- Species only nominated by the EPBC Act PMST.

12 APPENDIX B - FAUNA

12.1 Appendix B1 - Fauna Species Recorded

Table B1. Fauna previously recorded within 10 kilometres of the Project Area, during surveys of the entire alignment in 2009 and during the current assessment (30 – 31 May and 02 July 2013)

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
		MAMMALS					
Platypus	*Ornithorhynchus anatinus*	2006	39	-	-	-	-
Short-beaked Echidna	*Tachyglossus aculeatus*	2008	22	-	-	-	-
Dusky Antechinus	*Antechinus swainsonii*	1845	1	-	-	-	-
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	1883	1	Partial	-	-	-
Eastern Quoll	*Dasyurus viverrinus*	1846	1	-	-	-	-
Brush-tailed Phascogale	*Phascogale tapoatafa tapoatafa*	1845	1	Total	-	-	-
Fat-tailed Dunnart	*Sminthopsis crassicaudata*	2006	23	-	-	-	-
Eastern Barred Bandicoot	*Perameles gunnii*	2003	12	-	-	-	-
Koala	*Phascolarctos cinereus*	2006	7	-	-	-	-
Common Brushtail Possum	*Trichosurus vulpecula*	2008	77	Total	-	I	-
Sugar Glider	*Petaurus breviceps*	2006	26	Total	-	-	-
Common Ringtail Possum	*Pseudocheirus peregrinus*	2007	33	Partial	-	I	-
Eastern Grey Kangaroo	*Macropus giganteus*	2006	46	-	-	-	-
Black Wallaby	*Wallabia bicolor*	2008	29	-	-	I	-
Grey-headed Flying-fox	*Pteropus poliocephalus*	2006	2	-	-	-	-
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	2000	3	Total	-	-	-
Eastern Freetail Bat	*Mormopterus sp. 2*	1995	1	-	-	-	-
White-striped Freetail Bat	*Tadarida australis*	2006	20	Total	-	-	-
Southern Freetail Bat	*Mormopterus sp. 4*	1991	1	-	-	-	-
Gould's Wattled Bat	*Chalinolobus gouldii*	2006	19	Total	-	-	-
Chocolate Wattled Bat	*Chalinolobus morio*	2006	14	Total	-	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Southern Myotis	*Myotis macropus*	2006	1	Partial	-	-	-
Gould's Long-eared Bat	*Nyctophilus gouldi*	1991	1	Total	-	-	-
Lesser Long-eared Bat	*Nyctophilus geoffroyi*	2006	15	Total	-	-	-
Inland Broad-nosed Bat	*Scotorepens balstoni*	1991	1	Total	-	-	-
Large Forest Bat	*Vespadelus darlingtoni*	2006	19	Total	-	-	-
Southern Forest Bat	*Vespadelus regulus*	2006	11	Total	-	-	-
Little Forest Bat	*Vespadelus vulturnus*	2006	18	Total	-	-	-
Water Rat	*Hydromys chrysogaster*	2007	19	-	-	-	-
Eastern water rat	*Hydromys chryogaster*	2006	1	-	-	-	-
House Mouse*	*Mus musculus*	2006	102	-	-	-	-
Swamp Rat	*Rattus lutreolus*	1989	1	-	-	-	-
Brown Rat*	*Rattus norvegicus*	1992	4	-	-	-	-
Black Rat*	*Rattus rattus*	2006	21	-	-	-	-
Dog*	*Canis lupus*	1999	7	-	-	I	-
Red Fox*	*fam. Canidae gen. Vulpes*	2008	139	-	-	I	I
Ferret*	*Mustela furo*	1994	1	-	-	-	-
Cat*	*Felis catus*	2008	30	-	-	I	-
Goat (feral)*	*Capra hircus*	1988	1	-	-	-	-
European Rabbit*	*Oryctolagus cuniculus*	2008	206	-	-	S	S
European Hare*	*Lepus europeaus*	2008	78	-	-	S	S
Bottlenose Dolphin	*Tursiops truncatus*	1994	2	-	-	-	-
Common Wombat	*Vombatus ursinus*	2009	1	-	-	I	-
BIRDS							
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*	2008	26	-	-	-	-
Emu	*Dromaius novaehollandiae*	2004	2	-	-	-	-
Stubble Quail	*Coturnix pectoralis*	2008	68	-	Ma	-	-
Brown Quail	*Coturnix ypsilophora australis*	2008	23	-	-	-	-
Chukar Partridge*	*Alectoris chukar*	2008	1	-	-	-	-
Muscovy Duck	*Cairina moschata*	2007	1	-	-	-	-
Musk Duck	*Biziura lobata*	2007	28	-	Ma	-	-
Freckled Duck	*Stictonetta naevosa*	1990	4	-	-	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Cape Barren Goose	*Cereopsis novaehollandiae*	2006	3	-	Ma	-	-
Black Swan	*Cygnus atratus*	2008	170	-	-	-	-
Australian Shelduck	*Tadorna tadornoides*	2007	81	Total	-	-	-
Australian Wood Duck	*Chenonetta jubata*	2007	80	Total	-	-	S
Pink-eared Duck	*Malacorhynchus membranaceus*	2006	30	Partial	-	-	-
Australasian Shoveler	*Anas rhynchotis*	2006	46	-	-	-	-
Grey Teal	*Anas gracilis*	2006	145	Total	-	-	-
Chestnut Teal	*Anas castanea*	2007	171	Total	-	-	-
Northern Mallard*	*Anas platyrhynchos*	2004	13	-	-	-	-
Pacific Black Duck	*Anas superciliosa*	2008	294	-	-	-	-
Hardhead	*Aythya australis*	2006	41	-	-	-	-
Blue-billed Duck	*Oxyura australis*	1996	7	-	-	-	-
Australasian Grebe	*Tachybaptus novaehollandiae*	2007	99	-	-	-	-
Hoary-headed Grebe	*Poliocephalus poliocephalus*	2007	139	-	-	-	-
Great Crested Grebe	*Podiceps cristatus*	2000	10	-	-	-	-
Rock Dove*	*Columba livia*	2008	180	-	-	-	S
Spotted Turtle-Dove*	*Streptopelia chinensis*	2008	197	-	-	S	-
Common Bronzewing	*Phaps chalcoptera*	2008	24	-	-	-	-
Brush Bronzewing	*Phaps elegans*	1846	1	-	-	-	-
Diamond Dove	*Geopelia cuneata*	1999	1	-	-	-	-
Wonga Pigeon	*Leucosarcia melanoleuca*	1979	1	-	-	-	-
Tawny Frogmouth	*Podargus strigoides*	2006	29	-	-	-	-
White-throated Nightjar	*Eurostopodus mystacalis*	1902	2	-	-	-	-
Australian Owlet-nightjar	*Aegotheles cristatus*	2006	7	Total	-	-	-
White-throated Needletail	*Hirundapus caudacutus*	2008	26	-	Mi/Ma	-	-
Fork-tailed Swift	*Apus pacificus*	2007	13	-	Mi/Ma	-	-
Gang-gang Cockatoo	*Callocephalon fimbriatum*	1977	1	-	-	-	-
Australasian Gannet	*Morus serrator*	2006	1	-	Ma	-	-
Darter	*Anhinga novaehollandiae*	2008	14	-	-	-	-
Little Pied Cormorant	*Microcarbo melanoleucos*	2008	158	-	-	-	-
Great Cormorant	*Phalacrocorax carbo*	2006	54	-	-	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Little Black Cormorant	*Phalacrocorax sulcirostris*	2006	87	-	-	-	-
Pied Cormorant	*Phalacrocorax varius*	2006	13	-	-	-	-
Black-faced Cormorant	*Phalacrocorax fuscescens*	2007	2	-	Ma	-	-
Australian Pelican	*Pelecanus conspicillatus*	2008	131	-	Ma	-	-
Australasian Bittern	*Botaurus poiciloptilus*	2006	16	-	-	-	-
Little Bittern	*Ixobrychus minutus dubius*	1980	3	-	-	-	-
White-necked Heron	*Ardea pacifica*	2006	73	-	-	-	-
Eastern Great Egret	*Ardea modesta*	2007	74	-	Mi/Ma	-	-
Intermediate Egret	*Ardea intermedia*	1999	4	-	Ma	-	-
Cattle Egret	*Ardea ibis*	2008	30	-	Mi/Ma	-	-
White-faced Heron	*Egretta novaehollandiae*	2008	325	-	-	-	-
Little Egret	*Egretta garzetta nigripes*	2000	54	-	Ma	-	-
Nankeen Night Heron	*Nycticorax caledonicus hillii*	2007	23	-	Ma	-	-
Glossy Ibis	*Plegadis falcinellus*	2007	11	-	Mi/Ma	-	-
Australian White Ibis	*Threskiornis molucca*	2008	165	-	Ma	-	S
Straw-necked Ibis	*Threskiornis spinicollis*	2008	137	-	Ma	-	-
Royal Spoonbill	*Platalea regia*	2006	45	-	-	-	-
Yellow-billed Spoonbill	*Platalea flavipes*	2006	70	-	-	-	S
Black-shouldered Kite	*Elanus axillaris*	2008	170	-	-	-	S
Letter-winged Kite	*Elanus scriptus*	1977	2	-	-	-	-
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	1846	1	-	Mi/Ma	-	-
Whistling Kite	*Haliastur sphenurus*	2006	61	-	Ma	-	-
Black Kite	*Milvus migrans*	2006	7	-	-	-	-
Brown Goshawk	*Accipiter fasciatus*	2006	103	-	Ma	-	-
Collared Sparrowhawk	*Accipiter cirrhocephalus*	2005	26	-	-	-	-
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	1846	1	-	-	-	-
Spotted Harrier	*Circus assimilis*	2007	17	-	-	-	-
Swamp Harrier	*Circus approximans*	2006	49	-	Ma	-	-
Wedge-tailed Eagle	*Aquila audax*	2008	98	-	-	-	-
Little Eagle	*Hieraaetus morphnoides*	2006	67	-	-	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Nankeen Kestrel	*Falco cenchroides*	2008	176	Partial	Ma	-	-
Brown Falcon	*Falco berigora*	2006	209	-	-	-	-
Australian Hobby	*Falco longipennis*	2008	51	-	-	-	-
Black Falcon	*Falco subniger*	2008	12	-	-	-	-
Peregrine Falcon	*Falco peregrinus*	2006	48	Partial	-	-	-
Brolga	*Grus rubicunda*	2006	2	-	-	-	-
Purple Swamphen	*Porphyrio porphyrio*	2006	110	-	-	-	-
Lewin's Rail	*Lewinia pectoralis pectoralis*	2008	28	-	Mi	-	-
Buff-banded Rail	*Gallirallus philippensis*	2006	14	-	-	-	-
Baillon's Crake	*Porzana pusilla palustris*	2008	20	-	Ma	-	-
Australian Spotted Crake	*Porzana fluminea*	2008	33	-	-	-	-
Spotless Crake	*Porzana tabuensis*	2008	24	-	Ma	-	-
Black-tailed Native-hen	*Gallinula ventralis*	2008	10	-	-	-	-
Dusky Moorhen	*Gallinula tenebrosa*	2008	217	-	-	-	-
Eurasian Coot	*Fulica atra*	2008	156	-	-	-	-
Australian Bustard	*Ardeotis australis*	1846	1	-	-	-	-
Bush Stone-curlew	*Burhinus grallarius*	1846	1	-	-	-	-
Pied Oystercatcher	*Haematopus longirostris*	2007	3	-	-	-	-
Sooty Oystercatcher	*Haematopus fuliginosus*	2007	5	-	Ma	-	-
Red-necked Avocet	*Recurvirostra novaehollandiae*	2006	44	-	Ma	-	-
Banded Stilt	*Cladorhynchus leucocephalus*	2000	14	-	-	-	-
Black-winged Stilt	*Himantopus himantopus*	N/A	N/A		-	-	S
Pacific Golden Plover	*Pluvialis fulva*	2007	1	-	Mi/Ma	-	-
Red-capped Plover	*Charadrius ruficapillus*	2008	55	-	Ma	-	-
Double-banded Plover	*Charadrius bicinctus*	1990	4	-	Mi/Ma	-	-
Lesser Sand Plover	*Charadrius mongolus*	1976	1	-	Mi/Ma	-	-
Black-fronted Dotterel	*Elseyornis melanops*	2006	53	-	-	-	-
Red-kneed Dotterel	*Erythrogonys cinctus*	2006	21	-	-	-	-
Banded Lapwing	*Vanellus tricolor*	2008	34	-	-	-	-
Masked Lapwing	*Vanellus miles*	2008	239	-	-	-	S
Plains-wanderer	*Pedionomus torquatus*	2006	16	-	-	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Australian Painted Snipe	*Rostratula benghalensis australis*	1985	4	-	Mi/Ma	-	-
Latham's Snipe	*Gallinago hardwickii*	2008	33	-	Mi/Ma	-	-
Bar-tailed Godwit	*Limosa lapponica*	2008	4	-	Mi/Ma	-	-
Eastern Curlew	*Numenius madagascariensis*	1988	1	-	Mi/Ma	-	-
Terek Sandpiper	*Xenus cinereus*	1986	1	-	Mi/Ma	-	-
Common Sandpiper	*Actitis hypoleucos*	1970	2	-	Mi/Ma	-	-
Common Greenshank	*Tringa nebularia*	2008	50	-	Mi/Ma	-	-
Marsh Sandpiper	*Tringa stagnatilis*	2008	34	-	Mi/Ma	-	-
Wood Sandpiper	*Tringa glareola*	1985	6	-	Mi/Ma	-	-
Great Knot	*Calidris tenuirostris*	1982	1	-	Mi/Ma	-	-
Sanderling	*Calidris alba*	1987	5	-	Mi/Ma	-	-
Little Stint	*Calidris minuta*	1996	1	-	Mi/Ma	-	-
Red-necked Stint	*Calidris ruficollis*	2008	21	-	Mi/Ma	-	-
Long-toed Stint	*Calidris subminuta*	1984	3	-	Mi/Ma	-	-
Pectoral Sandpiper	*Calidris melanotos*	2006	10	-	Mi/Ma	-	-
Sharp-tailed Sandpiper	*Calidris acuminata*	2008	59	-	Mi/Ma	-	-
Curlew Sandpiper	*Calidris ferruginea*	1998	20	-	Mi/Ma	-	-
Stilt Sandpiper	*Calidris himantopus*	2007	118	-	-	-	-
Broad-billed Sandpiper	*Limicola falcinellus*	1986	1	-	Mi/Ma	-	-
Ruff	*Philomachus pugnax*	1988	3	-	Mi/Ma	-	-
Painted Button-quail	*Turnix varia*	2006	6	-	-	-	-
Red-chested Button-quail	*Turnix pyrrhothorax*	2006	4	-	-	-	-
Little Button-quail	*Turnix velox*	1846	1	-	-	-	-
Australian Pratincole	*Stiltia isabella*	1990	2	-	Ma	-	-
Welcome Swallow	*Petrochelidon neoxena*	2008	351	Partial	-	-	-
Pomarine Jaeger	*Stercorarius pomarinus*	2007	2	-	Mi/Ma	-	-
Arctic Jaeger	*Stercorarius parasiticus*	2007	1	-	Mi/Ma	-	-
Little Tern	*Sternula albifrons sinensis*	1983	3	-	Mi/Ma	-	-
Fairy Tern	*Sternula nereis nereis*	1970	2	-	Ma	-	-
Superb Parrot	*Polytelis swainsonii*	1846	1	Total	-	-	-
Gull-billed Tern	*Gelochelidon nilotica macrotarsa*	2008	2	-	Ma	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Caspian Tern	*Hydroprogne caspia*	2008	7	-	Mi/Ma	-	-
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii graptogyne*	1846	1	Total	Mi	-	-
Whiskered Tern	*Chlidonias hybridus javanicus*	2007	43	-	Ma	-	-
White-winged Black Tern	*Chlidonias leucopterus*	2007	7	-	Mi/Ma	-	-
Common Tern	*Sterna hirundo*	2007	18	-	Mi/Ma	-	-
Pacific Gull	*Larus pacificus pacificus*	2007	20	-	Ma	-	-
Silver Gull	*Chroicocephalus novaehollandiae*	2008	230	-	Ma	-	S
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*	1849	2	Total	-	-	-
Galah	*Eolophus roseicapilla*	2008	205	Total	-	-	S
Long-billed Corella	*Cacatua tenuirostris*	2006	18	Total	-	-	-
Little Corella	*Cacatua sanguinea*	2006	5	Total	-	-	-
Sulphur-crested Cockatoo	*Cacatua galerita*	2007	184	Total	-	-	-
Cockatiel	*Nymphicus hollandicus*	2006	7	Total	-	-	-
Rainbow Lorikeet	*Trichoglossus haematodus*	2008	17	Total	-	-	-
Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*	1999	2	Total	-	-	-
Musk Lorikeet	*Glossopsitta concinna*	2008	50	-	-	-	-
Little Lorikeet	*Glossopsitta pusilla*	2006	28	-	-	-	-
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*	2008	85	Total	-	-	-
Australian King-Parrot	*Alisterus scapularis*	1931	2	Total	-	-	-
Crimson Rosella	*Platycercus elegans*	2008	109	Total	-	S	-
Eastern Rosella	*Platycercus eximius*	2008	168	Total	-	-	-
Australian Ringneck	*Barnardius zonarius zonarius*	1988	1	-	-	-	-
Red-capped Parrot*	*Purpureicephalus spurius*	2008	1	-	-	-	-
Swift Parrot	*Lathamus discolor*	2006	9	Total	Ma	-	-
Red-rumped Parrot	*Psephotus haematonotus*	2006	168	-	-	-	-
Budgerigar	*Melopsittacus undulatus*	1998	4	Partial	-	-	-
Blue-winged Parrot	*Neophema chrysostoma*	2008	13	Partial	-	-	-
Orange-bellied Parrot	*Neophema chrysogaster*	1977	2	-	Mi/Ma	-	-
Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*	2008	73	-	Ma	-	-
Black-eared Cuckoo	*Chrysococcyx osculans*	2006	5	-	Ma	-	-
Shining Bronze-Cuckoo	*Chrysococcyx lucidus*	2006	24	-	Ma	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Pallid Cuckoo	*Cuculus pallidus*	2006	45	-	Ma	-	-
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	2008	49	-	-	-	-
Brush Cuckoo	*Cacomantis variolosus*	1929	1	-	-	-	-
Barking Owl	*Ninox connivens connivens*	1933	1	Total	-	-	-
Southern Boobook	*Ninox novaeseelandiae*	2008	37	Total	Ma	-	-
Masked Owl	*Tyto novaehollandiae novaehollandiae*	2006	1	Total	-	-	-
Pacific Barn Owl	*Tyto javanica*	2006	29	Partial	-	-	-
Azure Kingfisher	*Alcedo azurea*	1846	1	-	-	-	-
Laughing Kookaburra	*Dacelo novaeguineae*	2006	98	Total	-	-	-
Sacred Kingfisher	*Todiramphus sanctus*	2006	51	Partial	Ma	-	-
Rainbow Bee-eater	*Merops ornatus*	2006	14	-	Mi/Ma	-	-
Dollarbird	*Eurystomus orientalis*	2006	1	Total	Ma	-	-
White-throated Treecreeper	*Cormobates leucophaeus*	2006	30	Total	-	H	-
Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*	1991	21	Total	-	-	-
Satin Bowerbird	*Ptilonorhynchus violaceus*	1931	2	-	-	-	-
Superb Fairy-wren	*Malurus cyaneus*	2008	360	-	-	-	-
Splendid Fairy-wren	*Malurus splendens*	2007	1	-	-	-	-
White-browed Scrubwren	*Sericornis frontalis*	2006	98	-	-	-	-
Speckled Warbler	*Chthonicola sagittatus*	2006	16	-	-	-	-
Weebill	*Smicrornis brevirostris*	2006	29	-	-	-	-
Western Gerygone	*Gerygone fusca*	2005	2	-	-	-	-
Striated Thornbill	*Acanthiza lineata*	2006	25	-	-	-	-
Yellow Thornbill	*Acanthiza nana*	2006	96	-	-	-	-
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	2008	282	-	-	-	S
Buff-rumped Thornbill	*Acanthiza reguloides*	2006	17	-	-	-	-
Brown Thornbill	*Acanthiza pusilla*	2006	90	-	-	H	-
Southern Whiteface	*Aphelocephala leucopsis*	2006	14	-	-	-	-
Spotted Pardalote	*Pardalotus punctatus*	2006	79	-	-	H	-
Striated Pardalote	*Pardalotus striatus*	2006	112	Partial	-	-	-
Eastern Spinebill	*Acanthorhynchus tenuirostris*	2006	24	-	-	-	-
Yellow-faced Honeyeater	*Lichenostomus chrysops*	2006	22	-	-	S	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Singing Honeyeater	*Lichenostomus virescens*	2007	8	-	-	-	-
White-eared Honeyeater	*Lichenostomus leucotis*	2001	10	-	-	-	-
Yellow-tufted Honeyeater	*Lichenostomus melanops*	2006	23	-	-	-	-
Yellow-plumed Honeyeater	*Lichenostomus ornatus*	1936	2	-	-	-	-
Fuscous Honeyeater	*Lichenostomus fuscus*	2006	12	-	-	-	-
White-plumed Honeyeater	*Lichenostomus penicillatus*	2008	360	-	-	-	S
Bell Miner	*Manorina melanophrys*	2001	10	-	-	-	-
Noisy Miner	*Manorina melanocephala*	2006	51	-	-	-	-
Little Wattlebird	*Anthochaera chrysoptera*	2008	19	-	-	-	-
Regent Honeyeater	*Anthochaera phrygia*	1933	3	-	Mi	-	-
Red Wattlebird	*Anthochaera carunculata*	2008	229	-	-	S	S
White-fronted Chat	*Epthianura albifrons*	2007	94	-	-	-	-
Black Honeyeater	*Sugamel niger*	2006	1	-	-	-	-
Scarlet Honeyeater	*Myzomela sanguinolenta*	2008	1	-	-	-	-
Tawny-crowned Honeyeater	*Phylidonyris melanops*	1986	3	-	-	-	-
Crescent Honeyeater	*Phylidonyris pyrrhoptera*	2006	4	-	-	-	-
New Holland Honeyeater	*Phylidonyris novaehollandiae*	2008	46	-	-	S	-
Black-chinned Honeyeater	*Melithripterus gularis gularis*	2006	12	-	-	-	-
Brown-headed Honeyeater	*Melithreptus brevirostris*	2006	61	-	-	-	-
White-naped Honeyeater	*Melithreptus lunatus*	2006	27	-	-	-	-
Noisy Friarbird	*Philemon corniculatus*	2000	2	-	-	-	-
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	1933	4	-	-	-	-
White-browed Babbler	*Pomatostomus superciliosus*	1986	9	-	-	-	-
Spotted Quail-thrush	*Cinclosoma punctatum*	1968	3	-	-	-	-
Varied Sittella	*Daphoenositta chrysoptera*	2006	41	-	-	-	-
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	2008	150	-	Ma	-	-
White-bellied Cuckoo-shrike	*Coracina papuensis*	2000	3	-	Ma	-	-
White-winged Triller	*Lalage sueurii*	2007	22	-	-	-	-
Crested Shrike-tit	*Falcunculus frontatus*	2006	22	-	-	-	-
Golden Whistler	*Pachycephala pectoralis*	2006	64	-	-	-	-
Rufous Whistler	*Pachycephala rufiventris*	2008	46	-	-	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Grey Shrike-thrush	*Colluricincla harmonica*	2008	68	Partial	-	-	-
Crested Pigeon	*Ocyphaps lophotes*	2008	36	-	-	-	S
Crested Bellbird	*Oreoica gutturalis gutturalis*	1800	1	-	-	-	-
Olive-backed Oriole	*Oriolus sagittatus*	2006	12	-	-	-	-
Masked Woodswallow	*Artamus personatus*	2006	3	-	-	H	-
White-browed Woodswallow	*Artamus superciliosus*	2006	10	-	-	-	-
Dusky Woodswallow	*Artamus cyanopterus*	2006	42	Partial	-	-	-
Grey Butcherbird	*Cracticus torquatus*	2002	10	-	-	H	-
Australian Magpie	*Gymnorhina tibicen*	2008	457	-	-	-	S
Pied Currawong	*Strepera graculina*	1999	14	-	-	-	-
Grey Currawong	*Strepera versicolor*	2006	18	-	-	-	-
Rufous Fantail	*Rhipidura rufifrons*	2008	15	-	Mi/Ma	-	-
Grey Fantail	*Rhipidura albiscarpa*	2008	184	-	-	-	-
Willie Wagtail	*Rhipidura leucophrys*	2008	370	-	-	-	-
Australian Raven	*Corvus coronoides*	2006	103	-	-	-	S
Little Raven	*Corvus mellori*	2008	382	-	Ma	-	-
Satin Flycatcher	*Myiagra cyanoleuca*	1893	2	-	Mi/Ma	-	-
Restless Flycatcher	*Myiagra inquieta*	2006	35	-	-	-	-
Magpie-lark	*Grallina cyanoleuca*	2008	338	-	-	-	S
White-winged Chough	*Corcorax melanorhamphos*	2006	17	-	-	-	-
Jacky Winter	*Microeca fascinans*	2006	30	-	-	-	-
Scarlet Robin	*Petroica boodang*	2008	49	-	-	-	-
Red-capped Robin	*Petroica goodenovii*	2006	23	-	-	-	-
Flame Robin	*Petroica phoenicea*	2008	107	-	-	-	-
Rose Robin	*Petroica rosea*	2000	4	-	-	-	-
Pink Robin	*Petroica rodinogaster*	1982	3	-	-	-	-
Hooded Robin	*Melanodryas cucullata cucullata*	2006	7	-	-	-	-
Eastern Yellow Robin	*Eopsaltria australis*	2008	15	-	-	H	-
Horsfield's Bushlark	*Mirafra javanica*	2008	39	-	-	-	-
European Skylark*	*Alauda arvensis*	2008	236	-	-	-	-
Golden-headed Cisticola	*Cisticola exilis*	2008	139	-	-	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Clamorous Reed Warbler	*Acrocephalus stentoreus*	2008	81	-	Mi/Ma	-	-
Little Grassbird	*Megalurus gramineus*	2008	76	-	-	-	-
Rufous Songlark	*Cincloramphus mathewsi*	1990	12	-	-	-	-
Brown Songlark	*Cincloramphus cruralis*	2008	44	-	-	-	-
Silvereye	*Zosterops lateralis*	2006	162	-	Ma	-	-
White-backed Swallow	*Cheramoeca leucosternus*	2006	2	-	-	-	-
Fairy Martin	*Petrochelidon ariel*	2008	47	Partial	-	-	-
Tree Martin	*Petrochelidon nigricans*	2006	80	Total	Ma	-	-
Bassian Thrush	*Zoothera lunulata*	1933	2	-	-	-	-
Common Blackbird*	*Turdus merula*	2008	274	-	-	-	-
Song Thrush*	*Turdus philomelos*	2008	35	-	-	S	-
Common Starling*	*Sturnus vulgaris*	2008	437	Partial	-	-	S
Common Myna*	*Acridotheres tristis*	2008	326	-	-	-	S
Mistletoebird	*Dicaeum hirundinaceum*	2006	46	-	-	-	-
Zebra Finch	*Taeniopygia guttata*	2008	19	-	-	-	-
Red-browed Finch	*Neochmia temporalis*	2006	142	-	-	-	-
Diamond Firetail	*Stagonopleura guttata*	2006	19	-	-	-	-
House Sparrow*	*Passer domesticus*	2008	395	-	-	-	-
Eurasian Tree Sparrow*	*Passer montanus*	2008	52	-	-	-	S
Australasian Pipit	*Anthus novaeseelandiae*	2008	221	-	Ma	-	S
European Greenfinch*	*Carduelis chloris*	2008	122	-	-	-	-
European Goldfinch*	*fam. Fringillidae gen. Carduelis*	2008	315	-	-	-	S
Domestic Goose*	*fam. Anatidae gen. Anser*	2004	6	-	-	-	-
Crested Tern	*Thalasseus bergii*	1999	9	-	-	-	-
REPTILES							
Long neck tortoise	*Chelodina longicollis*	2009	14	-	-	-	-
Murray Short-necked Turtle	*Emydura macquarii*	2008	1	-	-	-	-
Marbled Gecko	*Christinus marmoratus*	2006	17	Partial	-	-	-
Striped Legless Lizard	*Delma impar*	2008	261	-	-	-	-
Tree Dragon	*Amphibolurus muricatus*	2006	10	Partial	-	-	-
Bearded Dragon	*Pogona barbata*	1988	1	Partial	-	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	2006	3	-	-	-	-
Large Striped Skink	*Ctenotus robustus*	2006	37	-	-	-	-
Cunningham's Skink	*Egernia cunninghami*	2008	42	-	-	-	-
Black Rock Skink	*Egernia saxatilis intermedia*	2006	2	Partial	-	-	-
White's Skink	*Liopholis whitii GROUP*	1999	21	-	-	-	-
Southern Water Skink	*Eulamprus tympanum tympanum*	2006	17	-	-	-	-
Garden Skink	*Lampropholis guichenoti*	2006	37	-	-	-	-
Bougainville's Skink	*Lerista bougainvillii*	2006	21	-	-	-	-
McCoy's Skink	*Nannoscincus maccoyi*	1947	2	-	-	-	-
Tussock Skink	*Pseudemoia pagenstecheri*	2008	80	-	-	-	-
Eastern Three-lined Skink	*Bassiana duperreyi*	2006	31	-	-	-	-
Common Blue-tongued Lizard	*Tiliqua scincoides*	2008	134	-	-	-	S
Stumpy-tailed Lizard	*Tiliqua rugosa*	2006	2	-	-	-	-
Lowland Copperhead	*Austrelaps superbus*	1991	5	-	-	-	-
White-lipped Snake	*Drysdalia coronoides*	2002	4	-	-	-	-
Tiger Snake	*Notechis scutatus*	2006	96	-	-	-	-
Red-bellied Black Snake	*Pseudechis porphyriacus*	2000	6	-	-	-	-
Eastern Brown Snake	*Pseudonaja textilis*	2006	42	-	-	-	-
Eastern Small-eyed Snake	*Rhinoplocephalus nigrescens*	1990	2	-	-	-	-
Little Whip Snake	*Suta flagellum*	2006	92	-	-	-	-
AMPHIBIANS							
Common Froglet	*Crinia signifera*	2008	209	-	-	-	H
Victorian Smooth Froglet	*Geocrinia victoriana*	1988	1	-	-	-	-
Southern Bullfrog (ssp. unknown)	*Limnodynastes dumerilii*	2007	88	-	-	-	-
Pobblebonk Frog	*Limnodynastes dumerilii dumerilii*	1973	2	-	-	-	-
Striped Marsh Frog	*Limnodynastes peronii*	2007	9	-	-	-	-
Spotted Marsh Frog (race unknown)	*Limnodynastes tasmaniensis*	2008	144	-	-	-	-
Spotted Marsh Frog SCR	*Limnodynastes tasmaniensis SCR*	2005	102	-	-	-	-
Common Spadefoot Toad	*Neobatrachus sudelli*	2006	30	-	-	-	-
Brown Toadlet	*Pseudophryne bibronii*	1990	20	-	-	-	-
Southern Brown Tree Frog	*Litoria ewingii*	2008	6	-	-	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Southern Brown Tree Frog SOUTHERN	*Litoria ewingii SOUTHERN*	1991	24	-	-	-	-
Lesueur's Frog	*Litoria lesueuri*	2006	17	-	-	-	-
Growling Grass Frog	*Litoria raniformis*	2007	242	-	-	-	-
Whistling Tree Frog	*Litoria verreauxii verreauxii*	2006	15	-	-	-	-
		FISH					
Short-headed Lamprey	*Mordacia mordax*	1997	6	-	-	-	-
Short-finned Eel	*Anguilla australis*	2009	105	-	-	-	-
Common Galaxias	*Galaxias maculatus*	2009	97	-	-	-	-
Mountain Galaxias	*Galaxias olidus*	2005	13	-	-	-	-
Spotted Galaxias	*Galaxias truttaceus*	2005	6	-	-	-	-
Australian Grayling	*Prototroctes maraena*	1982	5	-	-	-	-
Australian Smelt	*Retropinna semoni*	2009	57	-	-	-	-
Rainbow Trout*	*Oncorhynchus mykiss*	1969	1	-	-	-	-
Brown Trout*	*Salmo trutta*	2005	34	-	-	-	-
Yellow-eye Mullet	*Aldrichetta forsteri*	2006	2	-	-	-	-
Flat-tailed Mullet	*Liza argentea*	1991	1	-	-	-	-
Smallmouthed Hardyhead	*Atherinosoma microstoma*	2006	10	-	-	-	-
Goldfish*	*Carassius auratus*	2009	27	-	-	-	-
Gambusia*	*Gambusia holbrooki*	2009	69	-	-	-	-
Carp*	*Cyprinus carpio*	2009	22	-	-	-	-
Oriental Weatherloach*	*Misgurnus anguillicaudatus*	2005	19	-	-	-	-
Roach*	*Rutilus rutilus*	2005	14	-	-	-	-
Black Bream	*Acanthopagrus butcheri*	2005	6	-	-	-	-
Tamar River Goby	*Afurcagobius tamarensis*	2006	5	-	-	-	-
Bridled Goby	*Arenigobius bifrenatus*	2006	1	-	-	-	-
Silver Perch	*fam. Percichthyidae gen. Bidyanus*	1992	6	-	-	-	-
Macquarie Perch	*Macquaria australasica*	1970	2	-	-	-	-
Estuary Perch	*Macquaria colonorum*	2009	1	-	-	-	-
Southern Pygmy Perch	*Nannoperca australis*	2005	6	-	-	-	-
Redfin*	*Perca fluviatilis*	2009	15	-	-	-	-
Flat-headed Gudgeon	*Philypnodon grandiceps*	2009	116	-	-	-	-

Common name[1]	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma[2]	2009 report (entire alignment)	Present survey[3]
Silver Trevally	*Pseudocaranx dentex*	1991	1	-	-	-	-
	Pseudogobius sp. 9	2008	2	-	-	-	-
Tupong	*Pseudaphritis urvillii*	2006	25	-	-	-	-
Tench*	*fam. Cyprinidae gen. Tinca*	2009	39	-	-	-	-
Greenback Flounder	*Rhombosolea tapirina*	1989	3	-	-	-	-
MUSSELS & CRUSTACEANS							
Common Freshwater Shrimp	*Paratya australiensis*	2009	66	-	-	-	-
Lowland Burrowing Crayfish	*Engaeus quadrimanus*	2001	2	-	-	-	-
Murray River Mussel	*Alathyria jacksoni*	1997	1	-	-	-	-
Yabby	*Cherax destructor*	2009	26	-	-	-	-
INVERTEBRATES							
Eltham Copper	*Paralucia pyrodiscus lucida*	1920	1	-	-	-	-
Golden Sun Moth	*Synemon plana*	2008	46	-	-	-	-
Yellow Sedge-skipper	*Hesperilla flavescens flavescens*	1988	3	-	-	-	-

Notes:

1) * - Introduced species

2) Mi - Listed as a Migratory species under the EPBC Act, Ma - Listed as a Marine species under the EPBC Act

3) H - Heard, S - Seen, I - Incidental (feathers, bones, scats etc)

12.2 Appendix B2 – Significant Fauna Species

Table B2. Significant fauna within 10 kilometres of the Project Area

Common name	Scientific name	Last documented record	Total # of documented records	EPBC	DSE (2013)	FFG	Likely use of Project Area
NATIONAL SIGNIFICANCE							
Birds							
#Australasian Bittern	*Botaurus poiciloptilus*	2006	16	EN	en	L	3
#Plains-wanderer	*Pedionomus torquatus*	2006	16	VU	cr	L	3
#Australian Painted Snipe	*Rostratula benghalensis australis*	1985	4	VU, M	cr	L	3
#Fairy Tern	*Sternula nereis nereis*	1970	2	VU	en	L	4
Superb Parrot	*Polytelis swainsonii*	1846	1	VU	en	L	4
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii graptogyne*	1846	1	EN	en	L	4
#Swift Parrot	*Lathamus discolor*	2006	9	EN	en	L	2
#Orange-bellied Parrot	*Neophema chrysogaster*	1977	2	CR	cr	L	4
#Regent Honeyeater	*Anthochaera phrygia*	1933	3	EN	cr	L	4
# Malleefowl	*Leipoa ocellata*	-	-	VU	en	L	4
Mammals							
#Spot-tailed Quoll	*Dasyurus maculatus maculatus*	1883	1	EN	en	L	4
# Brush-tailed Rock-wallaby	*Petrogale penicillata*	-	-	VU	cr	L	4
# New Holland Mouse	*Pseudomys novaehollandiae*	-	-	VU	vu	L	4
#Eastern Barred Bandicoot	*Perameles gunnii*	2003	12	EN	rx	L	4
#Grey-headed Flying-fox	*Pteropus poliocephalus*	2006	2	VU	vu	L	2
Reptiles							
# Pink-tailed Worm-Lizard	*Aprasia parapulchella*	-	-	VU	en	L	4
#Striped Legless Lizard	*Delma impar*	2008	261	VU	en	L	1
#Grassland Earless Dragon	*Tympanocryptis pinguicolla*	2006	3	EN	cr	L	4
# Green Turtle	*Chelonia mydas*	-	-	VU, M	-	-	4
# Leathery Turtle	*Dermochelys coriacea*	-	-	VU, M	cr	L	4
# Loggerhead Turtle	*Caretta caretta*	-	-	EN, M	-	-	4

Common name	Scientific name	Last documented record	Total # of documented records	EPBC	DSE (2013)	FFG	Likely use of Project Area
Amphibians							
#Growling Grass Frog	*Litoria raniformis*	2007	242	VU	en	L	1
Fish							
# Dwarf Galaxias	*Galaxiella pusilla*	-	-	VU	vu	L	4
#Australian Grayling	*Prototroctes maraena*	1982	5	VU	vu	L	4
Macquarie Perch	*Macquaria australasica*	1970	2	EN	en	L	4
Invertebrates							
Eltham Copper	*Paralucia pyrodiscus lucida*	1920	1	-	en	L	4
#Golden Sun Moth	*Synemon plana*	2008	46	CR	cr	L	1
STATE SIGNIFICANCE							
Birds							
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	1846	1	-	vu	L	3
Musk Duck	*Biziura lobata*	2007	28	-	vu	-	3
Freckled Duck	*Stictonetta naevosa*	1990	4	-	en	L	3
Australasian Shoveler	*Anas rhynchotis*	2006	46	-	vu	-	3
Hardhead	*Aythya australis*	2006	41	-	vu	-	2
Blue-billed Duck	*Oxyura australis*	1996	7	-	en	L	2
Diamond Dove	*Geopelia cuneata*	1999	1	-	nt	L	4
White-throated Needletail	*Hirundapus caudacutus*	2008	26	M	vu	-	3
Little Bittern	*Ixobrychus minutus dubius*	1980	3	-	en	L	3
Eastern Great Egret	*Ardea modesta*	2007	74	M	vu	L	1
Intermediate Egret	*Ardea intermedia*	1999	4	M	en	L	3
Little Egret	*Egretta garzetta nigripes*	2000	54	-	en	L	3
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	1846	1	M	vu	L	3
Black Falcon	*Falco subniger*	2008	12	-	vu	-	2
Brolga	*Grus rubicunda*	2006	2	-	vu	L	4
Lewin's Rail	*Lewinia pectoralis pectoralis*	2008	28	-	vu	L	2
Baillon's Crake	*Porzana pusilla palustris*	2008	20	-	vu	L	2

Common name	Scientific name	Last documented record	Total # of documented records	EPBC	DSE (2013)	FFG	Likely use of Project Area
Australian Bustard	*Ardeotis australis*	1846	1	-	cr	L	4
Bush Stone-curlew	*Burhinus grallarius*	1846	1	-	en	L	4
Pacific Golden Plover	*Pluvialis fulva*	2007	1	M	vu	-	3
Lesser Sand Plover	*Charadrius mongolus*	1976	1	M	cr	-	4
Eastern Curlew	*Numenius madagascariensis*	1988	1	M	vu	-	4
Terek Sandpiper	*Xenus cinereus*	1986	1	M	en	L	4
Common Sandpiper	*Actitis hypoleucos*	1970	2	M	vu	-	4
Common Greenshank	*Tringa nebularia*	2008	50	M	vu	-	4
Marsh Sandpiper	*Tringa stagnatilis*	2008	34	M	vu	-	4
Wood Sandpiper	*Tringa glareola*	1985	6	M	vu	-	4
Great Knot	*Calidris tenuirostris*	1982	1	M	en	L	4
Red-chested Button-quail	*Turnix pyrrhothorax*	2006	4	-	vu	L	3
Little Tern	*Sternula albifrons sinensis*	1983	3	M	vu	L	4
Gull-billed Tern	*Gelochelidon nilotica macrotarsa*	2008	2	-	en	L	4
Caspian Tern	*Hydroprogne caspia*	2008	7	M	nt	L	4
Barking Owl	*Ninox connivens connivens*	1933	1	-	en	L	3
Masked Owl	*Tyto novaehollandiae novaehollandiae*	2006	1	-	en	L	3
Speckled Warbler	*Chthonicola sagittatus*	2006	16	-	vu	L	3
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	1933	4	-	en	L	3
Crested Bellbird	*Oreoica gutturalis gutturalis*	1800	1	-	nt	L	3
Hooded Robin	*Melanodryas cucullata cucullata*	2006	7	-	nt	L	4
Diamond Firetail	*Stagonopleura guttata*	2006	19	-	nt	L	2
Mammals							
Brush-tailed Phascogale	*Phascogale tapoatafa tapoatafa*	1845	1	-	vu	L	4
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	2000	3	-	dd	L	3
Reptiles							
Murray Short-necked Turtle	*Emydura macquarii*	2008	1	-	vu	-	4
Bearded Dragon	*Pogona barbata*	1988	1	-	vu	-	2
Tussock Skink	*Pseudemoia pagenstecheri*	2008	80	-	vu	-	2

Common name	Scientific name	Last documented record	Total # of documented records	EPBC	DSE (2013)	FFG	Likely use of Project Area
Amphibians							
Brown Toadlet	*Pseudophryne bibronii*	1990	20	-	en	L	3
Fish							
Silver Perch	*fam. Percichthyidae gen. Bidyanus*	1992	6	-	vu	L	4
Southern Pygmy Perch	*Nannoperca australis*	2005	6	-	vu	-	2
Invertebrates							
Yellow Sedge-skipper	*Hesperilla flavescens flavescens*	1988	3	-	vu	L	4
REGIONAL SIGNIFICANCE							
Birds							
Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*	1991	21	-	nt	-	3
Mammals							
Southern Myotis	*Myotis macropus*	2006	1	-	nt	-	3

Notes:

1) Listed as Critically Endangered (CR), Endangered (E), Vulnerable (V) or Migratory (M) under the EPBC Act

2) Listed (L) under the FFG Act

3) Listed as Critically Endangered (cr), Endangered (e), Vulnerable (v) or Near Threatened (nt) on the Victoria Advisory List (DSE 2013)

4) Likelihood of occurrence:

1	High Likelihood	• Known resident in the Study area based on site observations, database records, or expert advice; and/or, • Recent records (i.e. within five years) of the species in the local area (VBA 2011); and/or, • The Study area contains the species' preferred habitat.	2	Moderate Likelihood	• The species is likely to visit the Study area regularly (i.e. at least seasonally); and/or, • Previous records of the species in the local area (DSE 2011b); and/or, • The Study area contains some characteristics of the species' preferred habitat.
3	Low Likelihood	• The species is likely to visit the Study area occasionally or opportunistically whilst en route to more suitable sites; and/or, • There are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or, • The Study area contains few or no characteristics of the species' preferred habitat.	4	Unlikely	• No previous records of the species in the local area; and/or, • The species may fly over the Study area when moving between areas of more suitable habitat; and/or, • Out of the species' range; and/or, • No suitable habitat present.

- Species only nominated by the EPBC Act PMST.

13 APPENDIX C – BIODIVERSITY IMPACT AND OFFSET REQUIREMENTS REPORT

Biodiversity impact and offset requirements report

This report provides additional biodiversity information for moderate and high risk-based pathway applications for permits to remove native vegetation under clause 52.16 or 52.17 of the planning schemes in Victoria

Date of issue: **15/08/2014** **DEPI ref: EHP_0021**
Time of issue: **10:53 AM**

Project ID	EHP4915_PalmersRdFFNG

Note: Some of the proposed native vegetation removal zones submitted for this project are located within the Melbourne Strategic Assessment (MSA). The risk-based pathway and the specific-general offset test have been calculated on the combined area of the proposed native vegetation removal inside and outside of the MSA. The offset requirements detailed in this report are for the areas not included in the MSA. Offset requirements for the area in the MSA will be provided by the MSA team. Please contact them at msa.habitatcompensation@depi.vic.gov.au

Summary of marked native vegetation (including areas within the MSA)

Risk-based pathway	**High**
Total extent	11.512 ha
Remnant patches	11.371 ha
Scattered trees	2 trees
Location risk	B

Summary of marked native vegetation to be removed (excluding areas within the MSA)

Risk-based pathway	**High**
Total extent	11.326 ha
Remnant patches	11.185 ha
Scattered trees	2 trees
Location risk	B

Strategic biodiversity score of all marked native vegetation	0.639

Offset requirements if a permit is granted

If a permit is granted to remove the marked native vegetation, a requirement to obtain a native vegetation offset will be included in the permit conditions. The offset must meet the following requirements:

Offset type	General offset
General offset amount (general biodiversity equivalence units)	2.425 general units
General offset attributes	
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) **or** the Local Municipal District where clearing takes place
Minimum strategic biodiversity score	0.511[1]

See Appendices 1 and 2 for details in how offset requirements were determined.

NB: values presented in tables throughout this document may not add to totals due to rounding

[1] Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

Next steps

This proposal to remove native vegetation must meet the application requirements of the high risk-based pathway and it will be assessed under the high risk-based pathway.

If you wish to remove the marked native vegetation you are required to apply for a permit from your local council.
The biodiversity assessment report from NVIM and this biodiversity impact and offset report should be submitted with your application for a permit to remove native vegetation you plan to remove, lop or destroy.

The Biodiversity assessment report generated by the tool within NVIM provides the following information:

- The location of the site where native vegetation is to be removed.
- The area of the patch of native vegetation and/or the number of any scattered trees to be removed.
- Maps or plans containing information set out in the *Permitted clearing of native vegetation – Biodiversity assessment guidelines*
- The risk-based pathway of the application for a permit to remove native vegetation

This report provides the following information to meet application requirements for a permit to remove native vegetation:

- Confirmation of the risk-based pathway of the application for a permit to remove native vegetation
- The strategic biodiversity score of the native vegetation to be removed
- Information to inform the assessment of whether the proposed removal of native vegetation will have a significant impact on Victoria's biodiversity, with specific regard to the proportional impact on habitat for any rare or threatened species.
- The offset requirements should a permit be granted to remove native vegetation.

Additional application requirements must be provided with an application for a permit to remove native vegetation in the moderate or high risk-based pathways. These include:

- A habitat hectare assessment report of the native vegetation that is to be removed
- A statement outlining what steps have been taken to ensure that impacts on biodiversity from the removal of native vegetation have been minimised
- An offset strategy that details how a compliant offset will be secured to offset the biodiversity impacts of the removal of native vegetation.

Refer to the *Permitted clearing of native vegetation – Biodiversity assessment guidelines* and for a full list and details of application requirements.

Authorised by the Victorian Government, 8 Nicholson Street, East Melbourne.

For more information contact the DEPI Customer Service Centre 136 186

Appendix 1 – Biodiversity impact of removal of native vegetation

Habitat hectares

Habitat hectares are calculated for each habitat zone within your proposal using the extent and condition scores in the GIS data you provided.

Habitat zone	Site assessed condition score	Extent (ha)	Habitat hectares
4_PG3	0.180	0.007	0.001
20_PG6	0.360	0.020	0.007
28_PG8	0.240	0.030	0.007
29_PG8	0.240	0.043	0.010
30_PG8	0.240	0.041	0.010
35_PG9	0.310	0.124	0.039
37_PGWe2	0.550	0.016	0.009
36_PGWe1	0.490	0.007	0.004
5_PG4	0.290	0.622	0.180
6_PG4	0.290	0.671	0.195
7_PG4	0.290	0.104	0.030
8_PG4	0.290	0.160	0.046
9_PG4	0.290	0.567	0.164
11_PG5	0.220	0.010	0.002
12_PG5	0.220	0.009	0.002
13_PG5	0.220	0.010	0.002
14_PG5	0.220	0.021	0.005
15_PG5	0.220	0.056	0.012
17_PG5	0.220	0.124	0.027
18_PG5	0.220	0.160	0.035
10_PG4	0.290	0.397	0.115
21_PG6	0.360	0.292	0.105
22_PG6	0.360	0.004	0.001
24_PG7	0.310	0.033	0.010
25_PG7	0.310	0.045	0.014
19_PG5	0.220	0.483	0.106
31_PG8	0.240	0.263	0.063
38_PG10	0.200	0.045	0.009
32_PG8	0.240	0.136	0.033

Habitat zone	Site assessed condition score	Extent (ha)	Habitat hectares
33_PG8	0.240	1.226	0.294
34_PG8	0.240	0.018	0.004
26_PG7	0.310	0.063	0.020
27_PG7	0.310	0.069	0.021
39_PG11	0.200	5.310	1.062
40_ST1	0.200	0.070	0.014
41_ST2	0.200	0.070	0.014
1_PG1	ZONE WITHIN MSA		
2_PG1	ZONE WITHIN MSA		
3_PG2	ZONE WITHIN MSA		
TOTAL			**2.675**

Impacts on rare or threatened species habitat above specific offset threshold

The specific-general offset test was applied to your proposal. The test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the specific offset threshold. The threshold is set at 0.005 per cent of the total habitat for a species. When the proportional impact is above the specific offset threshold a specific offset for that species' habitat is required.

The specific-general offset test found your proposal does not have a proportional impact on any rare or threatened species' habitats above the specific offset threshold. No specific offsets are required. A general offset is required as set out below.

Clearing site biodiversity equivalence score(s)

The general biodiversity equivalence score for the habitat zone(s) is calculated by multiplying the habitat hectares by the strategic biodiversity score.

Habitat zone	Habitat hectares	Strategic biodiversity score	General biodiversity equivalence score (GBES)
4_PG3	0.001	0.781	0.001
20_PG6	0.007	0.639	0.005
28_PG8	0.007	0.944	0.007
29_PG8	0.010	0.896	0.009
30_PG8	0.010	0.844	0.008
35_PG9	0.039	0.913	0.035
37_PGWe2	0.009	0.688	0.006
36_PGWe1	0.004	0.730	0.003
5_PG4	0.180	0.100	0.018
6_PG4	0.195	0.100	0.019

Habitat zone	Habitat hectares	Strategic biodiversity score	General biodiversity equivalence score (GBES)
7_PG4	0.030	0.100	0.003
8_PG4	0.046	0.100	0.005
9_PG4	0.164	0.100	0.016
11_PG5	0.002	0.100	0.000
12_PG5	0.002	0.100	0.000
13_PG5	0.002	0.100	0.000
14_PG5	0.005	0.100	0.000
15_PG5	0.012	0.100	0.001
17_PG5	0.027	0.100	0.003
18_PG5	0.035	0.100	0.004
10_PG4	0.115	0.115	0.013
21_PG6	0.105	0.722	0.076
22_PG6	0.001	0.639	0.001
24_PG7	0.010	0.717	0.007
25_PG7	0.014	0.663	0.009
19_PG5	0.106	0.641	0.068
31_PG8	0.063	0.861	0.054
38_PG10	0.009	0.894	0.008
32_PG8	0.033	0.949	0.031
33_PG8	0.294	0.962	0.283
34_PG8	0.004	0.950	0.004
26_PG7	0.020	0.922	0.018
27_PG7	0.021	0.931	0.020
39_PG11	1.062	0.806	0.856
40_ST1	0.014	0.844	0.012
41_ST2	0.014	0.842	0.012
1_PG1	ZONE WITHIN MSA		
2_PG1	ZONE WITHIN MSA		
3_PG2	ZONE WITHIN MSA		

Mapped rare or threatened species' habitats on site

This table sets out the list of rare or threatened species' habitats mapped at the site beyond those species for which the impact is above the specific offset threshold. These species habitats do not require a specific offset according to the specific-general offset test.

Species number	Species common name	Species scientific name
10019	Red-chested Button-quail	Turnix pyrrhothorax
10045	Lewin's Rail	Lewinia pectoralis pectoralis
10050	Baillon's Crake	Porzana pusilla palustris
10170	Australian Painted Snipe	Rostratula benghalensis australis
10174	Bush Stone-curlew	Burhinus grallarius
10186	Intermediate Egret	Ardea intermedia
10195	Little Bittern	Ixobrychus minutus dubius
10197	Australasian Bittern	Botaurus poiciloptilus
10212	Australasian Shoveler	Anas rhynchotis
10215	Hardhead	Aythya australis
10230	Square-tailed Kite	Lophoictinia isura
10238	Black Falcon	Falco subniger
10498	Chestnut-rumped Heathwren	Calamanthus pyrrhopygius
10504	Speckled Warbler	Chthonicola sagittatus
10598	Painted Honeyeater	Grantiella picta
12159	Striped Legless Lizard	Delma impar
12177	Bearded Dragon	Pogona barbata
12283	Lace Monitor	Varanus varius
13117	Brown Toadlet	Pseudophryne bibronii
13207	Growling Grass Frog	Litoria raniformis
15021	Golden Sun Moth	Synemon plana
500798	Small Milkwort	Comesperma polygaloides
501456	Clover Glycine	Glycine latrobeana
502746	Snowy Mint-bush	Prostanthera nivea var. nivea
502773	Small Scurf-pea	Cullen parvum
502776	Tough Scurf-pea	Cullen tenax
503455	Rye Beetle-grass	Tripogon loliiformis
504066	Rosemary Grevillea	Grevillea rosmarinifolia subsp. rosmarinifolia
504655	Pale Swamp Everlasting	Coronidium scorpioides 'aff. rutidolepis (Lowland Swamps)' variant
504823	Spiny Rice-flower	Pimelea spinescens subsp. spinescens
505084	Matted Flax-lily	Dianella amoena
505560	Arching Flax-lily	Dianella sp. aff. longifolia (Benambra)

Appendix 2 – Offset requirements detail

If a permit is granted to remove the marked native vegetation the permit condition will include the requirement to obtain a native vegetation offset.

To calculate the required offset amount required the biodiversity equivalence scores are aggregated to the proposal level and multiplied by the relevant risk multiplier.

Offsets also have required attributes:

- General offsets must be located in the same Catchment Management Authority (CMA) boundary or Local Municipal District (local council) as the clearing and must have a minimum strategic biodiversity score of 80 per cent of the clearing.[2]

The offset requirements for your proposal are as follows:

Offset type	Clearing site biodiversity equivalence score	Risk multiplier	Offset requirements	
			Offset amount (biodiversity equivalence units)	Offset attributes
General	1.617 GBES	1.5	2.425 general units	Offset must be within Port Phillip and Westernport CMA **or** the same Municipal District as the vegetation removal Offset must have a minimum strategic biodiversity score of 0.511

[2] Strategic biodiversity score is a weighted average across habitat zones where a general offset is required

Appendix 3 – Images of marked native vegetation

Note: The images below include porposed and past removal of native vegetation.

Image 1. Native vegetation location risk map

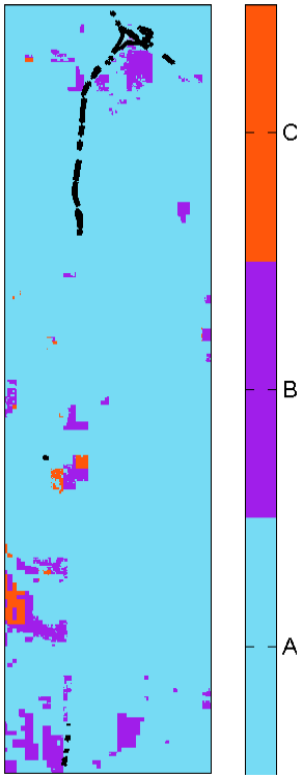


Image 2. Strategic biodiversity score map

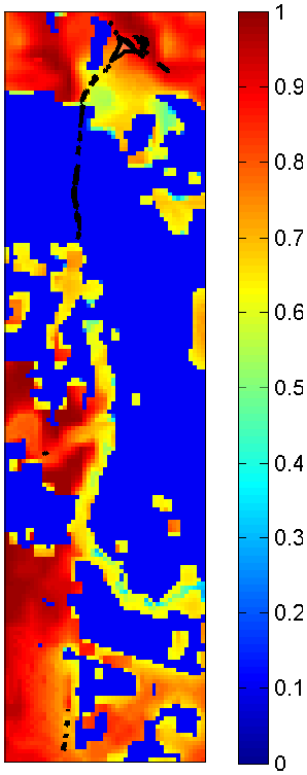
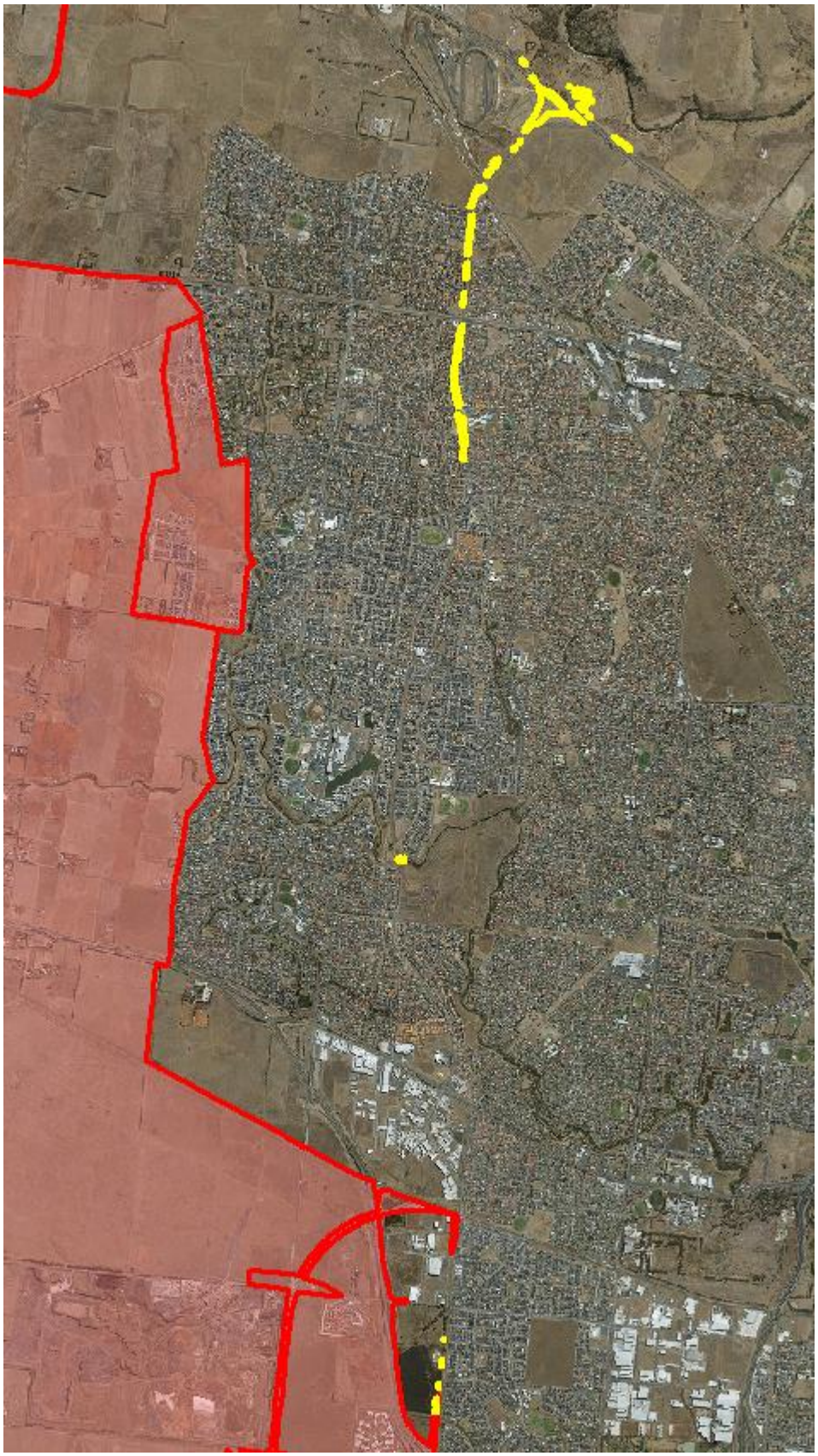


Image 3. Aerial photograph showing marked native vegetation



Yellow boundaries denote areas of proposed native vegetation removal

MSA-BCS shaded in red

Glossary

Condition score

This is the site-assessed condition score for the native vegetation. Each habitat zone in the clearing proposal is assigned a condition score according to the habitat hectare assessment method. This information has been provided by or on behalf of the applicant in the GIS file.

Dispersed habitat

A dispersed species habitat is a habitat for a rare or threatened species whose habitat is spread over a relatively broad geographic area greater than 2,000 hectares.

General biodiversity equivalence score

The general biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed makes to Victoria's biodiversity. The general biodiversity equivalence score is calculated as follows:

$$\boldsymbol{General\ biodiversity\ equivalence\ score} = \boldsymbol{habitat\ hectares} \times \boldsymbol{strategic\ biodiversity\ score}$$

General offset amount

This is calculated by multiplying the general biodiversity equivalence score of the native vegetation to be removed by the risk factor for general offsets. This number is expressed in general biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation.

$$\boldsymbol{Risk\ adjusted\ general\ biodiversity\ equivalence\ score} = \boldsymbol{general\ biodiversity\ equivalence\ score\ clearing} \times \mathbf{1.5}$$

General offset attributes

General offset must be located in the same Catchment Management Authority boundary or Municipal District (local council) as the clearing site. They must also have a strategic biodiversity score that is at least 80 per cent of the score of the clearing site.

Habitat hectares

Habitat hectares is a site-based measure that combines extent and condition of native vegetation. The habitat hectares of native vegetation is equal to the current condition of the vegetation (condition score) multiplied by the extent of native vegetation. Habitat hectares can be calculated for a remnant patch or for scattered trees or a combination of these two vegetation types. This value is calculated for each habitat zone using the following formula:

$$\boldsymbol{Habitat\ hectares} = \boldsymbol{total\ extent}\ (\boldsymbol{hectares}) \times \boldsymbol{condition\ score}$$

Habitat importance score

The habitat importance score is a measure of the importance of the habitat located on a site for a particular rare or threatened species. The habitat importance score for a species is a weighted average value calculated from the habitat importance map for that species. The habitat importance score is calculated for each habitat zone where the habitat importace map indicates that species habitat occurs.

Habitat zone

Habitat zone is a discrete contiguous area of antive vegetation that:

- is of a single Ecological Vegetation Class
- has the same measured condition.

Highly localised habitat

A highly localised habitat is habitat for a rare or threatened species that is spread across a very restricted area (less than 2,000 hectares). This can also be applied to a similarly limited sub-habitat that is disproportionately important for a wide-ranging rare or threatened species. Highly localised habitats have the highest habitat importance score (1) for all locations where they are present.

Minimum strategic biodiversity score

The minimum strategic biodiversity score is an attribute for a general offset.

The strategic biodiversity score of the offset site must be at least 80 per cent of the strategic biodiversity score of the native vegetation to be removed. This is to ensure offsets are located in areas with a strategic value that is comparable to, or better than, the native vegetation to be removed. Where a specific and general offset is required, the minimum strategic biodiversity score relates only to the habitat zones that require the general offset.

Offset risk factor

There is a risk that the gain from undertaking the offset will not adequately compensate for the loss from the removal of native vegetation. If this were to occur, despite obtaining an offset, the overall impact from removing native vegetation would result in a loss in the contribution that native vegetation makes to Victoria's biodiversity.

To address the risk of offsets failing, an offset risk factor is applied to the calculated loss to biodiversity value from removing native vegetation.

$$\boldsymbol{Risk\ factor\ for\ general\ offsets = 1.5}$$

$$\boldsymbol{Risk\ factor\ for\ specific\ offset = 2}$$

Offset type

The specific-general offset test determines the offset type required.

When the specific-general offset test determines that the native vegetation removal will have an impact on one or more rare or threatened species habitat above the set threshold of 0.005 per cent, a specific offset is required. This test is done at the permit application level.

A general offset is required when a proposal to remove native vegetation is not deemed, by application of the specific-general offset test, to have an impact on any habitat for any rare or threatened species above the set threshold of 0.005 per cent. All habitat zones that do not require a specific offset will require a general offset.

Proportional impact on species

This is the outcome of the specific-general offset test. The specific-general offset test is calculated across the entire proposal for each species on the native vegetation permitted clearing species list. If the proportional impact on a species is above the set threshold of 0.005 per cent then a specific offset is required for that species.

Specific offset amount

The specific offset amount is calculated by multiplying the specific biodiversity equivalence score of the native vegetation to be removed by the risk factor for specific offsets. This number is expressed in specific biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation.

$$\boldsymbol{Risk\ adjusted\ specific\ biodiversity\ equivalence\ score = specific\ biodiversity\ equivalence\ score\ clearing \times 2}$$

Specific offset attributes

Specific offsets must be located in the modelled habitat for the species that has triggered the specific offset requirement.

Specific biodiversity equivalence score

The specific biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed makes to the habitat of the relevant rare or threatened species. It is calculated for each habitat zone where one or more species habitats require a specific offset as a result of the specific-general offset test as follows:

$$\boldsymbol{Specific\ biodiversity\ equivalence\ score} = \boldsymbol{habitat\ hectares} \times \boldsymbol{habitat\ importance\ score}$$

Strategic biodiversity score

This is the weighted average strategic biodiversity score of the marked native vegetation. The strategic biodiversity score has been calculated from the *Strategic biodiversity map* for each habitat zone .

The strategic biodiversity score of native vegetation is a measure of the native vegetation's importance for Victoria's biodiversity, relative to other locations across the landscape. The *Strategic biodiversity map* is a modelled layer that prioritises locations on the basis of rarity and level of depletion of the types of vegetation, species habitats, and condition and connectivity of native vegetation.

Total extent (hectares) for calculating habitat hectares

This is the total area of the marked native vegetation in hectares.

The total extent of native vegetation is an input to calculating the habitat hectares of a site and in calculating the general biodiversity equivalence score. Where the marked native vegetation includes scattered trees, each tree is converted to hectares using a standard area calculation of 0.071 hectares per tree. This information has been provided by or on behalf of the applicant in the GIS file.

Vicinity

The vicinity is an attribute for a general offset.

The offset site must be located within the same Catchment Management Authority boundary or Local Municipal District as the native vegetation to be removed.

14 APPENDIX D – HABITAT COMPENSATION STATEMENT (BCS)

Thank you for your request for the habitat compensation obligations for the land impacted by construction works for the upgrade to Palmers Road, Derrimut (referred to in this communication as '**the Land**').

The Commonwealth Approval
On 5 September 2013, under section 146B of the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*, the Commonwealth Minister for Environment, Heritage and Water approved a class of actions associated with urban development in parts of a number of Melbourne's growth corridors. The area to which the Commonwealth Approval applies is set out in the *Biodiversity Conservation Strategy for Melbourne's Growth Corridors* (DEPI, June 2013) (**the BCS**). Copies of the Commonwealth Approval, the BCS and other documents relevant to the Commonwealth Approval are available on the DEPI website.

The Land is within the western growth corridor, and is in the area that the Commonwealth Approval applies to.

Actions to which the Commonwealth Approval applies that are proposed to be carried out on the Land may be subject to:

- Habitat compensation obligations;
- Land security obligations; and
- Salvage and translocation requirements.

Habitat compensation obligations are determined with reference to habitat data contained in the habitat compensation layer dataset maintained by DEPI, and the applicable fees. Fees are payable to DEPI. The current fees for each unit of obligation are set out in the document *Habitat compensation under the Biodiversity Conservation Strategy* (DEPI, August 2013), which is available on the DEPI website.

Data relating to land security obligations and salvage and translocation requirements is also contained in the habitat compensation layer dataset.

Additional conditions, requirements and obligations apply to actions subject to the Commonwealth Approval. For more information on the Commonwealth Approval, visit the DEPI website.

Data in the habitat compensation layer database relating to the Land

Based on the files submitted to DEPI on 13 August 2014, the habitat compensation layer currently shows the following habitat compensation obligations for the Land:

Habitat type	**Obligation**
Native vegetation	0.047 ha
Spiny Rice-flower	0.047 ha
Golden Sun Moth	0.990 ha

There are no land security obligations associated with the works.

Native vegetation permitted clearing regulations
I note that the construction footprint extends beyond the boundary of the area covered by the BCS and subject to the Commonwealth approval. Offsets for this area will be determined by applying the permitted clearing regulations.

Meeting habitat compensation obligations
For information about how to meet habitat compensation obligations, and salvage and translocation requirements, contact DEPI at msa.habitatcompensation@depi.vic.gov.au.

Disclaimers
The information in this communication is provided for indicative purposes only at the time of issue, and may be subject to change. The State of Victoria, its employees and officers do not guarantee that the data is complete, without flaw, or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from reliance upon it. No claim or representation is made as to the final obligations or requirements in respect of the Land under the Commonwealth Approval. For information on whether a particular use or development of the Land is subject to the Commonwealth Approval, or the specific requirements of the Commonwealth Approval for a particular use or development, DEPI recommends that you seek legal advice.

Please contact me should you have any questions.

Regards
Kate

Habitat Compensation
Melbourne Strategic Assessment
Department of Environment and Primary Industries
Tel: 9637 8992
msa.habitatcompensation@depi.vic.gov.au

15 APPENDIX E - HABITAT ZONE PHOTOGRAPHS

Photograph E1 – Habitat Zone PG1

Photograph E2 – Habitat Zone PG2

Photograph E3 – Habitat Zone PGWe1

Photograph E4 – Habitat Zone PGWe2

Photograph E5 – Habitat Zone PG3

Photograph E6 – Habitat Zone PG4

Photograph E7 – Habitat Zone PG5

Photograph E8 – Habitat Zone PG6

Photograph E9 – Habitat Zone PG7

Photograph E10 – Habitat Zone PG8

Photograph E11 – Habitat Zone PG9

Photograph E12 – Habitat Zone PG10

Photograph E3 – Habitat Zone PG11