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FINAL REPORT:

Biodiversity Assessment for Area 12, 'Casey Central', Cranbourne

PREPARED FOR:

Growth Areas Authority
October 2010

Ecology Partners Pty Ltd

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The following Ecology Partners Pty Ltd employees either undertook the field assessments and/or contributed to the preparation of the final report: Jenna Forbes, Simon Scott, Aaron Organ and Amanda Feetham.

EXECUTIVE SUMMARY

Introduction

Ecology Partners Pty Ltd was commissioned by the Growth Areas Authority to undertake a biodiversity assessment for the 2010 Biodiversity Mapping Project, in 'Area 12' in the urban fringe of south-east Melbourne. Area 12 is located approximately 50 kilometres south-east of the Melbourne CBD, and contains both private and public land, which is used for farming, low density residential housing and recreation.

The purpose of the biodiversity assessment was to provide a report that will be incorporated into the Growth Areas Authority's Precinct Structure Planning process.

Methods

The following resources and databases were reviewed over the duration of the project:

- The Atlas of Victorian Wildlife (AVW) and Flora Information System (FIS) databases.
- Department of Sustainability and Environment (DSE) Biodiversity Interactive Maps showing historic and current Ecological Vegetation Classes (EVCs).
- Aquatic Fish Database and 'DSE verified unpublished aquatic records'.
- Department of Sustainability, Environment, Water, Population and Communities Protected (DSEWPC) Matters Search Tool providing matters of National Environmental Significance (NES) (e.g. listed taxa and ecological communities, Ramsar wetlands) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Planning Schemes Online providing the current zone and overlays.
- Relevant legislation and policies.
- Ecological reports relevant to the study area.

Liaison was undertaken with the GAA and DSE to confirm the extent and intensity of the proposed methodology.

Site assessments were undertaken wherever access was granted. Biodiversity assessment methods followed the methodology stipulated within the Request for Tender, and included the following:

- *General flora and fauna survey*: Information regarding vegetation (both patches of vegetation and scattered remnant trees) quality and extent, and the presence of significant flora and fauna species were recorded into hand-held PDAs. Flora and fauna species observed within the precinct during the assessments were noted.

- *Targeted flora survey*: Targeted flora surveys were undertaken in spring and summer. Although there is low potential habitat for most significant flora species targeted surveys were undertaken in spring for Maroon Leek Orchid, Grey Billy Buttons, River

Swamp Wallaby-grass, Wine-lipped Spider Orchid, Purple Diuris and Pale Swamp Everlasting. Species targeted during summer included Swamp Everlasting, Matted Flax-lily and Veined Spear-grass. A targeted flora survey for Frankston Spider Orchid was also undertaken during early summer.

- *Targeted fauna assessment*: Due to the study area dominated by market gardens, a shopping centre to the north, and supporting very little remnant native vegetation no targeted fauna surveys were undertaken across the study area.

- *Incidental records*: All incidental observation of significant flora and fauna species observed were recorded with hand-held PDAs.

Results

Flora

Native vegetation within the study area has largely been cleared as a result of previous land use activities (i.e. agriculture) and is dominated by exotic vegetation (i.e. pasture grasses and weeds). Small patches of remnant native vegetation exists along Narre Warren Road, and one patch occurs in the north of property 626779, consisting of three Ecological Vegetation Classes (EVCs); Grassy Woodland, Heathy Woodland and Swamp Scrub.

No significant flora species were recorded during the assessment. Given the highly modified nature of the study area and lack of remnant native vegetation it is highly unlikely that any national or state significant species occur within the study area.

Habitat hectare assessment

Habitat hectare assessments were completed in areas where remnant native vegetation constituted a 'patch' under the *Native Vegetation Management – A Framework for Action* and where site access was granted.

Overall approximately less than **0.01 habitat hectares** of vegetation is present within the study area. This is comprised of very small areas of Low conservation significance Heathy Woodland (EVC 48), High conservation significance Swamp Scrub (EVC 53_61), and High conservation significance Grassy Woodland (EVC 175).

There are no Large Old Trees (LOTs) within remnant patches of vegetation, and there are 19 scattered remnant trees within the study area. These comprise very large, large and small trees, which are of High and Low conservation significance (Figure ES3).

Results of the habitat hectare assessment and Offset requirements for any future development of the study area are detailed in 'Offset Calculations for Area 12, 'Casey Central', Cranbourne'.

Fauna

No significant fauna species were recorded during the current surveys, and due to the high level of modification of the study area, there is a low likelihood of any threatened species occurring within the study area.

The study area supports habitat for locally common fauna species that are typically associated with highly modified environments. The study area currently supports five broad habitat types: modified woodland/remnant trees, Swamp Scrub, irrigation channels, artificial waterbodies, and introduced pasture grass and crops.

All waterbodies are artificial and used as dams for livestock, or for irrigation purposes (i.e. for vegetable crops). Shrubs and trees have been planted and comprise exotic shelterbelts. Some remnant native trees occur in the south-eastern corner of the area and the north-eastern corner of the study area. Trees, particularly the native trees containing hollows, provide habitat for native fauna including birds and bats.

Conclusion

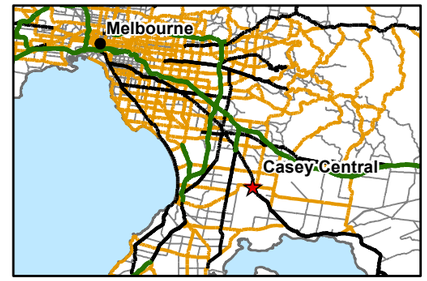
The study area is highly modified and dominated by exotic vegetation. However, there are modified examples of three EVCs within the study area; Grassy Woodland (EVC 175), Heathy Woodland (EVC 48) and Swamp Scrub (EVC 53_61).

A referral under the *Environment Protection and Biodiversity Conservation Act* (EPBC Act) to the Commonwealth Environment Minister is not recommended, as it is considered unlikely that any matters of NES will be impacted by future development of the study area. An FFG Act permit will be required for the removal of protected species under the Act, if protected species are located on public land.

There are opportunities to enhance ecological values within the study area, principally through the regeneration of native vegetation, revegetation and weed control.

Legend

- Urban Growth Boundary
- Study Boundary
- Railway Station
- Railway
- Freeway
- Highway
- Arterial Road
- Major Road
- Minor Road
- Elevation Contours (10m)
- Watercourses
- Waterbodies
- Parks and Recreatation



Location & Overview of PSP Area 12

Biodiversity Assessment Reporting 2009/10

GDA 1994; VicGrid 1994

0 62.5 125 250

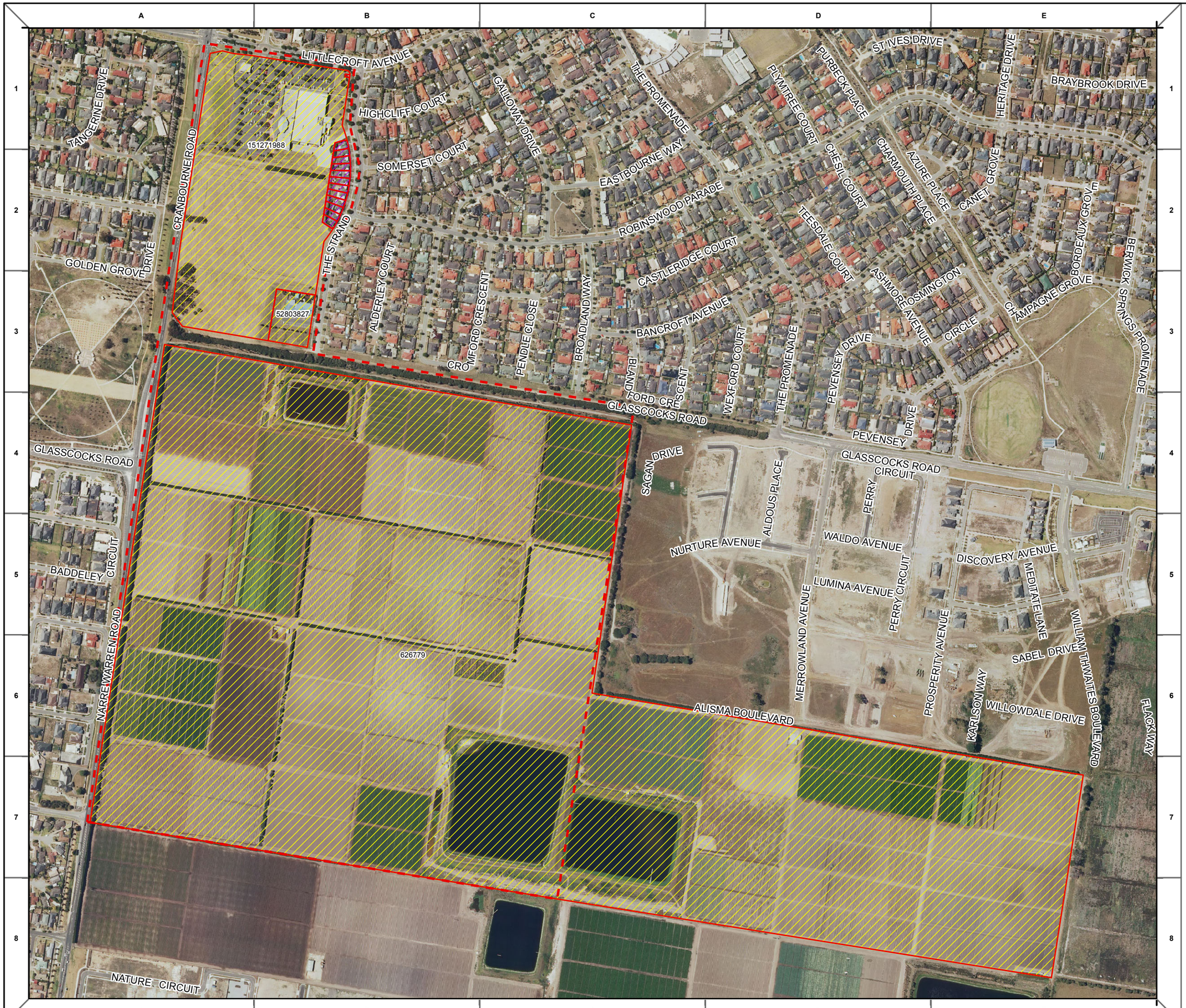
Meters

1:7,000 when printed @ A3

ecologypartners

FIGURE ES1

EP Map # : 1621 Study Area 12
File Path: 1621_Fig01_SiteLocation_14Sep10.mxd
Issue Date: 04/10/2010



Legend

- Urban Growth Boundary
- Study Boundary
- Property Boundaries

Access Status

- Properties Assessed
- Not Assessed - No Vegetation Quality Assessment or Targeted Flora and Fauna Surveys Required

Access Information for PSP Area 12

Biodiversity Assessment Reporting 2009/10

N

GDA 1994; VicGrid 1994

0 65 130 260

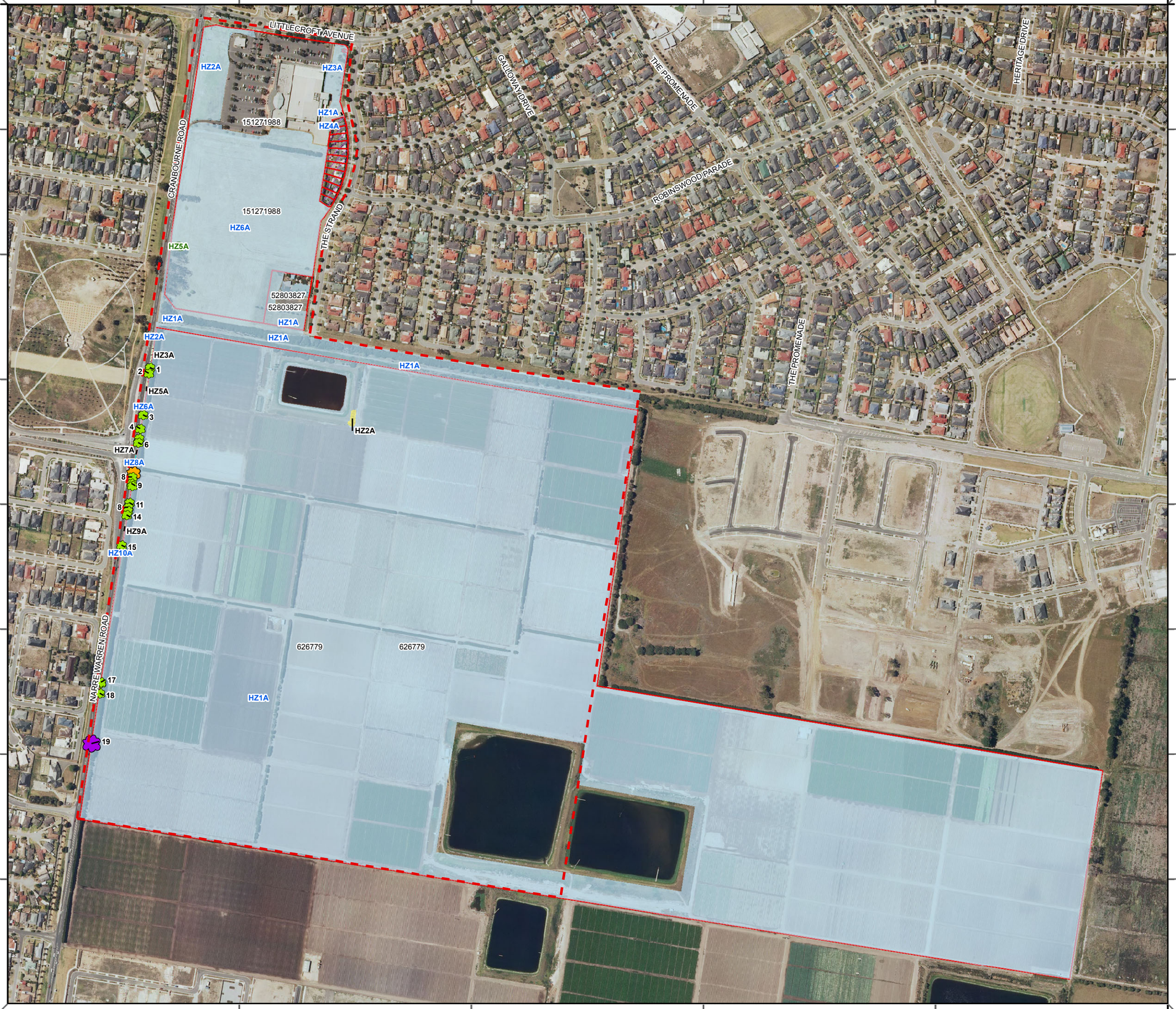
Meters

1:6,000 when printed @ A3

ecologypartners

FIGURE ES2

EP Map # : 1621 Study Area 12
File Path: 1621_Fig02_AccessInfo_14Sep10.mxd
Issue Date: 14/09/2010



Legend

- Urban Growth Boundary
- Study Boundary
- Property Boundaries
- Properties not Assessed

Scattered Tree Locations

- Very Large Old Tree
- Large Old Tree
- Medium Old Tree
- Small Tree
- Degraded Treeless Vegetation
- Non Native Vegetation

Surveyed EVCs

- 48, Heathy Woodland
- 53, Swamp Scrub
- 175, Grassy Woodland

EVC & Scattered Tree Locations for PSP Area 12

Biodiversity Assessment Reporting 2009/10

GDA 1994; VicGrid 1994

0 70 140 280

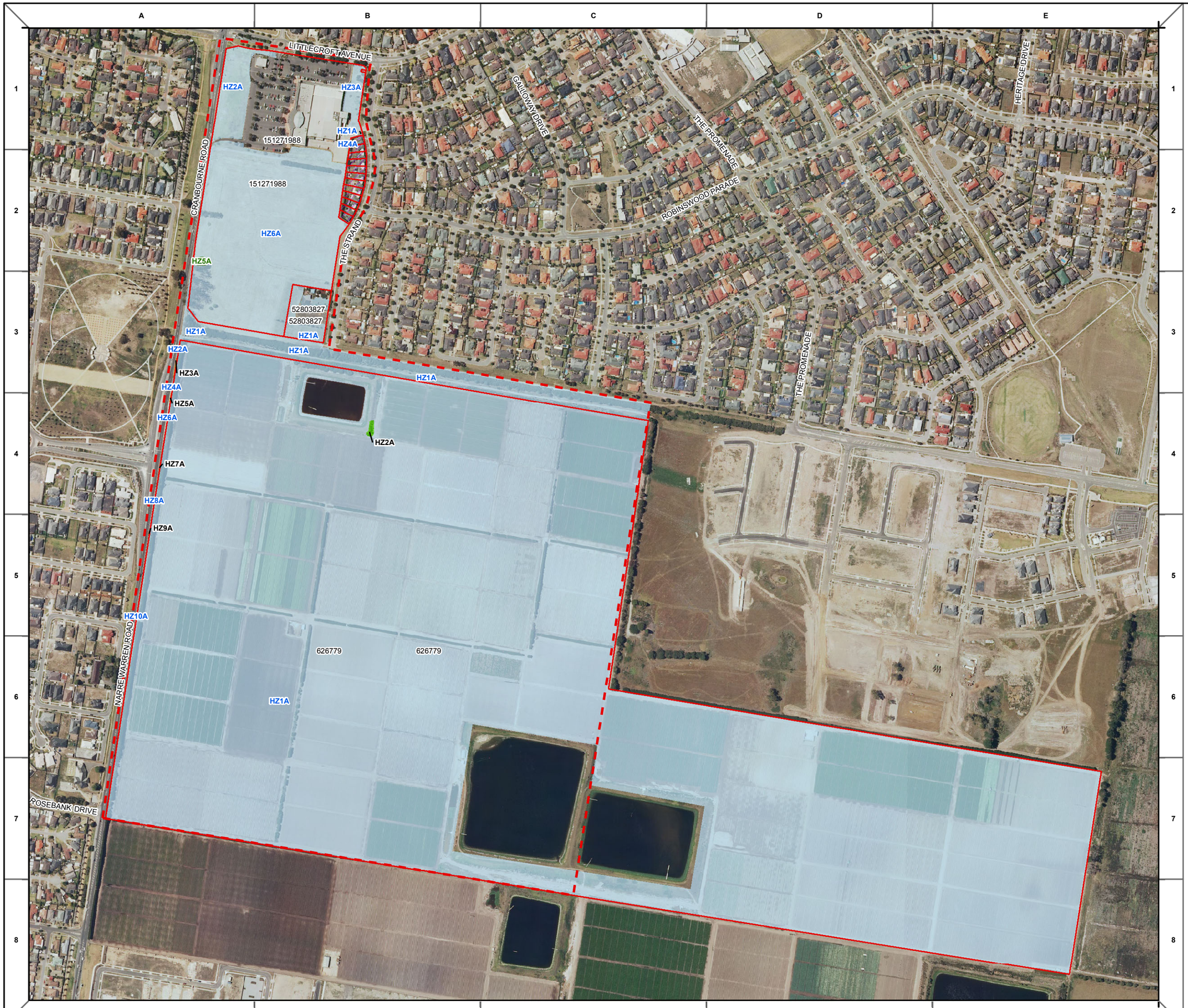
Meters

1:6,000 when printed @ A3

ecologypartners

FIGURE ES3

EP Map # : 1621 Study Area 12
File Path: 1621_Fig03_EVC_STLocn_14Sep10.mxd
Issue Date: 15/09/2010



Legend

- Urban Growth Boundary
- Study Boundary
- Propery Boundaries
- Properties not Assessed
- Degraded Treeless Vegetation
- Non Native Vegetation

Conservation Significance

- High
- Low

Conservation Significance for PSP Area 12

Biodiversity Assessment Reporting 2009/10

N

GDA 1994; VicGrid 1994

0 62.5 125 250

Meters

1:6,000 when printed @ A3

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FIGURE ES4

EP Map # : 1621 Study Area 12
File Path: 1621_Fig04_ConsSig_14Sep10.mxd
Issue Date: 15/09/2010

Legend

- Urban Growth Boundary
- StudyBoundary
- Property Boundaries

Database Flora Records

- Nationally Listed Species
- State Listed Species

Assessment Flora Species

- State Listed Species
- Nationally Lised Species

Database Fauna Records

- Nationally Listed Species
- State Listed Species
- DSE Verified Unpublished Records

Assessment Fauna Species

- State Listed Species
- Nationally Lised Species

Note: Database fauna records include the Aquatic Fauna Database (AFD) and Atlas of Victorian Wildlife(AVW). The locations of significant flora and fauna species are based on data available from DSEs AVW and FIS databases, the current field investigations and other sources. It is possible that additional fauna species of conservation significance have been recorded within the local area but are not shown

Threatened Flora & Fauna for PSP Area 12

Biodiversity Assessment Reporting 2009/10

N

GDA 1994; VicGrid 1994

0 300 600 1,200

Meters

1:25,000 when printed @ A3

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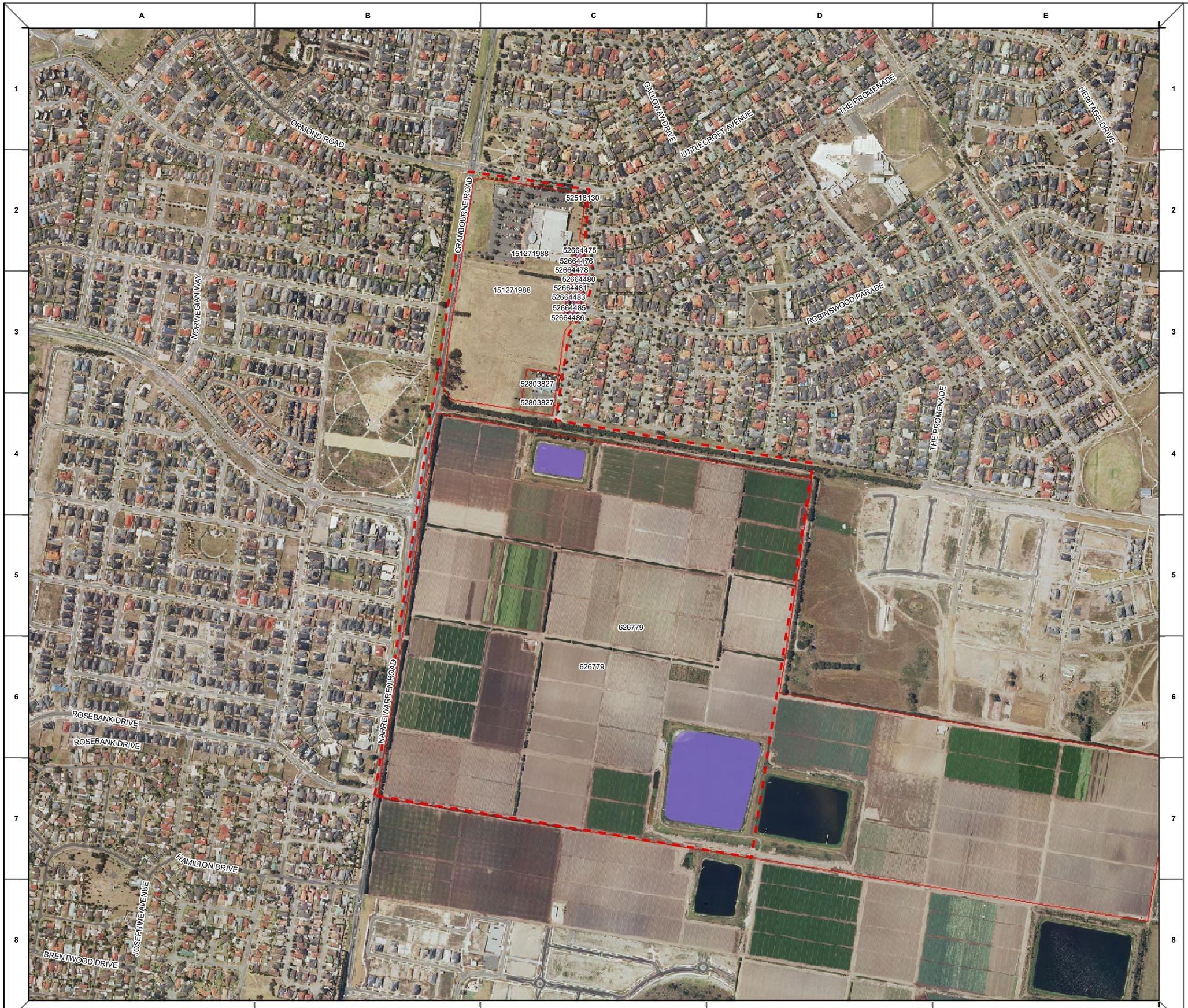
FIGURE ES5

EP Map # : 1621 Study Area 12
File Path: 1621_Fig05_ThrFlora&Fauna_30Mar10.mxd
Issue Date: 20/04/2010



Legend

- Urban Growth Boundary
- Study Boundary
- Property Boundaries
- Properties not Assessed

Potential Habitat

- Artificial Irrigation Dams

Artificial Irrigation Dams
Low Quality Waterbird Habitat for Royal Spoonbill, Eastern Great Egret and Latham's Snipe

Locations of Potential Habitat for PSP Area 12

Biodiversity Assessment Reporting 2009/10

GDA 1994; VicGrid 1994

0 90 180 360

Meters

1:7,500 when printed @ A3

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FIGURE ES6

EP Map # : 1621 Study Area 12 Executive Summary
File Path: 1621_Fig06_PotentialHabitat_14Sep10.mxd
Issue Date: 04/10/2010

1 INTRODUCTION

1.1 Background

Ecology Partners Pty Ltd was commissioned by the Growth Areas Authority (GAA) to undertake a biodiversity assessment as part of the 2010 GAA Biodiversity Mapping Project, at 'Area 12' on the urban fringe of south-east Melbourne. The purpose of this report is to identify biodiversity values within the Precinct and to inform the planning process.

A general flora and fauna assessment was completed for each property accessed within the study area, together with targeted flora surveys. Discussion on recommendations and requirements under Commonwealth, State, and local legislation and polices, along with potential impacts and mitigation measures has also been included.

A Net Gain analysis was also undertaken in accordance with Victoria's *Native Vegetation Management – A Framework for Action* (the Framework) (NRE 2002) for any remnant patches of native vegetation within the study area. Results of the habitat hectare assessment are detailed in 'Offset Calculations for Area 12, 'Casey Central', Cranbourne' (Ecology Partners Pty Ltd 2010).

1.2 Objectives

The objectives of the flora, fauna and habitat hectare assessment, and targeted significant flora and fauna surveys were to:

- To identify, assess and map significant flora, fauna and habitat in the Area and the level of conservation significance for any species or habitat found;
- To collect data at sufficient detail that enables a Precinct Structure Plan and Biodiversity Plan to be developed;
- To provide advice on any works or management measures that may reduce any impacts of the development on species (particularly significant species) known or likely to occur in the study area ; and,
- To ensure that development of the study area complies with legislative requirements regarding the protection of indigenous flora and fauna species and ecological communities.

1.3 Study Area

Area 12 (the study area) is located approximately 50 kilometres southeast of the Melbourne CBD, Victoria (Figure 1). The study area covers 82 hectares and consists of 41 properties. It is bound to the east and south by farmland, Narre Warren-Cranbourne road to the west and Littlecroft and Glasscocks Avenues to the north. Casey Central shopping centre is located in the north of the study area.

The majority of properties within the study area are privately owned, and others are public land comprised of property owned and managed by the City of Casey. The study area has largely been cleared for agricultural purposes, with small isolated areas of remnant native vegetation remaining.

According to the Department of Sustainability and Environment (DSE) Biodiversity Interactive Map (DSE 2010a) the study area lies within the Gippsland Plain bioregion. The Gippsland Plain bioregion extends from Port Phillip Bay in the west to Bairnsdale in the east, between the southern slopes of the Great Dividing Range and Wilsons Promontory, excluding the Strzelecki Ranges.

The study area lies within the boundaries of the Port Phillip and Westernport Catchment Management Authority (CMA). Under the City of Casey planning scheme the majority of the study area is an Urban Growth Zone (UGZ). The area owned by City of Casey is zoned Public Use Zone (PUZ6) and Mixed Use Zone (MUZ), and the remainder of the area falls within Business 1 Zone (B1Z) and Road Zone (RDZ1). There are several overlays which affect the study area, including Development Plan Overlay (DPO), Land Development Contributions Plan Overlay (DCPO6) and a Public Acquisition Overlay (PAO1) which only affects a small portion of the study area.

There are no BioSites located within the study area, however several are located within a five kilometre radius, which include habitat for national and state significant flora species, and one state significant waterbird species (Table 1).

Table 1: BioSites located in, or within the immediate vicinity of the study area.

BioSite No.	Name	Size (hectares)	Location	Significance	Attributes
5132	n/a	n/a	Approximately two kilometres south west of study area	Local	Contains significant flora Pale Swamp-everlasting *Helichrysum* aff. *rutidolepis*, Grey Billy-buttons *Craspedia canens*
3372	Barnbam Swamp (Cranbourne Swamp)	23.12	Approximately three kilometres west of study area	National	Contains high richness and diversity, including species such as Plains Yam-daisy *Microseris* sp. 1, River Swamp Wallaby-grass *Amphibromus fluitans*, Swamp Billy-buttons *Craspedia paludicola*, Hornwort *Ceratophyllum demersum*, Tussock-grass *Poa labillardierei* var. (Volcanic Plains), Grey Spike-sedge *Eleocharis macbarronii*, Swamp Everlasting *Xerochrysum palustre*, Pale Swamp-everlasting *Helichrysum* aff. *rutidolepis*, Grey Billy-buttons *Craspedia canens*, *Cardamine paucijuga*, Purple Blown-grass *Lachnagrostis punicea* subsp. *filifolia*, Australasian Shoveler *Anas rhynchotis* and Plains Grassy Wetland EVC.
5242	Tea-tree Creek, Cranbourne	0.77	Approximately 2 kilometres south of study area	Regional	Contains Plains Grassy Wetland EVC

2 METHODS

2.1 Nomenclature

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

Terrestrial and vertebrate fauna (mammals, birds, reptiles, amphibians and fish) follow the Atlas of Victorian Wildlife (AVW 2007).

2.2 Literature and Database Review

The following resources and databases were reviewed over the duration of the project:

- The AVW (2007) and FIS (2007) databases;
- Aquatic Fish Database and 'DSE verified unpublished aquatic records';
- DSE's Biodiversity Interactive Maps showing historic and current EVCs (DSE 2010a);
- Sites of Biological Significance (BioSites) (DSE 2010b)
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) Protected Matters Search Tool which identifies matters of National Environmental Significance (NES) (e.g. listed flora and fauna species and ecological communities, Ramsar wetlands) protected under the EPBC Act (DSEWPC 2010);
- Planning Schemes Online providing the current zone and overlays (DPCD 2010);
- Relevant legislation and policies; and
- Known ecological reports relevant to the study area, including:
    - Ecology Australia Pty Ltd (2010). Draft sub-regional surveys for the Growling Grass Frog *Litoria raniformis*; and
    - Practical Ecology Pty Ltd (2010). GAA sub-regional fauna survey; Southern Brown Bandicoot.

Liaison was undertaken with GAA and DSE representatives to clarify the appropriateness of the proposed methodology.

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

2.3 Field Surveys

Vegetation assessments were undertaken by experienced personnel who had completed the mandatory habitat hectare training held by GAA and DSE in August 2009.

A summary of the dates where each of the flora and fauna surveys was undertaken is provided in Section 2.3.7.

2.3.1 General flora survey

Flora surveys were undertaken on 10 and 12 November 2009. All properties to which access was provided were assessed on foot. Records of all vascular plants were recorded within each property. All remnant EVCs, scattered remnant trees and significant flora species were recorded and mapped on aerial photographs.

2.3.2 Native vegetation (habitat hectare assessment)

A native vegetation assessment was undertaken concurrently with the flora survey on 10 and 20 November, and 4 and 9 December 2009. All patches of remnant native vegetation were compared to historic and current EVC mapping (DSE 2010a) and relevant EVC benchmarks (DSE 2010b) to determine the most likely EVC from which it would have originated.

Patches of remnant native vegetation were assessed in accordance with the DSEs habitat hectare assessment methodology (DSE 2004), and the Biodiversity Assessment Project 2009/10 Vegetation Mapping and Condition Assessment Procedures 1.4 (DSE 2009). Data was entered into the DSEs "Habitat hectare form" loaded onto a Nomad Trimble Personal Digital Assistant (PDA) with ArcPad 8.0 software.

All scattered indigenous trees (i.e. those not located within a remnant patch of vegetation) were mapped onto aerial photography and as a point file in the forms provided by DSE. The species, size class (compared with the relevant EVC benchmark) and the conservation significance of each tree was determined.

2.3.3 Targeted flora surveys

Targeted flora surveys were undertaken at all properties which were accessed (Figure 2), and were undertaken in spring and summer depending on the flowering season of the species. The following species were targeted (whilst undertaking general and native vegetation assessments) on 10 and 12 November 2009 for the following species:

- Maroon Leek Orchid *Prasophyllum frenchii*;
- Grey Billy Buttons *Craspedia canens*;
- River Swamp Wallaby Grass *Amphibromus fluitans*;
- Wine-lipped Spider Orchid *Caladenia oenochila*;
- Purple Diuris *Diuris punctata* var. *punctata*; and
- Pale Swamp Everlasting *Helichrysum* aff. *rutidolepis*.

Targeted summer surveys were undertaken on 4 December 2009 for the following species:

- Swamp Everlasting *Xerochrysum palustre*;
- Matted Flax-lily *Dianella amoena*;
- Veined Spear Grass *Austrostipa rudis* subsp. *australis*; and,
- Frankston Spider Orchid *Caladenia robinsonii*.

In each case, the targeted surveys for these flora species remained the same. The assessor traversed the property at the same time as the general flora surveys (described in Section 2.3.1), and concentrated in areas supporting remnant native vegetation (i.e. Swamp Scrub along roadsides) that had the highest potential to support significant flora species. That is, greatest time was spent targeting significant species in areas comprising the highest cover/abundance of native vegetation, or ecological features with suitable habitat (i.e. waterways, dams).

2.3.4 General fauna survey

General fauna assessments were undertaken on 10 and 12 November 2009, concurrently with the general flora surveys. Weather conditions over this period were mild and fine. All fauna observed and/or heard were recorded, while the presence of a particular species within the study area was also confirmed through indirect evidence such as feathers, scats, scratchings and/or nests. Assessors used binoculars to scan for birds, mammals in hollows, and basking reptiles. Hard rubbish, woody debris and rocks were lifted to locate small ground-dwelling fauna including reptiles and frogs.

An assessment and general notes of different habitat types were made. These included areas such as grasslands, waterbodies, trees (including the presence or absence of hollows), drainage lines and remnant EVCs. Ground cover, vegetation composition and structure within these areas were also recorded.

2.3.5 Targeted fauna surveys

Prior to commencement of the project, an assessment was required to be undertaken for Dwarf Galaxias *Galaxiella pusilla*, Swamp Skink *Egernia coventryi*, Glossy Grass Skink *Pseudemoia rawlinsoni* over spring and summer and for Southern Toadlet *Pseudophryne semimarmorata* during April. However, following the general flora and fauna surveys, it was decided that the study area did not contain any suitable habitat for these species. Following discussion with GAA and DSE, it was agreed that no targeted survey for these were required.

2.3.6 Incidental flora and fauna surveys

Several site assessments were undertaken within the study area over the duration of the project. Throughout this period, flora and fauna records were maintained by all assessors. A consolidated list of all flora and fauna species recorded during the project area provided below (Appendices 2 and 3, respectively).

.

2.3.7 Summary of flora and fauna survey effort

A summary of the dates for the flora and fauna surveys undertaken over the duration of the project is provided below (Table 2).

Table 2: Summary of dates for the flora and fauna survey effort.

Property Number	General Flora Assessment	Habitat Hectare Assessment	Targeted Flora Assessment			General Fauna Assessment
			Spring Species[1]	Summer Species[2]	Winter Species[3]	
151271988	10-Nov-09	10-Nov-09	10-Nov-09	4-Dec-10	N/A	10-Nov-09
52518130	10-Nov-09	10-Nov-09	10-Nov-09	4-Dec-10	N/A	10-Nov-09
52664475	10-Nov-09	10-Nov-09	10-Nov-09	4-Dec-10	N/A	10-Nov-09
52664476	10-Nov-09	10-Nov-09	10-Nov-09	4-Dec-10	N/A	10-Nov-09
52664477	10-Nov-09	10-Nov-09	10-Nov-09	4-Dec-10	N/A	10-Nov-09
52664478	10-Nov-09	10-Nov-09	10-Nov-09	4-Dec-10	N/A	10-Nov-09
52664479	10-Nov-09	10-Nov-09	10-Nov-09	4-Dec-10	N/A	10-Nov-09
52664480	10-Nov-09	10-Nov-09	10-Nov-09	4-Dec-10	N/A	10-Nov-09
52664481	10-Nov-09	10-Nov-09	10-Nov-09	4-Dec-10	N/A	10-Nov-09
52664482	12-Nov-09	12-Nov-09	12-Nov-09	4-Dec-10	N/A	12-Nov-09
52664483	12-Nov-09	12-Nov-09	12-Nov-09	4-Dec-10	N/A	12-Nov-09
52664484	12-Nov-09	12-Nov-09	12-Nov-09	4-Dec-10	N/A	12-Nov-09
52664485	12-Nov-09	12-Nov-09	12-Nov-09	4-Dec-10	N/A	12-Nov-09
52664486	12-Nov-09	12-Nov-09	12-Nov-09	4-Dec-10	N/A	12-Nov-09
52803827	12-Nov-09	12-Nov-09	12-Nov-09	4-Dec-10	N/A	12-Nov-09
626779	12-Nov-09	12-Nov-09	12-Nov-09	4-Dec-10	N/A	12-Nov-09

1 Spring Species included Maroon Leek Orchid, Grey Billy Buttons, River Swamp Wallaby Grass, Wine-lipped Spider Orchid, Purple Diuris, and Pale Swamp Everlasting. 2 Summer Species included Swamp Everlasting, Matted Flax-lily, Veined Spear Grass; and Frankston Spider Orchid.

2.4 Assessment Qualifications and Limitations

The objectives of the assessment were to document flora and fauna species and communities that occur, or may occur, within the study area. Targeted assessments were undertaken for flora and fauna which were stipulated within the contract provided by GAA, as discussed in the above (Section 2).

As with any assessment, a greater amount of time on the site would increase the likelihood of recording additional flora and fauna species. The short duration of the survey meant that migratory, transitory or uncommon fauna species may have been absent from typically occupied habitats at the time of the present assessment.

Notwithstanding this, the data collected during the field surveys, and information obtained from relevant sources (e.g. biological databases, literature reviews) were reviewed and are considered sufficient to provide an accurate assessment of the ecological values within the study area, and to determine the likelihood of significant taxa and communities occurring within the study area.

3 RESULTS

3.1 Flora

3.1.1 Flora species

Fifty-four flora species (13 indigenous, 41exotics) were recorded in the study area during the assessment (Appendix 2.1).

Indigenous species within the study area included trees such as Manna Gum *Eucalyptus viminalis* and Narrow-leaf Peppermint *Eucalyptus radiata*, and shrubs such as Blackwood *Acacia melanoxylon*, Black Wattle *Acacia mearnsii*, Swamp Paperbark *Melaleuca ericifolia* and Kangaroo Apple *Solanum lacinatum* Common herb species recorded within the study area included Slender Dock *Rumex brownii* and Bracken *Pteridium esculentum*. The aquatic herb Water Buttons *Cotula coronopifolia* was also found.

Three species listed as protected under the *Flora and Fauna Guarantee Act 1988* (FFG Act) were recorded within the study area. They are Black Wattle *Acacia mearnsii,* Water Buttons and Cassinia *Cassinia* sp.

The study area is highly modified and dominated by exotic vegetation, (i.e. pasture grasses and environmental weeds), including Cocksfoot *Dactylis glomerata*, Sweet Vernal-grass *Anthoxanthum odoratum*, Cape Weed *Arctotheca calendula*, Variegated Thistle *Silybum marianum,* Perennial Rye-grass *Lolium perenne* and Toowoomba Canary-grass *Phalaris aquatica*. Other grassy weed species located within the study area include Prairie Grass *Bromus hordeaceus* and Brown-top Bent *Agrostis capillaris*. Woody weeds include Poplar *Populus* spp., Monterey Cypress *Cupressus macrocarpa* and African Boxthorn *Lycium ferocissimum*.

A consolidated list of all of flora species recorded during the general and targeted flora surveys and the incidental observations made throughout the assessment period is provided (Appendix 2).

3.1.2 Threatened flora species and communities

No flora species of national or state conservation significance were recorded within the study area during the assessment. Significant flora species documented as occurring within the local area (i.e. a 10 kilometre radius of the study area) are shown below (Appendix 2.2) (Figure 7). There are no BioSites within the study area (DSE 2010a).

National

No nationally significant flora species were recorded within the study area during the present assessment (Figure 7).

Four nationally significant flora species have previously been recorded from within the local area, and four nationally significant flora species are listed as potentially occurring within a 10 kilometre radius of the study area (DSEWPC 2010). Based on the results of the literature review, site surveys and the lack of suitable habitat within the study area, it is considered unlikely that any nationally significant species are expected to occur within the study area (Appendix 2.2).

State

No state significant threatened flora species were recorded within the study area during the present assessment (Figure 7). A total of 27 state significant flora species have been previously recorded from within the local area (Appendix 2.2.). Based on the assessment, it is considered unlikely that any state significant threatened flora is expected to occur within the study area (Appendix 2.2). Three flora species listed as protected under the FFG Act, Black Wattle, Cassinia and Water Buttons were recorded within the study area (Appendix 2.1).

Regional and Local

Four regionally significant flora species were recorded within the study area during the current assessment. All other indigenous species are considered to be of local significance, due to the depletion of native vegetation in the local area (Appendix 2.1).

Significant Communities

No vegetation communities listed as threatened under the EPBC Act or FFG Act are present within the study area. Grassy Woodland (EVC 175) and Swamp Scrub (EVC 53) are listed as Endangered within the Gippsland Plain bioregion (DSE 2010b). Heathy Woodland (EVC 48) is listed as Least Concern within the Gippsland Plain bioregion (DSE 2010b).

3.1.3 Best or remaining 50% habitat for rare and threatened flora species

Remnant native vegetation within study area is highly modified and provides low quality habitat for flora species. No significant flora species were recorded during the current assessment and none are considered likely to occur.

Following steps A to D within Table 2 in *Native Vegetation Guide for assessment of referred planning permit applications* (DSE 2007b), remnant vegetation within the study area is not considered to be either "Best" or "Remaining" 50% habitat for significant flora species.

3.2 Ecological Vegetation Classes

The DSE bioregional pre-1750 EVC mapping shows that the study area was once covered by Plains Grassy Woodland (EVC 55) and Plains Grassland (EVC 132_62), and to a lesser extent Heathy Woodland (EVC 48) (DSE 2010a). Current DSE (2010a) EVC mapping shows only isolated occurrences of these EVCs remaining within the study area.

All Grassy Woodland and Swamp Scrub remnants are Endangered and all Heathy Woodland remnants are Least Concern within the Gippsland Plain bioregion (DSE 2010b).

Areas of indigenous vegetation within the study area are considered to be highly modified and all patches were less than 0.05 hectares in area. A description of the highly modified EVCs within the study area is provided below.

Heathy Woodland (EVC 48)

Heathy Woodland spans a variety of geologies but is generally associated with nutrient-poor soils. It is eucalypt-dominated low woodland to 10 m tall lacking a secondary tree layer and generally supporting a diverse array of narrow or ericoid-leaved shrubs (DSE 2010b). One patch of Heathy Woodland was recorded to the south of the study area (Figure 3). Narrow-leaf Peppermint was recorded within the study area, which is a typical canopy species of this EVC. However, the understorey condition was generally very poor and lacking in other indigenous species.

Swamp Scrub (EVC 53_61)

Swamp Scrub consists of closed scrub to 8 metres tall at low elevations on alluvial deposits along streams or on poorly drained sites with higher nutrient availability. It is dominated by Swamp Paperbark which often forms a dense thicket, out-competing other species. Where light penetrates to ground level, a moss/lichen/liverwort or herbaceous ground cover is often present. Dry variants have a grassy/herbaceous ground layer (DSE 2010b)

One area of Swamp Scrub to the south of the study area contained Swamp Paperbark, often in conjunction with several introduced grassy weed species (Figure 3). Common weed species found within all patches of native vegetation included grassy weeds such as Panic Veldt-grass *Ehrharta erecta*, Sweet Vernal-grass and Paspalum *Paspalum dilatatum*.

Grassy Woodland (EVC 175)

Grassy Woodland consists of open woodland containing Eucalypts or She-oaks, with a diverse understorey of grasses and herbs (DSE 2010b). The shrub component is usually sparse. It occurs on sites with moderate fertility on gentle slopes or undulating hills on a range of geologies (DSE 2010b).

Three remnant patches of Grassy Woodland were identified to the south of the study area (Figure 3). These remnant patches did not contain any large trees within the canopy, and were of poor quality. Indigenous species within Grassy Woodland patches included She Oak and Blackwood.

3.3 Habitat Hectare Assessment

3.3.1 Remnant patches of native vegetation

There are five patches of remnant vegetation within the study area (Figure 3, Appendix 4.1). The vegetation is of Low and High conservation significance (Figure 5). Overall less than **0.01 habitat hectares** of vegetation is present within the study area, comprising Low conservation significance Heathy Woodland, High conservation significance Swamp Scrub, and High conservation significance Grassy Woodland. There are no Large Old Trees (LOTs) within remnant patches of vegetation.

3.3.2 Scattered trees

The study area contains 19 scattered remnant trees including:

- One Very Large Old Tree (VLOT);
- One Large Old Tree (LOT); and
- 17 Small Trees (ST) (Figure 4).

Seventeen scattered trees are considered to be of Low conservation significance, and two scattered trees are considered to be of High conservation significance (Appendix 4.2).

3.4 Fauna

3.4.1 Fauna species

Sixteen terrestrial fauna species were recorded within the study area, comprising one introduced mammal and 15 birds (10 native, five introduced) (Appendix 3.1).

A high level of terrestrial fauna surveys have been undertaken within a 10 kilometre radius of the study area, with 1810 fauna surveys or incidental records of individual species (AVW 2007). From these records, there has been 381 individual species documented, with a high number of bird records, and moderate number of mammals, reptiles and frogs (AVW 2007). A number of these species (common open country and woodland birds) are likely to use habitats within the study area.

3.4.2 Fauna habitats

The study area currently supports five broad habitat types: modified woodland/remnant trees, Swamp Scrub, irrigation channels, artificial waterbodies, and introduced pasture grass and crops (Figure 8).

Scattered trees (remnants of Grassy Woodland and Heathy Woodland), shelterbelts and planted vegetation

Overall habitat value – Habitat value for planted vegetation and scattered trees ranges from **low** for juvenile or immature trees, to **moderate** for mature trees (Appendix 1.5).

Description – Scattered indigenous trees as well as other planted native and exotic trees occur throughout the study area. Native and introduced trees and shrubs have been planted as shelterbelts and for ornamental use throughout the study area. Many of these trees are mature and reach a height of up to 20 metres, with some supporting crevices and hollows. The midstorey is generally absent, with an understorey predominantly consisting of introduced pasture grasses and bare ground.

Terrestrial fauna – Many of these trees provide a suitable foraging resource, primarily for a range of locally common birds. Additionally, low growing shrubs would be used by smaller passerine species such as wrens, thornbills, and fantails for nesting and foraging purposes.

Swamp Scrub (Corresponding EVC: Swamp Scrub)

Overall habitat value – Intact areas of swamp scrub areas are of **moderate** habitat value for a range of native fauna (Appendix 1.5). Despite lacking in floristic diversity, the dense and protective habitat structure they create provides some refuge for native birds and potentially ground dwelling species such as reptiles and frogs.

Description - This habitat type is generally present along low-lying areas and the artificial drains. It occurs in one isolated patch in the south of the study area. Swamp Scrub is characterised by an extensive midstorey of Swamp Paperbark, which typically grows densely, shading the understorey, and preventing most other vegetation from becoming established. The dense and sheltered environment that is subsequently created is favoured by many small woodland birds for shelter, foraging and possibly nesting.

Fauna – Due to the patch within the study area being surrounded by highly modified agricultural land, this habitat type supports few native fauna, but some woodland birds and skinks are likely to be present.

Irrigation channels (Corresponding EVCs: Swamp Scrub or non-native vegetation)

Overall habitat value – Irrigation channels and ephemeral drainage lines are considered to provide **low** to **moderate** habitat values for fauna (Appendix 1.5). They may provide temporary habitat for waterbirds and native fish when inundated.

They may provide dispersal routes for common frogs. Irrigation channels within the study area are not considered to provide habitat for Growling Grass Frog due to the lack of aquatic vegetation and other key habitat attributes (e.g. habitat connectivity throughout the landscape). Due to their lack of connectivity with other waterbodies, they are also not considered to be habitat for nationally significant fish such as Dwarf Galaxias and Australian Grayling.

Description – At the time of the assessment, irrigation channels lacked an extensive cover of fringing aquatic and semi-aquatic vegetation, and suitable refuge sites such as logs or rocks. The surrounding vegetation typically comprises introduced pasture grass or crops.

Fauna – Irrigation channels currently provide opportunistic foraging habitat for several common waterbirds such as Australian Wood Duck *Chenonetta jubata* and Pacific Black Duck *Anas superciliosa*. This habitat may also provide habitat for more elusive birds such as Hardhead *Aythya australis* and Australasian Shoveler *Anas ryhnchotis*.

Artificial waterbodies (Farm Dams) (Corresponding EVC: None)

Overall habitat value – Artificial waterbodies are considered to be of **low to moderate** habitat value for fauna (Appendix 1.5).

Description – Several artificial waterbodies exist within the study area. They currently support low levels of emergent macrophytes and aquatic vegetation, with few refuge sites such as logs or rocks. The surrounding vegetation comprises of introduced pasture grass or crops.

Fauna – Waterbirds such as Australian Wood Duck and Pacific Black Duck, and frog species such as Common Froglet *Crinia signifera* and Spotted Marsh Frog *Limnodynates tasmaniensis* are expected to use this habitat. This habitat does not provide suitable habitat for the state significant Southern Toadlet, and there is a low likelihood of occurrence for Growling Grass Frog.

Pastures and crops (Corresponding EVC: None)

Overall habitat value – This habitat is considered to be of **low** habitat value for fauna (Appendix 1.5). Cropped areas provide limited habitat for fauna, predominantly supporting common birds adapted to modified environments.

Description – This habitat occurs throughout the majority of the study area where native vegetation has been removed. It comprises mostly of crops, and other smaller areas of pasture grasses and environmental weeds.

Fauna – Few native species are known to use this habitat, these include birds adapted to modified habitats such as Raven *Corvus* spp., Australian Magpie *Gymnorhina tibicen* and Galah *Eolophus roseicapilla*. Introduced species such as Common Starling *Sturnus vulgaris* and House Sparrow *Passer domesticus* were also prevalent in this habitat.

Raptors (Brown Falcon *Falco berigora*, Nankeen Kestrel *Falco cenchroides* and Black-shouldered Kite *Elanus axillaris*) are likely to search for prey items over these areas. Although introduced grasses and crops do not provide optimal habitat for fauna, they do provide dispersal opportunities (cover) for reptiles, frogs and other species into more optimal habitats throughout the local area.

3.4.3 Significant fauna species

Terrestrial fauna species derived from respective Commonwealth and State databases as occurring, or having the potential to occur within the study area is provided below (Appendix 3.2).

No national or state significant fauna species were recorded during the present assessments. National, state and regionally significant fauna species that have been previously recorded within 10 kilometres of the study area are provided below (AVW 2007). Potential habitat for significant fauna species is shown in Figure 8.

National

Eleven nationally significant fauna have previously been recorded within 10 kilometres of the study area (AVW 2007) (Appendix 3.2). These species include:

- Two mammals: Southern Brown Bandicoot *Isoodon obselus obselus* (no suitable habitat) and Grey-headed Flying-fox *Pteropus poliocephalus* (occasional flyover).
- Five birds: Australian Painted Snipe *Rostratula australis*, Australasian Bittern *Botaurus poiciloptilus*, Orange-bellied Parrot *Neophema chrysogaster*, Swift Parrot *Lathamus discolor* and Regent Honeyeater *Anthrochaera Phrygia* (no suitable habitat for any species).
- Two fish: Dwarf Galaxias *Galaxiella pusilla* and Yarra Pygmy Perch *Nannoperca obscura* (no suitable habitat for both species).
- One frog: Growling Grass Frog *Litoria raniformis* (marginal habitat, low likelihood of occurrence).
- One invertebrate: Golden Sun Moth *Synemon plana* (no suitable habitat).

A further three species (not previously documented on the AVW) Long-nosed Potoroo *Potorus tridactylus*, Smoky Mouse *Pseudomys fumeus* and Spot-tailed Quoll *Dasyurus maculatus*, or habitat for these species, are identified as potentially occurring within a 10km radius of the study area (DSEWPC 2010) (Appendix 3.2).

Nationally significant fauna species that the GAA requested to be targeted are discussed in greater detail below.

Australian Grayling

Australian Grayling is a medium sized fish, generally growing to 190 millimetres, although it has been known to grow to 330 millimetres (Backhouse *et al.* 2008b). It is a slender, laterally compressed fish with soft-rayed fins that lack any spines (McDowall 1996; Allen *et al.* 2002). Australian Grayling is a greyish-bronze fish (though may sometimes appear greenish) which

is darker on the dorsal surface, graduating to a silvery underside with translucent to yellowish-grey fins (Backhouse *et al.* 2008).

Most of its life is spent in freshwater, though at least some of its juvenile stage is spent in coastal seas (Backhouse *et al.* 2008b). Spawning occurs in freshwater in late summer to winter, and is generally initiated by increase in volume and flow rate of rivers and streams, possibly coupled with decreases in water temperature (Backhouse *et al.* 2008). It is believed that most individuals die after their second year, often after only having spawned for one season, with only a small proportion of the population living for four to five years (Backhouse *et al.* 2008b).

Known from rivers and streams draining into the sea, south and east of the Great Dividing Range (McDowall 1996), Australian Grayling is now a relatively uncommon resident of south-east Australia (Allen *et al.* 2002). It seems much of the decline is due to habitat decline, though recent research suggests the lack of suitable conditions for breeding is likely responsible for the reduction in numbers of the species (Allen *et.al.* 2002).

Australian Grayling has not been previously recorded within the study area or in the near vicinity, the nearest record being taken at Cardinia Creek, over six kilometres from the study area. No tributaries of Cardinia Creek are present within the study area, and dams within the study area are not filled by water from nearby creeks. Therefore the study area is considered unlikely to support Australian Grayling (Figure 8).

Dwarf Galaxias

Dwarf Galaxias is a very small Galaxiid, with females reaching up to 40 millimetres and males only 35 millimetres (DPIW 2006). It is a slightly stocky fish, with a deepened trunk at the belly and small head with a blunt snout (McDowall 1996). The fins are small and membranous (McDowall 1996) with large flanges on the caudal (tail) fin that cause it to almost reach the dorsal and anal fin (McDowall 1996; DPIW 2006).

Breeding occurs in spring, where pairs will spawn eggs one by one on aquatic plants (likely less than 100 eggs), each approximately one millimetre in diameter. Dwarf Galaxias lives its entire life cycle in freshwater (McDowall 1996; DPIW 2006).

Dwarf Galaxias occurs in southern Victoria from Gippsland east to Mount Gambier in South Australia, also on Flinders Island and in the east of the north coast of Tasmania (Humphries 1996; McDowall 1996) and is intermittent in occurrence, though often locally abundant (DPIW 2006).

It is mostly found in still (McDowall 1996) or slow-flowing waters (DPIW 2006), which are often overgrown with aquatic and/or emergent plants. They can occur within permanent waterbodies, though are commonly located within ephemeral pools (connected to permanent waterways) and are thought to be able to aestivate when waterbodies are dry (McDowall 1996).

The nearest records of Dwarf Galaxias to the study area are within 500 metres to the north west of the study area, at created wetlands, and the species could potentially use Tea-tree Creek, which has ephemeral tributaries which flow close to the study area. However these tributaries do not reach the study area, and are unlikely to become inundated to the point of connecting to artificial dams within the study area. Therefore the study area is considered unlikely to contain Dwarf Galaxias (Appendix 3.2).

Growling Grass Frog

The Growling Grass Frog is listed as endangered in Victoria (DSE 2007a), is listed under the FFG Act, and vulnerable under the EBPC Act (DSEWPC 2010). A draft Flora and Fauna Guarantee Action Statement (Robertson 2003) and a draft National Recovery Plan have been development for the species (DEC 2005). Overall the species is of national conservation significance.

Although formerly widely distributed across southern eastern Australia, including Tasmania (Littlejohn 1963, 1982; Hero *et al.* 1991), the species has declined markedly across much of its former range. This has been most evident over the past two decades and in many areas, particularly in south and central Victoria, populations have experienced apparent declines and local extinctions (AVW 2007; Mahony 1999; Aaron Organ, Ecology Partners Pty Ltd pers. obs.).

This species is largely associated with permanent or semi-permanent still or slow flowing waterbodies (i.e. streams, lagoons, farm dams and old quarry sites) (Hero *et al.* 1991; Barker *et al.* 1995). Frogs can also use temporarily inundated waterbodies for breeding purposes providing they contain water over the breeding season, including down in south-eastern Melbourne (Aaron Organ, Ecology Partners Pty Ltd pers. obs.).

Based on previous investigations there is a strong correlation between the presence of the species and key habitat attributes at a given waterbody. For example, the species is typically associated with waterbodies supporting extensive cover of emergent, submerged and floating vegetation (Robertson *et al.* 2002; Ecology Partners Pty Ltd 2006; Hamer and Organ 2008).

Growling Grass Frog was not targeted during the general fauna assessment. While there have been no previous records of Growling Grass Frog within the study area there is a low likelihood that individuals would use habitats (e.g. artificial drainage lines) within the study area.

Growling Grass Frog has been previously recorded in dams approximately 10 kilometres east of the study in GAA Precinct 5, and has been recorded in several locations along Toomuc Creek and farm dams in GAA Precinct 7, approximately 15 kilometres east of the study area. Due to the lack of connecting habitat and suitable waterbodies within the study area Growling Grass Frog is considered to have a low likelihood of occurrence within the study area (e.g. along drainage channels) (Appendix 3.2).

Grey-headed Flying Fox

Grey-headed Flying Fox has also previously been recorded within a 10 kilometre radius of the study area, and may forage on flowering gums within the study area; however it also has a low likelihood of occurrence (Appendix 3.2).

State

Thirty-one state significant fauna species have previously been documented from the local area (AVW 2007), and the likely use of the study area by these species is provided in Appendix 3.2. These species include:

- Three diurnal raptors: Grey Goshawk *Accipiter novaehollandiae*, White-bellied Sea-Eagle *Haliaeetus leucogaster* and Black Falcon *Falco subniger* (no suitable habitat for any species).
- One nocturnal raptor: Powerful Owl *Ninox strenua* (no suitable habitat).
- Twenty-one wetland associated birds: Lewin's Rail *Lewinia pectoralis*, Baillon's Crake *Porzana pusilla*, White-faced Storm-Petrel *Pelagodroma marina*, Caspian Tern *Hydroprgne caspia*, Whimbrel *Numenius phaeopus*, Black-tailed Godwit *Limosa limosa*, Wood Sandpiper *Tringa glareola*, Grey-tailed Tattler *Heteroscelus brevipes*, Common Sandpiper *Actitis hypoleucos*, Terek Sandpiper *Xenus cinereus*, Royal Spoonbill *Platalea regia*, Little Egret *Egretta garzetta*, Intermediate *Egret Ardea intermedia*, Eastern Great Egret *Ardea modesta*, Little Bittern *Ixobrychus minutus*, Magpie Goose *Anseranas semipalmata*, Australasian Shoveler *Anas rhynchotis*, Freckled Duck *Stictonetta naevosa*, Hardhead *Aythya australis*, Blue-billed Duck *Oxyura australis* and Musk Duck *Biziura lobata* (suitable habitat for Baillon's Crake, Royal Spoonbill, Eastern Great Egret, Australasian Shoveler, Hardhead and Blue-billed Duck);
- Four woodland associated birds: Hooded Robin *Melanodryas cucullata*, Grey-crowned Babbler *Pomatostomus temporalis*, Diamond Firetail *Stagonopleura guttata* and Major Mitchell's Cockatoo *Lophocroa leadbeateri* (no suitable habitat);
- One reptile: Lace Goanna *Varanus varius* (no suitable habitat); and,
- One amphibian: Southern Toadlet *Pseudophryne semimarmorata* (marginal habitat, low likelihood).

Due to the low quality and isolation of this habitat in the local area, there is a low likelihood of occurrence for any of these threatened species (Appendix 3.2).

The state significant fauna species which may occur within the study area are discussed in detail below.

Southern Toadlet

Southern Toadlet is a small frog, with adult body length up to 30 millimetres. The back is warty and varies from brown to dark olive-green with darker flecks (Barker *et al.* 1995; Robinson 2000). The chest has black and white marbling, while the throat, lower belly and underside of the limbs are tan to orange in colour (Barker *et al.* 1995; Robinson 2000). Males have a granular belly, while the female belly is smooth (Hero *et al.* 1991; Barker et al. 1995; Robinson 2000).

Tadpoles are dark grey to brown, sometimes with a copper sheen and with transparent, spotted fins (Anstis 2002). Breeding season occurs from March to June and males call anytime from February to June depending on environmental conditions. The male call is a short, grating "cre-ek" repeated every few seconds (Hero *et al.* 1991).

Southern Toadlet can be found in forest, woodland, shrubland, grassland and heathland. Adults shelter under leaf litter, rocks, logs and other debris in damp areas (Hero *et al.* 1991; Robinson 2000). They are a ground dwelling frog with a preference for walking (Hero et al. 1991). Males of this species call from shallow burrows in low lying areas, usually near water or boggy ground (Hero *et al.* 1991; Robinson 2000). Males usually call in late summer to autumn, before and after periods of heavy rain (Robinson 2000).

Southern Toadlet was not recorded during the current assessment and there are no records of this species from the local area (i.e. within 10 kilometres of the study area) (AVW 2007). Given the results of the targeted surveys and the low quality habitat within the study area there is unlikely to be an extant population of Southern Toadlet within the study area. In addition, due to the species low dispersal ability and the lack of suitable habitat surrounding the study area, there is limited potential for this species to colonise the study area in the future.

Royal Spoonbill

Royal Spoonbill inhabits shallow wetlands and margins of deeper waters, such as fresh or saline swamps and flooded pastures, either open water or vegetated, and also coastal lagoons and mangroves (Morcombe 2000). Royal Spoonbill was not recorded during the fauna assessment, and is considered to have a low likelihood of occurrence within the study area. It may opportunistically use the edges of dams within the study area for foraging (Appendix 3.2).

Eastern Great Egret

Eastern Great Egret occurs throughout most of Victoria, with the exception of Mallee or Alpine areas. This species occupies a variety of wetlands and wet grasslands, preferring permanent waterbodies on floodplains (Marchant and Higgins 1990). Eastern Great Egret has not been previously recorded within the study area and is considered to have a low likelihood of occurrence (Appendix 3.2). Eastern Great Egret and other waterbirds such as Australasian Shoveler, Hardhead and Blue-billed Duck may also opportunistically use dams within the study area for foraging (Appendix 3.2).

Regional and local

No regionally significant fauna were recorded during the present assessment. Twenty-two fauna species have been previously recorded in the local area (Appendix 3.2). However, due to the high modification of habitat within the study area, it is unlikely that regionally significant fauna species occur. All other native fauna (primarily common open country birds) are of local significance, as they are not listed as rare or threatened on a national, state and regional level.

3.4.4 Best or remaining 50% habitat for rare and threatened fauna species

No remnant patches within the study area contain suitable habitat for threatened fauna. The habitat assessment for threatened species following the *Native Vegetation Guide for assessment of referred planning permit applications* (DSE 2007b) is summarised in Table 3.

Table 3: Habitat Assessment for threatened species

Step	Description	Outcome
A	Is the species, or has the species been recorded as resident on site> OR if the species is not 'resident' has it been recorded regularly (e.g. annually) on-site?	Yes – go to B No – go to D
B	Is it possible to discriminate between the importance of different populations of the species? For example, can numbers be reasonably estimated and is there available knowledge on what are typical population sizes?	Yes – go to C No – go to E
C	Does the site contain a population that is above average size or importance for the bioregion?	Yes – Best 50% of habitat No – remaining 50% of habitat
D	Does the habitat on site clearly meet one or more of the habitat requirements of the species? Is it reasonable to expect that the species is present or would make significant use of the site in the medium term (i.e. within the next 10 years)?	Yes to both – go to F No to either – no further consideration required for that species
E	Has some form of habitat modelling been undertaken for the species in the bioregion?	Yes – use this information to determine Best 50% of habitat or Remaining 50% of habitat No – go to F
F	Does the site represent above-average condition and landscape context for the relevant EVC or habitat type in the bioregion?	Yes – best 50% of habitat No – Remaining 50% of habitat

The remnant vegetation within study area provides low quality habitat for fauna species. It is considered that no remnant native vegetation within the study area provides potential habitat for threatened fauna species, including those previously recorded in the local area. Therefore, following steps A to D within Table 2 in *Native Vegetation Guide for assessment of referred planning permit applications* (DSE 2007b), remnant vegetation within the study area is not considered to be either Best or Remaining 50% habitat for threatened fauna species.

4 RELEVANT LEGISLATION AND POLICY

This section discusses the implications of relevant environmental legislation and policies within the three tiers of government; Commonwealth, State and Local.

4.1 Commonwealth

4.1.1 *Environment Protection and Biodiversity Conservation Act 1999*

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

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

Ramsar Wetlands of International Significance

There are no Ramsar listed wetlands within the study area; however the Port Phillip and Westernport Ramsar Wetland site is located within 10 kilometres of the study area. As with other adjacent developments, it is expected that practical mitigation measures can be undertaken to prevent any impacts on this Ramsar site.

Listed Flora and Fauna Species and Ecological Communities

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

Flora – No flora species listed under the EPBC Act were recorded during the current assessment. Eight species have the potential to occur within a 10 kilometre radius of the study area (DSEWPC 2010).

The study area is considered unlikely to support a nationally significant population of flora species. As such, based on available information, an EPBC Act referral to the Commonwealth Environment Minister is not recommended for any future development of the study area.

Fauna – No fauna species listed under the EPBC Act were recorded during the present assessment. Eleven listed species have been previously recorded in the local area (AVW 2007), and an additional three species or their habitats are predicted to occur in the local area (DSEWPC 2010). No suitable habitat for EPBC Act-listed species was recorded within the study area, and therefore there is a low likelihood that these species are present or likely to occur.

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

Listed Migratory and Marine Species

Several migratory and marine species have been recorded from the local area (AVW 2007). Common waterbirds are likely to forage within dams, and some state significant species may use the dams opportunistically. However, waterbodies within the study area are not considered important wetlands or marine habitats. No EPBC Act-listed migratory and/or marine species have been recorded in the near vicinity of the study area and are unlikely to use the study area for foraging or breeding.

Commonwealth Marine Area and Nuclear Actions

The study area is not within a marine area, nor are the proposed works related to nuclear actions.

Implications and Recommendations

No EPBC Act-listed flora or fauna species were recorded during the current assessment, and it is considered unlikely that any future development of the study area would have an impact on any matters of NES.

An agreement under the Strategic Assessment provision of the EPBC Act (Section 146(1) Agreement, Part 10 Strategic Assessment (EPBC Act)) was made between the Commonwealth of Australia and the State of Victoria on 16th June 2009.

The Strategic Assessment provides an opportunity to align State and Commonwealth requirements and approval standards. Based on the approved Strategic Impact Assessment there is no requirement to make an EPBC Act referral to the Commonwealth for assessment under Part 9 of the EPBC Act.

4.2 State

4.2.1 *Planning and Environment Act 1987*

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

- the application is exempt under the schedule to Clause 52.17; or
- A Native Vegetation Precinct Plan applies.
- Planning schemes may contain other provisions in relation to the removal of native vegetation.
- Clause 52.16 applies to land where a native vegetation precinct plan, corresponding to that land, is incorporated into this scheme. Where an NVPP applies, a permit is required to remove destroy or lop native vegetation, except where it is in accordance with that NVPP and Clause 52.16. Though an NVPP can stand alone, it may form part of a more general strategic or precinct structure plan. The purpose of an NVPP is to protect and conserve native vegetation to reduce the impact of land and water degradation and provide habitat for plants and animals, and to enable other areas of native vegetation to be removed in accordance with the NVPP. The NVPP may require specified works to be provided or specified payments to be made to offset the removal, destruction or lopping of native vegetation. No permit is required under clause 52.17 where an NVPP is incorporated and listed in the schedule to clause 52.16 Native Vegetation Precinct Plan.

Implications and Recommendations

A planning permit is required from Casey City Council to remove, destroy or lop native vegetation within the study area. However, consistent with above, once the NVPP is an incorporated document in the local planning scheme, Clause 52.16 applies to the protection and removal of native vegetation.

4.2.2 *Flora and Fauna Guarantee Act 1988*

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

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

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

Flora - Three flora species listed as threatened under the FFG Act, Metallic Sun-orchid, Swamp Everlasting and Frankston Spider-orchid have been recorded within a 10 kilometre radius of the study area (FIS 2007). Due to the low quality of remnant vegetation, it is considered unlikely that any FFG Act flora species listed as threatened are present or likely to occur within the study area. Three flora species listed as protected under the FFG Act, Black Wattle *Acacia mearnsii*, Cassinia *Cassinia* sp. and Water Buttons *Cotula coronopifolia*.

Vegetation Communities – No FFG Act listed communities are located within the study area.

Fauna – No FFG Act-listed fauna species were recorded within the study area during the assessment. Thirty fauna species listed as threatened under the FFG Act have previously been recorded from within the local area (i.e. within a 10 kilometre radius of the study area) (Appendix 3.2). However, there is no suitable habitat for any FFG Act-listed fauna species, and it is unlikely they would be recorded within the study area.

Threatening processes – Future development of the study area should consider FFG Act-listed threatening process such as invasion of native vegetation by environmental weeds.

Implications and Recommendations

Based on available information (i.e. the literature review, results of the field surveys), no flora or fauna species listed as threatened under the FFG Act are considered likely to occur within the study area.

An FFG Act permit will be required for the removal of protected species under the Act, if protected species are located on public land. Species protected under the FFG Act that were recorded within the study area include Black Wattle, Cassinia and Water Buttons.

4.2.3 *Environmental Effects Act 1978*

Environmental impacts or effects of a proposed development can be assessed according to the *Environment Effects Act 1978*. It is not an approval process itself, but a way of enabling Ministers, local government and statutory authorities to make informed decisions about whether a project with potentially significant environmental effects should proceed. The central part of the process is the preparation of an Environmental Effects Statement (EES). The proponent is responsible for preparing an EES if the Minister for Planning decides that one is required. After the EES is completed and released for public comment, the Minister provides an assessment to the relevant decision-makers. There are also opportunities for community involvement at certain stages of the process. The Department of Planning and Community Development coordinates the process, implementing Ministerial Guidelines that set out the details under the Act.

Implications and Recommendations

It is considered unlikely that an EES will be required for future development of the study area.

4.2.4 *Catchment and Land Protection Act 1994*

The *CALP Act* contains provisions relating to catchment planning, land management, noxious weeds and pest animals. This Act also provides a legislative framework for the management of private and public land and sets out the responsibilities of land managers, stating that they must take all reasonable steps to:

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

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

Implications and Recommendations

Based on the survey results at least four noxious weed species are present within the study area. Current and future landowners are responsible to control any infestation of noxious weeds that may become established within the study area.

4.2.5 *Wildlife Act 1975*

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

The *Wildlife Act 1975* has the following objectives:

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

Implications and Recommendations

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

4.2.6 The Native Vegetation Framework

Since 1989, most proposals to clear native vegetation have required a planning permit from the local Council (Responsible Authority), under the native vegetation provisions of Clause 52.17 of the Victoria Planning Provisions ('VPPs').

In 2002, the Victorian Government released *Victoria's Native Vegetation Management – A Framework for Action* (NRE 2002) ('the Framework'), which establishes a 'strategic direction for the protection, enhancement and revegetation of native vegetation across the State'.

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

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

The Framework states that the primary goal is to achieve:

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

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

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

1. To avoid adverse impacts, particularly through vegetation clearance.
2. If impacts cannot be avoided, to minimise impacts through appropriate consideration in planning processes and expert input to project design or management.
3. Identify appropriate offset options.

Vegetation within the study area was assessed according to the habitat hectare methodology, which is described in the Vegetation Quality Assessment Manual (DSE 2004). Habitat hectare is a unit of measurement, which combines both quality (relative to an EVC Benchmark) and quantity (EVC type) for a habitat zone (DSE 2004). Habitat hectare assessments have been undertaken on remnant patches of vegetation within the study area (Attachment 4.1).

4.2.7 Port Phillip and Westernport Native Vegetation Plan

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

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

The recommendations made in the *Native Vegetation Plan*, should be taken into consideration in the planning phase of any proposed future works.

Implications and Recommendations

The *Port Phillip and Westernport Native Vegetation Plan* (PPWCMA 2006) has been referred to when preparing this report.

4.2.8 Victoria's Biodiversity Strategy

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

The Biodiversity Strategy encourages Victorians to better understand and appreciate flora and fauna and ecosystems throughout the state, and to take an active part in conservation and management to ensure biodiversity is managed in an ecologically sound and sustainable manner. The Strategy should be taken into account for any proposed developments.

4.3 Local

4.3.1 Casey City Council

Under the City of Casey planning scheme, the majority of the study area is an Urban Growth Zone (UGZ) and Business 1 Zone (B1Z). The area of land owned by City of Casey is zoned Public Use Zone (PUZ6), and the remainder of the area falls under Mixed Use Zone (MUZ) and Road Zone Category 1 (RDZ1).

There are a number of overlays which affect the study area including Development Plan Overlay (DPO), Development Contributions Plan Overlay (DCPO6) and a Public Acquisition Overlay (PAO1) which affects a small portion of the study area. The Urban Growth Boundary (UGB) covers the majority of the study area.

Implications and Recommendations

At present, a planning permit is required from City of Casey for the removal of native vegetation. Once the NVPP has been prepared and the PSP is an incorporated document in the local planning scheme, this precludes the requirement for a planning permit to clear or remove remnant native vegetation.

5 POTENTIAL IMPACTS AND MITIGATION MEASURES

Potential impacts caused by future development of the study area include:

- The loss of:
    - less than 0.01 habitat hectares of vegetation is present within the study area, comprising Low conservation significance Heathy Woodland, High conservation significance Swamp Scrub, and High conservation significance Grassy Woodland.
    - The study area contains 19 scattered remnant trees including Seventeen scattered trees are considered to be of Low conservation significance, and two scattered trees are considered to be of High conservation significance; and
- The loss of pastures, grasses and dams which provide low quality habitat for native birds and reptiles.

5.1 Opportunities to Reduce Potential Impacts

Future development of the study area has the potential to impact (direct and indirect) indigenous flora and fauna species recorded within the study area. Measures to mitigate/ameliorate impacts on the ecological values in the study area include:

- Avoid areas of remnant native vegetation and scattered trees, along with of fauna habitat;
- If considered appropriate, fence areas of remnant native vegetation, scattered remnant trees, and other fauna habitats during construction;
- Eradicate or control weeds appropriately and ensure contractors and machinery are not transferring weed seed or material within, and outside of the study area;
- Wash-down procedures for vehicles entering the site should be implemented, to avoid the spread of introduced weed species within the study area;
- Prepare a detailed Revegetation Plan to improve the cover of native vegetation, mimic the EVCs what would have originally occurred within the study area;
- Incorporate Water Sensitive Urban Design (WSUD) into any future development plans to minimise pollution reaching Port Phillip and Westernport Bay, which are Ramsar wetlands; and,
- A zoologist or wildlife handler should be present at the time of tree removal to ensure the safety of any fauna living in the trees.

5.2 Opportunities to Protect and Enhance Regional and Local Biodiversity Values

Habitat within the study area is highly fragmented, and remnant patches of vegetation are small, and are often without connectivity to other remnant vegetation. Opportunities to enhance local biodiversity values include:

- Protect scattered indigenous trees along Narre Warren–Cranbourne Road;
- Allowing the natural regeneration of native vegetation within the study area;
- Provision of additional fauna habitat in the form or wetlands or stormwater treatment ponds/wetlands;
- Revegetating existing areas of vegetation along Narre Warren-Cranbourne Road with site species indigenous to the study area, and the appropriate EVCs; and,
- Controlling noxious weeds within the study area such as African Boxthorn, Blackberry and Variegated Thistle.

6 CONCLUSION

The study area is highly modified and is dominated by exotic vegetation. The majority of native vegetation within the study area has been cleared from previous land use activities (i.e. agriculture). Remnant vegetation within the study area comprises three EVCs; Grassy Woodland (EVC 175), Heathy Woodland (EVC 48) and Swamp Scrub (EVC 53_61).

There are less than **0.01 habitat hectares** of remnant native vegetation within the study area. Vegetation is considered to be of Low and High conservation significance, and is not considered to be in the best or remaining 50% of habitat for threatened flora and fauna species. There are 19 scattered trees within the study area. These consist of very large, large and small trees, which are of High and Low conservation significance. If any scattered trees within the study area are proposed to be removed, they must be offset in accordance with the Framework and Port Phillip and Westernport Native Vegetation Plan (PPWCMA 2006).

No significant flora was recorded during the current assessment, and it is concluded that that significant flora species are unlikely to be present within the study area.

The study area supports five main habitat types: modified woodland/remnant trees, irrigation channels, planted native and introduced vegetation, artificial waterbodies, and introduced pasture grass and crops.

No national or state significant flora or fauna species were recorded within the study area during the assessment. There are four nationally significant and 27 state significant flora species which have been previously recorded within the local area. There are 11 nationally significant and 31 state significant species which have been previously recorded within the local area. Based on available information (i.e. the literature review, results of the field surveys), there is a low likelihood that nationally significant Growling Grass Frog and Grey-headed Flying Fox (occasional fly over) occur, as they may use the dams and flowering gums within the study area, respectively. State significant birds such as Eastern Great Egret, Hardhead, Australasian Shoveler, Musk Duck, Blue-billed Duck and Royal Spoonbill may use the artificial waterbodies as visitors on an occasional basis.

An EPBC Act referral to the Commonwealth Environment Minister is not recommended as the future development of the study area (PSP area) will be assessed under Part 10 of the EPBC Act. It is unlikely that any matters of NES will be impacted by future development of the study area.

An FFG Act permit will be required for the removal of two protected species under the Act, if protected species are located on public land. Species protected under the FFG Act that were recorded within the study area (Black Wattle, Water Buttons and Cassinia).

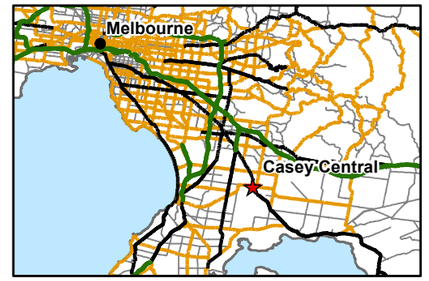
There are opportunities to enhance ecological values within the study area, principally through protection of the small patches of remnant native vegetation and areas of fauna habitat, and

allowing the regeneration of native vegetation, along with undertaking revegetation and weed control. Such activities should be undertaken in accordance with relevant Management Plans.

FIGURES

Legend

- Urban Growth Boundary
- Study Boundary
- Railway Station
- Railway
- Freeway
- Highway
- Arterial Road
- Major Road
- Minor Road
- Elevation Contours (10m)
- Watercourses
- Waterbodies
- Parks and Recreatation



Location & Overview of PSP Area 12

Biodiversity Assessment Reporting 2009/10

GDA 1994; VicGrid 1994

0 62.5 125 250

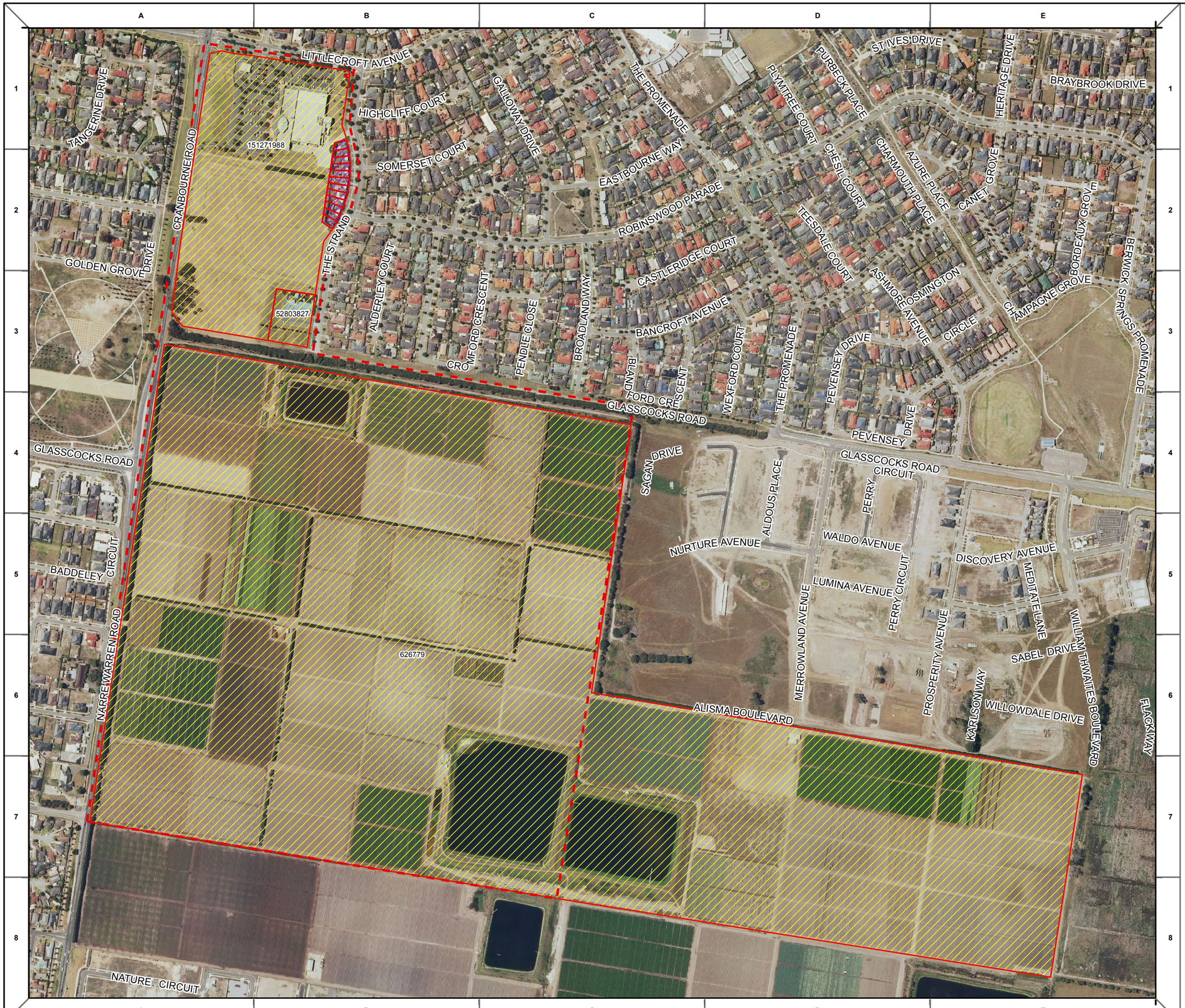
Meters

1:7,000 when printed @ A3

FIGURE 1

ecologypartners

EP Map # : 1621 Study Area 12
File Path: 1621_Fig01_SiteLocation_14Sep10.mxd
Issue Date: 14/09/2010



Legend

- Urban Growth Boundary
- Study Boundary
- Property Boundaries

Access Status

- Properties Assessed
- Not Assessed - No Vegetation Quality Assessment or Targeted Flora and Fauna Surveys Required

Access Information for PSP Area 12

Biodiversity Assessment Reporting 2009/10

N

GDA 1994; VicGrid 1994

0 65 130 260

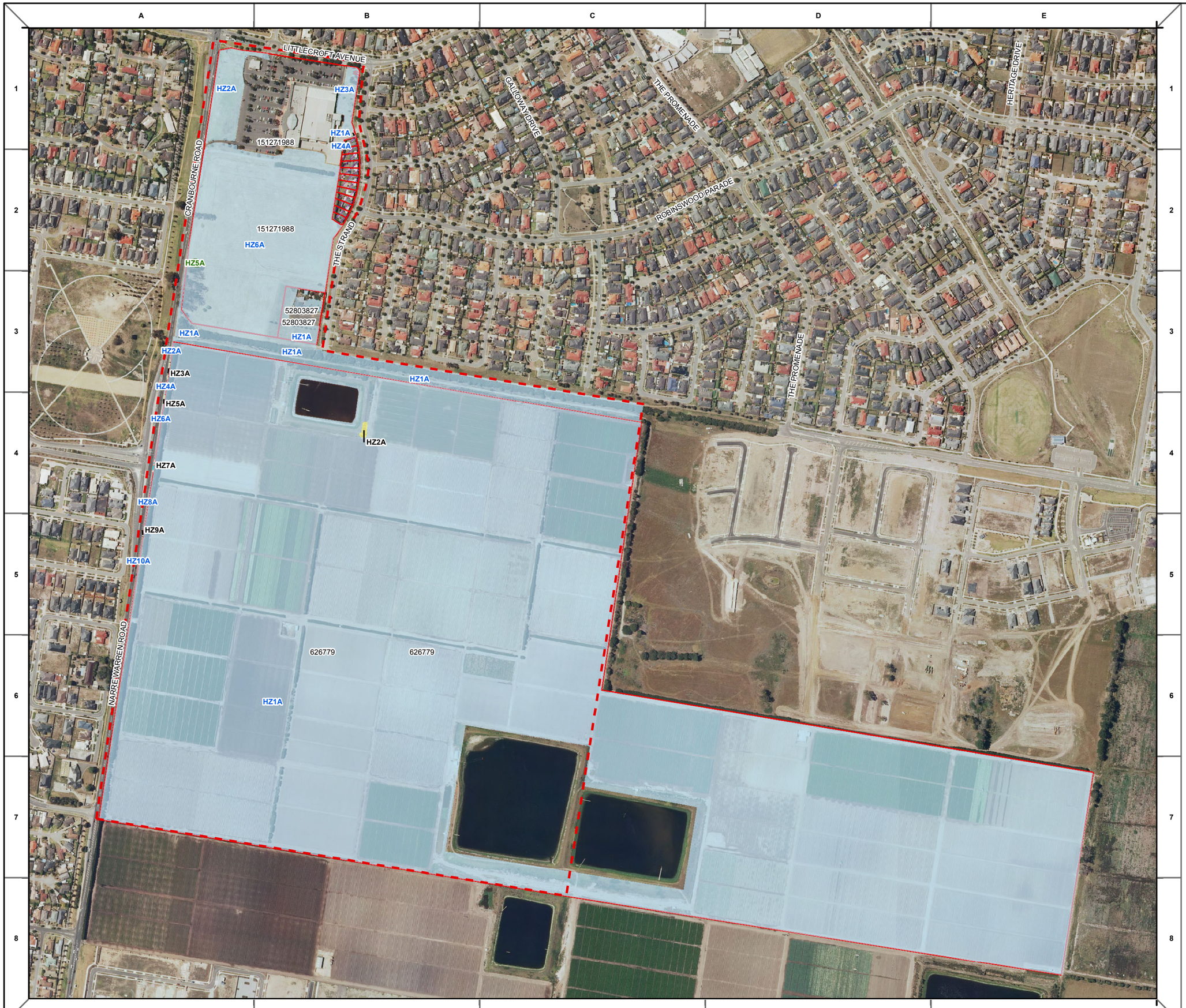
Meters

1:6,000 when printed @ A3

ecologypartners

FIGURE 2

EP Map # : 1621 Study Area 12
File Path: 1621_Fig02_AccessInfo_14Sep10.mxd
Issue Date: 14/09/2010



Legend

- Urban Growth Boundary
- Study Boundary
- Property Boundaries
- Properties not Assessed
- Degraded Treeless Vegetation
- Non Native Vegetation

Surveyed EVCs

- 48, Heathy Woodland
- 53, Swamp Scrub
- 175, Grassy Woodland

Native Vegetation Extents for PSP Area 12

Biodiversity Assessment Reporting 2009/10

N

GDA 1994; VicGrid 1994

0 70 140 280

Meters

1:6,000 when printed @ A3

ecologypartners

FIGURE 3

EP Map # : 1621 Study Area 12
File Path: 1621_Fig03_NativeVeg_14Sep10.mxd
Issue Date: 14/09/2010

Legend

- Urban Growth Boundary
- Study Boundary
- Property Boundaries
- Properties not Assessed

Scattered Tree Locations

- Very Large Old Tree
- Large Old Tree
- Medium Old Tree
- Small Tree

Scattered Tree Locations for PSP Area 12

Biodiversity Assessment Reporting 2009/10

GDA 1994; VicGrid 1994

0 70 140 280

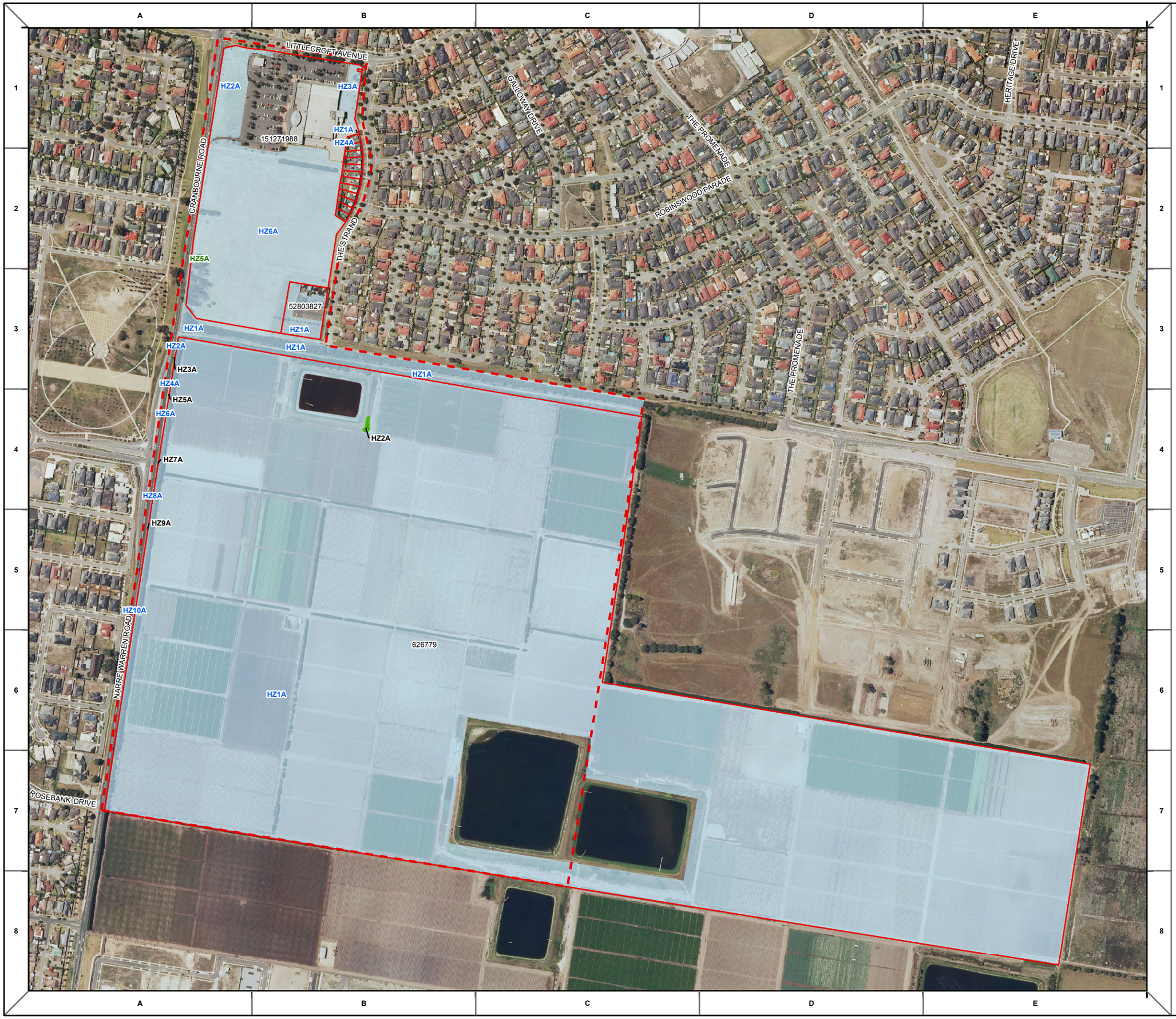
Meters

1:6,000 when printed @ A3

ecologypartners

FIGURE 4

EP Map # : 1621 Study Area 12
File Path: 1621_Fig04_STLocn_14Sep10.mxd
Issue Date: 14/09/2010



Legend

- Urban Growth Boundary
- Study Boundary
- Propery Boundaries
- Degraded Treeless Vegetation
- Non Native Vegetation

Conservation Significance

- High
- Low

Conservation Significance for PSP Area 12

Biodiversity Assessment Reporting 2009/10

N

GDA 1994; VicGrid 1994

0 62.5 125 250

Meters

1:6,000 when printed @ A3

ecologypartners

FIGURE 5

EP Map # : 1621 Study Area 12
File Path: 1621_Fig05_ConsSig_14Sep10.mxd
Issue Date: 14/09/2010

Legend

- Urban Growth Boundary
- StudyBoundary

Database Flora Records

- Nationally Listed Species
- State Listed Species

Assessment Flora Species

- State Listed Species
- Nationally Lised Species

Note: Database fauna records include the Aquatic Fauna Database (AFD) and Atlas of Victorian Wildlife(AVW). The locations of significant fauna species are based on data available from DSEs AVW database, the current field investigations and other sources. It is possible that additional fauna species of conservation significance have been recorded within the local area but are not shown.

Threatened Flora for PSP Area 12

Biodiversity Assessment Reporting 2009/10

N

GDA 1994; VicGrid 1994

0 180 360 720

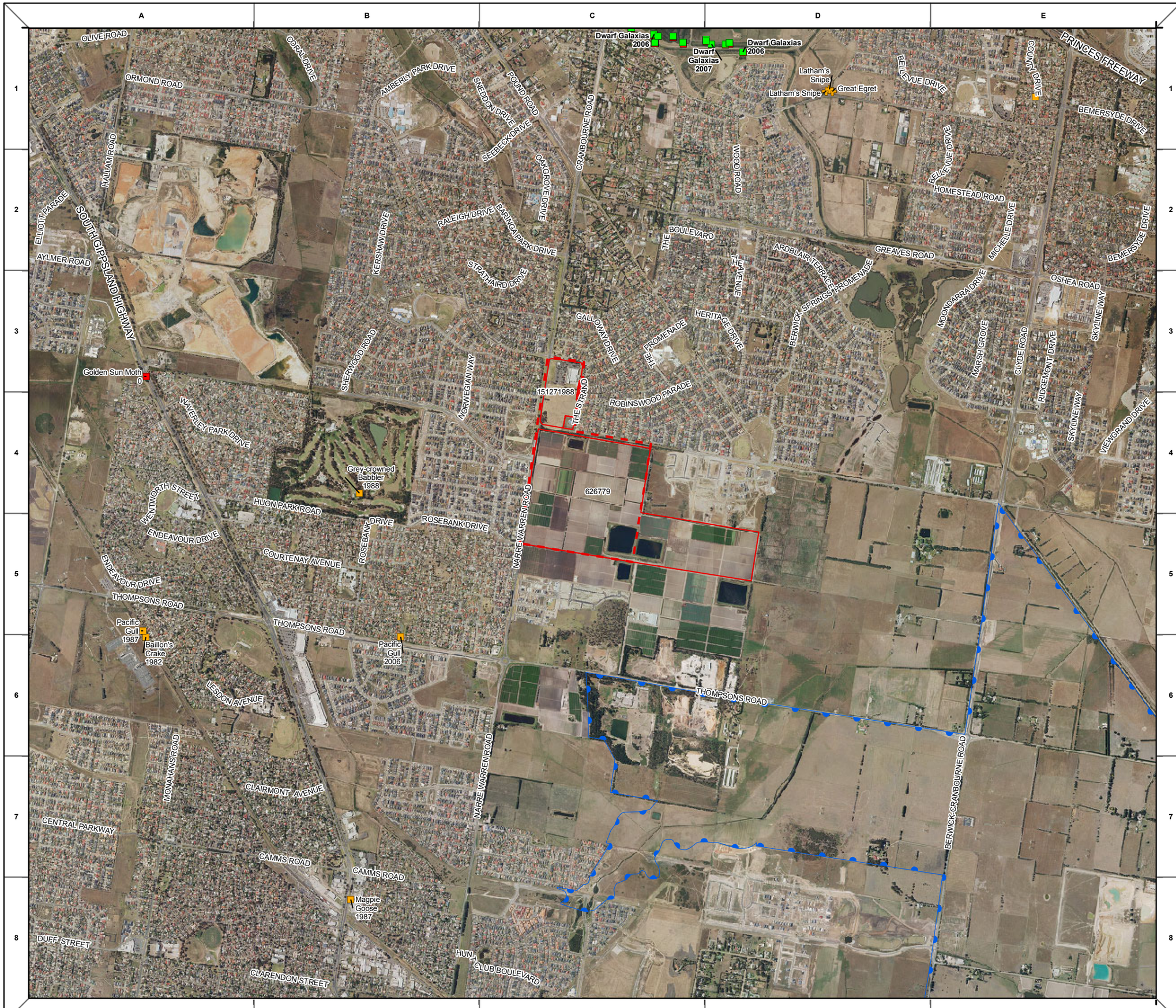
Meters

1:15,000 when printed @ A3

ecologypartners

FIGURE 6

EP Map # : 1621 Study Area 12
File Path: 1621_Fig06_ThrFlora_06Oct10.mxd.mxd
Issue Date: 06/10/2010



Legend

- Urban Growth Boundary
- StudyBoundary
- Property Boundaries

Database Fauna Records

- Nationally Listed Species
- State Listed Species
- DSE Verified Unpublished Records

Assessment Fauna Species

- State Listed Species
- Nationally Lised Species

Note: Database fauna records include the Aquatic Fauna Database (AFD) and Atlas of Victorian Wildlife(AVW). The locations of significant fauna species are based on data available from DSEs AVW database, the current field investigations and other sources. It is possible that additional fauna species of conservation significance have been recorded within the local area but are not shown.

Threatened Fauna for PSP Area 12

Biodiversity Assessment Reporting 2009/10

N

GDA 1994; VicGrid 1994

0 300 600 1,200

Meters

1:25,000 when printed @ A3

ecologypartners

FIGURE 7

EP Map # : 1621 Study Area 12
1621_Fig07_ThrFauna_06Oct10.mxd
Issue Date: 06/10/2010

Legend

- Urban Growth Boundary
- Study Boundary
- Property Boundaries
- Properties not Assessed

Potential Habitat

- Artificial Irrigation Dams

Artificial Irrigation Dams
Low Quality Waterbird Habitat for Royal Spoonbill, EasternGreat Egret and Latham's Snipe

Locations of Potential Habitat for PSP Area 12

Biodiversity Assessment Reporting 2009/10

GDA 1994; VicGrid 1994

0 60 120 240

Meters

1:7,000 when printed @ A3

ecologypartners

FIGURE 8

EP Map # : 1621 Study Area 12
File Path: 1621_Fig08_PotentialHabitat_14Sep10.mxd
Issue Date: 04/10/2010

APPENDICES

Appendix 1 – Significance Assessment

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

A1.1. Rare or Threatened Categories for listed Victorian taxa

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

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

A1.2. Defining Ecological Significance

Table A1.2. *Defining Ecological Significance.*

Criteria for defining Ecological Significance	
NATIONAL SIGNIFICANCE	
Flora	National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. extinct, critically endangered, endangered, vulnerable).
	Flora listed as rare in Australia in *Rare or Threatened Australian Plants* (Briggs and Leigh 1996).
Fauna	National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. extinct, critically endangered, endangered, vulnerable).
	Fauna listed as extinct, critically endangered, endangered, vulnerable, Rare or Lower Risk (near threatened, conservation dependent or least concern) under National Action Plans for terrestrial taxon prepared for the Department of Sustainability, Environment, Water, Population and Communities: threatened marsupials and monotremes (Maxwell *et al.* 1996), bats (Duncan *et al.* 1999), birds (Garnett and Crowley 2000), reptiles (Cogger *et al.* 1993), and amphibians (Tyler 1997).
	Species that have not been included on the EBPC Act but listed as significance according to the *IUCN 2009 Red List of Threatened Species* (IUCN 2009).
Communities	Vegetation communities considered critically endangered, endangered or vulnerable under the EPBC Act and considering vegetation condition.
STATE SIGNIFICANCE	
Flora	Threatened taxa listed under the provisions of the FFG Act.
	Flora listed as extinct, endangered, vulnerable or rare in Victoria in the DSE Flora Information System (most recent Version).
	Flora listed in the State Government's *Advisory List of Rare or Threatened Plants in Victoria*, 2005 (DSE 2005).
	Flora listed as poorly known in Australia in *Rare or Threatened Australian Plants* (Briggs and Leigh 1996).
Fauna	Threatened taxon listed under Schedule 2 of the FFG Act.
	Fauna listed as extinct, critically endangered, endangered and vulnerable on the State Government's *Advisory List of Threatened Vertebrate Fauna in Victoria - 2007* (DSE 2007a).
	Listed as Data Deficient, Insufficiently Known or Near-threatened under National Action Plans for terrestrial species prepared for the Department of Sustainability, Environment, Water, Population and Communities: threatened marsupials and monotremes (Maxwell *et al.* 1996), bats (Duncan *et al.* 1999), birds (Garnett and Crowley 2000), reptiles (Cogger *et. al.* 1993), and amphibians (Tyler 1997).

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

A1.3 Defining Site Significance

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

National: Australia

State: Victoria

Regional: Gippsland Plain bioregion

Local: Within 10 kilometres surrounding the study area

Table A1.3. *Defining Site Significance.*

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

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

A1.4. Defining Vegetation Condition

Table A1.4. *Defining Vegetation Condition.*

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

A1.5. Defining Habitat Quality

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

Table A1.5. *Defining Habitat Quality.*

Criteria for defining Habitat Quality
HIGH QUALITY
High degree of intactness (i.e. floristically and structurally diverse), containing several important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.
High species richness and diversity (i.e. represented by a large number of species from a range of fauna groups).
High level of foraging and breeding activity, with the site regularly used by native fauna for refuge and cover.
Habitat that has experienced, or is experiencing low levels of disturbance and/or threatening processes (i.e. weed invasion, introduced animals, soil erosion, salinity).
High contribution to a wildlife corridor, and/or connected to a larger area(s) of high quality habitat.
Provides known, or likely habitat for one or more rare or threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DSE 2005.
MODERATE QUALITY
Moderate degree of intactness, containing one or more important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.
Moderate species richness and diversity - represented by a moderate number of species from a range of fauna groups.
Moderate levels of foraging and breeding activity, with the site used by native fauna for refuge and cover.
Habitat that has experienced, or is experiencing moderate levels of disturbance and/or threatening processes.
Moderate contribution to a wildlife corridor, or is connected to area(s) of moderate quality habitat.
Provides potential habitat for a small number of threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DSE 2005.
LOW QUALITY
Low degree of intactness, containing few important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.
Low species richness and diversity (i.e. represented by a small number of species from a range of fauna groups).
Low levels of foraging and breeding activity, with the site used by native fauna for refuge and cover.
Habitat that has experienced, or is experiencing high levels of disturbance and/or threatening processes.
Unlikely to form part of a wildlife corridor, and is not connected to another area(s) of habitat.
Unlikely to provide habitat for rare or threatened species listed under the EPBC Act, FFG Act, or considered rare or threatened according to DSE 2005.

Appendix 2.1 – Flora survey results

Table A2.1. Indigenous flora recorded during the present survey (November 2009) from the study area.

Life form	Scientific name	Common name	Conservation Status			
			EPBC	DSE	FFG	Regional
	Allocasuarinaceae					
	Allocasuarina sp.	She oak	-	-	-	-
Tree	**Mimosaceae**					
	Acacia mearnsii	Black wattle	-	-	P	-
	Acacia melanoxylon	Blackwood	-	-	-	-
	Myrtaceae					
	Eucalyptus radiata	Narrow-leaf Peppermint	-	-	-	-
	Eucalyptus viminalis	Manna Gum	-	-	-	-
Shrub	**Asteraceae**					
	Cassinia sp.	Cassinia	-	-	P	-
	Myrtaceae					
	Melaleuca ericafolia	Swamp Paperbark	-	-	-	-
	Solanaceae					
	Solanum lacinatum	Kangaroo Apple	-	-	-	✓
Herb/Forb	**Asteraceae**					
	Cotula coronopifolia	Water Buttons	-	-	P	✓
	Polygonaceae					
	Rumex brownii	Slender Dock	-	-	-	✓
Graminoid (grass-like plant)	**Poaceae**					
	Distichilis distichophylla	Australian Salt-grass	-	-	-	✓
	Xanthorrhoeaceae					
	Lomandra longifolia	Spiny-headed Mat-rush	-	-	-	✓
Ferns	**Dennstaedtiaceae**					
	Pteridium esculentum	Austral Bracken	-	-	-	-

Notes: P – Protected flora species under the FFG Act

Table A2.2. Introduced flora recorded during the present survey (November 2009) from the study area.

Life form	Scientific name	Common name	Listed Status		
NON-INDIGENOUS NATIVE SPECIES			**EPBC**	**DSE**	**FFG**
Tree	**Myrtaceae**				
	Eucalyptus globulus	Southern Blue Gum	-	-	-
	Melaleuca armillaris subsp. *armillaris*	Spotted Gum	-	-	-
	Pittosporaceae				
	Pittosporum undulatum	Sweet Pittosporum	-	-	-
EXOTIC SPECIES			**CALP ACT LISTED WEEDS**		
Tree	**Cupressaceae**				
	Cupressus macrocarpa	Monterey Cypress	-		
	Salicaceae				
	Populus sp.	Poplar	-		
Shrub	**Rosaceae**				
	Rubus fruticosus spp. agg.	Blackberry	✓		
	Rubiaceae				
	Coprosma repens	Mirror Bush	-		
	Solanaceae				
	Lycium ferocissimum	African boxthorn	✓		
Her/Forb	**Asteraceae**				
	Arctotheca calendula	Cape Weed	-		
	Helminthotheca echioides	Ox-tongue	-		
	Hypochaeris radicata	Cat's ear	-		
	Silibum marianum	Variegated Thistle	✓		
	Sonchus oleraceus	Sow thistle	-		
	Carophyllaceae				
	Cerastium glomeratum	Sticky Mouse-ear Chickweed	-		
	Fabaceae				
	Trifolium repens	White Clover	-		
	Vicia sativa	Common Vetch	-		
	Malvaceae				
	Malva parvifolia	Small-flower Mallow	-		
	Oxalidaceae				
	Oxalis pes-caprae	Soursob	-		
	Plantaginaceae				
	Plantago lanceolata	Ribwort	-		
	Polygonaceae				
	Acetosella vulgaris	Sheep sorrel	-		
	Rubiaceae				
	Galium aparine	Cleavers	-		
	Solanaceae				
	Solanum nigrum	Black Nightshade	-		
Graminoid (grass-like plant)	**Iridaceae**				
	Romulea rosea var. *australis*	Onion grass	-		
	Poaceae				
	Aira elegantissima	Delicate hairgrass	-		
	Anthoxanthum odoratum	Sweet Vernal-grass	-		
	Avena fatua	Wild oat	-		
	Briza maxima	Large Quaking Grass	-		

Life form	Scientific name	Common name	Listed Status
	Briza minor	Lesser Quaking Grass	-
	Bromus diandrus	Great Brome	-
	Bromus hordeaceus subsp. *hordeaceus*	Soft brome	-
	Cortaderia selloana	Silver Pampas-grass	-
	Cynodon dactylon	Couch	-
	Dactylis glomerata	Cocksfoot	-
	Ehrharta erecta	Panic Veldt-grass	-
	Ehrharta longiflora	Annual Veldt-grass	-
	Holcus lanatus	Yorkshire fog	-
	Lolium perenne	Perennial Rye Grass	-
	Paspalum dilatatum	Paspalum	-
	Pennisetum clandestinum	Kikuyu	-
	Phalaris aquatica	Toowoomba Canary grass	-
	Sporobolous africanus	Rat-tail Grass	-

Appendix 2.2 – Flora database results

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

Source: Flora Information System

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

National status of species is designated by:
EX Extinct
CE Critically Endangered
EN Endangered
VU Vulnerable
K Poorly Known
EPBC Act Protected Matters Search Tool.

State status of species is designated by:
e Endangered
v Vulnerable
r Rare
k Poorly Known
L Listed

Life Form	Scientific Name	Common Name	Total # of documented records (FIS)	EPBC	VROT	FFG	Detected During Current Survey	Likely occurrence within the study area	Reasoning for Likelihood	Habitat description
NATIONAL SIGNIFICANCE										
Graminoid	# *Amphibromus fluitans*	River Swamp Wallaby-grass	5	VU	-	-	-	Unlikely	No habitat	Permanent swamps, wetlands and dams
Herb/Forb	# *Caladenia fragrantissima* subsp. *orientalis*	Cream Spider-orchid	-	EN	e	L	-	Unlikely	No habitat	Coastal heath and heathy woodland
Graminoid	# *Dianella amoena*	Matted Flax-lily	-	EN	e	L	-	Unlikely	No habitat	Lowland grasslands and grassy

Life Form	Scientific Name	Common Name	Total # of documented records (FIS)	EPBC	VROT	FFG	Detected During Current Survey	Likely occurrence within the study area	Reasoning for Likelihood	Habitat description
										woodlands
Herb/Forb	# *Glycine latrobeana*	Clover Glycine	-	VU	v	L	-	Unlikely	No habitat	Grassy woodlands and grasslands
Herb/Forb	# *Prasophyllum frenchii*	Maroon Leek-orchid	-	EN	e	L	-	Unlikely	No habitat	In or around coastal swamps
Herb/Forb	# *Thelymitra epipactoides*	Metallic Sun-orchid	1	EN	e	L	-	Unlikely	No habitat	Mainly coastal in fertile loams; scrubby heath or swampy areas
Herb/Forb	# *Xerochrysum palustre*	Swamp Everlasting	2	VU	v	L	-	Unlikely	No habitat	Swamps and wetlands in lowland areas
Herb/Forb	*Caladenia robinsonii*	Frankston Spider-orchid	1	EN	e	L	-	Unlikely	No habitat	Heathy woodland on sandy soil or grassy woodland
STATE SIGNIFICANCE										
Shrub	*Acacia howittii*	Sticky Wattle	2	-	r	-	-	Unlikely	No habitat	Moist forest south-east Vic
Herb/Forb	*Caladenia aurantiaca*	Orange-tip Finger-orchid	1	-	r	-	-	Unlikely	No habitat	Damp coastal to near-coastal heath or open woodlands
Herb/Forb	*Caladenia venusta*	Large White Spider-orchid	1	-	r	-	-	Unlikely	No habitat	Heathy woodland, usually coastal or subcoastal

Life Form	Scientific Name	Common Name	Total # of documented records (FIS)	EPBC	VROT	FFG	Detected During Current Survey	Likely occurrence within the study area	Reasoning for Likelihood	Habitat description
Herb/Forb	*Caladenia flavovirens*	Summer Spider-orchid	1	-	r	-	-	Unlikely	No habitat	Sheltered ridges and slopes in high altitude open forest with grassy understorey
Graminoid	*Chorizandra australis*	Southern Bristle-sedge	1	-	k	-	-	Unlikely	No habitat	Swamps; dams and waterholes
Herb/Forb	*Diuris punctata* var. *punctata*	Purple Diuris	3	-	v	L	-	Unlikely	No habitat	Grassy woodlands and grasslands
Tree	*Eucalyptus yarraensis*	Yarra Gum	2	-	r	-	-	Unlikely	No habitat	Moist woodland, southern Vic.
Graminoid	*Austrofestuca littoralis*	Coast Fescue	2	-	r	-	-	Unlikely	No habitat	Coastal sand dunes
Shrub	*Olearia asterotricha*	Rough Daisy-bush	2	-	r	-	-	Unlikely	No habitat	Moist forest and swampy heathland
Herb/Forb	*Philydrum lanuginosum*	Woolly Waterlily	1	-	v	-	-	Unlikely	No habitat	Shallow, freshwater swamps
Fern	*Pteris comans*	Netted brake	1	-	r	-	-	Unlikely	No habitat	Seepages, stream banks and damp flats in shady forests
Herb/Forb	*Ranunculus papulentus*	Large River Buttercup	7	-	k	-	-	Unlikely	No habitat	Seasonally wet areas
Shrub	*Thryptomene calycina*	Grampians Thryptomene	1	-	r	-	-	Unlikely	No habitat	Heathlands and heathy woodlands on sandy soils

Life Form	Scientific Name	Common Name	Total # of documented records (FIS)	EPBC	VROT	FFG	Detected During Current Survey	Likely occurrence within the study area	Reasoning for Likelihood	Habitat description
Graminoid	*Entolasia stricta*	Upright Panic	1	-	k	-	-	Unlikely	No habitat	Sandy, rocky or peaty soils of eastern Vic.
Graminoid	*Austrostipa hemipogon*	Half-bearded Spear-grass	1	-	r	-	-	Unlikely	No habitat	Mallee scrub, grassland and woodland
Graminoid	*Lachnagrostis filiformis* var. 2	Wetland Blown-grass	3	-	k	-	-	Unlikely	No habitat	Wetlands, dams and grassy swamp areas
Graminoid	*Lachnagrostis punicea* subsp. *filifolia*	Purple Blown-grass	9	-	r	L	-	Unlikely	No habitat	Wetlands, dams and grassy swamp areas
Shrub	*Goodia lotifolia* var. *pubescens*	Silky Golden-tip	1	-	r	-	-	Unlikely	No habitat	Dry and wet sclerophyll forest
Herb/Forb	*Craspedia canens*	Grey Billy-buttons	7	-	e	L	-	Unlikely	No habitat	Wetlands and swampy grasslands
Herb/Forb	*Helichrysum* aff. *rutidolepis (Lowland Swamps)*	Pale Swamp Everlasting	4	-	v	-	-	Unlikely	No habitat	Moist areas of open forest and woodland
Herb/Forb	*Microseris* sp. 1	Plains Yam-daisy	1	-	v	-	-	Unlikely	No habitat	Moist depressions of basalt plains
Graminoid	*Eleocharis macbarronii*	Grey Spike-sedge	7	-	k	-	-	Unlikely	No habitat	Drainage lines of heavy clay soils, often inundated
Graminoid	*Poa labillardierei* var. *(Volcanic Plains)*	Basalt Tussock-grass	4	-	k	-	-	Unlikely	No habitat	Grasslands of heavy, black clay soils
Graminoid	*Austrostipa rudis* subsp. *australis*	Veined Spear-grass	1	-	r	-	-	Unlikely	No habitat	Open forest on sandy or sandstone

Life Form	Scientific Name	Common Name	Total # of documented records (FIS)	EPBC	VROT	FFG	Detected During Current Survey	Likely occurrence within the study area	Reasoning for Likelihood	Habitat description
										derived soils
Herb/Forb	*Ranunculus amplus*	Lacey River Buttercup	2	-	r	-	-	Unlikely	No habitat	Permanent swamps, dams and backwaters or rivers
Herb/Forb	*Cardamine paucijuga s.s.*	Annual Bitter-cress	1	-	v	-	-	Unlikely	No habitat	Moist forest and riparian habitats
Herb/Forb	*Eucalyptus X studleyensis*	Studley Park Gum	3	-	e	-	-	Unlikely	No habitat	Grassy woodland

Source: DSE Flora Information System (FIS 2007); DSEWPC Protected Matters Search Tool (DSEWPC 2010); Flora of Victoria Vol.2 (Walsh and Entwisle 1994); Flora of Victoria Vol.3 (Walsh and Entwisle 1996); and, Flora of Victoria Vol.4 (Walsh and Entwisle 1999).

Appendix 3.1 – Fauna results

Table A3.1.1 Native fauna species recorded during the present surveys.

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

Scientific name	Common name	Conservation Status				
		EPBC	DSE	FFG	Regional	Type of Record
BIRDS						
Ocyphaps lophotes	Crested Pigeon	-	-	-	-	S
Phaps chalcoptera	Common Bronzewing	-	-	-	-	S
Chenonetta jubata	Australian Wood Duck	-	-	-	-	S
Anas superciliosa	Pacific Black Duck	-	-	-	-	S
Corvus mellori	Little Raven	-	-	-	-	S
Hirundo neoxena	Welcome Swallow	-	-	-	-	S
Rhipidura leucophrys	Willie Wagtail	-	-	-	-	S
Grallina cyanoleuca	Magpie-lark	-	-	-	-	S
Manorina melanocephala	Noisy Miner	-	-	-	-	S
Anthochaera carunculata	Red Wattlebird	-	-	-	-	S

Source: DSE Atlas of Victorian Wildlife (2007)

Table A3.1.2 Exotic fauna recorded during the present surveys.

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

Scientific name	Common name	Type of Record
BIRDS		
Streptopelia chinensis	Spotted Turtle-Dove	S
Turdus merula	Common Blackbird	S
Passer domesticus	House Sparrow	S
Acridotheres tristis	Common Myna	S
Sturnus vulgaris	Common Starling	S
MAMMALS		
Oryctolagus cuniculus	European Rabbit	I

Appendix 3.2 – Significant fauna species

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

Sources used to determine species status:

EPBC *Environment Protection and biodiversity Conservation Act 1999* (Commonwealth)
DSE Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2007a)
FFG *Flora and Fauna Guarantee Act 1988* (Victoria)

Species status:

EX Extinct
RX Regionally extinct
CR Critically endangered
EN Endangered
VU Vulnerable
NT Near threatened
L Listed as threatened under FFG Act
Protected Matters Search Tool (DSEWPC)

Common Name	Scientific Name	Last documented record	Total # of records	EPBC Act	DSE (2007a)	FFG ACT	National Action Plan	Likely occurrence in study area	Likelihood Reasoning	Habitat description
NATIONAL SIGNIFICANCE										
# Australian Painted Snipe	*Rostratula australis*	2000	4	VU	CR	L	VU	Unlikely	No habitat	Flooded Saltmarsh, shallow freshwater swamps
Australasian Bittern	*Botaurus poiciloptilus*	2001	68	-	EN	L	VU	Unlikely	No habitat	Densely vegetated freshwater lakes, wetlands and swamps
Orange-bellied Parrot	*Neophema*	1986	3	CE	CR	L	CR	Unlikely	No habitat	Coastal

Common Name	Scientific Name	Last documented record	Total # of records	EPBC Act	DSE (2007a)	FFG ACT	National Action Plan	Likely occurrence in study area	Likelihood Reasoning	Habitat description
	chrysogaster									Saltmarsh and adjacent grassland/ shrublands
# Swift Parrot	*Lathamus discolor*	1988	2	EN	EN	L	EN	Unlikely	No habitat	Iron-bark forests and woodlands
# Regent Honeyeater	*Anthochaera phrygia*	1947	1	EN	CR	L	EN	Unlikely	No habitat	Box-ironbark and woodland north of GDR. Some other woodland dependent upon food availability
# Southern Brown Bandicoot	*Isoodon obesulus obesulus*	2001	39	EN	NT	L	NT	Unlikely	No habitat	Heathy forest, Swamp Scrub, drainage lines, roadside vegetation
# Grey-headed Flying-fox	*Pteropus poliocephalus*	2004	6	VU	VU	L	VU	Low	May forage in flowering gums and/or fly over the study area	Lowland rainforest, woodland, agricultural land and suburbs
# Growling Grass Frog	*Litoria raniformis*	1990	13	VU	EN	L	VU	Low	Dams provide degraded habitat, but have a lack of connectivity to other waterbodies	Permanent or semi-permanent waterways, wetlands and waterbodies
# Dwarf Galaxias	*Galaxiella pusilla*	1992	4	VU	VU	L	VU	Unlikely	Dams no connectivity to other waterbodies, marginal habitat present	Still-slow flowing waters with abundant macrophytes
# Yarra Pygmy Perch	*Nannoperca obscura*	1982	2	VU	NT	L	VU	Unlikely	No habitat	Slow flowing/still creeks with abundant macrophytes

Common Name	Scientific Name	Last documented record	Total # of records	EPBC Act	DSE (2007a)	FFG ACT	National Action Plan	Likely occurrence in study area	Likelihood Reasoning	Habitat description
# Golden Sun Moth	*Synemon plana*	0	1	CR	EN	L	-	Unlikely	No habitat	Remnant and modified grasslands
# Long-nosed Potoroo	*Potorous tridactylus*			VU	EN	L	VU	Unlikely	No habitat	Wet forest and wet scrub on sandy soils, with dense understorey
# Smoky Mouse	*Pseudomys fumeus*			EN	CR	L	RA	Unlikely	No habitat	Sclerophyll forest; heath and tussock grass understorey; coastal heath
# Spot-tailed Quoll	*Dasyurus maculatus*			EN	EN	L	VU	Unlikely	No habitat	Forest (wet and dry sclerophyll), rainforests
STATE SIGNIFICANCE										
Lewin's Rail	*Lewinia pectoralis*	1996	3	-	VU	L	NT	Unlikely	No habitat	Vegetated swamp; coastal Saltmarsh; swampy streams; tidal creeks
Baillon's Crake	*Porzana pusilla*	2001	38	-	VU	L	-	Low	Use farm dams on an occasional basis	Freshwater wetlands; well vegetated floodwaters
White-faced Storm-Petrel	*Pelagodroma marina*	1980	1	-	VU	-	-	Unlikely	No habitat	Coastal species of southern Australia, colonies on offshore islands
Caspian Tern	*Hydroprogne caspia*	2001	8	Mi/Ma	NT	L	-	Unlikely	No habitat	Coastal bays and estuaries and large, brackish inland lakes
Whimbrel	*Numenius phaeopus*	1977	2	-	VU	-	-	Unlikely	No habitat	Intertidal mudflats or rock platforms
Black-tailed Godwit	*Limosa limosa*	1996	7	Mi/Ma	VU	-	-	Unlikely	No habitat	Shallow freshwater swamps; saline lakes

Common Name	Scientific Name	Last documented record	Total # of records	EPBC Act	DSE (2007a)	FFG ACT	National Action Plan	Likely occurrence in study area	Likelihood Reasoning	Habitat description
										and sewage lagoons
Wood Sandpiper	*Tringa glareola*	2001	43	Mi/Ma	VU	-	-	Unlikely	No habitat	Shallow freshwater swamps; large farm dams; sewage farms and receeding floodwaters
Grey-tailed Tattler	*Heteroscelus brevipes*	1987	3	Mi/Ma	CR	L	-	Unlikely	No habitat	Tidal mudflats near rocky reefs, mangroves
Common Sandpiper	*Actitis hypoleucos*	2001	24	Mi/Ma	VU	-	-	Unlikely	No habitat	Mudflats in estuaries, muddy shores, occasionally inland lakes
Terek Sandpiper	*Xenus cinereus*	1977	1	Mi/Ma	EN	L	-	Unlikely	No habitat	Mangrove mudflats; sewage lagoons
Royal Spoonbill	*Platalea regia*	2005	114	-	VU	-	-	Low	Dams may provide some degraded habitat for foraging or species may fly over	Freshwater and saline wetlands, intertidal mudflats along coast
Little Egret	*Egretta garzetta*	2000	15	-	EN	L	-	Unlikely	No habitat	Wetlands; tidal flats; estuaries; inland lakes; swamps and rivers
Intermediate Egret	*Ardea intermedia*	2001	10	-	CR	L	-	Unlikely	No habitat	Grassy inland wetlands; flooded pasture or grasslands
Eastern Great Egret	*Ardea modesta*	2005	107	-	VU	L	-	Low	Dams may provide some degraded habitat for foraging or fly over	Wetlands; tidal flats; estuaries; inland lakes; swamps and rivers

Common Name	Scientific Name	Last documented record	Total # of records	EPBC Act	DSE (2007a)	FFG ACT	National Action Plan	Likely occurrence in study area	Likelihood Reasoning	Habitat description
Little Bittern	*Ixobrychus minutus*	1990	2	-	EN	L	-	Unlikely	No habitat	Reedbeds and vegetated fresh water wetlands
Magpie Goose	*Anseranas semipalmata*	2006	57	-	NT	L	-	Unlikely	No habitat	Tropical species in reedbeds and flooded pasture
Australasian Shoveler	*Anas rhynchotis*	2005	223	-	VU	-	-	Low	May opportunistically forage in dams	Large, permanent lakes, some saline, freshwater swamps
Freckled Duck	*Stictonetta naevosa*	2003	8	-	EN	L	-	Unlikely	No habitat	Open freshwater or brackish wetlands
Hardhead	*Aythya australis*	2005	163	-	VU	-	-	Moderate	May opportunistically forage in dams	Deep, permanent open freshwater wetlands
Blue-billed Duck	*Oxyura australis*	2003	199	-	EN	L	-	Low	May opportunistically forage in dams	Deep, permanent, heavily vegetated wetlands
Musk Duck	*Biziura lobata*	2003	110	-	VU	-	-	Low	May opportunistically forage in dams	Deep, permanent lakes and swamps, occasionally saline wetlands
Grey Goshawk	*Accipiter novaehollandiae*	1990	1	-	VU	L	-	Unlikely	No habitat	Otway wet forests; also forests and woodlands
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	1996	3	Mi/Ma	VU	L	-	Unlikely	No habitat	Coastal islands, lakes, some inland rivers and lakes
Black Falcon	*Falco subniger*	1973	1	-	VU	-	-	Unlikely	No habitat	Fly over croplands; grasslands and wooded farmland
Powerful Owl	*Ninox strenua*	1995	1	-	VU	L	-	Unlikely	No habitat	Foothill and coastal forests; also mountain forest and box-ironbark woodlands
Major Mitchell's Cockatoo	*Lophocroa*	1979	1	-	VU	L	NT	Unlikely	No habitat	Woodland (Slender

Common Name	Scientific Name	Last documented record	Total # of records	EPBC Act	DSE (2007a)	FFG ACT	National Action Plan	Likely occurrence in study area	Likelihood Reasoning	Habitat description
	leadbeateri									Cypress pine and Box-buloke) and adjacent mallee scrub
Hooded Robin	*Melanodryas cucullata*	1976	2	-	NT	L	NT	Unlikely	No habitat	Semi-arid mallee scrub, cypress pine woodland/ mallee heaths and box-ironbark forest
Grey-crowned Babbler	*Pomatostomus temporalis*	2002	48	-	EN	L	NT	Unlikely	No habitat	Dry forests and woodland; wooded farmland associated with river floodplains
Diamond Firetail	*Stagonopleura guttata*	1990	1	-	VU	L	NT	Unlikely	No habitat	Open forest and woodland; River Red Gums; Mallee; Buloke; Acacia scrub
Lace Goanna	*Varanus varius*	1977	2	-	VU	-	-	Unlikely	No habitat	Arboreal, woodland and forested areas
Southern Toadlet	*Pseudophryne semimarmorata*	1990	4	-	VU	-	-	Unlikely	No habitat	Moist ground layer in dry or wet sclerophylla forest; roadside gutters; small creeks
REGIONAL SIGNIFICANCE										
Brown Quail	*Coturnix ypsilophora*	2001	4	-	NT	-	-	Unlikely	No habitat	Grassy and sedgy flats, agricultural crops; swamps
Common Diving-Petrel	*Pelecanoides urinatrix*	1980	1	-	NT	-	-	Unlikely	No habitat	Coastal foragers
Black-faced Cormorant	*Phalacrocorax fuscescens*	1994	1	-	NT	-	-	Unlikely	No habitat	Coastal; large bays; deep inlets, rocky headlands and islands
Pied Cormorant	*Phalacrocorax varius*	2005	65	-	NT	-	-	Unlikely	No habitat	Large freshwater and saline wetlands; tidal bays along coast

Common Name	Scientific Name	Last documented record	Total # of records	EPBC Act	DSE (2007a)	FFG ACT	National Action Plan	Likely occurrence in study area	Likelihood Reasoning	Habitat description
White-winged Black Tern	*Chlidonias leucopterus*	2000	11	Mi/Ma	NT	-	-	Unlikely	No habitat	Large, shallow freshwater swamps and lakes
Whiskered Tern	*Chlidonias hybridus*	2005	68	-	NT	-	-	Unlikely	No habitat	Shallow freshwater swamps; fresh or brackish lakes; large rivers; sewage lagoons.
White-fronted Tern	*Sterna striata*	1994	2	-	NT	-	-	Unlikely	No habitat	Coastal; nearly rocks; sandy shorelines and wide mudflats
Pacific Gull	*Larus pacificus pacificus*	2005	73	-	NT	-	-	Unlikely	No habitat	Coastal; intertidal mudflats; estuaries.
Grey Plover	*Pluvialis squatarola*	1977	1	-	NT	-	-	Unlikely	No habitat	Intertidal mudflats near Corner Inlet
Pacific Golden Plover	*Pluvialis fulva*	2005	10	Mi/Ma	NT	-	-	Unlikely	No habitat	Beaches, mudflats or sandflats. Occasionally mangroves.
Eastern Curlew	*Numenius madagascariensis*	2001	7	Mi/Ma	NT	-	-	Unlikely	No habitat	Coastal; tidal mudflats occasionally inland saline lakes
Sanderling	*Calidris alba*	2001	2	Mi/Ma	NT	-	-	Unlikely	No habitat	Sandy beaches in wave-wash zone, seaweed wash-up on beaches
Latham's Snipe	*Gallinago hardwickii*	2003	127	Mi/Ma	NT	-	-	Unlikely	No habitat	Vegetated swamps; pools/ditches in heath or herblands; grasslands
Glossy Ibis	*Plegadis falcinellus*	2005	26	Mi/Ma	NT	-	-	Unlikely	No habitat	Vegetated and muddy wetlands (freshwater) and nearby grasslands and pastures

Common Name	Scientific Name	Last documented record	Total # of records	EPBC Act	DSE (2007a)	FFG ACT	National Action Plan	Likely occurrence in study area	Likelihood Reasoning	Habitat description
Nankeen Night Heron	*Nycticorax caledonicus*	2001	23	-	NT	-	-	Unlikely	No habitat	Wetlands of all types, roost in trees near water
Cape Barren Goose	*Cereopsis novaehollandiae*	2003	9	-	NT	-	-	Unlikely	No habitat	Coastal islands; open wetlands and pastures on mainland
Spotted Harrier	*Circus assimilis*	1985	2	-	NT	-	-	Unlikely	No habitat	Wetland margins; farmlands; grasslands and dry woodlands
Azure Kingfisher	*Alcedo azurea*	1994	1	-	NT	-	-	Unlikely	No habitat	Murray and Goulburn River, forested margins of large rivers and streams, some tidal estuaries
Red-backed Kingfisher	*Todiramphus pyrrhopygia*	1993	1	-	NT	-	-	Unlikely	No habitat	River Red Gum forest and dry woodlands along Murray River
Long-toed Stint	*Calidris subminuta*	2000	6	Mi/Ma	NT	-	-	Unlikely	No habitat	Muddy margins of shallow freshwater or saline swamps
Pectoral Sandpiper	*Calidris melanotos*	2005	32	Mi/Ma	NT	-	-	Unlikely	No habitat	Muddy shores of shallow freshwater or saline swamps
Eastern Pygmy-possum	*Cercartetus nanus*	1963	3	-	NT	-	-	Unlikely	No habitat	Sub-alpine woodland; ash forest; gully forest; heathy woodlands; coast scrub and wet heath

Source: DSE Atlas of Victorian Wildlife (AVW 2007); DSEWPC Protected Matters Search Tool (DSEWPC 2010); Atlas of Victorian Birds (Emison *et.al.* 1987); Mammals of Victoria (Menkhorst 1995); and, Reptiles and Amphibians (Cogger 1996).

Appendix 4.1 – Net Gain Table

Table A4.1. Habitat hectare analysis of remnant vegetation recorded within the study area.

Habitat Zone			1	2	3	4	5
Map Reference			Fig 3 B4	Fig 3 B4	Fig 3 B4	Fig 3 A4	Fig 3 B4
PFI			626779	R626779	R626779	R626779	R626779
Site ID			2	3	5	7	9
Zone ID			A	A	A	A	A
EVC Name (Initials)			HW	GW	GW	SS	GW
EVC Number			GipP0048	GipP0175	GipP0175	GipP0053_61	GipP0175
Total Area of Habitat Zone (ha)			0.03	0.01	0.001	0.001	0.001
		Max Score	Score	Score	Score	Score	Score
Site Condition	Large Old Trees	10	0	0	0	n/a	0
	Canopy Cover	5	0	0	0	3	0
	Lack of Weeds	15	4	0	0	0	0
	Understorey	25	5	5	5	5	5
	Recruitment	10	0	0	0	0	0
	Organic Litter	5	0	0	0	0	0
	Logs	5	0	0	0	0	0
	Total Score	75	**9**	**5**	**5**	**8**	**5**
Standardiser		n/a	n/a	n/a	n/a	9.23	n/a
Landscape Score		25	2	2	2	2	2
Habitat Score#		100	11	7	7	11.23	7
Habitat Score as above = #/100			0.11	0.07	0.07	0.11	0.07
Habitat Hectares			**0.003**	**0.001**	**0.0001**	**0.0001**	**0.0001**
Bioregion			GipP	GipP	GipP	GipP	GipP
EVC Conservation Status			LC	E	E	E	E
Conservation Significance	Conservation Status x Habitat Score		Low	High	High	High	High
	Threatened Species Rating		n/a	n/a	n/a	n/a	n/a
	Other Site Attribute Rating		n/a	n/a	n/a	n/a	n/a
	Overall Conservation Significance (highest rating)		**Low**	**High**	**High**	**High**	**High**
No. of Large Old trees in each Habitat Zone			**0**	**0**	**0**	**0**	**0**

Appendix 4.2 – Scattered Tree Table

Table A4.2. Scattered remnant trees recorded during the present survey (November 2009).

Property No.	Scattered Tree Number	Species (scientific name)	Common Name	Size of Tree (VLOT, LOT, MOT, small)	Bioregion	Conservation Significance	Easting	Northing	Map no. (location)
R626779	1	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526166.040	2381150.597	Fig 4 A3
	2	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526163.977	2381141.076	Fig 4 A4
	3	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526154.474	2381072.342	Fig 4 A4
	4	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526150.073	2381049.453	Fig 4 A4
	5	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526147.870	2381033.408	Fig 4 A4
	6	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526146.283	2381026.585	Fig 4 A4
	7	*Eucalyptus* sp.	eucalypt	LOT	GipPlain	High	2526138.746	2380976.361	Fig 4 A4
	8	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526136.683	2380969.855	Fig 4 A4
	9	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526135.488	2380959.107	Fig 4 A4
	10	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526136.524	2380955.256	Fig 4 A4
	11	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526132.002	2380927.407	Fig 4 A4
	12	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526130.097	2380919.790	Fig 4 A4
	13	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526129.304	2380914.395	Fig 4 A5
	14	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526127.559	2380907.254	Fig 4 A5
	15	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526119.148	2380857.586	Fig 4 A5
	16	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526084.858	2380630.222	Fig 4 A6
	17	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526085.315	2380631.746	Fig 4 A6
	18	*Eucalyptus* sp.	eucalypt	ST	GipPlain	Low	2526083.181	2380613.152	Fig 4 A6
	19	*Eucalyptus* sp.	eucalypt	VLOT	GipPlain	High	2526069.539	2380530.411	Fig 4 A6

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