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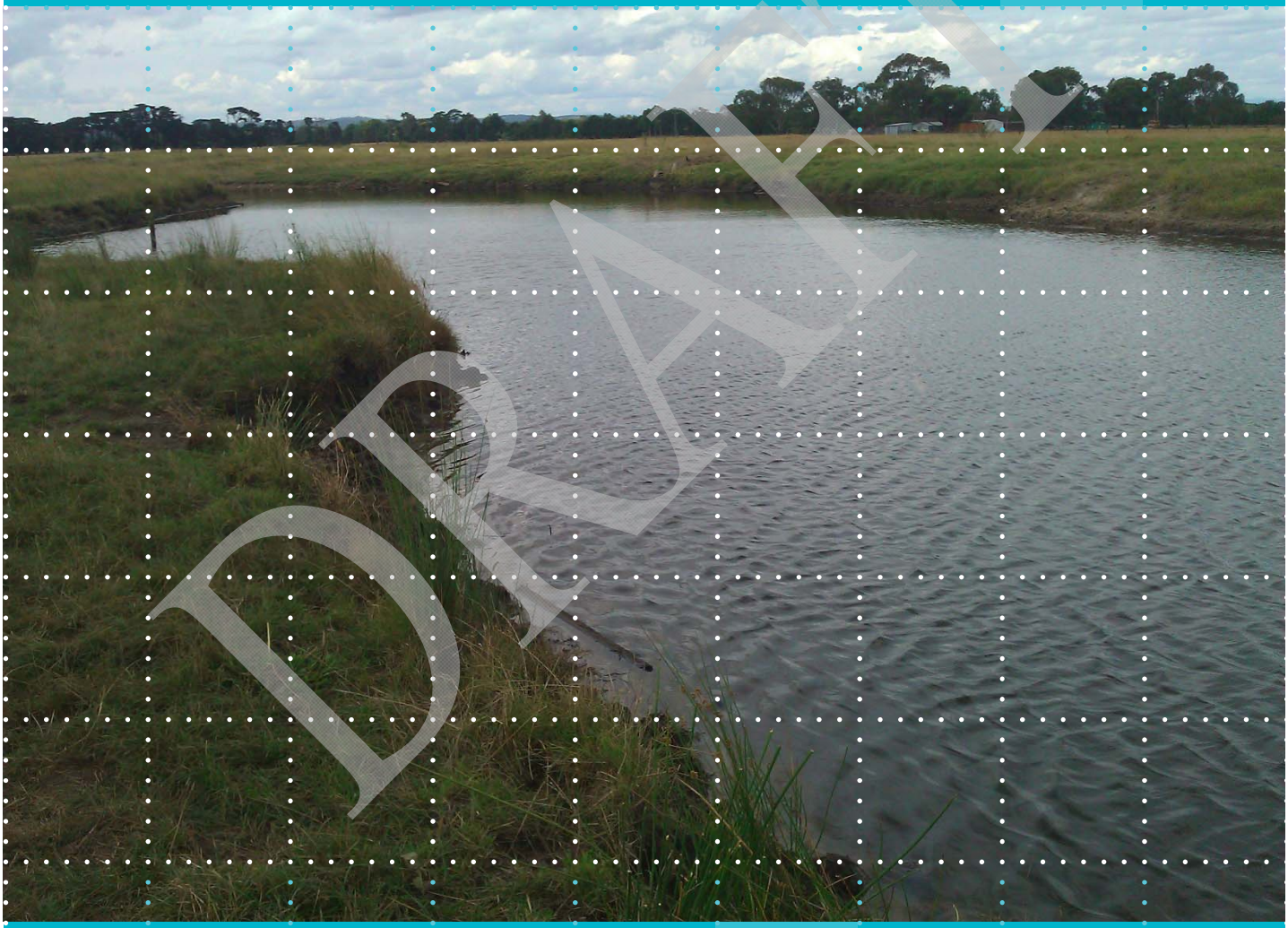
DRAFT REPORT:

Biodiversity Assessment for Area 1053, Thompson Road Precinct Structure Plan, Clyde

PREPARED FOR:

Growth Areas Authority
June 2012



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Acknowledgments

We thank the following people for their contribution in the project.

- Bill Vasiliadis (Growth Areas Authority) for assistance throughout the project and for comments on the draft versions of the report.
- Merryn Kelly, Angela Robb, and Adam Muir (Department of Sustainability and Environment) for ongoing involvement in the project, data validation, and comments on the draft report.
- The Department of Sustainability and Environment for the use of the Victorian Biodiversity Atlas.
- Landholders for providing access and information on their properties.

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

Document Control

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Project Number	3339
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File Name	3339_Thompson Road_Draft_220612

Report Version	Comments	Comments Updated by:	Date Submitted
Draft	Draft Report	SS	22/06/12

EXECUTIVE SUMMARY

Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by the Growth Areas Authority (GAA) to undertake Biodiversity Assessments for the 2011/12 Biodiversity Mapping Project, at 'Area 1053' in the urban fringe of south-east Melbourne. Area 1053 is located approximately 50 kilometres south-east of the Melbourne CBD. Land uses include farming, housing and recreation (Figure ES1).

The purpose of the Biodiversity Assessments is to identify biodiversity values within the Precinct and 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 during the project:

- The Victorian Biodiversity Atlas database.
- Department of Sustainability and Environment (DSE) Biodiversity Interactive Maps showing historic and current Ecological Vegetation Classes (EVCs).
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) Protected 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.

Site assessments were undertaken wherever access was granted (Figure ES2). Biodiversity assessments followed the methodology stipulated within the Request for Tender, and included the following:

- *General flora survey:* The general flora survey was undertaken by assessors at all properties accessed. Assessors traversed the property on foot or in a vehicle, and recorded flora species observed, the extent of patches of vegetation (compared with the DSEs Time Stamped data layer) and potential habitats for significant species.

- *Indigenous tree assessment:* The species, size class, and location of all indigenous trees were recorded as point files into-held PDAs.

- *General fauna survey*: Fauna species observed, and heard, as well as other indicators of their presence e.g. nests, scats, were recorded. The differing habitats for fauna was including potential habitats for significant fauna species was also recorded.

- *Targeted flora survey*: Targeted flora surveys were undertaken across all of DSE's time stamped data in spring and summer. This included botanists walking five metre transects and recording all significant species. Samples of potentially significant species that could not be verified in the field were collected for later identification in the office. Targeted flora species included those set as a minimum requirement within the contract agreement, however, all significant species were recorded during this survey methodology.

Results

Flora

The vast majority of native vegetation within the study area has been cleared as a result of previous agricultural land use. Areas of remnant vegetation mainly occur along Thompsons Road road reserve along the northern boundary of the PSP, comprising highly modified Swampy Riparian Woodland (EVC 83). This generally included Swamp Gums *Eucalyptus ovata* with a non-native understorey, and a very small patch of highly modified Plains Grassy Woodland (EVC 55) along Pound Road road reserve (Figure ES3).

No threatened flora were recorded during the targeted surveys and during the general flora assessment. Due to the highly modified condition of the vegetation within the study area, there is only a very low likelihood of occurrence for River Swamp Wallaby-grass *Amphibromus fluitans* and Wetland Blown-grass *Lachnagrostis filiformis* var. 2 within dams and drainage lines within the study area.

There are 119 scattered trees within the study area. These consist of two Very Large Old Trees (VLOTs), 14 Large Old Trees (LOTs), 41 Medium Old Trees (MOTs) and 62 Small Trees (STs), of which 57 are of High conservation significance and 62 of Low conservation significance (Figure ES4).

Fauna

No threatened fauna species were recorded within the study area (Figure ES5). Targeted fauna surveys are beyond the scope of wok commissioned for this project. In addition, surveys for Growling Grass Frog *Litoria raniformis* and Southern Brown Bandicoot *Isodon obeselus obeselus* have been undertaken as part of the preparation of sub-regional species surveys. Swift Parrot *Lathamus discolor* and Grey-headed Flying-fox *Pteropus poliocephalus* may occasionally forage in flowering gums and/or fly over the study area on rare occasions. There is also a low likelihood for Growling Grass Frog to use artificial dams and drainage lines within the study area (Figure ES6).

The study area currently supports four main fauna habitat types: i) modified woodland, ii) native and introduced trees including shelter belts, iii) artificial waterbodies and drainage lines, and iv) introduced pasture grass/crops.

Recommendations

Remnant native vegetation is almost entirely limited to road reserves, and these areas should be retained where possible. Vegetation offsets will be required for the permitted removal of remnant native vegetation, and information detailing areas proposed to be retained and areas to be removed will be outlined in an endorsed Native Vegetation Precinct Plan.

A permit to 'take' native vegetation under the *Flora and Fauna Guarantee Act 1988* will be required for the removal of protected flora located on public land (e.g. road reserves). Animal welfare measures should be undertaken during construction and fauna salvage and translocation is recommended for Growling Grass Frog if habitats are proposed to be disturbed as part of the future development.

There are opportunities to enhance ecological values within the study area, principally through the regeneration of remnant native vegetation, revegetation with site indigenous species, weed control, and the provision of stormwater treatment wetlands which will provide additional habitat for a range of fauna species.

Legend

- Precinct Study Area
- Urban Growth Boundary
- Railway Station
- Railway
- Freeway
- Collector Road
- Minor Road
- Contour (10m)
- Minor Watercourse
- Waterbody
- Land Subject to Inundation
- Wetland/Swamp
- Parks and Reserves
- Crown Land
- Localities
- Property Boundaries

Overveiw of Study Area PSP 1053

Biodiversity Assessment Project 2011/12

N

GDA 1994; VicGrid 1994

0 150 300 600

Metres

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FIGURE ES1

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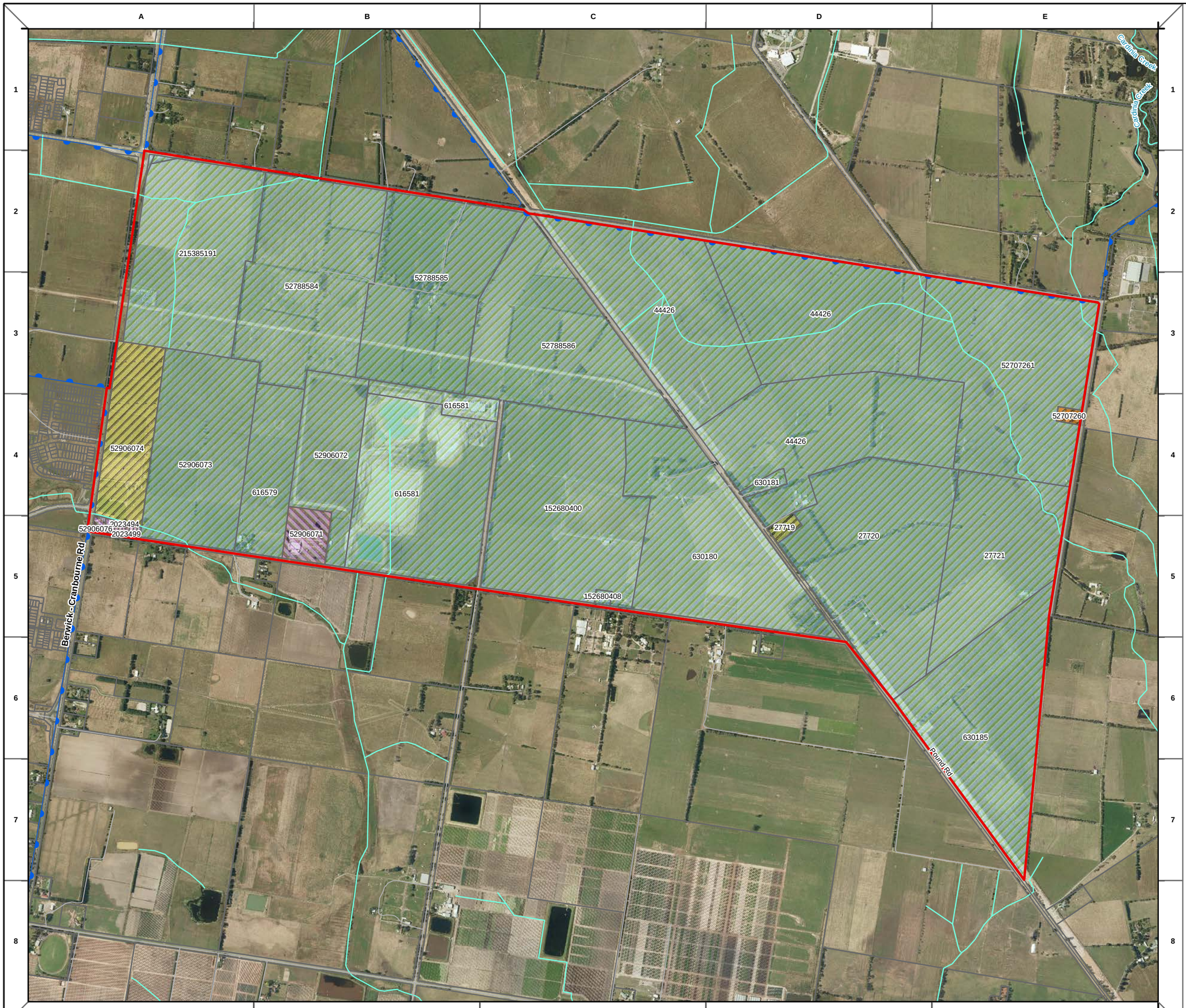

Legend

- Precinct Study Area
- Urban Growth Boundary
- Railway Station
- Railway
- Freeway
- Collector Road
- Minor Road
- Minor Watercourse
- Property Boundaries
- Access Granted
- Access Unattainable
- Access Denied
- Landowner Details not Provided

Access Information
PSP 1053

Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

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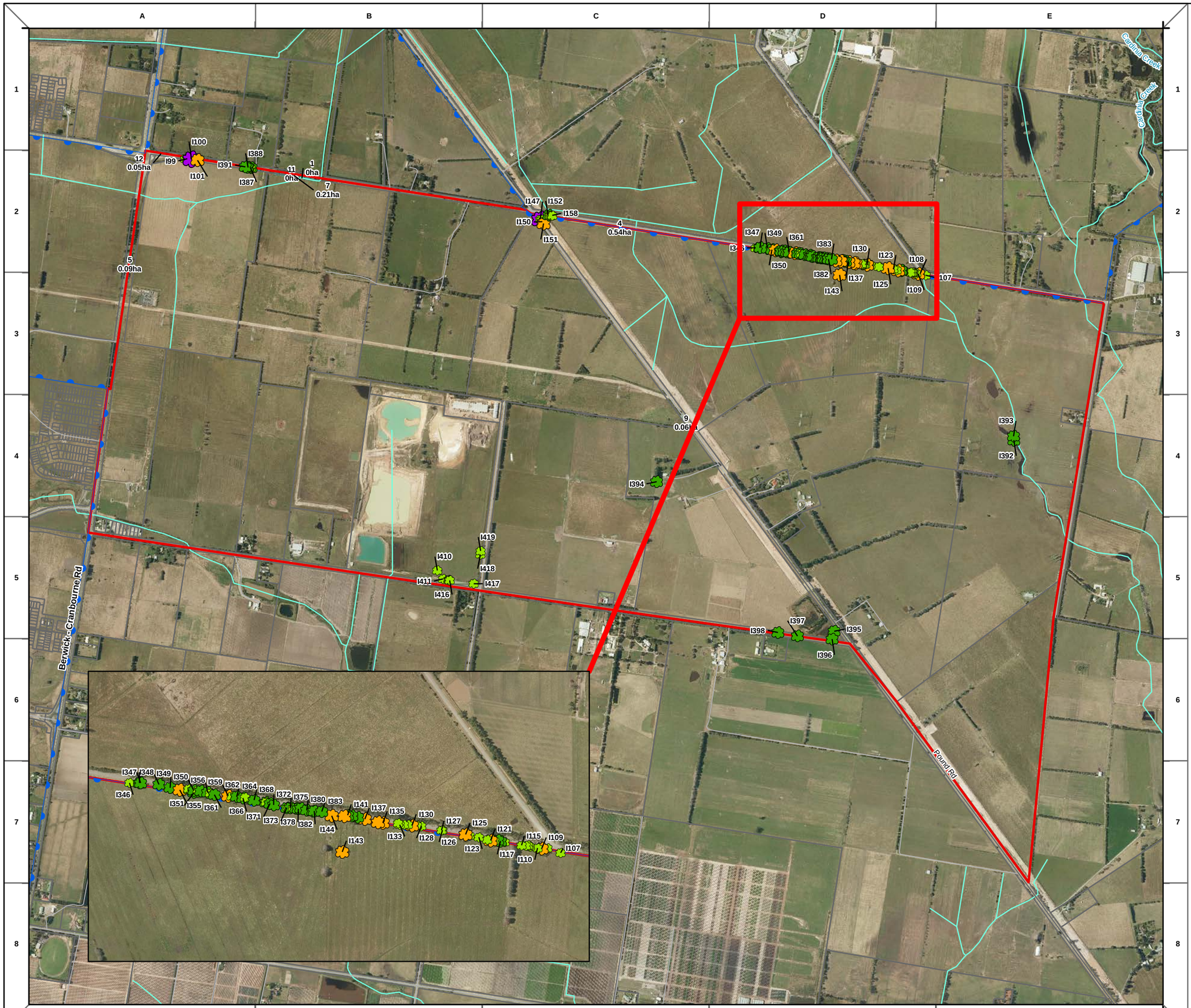
FIGURE

ES2

3339/1053_ES2_AccessInfo.mxd Issue Date: 29/05/2012



Legend

- Precinct Study Area
- Urban Growth Boundary
- 83, Swampy Riparian Woodland
- 175, Grassy Woodland
- Very Large Old Tree
- Large Old Tree
- Medium Old Tree
- Small Tree

Vegetation mapping based on DSE Time Stamped Data, May 2012

Extent of Native Vegetation & Location of Scattered Trees PSP 1053

Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

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FIGURE ES3

File Path: 3339/1053_ES3_Native_Vegetation.mxd Issue Date: 29/05/2012

Legend

- Precinct Study Area
- Urban Growth Boundary

Conservation Significance

- Very High
- High

Vegetation mapping based on DSE Time Stamped Data, May 2012

Conservation Significance PSP 1053

Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

1:15,000 when printed @ A3

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FIGURE ES4

File Path: 3339/1053_ES4_Cons_Sig.mxd Issue Date: 29/05/2012

Legend

- Precinct Study Area
- Urban Growth Boundary

Note: No significant species were recorded during the assessment. The locations of significant flora and fauna species are based on data available from DSEs AVW database, FIS database and Victorian Biodiversity Atlas (VBA 2011), the current field investigations and other sources.

Threatened Flora & Fauna Records
PSP 1053
Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

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FIGURE ES5

File Path: 3339/1053_ES3_Native_Vegetation.mxd Issue Date: 29/05/2012

Legend

- Precinct Study Area
- Urban Growth Boundary
- Potential Growling Grass Frog Habitat
- Potential Eastern Great Egret & Royal Spoonbill Habitat
- Access Unattainable
- Access Denied
- Landowner Info not Provided

Potential Habitat
PSP 1053

Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

1:15,000 when printed @ A3

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FIGURE ES6

File Path: 3339/1053_ES6_Potential_Habitat.mxd Issue Date: 29/05/2012

1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by the Growth Areas Authority (GAA) to undertake a biodiversity assessment as part of the 2011/12 GAA Biodiversity Mapping Project, at 'Area 1053' (Clyde North) on the urban fringe of south-east Melbourne (Figure 1). The purpose of this report is to identify biodiversity values within the Precinct and to inform the planning process.

1.2 Scope

A desktop assessment was undertaken to identify significant flora surveys for species within 10 kilometres of the study area (Appendix 2). A general flora and fauna assessment was completed for each property accessed within the study area. Targeted flora surveys were completed within vegetation 'time stamped' by DSE as vegetation patches. Targeted fauna surveys and habitat hectare assessments were not commissioned as part of this project. The time-stamped vegetation has been used for the habitat hectare calculations presented below.

Information relating to the implications under Commonwealth and State Government legislation, and local environmental polices, along with potential impacts associated with the future development of the study area, and recommended mitigation measures have been included.

1.3 Objectives

The objectives of the project were to:

- Identify, assess and map significant flora, fauna and habitat within the study area and the level of conservation significance for any species or habitat found;
- Collect data at a sufficient detail and standard to enable the development of a Precinct Structure Plan (PSP) and Biodiversity Plan;
- Provide advice on any works or management measures that may reduce adverse impacts of the development on species known or likely to occur in the study area; and,
- Advise where development of the study area complies with legislative requirements regarding the protection of indigenous flora and fauna species and communities.

1.4 Study Area

Area 1053 (the study area) is located approximately 50 kilometres south-east of the Melbourne CBD, Victoria (Figure 1). The study area covers 652 hectares and consists of 24 properties. It is bound by Berwick-Cranbourne Road to the west, Thompsons Road to the north, Hardys Road to the south and Smiths Lane to the east.

The majority of properties within the study area are privately owned, while others areas comprise public land such as road reserves and creeklines. The study area has largely been cleared for agricultural purposes, with very small isolated areas of remnant native vegetation remaining. The study area is mostly flat throughout, and contains drainage lines which run through the north-east and south-west corners of the study area. There are several farm dams and a small number of quarry pits within the study area, and these are not connected to any permanent waterways, drainage lines or ephemeral waterbodies.

The study area lies within the Gippsland Plain bioregion (DSE 2012a). 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 Urban Growth Zone (UGZ), with areas of Farming Zone – Schedule 2 (FZ2), Road Zone – Schedule 2 (RDZ2), Special Use Zone – Schedule 1 (SUZ1) and Urban Floodway Zone (UFZ). Some areas of the study area are subject to a Land Subject to Inundation Overlay (LSIO). The study area lies within the Urban Growth Boundary (UGB).

There are no BioSites within the study area. However, several are recorded in the vicinity of the study area (DSE 2012a), including areas containing EVCs of regional conservation significance (Table 1).

Table 1: *Listed BioSites located within the local area.*

BioSite No.	Name	Size (hectares)	Location	Significance	Attributes
5611	Ballarto Road, Clyde	n/a	3 km south of study area along rail reserve	Regional	Plains Grassy Woodland EVC remnant.
5095	Royal Botanic Gardens - Cranbourne Annexe	135.94	5 km southwest of study area	State	High ecological integrity and viability, contains Plains Grassland, (Lowan Sands) Heathy Woodland EVC and significant species including Grey Goshawk *Accipiter novaehollandiae*, Orange-tip Caladenia *Caladenia aurantiaca*, Growling Grass Frog *Litoria raniformis*, Swamp Skink *Egernia coventryi*, Naked Sun-orchid *Thelymitra circumsepta*, Upright Panic *Entolasia stricta*, New *Holland Mouse* Pseudomys novaehollandiae, Chesnut-rumped Heath Wren *Calamanthus pyrrhopygius*, Brown Quail *Coturnix ypsilophora*, Musk Duck *Biziura lobata*, Swift Parrot *Lathamus discolor*, Dense Leek-orchid *Prasophyllum spicatum*, Hardhead *Aythya australis*
5242	Tea-tree Creek, Cranbourne	0.77	3 km west of study area	Regional	Plains Grassy Wetland EVC remnant.
7006	Ballarto Road/Tooradin Station Road, Cardinia	22.02	4 km southeast of study area	Regional	Breeding Site for Southern Brown Bandicoot *Isoodon obselus obselus*

BioSite No.	Name	Size (hectares)	Location	Significance	Attributes
7987	Muddy Gates Lane private grassland	n/a	4 km south-east of study area	State	South Gippsland Plains Grassland EVC remnant.
6888	Cardinia Creek – lower	169.80	1 km east of study area	Regional	Cardinia Creek remnant habitat.
6975	Lecky Road, Officer	8.90	2 km east of study area	Regional	Abuts Cardinia Creek – lower biosite (6975) and Greater Pakenham Habitat biosite (6976).
6889	Cardinia Creek Retarding Basin	52.2	4 km north of the study area	Regional	Significant riparian and wetland vegetation
5640	Officer 1	0.10	4 km north of the study area	Regional	Grassy Woodland EVC along rail reserve.
5642	Officer 2	0	4 km north of the study area	Regional	Grassy Woodland EVC along rail reserve.
5645	Officer 3	0.10	4 km north of the study area	Regional	Grassy Woodland EVC along rail reserve.
5650	Officer 4	0.10	4 km north of the study area	Regional	Grassy Woodland EVC along rail reserve.
6884	Officer Township – Grassland Site	21.20	4 km north of the study area	State	Grassland EVC that supports threatened species.

2 METHODS

2.1 Nomenclature

Common and scientific names of vascular plants follow the Victorian Biodiversity Atlas (DSE 2011a) and the Census of Vascular Plants of Victoria (Walsh and Stajsic 2007). Vegetation community names follow DSE's EVC Benchmarks (DSE 2012b).

Terrestrial and vertebrate fauna (mammals, birds, reptiles, amphibians and fish) follow the Victorian Biodiversity Atlas (VBA) (DSE 2011a).

2.2 Literature and Database Review

A desktop assessment was undertaken prior to field surveys. The following resources and databases were reviewed over the duration of the project:

- The Victorian Biodiversity Atlas (DSE 2011a), Atlas of Victorian Wildlife (Viridans 2011a) and Flora Information System (2011c) databases;
- The DSE's Biodiversity Interactive Maps showing historic and current EVCs (DSE 2012a);
- Sites of Biological Significance (BioSites) (DSE 2012a).
- 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 2012).
- Planning Schemes Online providing the current zone and overlays (DPCD 2012).
- Relevant legislation and policies; and,
- Ecological reports that was relevant to the study area, including:
    - Draft sub-regional surveys for the Growling Grass Frog (DSE 2011b).
    - Draft sub-regional fauna survey for Southern Brown Bandicoot (DSE 2011c).

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

2.3 Field Surveys

All vegetation assessments were undertaken by experienced personnel who had a current Vegetation Quality Assessment Check Certificate.

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

A general flora assessment was undertaken by qualified botanists across properties where site access was granted (Table 2). All properties were assessed on foot and/or in a vehicle (Figure 2). Records of vascular plants were recorded within each property, with the exception of those that were planted. General comments on EVCs, remnant trees and significant flora species were recorded and mapped on aerial photographs for later comparison with DSE time stamped data layer.

2.3.2 Indigenous tree assessment

A scattered tree assessment was undertaken concurrently with the general flora survey in November 2011 and February 2012 (Table 2). 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 required software. The species, size class and the conservation significance of each tree was determined according to the relevant EVC benchmark.

2.3.3 Targeted flora surveys

Targeted flora surveys were undertaken at areas of time stamped vegetation. Consistent with the project scope targeted flora surveys were required for the following species during and appropriate time of year (i.e. when the species was known to be flowering and when detection was highest):

- Eastern Spider-orchid *Caladenia orientalis*
- Frankston Spider-orchid *Caladenia robinsonii*
- Green-striped Greenhood *Pterostylis chlorogramma*
- Grey Billy Buttons *Craspedia canens*
- Maroon Leek Orchid *Prasophyllum frenchii*
- Matted Flax-lily *Dianella amoena*
- Metallic Sun-orchid *Thelymitra epipactoides*
- Naked Sun-orchid *Thelymitra circumspecta*
- Pale Swamp Everlasting *Helichrysum* aff. *rutidolepis* (Lowland Swamps)
- Purple Diuris *Diuris punctata* var. *punctata*
- River Swamp Wallaby-grass *Amphibromus fluitans*
- Swamp Everlasting *Xerochrysum palustre*
- Veined Spear Grass *Austrostipa rudis* subsp. *australis*
- Wine-lipped Spider-orchid *Caladenia oenochila*

In addition, assessors undertook targeted surveys for other significant flora species across DSE's time stamped vegetation areas. This was informed by the desktop assessment, the assessor's knowledge of the species and its habitat requirements. So in effect, the targeted

flora assessment is considered appropriate for all significant species that may occur within the time stamped vegetation areas.

Prior to the field surveys, areas of DSE time stamped vegetation provided by the GAA were determined and then assessors subsequently undertook the targeted surveys. Five metre transects were walked and assessors visually searches for significant flora within a few metres either side of the transect. The survey date, duration and assessor are provided below (Table 2).

2.3.4 General fauna assessment

General fauna assessments were undertaken concurrently with the general flora surveys (Section 2.3.1). All fauna observed and/or heard were recorded. 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 ground-dwelling fauna.

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

2.3.5 Summary of flora and fauna survey effort

A summary of the flora and fauna field surveys completed during the project are provided below (Table 2).

Table 2: Summary of flora and fauna survey effort within the study area.

Property Number	Assessors	General Flora Assessment & Tree Assessment		Targeted Flora Surveys						General Fauna Assessment	
				Spring Species[1]		Summer Species[2]		Winter Species[3]			
		Date	Duration	Date	Duration	Date	Duration	Date	Duration	Date	Duration
616579	Simon Scott and Marc Freestone	30-Nov-12	11.00 am – 11.30 am	30-Nov-12	11.00 am – 11.30 am	N/A	N/A	Not required	Not required	30-Nov-12	11.00 am – 11.30 am
215385191	Simon Scott and Marc Freestone	2-Feb-12	10.00 am – 10.30 am	N/A	N/A	2-Feb-12	10.00 am – 10.30 am	Not required	Not required	2-Feb-12	10.00 am – 10.30 am
52906073	Simon Scott and Marc Freestone	2-Feb-12	11.00 am – 11.30 am	N/A	N/A	2-Feb-12	11.00 am – 11.30 am	Not required	Not required	2-Feb-12	11.00 am – 11.30 am
52788584	Simon Scott and Marc Freestone	2-Feb-12	10.30 am – 11.00 am	N/A	N/A	2-Feb-12	10.30 am – 11.00 am	Not required	Not required	2-Feb-12	10.30 am – 11.00 am
52788585	Simon Scott and Marc Freestone	2-Feb-12	11.30 am – 12.00 pm	N/A	N/A	2-Feb-12	11.30 am – 12.00 pm	Not required	Not required	2-Feb-12	11.30 am – 12.00 pm
52788586	Simon Scott and Marc Freestone	2-Feb-12	12.00 pm – 12.30 pm	N/A	N/A	2-Feb-12	12.00 pm – 12.30 pm	Not required	Not required	2-Feb-12	12.00 pm – 12.30 pm
630180	Simon Scott and Marc Freestone	2-Feb-12	3.00 pm – 3.30 pm	N/A	N/A	2-Feb-12	3.00 pm – 3.30pm	Not required	Not required	2-Feb-12	3.00 pm – 3.30 pm
44426	Simon Scott and Marc Freestone	2-Feb-12	1.00 pm – 1.30 pm, 2.00 pm – 2.20 pm	N/A	N/A	2-Feb-12	1.00 pm – 1.30 pm, 2.00 pm – 2.20 pm	Not required	Not required	2-Feb-12	1.00 pm – 1.30 pm, 2.00 pm – 2.20 pm
630181	Simon Scott	2-Feb-12	2.20 pm –	N/A	N/A	2-Feb-	2.20 pm –	Not required	Not required	2-Feb-12	2.20 pm –

Property Number	Assessors	General Flora Assessment & Tree Assessment		Targeted Flora Surveys						General Fauna Assessment	
				Spring Species[1]		Summer Species[2]		Winter Species[3]			
		Date	Duration	Date	Duration	Date	Duration	Date	Duration	Date	Duration
	and Marc Freestone		2.30 pm			12	2.30 pm				2.30 pm
27720	Simon Scott and Marc Freestone	3-Feb-12	11.00 am – 11.30 am	N/A	N/A	3-Feb-12	11.00 am – 11.30 am	Not required	Not required	3-Feb-12	11.00 am – 11.30 am
52707261	Simon Scott and Marc Freestone	2-Feb-12	3.30 pm – 4.30 pm	N/A	N/A	2-Feb-12	3.30 pm – 4.30 pm	Not required	Not required	2-Feb-12	3.30 pm – 4.30 pm
27721	Simon Scott and Marc Freestone	3-Feb-12	11.30 am – 12.00 pm	N/A	N/A	3-Feb-12	11.30 am – 12.00 pm	Not required	Not required	3-Feb-12	11.30 am – 12.00 pm
630185	Simon Scott and Marc Freestone	2-Feb-12	2.30 pm – 3.00 pm	N/A	N/A	2-Feb-12	2.30 pm – 3.00 pm	Not required	Not required	2-Feb-12	2.30 pm – 3.00 pm
R4426	Simon Scott and Marc Freestone	16-Nov-11	10.00 am – 10.30 am	16-Nov-11	10.00am – 10.30am	2-Feb-12	4.30 pm – 5.00 pm	Not required	Not required	16-Nov-11	10.00 am – 10.30 am
R215385191	Simon Scott and Marc Freestone	16-Nov-11	9.30 am – 10.00 am	16-Nov-11	9.30am – 10.00am	2-Feb-12	5.00 pm- 5.30 pm	Not required	Not required	16-Nov-11	9.30 am – 10.00 am
R616581	Simon Scott and Marc Freestone	16-Nov-11	9.00 am – 9.30 am	16-Nov-11	9.00am – 9.30am	2-Feb-12	5.30 pm- 6.00 pm	Not required	Not required	16-Nov-11	9.00 am – 9.30 am
152680400	Simon Scott and Marc Freestone	2-Feb-12	12.30 pm – 1.00 pm	N/A	N/A	2-Feb-12	12.30 pm – 1.00 pm	Not required	Not required	2-Feb-12	12.30 pm – 1.00 pm
152680408	Simon Scott and Marc Freestone	2-Feb-12	12.30 pm – 1.00 pm	N/A	N/A	2-Feb-12	12.30 pm – 1.00 pm	Not required	Not required	2-Feb-12	12.30 pm – 1.00 pm
616581	Simon Scott and Marc Freestone	8-Feb-12	10.00 am – 11.00 am	N/A	N/A	8-Feb-12	10.00 am – 11.00 am	Not required	Not required	8-Feb-12	10.00 am – 11.00 am
52906072	Simon Scott and Marc	8-Feb-12	11.00 am – 12.00 am	N/A	N/A	8-Feb-12	11.00 am – 12.00	Not required	Not required	8-Feb-12	11.00 am – 12.00 am

Property Number	Assessors	General Flora Assessment & Tree Assessment		Targeted Flora Surveys						General Fauna Assessment	
				Spring Species[1]		Summer Species[2]		Winter Species[3]			
		Date	Duration	Date	Duration	Date	Duration	Date	Duration	Date	Duration
	Freestone						am				

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 surveys were undertaken for several significant flora species that were stipulated within the contract provided by GAA. However, targeted fauna surveys were not required as part of the current contract.

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 some fauna species particularly migratory, transitory or uncommon fauna species may have been absent from habitats at the time of the assessments.

Vegetation assessments were undertaken in November, at a time considered appropriate to undertake targeted flora surveys for the majority of plant species. However, some flora species (e.g. orchids), may not have been visible at the time of the assessment. Where this was the case, and where the assessor felt that additional assessments are warranted, this is noted within the report.

Habitat hectare assessments were not undertaken as part of the current project. Habitat scores are based on DSE's time stamped data which was provided as part of our assessments. The best and remaining 50% habitat for rare and threatened fauna species undertaken as part of a habitat hectare assessment has been provided. However, based on detailed field assessments the time stamped data appeared to be an overestimate of vegetation quality, as the observed patches are generally more representative of 'scattered tree areas' rather than 'remnant patches' due to the dominant exotic understorey.

In addition, not all properties within the study area were assessed due to the lack of property access. Properties that weren't accessed include:

- 52906074 660 Berwick-Cranbourne Road
- 52707260 55 Smiths Lane
- 52906071 85 Hardys Road
- 27719 1485 Pound Road
- 52906076 5 Hardys Road
- 616569 Lot 1 Hardy's Road
- 2023494 17-23 Hardys Road
- 2023499 17-23 Hardys Road

Some landholders were not contactable while others did not confirm that they wanted to participate in this project for multiple reasons.

3 RESULTS

3.1 Flora

3.1.1 Flora species

Eighty-five flora species (27 indigenous, 58 exotics) were recorded in the study area during the assessment (Appendix 2.1). The study area is highly modified and dominated by exotic vegetation. Remnant native vegetation was limited to Thompsons Road and Pound Road road reserves (Figure 3).

Indigenous overstorey species within the study area include trees such as River Red-gum *Eucalyptus camaldulensis* and Swamp Gum *Eucalyptus ovata*. Shrubs included Hedge Wattle *Acacia paradoxa*, and Swamp Paperbark *Melaleuca ericifolia*, while other common understorey species within the study area include Bidgee Widgee *Acaena novae-zelandiae*, Spiny-headed Mat-rush *Lomandra longifolia*, Weeping Grass *Microlaena stipoides* var. *stipoides* and Austral Bracken *Pteridium esculentum*.

Generally, exotic vegetation consists of large areas of pasture grasses and environmental weeds, including Cocksfoot *Dactylis glomerata*, Cape Weed *Arctotheca calendula*, Spear Thistle *Cirsium vulgare*, Perennial Rye Grass *Lolium perenne*, Toowoomba Canary-grass *Phalaris aquatic*, Brown-top Bent *Agrostis capillaris* and Paspalum *Paspalum dilatatum.* Common woody weeds are Hawthorn *Crataegus monogyna*, Blackberry *Rubus fruticosus spp. agg.*, Sweet Briar *Rosa rubiginosa* and African Boxthorn *Lycium ferocissimum.*

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

3.1.2 Significant flora species and communities

No flora species of national or state conservation significance were recorded within the study area during the survey. However, several significant flora species have been recorded within a rail reserve in the local area (i.e. a 10 kilometre radius of the study area). These species include Maroon Leek-orchid, Grey Billy-buttons, Pale Swamp Everlasting, Swamp Everlasting, Matted Flax-lily. These species and other significant flora that have been recorded within the local area are listed below (Appendix 2.2) (Figure 6).

National

No nationally significant flora species were recorded within the study area during the targeted flora surveys. Seven nationally significant flora species have been previously recorded from within the local area (DSE 2011a), and five nationally significant flora species are listed as potentially occurring within a 10 kilometre radius of the study area (Appendix 2.2.) (DSEWPC 2012). Based on the results of the literature review and surveys undertaken

throughout the study area there is a low likelihood for River Swamp Wallaby-grass to persist around the farm dams and in the drainage lines within the study area, and Matted Flax-lily along the road reserves. It is considered unlikely that any other nationally significant species are present or likely to occur within the study area (Appendix 2.2).

State

No state significant flora species were recorded within the study area during the survey. There have been 26 state significant flora species previously recorded from within the local area (Appendix 2.2.). Based on the survey, there is a low likelihood of occurrence for Purple Blown-grass *Lachnagrostis punicea ssp. filifolia* to occur around farm dams and in drainage lines, and for Veined Spear-grass *Austrostipa rudis ssp. australis* to occur in the road reserves (Appendix 2.2). One other species, not identified through the desktop assessment may also occur within the road reserves; Pale Flax-lily (Benambra) *Dianella* sp. aff. *longifolia* (Benambra).

Regional and Local

Eleven regionally significant flora species were recorded within the study area during the site survey. 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 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Flora and Fauna Guarantee Act 1988* (FFG Act) are present within the study area. Plains Grassy Woodland (EVC 55) and Swampy Riparian Woodland (EVC 83) are listed as endangered within the Gippsland Plain bioregion (DSE 2012b).

3.2 Ecological Vegetation Classes

The DSE bioregional pre-1750 EVC mapping shows that the precinct was once covered by Plains Grassland/Plains Grassy Woodland Mosaic (EVC 897), Heathy Woodland (EVC 48) and Swamp Scrub (EVC 53). Current EVC mapping (DSE 2012a) shows only isolated occurrences of these three EVC's within the precinct.

Plains Grassy Woodland, Plains Grassland, and Swamp Scrub remnants are listed as Endangered, and Heathy Woodland remnants are listed as Least Concern within the Gippsland Plain bioregion (DSE 2012b).

Time stamped remnant native vegetation within the precinct comprises Plains Grassy Woodland and Swampy Riparian Woodland.

3.2.1 Plains Grassy Woodland (EVC 55)

Plains Grassy Woodland occurs on a range of different soil types, and is typically open woodland with sparse shrubs and a diverse understorey of grasses and herbs. It occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer (DSE 2012b).

Plains Grassy Woodland is present only in a small patch on the western Pound Road road reserve. This patch was highly modified and contains Black Wattle *Acacia mearnsii*, Hedge Wattle and Weeping Grass. Many grassy and woody weed species were present.

3.2.2 Swampy Riparian Woodland (EVC 83)

Swampy Riparian Woodland occupies the banks of streams of foothills and plains, and has a canopy reaching heights of 15 metres tall. Typical canopy species include Narrow-leaf Peppermint and Swamp Gum. The understorey contains a diverse understorey of shrubs, with sedges and grasses in the ground layer (DSE 2012b).

Swampy Riparian Woodland is present within the precinct on the southern Thompsons Road road reserve in the north of the study area. Swamp Gum dominates these patches and is often the only native plant species present, though there are occasional indigenous understorey species (e.g. Slender Dock *Rumex brownii*). The understorey is largely composed of exotic grassy weeds in these patches.

3.3 Habitat Hectare Assessment

3.3.1 Remnant patches of native vegetation

Patches of remnant native vegetation were not mapped as part of this study. The time stamped data contains 13 patches of remnant native vegetation. Habitat hectare scores range from 10 to 27 and conservation significance is High to Very High. It appears that the data is incorrect as the patches with a habitat hectare score less than 40 should be assigned a conservation significance rating of High.

3.3.2 Indigenous trees

The study area contains 119 scattered trees (Figure 4) including:

- 2 Very Large Old Tree (VLOT);
- 14 Large Old Trees (LOTs);
- 41 Medium Old Trees (MOTs); and
- 62 Small Trees (ST) (Appendix 4.2).

Of these, two are located within remnant patches of vegetation.

Sixty-two scattered remnant trees within the precinct are of Low conservation significance, while 57 scattered trees are of High conservation significance.

3.3.3 Best or remaining 50% of habitat for rare or threatened flora species

An assessment of the best or remaining 50% of habitat is undertaken to determine if the conservation significance of any remnant patches of vegetation should be elevated during the habitat hectare assessment. Remnant patches of vegetation located at the study area have a very low likelihood of containing any rare or threatened flora species. On this basis, the remnant patches are not likely to provide the best 50% habitat for any rare or threatened flora species, and further consideration relating to the best and remaining 50% of habitat is not required.

3.4 Fauna

3.4.1 Fauna species

Forty-two terrestrial fauna species were recorded during the assessment, comprising four mammals (two native, two introduced), 36 birds (29 native, seven introduced), and two native frogs (Appendix 3.1). Species recorded are representative of fauna expected to occur within modified habitats or farmland areas in Melbourne's south east. Further discussion of species recorded is provided below (Section 3.4.2).

3.4.2 Fauna habitats

The site contains four broadly categorised habitat types i) modified woodland, ii) native and introduced trees including shelter belts, iii) artificial waterbodies and drainage lines, and iv) introduced pasture grass/crops.

Modified Woodlands (modified remnants of Swampy Woodland, and Plains Grassy Woodland)

Overall habitat value - Remnant woodland patches are of **moderate** habitat value for fauna (Appendix 1.5). These small and disjunct areas occur in the road reserves, but not on private property. They are highly modified, generally lacking and lack understorey plants and midstorey shrubs that should be associated with these EVCs. Still, these patches may provide habitat or temporary habitat when moving between higher quality woodlands near riparian vegetation and reserves.

Description - This habitat type is highly modified with a poor quality understorey and general lack of midstorey native vegetation. Some of these areas contain mature trees currently with hollows of varying size and shape.

Fauna – Woodland birds observed included Eastern and Crimson Rosellas *Platycercus* spp., White-plumed honeyeater *Lichenostomus penicillatus*, Red Wattlebird *Anthochaera*

carunculata and Sulphur-crested Cockatoo *Cacatua galerita*, all of which are common species within the local area.

These areas provide habitat for arboreal mammals such as Common Brush-tailed Possum *Trichosurus vulpecula* and Common Ring-tailed Possum *Pseudocheirus peregrines*, while microbats are expected to use tree hollows for roosting and breeding purposes. When in flower, remnant woodland trees provide an important nectar resource for a variety of honeyeaters and lorikeets, while Grey-headed Flying-fox *Pteropus policepahlus* may occasionally use these areas. These areas provide lower quality habitat for other ground dwelling species such as reptiles and frogs.

Native and introduced trees including shelterbelts

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 – Few indigenous scattered trees occur within the precinct. They are almost entirely located within the road reserve. A total of 119 scattered indigenous trees along with exotic trees occur throughout the precinct (Appendix 1.5). Generally Pine Trees *Pinus radiata* and Monterey Cypress *Cupressus macrocarpa* have been planted as shelterbelts throughout the precinct. Recently landholders have removed these trees within the properties in the north-western portion of the study area. The indigenous trees are typically mature although small and do not currently contain hollows. Planted trees provide suitable foraging and roosting habitat for birds.

Terrestrial fauna – Many of these trees provide an important foraging resource, primarily for a range of locally common birds. Trees are also vantage points for raptors, and are likely to provide habitat for bats within hollows or underneath bark. Australian Hobby *Falco longipennis* was recorded perching in trees and circling for prey in adjoining paddocks.

Creeks, drainage lines and waterbodies

Overall habitat value – Ephemeral drainage lines provide **low - moderate** habitat values for fauna (Appendix 1.5). When inundated drainage lines provide temporary habitat for waterbirds, native fish and frogs.

Description – This habitat is quite variable in its vegetation composition and structure. Approximately 200 metres of Clyde Creek intersects the south-western corner of the study area. This area is highly degraded and dominated by exotic pasture, with an overstorey of swamp Paperbark *Melaleuca ericifolia*. It contained water during the assessment. Two tributaries to the Cardinia Creek occur within the eastern portion of the study area. These areas are low-lying and may become seasonally inundated, however they are generally dominated by pasture grasses typical of the adjoining paddock. Some dams along the waterway. Vegetation within the tributary itself is dominated by pasture grasses, although the

waterbodies contain areas of fringing indigenous grasses such as Rush *Juncus* sp and Common Spike-sedge *Eleocharis acuta*.

Two other small dams occur within the study area. These include one near the southern boundary of the study area and one located within the north-western portion of the study area. These are notable as both dams contain a higher proportion of emergent and fringing vegetation than those mentioned above.

There is also a quarry within the southern portion of the study area. They contained water during at the time of the assessment however, they generally did not contain any fringing or emergent native vegetation.

Fauna – Ephemeral drainage lines provide foraging and refuge habitat for a suite of native fauna, including waterbirds such as White-faced Heron *Egretta novaehollandiae*, Australian Wood Duck *Chenonetta jubata* and Pacific Black Duck *Anas superciliosa*. A pair of Australasian Grebe *Tachybaptus navaehollandiae* were nesting at one of the dams associated with the unnamed tributary in the eastern portion of the study area. Areas of long vegetation provide habitat for regionally significant Latham's Snipe *Gallinago hardwickii*. Two state-significant species may forage within these areas, Royal Spoonbill *Platalea regia* and Eastern Great Egret *Ardea modesta*. Pink-eared Duck *Malacorrynchus membranaceus* was recorded at the quarry dams.

Several common frog species, including Common Froglet *Crinia signifera* and Spotted Marsh Frog *Limnodynastes tasmaniensis* were recorded at farm dams. These areas provided generally poor quality fish habitats. The small portion of Cardinia Creek is likely to provide temporary habitat for Dwarf Galaxias *Galaxiella pusilla* when inundated (which it wasn't at the time of the assessment). Other waterways and waterbodies are highly modified, and are largely isolated from the population known to occur within Cardinia Creek. They provide a very low likelihood of containing temporary habitat during high rainfall events.

Pastures and Crops (Corresponding EVC: None)

Overall habitat value – This habitat is considered to be of **low** habitat value for fauna (Appendix 1.5).

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

Fauna – Few native species are known to use this habitat, including birds adapted to modified habitats such as Raven *Corvus* spp., Australian Magpie 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*, 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 assessment. National, state and regionally significant fauna species that have been previously recorded within 10 kilometres of the study site are provided below VBA (DSE 2011a) (Figure 7). Fauna with moderate likelihood of occurrence are discussed within relevant sections, based on their conservation status.

National

Ten nationally significant fauna have previously been recorded in the local area, within 10 kilometres of the study area (DSE 2011a) (Appendix 3.2.) (Figure 7). These species include:

- Three birds: Australasian Bittern *Botaurus poiciloptilus*, Swift Parrot *Lathamus discolor* and Helmeted Honeyeater *Lichenostomus melanops cassidix* (Swift Parrot may forage at flowering indigenous and planted Gums).
- Three mammals: Southern Brown Bandicoot *Isoodon obeselus obeselus, New Holland Mouse Pseudomys novaehollandiae, Grey-headed Flying-fox Pteropus poliocephalus* (Southern Brown Bandicoot is a low likelihood due to degraded habitats, and Grey-headed Flying fox may forage at floweiring Gums).
- Two fish: Dwarf Galaxias *Galaxiella pusilla* and Australian Grayling *Prototroctes maraena* (moderate likelihood within Cardinia Creed when site is inundated).
- One frog: Growling Grass Frog *Litoria raniformis* (low to moderate likelihood, potential resident).
- One invertebrate: Large Ant Blue *Acrodipsas brisbanensis* (no suitable habitat).

A further nine species (not previously documented on the VBA (DSE 2011a), or habitat for these species, are identified as potentially occurring within a 10 kilometre radius of the study area (DSEWPC 2012) (Appendix 3.2). There is no suitable habitat for any of these additional species within the study area.

Descriptions of nationally significant species that have the potential to occur within the study area are provided below.

Grey-headed Flying-fox

Grey-headed Flying-fox is listed as vulnerable under the EBPC Act (DSEWPC 2012) and vulnerable in Victoria (DSE 2007a). The species is also listed threatened under the FFG Act. Grey-headed Flying-fox is generally a colonial roosting bat that disperse to forage at nights. The two largest colonies in Australia are in Melbourne and near Geelong. Food preferences include fruit and nectar from flower trees, particularly gums. It is likely that Grey-headed Flying-foxes will occasionally forage on flowering eucalypts within the study area.

Growling Grass Frog

Growling Grass Frog is listed as endangered in Victoria (DSE 2007a), is listed under the FFG Act, and vulnerable under the EBPC Act (DSEWPC 2012). 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 (Viridans 2011a; Mahony 1999).

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 and Heritage 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 has not previously been recorded within the study area (DSE 2011b). Sub-regional surveys have also been completed for Growling Grass Frog within the study area and surrounds and no species were recorded (DSE 2011b). The landowner of the quarry property (Property PFI 616581) has also commissioned their own Growling Grass Frog assessment, and no Growling Grass Frogs were recorded. Based on the habitat conditions present and lack of recent records within the study area despite surveys being undertaken there is a low to moderate likelihood of the species occurring within the dams associated with the Cardinia Creek tributary and possibly the small area of Clyde Creek that occurs within the study area.

Clyde Creek has been designated as Category 1 habitat for Growling Grass Frog and is required to be protected and managed for conservation (DSE 2011b). Other waterbodies, drainage lines, and the tributaries to Cardinia Creek are all mapped as Category 2 habitats and the removal of these habitats is likely to be permitted, subject to meeting offsets requirements (DSE 2011b). A Conservation Management Plan will be required for this species.

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).

There is a low to moderate likelihood that Australian Grayling may temporarily utilise inundated areas of Clyde Creek, and the ephemeral tributaries to Cardinia Creek for dispersal when inundated. There is a low likelihood that Australian Grayling persists in small dams as these areas represent marginal habitat for the species (i.e. the species is associated with waterways such as Cardinia Creek).

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).

Dwarf Galaxias is known to occur within Cardinia Creek (McGuckin 2006; 2010). There is a moderate likelihood that Dwarf Galaxias may occur within the tributaries associated with Cardinia Creek located within the eastern portion of the study area when inundated. There is a low likelihood that Dwarf Galaxias will persist in small dams that represent marginal habitats and are subject to ongoing degradation by livestock (Appendix 3.2).

Dwarf Galaxias has not been recorded from Clyde Creek (DSE 2011a). It is within a separate catchment to Cardinia Creek, and there is a low likelihood that this species may occur within the south-western portion of the study area.

State

Thirty-two state significant fauna species have previously been documented from the local area (DSE 2011a), and the likely use of the study area by these species is provided in Appendix 3.2. These species include:

- Three raptors: Grey Goshawk *Accipiter novahollandiae*, White-bellied Sea-Eagle *Haliaeetus leucogaster* and Black Falcon *Falco subniger* (no suitable habitat, occasional)
- Two owls: Powerful Owl *Ninox strenua* and Sooty Owl *Tyto tenebricosa tenebricosa*,
- Fifteen wetland associated birds: Common Sandpiper *Actitis hypoleucos*, Wood Sandpiper *Tringa glareola*, Caspian Tern *Hydroprogne caspia*, Lewin's Rail *Lewinia pectoralis*, Baillon's Crake *Porzana pusilla*, Royal Spoonbill *Platalea regia*, 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* (occasional use of the study area by a small number of these species – see below).

- Six woodland associated birds: Brown Treecreeper (south-eastern ssp.) *Climacteris picumnus victoriae*, Speckled Warbler *Chthonicola sagittatus*, Hooded Robin *Melanodryas cucullata*, Grey-crowned Babbler *Pomatostomus temporalis*, Chesnut-rumped Heathwren *Calamanthus pyrrhopygius* and Painted Honeyeater *Grantiella picta* (no suitable habitat).

- Two mammals: New Zealand Fur Seal Arctocephalus forsteri, New Holland Mouse *Pseudomys novaehollandiae* (no suitable habitat).

- One reptile: Swamp Skink *Egernia coventryi* (no suitable habitat).

- One amphibian: Southern Toadlet *Pseudophryne semimarmorata* (marginal habitat, low likelihood of occurrence).

- One fish Pale Mangrove Goby *Mugilogobius paludis* (marginal habitat, low likelihood of occurrence).,

- One crustacean: Foothill Burrowing Crayfish *Engaeus victoriensis* (marginal habitat, low likelihood of occurrence).

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

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). While Royal Spoonbill was not recorded during the fauna assessment, the species has been recorded in the local area, and is expected to use habitat within farm dams and low lying areas within the study area on occasions (moderate likelihood of occurrence) (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 been previously recorded within the local area, and this species is likely to use artificial waterbodies (edges of farm dams) and ephemeral depressions within the study area as a visitor on an occasional basis (Appendix 3.2, Figure 7).

Regional and Local

No regionally significant fauna were recorded during the present assessment. Fourteen regionally significant fauna species have been previously recorded in the local area (Appendix 3.2). Due to the highly modified nature of the study area, the likelihood of occurrence for

regionally significant fauna species such as Pied Cormorant *Phalacrocorax varius*, Cape Barren Goose *Cereopsis novaehollandiae* and Spotted Harrier *Circus assimilis* is considered low (Appendix 3.2). However, it is expected that low numbers of Latham's Snipe *Gallinago hardwickii* would use seasonally inundated areas and the edge of waterbodies on occasions (i.e. during the spring and summer period).

Other regionally significant fauna recorded within the local area are considered unlikely to 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

An assessment of the best or remaining 50% of habitat is undertaken to determine if the conservation significance of any remnant patches of vegetation should be elevated during the habitat hectare assessment (DSE 2007b, NRE 2002). Remnant patches of vegetation located at the study area have only a very low likelihood of containing any rare or threatened fauna species, with the exception of Swift Parrot and Grey-headed Flying Fox (Table 3). Flowering Gum trees may provide an opportunistic food resource for these species on an occasional basis (Figure 9). However, these patches are unlikely to provide breeding or important or limiting habitat such as reeding sites. On this basis, the habitat is considered the remaining 50% of habitat for the species within the bioregion, and the conservation significance for the remnant patches of vegetation remains unchanged.

Table 3: Habitat assessment for threatened species within properties accessed for the study area.

Potential Habitat (Remnant Patch No)	Threatened Species or Species' with the Highest Likelihood of Occurrence[1]	Steps Followed	Best or Remaining 50% of Habitat for the Species?	Notes	Conservation Significance Rating Prior to this Evaluation	Conservation Significance Rating after this Evaluation
All remnant patches	Swift Parrot and Grey-headed Flying Fox	A, D, F	Remaining	Will opportunistically forage within flowering Gums, but will not provide important or limiting habitats such as breeding sties.	High	High

1 The assessment is undertaken on the species or species' with the highest likelihood of occurrence as a resident or most regular occurrence if it is a mobile fauna species. Ecology and Heritage Partners Pty Ltd. does not intend to assess species' with a lower likelihood of occurrence as they are unlikely to alter the outcome of the assessment.

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 national conservation significance:

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

Ramsar Wetlands of International Significance

There are no Ramsar listed wetlands within the study area. However, Port Phillip and Westernport Ramsar site is located within 10 kilometres of the study area. As with other nearby developments, it is expected that practical mitigation measures can be undertaken to minimise 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. Three listed flora species have been previously recorded within a 10 kilometre radius of the study area, and five additional species were identified on the DSEWPC Protected Matters Search Tool (DSEWPC 2012) (Appendix 2.2).

Based on the results of this assessment, there is a low likelihood of occurrence for River Swamp Wallaby-grass near farm dams and waterways, and a low likelihood for Matted Flax-lily to occur within the road reserves as described in section 3.1.2.

Fauna – No fauna species listed under the EPBC Act were recorded during the present assessment. Eight listed species have been recorded in the local area previously (DSE 2011a), and an additional nine species or their habitats are predicted to occur in the local area (DSEWPC 2012) (Appendix 3.2). There is a moderate likelihood that Dwarf Galaxias and Australian Grayling may occur within tributaries associated with Cardinia Creek when inundated. There is a low to moderate likelihood for Growling Grass Frog to use farm dams and ephemeral drainage lines within the study area. Swift Parrot and Grey-headed Flying Fox may forage in flowering eucalypts within the study area. Other species have a low likelihood of occurrence due to the degraded habitat at the study area (Appendix 3.2). The study area does not contain any vegetation proposed to be retained or enhanced for the conservation of Southern Brown Bandicoot (DSE 2011c).

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

Fourteen migratory and marine species have been recorded from the local area, or predicted to occur based on their habitat requirements (DSEWPC 2012; DSE 2011a) (Appendix 3.2). While several listed migratory and marine species would be expected to use the study area on occasions, there are no important wetland or marine habitats within the study area.

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 nationally significant flora or fauna have been recorded during the current site surveys. 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 16 June 2009. So whilst Commonwealth approval is still required, the agreement is designed to expedite the process. The state government currently has mechanisms in place to gain this approval, subject to meeting a number of other prescriptions. These prescriptions are discussed in greater detail below (4.1.2).

4.1.2 Strategic Impact Assessment and Biodiversity Conservation Strategy

In June 2009 the Victorian Government entered into an agreement with the Commonwealth Government to undertake a Strategic Impact Assessment Report (SIAR) under the EPBC Act.

The program defined in the Commonwealth-State agreement is the Urban Growth Boundary Review for Melbourne undertaken by the State of Victoria. The SIAR provides details of potential impacts of the proposed program of urban development on matters of NES (DSE 2009).

It is important to note however that the *Biodiversity Conservation Strategy for Melbourne's Growth Areas* (BCS) (DSE 2011d), currently in draft form for consultation, is intended to supersede SIAR. This Strategy is likely to be finalised during 2012, and may alter the retention or offset requirements for matters of NES. It is anticipated that acceptance of the BCS, will also include finalisation of the Draft Sub-regional Species Strategies, allowing for their implementation.

Relevant prescriptions under the SIAR include have been prepared for Southern Brown Bandicoot and Growling Grass Frog.

Implications

There is potential habitat within the study area for the EPBC Act-listed Growling Grass Frog and Southern Brown Bandicoot. Targeted surveys should be undertaken for these species in accordance with methodology outlined in the Biodiversity Precinct Structure Planning Kit (DSE 2010). Should any of these species be recorded within the study area, habitat retention and/or offset requirements will follow as per the prescriptions under the SIAR.

Under the SIAR prescriptions for Growling Grass Frog and Southern Brown Bandicoot (DSE 2009), a Conservation Management Plan (CMP) must be prepared to the satisfaction of the Department of Sustainability and Environment. Approval for the proposed development has not been provided for this precinct, and will be required.

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, unless:

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

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

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.

A permit to remove destroy or lop vegetation may still be required under an applicable overlay, such as an Environmental Significance Overlay (ESO) depending on the requirements of the schedule to that overlay. However, it is often the case that such overlays are removed during the precinct planning process.

Implications and Recommendations

A planning permit is currently required from Casey City Council to remove, destroy or lop native vegetation within the study area. However, once the NVPP has been prepared and incorporated, clause 52.16 applies to the protection and removal of native vegetation on properties within the NVPP.

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 - Ten flora species listed as threatened under the FFG Act have been recorded within a 10-kilometre radius of the study area (Viridans 2011b). Matted Flax-lily is considered to have a low likelihood of occurrence within the road reserves, while Purple Blown-grass is also considered to have only a low likelihood of occurrence within the drainage lines and dams in the study area.

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

Fauna – No FFG Act-listed fauna species were recorded within the study area during the assessment. Thirty-nine fauna species listed as threatened under the FFG Act have previously been recorded from within a 10 kilometre radius of the study area (Appendix 3.2). It is considered unlikely that any of these species would occur within the study area as no suitable habitat is present.

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 or vegetation communities 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, if they are located on public land.

For native fauna species which are listed under the FFG Act (discussed above), a permit, or 'Management Authorisation' (MA) under the *Wildlife Act 1975* issued by DSE will be required where handling or salvage and translocation is required within the project area.

4.2.3 Environment 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

An EES is not considered necessary as part of the future development of the precinct.

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

Seven noxious weed species were recorded within the study area during the site assessments. Land owners are responsible for controlling 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*.

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).*

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

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

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

3. Identify appropriate offset options.

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

Implications and Recommendations

Habitat hectare results provided by DSE within time stamped vegetation patches is provided in Appendix 4.1. Offsets will be required for the removal of native vegetation.

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 as required.

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 future development of the study area.

4.3 Local

4.3.1 Casey City Council

Under the City of Casey planning scheme the majority of the study area is Urban Growth Zone (UGZ), with areas of Farming Zone – Schedule 2 (FZ2), Road Zone – Schedule 2 (RDZ2), Special Use Zone – Schedule 1 (SUZ1) and Urban Floodway Zone (UFZ). Some areas of the study area are subject to a Land Subject to Inundation Overlay (LSIO). The study area lies within the Urban Growth Boundary (UGB).

Implications and Recommendations

The NVPP and the Thompson Road PSP will guide future development from the time it becomes an incorporated into the Casey Planning Scheme.

5 POTENTIAL IMPACTS AND MITIGATION MEASURES

5.1 Potential Impacts

Potential impacts associated with the future development of the study area include:

- The removal or disturbance to;
    - 0.04 habitat hectares of High conservation significance Grassy Woodland;
    - 0.11 habitat hectares of Very High conservation significance Grassy Woodland;
    - 0.04 habitat hectares of High conservation significance Swampy Riparian Woodland;
    - 0.06 habitat hectares of Very High conservation significance Swampy Riparian Woodland;
    - 62 indigenous trees that are of Low conservation significance, and
    - 57 indigenous trees that are of High conservation significance.
- The loss or disturbance to potential breeding habitat (farm dams) for Growling Grass Frog, and foraging habitat for significant waterbirds such as Royal Spoonbill, Eastern Great Egret and Latham's Snipe.
- The loss or disturbance to a range of habitats that provide low quality habitat for native birds and reptiles.
- The loss or disturbance waterbodies and drainage lines that provide habitat for native amphibian and fish species.

5.2 Opportunities to Reduce Potential Impacts

Future development of the study area has the potential to impact (direct and indirect) indigenous flora and fauna species within the study area, and habitat for threatened fauna species. Measures to mitigate impacts of the future development on ecological values within the study area include:

- Protect and enhance areas of remnant native vegetation and fauna habitat (i.e. remnant trees and vegetation, dams), especially those containing potential habitat for significant flora and fauna species.

- Fence areas of ecological value (i.e. remnant trees and vegetation) during construction. These areas include the scattered trees and remnant patches along Thompsons Road and Hardys Road.

- Prepare a Revegetation Plan to improve the cover of native vegetation, mimic the EVCs what would have originally occurred within the study area.

- Eradicate or control weeds appropriately to minimise the spread of material into, within and outside of the study area.
- Where possible, minimise alterations to hydrological regime and runoff water quality via use of water sensitive urban design.
- Where possible, minimise disturbance to retained drainage lines. Stormwater treatment wetlands should be located adjacent to (offline), rather than located within (online) these drainage lines;
- Prepare a Conservation Management Plan (CMP) that includes measures to retain and enhance remnant native vegetation and fauna habitat. The CMP needs to have specific protection and management actions for the nationally significant Growling Grass Frog.
- Ensure that Environmental Management Plan (EMP) is prepared prior to development. The EMP should include sediment and erosion control measures to avoid impacts to drainage lines, waterways (outside of the study area) and dams.
- Prepare a Weed Management Plan that aims to eradicate or control weeds appropriately to minimise the spread of material within and beyond the study area.
- Prepare a Pest Animal Management Plan.
- A zoologist or wildlife handler should be present at the time of tree removal to undertake salvage and translocation measures.

5.3 Opportunities to Protect and Enhance Ecological Values

Habitat within the study area is highly fragmented, and remnant patches of native vegetation are small and are often without connectivity to other remnant vegetation.

The following measures to enhance ecological values within the study area are recommended:

- Control of weeds such as African Boxthorn, Hawthorn, Sweet Briar and Blackberry within the study area.
- Encourage natural regeneration of remnant native vegetation within the study area (e.g. along the roadsides).
- Provide connectivity to other areas of remnant native vegetation through the use of the linear features (e.g. road reserves).
- Undertake supplementary planting in areas retained for conservation purposes and public open space. The aim should be to improve the quality and extent of remnant native vegetation through the use of site indigenous flora species that are associated

with the former EVCs within the study area. Future revegetation works should be undertaken in accordance with an approved Revegetation Plan.

- Targeted survey, salvage and translocation of flora that have a potential to occur within modified habitats (as they were not located within the time stamped vegetation areas, they were not surveyed during this project) may be required. Specifically, this includes River Swamp Wallaby-grass around waterways and dams, and Matted Flax-lily and Pale Flax-lily (Benambra) within road reserves.

6 CONCLUSION

The study area is highly modified and dominated by exotic vegetation. The majority of remnant native vegetation within the study area has been cleared for agriculture. Remnant native vegetation within the study area comprises two EVCs: Plains Grassy Woodland, Swampy Riparian Woodland.

There are 119 scattered trees within the study area. These comprise two VLOTs, 14 LOTs, 41 MOTs and 62 ST, which are of High and Low conservation significance. If any scattered trees within the study area are approved for removal, they must be offset in accordance with the Framework and Port Phillip and Westernport Native Vegetation Plan (PPWCMA 2006).

No national or state significant flora or fauna species were recorded within the study area during the assessment. Seven nationally significant and 47 state significant flora species have been previously recorded within the local area. There is a low likelihood that nationally significant River Swamp Wallaby-grass may occur within farm dams and drainage lines, and that Matted Flax-lily may occur within the road reserve. There is also a low likelihood of occurrence for state significant flora species such as Veined Spear-grass and Purple Blown-grass to occur within the study area.

The study area supports four broad habitat types: habitat types: i) modified woodland, ii) native and introduced trees including shelter belts, iii) artificial waterbodies and drainage lines, and iv) introduced pasture grass/crops.

Eight significant fauna species have a low to moderate likelihood of occurrence within the study area. These include;

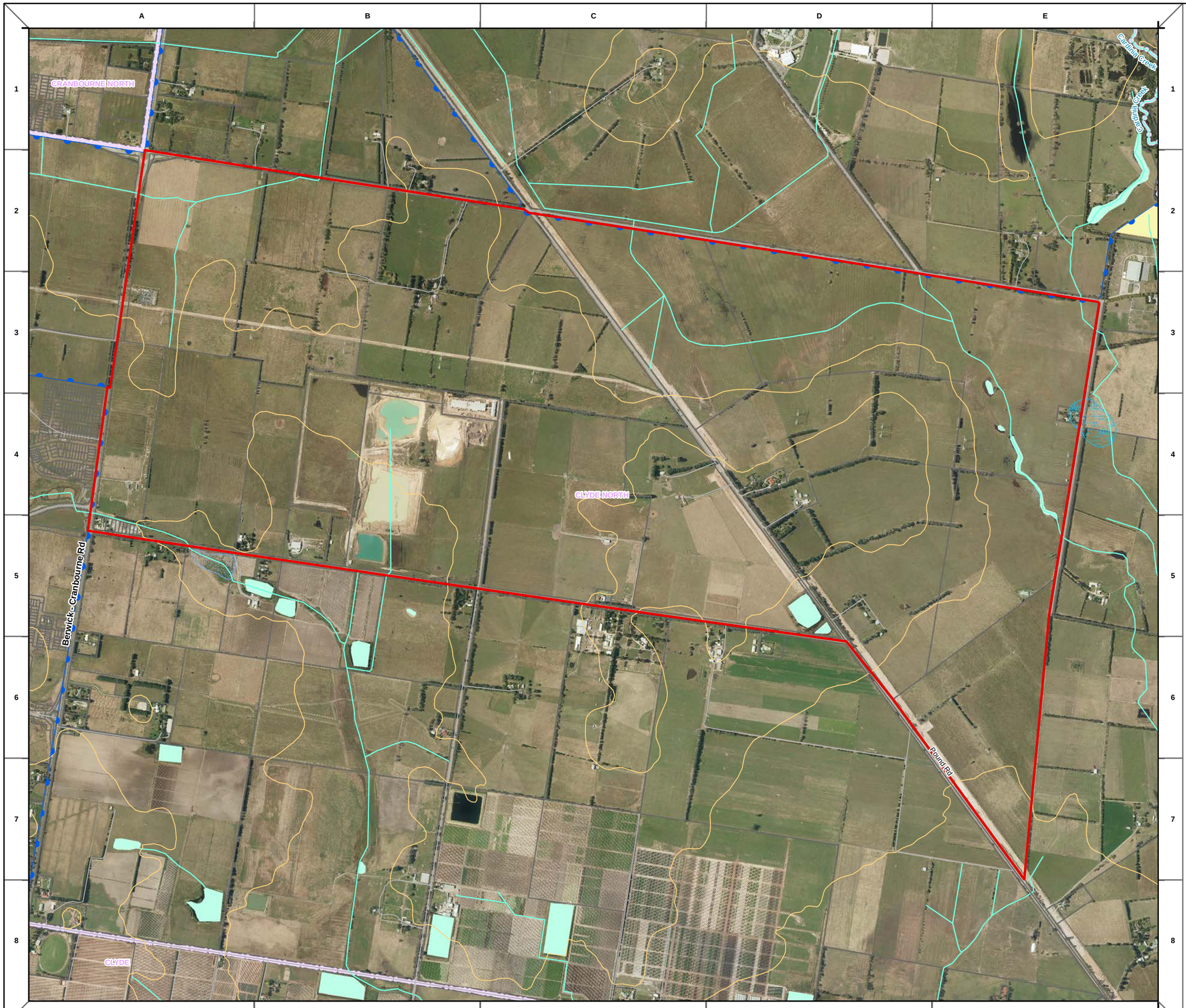
- Grey-headed Flying–fox and Swift Parrot that may opportunistically forage in flowering eucalypts;
- Growling Grass Frog may occur at farm dams associated with two ephemeral drainage lines in the east of the study area, and at Clyde Creek;
- Dwarf Galaxias and Australian Grayling may occur within the ephemeral drainage lines in the eastern portion of the study area when inundated;
- Royal Spoonbill and Eastern Great Egret are likely to forage at waterways and waterbodies thought the study area; and
- Latham's Snipe may opportunistically forge in areas of long grass near waterways and waterbodies.

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 protection of native vegetation and areas of fauna habitat, and allowing the regeneration of native vegetation, along with undertaking revegetation and weed control. Clyde Creek will be

required to be retained as Growling Grass Frog habitat. All works should be undertaken in accordance with a Conservation Management Plan.

FIGURES



Legend

- Precinct Study Area
- Urban Growth Boundary
- Railway Station
- Railway
- Freeway
- Collector Road
- Minor Road
- Contour (10m)
- Minor Watercourse
- Waterbody
- Land Subject to Inundation
- Wetland/Swamp
- Parks and Reserves
- Crown Land
- Localities
- Property Boundaries

Overveiw of Study Area PSP 1053

Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

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ecology & heritage partners

FIGURE 1

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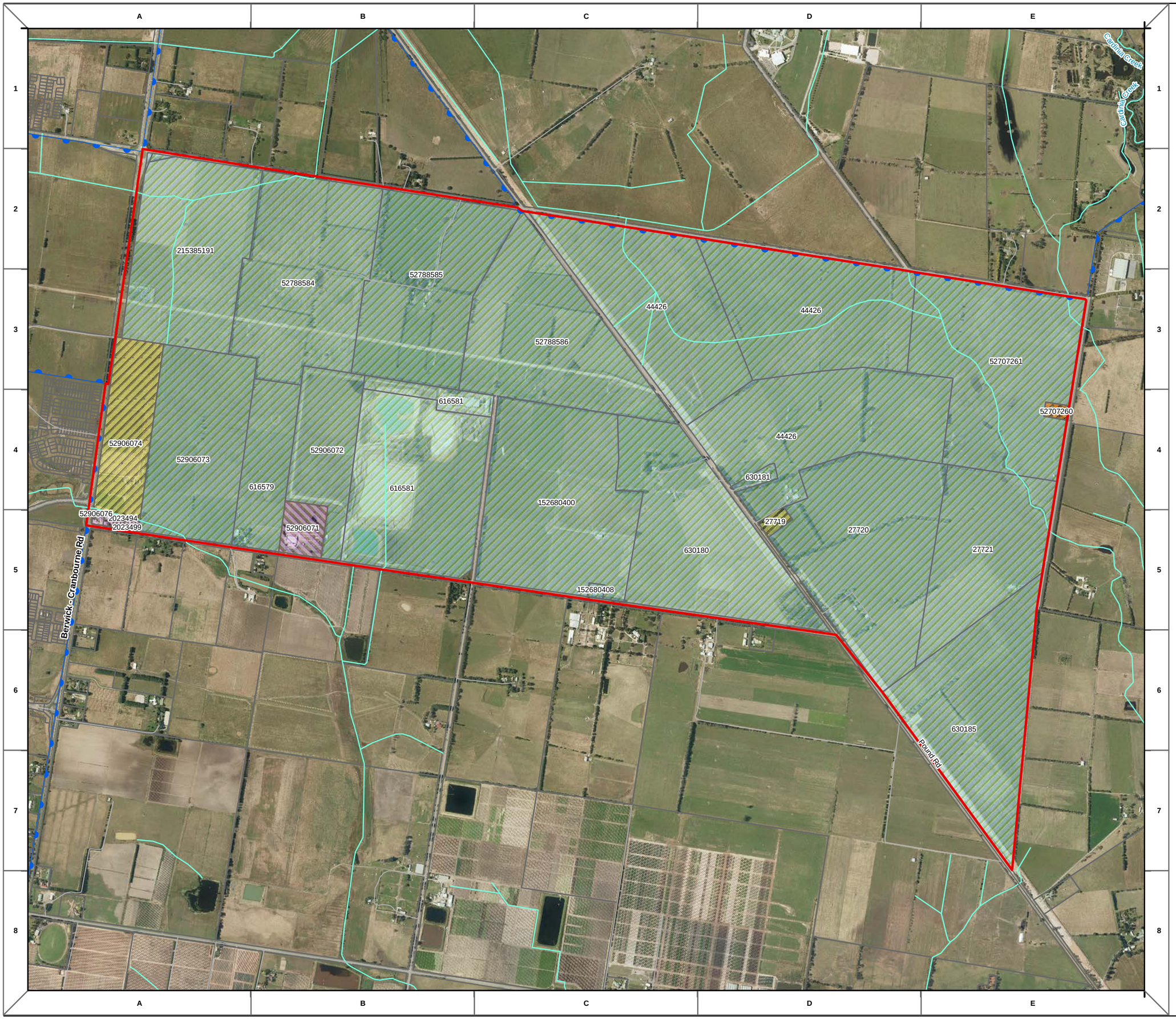

Legend

- Precinct Study Area
- Urban Growth Boundary
- Railway Station
- Railway
- Freeway
- Collector Road
- Minor Road
- Minor Watercourse
- Property Boundaries
- Access Granted
- Access Unattainable
- Access Denied
- Landowner Details not Provided

Access Information PSP 1053

Biodiversity Assessment Project 2011/12

N

GDA 1994; VicGrid 1994

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FIGURE 2

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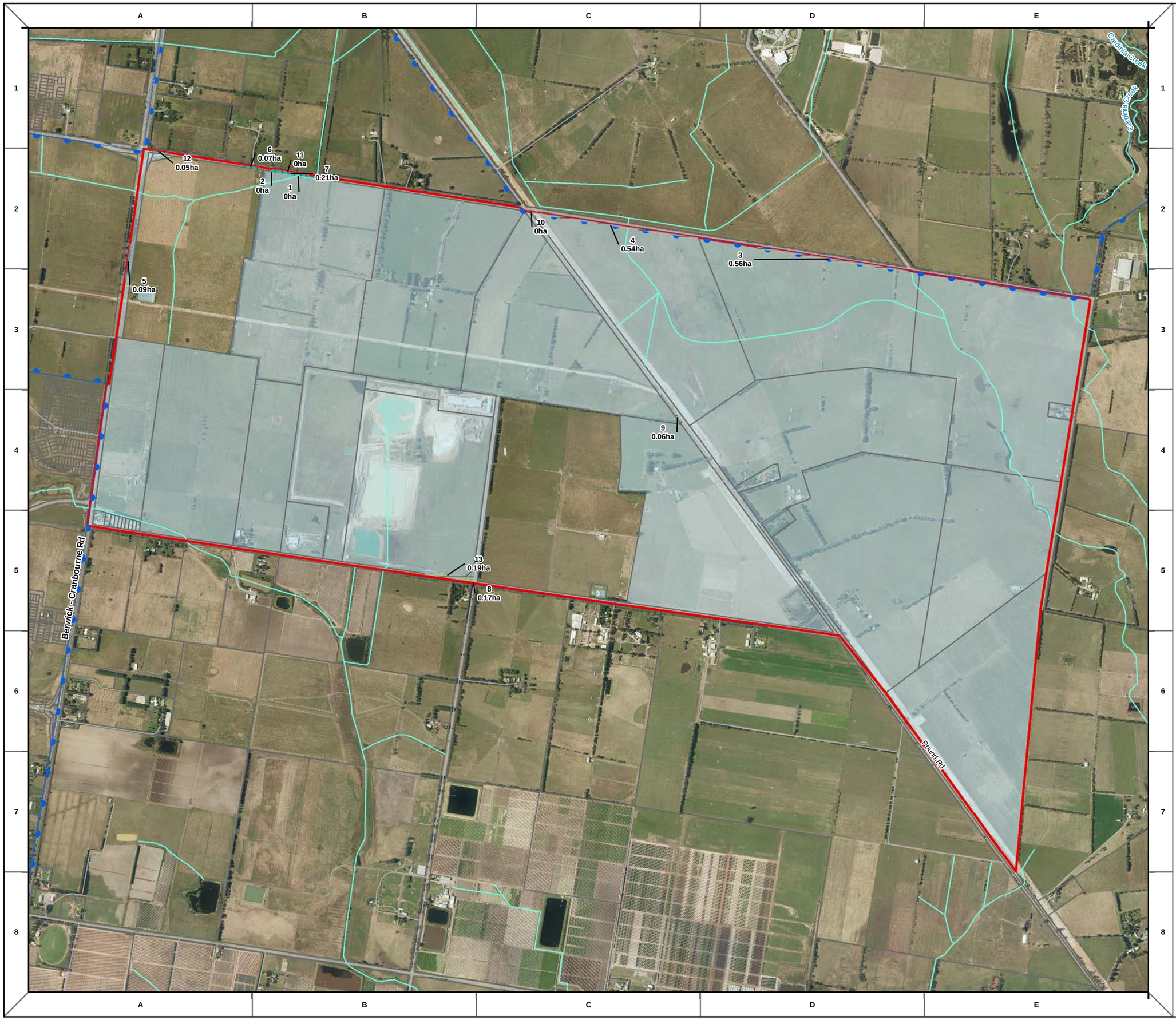

Legend

- Urban Growth Boundary
- Precinct Study Area
- Non-native Vegetation
- Degreaded Treeless Vegetation
- 83, Swampy Riparian Woodland
- 175, Grassy Woodland

Vegetation mapping based on DSE Time Stamped Data, May 2012

Extent of Native Vegetation PSP 1053

Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

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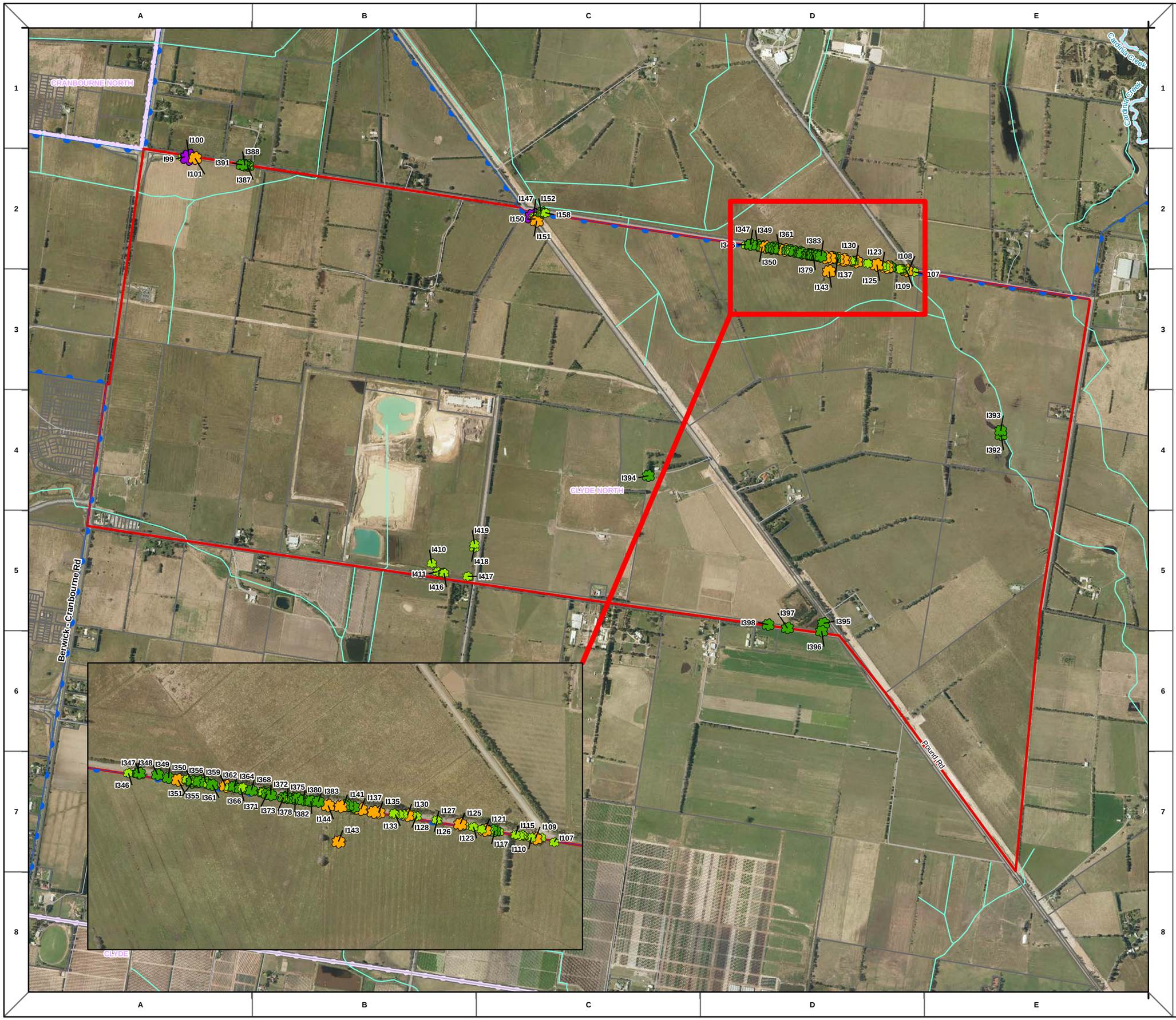
FIGURE 3

File Path: 3339/1053_Fig03_Native_Vegetation.mxd Issue Date: 29/05/2012



Legend

- Precinct Study Area
- Urban Growth Boundary
- Very Large Old Tree
- Large Old Tree
- Medium Old Tree
- Small Tree

Location of Scattered Trees
PSP 1053

Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

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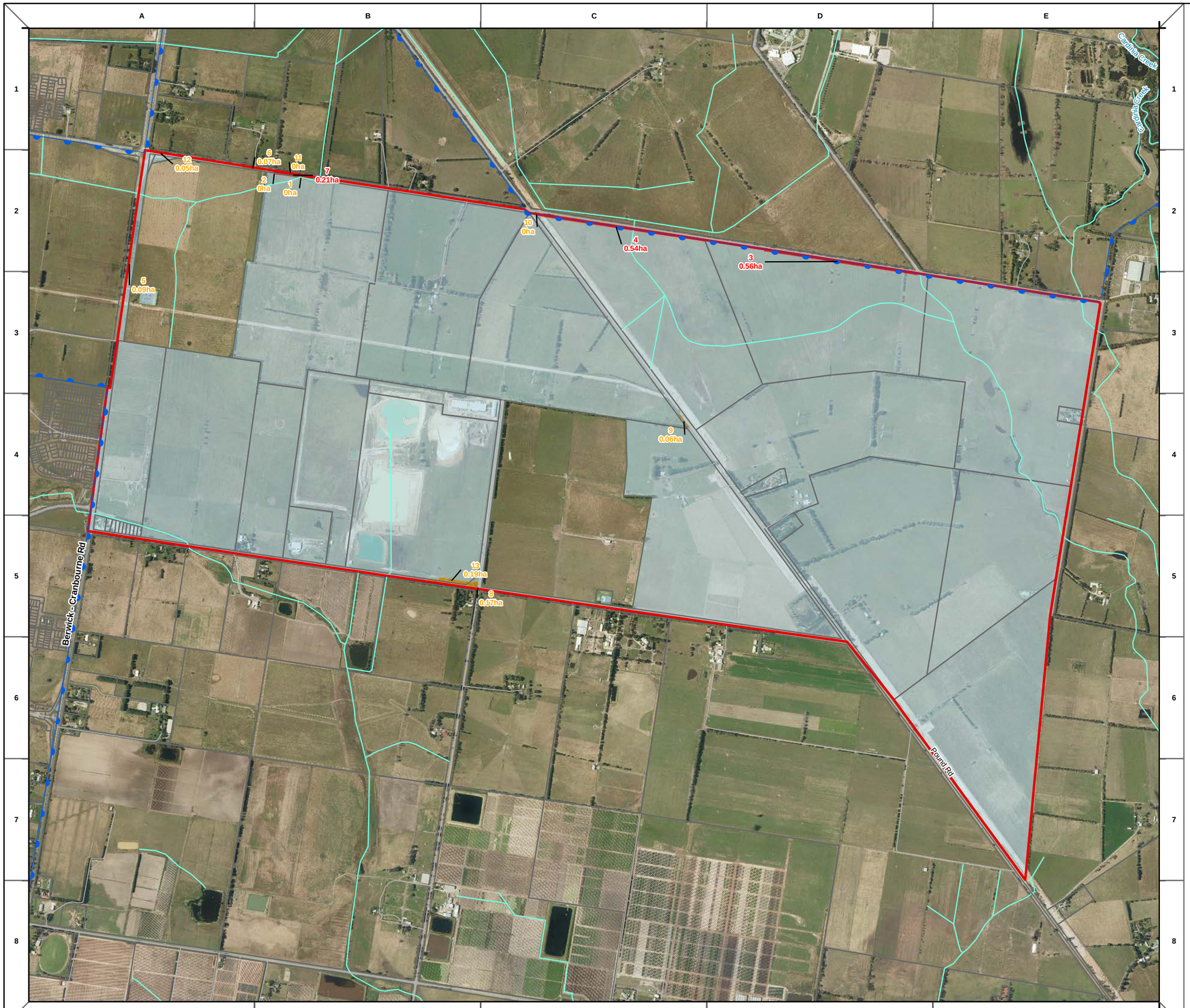
FIGURE 4

3339/1053_Fig04_Scattered Trees.mxd Issue Date: 12/06/2012



Legend

- Precinct Study Area
- Urban Growth Boundary
- Non-native Vegetation
- Degreaded Treeless Vegetation

Conservation Significance

- Very High
- High

Vegetation mapping based on DSE Time Stamped Data, May 2012

Conservation Significance PSP 1053

Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 130 260 520

Metres

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FIGURE 5

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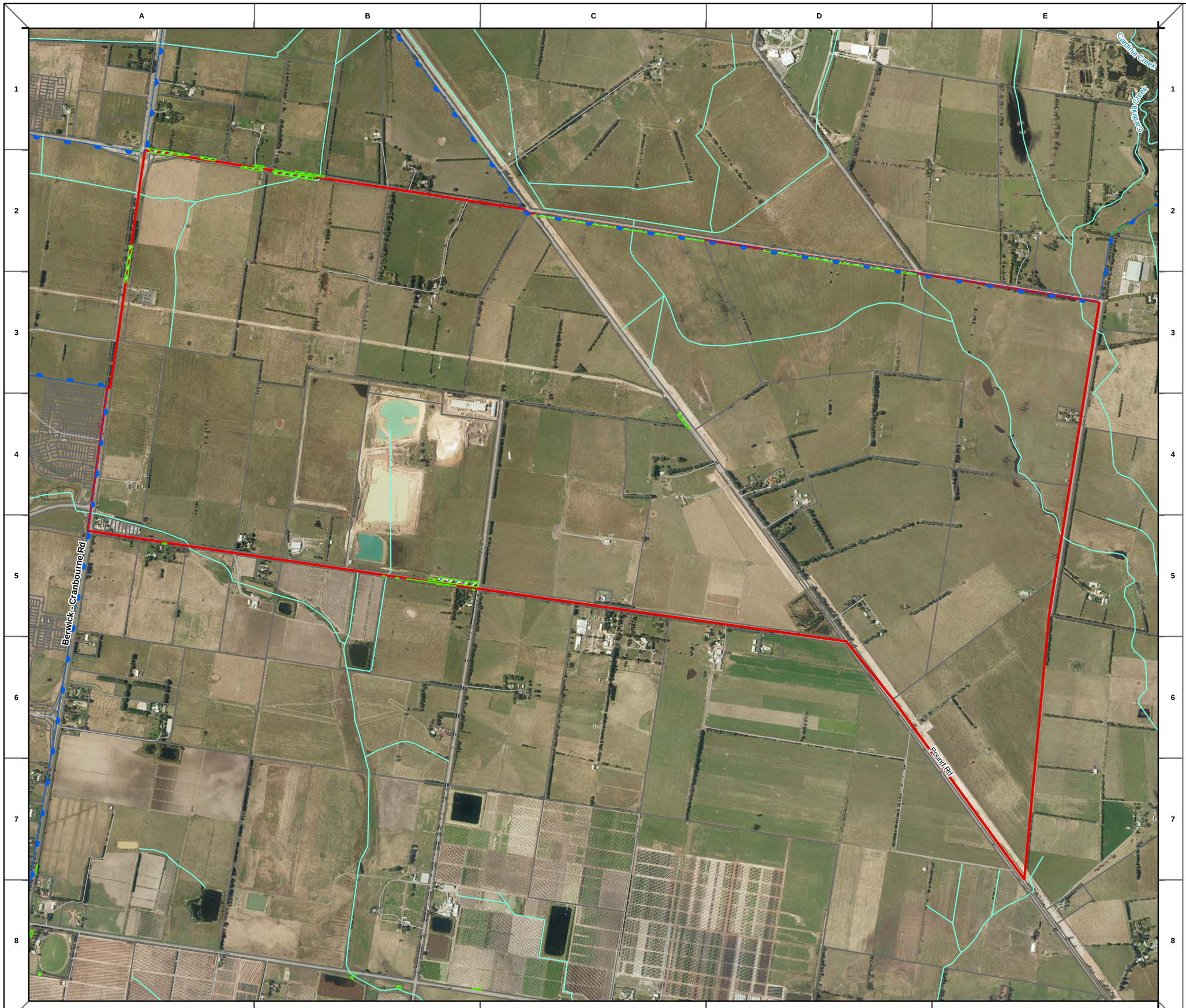

Legend

- Precinct Study Area
- Urban Growth Boundary
- Targeted Spring Flora Surveys
- Targeted Summer Flora Surveys

Both Sping and Summer surveys based on DSE Time Stamped Data, May 2012.

Targeted Surveys PSP 1053

Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

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FIGURE 6

File Path: 3339/1053_Fig05_Cons_Sig.mxd Issue Date: 29/05/2012

Legend

- Precinct Study Area
- Urban Growth Boundary

Note: No significant species were recorded during the assessment. The locations of significant flora species are based on data available from DSEs FIS database and Victorian Biodiversity Atlas (VBA 2010), the current field investigations and other sources.

Threatened Flora Records
PSP 1053
Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

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FIGURE 7

File Path:3339/1053_Fig07_Flora.mxd Issue Date: 29/05/2012

Legend

- Precinct Study Area
- Urban Growth Boundary

Note: No significant species were recorded during the assessment. The locations of significant fauna species are based on data available from DSEs AVW database and Victorian Biodiversity Atlas (VBA 2011), the current field investigations and other sources.

Threatened Fauna Records
PSP 1074
Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

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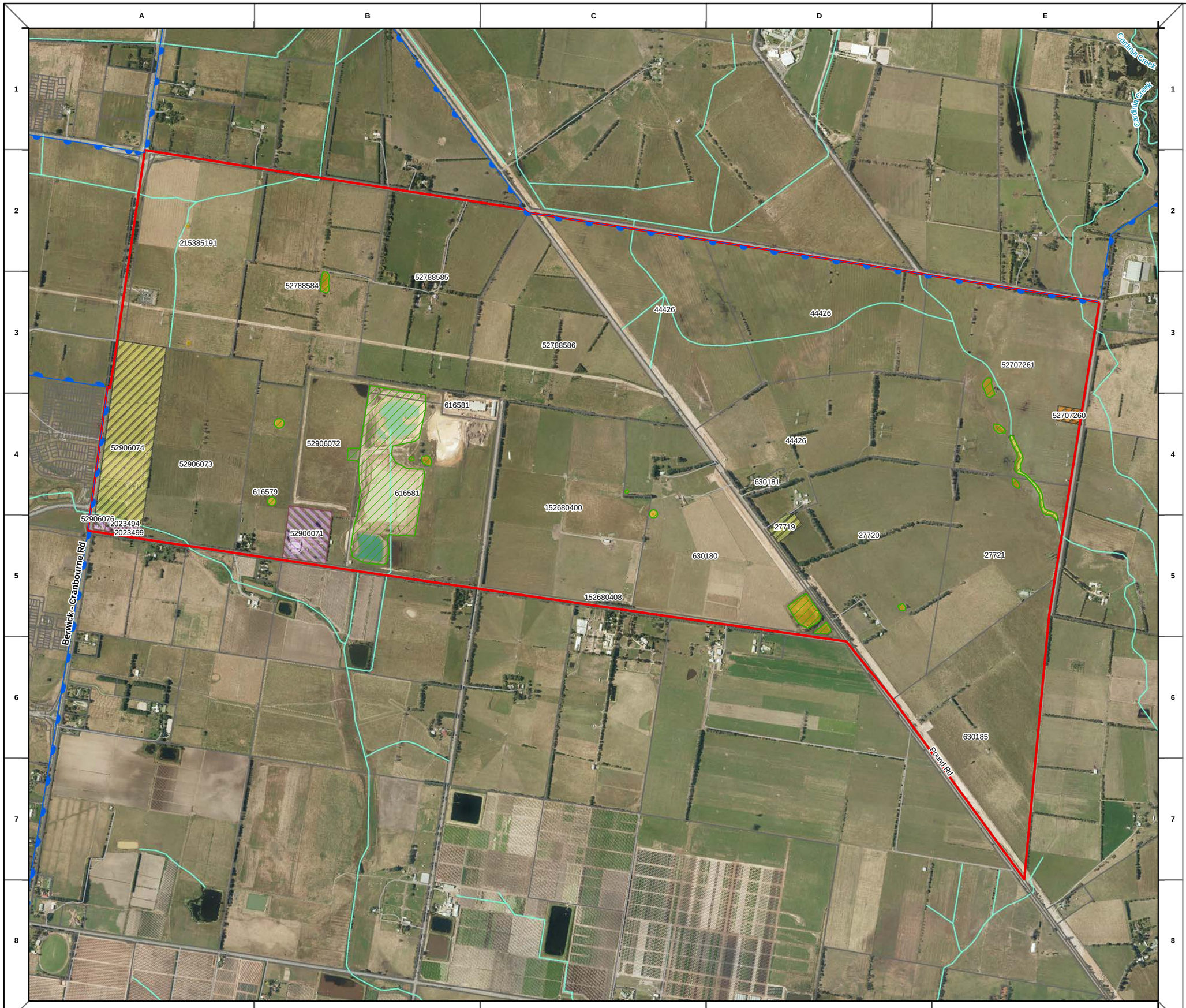
FIGURE 8

File Path:3339/1074_Fig08_Fauna.mxd Issue Date: 29/05/2012



Legend

- Precinct Study Area
- Urban Growth Boundary
- Potential Growling Grass Frog Habitat
- Potential Eastern Great Egret & Royal Spoonbill Habitat
- Access Unattainable
- Access Denied
- Landowner Info not Provided

Potential Habitat PSP 1053

Biodiversity Assessment Project 2011/12

GDA 1994; VicGrid 1994

0 150 300 600

Metres

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FIGURE 9

File Path: 3339/1053_Fig09_Potential_Habitat.mxd Issue Date: 22/06/2012

APPENDICES

Appendix 1 – Significance Assessment

Criteria used by Ecology and Heritage 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 or 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*, 2007 (DSE 2007a).
	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	EVC listed as depleted or least concern in a Native Vegetation Plan for a particular bioregion (DSE Website) and considering vegetation condition.
	EVC 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 A2.1.1. Indigenous flora recorded during the present survey (November 2009) from the study area.

P – Listed as protected under the FFG Act

Lifeform	Scientific Name	Common Name	Conservation Significance			Regional Significance
			EPBC	VROTS	FFG	
Fern	**Dennstaedtiaceae**					
	Pteridium esculentum	Austral Bracken	-	-	-	-
Graminoid	**Cyperaceae**					
	Eleocharis acuta	Common Spike-sedge	-	-	-	-
	Schoenus apogon	Common Bog-sedge	-	-	-	-
	Hemerocallidaceae					
	Dianella admixta	Black-anther Flax-lily	-	-	-	✓
	Tricoryne elatior	Yellow Rush-lily	-	-	-	-
	Juncaceae					
	Juncus bufonius	Toad Rush	-	-	-	✓
	Juncus pallidus	Pale Rush	-	-	-	✓
	Poaceae					
	Austrostipa rudis subsp. rudis	Veined Spear-grass	-	-	-	✓
	Lachnagrostis filiformis s.l.	Common Blown-grass	-	-	-	✓
	Microlaena stipoides var. stipoides	Weeping Grass	-	-	-	-
	Phragmites australis	Common Reed	-	-	-	✓
	Poa labillardierei	Common Tussock-grass	-	-	-	-
	Rytidosperma duttonianum	Brown-backed Wallaby-grass	-	-	-	✓
	Xanthorrhoeaceae					
	Lomandra longifolia	Spiny-headed Mat-rush	-	-	-	-
Herb/forb	**Lythraceae**					
	Lythrum hyssopifolia	Small Loosestrife	-	-	-	✓
	Polygonaceae					
	Rumex brownii	Slender Dock	-	-	-	✓
	Portulaca oleracea	Common Purslane	-	-	-	✓
	Rosaceae					
	Acaena novae-zelandiae	Bidgee-widgee	-	-	-	-
Shrub	**Mimosaceae**					
	Acacia paradoxa	Hedge Wattle	-	-	-	-
	Myrtaceae					
	Melaleuca ericifolia	Swamp Paperbark	-	-	-	-
Tree	**Mimosaceae**					
	Acacia dealbata	Silver Wattle	-	-	-	-
	Acacia mearnsii	Black Wattle	-	-	-	✓
	Acacia melanoxylon	Blackwood	-	-	-	-
	Myrtaceae					
	Eucalyptus camaldulensis	River Red-gum	-	-	-	-
	Eucalyptus ovata	Swamp Gum	-	-	-	-
	Eucalyptus pauciflora subsp.	White Sallee	-	-	-	-

Lifeform	Scientific Name	Common Name	Conservation Significance			Regional Significance
			EPBC	VROTS	FFG	
	pauciflora					
	Santalaceae					
	Exocarpos cupressiformis	Cherry Ballart	-	-	-	-

Table A2.1.2. Exotic flora recorded during the present survey (November 2009) from the study area.

Life form	Scientific name	Common name	Conservation Significance		
NON-INDIGENOUS NATIVE SPECIES			**EPBC**	**DSE**	**FFG**
Shrub	**Pittosporaceae**				
	Pittosporum undulatum	Sweet Pittosporum	-	-	-
	Mimosaceae				
	Acacia longifolia var.longifolia	Coast Wattle	-	-	-
	Acacia pravissima	Ovens Wattle	-	-	-
	Myrtaceae				
	Callistemon spp.	Bottlebrush	-	-	-
Tree	**Mimosaceae**				
	Acacia baileyana	Cootamundra Wattle	-	-	-
	Myrtaceae				
	Corymbia maculata	Spotted Gum	-	-	-
EXOTIC SPECIES			**CALP ACT LISTED WEEDS**		
Tree	**Cupressaceae**				
	Cupressus macrocarpa	Monterey Cypress	-		
	Pinaceae				
	Pinus radiata	Radiata Pine	-		
Shrub	**Fabaceae**				
	Genista monspessulana	Montpellier Broom	✓		
	Ulex europaeus	Gorse	✓		
	Rosaceae				
	Crataegus monogyna	Hawthorn	✓		
	Rosa rubiginosa	Sweet briar	✓		
	Rubus fruticosus spp. agg.	Blackberry	✓		
	Solanaceae				
	Lycium ferocissimum	African boxthorn	✓		
Herb/Forb	**Apiaceae**				
	Daucus carota	Carrot	-		
	Asteraceae				
	Arctotheca calendula	Cape Weed	-		
	Cirsium vulgare	Spear Thistle	✓		
	Helminthotheca echioides	Ox-tongue	-		
	Hypochaeris radicata	Cat's ear	-		
	Lactuca saligna	Willow-leaf Lettuce	-		
	Lactuca serriola	Prickly Lettuce	-		
	Leontodon taraxacoides ssp. taraxacoides	Hairy Hawkbit	-		
	Sonchus oleraceus	Sow thistle	-		
	Fabaceae				

Life form	Scientific name	Common name	Conservation Significance
	Medicago polymorhpa	Burr Medic	-
	Trifolium repens	Clover	-
	Vicia sativa	Common Vetch	-
	Gentianaceae		
	Centaurium erythraea	Common Centaury	-
	Malvaceae		
	Modiola caroliniana	Red-flowered Mallow	-
	Polygonaceae		
	Acetosella vulgaris	Sheep sorrel	-
	Rumex crispus	Curled dock	-
	Polygonum aviculare	Wireweed	-
	Primulaceae		
	Anagallis arvensis var. arvensis	Scarlet Pimpernel	-
	Rubiaceae		
	Galium aparine	Cleavers	-
	Solanaceae		
	Solanum nigrum	Black Nightshade	-
	Veronicaceae		
	Plantago coronopus	Buck's-horn Plantain	-
	Plantago lanceolata	Ribwort	-
Graminoid	**Cyperaceae**		
	Cyperus eragrostis	Drain Flat-sedge	-
	Iridaceae		
	Romulea rosea var. australis	Onion grass	-
	Sisyrinchium iridifolium	Striped Rush-leaf	-
	Poaceae		
	Agrostis capillaris	Brown-top Bent	-
	Anthoxanthum odoratum	Sweet Vernal-grass	-
	Briza maxima	Quaking Grass	-
	Bromus catharticus	Prairie Grass	-
	Bromus diandrus	Great Brome	-
	Bromus hordeaceus subsp. hordeaceus	Soft brome	-
	Cortaderia selloana	Silver Pampas-grass	-
	Cynodon dactylon	Couch	-
	Dactylis glomerata	Cocksfoot	-
	Ehrharta erecta var. erecta	Panic Veldt-grass	-
	Holcus lanatus	Yorkshire fog	-
	Lagarus ovatus	Hare-tail Grass	-
	Lolium perenne	Perennial Rye Grass	-

Life form	Scientific name	Common name	Conservation Significance
	Paspalum dilatatum	Paspalum	-
	Pennisetum clandestinum	Kikuyu	-
	Phalaris aquatica	Toowoomba Canary grass	-
	Poa annua	Annual Meadow-grass	-
	Sporobolous africanus	Rat-tail Grass	-
	Vulpia bromoides	Squirrel-tail fescue	-

Appendix 2.2 – Flora database results

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

Sources used to determine species status:

EPBC *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
DSE Advisory List of Threatened Flora in Victoria (DSE 2005)
FFG Flora and Fauna Guarantee Act 1988 (Victoria)

National status of species is designated by:

X Extinct
CR Critically endangered
EN Endangered
VU Vulnerable
K Poorly Known (Briggs and Leigh 1996)
Records identified from EPBC Act Protected Matters Search Tool.

State status of species is designated by:

X Extinct
e Endangered
v Vulnerable
r Rare
k Poorly Known
L Listed

Lifeform	Scientific name	Common name	Last documented record (VBA)	Total # of documented records (VBA)	EPBC	DSE	FFG	Detected during current survey	Likely occurrence within the precinct and reasoning for likelihood	Habitat description
NATIONAL SIGNIFICANCE										
Graminoid	#*Amphibromus fluitans*	River Swamp Wallaby-grass	-	-	VU	-	-	-	Low likelihood around dams and waterbodies.	Permanent wetlands, swamps and dams
Herb/Forb	#*Caladenia orientalis*	Eastern Spider-orchid	-	-	EN	e	L	-	Unlikely. Degraded habitats	Heathland or swampy woodland

Lifeform	Scientific name	Common name	Last documented record (VBA)	Total # of documented records (VBA)	EPBC	DSE	FFG	Detected during current survey	Likely occurrence within the precinct and reasoning for likelihood	Habitat description
Graminoid	*#Dianella amoena*	Matted Flax-lily	2008	14	EN	e	L	-	Low. Marginal habitat. Not recorded during the assessment.	Native grasslands and grassy woodlands
Herb/Forb	*Glycine latrobeana*	Clover Glycine	1995	1	VU	v	L	-	Unlikely. Degraded habitats	Native grasslands and grassy woodlands
Herb/Forb	*#Prasophyllum frenchii*	Maroon Leek-orchid	-	-	EN	e	L	-	Unlikely. Degraded habitats	In or around coastal swamps
Herb/Forb	*Senecio macrocarpus*	Large-headed Fireweed	2004	12	VU	e	L	-	Unlikely. Degraded habitats	Basalt plains grassland
Herb/Forb	*#Thelymitra epipactoides*	Metallic Sun-orchid	-	-	EN	e	L	-	Unlikely. Degraded habitats	Fertile loams, heathlands and heathy woodlands or swampy depressions
Herb/Forb	*#Xerochrysum palustre*	Swamp Everlasting	-	-	VU	v	L	-	Unlikely. Degraded habitats	Swamps and wetlands in lowland areas
STATE SIGNIFICANCE										
Shrub	*Acacia howittii*	Sticky Wattle	2006	1	-	r	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Woodlands and damp forest
Shrub	*Acacia leprosa (Dandenong Range variant)*	Dandenong Range Cinnamon Wattle	2004	9	-	r	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Damp forest
Shrub	*Atriplex paludosa subsp. paludosa*	Marsh Saltbush	2009	1	-	r	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Coastal saltmarshes

Lifeform	Scientific name	Common name	Last documented record (VBA)	Total # of documented records (VBA)	EPBC	DSE	FFG	Detected during current survey	Likely occurrence within the precinct and reasoning for likelihood	Habitat description
Graminoid	*Austrostipa rudis subsp. australis*	Veined Spear-grass	2004	5	-	r	-	-	Low. Degraded habitats. Not recorded during surveys.	Open forest or woodland on sandy or sandstone-derived soils
Herb/Forb	*Burnettia cuneata*	Lizard Orchid	1770	1	-	r	-	-	Unlikely. Degraded habitats	Wet heathland
Herb/Forb	*Caladenia aurantiaca*	Orange-tip Finger-orchid	1999	2	-	r	-	-	Unlikely. Degraded habitats	Damp coastal-near coastal heathlands or woodland
Herb/Forb	*Caladenia oenochila*	Wine-lipped Spider-orchid	2003	2	-	v	-	-	Unlikely. Degraded habitats	Grassy and heathy woodlands
Graminoid	*Carex alsophila*	Forest Sedge	1980	1	-	r	-	-	Unlikely. Unsuitable habitats.	Mountain gullies and swamps
Shrub	*Correa reflexa var. lobata*	Powelltown Correa	1981	1	-	r	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Grassy woodlands and forests
Herb/Forb	*Corybas aconitiflorus*	Spurred Helmet-orchid	1998	1	-	r	-	-	Unlikely. Degraded habitats	Damp vegetation on sandy soils
Herb/Forb	*Craspedia canens*	Grey Billy-buttons	1993	4	-	e	L	-	Unlikely. Degraded habitats. Not recorded during surveys.	Wet grasslands and swampy vegetation
Herb/Forb	*Diuris punctata var. punctata*	Purple Diuris	1986	12	-	v	L	-	Unlikely. Degraded habitats	Lowland native grasslands, grassy woodlands, heathy woodlands and open heathlands on fertile soils

Lifeform	Scientific name	Common name	Last documented record (VBA)	Total # of documented records (VBA)	EPBC	DSE	FFG	Detected during current survey	Likely occurrence within the precinct and reasoning for likelihood	Habitat description
Tree	*Eucalyptus fulgens*	Green Scentbark	2004	10	-	r	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Heathy and grassy forest
Herb/Forb	*Geranium solanderi var. solanderi s.s.*	Austral Crane's-bill	2008	2	-	v	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Grasslands and Grassy Woodlands
Herb/Forb	*Helichrysum aff. rutidolepis (Lowland Swamps)*	Pale Swamp Everlasting	1994	5	-	v	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Moist areas of open forest and woodland
Graminoid	*Lachnagrostis punicea subsp. filifolia*	Purple Blown-grass	1998	6	-	r	L	-	Low. Degraded habitats. Not recorded during surveys.	Wet grassland
Herb/Forb	*Limonium australe*	Yellow Sea-lavender	1970	1	-	r	-	-	Unlikely. Unsuitable habitats	Coastal saltmarsh
Herb/Forb	*Microseris scapigera s.s.*	Plains Yam-daisy	1994	3	-	v	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Grasslands
Shrub	*Olearia asterotricha*	Rough Daisy-bush	1914	1	-	r	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Grassy and heathy woodland
Herb/Forb	*Pterostylis grandiflora*	Cobra Greenhood	1989	2	-	r	-	-	Unlikely. Degraded habitats	Moist open forest or woodland
Herb/Forb	*Pterostylis sp. aff. parviflora (Southern Victoria)*	Red-tip Greenhood	2003	1	-	r	-	-	Unlikely. Degraded habitats	Grassy and heathy woodland

Lifeform	Scientific name	Common name	Last documented record (VBA)	Total # of documented records (VBA)	EPBC	DSE	FFG	Detected during current survey	Likely occurrence within the precinct and reasoning for likelihood	Habitat description
Herb/Forb	*Pterostylis X ingens*	Sharp Greenhood	1770	1	-	r	-	-	Unlikely. Degraded habitats	Grassy or riparian woodland or forest
Shrub	*Tetratheca stenocarpa*	Long Pink-bells	1935	1	-	r	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Damp forests and woodlands
Graminoid	*Thelionema umbellatum*	Clustered Lily	1988	2	-	r	-	-	Unlikely. Degraded habitats. Not recorded during surveys.	Wet heathland
Herb/Forb	*Thelymitra circumsepta*	Naked Sun-orchid	2007	5	-	v	-	-	Unlikely. Degraded habitats	Heathy woodland or grassland
Herb/Forb	*Thelymitra X irregularis*	Crested Sun-orchid	1770	1	-	r	-	-	Unlikely. Degraded habitats	Heathy woodlands and grasslands

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 Entwisle1996); and, Flora of Victoria Vol.4 (Walsh and Entwisle1999).

Appendix 3.1 – Fauna results

Table A3.1.1 Native fauna recorded during the present survey.

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

Scientific name	Common name	Conservation Status				
		EPBC	DSE	FFG	Regional	Type of Record
MAMMALS						
Trichosurus vulpecula	Common Brushtail Possum	-	-	-	-	I
Pseudocheirus peregrinus	Common Ringtail Possum	-	-	-	-	I
BIRDS						
Ocyphaps lophotes	Crested Pigeon	-	-	-	-	S
Chroicocephalus novaehollandiae	Silver Gull	-	-	-	-	S
Tachybaptus novaehollandiae	Australasian Grebe					S
Threskiornis spinicollis	Straw-necked Ibis	-	-	-	-	S
Chenonetta jubata	Australian Wood Duck	-	-	-	-	S
Circus approximans	Swamp Harrier	-	-	-	-	S
Anas superciliosa	Pacific Black Duck	-	-	-	-	S
Elanus axillaris	Black-shouldered Kite	-	-	-	-	S
Falco berigora	Brown Falcon	-	-	-	-	S
Falco cenchroides	Nankeen Kestrel	-	-	-	-	S
Trichoglossus haematodus	Rainbow Lorikeet	-	-	-	-	S
Cacatua tenuirostris	Long-billed Corella	-	-	-	-	S
Eolophus roseicapillus	Galah	-	-	-	-	S
Cacatua galerita	Sulphur-crested Cockatoo	-	-	-	-	H
Psephotus haematonotus	Red-rumped Parrot	-	-	-	-	S
Hirundo neoxena	Welcome Swallow	-	-	-	-	S
Rhipidura leucophrys	Willie Wagtail	-	-	-	-	S
Grallina cyanoleuca	Magpie-lark	-	-	-	-	S
Malurus cyaneus	Superb Fairy-wren	-	-	-	-	S
Acanthiza pusilla	Brown Thornbill	-	-	-	-	S
Lichenostomus penicillatus	White-plumed Honeyeater	-	-	-	-	S
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	-	-	-	-	S
Manorina melanocephala	Noisy Miner	-	-	-	-	S
Anthochaera chrysoptera	Little Wattlebird	-	-	-	-	S
Anthochaera carunculata	Red Wattlebird	-	-	-	-	S
Gymnorhina tibicen	Australian Magpie	-	-	-	-	S
Eolophus roseicapilla	Galah	-	-	-	-	S
Corvus sp.	Raven	-	-	-	-	S
Egretta novaehollandiae	White-faced Heron	-	-	-	-	S

Scientific name	Common name	Conservation Status				
		EPBC	DSE	FFG	Regional	Type of Record
AMPHIBIANS						
Limnodynastes tasmaniensis	Spotted Marsh Frog	-	-	-	-	H
Crinia signifera	Common Froglet	-	-	-	-	H

Source: DSE Atlas of Victorian Wildlife (2007)

Table A3.1.2 Introduced fauna recorded during the present survey .

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

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

Scientific name	Common name	Type of Record
MAMMALS		
Oryctolagus cuniculus	European Rabbit	S
Vulpes vulpes	Fox	S
BIRDS		
Streptopelia chinensis	Spotted Turtle-Dove	S
Turdus merula	Common Blackbird	S
Alauda arvensis	European Skylark	S
Passer domesticus	House Sparrow	S
Carduelis carduelis	European Goldfinch	S
Acridotheres tristis	Common Myna	S
Sturnus vulgaris	Common Starling	S

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
RA Rare
NT Near threatened
CD Conservation dependent
LR Lower risk (least concern)
DD Data deficient (insufficiently or poorly known)
L Listed as threatened under FFG Act
I Invalid or ineligible for listing under the FFG Act
Protected Matters Search Tool (DSEWPC)

Common name	Scientific name	Last documented record	Total # of documented records	EPBC Act	DSE (2007)	FFG Act	National Action Plan	Present Survey	Likely occurrence in Precinct	Likelihood Reasoning	Habitat description
NATIONAL SIGNIFICANCE											
# Spot-tailed Quoll	*Dasyurus maculatus*	-	-	EN	EN	L	VU	-	Unlikely	No suitable habitat	Forest (wet and dry sclerophyll), rainforests, Red Gum forests, coastal heath and scrub

Common name	Scientific name	Last documented record	Total # of documented records	EPBC Act	DSE (2007)	FFG Act	National Action Plan	Present Survey	Likely occurrence in Precinct	Likelihood Reasoning	Habitat description
#Southern Brown Bandicoot	*Isoodon obesulus obesulus*	2008	63	EN	NT	L	NT	-	Very Low	Marginal habitat in thick grass within road reserves, an along Clyde Creek.	Heathy forest, heath and coastal scrub with dense vegetation
# Long-nosed Potoroo	*Potorous tridactylus*	-	-	VU	EN	L	VU	-	Unlikely	No suitable habitat	Wet sclerophyll forest, coastal heathy woodland
# New Holland Mouse	*Pseudomys novaehollandiae*	1976	3	VU	VU	L	-	-	Unlikely	No suitable habitat	Dry coastal heath and sclerophyll forest with little shrub or ground cover
# Smoky Mouse	*Pseudomys fumeus*	-	-	EN	CR	L	RA	-	Unlikely	No suitable habitat	Dry sclerophyll forest, coastal heath, subalpine heath
#Grey-headed Flying-fox	*Pteropus poliocephalus*	2003	1	VU	VU	L	VU	-	Moderate	May forage at flowering eucalypts	Forests, rainforests, sclerophyll vegetation usually near water or in mangroves
# Australian Painted Snipe	*Rostratula australis*	-	-	VU	CR	L	VU	-	Very Low	Marginal habitat	Shallow, inland wetlands
#Australasian Bittern	*Botaurus poiciloptilus*	2008	9	EN	EN	L	VU	-	Very Low	Marginal habitat	Large, permanent waterbodies
# Fairy Tern	*Sternula nereis*	-	-	VU	EN	L	-	-	Unlikely	Marginal habitat	Coastal areas and estuaries
#Swift Parrot	*Lathamus discolor*	1989	5	EN	EN	L	EN	-	Low	May opportunistically forage in flowering eucalypts	Dry sclerophyll forest and woodland, suburban parks and flowering fruit trees
Helmeted Honeyeater	*Lichenostomus melanops cassidix*	1932	5	EN	CR	L	CR	-	Unlikely	No suitable habitat	Swamp and streamside habitat with eucalypts such as Manna Gum, Mountain Swamp Gum, and Swamp Gum, with a dense shrub and sedge understorey

Common name	Scientific name	Last documented record	Total # of documented records	EPBC Act	DSE (2007)	FFG Act	National Action Plan	Present Survey	Likely occurrence in Precinct	Likelihood Reasoning	Habitat description
# Regent Honeyeater	*Anthochaera phrygia*	-	-	EN	CR	L	EN	-	Unlikely	No suitable habitat	Forests and woodlands, particularly in flowering trees and mistletoe
# Orange-bellied Parrot	*Neophema chrysogaster*	-	-	CR	CR	L	CR	-	Unlikely	No suitable habitat	Open forest, coastal saltmarsh, damp grasslands
#Growling Grass Frog	*Litoria raniformis*	2008	125	VU	EN	L	VU	-	Moderate	May occur within Clyde Creek and dams associated with Cardinia Creek tributaries	Permanent or semi-permanent waterways, wetlands and waterbodies
#Dwarf Galaxias	*Galaxiella pusilla*	2008	119	VU	VU	L	VU	-	Moderate	May occur within tributaries associated with Cardinia Creek when inundated. Low likelihood in Clyde Creek.	Still-slow flowing waters with abundant macrophytes
#Australian Grayling	*Prototroctes maraena*	1985	3	VU	VU	L	VU	-	Low	May occur within tributaries associated with Cardinia Creek when inundated. Low likelihood in Clyde Creek.	Coastal rivers and streams south east of Great Dividing Range
# Yarra Pygmy Perch	*Nannoperca obscura*	-	-	VU	NT	L	VU	-	Unlikely	No suitable habitat	Still-slow flowing waters with abundant macrophytes
Large Ant Blue	*Acrodipsas brisbanensis*	1941	1	-	EN	L	VU	-	Unlikely	No suitable habitat	Dry eucalypt open forest, woodland and open-woodland, frequently occurring on hilltops
# Golden Sun Moth	*Synemon plana*	-	-	CR	EN	L		-	Unlikely	No suitable habitat	Remnant and modified grasslands

Common name	Scientific name	Last documented record	Total # of documented records	EPBC Act	DSE (2007)	FFG Act	National Action Plan	Present Survey	Likely occurrence in Precinct	Likelihood Reasoning	Habitat description
STATE SIGNIFICANCE											
New Zealand Fur Seal	*Arctocephalus forsteri*	1977	1	-	VU	-	-	-	Unlikely	No suitable habitat	Islands off south Australia in areas of jumbled rock/boulders
Magpie Goose	*Anseranas semipalmata*	1994	2	-	NT	L	-	-	Unlikely	No suitable habitat	Rush and sedge dominated swamps, flood plains and rice crops
Musk Duck	*Biziura lobata*	1992	17	-	VU	-	-	-	Very Low	Marginal habitat	Deep, permanent lakes and swamps, occasionally saline wetlands
Freckled Duck	*Stictonetta naevosa*	2002	1	-	EN	L	-	-	Very Low	Marginal habitat	Permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree
Australasian Shoveler	*Anas rhynchotis*	2005	27	-	VU	-	-	-	Very Low	Marginal habitat	Large, permanent waterbodies
Hardhead	*Aythya australis*	2005	44	-	VU	-	-	-	Very Low	Marginal habitat	Large, permanent waterbodies
Blue-billed Duck	*Oxyura australis*	2006	22	-	EN	L	-	-	Very Low	Marginal habitat	Large, permanent waterbodies
Little Bittern	*Ixobrychus minutus dubius*	2006	3	-	EN	L	-	-	Very Low	Marginal habitat	Freshwater swamps and creek with dense vegetation and reedbeds
Eastern Great Egret	*Ardea modesta*	2007	64	-	VU	L	-	-	High	Likely to opportunistically waterbodies and waterways	Large permanent waterbodies and vegetation drainage lines
Intermediate Egret	*Ardea intermedia*	1977	1	-	CR	L	-	-	Very Low	Marginal habitat	Freshwater wetlands and intertidal mudflats

Common name	Scientific name	Last documented record	Total # of documented records	EPBC Act	DSE (2007)	FFG Act	National Action Plan	Present Survey	Likely occurrence in Precinct	Likelihood Reasoning	Habitat description
Royal Spoonbill	*Platalea regia*	2007	48	-	VU	-	-	-	Moderate – High	May opportunistically waterbodies and waterways	Large permanent waterbodies
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	2008	4	-	VU	L	-	-	Low	Marginal habitat	Forested coasts and forested margins of inland waterways
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	1990	5	-	VU	L	-	-	Very Low	Marginal habitat	Forested areas, particularly coastal closed forests
Black Falcon	*Falco subniger*	1999	3	-	VU	-	-	-	Very Low	Marginal habitat	All habitats are suitable for potential foraging or roosting purposes
Lewin's Rail	*Lewinia pectoralis pectoralis*	1997	2	-	VU	L	NT	-	Very Low	Marginal habitat	Vegetated swamp; coastal Saltmarsh; swampy streams; tidal creeks
Baillon's Crake	*Porzana pusilla palustris*	2003	6	-	VU	L	-	-	Very Low	Marginal habitat	Vegetated freshwater and brackish swamps
Common Sandpiper	*Actitis hypoleucos*	1993	23	-	VU	-	-	-	Very Low	Marginal habitat	Vegetated swamp, coastal saltmarshes, tidal mudflat
Wood Sandpiper	*Tringa glareola*	1980	2	-	VU	-	-	-	Very Low	Marginal habitat	Freshwater swamps, brackish swamps
Caspian Tern	*Hydroprogne caspia*	1991	9	-	NT	L	-	-	Very Low	Marginal habitat	Vegetated swamp, coastal saltmarshes, tidal mud flats
Powerful Owl	*Ninox strenua*	2003	2	-	VU	L	-	-	Very Low	- Marginal habitat	Woodland, open sclerophyll forest, tall open wet forest and rainforest, can occur in fragmented landscapes
Sooty Owl	*Tyto tenebricosa tenebricosa*	1992	1	-	VU	L	-	-	Unlikely	Marginal habitat	Well vegetated gullies in tall wet forest

Common name	Scientific name	Last documented record	Total # of documented records	EPBC Act	DSE (2007)	FFG Act	National Action Plan	Present Survey	Likely occurrence in Precinct	Likelihood Reasoning	Habitat description
Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*	2000	1	-	NT	-	NT	-	Unlikely	No suitable habitat	Lowland dry woodland and wooded farmland
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	1999	3	-	VU	L	-	-	Unlikely	Marginal habitat	Heathland areas, dense undergrowth
Speckled Warbler	*Chthonicola sagittatus*	1908	1	-	VU	L	NT	-	Unlikely	No suitable habitat	Dry sclerophyll forest and woodland
Painted Honeyeater	*Grantiella picta*	1981	2	-	VU	L	NT	-	Unlikely	No suitable habitat	Dry open woodlands with a strong association with mistletoe
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	1988	2	-	EN	L	NT	-	Unlikely	No suitable habitat	Dry forests and woodland; wooded farmland associated with river floodplains
Hooded Robin	*Melanodryas cucullata cucullata*	1981	1	-	NT	L	NT	-	Unlikely	No suitable habitat	Open eucalypt woodland, with presence of acacia spp.
Swamp Skink	*Egernia coventryi*	1997	10	-	VU	L	-	-	Low	Marginal habitat	Low-lying marshes, swamps and lagoon margins
Southern Toadlet	*Pseudophryne semimarmorata*	1988	59	-	VU	-	-	-	Low	Marginal habitat	Forested areas, where it hides under fallen timber and rocks
Pale Mangrove Goby	*Mugilogobius paludis*	2000	5	-	VU	L	-	-	Unlikely	Marginal habitat	Coastal streams and rivers
Foothill Burrowing Crayfish	*Engaeus victoriensis*	1962	1	-	EN	-	-	-	Very Low	Marginal habitat	Grey, clay-dominated soils in wet sclerophyll forest at the foot of the Dandenong Ranges.
REGIONAL SIGNIFICANCE											

Common name	Scientific name	Last documented record	Total # of documented records	EPBC Act	DSE (2007)	FFG Act	National Action Plan	Present Survey	Likely occurrence in Precinct	Likelihood Reasoning	Habitat description
Brown Quail	*Coturnix ypsilophora australis*	2000	9	-	NT	-	-	-	Very Low	Marginal habitat	Grassy and sedgy flats, agricultural crops; swamps
Cape Barren Goose	*Cereopsis novaehollandiae*	1999	1	-	NT	-	-	-	Low	Marginal habitat	Small offshore grassland islands, improved pastures
Pied Cormorant	*Phalacrocorax varius*	1997	38	-	NT	-	-	-	Very Low	Marginal habitat	Large freshwater and saline wetlands; tidal bays along coast
Black-faced Cormorant	*Phalacrocorax fuscescens*	1977	1	-	NT	-	-	-	Unlikely	No suitable habitat	Marine, offshore rock stacks, islets
Nankeen Night Heron	*Nycticorax caledonicus hillii*	2008	3	-	NT	-	-	-	Low	Marginal habitat	Well vegetated wetlands, shallow river margins, mangroves, floodplains, swamps, parks and gardens
Glossy Ibis	*Plegadis falcinellus*	1976	1	-	NT	-	-	-	Very low	Marginal habitat	Freshwater wetlands, pasture
Spotted Harrier	*Circus assimilis*	2004	4	-	NT	-	-	-	Very Low	-	Open woodland country
Sooty Oystercatcher	*Haematopus fuliginosus*	1991	1	-	NT	-	-	-	Very Low	Marginal habitat	Coastal rocky areas, estuaries
Latham's Snipe	*Gallinago hardwickii*	2006	41	-	NT	-	-	-	Moderate	May opportunistically forage in long grass near waterways and dams	Vegetated swamps; pools/ditches in heath or herblands; grasslands
Eastern Curlew	*Numenius madagascariensis*	1991	4	-	NT	-	-	-	Very Low	Marginal habitat	Coastal estuaries, mudflats, mangroves, sandpits
Whiskered Tern	*Chlidonias hybridus javanicus*	2004	7	-	NT	-	-	-	Unlikely	No suitable habitat	Shallow freshwater wetlands with emergent vegetation, flooded saltmarsh, estuaries

Common name	Scientific name	Last documented record	Total # of documented records	EPBC Act	DSE (2007)	FFG Act	National Action Plan	Present Survey	Likely occurrence in Precinct	Likelihood Reasoning	Habitat description
Pacific Gull	*Larus pacificus pacificus*	2007	210	-	NT	-	-	-	Moderate	No suitable habitat	Coastal areas and shorelines
Black-eared Cuckoo	*Chrysococcyx osculans*	1908	1	-	NT	-	-	-	Low	No suitable habitat	Arid and semi arid woodland and scrub, mallee and mulga
River Blackfish	*Gadopsis marmoratus*	2006	5	-	DD	-	-	-	Very Low	Marginal habitat	Diverse range of stream types, abundant in-stream cover, including timber and macrophytes

Source: Victorian Biodiversity Atlas (Viridans 2011a); Victorian Fauna Database (Viridans 2011b); Protected Matters Search Tool (SEWPaC 2011).

Appendix 4.1 – Habitat Hectare Table

Table A4.1.1. *Remnant patches of time stamped vegetation.*

Habitat Zone		1	2	3	4	5	6	7
Map Reference		N/A	N/A	Fig 3 D2	Fig 3 C2	Fig 3 a2	Fig 3 a2	Fig 3 b2
PFI		52788584	52788584	44426	44426	BERW CRAN_1_A	THOMSONS_1_A	THOMSONS_2_A
Site ID		EST_52788584_16174	EST_52788584_16177	EST_44426_18317	EST_44426_18318	GAA2d_BERW CRAN_1_A	GAA2d_THOMSONS_1_A	GAA2d_THOMSONS_2_A
Zone ID		Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
EVC Name (Initials)		GW	GW	GW	GW	SRW	SRW	SRW
EVC Number		175	175	175	175	83	83	83
Total Area of Habitat Zone (ha)		0.004	0.001	0.562	0.537	0.091	0.072	0.209
Habitat Score#	100	10	10	10	10	22	24	27
Habitat Score as above = #/100		0.1	0.1	0.1	0.1	0.22	0.24	0.27
Habitat Hectares		0.000	0.000	0.056	0.054	0.020	0.017	0.057
Bioregion		GipP0175	GipP0175	GipP0175	GipP0175	GipP0083	GipP0083	GipP0083
Conservation Significance	Conservation Status x Habitat Score	High	High	Very High**	Very High**	High	High	Very High**
	Threatened Species Rating	Medium	Medium	Medium	Medium	Medium	Medium	Medium
	Other Site Attribute Rating	Low	Low	Low	Low	Low	Low	Low
	Overall Conservation Significance (highest rating)	High	High	Very High**	Very High**	High	High	Very High**

Notes: PFI = Unique Property Identifier, EVC = Ecological Vegetation Class, GipP = Gippsland Plain, SS = Swamp Scrub, PGW = Plains Grassy Woodland, E = Endangered. *Not significant at two decimal places. ** DSE data appears incorrect and these patches should be High.

Table A4.1.2. *Remnant patches of time stamped vegetation.*

Habitat Zone		8	9	10	11	12	13
Map Reference		Fig 3 b5	Fig 3 C4	Fig 3 C2	Fig 3 B2	Fig 3 A2	Fig 3 B5
PFI		R 3568	R 3569	R 3570	R 3572	R636934	616581
Site ID		EST_R 3568	EST_R 3569	EST_R 3570	EST_R 3572	GAA2d_R636934_4_A	EST_616581_6489
Zone ID		Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
EVC Name (Initials)		GW	GW	GW	GW	SRW	GW
EVC Number		175	175	175	175	83	83
Total Area of Habitat Zone (ha)		0.168	0.059	0.004	0.003	0.048	0.193
Habitat Score#	**100**	10	10	10	10	10	10
Habitat Score as above = #/100		0.1	0.1	0.1	0.1	0.1	0.1
Habitat Hectares		0.017	0.006	0.000	0.000	0.005	0.019
Bioregion		GipP0175	GipP0175	GipP0175	GipP0175	GipP0083	GipP0175
Conservation Significance	**Conservation Status x Habitat Score**	High	High	High	High	High	High
	Threatened Species Rating	Medium	Medium	Medium	Medium	Medium	Medium
	Other Site Attribute Rating	Low	Low	Low	Low	Low	Low
	Overall Conservation Significance (highest rating)	High	High	High	High	High	High

Notes: PFI = Unique Property Identifier, EVC = Ecological Vegetation Class, GipP = Gippsland Plain, HW = Heathy Woodland, PGW = Plains Grassy Woodland, E = Endangered, LC = Least Concern. *Not significant at two decimal places. ** DSE data appears incorrect and these patches should be High.

Appendix 4.2 – Scattered Tree Table

Table A4.2. Scattered trees recorded during the present survey (November 2011).

Property No.	Scattered Tree Number*	Species (scientific name)	Common Name	Size of Tree (VL, LT, MT, ST)	Bioregion	Conservation Significance	Easting	Northing	Map no. (location)
R215385191	I98	*Eucalyptus viminalis* subsp. *pryoriana*	Gippsland Manna Gum	ST	GipPlain	Low	2529362.5178	2379032.6299	Fig. 4
	I99	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2529371.2866	2379031.4891	Fig. 4
	I100	*Eucalyptus ovata*	Swamp Gum	VL	GipPlain	High	2529389.7016	2379029.2043	Fig. 4
	I101	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2529415.1308	2379025.7847	Fig. 4
R44426	I107	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532486.3771	2378540.4230	Fig. 4
	I108	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532464.4767	2378548.2783	Fig. 4
	I109	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2532454.8229	2378547.2058	Fig. 4
	I110	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532447.8094	2378548.3431	Fig. 4
	I111	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532435.5369	2378550.6108	Fig. 4
	I112	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532433.7868	2378551.7276	Fig. 4
	I113	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532432.0367	2378552.8445	Fig. 4
	I114	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532428.5234	2378551.7481	Fig. 4
	I115	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532421.5100	2378552.8853	Fig. 4
	I116	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532393.4603	2378558.5443	Fig. 4
	I117	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532386.4468	2378559.6815	Fig. 4
	I118	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532382.0650	2378560.8085	Fig. 4
	I119	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532375.9244	2378560.8324	Fig. 4
	I120	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532372.4155	2378560.8460	Fig. 4
	I121	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2532369.7838	2378560.8562	Fig. 4
	I122	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532364.5248	2378561.9866	Fig. 4
	I123	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532350.5064	2378566.4810	Fig. 4
	I124	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532334.7249	2378568.7621	Fig. 4

Property No.	Scattered Tree Number*	Species (scientific name)	Common Name	Size of Tree (VL, LT, MT, ST)	Bioregion	Conservation Significance	Easting	Northing	Map no. (location)
	I125	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2532328.5929	2378571.0059	Fig. 4
	I126	*Eucalyptus pauciflora*	Snow Gum	ST	GipPlain	Low	2532290.0207	2378577.8153	Fig. 4
	I127	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532288.2662	2378577.8221	Fig. 4
	I128	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532254.9573	2378584.6109	Fig. 4
	I129	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532247.9438	2378585.7481	Fig. 4
	I130	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2532239.1715	2378585.7819	Fig. 4
	I131	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532232.1579	2378586.9190	Fig. 4
	I132	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532226.0173	2378586.9427	Fig. 4
	I133	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532218.9995	2378586.9698	Fig. 4
	I134	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532216.3764	2378589.2000	Fig. 4
	I135	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2532190.9410	2378590.4081	Fig. 4
	I136	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2532183.0503	2378591.5485	Fig. 4
	I137	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2532161.1366	2378596.0730	Fig. 4
	I138	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532148.8683	2378599.4503	Fig. 4
	I139	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532141.8547	2378600.5874	Fig. 4
	I140	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532139.2273	2378601.7075	Fig. 4
	I141	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532132.2137	2378602.8445	Fig. 4
	I142	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2532126.9418	2378600.6447	Fig. 4
	I144	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2532105.8925	2378601.8357	Fig. 4
	I145	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530857.3608	2378780.8158	Fig. 4
	I146	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530859.1071	2378778.5893	Fig. 4
	I147	*Eucalyptus ovata*	Swamp Gum	VL	GipPlain	High	2530859.9803	2378777.4761	Fig. 4
	I148	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530860.8534	2378776.3629	Fig. 4
	I149	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530865.2315	2378774.1266	Fig. 4
	I150	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530869.5890	2378766.3404	Fig. 4

Property No.	Scattered Tree Number*	Species (scientific name)	Common Name	Size of Tree (VL, LT, MT, ST)	Bioregion	Conservation Significance	Easting	Northing	Map no. (location)
	I151	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2530873.9506	2378759.6641	Fig. 4
	I152	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530893.3814	2378795.1130	Fig. 4
	I153	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530895.1318	2378793.9965	Fig. 4
	I154	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2530897.7635	2378793.9867	Fig. 4
	I155	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530899.5180	2378793.9802	Fig. 4
	I156	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530903.9043	2378793.9640	Fig. 4
	I157	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530908.2864	2378792.8378	Fig. 4
	I158	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530910.9182	2378792.8280	Fig. 4
	I346	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2531770.1162	2378656.4010	Fig. 4
	I347	*Stag*	unknown	MT	GipPlain	High	2531786.7837	2378656.3375	Fig. 4
	I348	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531788.5381	2378656.3309	Fig. 4
	I349	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531819.2329	2378653.9939	Fig. 4
	I350	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531837.6337	2378648.3737	Fig. 4
	I351	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2531853.4112	2378644.9834	Fig. 4
	I352	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2531867.4470	2378644.9299	Fig. 4
	I353	*Stag*	unknown	ST	GipPlain	Low	2531868.3242	2378644.9265	Fig. 4
	I354	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2531868.3284	2378646.0365	Fig. 4
	I355	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531877.0796	2378640.4530	Fig. 4
	I356	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531877.0923	2378643.7831	Fig. 4
	I357	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2531883.2330	2378643.7596	Fig. 4
	I358	*Stag*	unknown	MT	GipPlain	High	2531888.4921	2378642.6295	Fig. 4
	I359	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531899.8877	2378640.3659	Fig. 4
	I360	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2531904.2696	2378639.2392	Fig. 4
	I361	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531911.2790	2378636.9923	Fig. 4
	I362	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2531934.0786	2378634.6852	Fig. 4

Property No.	Scattered Tree Number*	Species (scientific name)	Common Name	Size of Tree (VL, LT, MT, ST)	Bioregion	Conservation Significance	Easting	Northing	Map no. (location)
	I363	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2531939.3377	2378633.5550	Fig. 4
	I364	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531948.1101	2378633.5215	Fig. 4
	I365	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2531956.0009	2378632.3812	Fig. 4
	I366	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531958.6284	2378631.2612	Fig. 4
	I367	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2531962.1416	2378632.3577	Fig. 4
	I368	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531977.0375	2378627.8606	Fig. 4
	I369	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531996.3239	2378624.4567	Fig. 4
	I370	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2531996.3239	2378624.4567	Fig. 4
	I371	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532003.3332	2378622.2098	Fig. 4
	I372	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532009.4653	2378619.9662	Fig. 4
	I373	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532031.3791	2378615.4421	Fig. 4
	I374	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532033.1336	2378615.4354	Fig. 4
	I375	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532037.5197	2378615.4186	Fig. 4
	I376	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2532041.9059	2378615.4017	Fig. 4
	I377	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532046.2878	2378614.2749	Fig. 4
	I378	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532050.6697	2378613.1481	Fig. 4
	I379	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532055.0601	2378614.2412	Fig. 4
	I380	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532064.6968	2378610.8742	Fig. 4
	I381	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532074.3421	2378609.7271	Fig. 4
	I382	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532076.9738	2378609.7170	Fig. 4
	I383	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532089.2508	2378608.5598	Fig. 4
44426	I143	*Eucalyptus ovata*	Swamp Gum	LT	GipPlain	High	2532123.2066	2378541.8278	Fig. 4
R215385191	I384	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2529642.2306	2378992.7911	Fig. 4
	I385	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2529640.4800	2378993.9074	Fig. 4
	I386	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2529637.8482	2378993.9167	Fig. 4

Property No.	Scattered Tree Number*	Species (scientific name)	Common Name	Size of Tree (VL, LT, MT, ST)	Bioregion	Conservation Significance	Easting	Northing	Map no. (location)
	I387	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2529637.8482	2378993.9167	Fig. 4
	I388	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2529628.2022	2378995.0610	Fig. 4
	I389	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2529626.4516	2378996.1772	Fig. 4
	I390	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2529624.6970	2378996.1834	Fig. 4
	I391	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2529615.9283	2378997.3245	Fig. 4
52707261	I392	*Eucalyptus camaldulensis*	River Red Gum	MT	GipPlain	High	2532858.2216	2377845.2019	Fig. 4
	I393	*Eucalyptus camaldulensis*	River Red Gum	MT	GipPlain	High	2532857.4099	2377861.8555	Fig. 4
630180	I394	*Stag*	unknown	MT	GipPlain	High	2531352.3517	2377670.0570	Fig. 4
	I395	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532100.7611	2377038.9365	Fig. 4
R630180	I396	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2532091.8625	2377005.6698	Fig. 4
	I397	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531945.4398	2377018.4416	Fig. 4
	I398	*Eucalyptus ovata*	Swamp Gum	MT	GipPlain	High	2531863.0552	2377034.2968	Fig. 4
616581	I410	*Stag*	unknown	ST	GipPlain	Low	2530426.4752	2377294.9623	Fig. 4
	I411	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530450.0271	2377259.3555	Fig. 4
	I412	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530473.6964	2377255.9391	Fig. 4
	I413	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530474.5735	2377255.9359	Fig. 4
	I414	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530475.4465	2377254.8226	Fig. 4
	I415	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530476.3196	2377253.7094	Fig. 4
	I416	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530478.0737	2377253.7030	Fig. 4
	I417	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530580.6443	2377240.0076	Fig. 4
	I418	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530607.4085	2377363.1229	Fig. 4
	I419	*Eucalyptus ovata*	Swamp Gum	ST	GipPlain	Low	2530609.2156	2377377.5466	Fig. 4

*Unique identification number supplied by DSE.

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