growth areas AUTHORITY

Biodiversity Assessment Report (Native Vegetation)

PSP 23: Greenvale South

April 2010

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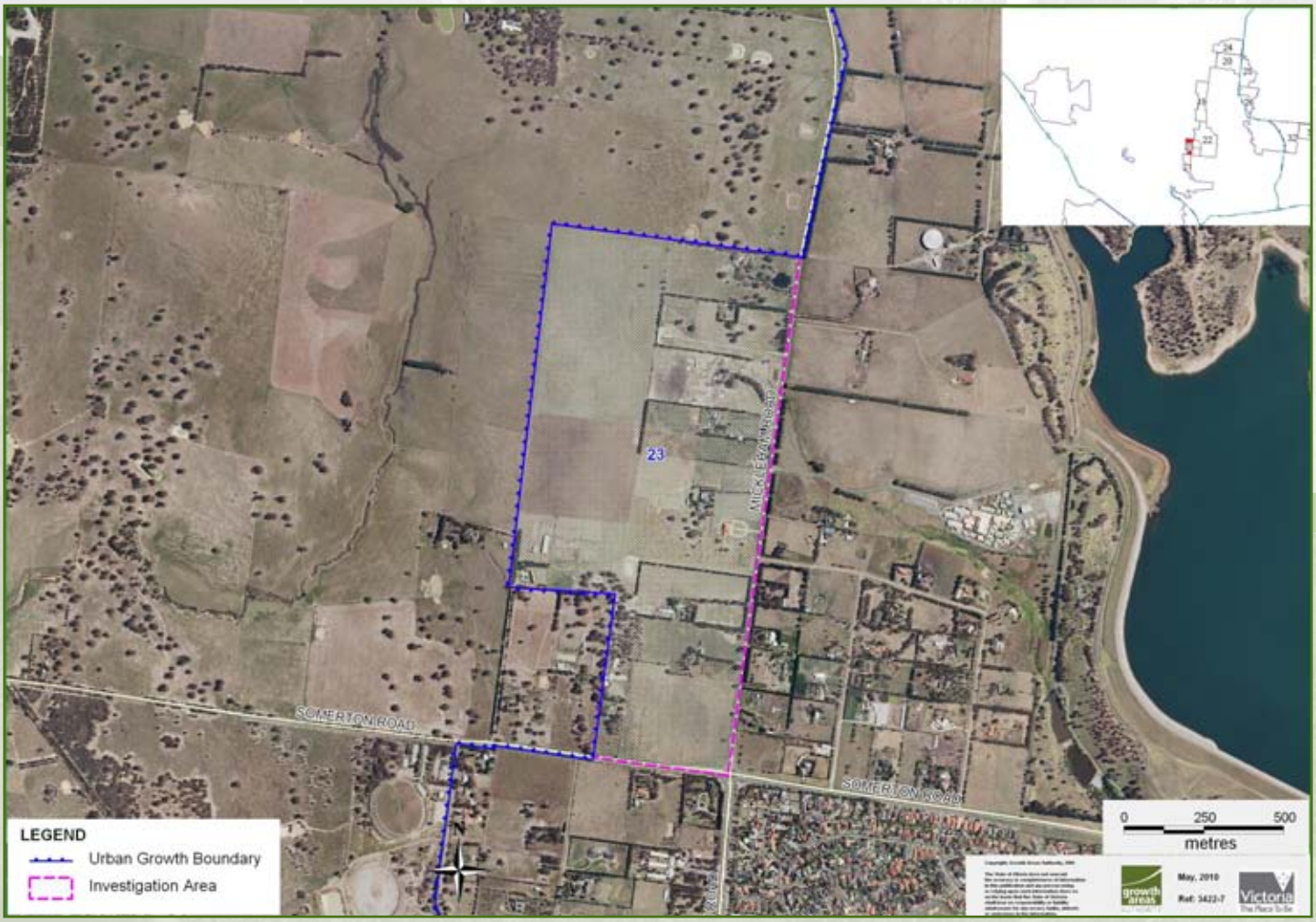

MAP: PSP 23 - Greenvale South

Biodiversity Assessment Project
Quality Assurance - Verification Sheet
PSP 23: Greenvale South

Document Title	Biodiversity Assessment Report (Native Vegetation)		
Precinct (Name and Number)	PSP 23: Greenvale South		
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This document is approved for release	**Organisation**
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		Date	**Verifier**
Contract Signed		August 2008	Bill Vasiliadis
Habitat Hectare Competency Training Completed		August 2008	Christopher White, Mark Cairns, Cameron Miller
Survey Period	**Start**	October 2008	Christopher White, Mark Cairns, Cameron Miller
	Completed	December 2008	Christopher White, Mark Cairns, Cameron Miller
Vegetation Assessment Surveys completed in accordance with DSE's Vegetation Quality Assessment Manual Version 1.3 (2004)		December 2008	Christopher White, Mark Cairns, Cameron Miller
Mapping completed to agreed standards		December 2008	Christopher White, Mark Cairns, Cameron Miller
Data authenticated by DSE		June 2009	Simon Denby
Habitat Hectare Assessment completed using 'Habitat Hectares for ArcPad' in accordance with agreed DSE approved methodology		December 2008	Christopher White, Mark Cairns, Cameron Miller
Targeted Fauna surveys completed in accordance with agreed with DSE's Vegetation Quality Assessment Manual Version 1.3 (2004)		December 2008	Christopher White, Mark Cairns, Cameron Miller
Survey Results not included with this Report		General fauna survey for species not listed as state or nationally significant	N/A
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Executive Summary

This Biodiversity Report provides native vegetation and fauna habitat information for Precinct Structure Plan Area 23 – Greenvale South.

SMEC Australia (SMEC) was engaged by the Growth Areas Authority (GAA) to provide vegetation and fauna assessments and mapping services for the Greenvale South Precinct Structure Plan Area (PSP Area 23). The purpose of the mapping and assessment project is to inform:

- The preparation of Precinct Structure Plans in areas designated for future urban development ;
- Long term planning with a focus on infrastructure to ensure requirements are met over the next 30-50 years.

The report was prepared by SMEC and commissioned by the Growth Areas Authority.

The assessment surveys were conducted by the contractor during October, November and December in 2008 and January 2009.

The survey methodologies used by the contractor in preparation of this report are in accordance with guidelines and training provided by the Department of Sustainability and Environment (DSE).

Any limitations to the report or to the application of its findings are outlined in Part 2 section 3 and Part 3 section 3 of this report.

Overview of the Study Area

The area is located approximately 25km North of the City of Melbourne, and within Melbourne's current Urban Growth Boundary (UGB). The Greenvale South PSP area covers approximately 280 Hectares and is represented in Figure i.

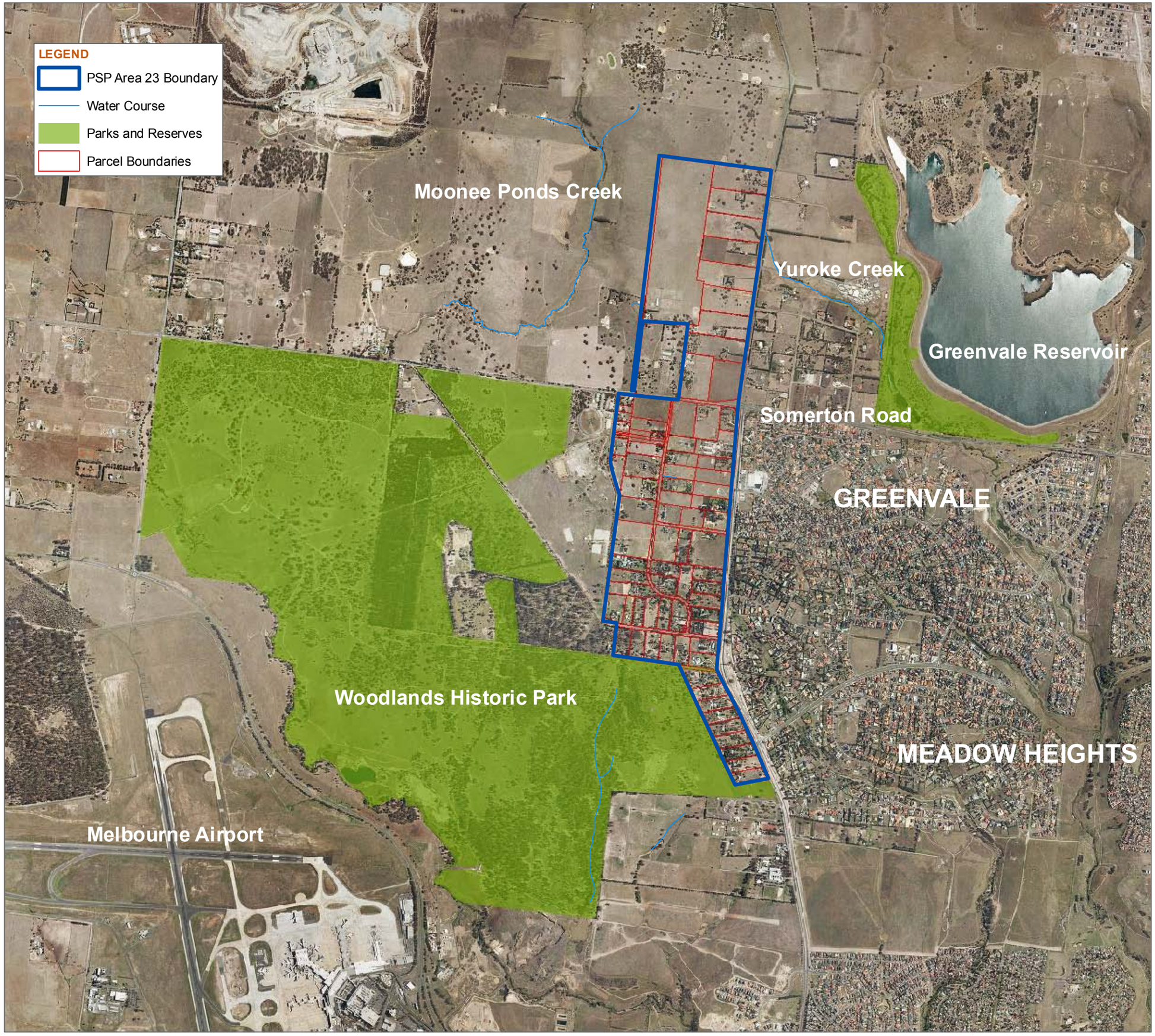
Much of the Greenvale South PSP Area has largely been cleared for agricultural purposes with remnant native vegetation and fauna habitat predominately associated with Woodlands Historic Park, which abuts the South-western boundary of the site. The PSP area also supports a number of smaller patches of remnant Ecological Vegetation Classes (EVC's), comprising either EVC 55: Plains Grassy Woodland (BCS of Endangered), or EVC 71: Hills Herb-rich Woodland.

Conclusion – Summary of Key Findings

Despite an intensive agricultural history, 41 Habitat Zones of varying quality were recorded and mapped, 25 of which are associated with Plains Grassy Woodland Ecological Vegetation Classes (EVC), and 16 of which are associated with Hills Herb-rich Woodland EVC. Most of these habitat zones were of high conservation significance. The site also supported 78 Large Old Trees (LOT's) and Very Large Old Trees (VLOT's), some of which are in excess of 2 metres Diameter at Breast Height (DBH), and of significant habitat and aesthetic value.

Patches of Plains Grassy Woodland located North of Somerton road supported a relatively discrete population of Golden Sun Moth *Synemon plana*, whilst the patches of Hills Herb-rich Woodland associated with Woodlands Historic Park have the potential to support arboreal mammals and nectarivorous avifauna.

No Growling Grass Frogs *Litoria raniformis* were detected during the survey which was largely the result of the lack of suitable habitat, with most water bodies present in the site being dry as a result of extended drought conditions. Much of the southern part of the PSP study site (south of Somerton Road), despite being located adjacent to Woodlands Historic Park, contained largely cosmopolitan species that are typically found in residential urban environments



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PROJECT:

GAA Native Vegetation Mapping Project

TITLE:

Figure i- Location and Overview map of Precinct Struture Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009

CHECKED BY: Cameron Miller **DATE:** 14/09/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY © The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

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Drawing No. 1 of 1

Revision. 3 **Sheet Size.** A3

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Part One- Background and Purpose

1. Background and Purpose

1.1 PROJECT SCOPE

The Growth Area Authority (GAA) engaged contractors during 2008 / 2009 to map and assess native vegetation and fauna habitat in designated Precinct Structure Plan areas surrounding Melbourne. The scope and design of this project was developed jointly with the Department of Sustainability and Environment (DSE). The purpose of this mapping and assessment was to:

- Prepare biodiversity reports as essential background input into precinct structure planning at an early stage in the planning process;
- Inform the preparation of precinct structure plans in areas designated for future urban development (in most cases this will also include preparation of a Native Vegetation Precinct Plan), and;
- Long term planning related to infrastructure including liaison with relevant service authorities to ensure their requirements are met over the next 30-50 years.

This new approach focuses on achieving the objectives of the Victorian Native Vegetation Framework and planning development within the Urban Growth Zone at a regional level. This approach will improve the clarity and flexibility of native vegetation management, reduce the administrative burden on local government, provide greater certainty for urban development and improve biodiversity outcomes.

The mapping and assessment undertaken as part of this project has been undertaken in sufficient detail and of a sufficient standard to be used for the preparation of Native Vegetation Precinct Plans and Precinct Structure Plans.

The contractors assessed and mapped vegetation within existing precinct planning areas inside the Urban Growth Boundary (UGB). Contractors were required to submit a GIS data layer of all site assessments, together with other site information and observations on a monthly basis. The site assessments included:

- The extent of native and non-native vegetation;
- Mapped polygons of sites / zones;
- Confirmation of the native vegetation type (EVC);
- Native vegetation condition assessment (employing the Habitat hectares method) and other site attributes including land use, dominant weeds etc;
- The species, size (small, medium, large) and location of all remnant indigenous trees (either as patches or individual trees when scattered in the landscape);
- The location of all observed rare or threatened plants or observed native flora, and;
- The location of all observed rare or threatened native fauna or habitat and land use features for fauna.

The outputs of the Vegetation and Fauna Assessment and Mapping project will include 2 parts, Part 2 and Part 3:

- PART 2 Vegetation condition/Rare or Threatened Flora species/ Habitat and Land Use Features
- PART 3 Fauna Surveys.

After consideration of the maps, information and records collected in Part 2 above and; existing data and fauna and mapping provided by DSE; GAA in consultation with DSE proposed to identify Study Sites for a general assessment of fauna and habitats.

This original approach to Fauna surveys was amended through negotiation with and agreement of the DSE to a targeted approach to survey for significant species. The specifications for these surveys are outlined in Appendix 1 of this report.

2. PROJECT SPECIFICATIONS AND MANAGEMENT ARRANGEMENTS

2.1 Tenders and Selection of Contractors

The Request for Tender was prepared by Growth Areas Authority jointly with the Department of Sustainability and Environment to ensure that the survey methodologies and all data collected and recorded as part of the project complied with Departmental standards. The Request for Tender was advertised in the Herald – Sun and on the VicTender web site on the 23rd July 2008.

The Tenders were assessed against the Evaluation Criteria and 4 Contracts were awarded on the 26th August 2008 for Part A (Vegetation condition/Rare or Threatened Flora species/Habitat attributes and Land Use Features). Two Contracts were also awarded for Part B (Fauna Surveys).

2.2 Vegetation Condition Assessment and Mapping

Each contractor used a GPS to map habitat zones (as described in Vegetation Quality Assessment Manual Version 1.3 DSE 2004) within the assigned study sites. Habitat zones were mapped across all vegetation, regardless of whether it was native vegetation.
Contractors also identified the Ecological Vegetation Class (EVC) of each mapped habitat zone and conducted a habitat hectare assessment using 'Habitat Hectares for Arc Pad'. Each contractor recorded land use, other habitat features and dominant weed species at each zone. DSE supplied each contractor with 'Habitat Hectares for Arc Pad' which was used when mapping and undertaking native vegetation condition assessments.

Contractors undertook a 30 minute assessment to identify any habitat features for native fauna. DSE provided an assessment sheet for recording habitat and land use features for fauna likely to be present in the study area including hollow logs, tree hollows, litter, rocks and rock walls. This assessment sheet was also made available to load onto PDAs and these land use and habitat attributes were recorded for all properties that were assessed and mapped.

For scattered trees, contractors identified and recorded the location of all individual indigenous trees encountered within any habitat zone, including the species, diameter at breast height and assessment to determine ecological/ habitat significance.

2.3 Targeted Fauna Surveys

Appendix 1 outlines the agreed approach to surveys for significant fauna species throughout these investigation areas.

2.4 Training of Contractors

The GAA and DSE provided a mandatory (3 day) training course in the assessment methods and tools. The dates for this training course were 27, 28, 29 August 2008. This included Habitat Hectares assessments and mapping (to ensure the method is being applied in a consistent manner), use of the Habitat Hectares for Arc Pad software, other data collection requirements, OH&S and landholder engagement

Staffs of contractors were trained in field situations in Native Vegetation assessment by DSE using the habitat hectare assessment methodology and the use of hand held GPS devices loaded with Arc View software provided by DSE.

2.5 Access to Properties / Communication with Landowners

GAA developed procedures for access to properties and protocols for contact with landholders. Contractors were provided with GAA authorised identification documentation to be carried by all staff whilst undertaking field surveys. The GAA assisted in the engagement of landholders in the process and facilitated access to properties to undertake site assessments.

A letter explaining the mapping project and requesting access to properties was sent to each landholder and occupier. Fact Sheets explaining precinct structure planning and the vegetation mapping project were also forwarded with the letter to landholders. Land owners were given the choice to make contact with the respective contractor to arrange access to their property. Contractors also spent considerable resources in making contact with land owners and arranging site visits. A small number of landholders refused to provide access to their properties and in some cases the land owner data base did not lead to any contact being made with the land owner or occupier. Contractors provided regular updates as to which landowners had denied the contractor access to their property to conduct a survey.

In cases where access to a property has not been possible, mapping in this report will show the DSE modelled data layer of information and the contractors confirmation of this by a ‘drive by’ assessment. While this is not ground survey results it provides an indication of likely vegetation and habitat. In some cases, finalisation of the precinct structure plan and /or native vegetation precinct plan will require additional on ground assessment surveys to be undertaken at these properties.

2.6 Access to Existing Reports and Databases

In some parts of the precinct planning areas flora and/or fauna surveys had been previously arranged by landholders, councils or property developers. The GAA, where possible, sought access to these reports and provided a copy to the relevant contractor. DSE staff also provided copies of reports that they knew existed for some of these areas.

Contractors were provided with a copy of or access to the DSE corporate flora and fauna databases eg. Atlas of Victorian Wildlife / Flora Information System / Aerial photography. Access to landholder and property information was arranged through the DSE and in some cases a contractor was engaged to compile a telephone contact database to enable contractors to contact property owners.

2.7 DSE Quality Assurance Arrangements

- Field surveys were undertaken by qualified and experienced botanists and ecologists who had participated in the training provided by the DSE as part of this project;
- DSE also undertook quality assurance site visits with the contractors to ensure that the assessment methodology was being applied in a consistent manner;
- Contractors provided monthly reports to the GAA contract manager including an account of hectares assessed and the data collected. The GAA undertook a check of GIS integrity and then arranged for DSE to check the data for its biological integrity;
- Audits of the data files were conducted by DSE to ensure that the records conformed to DSE standards and that all attributes had been recorded accurately, and;
- Any deficiencies were reported to each contractor for correction and improvement prior to acceptance of the results and finalisation of payments.

2.8 Project Governance

A Native Vegetation Project Control Group was established by the GAA and the Group initially included the GAA and DSE representatives. The Project Control Group has met regularly since the project commenced.

Representatives of VicRoads and Department of Transport were invited to join the Project Control Group when it was decided that the GAA contracts would be used to undertake the assessment and data gathering for their road and rail project. The Department of Transport also arranged for their project manager (Maunsell) to attend the meetings.

2.9 Monthly Reporting

Monthly updates and data files were provided on the progress of the assessments along with the contractor's updated project plan to ensure completion of the planned extent of assessment/mapping within the time period provided for the assessment. Initially the assessments were to be completed by the end of December 2008 but the GAA negotiated with contractors to extend the survey deadline into early 2009 to maximise the areas assessed and mapped.

PART TWO – Flora Assessment and Mapping

1. Details of the Study Area

1.1 PSP Area 23

The Greenvale South PSP area covers an area of approximately 278ha, and is contained within the Port Philip and Western Port Catchment Management Authority (PPWPCMA) boundary. The site is bordered to the east by Mickleham Road, to the west by Woodlands Historic Park (a state-significant biosite), and to the North and South by privately owned property. The PSP Area overlies Quaternary volcanics and shallow reddish brown heavy clays with thick loamy topsoil.

Much of the land within this PSP area has been extensively cleared, and is considered 'improved pasture' dominated by introduced pasture grass species, in particular Toowoomba Canary Grass *Phalaris aquatica.* Remnant vegetation is largely restricted to scattered, individual trees and small patches of remnant vegetation contained within properties lining Providence Road, and within properties sharing a boundary with Woodlands Historic Park.

This precinct is currently zoned as an Urban Growth Zone (UGZ), and contains no overlays.

2. Details of Methods

This section details the methods used throughout the assessment.

2.1 Background Dataset Literature Review

Flora, fauna, habitat and related environmental values previously recorded within the assessment area were assessed via a literature and database review. In order to undertake this assessment the following data and information sources were reviewed and analysed (supplied by the GAA, the Department of Sustainability and Environment (DSE) and the Department of Environment, Water, Heritage and the Arts (DEWHA)):

- *EPBC Act* Protected Matters Search Tool;
- Victorian Bioregions;
- Native vegetation extent;
- Threatened flora record data (from the Flora Information System);
- Threatened fauna record data (from the Atlas of Victorian Wildlife); and
- Water Courses.

In addition to vegetation extent, the DSE supplied information on the conservation status of EVCs. Categories of conservation status include Least Concern, Depleted, Rare, Vulnerable and Endangered (DSE 2006a). Classification of EVC conservation status is undertaken by DSE using the following criteria:

- Endangered: EVCs have contracted to <10% of pre-European extent or are highly contracted (10-30% pre-European extent) and degraded;
- Vulnerable: 10-30% pre-European extent or 30->50% extent remains but is moderately or severely degraded;
- Depleted: greater than 30-50% pre-European extent remains; or >50% pre-European extent remains and moderately degraded over the majority of this area;
- Rare: Rare EVC (as defined by geographic extent) but neither depleted, degraded nor currently threatened to an extent that would qualify as endangered, Vulnerable or Depleted; and
- Least Concerned; Greater than 50% of pre-European extent remains and subject to little or no degradation over the majority of this area.

Information regarding the likely occurrence of specific Ecological Vegetation Classes (EVC's) within the site was inferred from EVC mapping provided by DSE (DSE, 2008a). Benchmark quality values for the EVC's that are suggested to occur on site were used to confirm their presence in the field and to help determine the conservation significance of the site in accordance with the Native Vegetation Management Framework (DNRE 2002).

2.2 Field Survey- Flora

SMEC undertook a field assessment of the entire Greenvale South PSP area between October and December, 2008. Field work was undertaken by four trained and experienced staff (each attended DSE's habitat hectare training) in groups of two. Approximately 20 field days were spent surveying Greenvale South PSP Area 23. Field survey was conducted between the hours of 7am and 5pm for flora, and only on days of dry weather conditions.

The field survey aimed to identify and validate the findings from the background literature review, as well as to identify new records of flora species and identify any remnant patches, scattered indigenous trees and records of threatened flora and fauna. The field survey generally follows the *Guidelines for the Conduct of Biological Surveys (Flora & Fauna)* (Vic Roads 2000) and where required the *Vegetation Quality Assessment Manual* (DSE 2004) and the *GAA Native Vegetation Mapping Project Field Assessment User Guide* (DSE 2008b).

The Random Meander Method (Cropper 1993) was adopted to search for the presence of native flora. Significant habitats identified during the background assessment were targeted during the field assessment. Where present, remnant patches of native vegetation (as defined by DSE) were identified and mapped. In order for vegetation to be considered a 'remnant patch' under the Framework it must meet certain criteria, these being:

> *"An area of vegetation, with or without trees, where less than 75% of the total understorey plant cover is weeds or non-native plants (bare ground not included). That is at least 25% of the understorey is native"; or*
>
> *"A group (3 or more) of trees where the canopy cover is at least 20%" (DSE 2006b).*

The Framework also has provisions to protect 'Scattered Trees' which are defined as:

> *Canopy trees within an area where at least 75% of the total understorey plant cover is weeds or non-native plants and the overall canopy cover for a group (3 or more) is less than 20% (DSE 2006b).*

In addition, DSE provide a further clarification:

Vegetation that is not a remnant patch or scattered trees, nor a wetland should be treated as degraded treeless vegetation (DSE 2007).

A vegetation quality assessment of remnant patches was undertaken using the habitat hectares methodology adapted for ArcPad (DSE 2008b) and scattered trees were assessed following the GAA guidelines. The conservation significance of any native vegetation or flora species present on site was determined in line with Victorian and Commonwealth policy and legislation, including the Framework.

3. **Limitations of the Project**

This section highlights the limitations of the project.

- At the time of the field survey, SMEC were unaware that the data collected was intended to be used for the development of a detailed ecological report (this report). Therefore no site photographs or geographical descriptions are included within this report.
- It should be recognised that the timing of the surveys was during an extensive period of drought. This has clearly led to a deterioration of ecological condition and may have limited opportunities for threatened flora species emergence.
- SMEC were not contracted to conduct targeted threatened species survey for this PSP Area. Incidental threatened species records were noted at the time of field survey.
- SMEC did not have access to all properties within PSP Area 23. Thus, SMEC has not assessed the ecological value associated with these land parcels. Prior to any planning decisions full site access should be sought and appropriate ecological assessments undertaken.

4. Ecological Assessment Results

This section presents the findings from the ecological assessment.

4.1 Remnant Patches

4.1.1 Description

SMEC have identified a total of 41 patches of remnant vegetation (refer to Table 3) encompassing 2 Ecological Vegetation Classes: EVC No. 55_61- Plains Grassy Woodland, and EVC No. 71- Hills Herb-rich Woodland. In the Victorian Volcanic Plain Bioregion, Plains Grassy Woodland has a Bioregional Conservation Status (BCS) of Endangered, and Hills Herb-rich Woodland has a BCS of Vulnerable. Plains Grassy Woodland is identifiable in the landscape as an open eucalypt woodland typically dominated (in the Volcanic Plain Bioregion) by an overstorey of River Red Gum *Eucalyptus camaldulensis.* This EVC typically occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations (DSE, 2004a.) A characteristic of this particular EVC is the lack of mid-stratum species- canopy eucalypts typically grow over a species-rich grassy and herbaceous layer.

Hills Herb-rich Woodland is identifiable in the landscape as dry, open eucalypt woodland with a sparse shrub layer, overlying an understorey of herbs and grasses. Bedrock outcroppings are a regular feature of this EVC, and the landform can vary from relatively flat ground to ridge tops on sedimentary sandstones to undulating, rounded, granite and basaltic hill landforms (DSE, 2004b). Within the Greenvale PSP area, this EVC is typically dominated by Grey Box *Eucalyptus microcarpa* with interspersed Yellow Box *Eucalyptus melliodora* and River Red Gum.

4.1.2 Conservation Significance of the Patches

The Framework provides a series of measures to assess the conservation significance of native vegetation. The conservation significance of vegetation on a site can range from very high, high, medium and low and is determined by the conservation status of existing vegetation, the quality of vegetation (habitat hectares) and several other biodiversity attributes such as the presence (or likely presence) of threatened species and nearby sites of biological significance (DNRE 2002). Thus, in accordance with the criteria set out in the Framework the conservation significance of Habitat Zones is set out in Table (below).

Table 1. Habitat Zone Patches and their conservation significance within the Greenvale South PSP area.

Habitas Layer Property ID Number	203530878	2053063	2083198	222045	222045	222047	222049	222049	222054	223346	223350	223352	233812
Site Number	1	1	1	2	3	1	3	2	2	1	2	1	2
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A
Vegetation Category	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
Size (Ha)	0.85	0.39	0.04	0.05	0.63	0.02	0.69	0.12	0.09	0.14	0.01	0.19	0.42
EVC	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland
EVC No.	55_61	55_61	55_61	71	71	71	55_61	55_61	55_61	71	71	71	71
EVC Conservation Status	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Vulnerable	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Vulnerable	Vulnerable
Landscape Score	3	5	5	3	3	6	5	5	5	5	5	5	8
Site Condition Score	29	9	9	12	28	24	9	21	13	34	13	14	22
Habitat Score	32	14	14	15	31	30	13	26	18	39	15	19	30
habitat hectares	0.27	0.05	0.01	0.01	0.2	0.01	0.1	0.03	0.02	0.05	0.00	0.04	0.13
Conservation Significance	High	High	High	Medium	High	High	High	High	High	High	Medium	Medium	High
Net Outcome Ratio	1.5	1.5	1.5	1	1	1	1.5	1.5	1.5	1	1	1	1
Map Number (location of Patch)	Figure 1.1 (C4)	Figure 1.2 (D2)	Figure 1.2 (D2)	Figure 1.2 (C4)	Figure 1.2 (C4)	Figure 1.2 (C4)	Figure 1.2 (A3)	Figure 1.2 (A3)	Figure 1.2 (B2)	Figure 1.2 (C4)	Figure 1.2 (A4)	Figure 1.2 (C4)	Figure 1.3 (E3)

Habitas Layer Property ID Number	233815	233819	233819	233824	233824	233827	233827	233828	233837	233839	233839	233841	233843
Site Number	2	1	2	1	4	2	3	2	2	2	3	2	1
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A
Vegetation Category	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
Size(Ha)	0.49	0.69	0.3	0.49	0.05	0.33	0.05	0.43	1.17	0.11	0.09	4.43	2.22
EVC	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland
EVC No.	71	71	71	71	71	71	71	71	55_61	55_61	55_61	55_61	55_61
EVC Conservation Status	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Endangered	Endangered	Endangered	Endangered	Endangered
Landscape Score	8	8	8	5	3	3	3	3	5	5	5	9	6
Site Condition Score	28	26	26	20	18	28	8	32	29	27	9	28	14
Habitat Score	36	34	34	25	21	31	11	35	34	32	14	37	20
habitat hectares	0.18	0.23	0.09	0.12	0.01	0.1	0.01	0.16	0.4	0.04	0.01	1.64	0.44
Conservation Significance	High	High	High	Medium	Medium	High	Medium	High	High	High	High	High	High
Net Outcome Ratio	1	1	1	1	1	1	1	1	1.5	1.5	1.5	1.5	1.5
Map Number (location of Patch)	Figure 1.3 (D3)	Figure 1.3 (C2)	Figure 1.3 (D2)	Figure 1.2 (C5)	Figure 1.2 (D5)	Figure 1.2 (C4)	Figure 1.2 (C4)	Figure 1.2 (D4)	Figure 1.1 (C4)	Figure 1.1 (C4)	Figure 1.1 (C4)	Figure 1.1 (D1)	Figure 1.1 (C3)

Habitas Layer Property ID Number	233849	233849	233851	233851	236772	238392	238395	239023	239023	239024	239025	239025	239027
Site Number	3	2	2	3	3	2	2	1	2	4	2	3	2
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A
Vegetation Category	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
Size (Ha)	0.2	0.43	1.45	0.12	0.77	0.01	0.17	1.13	0.2	0.23	0.79	0.11	0.05
EVC	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland
EVC No.	55_61	55_61	55_61	55_61	71	55_61	55_61	55_61	55_61	55_61	55_61	55_61	55_61
EVC Conservation Status	Endangered	Endangered	Endangered	Endangered	Vulnerable	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered
Landscape Score	5	5	5	5	9	5	5	5	5	3	5	7	5
Site Condition Score	20	13	28	26	28	28	33	10	10	21	9	9	9
Habitat Score	25	18	33	31	37	33	38	15	15	24	14	16	14
habitat hectares	0.05	0.08	.48	0.04	0.28	0.00	0.06	0.17	0.03	0.06	0.11	0.02	0.01
Conservation Significance	High	High	High	High	High	High	High	High	High	High	High	High	High
Net Outcome Ratio	1.5	1.5	1.5	1.5	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Map Number (location of Patch)	Figure 1.1 (E2)	Figure 1.1 (D1)	Figure 1.1 (E1)	Figure 1.1 (D1)	Figure 1.2 (B5)	Figure 1.2 (A2)	Figure 1.2 (A1)	Figure 1.2 (D2)	Figure 1.2 (D2)	Figure 1.2 (C1)	Figure 1.1 (C5)	Figure 1.2 (C2)	Figure 1.1 (B5)

Habitas Layer Property ID Number	239029	52476438
Site Number	2	3
Habitat Zone	A	A
Vegetation Category	RP	RP
Size (	0.04	0.09
EVC	Plains Grassy Woodland	Plains Grassy Woodland
EVC No.	55_61	55_61
EVC Conservation Status	Endangered	Endangered
Landscape Score	5	5
Site Condition Score	10	26
Habitat Score	15	31
habitat hectares	0.01	0.03
Conservation Significance	High	High
Net Outcome Ratio	1	1.5
Map Number (location of Patch)	Figure 1.1 (A5)	Figure 1.2 (A2)

4.1.3 Vegetation Quality

Overall, the PSP area exhibits characteristics associated with a long history of land modification and agriculture. On many of the parcels assessed these farming practices continue today. A total of 25 individual patches of Plains Grassy Woodland were identified and mapped within PSP area 23, encompassing a total area of 15.22 hectares and representing 4.16 habitat hectares. As a result of continued agricultural practices and land degradation associated with urban encroachment, the quality of the vegetation contained within these habitat zones is generally poor. Typically, remnant patches of Plains Grassy Woodland were only identifiable by the presence of at least 20% cover of River Red Gums. Very little remnant grassland existed beneath the canopy of most habitat zones, instead being replaced by introduced pasture grass and herb species including Phalaris, Rye Grass *Lolium perenne,* and Mallow *Malva* sp. Typically within patches that contained some indigenous understorey (Site Condition Score of between 30 and 75), native vegetation was restricted to secondary grassland containing at least one native grass species (usually Wallaby Grass *Danthonia* sp). All patches displayed evidence of some degree of modification and the impacts of competition with weed species further affected on the ecological functionality of each patch. The majority of mapped Plains Grassy Woodland patches were small in size, generally under 0.5 hectares. Only 5 individual patches of Plains Grassy Woodland were mapped that covered more than 1 hectare, the largest being 4.43 hectares in size.

A total of 16 individual patches of Hills Herb-rich Woodland were identified and mapped within PSP area 23, encompassing a total area of 5.06 hectares and representing 1.62 habitat hectares. Hills Herb-rich Woodland has been affected by the history of agriculture in much the same way as Plains Grassy Woodland. As such the quality of the vegetation within patches of Hills Herb-rich Woodland was poor. Understorey weed species including Rye Grass, Thistle *Cirsium* and *Cynara* sp, and Sweet Vernal Grass *Anthoxanthum odoratum* are out competing native grass species, thereby reducing the likelihood of each patch to support fauna values. Within the Greenvale South PSP area, Hills Herb-rich Woodland was often associated with sites of local relief with emergent basaltic outcrops. This appears to have limited the usefulness of the land for agricultural purposes, and has favoured greater indigenous species richness in comparison to the vegetation on the plains. As such, the Habitat Hectares within this EVC were comparatively higher than those of Plains Grassy Woodland.

4.2 Scattered Trees

4.2.1 Description

A total of 26 Large Old Trees (LOT's) and 51 Very Large Old Trees (VLOT's) were recorded within PSP Area 23 (see Table below). The majority of the trees surveyed were either Grey Box or River Red Gum. The area taken up by the drip zone of each of the mapped scattered trees is represented by the scattered tree polygons as displayed in Appendix E, Figures 1.1-1.3.

A complete list of scattered trees is presented in Appendix 3. The dominant tree species across the Precinct was River Red Gum, with Grey Box sub-dominant. The size class of scattered indigenous trees was determined by the EVC Benchmark 55: Plains Grassy Woodland and EVC Benchmark 71- Hills Herb-rich Woodland as per methods prescribed by DSE (DSE 2004 a, b). Size categories are provided below:

EVC 55- Plains Grassy Woodland:

- Eucalypts: very large old trees were those with a Diameter at Breast height (DBH) ≥ 120 cm, large old trees are 80 - 120 cm DBH, medium trees are 60-80 cm DBH, and small trees < 60 cm DBH.

EVC 71- Hills Herb-rich Woodland

- Eucalypts: Very Large Old Trees were those with a Diameter at Breast Height (DBH) ≥ 105 cm, Large Old Trees are between 70 and 105 cm DBH, Medium Old Trees are between 52.5 and 70 cm DBH and small trees are less than 52.5 cm DBH

4.2.2 Conservation Significance of Scattered Trees

The conservation significance of scattered indigenous trees is presented in Table (overleaf).

Table 2- Scattered trees mapped within PSP Area 23 and their Conservation Significance

Habitas Layer Property ID Number	151625319	203530878	203530878	2053063	2083193	20841127	20841127	222051	222054	222054	223347	223347	2233449	223352	233809	233809	233809	233809
Site Number	2	1	2	3	1	1	2	2	3	4	1	3	2	3	1	2	3	4
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Size of Zone (Ha)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.09	0.14	0.01	0.01	0.01	0.03	0.02	0.03
EVC	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland
EVC No.	55_61	55_61	55_61	55_61	55_61	71	71	55_61	55_61	55_61	71	71	71	71	71	71	71	71
EVC Conservation Status	Endangered	Endangered	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable
Genera	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalyptus	Eucalyptus	Eucalyptus	Eucalypt
Number of Trees in Size Category	1 VLOT	1 MOT	1 MOT	1 MOT	1 LOT	1 LOT	1 MOT	1 VLOT	1 VLOT	1 MOT	5 VLOT	3 VLOT 1 MOT	2 MOT, 1 ST	1 LOT	1 VLOT	1 VLOT	1 MOT, 4 ST	1 MOT, 4 ST
Conservation Significance	High	High	High	High	High	Medium	Medium	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Map Number (location of Patch)	Figure 1.1 (A5)	Figure 1.1 (C4)	Figure 1.1 (C5)	Figure 1.2 (E2)	Figure 1.2 (B1)	Figure 1.2 (B5)	Figure 1.2 (B5)	Figure 1.2 (A2)	Figure 1.2 (A2)	Figure 1.2 (B2)	Figure 1.2 (C5)	Figure 1.2 (B5)	Figure 1.2 (A4)	Figure 1.2 B4)	Figure 1.3 (E4)	Figure 1.3 (E4)	Figure 1.3 (E4)	Figure 1.3 (E4)

Habitas Layer Property ID Number	233810	233810	233810	233812	233812	233813	233813	233815	233820	233822	233822	233822	233823	233824	233825	233826	233828	233829
Site Number	2	3	4	3	4	2	3	3	2	2	3	4	2	3	2	2	4	1
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Size of Zone (Ha)	0.02	0.07	0.04	0.09	0.02	0.11	0.08	0.06	0.11	0.03	0.02	0.1	0.03	0.01	0.06	0.01	0.04	0.02
EVC	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland
EVC No.	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
EVC Conservation Status	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable
Genera	Eucalypt	Eucalyptus	Eucalypt	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalyptus	Eucalypt, Acacia	Eucalypt	Eucalypt
Number of Trees in Size Category	1 VLOT	1 VLOT 2 MT, 2 ST	1 VLOT	2 VLOT 2 MOT	1 VLOT	1 VLOT 1 MOT 2 ST	3 VLOT	3 MOT	5 VLOT 2 LOT 2 MOT 2 ST	1 VLOT 1 ST	1 VLOT	2 VLOT	1 VLOT	1 LOT	4 MOT 5 ST	1 MOT 3 ST	1 LOT, 1 MOT and 1 ST	1 LOT
Conservation Significance	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Map Number (location of Patch)	Figure 1.3 (E3)	Figure 1.4 (E3)	Figure 1.3 (E3)	Figure 1.3 (D3)	Figure 1.3 (D3)	Figure 1.3 (E3)	Figure 1.3 (D3)	Figure 1.3 (D2)	Figure 1.3 (D1)	Figure 1.3 (D1)	Figure 1.3 (D1)	Figure 1.3 (C1)	Figure 1.3 (C1)	Figure 1.2 (D5)	Figure 1.2 (C4)	Figure 1.2 (C4)	Figure 1.2 (D3)	Figure 1.2 (D3)

Habitas Layer Property ID Number	233829	233829	233829	233832	233843	233849	233849	236767	236768	236768	236768	236769	236769	236770	236770	236770	236770	236770
Site Number	2	3	5	4	3	4	5	2	2	3	4	1	3	1	2	3	4	5
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Size of Zone (Ha)	0.03	0.1	0.01	0.01	0.04	0	0.01	0.1	0.03	0.08	0.07	0.02	0.02	0.02	0.03	0.01	0.02	0.03
EVC	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland
EVC No.	71	71	71	55_61	55_61	55_61	55_61	71	71	71	71	71	71	71	71	71	71	71
EVC Conservation Status	Vulnerable	Vulnerable	Vulnerable	Endangered	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable
Genera	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Acacia	Eucalyptus	Eucalypt	Eucalypt	Eucalyptus	Eucalyptus	Eucalyptus
Number of Trees in Size Category	1 VLOT 1 LOT	1 VLOT 5 LOT 14 MOT	1 MOT	1 VLOT	1 MOT	1 VLOT	1 LOT	2 VLOT. 2 MOT, 2 ST	1 VLOT 1 MOT	1 VLOT 1LOT 1 MOT 13 ST	1 VLOT 12 ST	1 MOT	2 MOT 1 ST	1 LOT	1 MOT	1 MOT	2 MOT	1 VLOT
Conservation Significance	Medium	Medium	Medium	High	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Map Number (location of Patch)	Figure 1.2 (E3)	Figure 1.2 (D3)	Figure 1.2 (E3)	Figure 1.2 (E2)	Figure 1.1 (D3)	Figure 1.1 (D1)	Figure 1.1 D14	Figure 1.3 (C2)	Figure 1.2 (C5)	Figure 1.2 (C5)	Figure 1.2 (C5)	Figure 1.3 (B2)	Figure 1.3 (B2)	Figure 1.3 (B1)	Figure 1.3 (B1)	Figure 1.3 (B1)	Figure 1.3 (B1)	Figure 1.3 (B1)

Habitas Layer Property ID Number	236771	236771	236771	236772	238391	238393	238394	238394	239024	239024	52476438	52476438	BONDS	CARROLL	MICKLEHAM	MICKLEHAM	MICKLEHAM	MICKLEHAM
Site Number	2	3	4	1	1	2	2	3	2	3	1	2	2	1	1	3	4	5
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Size of Zone (Ha)	0.03	0.03	0.03	0.04	0.01	0.02	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.05	0.01	0.03	0.01	0.01
EVC	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland
EVC No.	71	71	71	71	71	55_61	55_61	55_61	55_61	55_61	55_61	55_61	55_61	71	71	71	71	71
EVC Conservation Status	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable
Genera	Eucalyptus	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Acacia	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalyptus	Eucalypt	Eucalyptus	Eucalyptus
Number of Trees in Size Category	2 VLOT, 1 ST	1 MOT	1 MOT 1 ST	1 VLOT	1 MOT	1 MOT	2 MOT	1 LOT	2 VLOT 1 ST	2 LOT	1 MOT	1 LOT	2 ST	45 ST	1 LOT	1 VLOT 1 MOT	1 LOT 1 ST	1 MOT
Conservation Significance	Medium	Medium	Medium	Medium	Medium	High	High	High	High	High	High	High	High	Medium	Medium	Medium	Medium	Medium
Map Number (location of Patch)	Figure 1.3 (B1)	Figure 1.3 (B1)	Figure 1.2 (B5)	Figure 1.3 (B1)	Figure 1.2 (A3)	Figure 1.2 (A2)	Figure 1.2 (A1)	Figure 1.2 (A1)	Figure 1.2 (C4)	Figure 1.2 (C4)	Figure 1.2 (A2)	Figure 1.2 (A2)	Figure 1.2 (B2)	Figure 1.3 (C5)	Figure 1.3 (D1)	Figure 1.4 (E4)	Figure 1.3 (E3)	Figure 1.3 (E2)

Habitas Layer Property ID Number	MICKLEHAM	MICKLEHAM	MICKLEHAM	MICKLEHAM	MICKLEHAM	PROVIDENCE	PROVIDENCE	PROVIDENCE	PROVIDENCE	SECTION	SECTION	SECTION	SOMERTON	WOODLANDS
Site Number	6	7	8	9	10	1	2	3	5	2	3	4	1	2
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Size of Zone (Ha)	0.02	0.01	0,01	0.01	0.01	0.02	0.01	0.04	0.01	0.01	0.02	0.07	0.09	0.03
EVC	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills- Herb Rich Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland
EVC No.	71	71	71	71	55_61	71	71	71	71	71	71	71	55_61	71
EVC Conservation Status	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Endangered	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Endangered	Vulnerable
Genera	Eucalyptus	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalyptus	Eucalyptus	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt
Number of Trees in Size Category	3 MOT, 2 ST	1 LOT	1 VLOT	1 VLOT 3 MOT 8 ST	1 VLOT	2 MOT 4 ST	1 LOT	2 MOT 13 ST	1 MOT	1 LOT	1 LOT 2 MOT 2 ST	3 MOT 45 ST	8 ST	2 MOT 1 ST
Conservation Significance	Medium	Medium	Medium	Medium	High	Medium	Medium	Medium	Medium	Medium	Medium	Medium	High	Medium
Map Number (location of Patch)	Figure 1.3 (D2)	Figure 1.3 (D2)	Figure 1.2 (D5)	Figure 1.2 (D5)	Figure 1.1 (E5)	Figure 1.2 (C5)	Figure 1.2 (C5)	Figure 1.2 (B5)	Figure 1.2 (D5)	Figure 1.2 (A4)	Figure 1.2 (A3)	Figure 1.2 (A2)	Figure 1.1 (B5)	Figure 1.3 (D2)

4.3 Degraded Treeless Vegetation

4.3.1 Description

In *Native Vegetation: Guide for assessment of referred planning permit applications* (DSE 2007), DSE provides the following definition for Degraded Treeless Vegetation (DTV):

'Vegetation that is not a remnant patch or scattered trees, nor a wetland should be treated as ***Degraded Treeless Vegetation.*** *DSE may also treat a site as degraded treeless vegetation if it meets the cover threshold to qualify as a patch but is now dominated by a species that is unlikely to have originally dominated the site. This may include such situations as former grasslands that have had a history of cropping, and now have an extremely modified cover consisting of a few opportunistic, primary colonising native grass species generally amongst exotic species, with little other indigenous diversity.'*

4.3.2 Hectares Present

There was approximately 250 Hectares of DTV in the Greenvale South PSP 23 Area. The largest patches of DTV were to be found North of Somerton Road, where individual land parcels tended to be larger in size, and as a result, were more conducive to intensive agricultural practices. This figure is not inclusive of those properties for which SMEC had no access.

4.4 Significant Flora Species and Ecological Communities

4.4.1 EPBC Act Listed Species and Ecological Communities

An EPBC Act protected matters report was generated on the 8.5.09 for PSP Area 23, highlighting a number of matters of environmental significance known to occur within and surrounding the PSP Boundary. Information was searched utilizing a 5km buffer around the site. Two EPBC listed threatened ecological communities were identified within or near the Greenvale South PSP Area. These were:

- Natural Temperate Grassland of the Victorian Volcanic Plain (listed as Critically Endangered) and White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland (listed as critically endangered). It should be noted here that at the time of survey, Grassy Eucalypt Woodland of the Victorian Volcanic Plain has been nominated for EPBC act listing.

No White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland was recorded during the current assessment, however patches of Natural Temperate Grassland of the Victorian Volcanic Plain were recorded and mapped. To be considered as being a representative of Natural Temperate Grassland of the Victorian Volcanic Plain, a remnant patch of under 1 hectare in size should contain at least 0.05 hectares of native grassland provided that trees and shrubs comprise no more than 5% projective canopy cover OR for a native vegetation remnant that is more than 1 hectare, the grassland patch should be at least 0.5 hectares in size and support no more than 2 mature trees per hectare. Although the listing criteria for Grassy Eucalypt Woodland of the Victorian Volcanic Plain has yet to be published, this community will have a crown of Red Gum, Swamp Gum, or Manna Gum, depending on the rainfall regime over a mid and ground layer of native shrubs, herbs and grasses. Following these criteria, SMEC have mapped a total of 8 patches of remnant vegetation that meet the criteria for consideration as Natural Temperate Grassland of the Victorian Volcanic Plain. As such, any activity that may have a

significant impact upon the federally listed community will require a referral to the Minister for the Environment, Heritage and the Arts for assessment and approval, unless the work is subject to an exemption under the EPBC Act. Patches of Natural Temperate Grassland of the Victorian Volcanic Plain are identified with the Label "EPBC Community" in Figures 1.1- 1.3 located in Appendix E.

No EPBC Act listed species were recorded during the current assessment; however 6 threatened flora species were highlighted as having the potential to occur within and surrounding PSP area 23. Table presents the outcomes of this search.

Table 3. EPBC flora species listed as occurring in the Greenvale South PSP area 23.

Species Name	Common Name	EPBC Conservation Status
Amphibromus fluitans	River Swamp Wallaby-grass	Vulnerable
Carex tasmanica	Curly Sedge	Vulnerable
Glycine latrobeana	Clover Glycine	Vulnerable
Pimelea spinescens	Plains Rice-flower	Critically Endangered
Prasophyllum frenchii	Maroon Leek-orchid	Endangered
Senecio macrocarpus	Large-fruit Fireweed	Vulnerable

4.4.2 FFG Act listed species and Victorian Rare or Threatened Species (VROT's)

No FFG Act or VROT flora species were recorded during the current assessment, however historic records exist for 18 VROT and FFG Act listed flora species from within and surrounding PSP Area 23. Table presents the outcomes of this search.

Table 4. Victorian rare and threatened flora species listed as occurring in the Greenvale South PSP area 23.

Species Name	Common Name	VROT status	EPBC status	FFG status
Melaleuca armillaris subsp. armillaris	Giant Honey-myrtle	Rare	-	-
Helichrysum aff. rutidolepis (Lowland Swamps)	Pale Swamp Everlasting	Vulnerable	-	-
Dianella amoena	Matted Flax-lily	Endangered	Endangered	-
Desmodium varians	Slender Tick-trefoil	Poorly Known	-	-
Pterostylis cucullata	Leafy Greenhood	-	Vulnerable	Listed
Lachnagrostis punicea subsp. punicea	Purple Blown-grass	Rare	-	-
Geranium sp. 3	Pale-flower Crane's-bill	Rare	-	-
Geranium sp. 1	Large-flower Crane's-bill	Endangered	-	-
Corymbia maculata	Spotted Gum	Vulnerable	-	-
Botrychium australe	Austral Moonwort	Vulnerable	-	Listed
Tripogon loliiformis	Rye Beetle-grass	Rare	-	-
Lepidium pseudohyssopifolium	Native Peppercress	Poorly Known	-	-
Lepidium hyssopifolium	Basalt Peppercress	Endangered	Endangered	Listed
Austrodanthonia setacea var. breviseta	Short-bristle Wallaby-grass	Rare	-	-
Geranium sp. 1	Large-flower Crane's-bill	Endangered	-	-
Geranium solanderi var. solanderi s.s.	Austral Crane's-bill	Vulnerable	-	-

Eragrostis trachycarpa	Rough-grain Love-grass	rare	-	-
Geranium solanderi var. solanderi s.s.	Austral Crane's-bill	Vulnerable	-	-

5. Legislative and Policy Implications

This section discusses the implications of development within PSP Area 23 in relation to biodiversity legislation and policy.

5.1 Environment Protection and Biodiversity Conservation Act 1999

One of the main aims of the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is to provide for the conservation of biodiversity and the protection of the environment, particularly those aspects that are considered to be matters of national environmental significance. The Act defines seven matters of national environmental significance, these are:

- World Heritage properties;
- National Heritage places;
- wetlands of international importance;
- listed threatened species and ecological communities;
- migratory species protected under international agreements;
- Commonwealth marine areas, and;
- Nuclear actions (including uranium mines).

Under the Act, actions that are likely to have a significant impact upon matters of national environmental significance require approval from the Environment Minister to undertake those actions. An action includes any project, development, undertaking, activity or series of activities.

Those matters considered relevant to development within the PSP Area 23 are:

- Listed threatened species and communities;
- Listed migratory species; and
- Ramsar wetlands of international importance.

Under the Act, actions that are likely to have a significant impact upon matters of national environmental significance require approval from the Environment Minister to undertake those actions. Those nationally listed species that have at least a moderate likelihood of occurrence within PSP Area 23 were identified in Chapter 4 and include:

- River Swamp Wallaby Grass;
- Curly Sedge;
- Clover Glycine;
- Plains Rice-flower;
- Maroon Leek-orchid, and;
- Large-fruit Fireweed.

Existing surveys did not establish the presence of the above-mentioned species. However, given the time of the surveys (during an extensive period of drought) and the limited opportunity for statistically rigorous survey protocols, this may not be a true reflection of these species presence or absence.

Surveys did however, establish the presence of one EPBC Act listed community, that of Natural Temperate Grassland of the Victorian Volcanic Plain. At the time of survey, Grassy Eucalypt Woodland of the Victorian Volcanic Plain was a nominated community for EPBC listing, and is likely to occur throughout PSP Area 23.

The future, planned development of PSP Area 23 has the potential to impact upon the values associated with Woodlands Historic Park. Woodlands Historic Park (Or Gellibrand Hill Park) is listed on the Register of the National Estate. The statement of Significance accompanying its listing on the Register described Gellibrand Hill as being "comprised of an outcrop of granite rising above the surrounding basalt plains. The vegetation of the Park is a significant remnant of the once extensive basalt plains vegetation. The Grey box/Red gum woodland with regenerating native grass understorey and the visual prominence of Gellibrand Hill have high landscape amenity." The property has a most interesting history and contains a very significant historic resource in the form of the 1843 Woodlands Homestead complex." Gellibrand Hill Park also has indigenous values of National Estate significance.

As such, any development in PSP Area 23 should be cognisant of the values associated with Woodlands Historic Park.

5.2 Flora and Fauna Guarantee Act 1988

The *Victorian Flora and Fauna Guarantee Act 1988* (FFG Act) was established to provide a legal framework for enabling and promoting the conservation of all Victoria's native flora and fauna, and to enable management of potentially threatening processes. One of the main features of the Act is the listing process, whereby native species and communities of flora and fauna, and the processes that threaten native flora and fauna are listed in the schedules of the Act. This assists in identifying those species and communities that require management to survive, and identifies the processes that require management to minimise the threat to native flora and fauna species and communities within Victoria. A permit from DSE is required to 'take' listed flora species that are members of listed communities or protected flora from public land. A permit is not required under the *FFG Act* for private land, unless listed species are present and the land is declared 'critical habitat' for the species.

No historical records of FFG protected flora species exist within PSP Area 23 boundary. Three flora species listed under the Act have historically been found in the area (refer to Table) but SMEC surveys failed to observe any of these species. Should vegetation removal be required and these species found, a permit to remove these species will be required.

5.3 Planning and Environment Act 1987

The *Planning and Environment Act* established the framework for the use, development and protection of land and associated values in Victoria. The Act provides for the preparation of standard provisions for planning schemes which are administered by local government. The purpose of Planning Schemes is to:

- Provide a clear and consistent framework within which decisions about the use and development of land can be made;
- Express State, regional and local community expectations for areas and land uses; and
- Provide for the implementation of State, regional and local policies affecting land use and development.

A number of clauses under the Shire of Hume Planning Scheme are relevant to the proposed PSP Area 23 development and these are summarised below:

5.3.1 Conservation of native flora and fauna (Clause 15.09-2)

Decision-making by planning and responsible authorities should:

- *Assist the protection of conservation values of national parks and conservation reserves.*
- *Assist the conservation of the habitats of threatened and endangered species and communities as identified under the Flora and Fauna Guarantee Act 1988, including communities under-represented in conservation reserves such as native grasslands, grassy woodlands and wetlands.*
- *Address potentially threatening processes identified under the Flora and Fauna Guarantee Act 1988.*
- *Assist re-establishment of links between isolated habitat remnants.*

The entire Greenvale South PSP area 23 is currently zoned Urban Growth Zone (UGZ) and thus has no specific environmental requirements.

5.3.2 Victoria's Native Vegetation Management – A Framework for Action

Under Clause 52.17 of the Hume Shire Council Planning Scheme, a planning permit is required to remove, destroy or lop native vegetation on a landholding of more than 0.4-hectares, unless certain exemptions apply (refer to the Victoria Planning Provisions). Under this clause the responsible authority must consider *Victoria's Native Vegetation Management – a Framework for Action* (DNRE 2002)) and related policy documents when deciding on an application. The aim of clause 52.17 is to protect and conserve native vegetation to reduce the impact of land and water degradation and provide habitat for plants and animals. Clause 52.17 exists to facilitate the following objectives:

Step 1: Avoid adverse impacts, particularly through vegetation clearance.

The objectives of the first step in the 'Three-step Approach' to achieving Net Gain, is to avoid adverse impacts, particularly through vegetation clearance (DNRE 2002).

Step 2: Minimise impacts to native vegetation.

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

Step 3: Identify Offsets

Identify appropriate offset options.

In addition to planning overlays, Under *Clause 52.17* of the City of Hume Planning Scheme DSE is a mandatory referral authority for vegetation clearance which involves:

- Removal of more than 15 trees with a diameter less than 40 cm at 1.3 metres above ground;
- Removal of more than five trees with a diameter more than 40 cm at 1.3 metres above ground;
- Removal of more than 0.5 hectare of vegetation in an Ecological Vegetation Class with Bioregional Conservation Status of Endangered, Vulnerable or Rare;

- Removal of more than one hectare of vegetation in an Ecological Vegetation Class with Bioregional Conservation Status of Depleted or Least Concern;
- Any vegetation clearance on Crown Land or where a property vegetation plan applies to the site; or
- Any vegetation clearance where a Vegetation Protection Overlay applies to the site.

However Clause 52.17-1, stipulates that if the land in question incorporates a Native Vegetation Precinct Plan (NVPP), then it may be excluded from any further requirements of Clause 52.17. A NVPP sets out requirements for the protection and removal of native vegetation for a defined area or precinct in accordance with the principles of Net Gain, discussed above. The plan can form a component of a PSP with other development requirements. Under clause 52.16 a native vegetation precinct plan must:

- Specify the purpose of the plan.
- Specify the area to which the plan applies.
- Specify the native vegetation which can be removed, destroyed or lopped.
- Specify the native vegetation to be protected.
- Set out the conservation significance and status of the native vegetation to be protected, and the vegetation protection objective to be achieved.
- Set out the works, payments or other actions necessary to offset the removal, destruction or lopping of native vegetation.
- Relate the need for the works, payments or other actions to the proposed removal, destruction or lopping of native vegetation in the area.
- Provide for the procedures for the collection of any payments.

It is SMEC's understanding that an NVPP will be developed for the Greenvale South PSP area 23 in accordance with Clause 52.16 and in consultation with DSE. The NVPP will be incorporated into the City of Hume planning scheme and will replace the requirement to obtain a permit to remove native vegetation under Clause 52.17 of the planning scheme.

5.4 Wildlife Act 1975

The *Wildlife Act* forms the procedural, administrative and operational basis for the protection and conservation of native wildlife within Victoria. This Act often sits as the default reference for other associated legislation, and is basis for the majority of Wildlife permit/licensing requirements within the state. In accordance with this Act if any wildlife is located within vegetation proposed for clearing, salvage and translocation of such wildlife may be needed.

5.5 Port Phillip and Western Port CMA Native Vegetation Plan

The protection and enhancement of remnant native vegetation is recognised by the PPWPCMA as one of the most important land management issues in the region. The Native Vegetation Plan has been prepared to provide a strategic and co-ordinated approach to native vegetation retention and management across the region (PPWPCMA, 2006.) The plan sets out four directions to achieve the vision of the CMA. These tie

in with the directions outlined in *Victoria's Native Vegetation Management: A Framework for Action.* The four directions are:

1. Retain the quantity of native vegetation by minimising clearing;
2. Protect native vegetation with reservation and management agreements;
3. Maintain and improve the quality of native vegetation. and;
4. Increase the quantity of native vegetation.

Any development works that occur within the PPWPCMA jurisdiction must be cognisant of this Native Vegetation Management Plan.

5.6 Water Act 1989

Victoria's water allocation framework (*The Water Act 1989*) provides the basis for the management of Victoria's water resources. Under the Act, the state government retains the overall right to use, flow and control all surface water and groundwater on behalf of all Victorians. All water that is taken for consumptive use in Victoria is done so under the restrictions imposed by *The Water Act, 1989.* The Act exists to ensure that water requirements in the State of Victoria are provided for in a responsible and efficient way, and to ensure that water resources are conserved and properly managed for sustainable use for the benefit of present and future Victorians.

Within the Greenvale South PSP Area 23 there are no significant rivers, creeks or water bodies relevant to this act.

5.7 Environmental Protection Act, 1970: State Environmental Protection Policy (Waters of Victoria) 2003

The SEPP (Waters of Victoria) sets a statutory framework for the protection of the uses and values of Victorias fresh and marine water environments (EPA, 2003.) The *Environment Protection Act, 1970* requires the SEPP include:

- The uses and values of the water environment that the community and the government want to protect (known as beneficial uses);
- The objectives and indicators which describe the environmental quality required to protect beneficial uses;
- Guidance to CMA's coastal boards, water authorities, communities, businesses and local government and state government agencies to protect and rehabilitate water environments to a level where environmental objectives are met and beneficial uses are protected.

The SEPP recognises that human's use of Victoria's land and water resources has affected the health of the aquatic environment to such an extent that threatens the very features that make them valuable. The most imminent threats include excess nutrients, suspended solids, salinity, reduced environmental flows and altered flow regimes, heavy metals and oils, aquatic pests and other threats.

Within the Greenvale South PSP Area 23 there are no significant rivers, creeks or water bodies relevant to this act, however development within this PSP Area needs to be cognisant of the SEPP (Waters of Victoria).

5.8 Port Phillip and Westernport Regional Catchment Strategy

The Port Phillip and Westernport Regional Catchment Strategy (RCS) is an overarching document developed by the Port Phillip and Westernport CMA. It '*describes catchment assets and how they are interrelated. It indicates what needs to be done to manage and use the assets in a sustainable and integrated way, and outlines goals and priorities for the future. It focuses on improving environmental and catchment management while recognizing that, by helping resources to be managed more sustainably, it will contribute to society's present and future options for social and economic development. In this way, the RCS is much more than a geographic inventory of issues and proposed actions.'* (PPWPCMA 2004).

The Strategy identifies a number of catchment values such as biodiversity, water, land etc and risks to those values. For the purpose of this report we believe this document is too big to summarize here. However, we have endeavored to extract some of the identified risks to biodiversity that have relevance to the Greenvale South PSP area 23, including:

- BR1 - Loss and degradation of native vegetation through clearing and urban development;
- BR2 - Pest plants and animals;
- BR3 - Land and water management issues; and
- BR5 – Climate change (source PPWPCMA 2004).

In order to counter the above-mentioned risks, the Strategy identifies a number of objectives, listed as:

BO1 Achieve a net gain in the quantity and quality of indigenous vegetation.

BO2 Maintain the diversity of indigenous habitats and species in terrestrial, aquatic and marine environments.

BO3 Achieve sustainable populations of indigenous flora and fauna species.

BO4 Improve the connectivity and long-term security of indigenous habitats and species.

BO5 Encourage intelligent use of introduced flora and fauna species with minimal impacts on indigenous habitats and species (source PPWPCMA 2004).

Thus, in order to comply with the objectives of the Strategy, the PSP and subsequent NVPP should aim to address and plan for each of the above-mentioned objectives.

5.9 Port Phillip and Westernport Regional River Health Strategy

The Port Phillip and Westernport Regional River Health Strategy is one of ten strategies developed across Victoria to achieve key river health objectives for the State. It focuses on the importance of protecting and restoring ecologically important rivers and wetlands (Melbourne Water & PPWCMA).

The Port Phillip and Westernport Regional River Health Strategy identifies:

- waterway values (catchment based);
- threats to waterway values, and;
- actions to address these threats.

The strategy provides a five-year blueprint for Melbourne Water, the PPWPCMA, councils, community groups and environmental and industry associations to work together to improve our rivers and creeks. It forms an important part of the Port Phillip and Westernport Regional Catchment Strategy, which sets the framework for the overall coordination of natural resource management.

The Greenvale South PSP Area 23 is located within the Yarra Catchment (Melbourne Water and PPWCMA). This is a diverse catchment that includes major water storages supplying much of Melbourne's drinking water. The major river of relevance to the PSP area is Moonee Ponds Creek which runs south of Greenvale down through Tullamarine and joins the Yarra in West Melbourne. Overall the Creek is in poor condition except for areas within Woodlands Historic Park.

Development of the PSP should be cognisant of the River Health Strategy and aim to minimise any further impacts on Moonee Ponds Creek, and in fact aim to rehabilitate sections of the Creek.

6. Conclusions – Summary of Key Findings

Much of the Greenvale South Precinct Structure Plan Area 23 has largely been cleared for agricultural purposes with remnant native vegetation and fauna habitat predominately restricted to a number of patches of Plains Grassy Woodland North of Somerton Road, and a number of patches of Hills Herb-rich Woodland EVC, associated with properties in close proximity to Woodland Historic Park. The Precinct was found to contain 41 habitat zones of varying quality, many of which were of high conservation significance. All of these zones were to be found on properties within private ownership. The site also contains 78 Large and Very Large scattered indigenous trees, predominantly located within private property. Scattered trees range from recently regenerated saplings to mature River Red Gums over 200 cm in DBH.

Where remnant vegetation or scattered indigenous trees exist, potential development is constrained and must aim to conform to State and National legislation and policy.

6.1 Summary of Legislative issues

Although introduced understorey pasture species are a dominant feature of the study site, the site does contain attributes (eg. Habitat zones, mature indigenous trees) that provide suitable resources for some native plant and animal species, and that are likely to have implications for the potential development of this PSP area.

Strategic Vegetation Issues and potential implications include:

- The possible existence, and possible removal, of patches of the EPBC listed 'Natural temperate Grassland of the Victorian Volcanic Plain" and/or 'Grassy Eucalypt Woodland of the Victorian Volcanic Plain.' The EPBC Act states that any activity that may lead to a loss of these critically endangered ecological communities will require a referral under the EPBC Act. SMEC have recorded and mapped 24 habitat zones within Greenvale South that may match the criteria for EPBC Act referral.
- Although no EPBC listed flora species were identified during site visits to Greenvale South PSP Area, this is not a definitive argument for their absence from the site. As such, any of the EPBC listed species identified in this report have the potential to be impacted upon by development works within this PSP boundary, and any activities that will impact upon these species will require referral to the Federal Environment Minister.

6.2 Vegetation Issues in a Landscape Context

The widespread destruction of Plains Grassland and Plains Grassy Woodland throughout Victoria means that those patches still present in the landscape are crucially important to the continuing maintenance of these EVC's in the face of a range of threatening processes, including housing developments within Melbourne's Urban Growth Boundary. The role of these EVC's in supporting populations of threatened flora and fauna, including Golden Sun Moth and Striped Legless Lizard is well publicised, and every effort should be made to maintain and improve the long-term viability of these EVC's in the current landscape context.

The value of a patch of remnant vegetation in the landscape varies according to the size of a patch, the vegetation condition, the habitat hectares present and the context of that patch within the landscape.

'Context' refers to the proximity of one patch of vegetation to another and the distance of a particular patch to a 'core area'. In the case of the Greenvale South PSP area, the most significant core area is Woodlands Historic Park.

Within the PSP area, North of Somerton Road, the ecological effects of habitat fragmentation are greater than the southern reaches of the PSP Area. This is primarily due to the distinction in land use between these two zones of the PSP 23 Area. Individual parcels boundaries north of Somerton Road are larger in size, hence are more conducive to larger scale and more intense agricultural practices. This has had a marked impact on the extent and quality of native vegetation. Widespread vegetation clearance has lead to the remnant patches being completely discontinuous with Woodlands Historic Park.

South of Somerton Road, the land parcels are substantially smaller in size, in particular those lining Carroll lane, Providence Road, and the southern reaches of Mickleham Road. Typically, these are no larger than 4 hectares. Consequently, their utility as agricultural land has been limited and the vast majority of parcels are used for residential purposes. This has resulted in less widespread native vegetation clearance on these properties, and many remnant scattered trees remain, providing a more continuous link with Woodlands Historic Park. As such, the ecological functionality of these patches of vegetation is likely to be higher than those North of Somerton Road.

Potential negative impacts to the remnant vegetation within the Greenvale PSP Area 23 include:

- Habitat fragmentation i.e. further isolation of extant 'patches' of indigenous vegetation;
- Habitat removal eg. native vegetation and associated habitat features such as logs and ground debris that provide potentially suitable resources for reptiles, birds and small arboreal mammals;
- The removal of mature trees (native and exotic) that provide foraging, nesting and roosting resources for common native fauna species;
- An increase in the cover and abundance of exotic species which can alter indigenous vegetation structure and quality;
- Modification to the drainage of the site that may lead to indirect habitat degradation;
- The introduction of urban activities which have the potential to result in stormwater contamination and the subsequent deterioration of surrounding soils and surface water. Uncontrolled runoff can also lead to eutrophication of waterways, decreases in aquatic biodiversity and terrestrial and aquatic weed invasion; and
- Increases in the area of hard surfacing resulting in increased runoff, nutrient levels and sediment movement, particularly during the construction phase.

Positive impacts that may occur (but are dependent upon the final precinct design) include:

- Improvement to existing linear road-side reserves / linkages within the site, and;
- Retention and improvement of habitat zones representative of the EVC's observed in the precinct area.

6.3 Recommendations

Key recommendations for Precinct Area 23 are centred on improving landscape function and include retaining higher value native vegetation, reducing stormwater, utilizing existing native remnants for passive recreation and through the creation of ecological links through targeted revegetation works.

In total SMEC has made a number of recommendations, these include:

- Retain patches of vegetation which have high ecological value, and that are representative of the best quality native vegetation within the site.
- Retain as many Very Large Old Trees of high and medium conservation significance and Large Old Trees of high conservation as possible. Where feasible these should be incorporated into Public Open Space, offset sites or biodiversity corridors.
- Further targeted flora surveys are required to determine the presence of State and Nationally listed threatened species and the associated permit or referral requirements. In particular, the following species should be targeted: River Swamp Wallaby-grass, Curly Sedge, Clover Glycine, Plains Rice-flower, Maroon Leek-orchid, Large-fruit Fireweed, Matted Flax-lily, Pale Swamp Everlasting, Slender Tick-trefoil, Leafy Greenhood, Purple Blown-grass, Pale-flower Cranes-bill, Large-flower Crane's-bill, Spotted Gum, Austral Moonwort, Rye Beetle-grass, Native Peppercress, Basalt Peppercress, Short-bristle Wallaby-grass, Rough-grain Love-grass, and Austral Crane's-bill.
- A detailed NVPP should be developed in conjunction with the GAA, DSE and Hume Shire Council that complies with the Planning and Environment Act and DSE's Native Vegetation Framework.
- Establishment of a vegetation buffer around Woodlands Historic Park to minimise increases in risks to the parks biodiversity values associated with urban encroachment.
- Improvement to existing linear road-side reserves / linkages across the Precinct, particularly focusing on a system of North-South and East-West corridors. For example, along Somerton Road between Woodlands Historic Park and Greenvale Reservoir and along the western border of the PSP.
- Improvement and re-establishment to riparian vegetation corridors, in particular a link between the Yuroke and Mooney ponds Creeks;
- Retention and habitat improvement to areas representative of both the EVC's observed in the precinct area, and
- Where vegetation removal is permitted, offset planning should endeavour to offset into a smaller number of larger reserves rather than many small reserves. These reserves should be planned to use existing remnants and should be spatially discrete to create a series of 'stepping stone parks' within the PSP area. Ideally, these should be joined through vegetation corridors and linked to Woodlands Historic Park through roadside vegetation or newly established vegetation corridors.

Part 3: Fauna Survey and results

1. Details of the Study Area

1.1 Assessment Area

The Greenvale South PSP area covers an area of approximately 278ha, and is contained within the Port Philip and Western Port Catchment Management Authority (PPWPCMA) boundary. The site is bordered to the east by Mickleham Road, to the west by Woodlands Historic Park (a state-significant biosite), and to the North and South by privately owned property. The PSP Area 23 overlies Quaternary volcanics and shallow reddish brown heavy clays with thick loamy topsoil.

Much of the land within this PSP area has been extensively cleared, and is considered 'improved pasture' dominated by introduced pasture grass species such as Toowoomba Canary Grass *Phalaris aquatica.* Remnant vegetation is largely restricted to scattered trees and small patches of remnant vegetation contained within properties lining Providence Road, and within properties sharing a boundary with Woodlands Historic Park.

This precinct is currently zoned as an Urban Growth Zone (UGZ), and contains no overlays.

2. Methods

This section details the methods used throughout the fauna assessment.

2.1 Background Dataset Literature Review

Historic Fauna records from PSP Area 23 (with a 5km buffer) were assessed via a literature and database review. In order to undertake this assessment the following data and information sources were reviewed and analysed (supplied by the GAA, the Department of Sustainability and Environment (DSE) and the Department of Environment, Water, Heritage and the Arts (DEWHA)):

- *EPBC Act* Protected Matters Search Tool;
- Threatened fauna record data (from the Atlas of Victorian Wildlife); and
- Golden Sun Moth *Synemon plana* (Lepidoptera: Castniidae): results of a broad survey of populations around Melbourne (Gilmore *et al.* 2008)

2.2 Field Survey

SMEC undertook a fauna field assessment of the entire Greenvale South PSP area between October and December, 2009. It should be noted that fauna surveys were conducted only for Golden Sun Moth and Growling Grass Frog. No other reptile or mammal surveys were conducted due to timing constraints as instructed by the GAA. The field survey aimed to validate the findings from the background literature and database review as well as identify and record new fauna species. The field survey generally followed the *Biodiversity Guidelines (*Vic Roads 2000) and where specifically required the '*Flora, Fauna, and Habitat Hectare Assessment Model – Precinct Planning*' (DSE, 2008).

2.2.1 Golden Sun Moth *Synemon plana* survey

Field surveys for the Golden Sun Moth (GSM) were undertaken between October and December 2009; the known flight season for GSM. Weather conditions were regularly monitored using the Bureau of Meteorology website and only days that were considered suitable for encouraging male flight were surveyed. Surveys were only undertaken on days exceeding 20°C, lacking cloud cover and rain, and when the level of wind was minimal. Surveys were also conducted during the peak diurnal period of 10am- 4pm. Each site was visited up to a maximum of four times to determine the presence of the species. Once identified on site, the GSM was considered present and no further surveys were undertaken. If at the end of four surveys the species was not identified on site, it was considered absent for this survey period. Multiple sampling events allowed for an increase the probability of detection where there is local variability of adult emergence within the November-December flight period. Where possible, repeat site visits were spread evenly across the period and were at least a week apart. Craigieburn Grasslands Reserve was utilised periodically as a reference site for moth activity.

Survey transects were conducted on foot with minimum 2 people spaced 15 -20m apart. Each site has sufficient number of transects to adequately cover each land parcel. Total moth numbers and sex were recorded along with total search time taken for each land parcel.

2.2.2 Growling Grass Frog *Litoria raniformis* survey

Survey methods for the Growling Grass Frog were based on '*Flora, Fauna, and Habitat Hectare Assessment Model – Precinct Planning*' provided by DSE and the GAA, and successful methods previously undertaken by SMEC staff to survey the Mickleham PSP Areas for Growling Grass Frog. These methods are summarised below:

- Surveys to be undertaken by an experienced and qualified herpetologist;
- Survey time: ideal period is during mating season as male calls (October – November - depends on seasonal conditions and can extend into Dec in a good year). Surveys can extend into February for spotlighting and Diurnal surveys;
- Nocturnal survey at night (true dark) only under suitable weather conditions *i.e*. > 15^{o}C, with little or no wind and preferably after rain.
- SMEC undertook 3 90 minute visits to the only water body within this PSP area- a farm dam located in the most North eastern property of the PSP Area. Spotlighting and listening for calls (under above conditions) are required to ensure a high probability of detecting the Growling Grass Frog;
- Diurnal surveys were conducted during daylight for tadpoles and metamorphs in areas of standing water including netting and fish traps (fish traps should be set for a number of nights - up to four nights). SMEC did not use fish traps to survey Growling Grass Frog as this is outside current experience and permit approvals; and
- SMEC also used call playback response to detect adults.

SMEC utilised Craigieburn Grassland Reserve as a reference site for Growling Grass Frog which was visited 4 times throughout the survey period from 24th November 2008 to 13th January 2009.

3. **Limitations of the Project**

This section highlights the limitations of the project.

- At the time of the field survey, SMEC were unaware that the data collected was intended to be used for an impact assessment report or detailed ecological report. Therefore no photographs or detailed site descriptions are included within this report.
- During fieldwork, SMEC was not asked to assess or map potentially valuable habitat, and as such, this report does not adequately deal with the issue of valuable faunal habitat across the PSP region. SMEC was asked only to survey for species themselves, not assess the presence or absence of suitable faunal habitat such as stony rises and other indicative habitat types.
- SMEC conducted fauna assessments for two threatened species- Golden Sun Moth and Growling Grass Frog. No specific surveys were conducted for any of the remaining threatened species identified as having potential to occur in the area. Prior to the development of the site further surveys to establish the presence of threatened fauna are recommended.
- SMEC did not have access to all properties within PSP Area 23.

4. Fauna Assessment Results

This section presents the findings from the ecological assessment.

4.1 Summary of fauna records from the current assessment.

During the field survey, fauna observed, encountered or detected using indirect means were noted and are subsequently presented in Table .

Table 5: Fauna species recorded within the Greenvale South PSP Area between October and December, 2008.

Common Name	*Scientific Name*
Birds	
Australian Wood Duck	*Chenonetta jubata*
Pacific Black Duck	*Anas superciliosa*
Australian Magpie	*Gymnorhina tibicen*
Crested Pigeon	*Ocyphaps lophotes*
Common Bronzewing	*Phaps chalcoptera*
*Spotted Turtledove	**Streptopelia chinensis*
*Domestic/Rock Pigeon	**Columba livia*
Galah	*Cacatua roseicapilla*
Sulphur Crested Cockatoo	*Cacatua galerita*
Rainbow Lorikeet	*Trichoglossus haematodus*
Musk Lorikeet	*Glossopsitta concinna*
Eastern Rosella	*Platycercus eximius*
Laughing Kookaburra	*Dacelo novaeguineae*
Noisy Miner	*Manorina melanocephala*
Superb Fairy-wren	*Malurus cyaneus*
Red Wattle Birds	*Anthochaera carunculata*
New Holland Honeyeater	*Phylidonyris novaehollandiae*
White Plumed Honeyeater	*Lichenostomus penicillata*
Yellow-faced Honeyeater	*Lichenostomus chrysops*
Grey Butcherbird	*Cracticus torquatus*
Australian Raven	*Corvus coronoides*
*House Sparrow	**Passer domesticus*
*Indian Mynah	**Acridotheres tristis*
*Common Starling	**Sturnus vulgaris*
Mammals	
European Rabbit	*Oryctolagus cuniculus*
Amphibians	
Spotted Marsh Frog	*Limnodynastes tasmaniensis*
Common Toadlet	*Crinia signifera*

**Indicates exotic species*

4.2 Golden Sun Moth surveys

An assessment of the potential of the PSP area to support Golden Sun Moth habitat was held in consultation with Alan Webster from DSE. It was determined that the entire PSP area should be subject to survey. Surveys for the Golden Sun Moth were conducted in accordance with the methods outlined in section 2.2. Surveys were conducted between 17th of November and the 23 January 2009 to coincide with the peak adult flight period for the species. The field survey program followed is summarised by the followed survey periods:

- 17th – 21st November
- 24th -28th November
- 8th-12th December
- 22nd – 24th December 2008
- 19th – 23rd January 2009

Craigieburn Grasslands Reserve (CGR) was used as a reference site to determine the likelihood of moth's flight period for the Greenvale PSP site given its proximity and landscape context. Table below shows the details of reference site visits to CGR.

Table 6- Golden Sun Moth records within Craigieburn Grasslands Reserve between October 2008, and January, 2009.

Date	Time	*Approx. Numbers Observed*	*Sex*
12.11.2008	11.00am	20+	Multiple Males 2 Females
4.12.2008	11.30am	35+	30+ Males 5 Females
27.12.2008	11.30am	7	Males only
13.01.2009	2.30pm	12	Males only
21.01.2009	2.00pm	5	3 males 2 females

A total of 9 new records for the species were found in Greenvale South PSP Area 23 (see Table , below), which were all located within parcels north of Somerton Road. These all appeared to be associated with what could be described as a single relic population. New records and localities confirm that the species is not restricted to areas dominated by Wallaby grass *Austrodanthonia* sp. and that they may in fact use non-indigenous host plants. Moths were also recorded in areas that were subject to heavy grazing activity. Observations of individual males resting on vegetation showed some variation in size suggesting further research is required to determine whether this phenomenon is naturally occurring or an artefact of environmental change, for example, relating to the quality and suitability of host plant species.

Table 7- Golden Sun Moth records within the Greenvale PSP Area 23 between October and December, 2008.

Date	Site Visit No.	Time of day	*Total Search Time*	*Number observed*	*Sex*	*Location Centre (Decimal Degrees)*	
						Easting	*Northing*
19.11.2008	1		20min	1	Male	144.879737	-37.633809
11.12.2008	1	11.30am-10.40am	10min	1	Male	144.879246	-37.624585
11.12.2008	1	11.10am-12.00am	50min	4	Males only	144.879594	-37.625342
11.12.2008	1	12.15pm- 1.05pm	50min	50+	Flying males, only one Female observed mating	144.878776	-37.626385
11.12.2008	2	1.05pm – 1.20pm	15min	5	Males only	144.877487	-37.626283
11.12.2008	1	1.25pm – 1.40pm	15min	17	16 Males, 1 Female	144.880780	-37.626344
11.12.2008	1	1.45pm – 2.10pm	25min	14	Males only	144.881925	-37.626569
11.12.2008	1	2.15pm – 2.35pm	20min	2	Males only	144.880985	-37.627203
11.12.2008	1	2.20pm – 2.50pm	30min	4	Males only	144.878980	-37.627530

Historic land practices in the form of physical soil disturbance are likely to play a major role in the current distribution of the Golden Sun Moth. New records collected suggest that variable levels of grazing, both from cattle and sheep, are tolerated providing that the timing and extent of grazing has not significantly impacted on tussock formation. These surveys also confirm that Golden Sun Moths are also capable of surviving in small restricted patches of suitable habitat within a largely disturbed landscape.

Figure 2.1 displays areas of high faunal habitat for Golden Sun Moth. This encompasses the grassland habitat within which GSM records were obtained. It should be noted here that the understorey vegetation structure at the time of the survey was uniform across the most land parcels north of Somerton road, however Golden Sun Moth were only observed in a small, discrete population. This means that although they were not observed across all parcels, the entire northern section of this PSP area could be classified as having the potential to support populations of the species.

4.3 Growling Grass Frog Surveys

Inspection of the PSP area for suitable Growling Grass Frog habitat determined that only the far northern extent of the PSP Area should be subject to field survey. The majority of farm dams interspersed across the PSP area that would normally represent potential Growling Grass Frog sites were found to be completely dry at the time of survey. Those dams that still contained water exhibited very poor quality condition with little or no fringing or emergent vegetation. Other land parcels supporting water bodies existed as either swimming pools or ornamental garden water features and lacked both a recognisable habitat structure and obvious connectivity with any known site for the species. As such, Survey for the Growling Grass Frog was only conducted at one site that existed as a full farm dam with minimal fringing vegetation and with what appeared to be good water quality. This was situated within the most North-eastern parcel of land in the precinct area. This site only contained water post Christmas and was dry prior to this time. The survey was conducted on the 13th and 21st of January using methods outlined in section 9.2. No adult or juvenile frogs were found during this survey.

4.4 Study of Database Records from within the study area

A range of species of conservation significance were identified as occurring, or have the potential to occur within the Study area.

4.4.1 National (EPBC Act listed) Species

The only EPBC Act listed species recorded during the current assessment of PSP Area 23 was Golden Sun Moth, however 12 threatened fauna species, and 13 migratory species were highlighted as having the potential to occur within and surrounding PSP area 23.

Table presents the outcomes of this search.

A number of species identified by the search tool can be immediately discounted because of their known fauna distribution within the state or their individual habitat requirements. Species in this category include the Spotted-tailed Quoll *Dasyurus maculatus maculatus* and the Smoky Mouse *Pseudomys fumeus* which are typically associated with intact wet and dry sclerophyll forests of East Gippsland and the Otways. The Smoky Mouse is also found in the Grampians. Similarly the Southern Bent-wing Bat *Miniopterus schreibersii*

bassanii is an obligate cave roosting species. It has a known distribution ranging from around Colac in Victoria to as far west as the Flinders Ranges in South Australia. It roosts during the winter months throughout periods of low resource availability in over wintering caves. The species breeds only in caves where the combination of heat and humidity are suitable for nursing young bats. Only two active maternity caves are known to exist being Bat Cave at Naracoorte, and Starlight Cave at Warrnambool.

A number of terrestrial and wetland migratory species were previously identified and include the Great Egret *Ardea alba* and Cattle Egret *Ardea ibis*. Habitat resources for these species are limited although the Cattle Egret has the potential to occur intermittently across the study site.

Similarly, wetland species of conservation significance including the Painted Snipe *Rostratula benghalensis*, and Latham's Snipe *Gallinago hardwickii*, have either extremely limited or no habitat occurring within the study area.

Water bodies, primarily of sufficient depth that occurred as farm dams, were not of adequate quantity and/or quality to support these species on a regular basis.

Table 8- EPBC listed species with the potential to occur in PSP Area 23.

Species	Latin Name	EPBC Status
Birds		
Regent Honeyeater	*Anthochaera phrygia*	Endangered
Swift Parrot	*Lathamus discolor*	Endangered
Australian Painted Snipe	*Rostratula Australis*	Vulnerable
Frogs		
Growling Grass Frog	*Litoria raniformis*	Vulnerable
Insects		
Golden Sun Moth	*Synemon plana*	Critically Endangered
Mammals		
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	Endangered
Eastern Barred Bandicoot	*Perameles gunnii*	Endangered
Smoky Mouse	*Pseudomys fumeus*	Endangered
Grey-Headed Flying Fox	*Pteropus poliocephalus*	Vulnerable
Ray-finned fishes		
Eastern Dwarf Galaxias	*Galaxiella pusilla*	Vulnerable
Australian Grayling	*Prototroctes maraena*	Vulnerable
Reptiles		
Striped Legless Lizard	*Delma impar*	Vulnerable
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	Endangered
Migratory Terrestrial Species		
White-bellied Sea Eagle	*Haliaeetus leucogaster*	Migratory
White-throated Needletail	*Hirundapus caudacutus*	Migratory
Rainbow Bee-eater	*Merops ornatus*	Migratory
Satin Flycatcher	*Myiagra cyanoleuca*	Migratory
Rufous Fantail	*Rhipidura rufifrons*	Migratory
Regent Honeyeater	*Xanthomyza phrygia*	Migratory

Migratory Wetland Bird Species		
Great Egret	*Ardea alba*	Migratory
Cattle Egret	*Ardea ibis*	Migratory
Lathams Snipe	*Gallinago hardwickii*	Migratory
Painted snipe	*Rostratula benghalensis*	Migratory
Migratory Marine Birds		
Fork-tailed swift	*Apus Pacificus*	Migratory
Great Egret	*Ardea alba*	Migratory
Cattle egret	*Ardea ibis*	Migratory

4.4.2 State Significant Species

One FFG Act and VROT fauna species was recorded during the current assessment, however a total of 4 VROT and 3 FFG Act listed fauna species have previously been recorded from within and surrounding PSP Area 23. Table presents the outcomes of this search.

Table 9- Victorian Rare or Threatened Fauna Species listed as occurring in the Greenvale South PSP Area 23.

Species	Scientific Name	VROT Status	FFG Status	EPBC Status
Musk Duck	*Biziura lobata*	Vulnerable		
Blue-billed Duck	*Oxyura australis*	Endangered	FFG Listed	
Eastern Barred Bandicoot	*Perameles gunnii*	Critically Endangered	FFG Listed	Endangered
Golden Sun Moth	*Synemon plana*	Endangered	FFG Listed	Critically Endangered

4.5 Summary of Habitat Types within the Study Area

A key limiting factor for fauna presence and distribution is the provision of habitat within the Precinct. An indicator of habitat availability is the presence/absence of EVC's. Although a specific or individual EVC by itself is a poor indicator for presence or absence of fauna species, its presence can provide at least some indication of the potential habitat availability and the fauna species it may support. Over the whole precinct are a number of patches of recognised EVC's of varying size and quality. Most of the remnant EVC's are restricted to patches of Plains Grassy Woodland North of Somerton Road, and Hills Herb-rich Woodland associated with Woodlands Historic Park in the southern reaches of the precinct. The close proximity of the PSP Area to Woodlands Historic Park provides significant off-site habitat for many fauna species.

Habitat values for fauna species are variable, limited and disjunct. Much of the area is modified, occurring primarily as improved pasture which limits the availability of fauna habitat within the PSP area. These areas do however contain isolated scattered trees that are likely to be primarily utilised during spring/summer by breeding hollow dependent birds. Hollow bearing trees within close proximity to other core native habitat are also likely to provide habitat for arboreal mammals, however further investigation is recommended to

confirm this. The diversity of terrestrial species presence within the site is considered limited and is likely to be an artefact of historic clearance, disturbance, grazing and introduced predator pressure.

Core fauna habitat within the landscape primarily includes the Woodlands Historic Park and remnant patches associated with it. Much of the surrounding linear roadside reserves are not capable of sustaining permanent resident populations in the absence of such core areas.

Key fauna habitat- Grassland has been mapped across a number of parcels North of Somerton road, in conjunction with a large number of Golden Sun Moth recorded during the current field survey. (see Appendix F, Figure 2.1 and 2.2). This classification as key fauna habitat is often at odds with the EVC mapping (See Appendix E, figure 1.1 and 1.2); however SMEC's experience during the current survey period showed that Golden Sun Moth records were linked to vegetative structure, rather than species composition. That is, tussock forming grass species, including introduced graminoids such as Phalaris, were as likely to support populations of Golden Sun Moth as native species such as Wallaby-Grass. Thus the process of mapping 'key fauna habitat' for this species is difficult for the Greenvale PSP Area 23. SMEC have mapped Key Fauna Habitat- Grassland in areas immediately surrounding current Golden Sun Moth records. It is however important to comment on the continuity of the vegetative structure across all properties North of Somerton Road. Tussock-forming grasses are dominant, and are comprised primarily of introduced species including Phalaris and *Nassella* sp. This vegetative structure, and species composition is consistent across most land parcels North of Somerton Road, hence this area is mapped as having the potential to be Key Fauna Habitat- particularly in relation to Golden Sun Moth populations.

There is a major shift in the primary land use from agricultural to residential in land parcels south of Somerton road, and a corresponding reduction in the extent of areas mapped as "Key Faunal Habitat". Most of the land parcels in this area are utilised for residential housing, and as such, are dominated by a variety of introduced ornamental species. The exception to this being properties adjoining Woodlands Historic Park: those lining Mickleham and Providence Roads. Remnant overstorey vegetation comprising Grey box and River Red Gum form a continuous canopy with Woodlands Historic Park, hence providing effective faunal habitat for avian and arboreal species. The significance of this vegetation in a regional context is high given the lack of comparable vegetation throughout the City of Hume.

4.6 Description of Key Species recorded during the current assessment or considered likely to be present

Species that are considered to have a moderate – high likelihood of occurrence within the precinct are discussed in more detail below.

4.6.1 The Grey-headed Flying Fox *Pteropus poliocephalus*

The Grey-headed Flying Fox *Pteropus poliocephalus is* currently listed as vulnerable in both Victoria and the Commonwealth. This species has colonised areas in and around Melbourne taking advantage of year round supplies of non-indigenous flowering trees, and horticultural fruit tree plantations. Individuals are known to forage up to 60km from their roost camps. In 2003 animals were relocated from the Royal Botanic Gardens in Melbourne to Yarra Bend Park, Melbourne, and Eastern Park, Geelong. Numbers within roost camps naturally fluctuate in response the natural flowering patterns with numbers normally peaking in Victoria during spring/summer. Animals from the Eastern Park population are known to forage 20-30km from the roost camps (CGG 2008). It should be recognised that native woodland remnants that occur within the study area possibly provide intermittent blossom and nectar resources for the species and

therefore may be significant for any local populations that may occur within the Greenvale South PSP area. These remnant woodlands are located within the immediate vicinity of Woodlands Historic Park particularly along Mickleham and Providence Roads, and in a small number of parcels North of Somerton Road. This is mapped in Key Fauna Habitat- Woodland in Figure 2.1 and 2.2 in Appendix F.

4.6.2 Growling Grass Frog *Litoria raniformis*

This species is currently listed as Vulnerable under the EPBC Act, threatened under the FFG Act and considered Endangered in the Advisory List of Threatened Vertebrate Fauna in Victoria – 2007. The species has undergone a dramatic decline in the northern and north-eastern plains of Victoria; however significant remnant populations are known to occur in the greater Melbourne area, and in the south-east, north-west and central regions of Victoria. The species inhabits a wide range of permanent to semipermanent waterbodies across its range, including lagoons, swamps, lakes, ponds, farm dams, irrigation channels and quarries, as well as slow-flowing sections of streams and rivers. The preferred pH range for amphibians is generally considered optimum between pH 6.5-7.5. Some Australian amphibian species and others worldwide, show a degree of tolerance to lowered (acidic) pH conditions, whereas levels of pH 9.5+ (alkaline) may not be tolerated. Low pH has been shown to only prolong larval development where high pH produced deformed hatchlings (Glos *et. al.* 2003). The tolerance of variable water quality is also likely to be dependent upon the species. Generally the specific range of tolerance for many species is unknown, including that of the Growling Grass Frog. Presence and absence in particular areas are likely to be attributed to a combination of factors (mostly anthropological) and outside what would be considered normal natural environmental variation. Definitive determination of Growling Grass Frog presence is important for two reasons: Firstly to locate the presence of a local viable population, and secondly to ensure that development planning allows adequate movement of animals within the modified landscape to secure long term viability. Potential fauna habitat within PSP Area 23 was restricted to a farm dam on private property in the far north of the PSP area. Subsequent surveys did not record any individuals.

4.6.3 Regent Honeyeater *Xanthomyza phrygia*

The Regent Honeyeater is currently listed as Endangered under the EPBC act, listed under the FFG Act and considered Critically Endangered on the Advisory List of Threatened Vertebrate Fauna in Victoria – 2007. This species mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Individuals are also found in drier coastal woodlands and forests but this is dependent upon the timing of eucalypt blossoms. The species typically requires regions with large numbers of mature trees, high canopy cover and an abundance of mistletoe, and feeds mainly on nectar from a wide range of species include Mugga Ironbark, Yellow Box *Eucalyptus melliodora*, Blakely's Red Gum *Eucalyptus blakelyi*, White Box *Eucalyptus albens* and Swamp Mahogany *Eucalyptus robusta*. Other native indigenous and non-indigenous species such as Grey Box, Grey Gum *Eucalyptus longirostrata*, Red Box *Eucalyptus polyanthemos*, Narrow-leaved Ironbark *Eucalyptus crebra*, Apple Box *Eucalyptus angophoroides*, Red Stringybark *Eucalyptus macrorrhyncha*, Spotted Gum *Corymbia maculata* and Silvertop Stringybark *Eucalyptus sieberi* are also utilised, with the nectar and fruit from Stalked, Drooping and Needle-leaf mistletoes often eaten during the breeding season. Lerp and flowers from other plants are also eaten when nectar is scarce. Insects make up about 15% of the total diet and are important components of the diet of nestlings. A shrubby understorey is an important source of insects and nesting material. There are only three known key breeding regions remaining: north-east Victoria (Chiltern, Wodonga), and in NSW at Capertree Valley and the Bundarra-Barraba region (DEWHA, 1999). Key habitat for this species within PSP Area 23 is limited to the Grey Box dominated woodlands associated with the occurrence of Hills Herb-rich Woodland. This is found on Parcels south of Somerton Road, in close proximity to Woodlands Historic Park.

4.6.4 Swift Parrot *Lathamus discolor*

The Swift Parrot is currently listed as Endangered under the EPBC act, listed under the FFG Act and considered Endangered in the Advisory List of Threatened Vertebrate Fauna in Victoria – 2007. It is a migratory species, breeding in Tasmania during spring and summer, then migrating north during autumn and winter to mainland south-eastern Australia including Victoria and the eastern parts of South Australia to south-east Queensland. Overwintering habitat preferences includes open forest, woodland, orchards and gardens, and mainly occur in areas containing winter-flowering eucalypts, or where there are abundant lerp infestations. Birds appear most years in north-east Victoria along the Hume Highway corridor, associated with Grey Box and Blakely's Red Gum in April/May, then disperse into adjacent box-ironbark habitats. Other trees commonly utilised by the species include Swamp Mahogany *Eucalyptus robusta,* Spotted Gum *Corymbia maculata*, Red Bloodwood *Corymbia gummifera*, Mugga Ironbark *Eucalyptus sideroxylon* and White Box *Eucalyptus albens*. Foraging in lerp infested trees typically include Grey Box *Eucalyptus macrocarpa, Eucalyptus moluccana*, and Blackbutt *Eucalyptus pilularis.* The species is known to inhabit numerous catchment areas, including the Lower Murray/Darling, Murray and Murrumbidgee Rivers. Key habitat for this species within PSP Area 23 is limited to the Grey Box dominated woodlands associated with the occurrence of Hills Herb-rich Woodland. This is found on Parcels south of Somerton Road, in close proximity to Woodlands Historic Park.

4.6.5 Golden Sun Moth *Synemon plana.*

The Golden Sun Moth is currently listed as Critically Endangered under the EPBC Act, threatened under the FFG Act and Endangered in the Advisory List of Threatened Vertebrate Fauna in Victoria – 2007. This species has been the subject of recent survey work to establish the location of remnant populations within the Craigieburn and Laverton areas. It was previously thought that local populations were heavily reliant upon patches of remnant Wallaby Grass and to a lesser extent Spear Grass and Kangaroo Grass. However, recent work has found this species in areas containing high levels of exotic grasses (e.g. *Nassella* sp.) which are often a component of remnant native grasslands (A Webster pers. comm.). Given that the Golden Sun Moth spends the majority of its lifetime (~90 %) in larval form underground, periodic grazing of grassland habitat does not necessarily eliminate the species from a site. For areas that are continuously exposed to frequent heavy grazing the Golden Sun Moth is likely to have significantly reduced availability of suitable ovipositing sites which may affect larval survivorship. Both this, and continuous soil disturbance through ripping, tilling, and cultivation are the likely cause of local extinctions for the species in many areas of greater Melbourne. Areas exposed to this type of activity, which can only be assessed by site visits, can be justifiably excluded from survey. Therefore all areas that contain remnant native grassland and/or exotic grass species should be surveyed for this species during the 6-8 week peak flight period during November/December. This should be conducted independently despite the absence of previous records, and lack of extent of native vegetation or any other recognised biodiversity asset within the region. Suitable habitat for this species within PSP Area 23 is restricted to patches of Plains Grassy Woodland, recorded North of Somerton Road. Numerous moths were recorded within those patches mapped as Key Faunal Habitat- Grassland as indicted in Figure 2.1, Appendix F.

4.6.6 Striped Legless Lizard *Delmar impar*

This species is currently listed as Vulnerable under the EPBC Act, threatened under the FFG Act and considered Endangered in the Advisory List of Threatened Vertebrate Fauna in Victoria – 2007. The Striped Legless Lizard appears to be strongly associated with lowland native grassland habitats. This type of habitat is critical to the survival of local populations, therefore the identification and location of all populations is essential for planning a Recovery Action Plan for this species and to ensure appropriate management and

long term survival. Target areas for survey should include suitable habitats in remnant grassy Woodland patches, and areas with outcropping along the escapements and/or stony rises. Potential habitat is extremely limited for this species within PSP Area 23, due to an almost complete absence of escarpments and stony rises, and the intensive grazing regimes supported by many properties North of Somerton Road. That said there is potential for the species to occur in those patches mapped as Key Faunal Habitat- Woodland and Key Faunal Habitat- Grassland in Figures 2.1 and 2.2 of Appendix F.

4.6.7 Grassland Earless Dragon *Tympanocryptis pinguicolla*

The Grassland Earless Dragon is listed as Endangered under the EPBC Act, threatened under the FFG Act, and recognised as Critically Endangered in the Advisory List of Threatened Vertebrate Fauna in Victoria – 2007. This species is known from only 5 recent records between 1988 and 1990. Survey efforts using the DSE ratified methods should ideally be conducted from February through to April to coincide with peak juvenile activities and dispersal. Survey effort using the current accepted detection methods of spider burrows in conjunction with pitfall trapping and observation should target all areas of remnant native vegetation, as well minor rocky grassland escarpments and depressions associated with existing water bodies and natural drainage lines. Potential habitat for this species is also extremely limited within PSP Area 23, due to the absence of rocky escarpments and natural drainage lines. There is slight potential for the species to occur in those patches mapped as Key Faunal Habitat- Woodland and Key Faunal Habitat- Grassland in Figures 2.1 and 2.2 of Appendix F.

5. Conclusions – Summary of Key Findings

Much of the Greenvale South Precinct Structure Plan Area 23 has largely been cleared for agricultural purposes with remnant native vegetation and fauna habitat predominately restricted to a number of patches of Plains Grassy Woodland North of Somerton Road, and a number of patches of Hills Herb-rich Woodland EVC associated with properties in close proximity to Woodland Historic Park. The Precinct was found to contain 41 habitat zones of varying quality and 78 Large or Very Large scattered indigenous trees. Habitat zones and scattered indigenous trees represent the predominant fauna habitat within the Greenvale South PSP area.

SMEC undertook detailed surveys for the Golden Sun Moth and the Growling Grass frog during the optimal sampling period for these species. No new records for the Growling Grass Frog were observed, however, it should be recognised that at the time of survey Victoria was experiencing an extended period of drought which significantly reduced the amount of suitable habitat and is likely to have resulted in a significant retraction in the distribution of this species. During periods of higher rainfall it is possible this species will utilise habitat resources available within the PSP area. Presence and absence in particular areas are likely to be attributed to a combination of factors (mostly anthropological) and outside what would be considered normal natural environmental variation. Definitive determination of Growling Grass Frog presence is important for two reasons: Firstly to locate the presence of a local viable population, and secondly to ensure that development planning allows adequate movement of animals within the modified landscape to secure long term viability. Surveys concluded that there was no viable local population of Growling Grass Frog.

Nine new observations of the Golden Sun Moth were recorded and included observations of single individuals to observations of >50 individuals. As a result of the Golden Sun Moth survey, it could be concluded that:

- The occurrence of Golden Sun Moth can be found in areas currently subjected to grazing by livestock but that it appears these land parcels have historically had relatively minor disturbance and low-intensity grazing;
- Moths were generally not found on parcels dominated by introduced grass species (not including *Nassella* sp.);
- Moths persisted in areas that retained native grassland species that exhibited variable degrees of invasion from weedy species (predominately *Nassella sp.*, Phalaris, Cats ear and Ryegrass.);
- On parcels where moths occurred, there appeared to be a consistent 'inter – tussock' space irrespective of vegetation height or current level of grazing. Similarly, moths were absent in areas lacking inter tussock space, irrespective of plant species composition;
- Moths were not recorded amongst native or exotic revegetated areas (windbreaks of cypress pine or recently planted indigenous or non- indigenous native plants) and urbanised (housing subdivision) areas despite these being adjacent to relatively intact core remnant vegetation patches (i.e. Woodlands Historic Park)

5.1 Strategic Fauna Issues within the Greenvale South PSP area 23

Although introduced understorey pasture grass species are a dominant feature of the Precinct Structure Plan Area 23, the site does contain faunal attributes likely to have implications for the proposed future development. These attributes generally overlap habitat zones and scattered indigenous trees, however, in

the case of the Golden Sun Moth this may also include areas dominated by an introduced grass, *Nassella* sp.

It is important to note that conclusions can only be drawn regarding the two species that SMEC actively surveyed for and our general knowledge of the PSP area. Based on the limited survey completed by SMEC, the major implication for the development of the precinct relates to the presence of known and recorded populations of Golden Sun Moth. Given the classification of Golden Sun Moth as being a species of National Environmental Significance, an action that is likely to impact upon known populations of this species will require a referral from the Federal Environment Minister.

Activities that have the potential to adversely impact on biodiversity include:

- Habitat fragmentation i.e. further isolation of extant 'patches' of indigenous vegetation of habitat value;
- Habitat removal eg. native vegetation and associated habitat features such as logs and ground debris that provide potentially suitable resources for reptiles, birds and small arboreal mammals;
- The removal of mature trees (native and exotic) that provide foraging, nesting and roosting resources for common native fauna species;
- An increase in the cover and abundance of exotic species which can alter indigenous vegetation structure and function;
- Modification to the drainage of the site that may lead to indirect habitat degradation;
- The introduction of urban activities which have the potential to result in stormwater contamination and the subsequent deterioration of surrounding soils and surface water. Uncontrolled runoff can also lead to eutrophication of waterways, decreases in aquatic biodiversity, increased terrestrial and aquatic weed invasion. These all have long term effects on populations of aquatic and riparian dependant species.

5.2 Recommendations

Key recommendations for Precinct Area 23 are centred on retaining higher quality fauna habitat, avoiding works that reduce stormwater run-off and sources for pollution and sedimentation, utilizing existing native remnants for passive recreation, creating landscape linkages where practical, control pest plant and animal species, undertake targeted revegetation works, and where necessary undertake a targeted and more detailed fauna survey with emphasis on species of conservation significance.

In total SMEC has made 9 recommendations, these include:

1. The PSP seeks to retain as many large and very large trees as is practicable, in particular those trees located in close proximity to remnant native vegetation. These trees are of high conservation significance and have value for visual amenity and are crucial as faunal habitat.
2. While planted, non-indigenous trees also have some value for biodiversity and visual amenity; it is recommended that these be a lower priority for retention than remnant trees.
3. The PSP should proceed on with the knowledge that the Golden Sun Moth occurs within the Precinct Area. As such, SMEC recommends consideration of this species in the PSP development and to action possible mitigation measures.

4. The development should proceed on the presumption that ALL threatened fauna identified during the historical database search have the potential to occur within the Precinct Area or only after sufficient survey to determine their absence. Where additional threatened species are identified as occurring within the PSP, additional Management Plans should be written and included in the Biodiversity Plan, which forms part of the Precinct Structure Plan.
5. Areas designated as 'core habitat areas' for threatened species (as opposed to core population area as defined by new records) as identified in Appendix F should be considered for retention as this is the only measure of protection for extant populations. Translocation of individuals is not an option and Golden Sun Moth is known to be very poor at recolonising suitable habitat.
6. Where possible, improve existing linear road-side reserves / linkages within the site;
7. Retention and improvement of habitat zones representative of both the EVC's observed in the precinct area;
8. Providing a buffer from development for existing sites of importance (e.g. Golden Sun Moth colony centred on the northern section of the PSP) is likely to increase the long-term viability of sites and is recommended.

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Personal Communications

Alan Webster — Senior Flora and Fauna Officer, Port Phillip and Western Port Region, Box Hill, Department of Sustainability and Environment

APPENDIX A Targeted Fauna Surveys: Specifications

A. MELTON – WYNDHAM AREA (Outside the UGB)

Fauna Species discussed at site visit north -west of Werribee:

•**Golden Sun Moth** – known to occur across the grasslands between Altona and Eynesbury etc. and elsewhere in the local vicinity. This species has a short flight period to enable detection so is a priority for immediate survey.

No moths were observed flying on the day of the site inspection- very windy but suitable grassland habitat was inspected and should form the basis for detailed field surveys.

Surveys for this species needs to be undertaken ASAP across the study area in sites not cropped or recently pasture improved. This species is known to inhabit degraded modified grasslands so its occurrence should not be dismissed on such areas – however initial focus is to be on areas of intact grassland as per the Biosis Research vegetation assessment.

Growling Grass Frogs – known from the Werribee River and waterways in the nearby area.

Ideal time for surveying is October to December as males calling during breeding season. Survey can be extended until February for spotlighting and diurnal surveys. Survey Werribee River and all drainage lines, dams, water bodies, streams, rivers, areas where there is water etc as per survey methodology

Striped Legless Lizard – known from the surrounding basalt plains. Surveying by rock rolling and tile grids in native grassland habitat. This species is known to inhabit degraded modified grasslands so its occurrence should not be dismissed on such areas but focus initially on natural areas and sample with grids (5 x 10 @ 5m intervals)) at a density of one trap grid per 2ha area. Tile grids should ideally be in place for around 3-6 months prior to commencing the checking program. Begin checking in late Spring-early summer on a weekly basis, ceasing in summer when tiles too hot for lizard occupation.

Pitfall lines can be installed at sites if immediate assessment of site is required. Finding animals in pitfall traps will confirm presence of the species at the site, however lack of records is not confirmation of absence.

This also applies to tile grids eg. A tile grid recorded 36 eggs under a single tile (equals 18 females at 2 eggs each) – only 2 animals were detected in the tile grid! So, the other 16 animals were living in the vicinity of the tile grid but remained undetected.

Grassland Earless Dragon – previously recorded from the Little River area and a more recent sighting in the Wyndham area. Possible to survey using endoscope/fiberscope down existing spider burrows and cracks in the basalt soils. Can also place artificial spider burrows in the field and inspect for occupation.

B. HUME - WHITTLESEA AREA

Fauna Species discussed at site visit:

Golden Sun Moth – known from south of Summerhill and elsewhere in the local vicinity. This species has a short flight period to enable detection so is a priority for immediate survey.

Moths were observed flying on the day of the site inspection south of Summerhill Road immediately east of the railway land in a degraded/disturbed paddock GSM's were also observed in high quality intact native Themeda grassland north of Summerhill Road and west of railway line.

Surveys for this species need to be undertaken ASAP across the study area in sites not cropped or recently pasture improved. This species is known to inhabit degraded modified grasslands so its occurrence should not be dismissed on such areas - however initial focus is to be on areas of intact grassland as per the SMEC vegetation assessment.

Growling Grass Frogs – known from the Merri Creek, Kalkallo Creek and dams in the nearby area.

Ideal time for surveying is October - December as males calling during breeding season. Survey can be extended until February for spotlighting and diurnal surveys. Survey Merri Creek and all drainage lines, dams, water bodies, streams, rivers, areas where there is water etc as per survey methodology

Striped Legless Lizard – known from the basalt plains at nearby Craigieburn Grasslands and north near Beveridge Surveying by rock rolling and tile grids in native grassland habitat i.e. north of Summerhill Road and west of railway line on site visited which is intact Themeda grassland. This species is known to inhabit degraded modified grasslands so its occurrence should not be dismissed on such areas but focus initially on natural areas and sample with grids (5 x 10 @ 5m intervals)) at a density of one trap grid per 2ha area. Tile grids should ideally be in place for around 3-6 months prior to commencing the checking program. Begin checking in late Spring-early summer on a weekly basis, ceasing in summer when tiles too hot for lizard occupation.

Pitfall lines can be installed at sites if immediate assessment of site is required. Finding animals in pitfall traps will confirm presence of the species at the site, however no records will not confirm absence - egg. Many trapping efforts were unrewarded without catching animals, when animals are known to occur on the subject site in question.

This also applies to tile grids eg. A tile grid recorded 36 eggs under a single tile (equals 18 females at 2 eggs each) – only 2 animals were detected in the tile grid! So, the other 16 animals were living in the vicinity of the tile grid but remained undetected.

Grassland Earless Dragon – previously recorded from the Merri Creek near Donnybrook area, and an unconfirmed sighting near the Craigieburn Grasslands.

Survey using endoscope/fiberscope down existing spider burrows and cracks in the basalt soils. Can also place artificial spider burrows in the field and inspect for occupation.

C. CASEY- CARDINIA AREA

Includes Precincts: Botanic Ridge PSP, Clyde North PSP, Cranbourne North (Stage 2) PSP

In addition to the targeted survey guidance as outlined in Appendix 2 of the DSE Draft Flora, Fauna, and Habitat Hectare Assessment Model please see comments below.

Fauna Species discussed at site visit:

Growling Grass Frogs – ideal time for nocturnal surveying is October to December for calling males – particularly after rain. Survey can be extended until February for nocturnal spotlighting and diurnal surveys. Survey all drainage lines, dams, water bodies, streams, rivers, areas where there is water in all three precincts etc.

Dwarf Galaxias, Australasian Grayling – ideal time is spring when there is permanent water. Survey all areas where there is water.

Southern Brown Bandicoots – survey should occur in winter when the species are active and digging. Survey in areas of potential habitat (where vegetation or habitat structure is appropriate – including patches of weeds) in Botanic Ridge and other precincts with suitable habitat.

Survey to include:

- Daytime searches of at least two hours for each site of suitable habitat resources, such as areas with a dense understorey and thick ground cover, perhaps focussing on areas where fire has produced a mosaic of habitat that vary according to time since burning;
- Daytime searches for signs of activity, including tracks, scats, nests and conical foraging holes. Usually undertaken concurrently with habitat resource searches and recommended survey effort is therefore the same;
- Collection and analysis of predator scats, owl casts or remains, targeting predatory bird/mammal nests/dens;
- Multiple spotlight surveys of transects at least 100 m apart in all areas of likely habitat to maximise area surveyed with total transect length of at least 1000m; repeat over two nights and across all seasons if possible to reduce influence of climatic conditions on survey outcome, and;
- Additional cage (3 nights in a row) and camera surveys in areas of likely habitat.

DSE has provided information of landholders with records and updated AVW records.

•Swamp Skink, Glossy Grass Skink -

- Likely to be present in Botanic Ridge precinct and other precincts if suitable habitat;
- Pit fall traps/ tiles /metal sheets over summer period in selected areas of potential habitat;
- If Elliot traps used they should be triggered for the lightest weight possible, and;
- They are cryptic species and often missed in targeted survey so very important for ecological assessment of site and potential and likely habitat to be mapped. Often in disturbed areas.

•Southern Toadlet

- Survey in autumn;

•White Footed Dunnart

- If there are records around Clyde North then targeted survey in likely habitat.

Appendix B: List of Flora Species and their Conservation Status

List of flora species recorded during the current assessment:

Scientific Name	Common Name	VROT	EPBC	FFG
Eucalyptus camaldulensis	River Red Gum			
Danthonia Sp.	Wallaby Grass			
Themeda triandra	Kangaroo Grass			
Juncus sp.	Rushes			
Poa sp.	Tussock Grass			
Eryngium ovinum	Blue Devil			
Stipa sp.	Spear Grass			
Acaena ovina	Sheep's Burr			
Lomandra sp.	Mat Rush			
Arthropodium strictum	Chocolate Lily			
Convolvulus erubescens	Pink Bindweed			
Craspedia variabilis	Billy Buttons			
Wahlenbergia sp.	Bluebell			
Eucalyptus microcarpa	Grey Box			

List of flora species recorded obtained from Flora Information System Data with 5km buffer

Scientific Name	Common Name	VROT	EPBC	FFG
Melaleuca armillaris subsp. armillaris	Giant Honey-myrtle	r		
Helichrysum aff. rutidolepis (Lowland Swamps)	Pale Swamp Everlasting	v		
Dianella amoena	Matted Flax-lily	e	E	
Desmodium varians	Slender Tick-trefoil	k		
Pterostylis cucullata	Leafy Greenhood		V	L
Lachnagrostis punicea subsp. punicea	Purple Blown-grass	r		
Geranium sp. 3	Pale-flower Crane's-bill	r		
Geranium sp. 1	Large-flower Crane's-bill	e		
Corymbia maculata	Spotted Gum	v		
Botrychium australe	Austral Moonwort	v		L
Tripogon loliiformis	Rye Beetle-grass	r		
Lepidium hyssopifolium	Basalt Peppercress	e	E	L
Austrodanthonia setacea var. breviseta	Short-bristle Wallaby-grass	r		
Lepidium pseudohyssopifolium	Native Peppercress	k		
Geranium solanderi var. solanderi s.s.	Austral Crane's-bill	v		
Eragrostis trachycarpa	Rough-grain Love-grass	r		
Geranium solanderi var. solanderi s.s.	Austral Crane's-bill	v		

List of flora species recorded obtained from the EPBC Act Protected Matters Search Tool with 5km buffer

Scientific Name	Common Name	Conservation Status
Amphibromus fluitans	River Swamp Wallaby Grass	Vulnerable
Carex tasmanica	Curly Sedge	Vulnerable
Dianella amoena	Matted Flax-lily	Endangered
Glycine latrobeana	Clover Glycine	Vulnerable
Lachnagrostis adamsonii	Adamson's Blown-grass	Endangered
Lepidium hyssopifolium	Basalt Pepper-cress	Endangered
Pimelea spinescens subsp. spinescens	Plains Rice-flower	Critically Endangered
Prasophyllum frenchii	Maroon Leek-orchid	Endangered
Rutidosis leptorhynchoides	Button Wrinklewort	Endangered
Senecio macrocarpus	Large-fruit Fireweed	Vulnerable

Appendix C: Habitat Zone Results Summary Table

Habitas Layer Property ID Number	203530878	2053063	2083198	222045	222045	222047	222049	222049	222054	223346	223350	223352	233812
Site Number	1	1	1	2	3	1	3	2	2	1	2	1	2
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A
Vegetation Category	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
Size of Zone (Ha)	0.85	0.39	0.04	0.05	0.63	0.02	0.69	0.12	0.09	0.14	0.01	0.19	0.42
EVC	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland
EVC No.	55_61	55_61	55_61	71	71	71	55_61	55_61	55_61	71	71	71	71
EVC Conservation Status	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Vulnerable	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Vulnerable	Vulnerable
Landscape Score	3	5	5	3	3	6	5	5	5	5	5	5	8
Site Condition Score	29	9	9	12	28	24	9	21	13	34	13	14	22
Habitat Score	32	14	14	15	31	30	13	26	18	39	15	19	30
habitat hectares	0.27	0.05	0.01	0.01	0.2	0.01	0.1	0.03	0.02	0.05	0.00	0.04	0.13
Conservation Significance	High			Medium	High	High				High	Medium	Medium	High
Net Outcome Ratio	1.5	1.5	1.5	1	1	1	1.5	1.5	1.5	1	1	1	1
Map Number (location of Patch)	Figure 1.1 (C4)	Figure 1.2 (D2)	Figure 1.2 (D2)	Figure 1.2 (C4)	Figure 1.2 (C4)	Figure 1.2 (C4)	Figure 1.2 (A3)	Figure 1.2 (A3)	Figure 1.2 (B2)	Figure 1.2 (C4)	Figure 1.2 (A4)	Figure 1.2 (C4)	Figure 1.3 (E3)

Habitas Layer Property ID Number	233815	233819	233819	233824	233824	233827	233827	233828	233837	233839	233839	233841	233843
Site Number	2	1	2	1	4	2	3	2	2	2	3	2	1
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A
Vegetation Category	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
Size of Zone (Ha)	0.49	0.69	0.3	0.49	0.05	0.33	0.05	0.43	1.17	0.11	0.09	4.43	2.22
EVC	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland
EVC Number	71	71	71	71	71	71	71	71	55_61	55_61	55_61	55_61	55_61
EVC Conservation Status	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Endangered	Endangered	Endangered	Endangered	Endangered
Landscape Score	8	8	8	5	3	3	3	3	5	5	5	9	6
Site Condition Score	28	26	26	20	18	28	8	32	29	27	9	28	14
Habitat Score	36	34	34	25	21	31	11	35	34	32	14	37	20
habitat hectares	0.18	0.23	0.09	0.12	0.01	0.1	0.01	0.16	0.4	0.04	0.01	1.64	0.44
Conservation Significance	High	High	High	Medium	Medium	High	Medium	High	High			High	High
Net Outcome Ratio	1	1	1	1	1	1	1	1	1.5	1.5	1.5	1.5	1.5
Map Number (location of Patch)	Figure 1.3 (D3)	Figure 1.3 (C2)	Figure 1.3 (D2)	Figure 1.2 (C5)	Figure 1.2 (D5)	Figure 1.2 (C4)	Figure 1.2 (C4)	Figure 1.2 (D4)	Figure 1.1 (C4)	Figure 1.1 (C4)	Figure 1.1 (C4)	Figure 1.1 (D1)	Figure 1.1 (C3)

Habitas Layer Property ID Number	233849	233849	233851	233851	236772	238392	238395	239023	239023	239024	239025	239025	239027
Site Number	3	2	2	3	3	2	2	1	2	4	2	3	2
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A
Vegetation Category	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
Size of Zone (Ha)	0.2	0.43	1.45	0.12	0.77	0.01	0.17	1.13	0.2	0.23	0.79	0.11	0.05
EVC	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland
EVC Number	55_61	55_61	55_61	55_61	71	55_61	55_61	55_61	55_61	55_61	55_61	55_61	55_61
EVC Conservation Status	Endangered	Endangered	Endangered	Endangered	Vulnerable	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered
Landscape Score	5	5	5	5	9	5	5	5	5	3	5	7	5
Site Condition Score	20	13	28	26	28	28	33	10	10	21	9	9	9
Habitat Score	25	18	33	31	37	33	38	15	15	24	14	16	14
habitat hectares	0.05	0.08	.48	0.04	0.28	0.00	0.06	0.17	0.03	0.06	0.11	0.02	0.01
Conservation Significance			High		High					High			
Net Outcome Ratio	1.5	1.5	1.5	1.5	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Map Number (location of Patch)	Figure 1.1 (E2)	Figure 1.1 (D1)	Figure 1.1 (E1)	Figure 1.1 (D1)	Figure 1.2 (B5)	Figure 1.2 (A2)	Figure 1.2 (A1)	Figure 1.2 (D2)	Figure 1.2 (D2)	Figure 1.2 (C1)	Figure 1.1 (C5)	Figure 1.2 (C2)	Figure 1.1 (B5)

Habitas Layer Property ID Number	239029	52476438
Site Number	2	3
Habitat Zone	A	A
Vegetation Category	RP	RP
Size of Zone (Ha)	0.04	0.09
EVC	Plains Grassy Woodland	Plains Grassy Woodland
EVC Number	55_61	55_61
EVC Conservation Status	Endangered	Endangered
Landscape Score	5	5
Site Condition Score	10	26
Habitat Score	15	31
habitat hectares	0.01	0.03
Conservation Significance	Medium	
Net Outcome Ratio	1	1.5
Map Number (location of Patch)	Figure 1.1 (A5)	Figure 1.2 (A2)

Appendix D: Scattered Tree Results Summary Table

Habitas Layer Property ID Number	151625319	203530878	203530878	2053063	2083193	20841127	20841127	222051	222054	222054	223347	223347	2233449	223352	233809	233809	233809	233809
Site Number	2	1	2	3	1	1	2	2	3	4	1	3	2	3	1	2	3	4
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Size of Zone (Ha)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.09	0.14	0.01	0.01	0.01	0.03	0.02	0.03
EVC	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland
EVC No.	55_61	55_61	55_61	55_61	55_61	71	71	55_61	55_61	55_61	71	71	71	71	71	71	71	71
EVC Conservation Status	Endangered	Endangered	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable
Genera	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalyptus	Eucalyptus	Eucalyptus	Eucalypt
Number of Trees in Size Category	1 VLOT	1 MOT	1 MOT	1 MOT	1 LOT	1 LOT	1 MOT	1 VLOT	1 VLOT	1 MOT	5 VLOT	3 VLOT 1 MOT	2 MOT, 1 ST	1 LOT	1 VLOT	1 VLOT	1 MOT, 4 ST	1 MOT, 4 ST
Conservation Significance	High	High	High	High	High	Medium	Medium	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Map Number (location of Patch)	Figure 1.1 (A5)	Figure 1.1 (C4)	Figure 1.1 (C5)	Figure 1.2 (E2)	Figure 1.2 (B1)	Figure 1.2 (B5)	Figure 1.2 (B5)	Figure 1.2 (A2)	Figure 1.2 (A2)	Figure 1.2 (B2)	Figure 1.2 (C5)	Figure 1.2 (B5)	Figure 1.2 (A4)	Figure 1.2 B4)	Figure 1.3 (E4)	Figure 1.3 (E4)	Figure 1.3 (E4)	Figure 1.3 (E4)

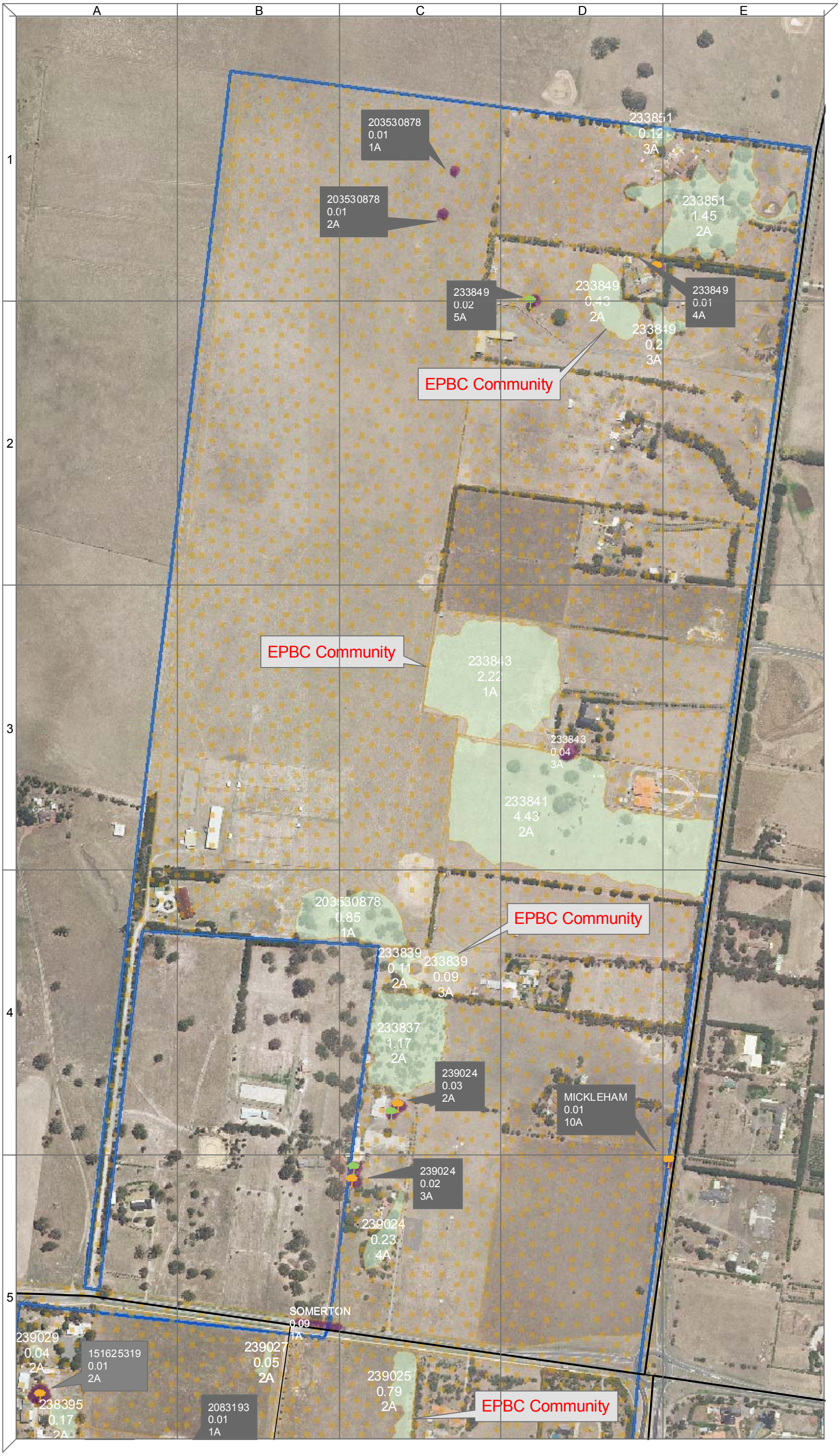
Habitas Layer Property ID Number	233810	233810	233810	233812	233812	233813	233813	233815	233820	233822	233822	233822	233823	233824	233825	233826	233828	233829
Site Number	2	3	4	3	4	2	3	3	2	2	3	4	2	3	2	2	4	1
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Size of Zone (Ha)	0.02	0.07	0.04	0.09	0.02	0.11	0.08	0.06	0.11	0.03	0.02	0.1	0.03	0.01	0.06	0.01	0.04	0.02
EVC	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland
EVC No.	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
EVC Conservation Status	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable
Genera	Eucalypt	Eucalyptus	Eucalypt	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalyptus	Eucalypt, Acacia	Eucalypt	Eucalypt
Number of Trees in Size Category	1 VLOT	1 VLOT 2 MT, 2 ST	1 VLOT	2 VLOT 2 MOT	1 VLOT	1 VLOT 1 MOT 2 ST	3 VLOT	3 MOT	5 VLOT 2 LOT 2 MOT 2 ST	1 VLOT 1 ST	1 VLOT	2 VLOT	1 VLOT	1 LOT	4 MOT 5 ST	1 MOT 3 ST	1 LOT, 1 MOT and 1 ST	1 LOT
Conservation Significance	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Map Number (location of Patch)	Figure 1.3 (E3)	Figure 1.4 (E3)	Figure 1.3 (E3)	Figure 1.3 (D3)	Figure 1.3 (D3)	Figure 1.3 (E3)	Figure 1.3 (D3)	Figure 1.3 (D2)	Figure 1.3 (D1)	Figure 1.3 (D1)	Figure 1.3 (D1)	Figure 1.3 (C1)	Figure 1.3 (C1)	Figure 1.2 (D5)	Figure 1.2 (C4)	Figure 1.2 (C4)	Figure 1.2 (D3)	Figure 1.2 (D3)

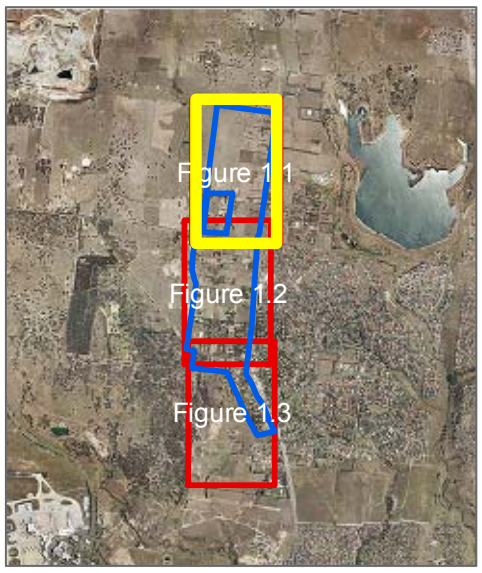
Habitas Layer Property ID Number	233829	233829	233829	233832	233843	233849	233849	236767	236768	236768	236768	236769	236769	236770	236770	236770	236770	236770
Site Number	2	3	5	4	3	4	5	2	2	3	4	1	3	1	2	3	4	5
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Size of Zone (Ha)	0.03	0.1	0.01	0.01	0.04	0	0.01	0.1	0.03	0.08	0.07	0.02	0.02	0.02	0.03	0.01	0.02	0.03
EVC	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland
EVC No.	71	71	71	55_61	55_61	55_61	55_61	71	71	71	71	71	71	71	71	71	71	71
EVC Conservation Status	Vulnerable	Vulnerable	Vulnerable	Endangered	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable
Genera	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Acacia	Eucalyptus	Eucalypt	Eucalypt	Eucalyptus	Eucalyptus	Eucalyptus
Number of Trees in Size Category	1 VLOT 1 LOT	1 VLOT 5 LOT 14 MOT	1 MOT	1 VLOT	1 MOT	1 VLOT	1 LOT	2 VLOT. 2 MOT, 2 ST	1 VLOT 1 MOT	1 VLOT 1LOT 1 MOT 13 ST	1 VLOT 12 ST	1 MOT	2 MOT 1 ST	1 LOT	1 MOT	1 MOT	2 MOT	1 VLOT
Conservation Significance	Medium	Medium	Medium	High	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Map Number (location of Patch)	Figure 1.2 (E3)	Figure 1.2 (D3)	Figure 1.2 (E3)	Figure 1.2 (E2)	Figure 1.1 (D3)	Figure 1.1 (D1)	Figure 1.1 D14	Figure 1.3 (C2)	Figure 1.2 (C5)	Figure 1.2 (C5)	Figure 1.2 (C5)	Figure 1.3 (B2)	Figure 1.3 (B2)	Figure 1.3 (B1)	Figure 1.3 (B1)	Figure 1.3 (B1)	Figure 1.3 (B1)	Figure 1.3 (B1)

Habitas Layer Property ID Number	236771	236771	236771	236772	238391	238393	238394	238394	239024	239024	52476438	52476438	BONDS	CARROLL	MICKLEHAM	MICKLEHAM	MICKLEHAM	MICKLEHAM
Site Number	2	3	4	1	1	2	2	3	2	3	1	2	2	1	1	3	4	5
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Size of Zone (Ha)	0.03	0.03	0.03	0.04	0.01	0.02	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.05	0.01	0.03	0.01	0.01
EVC	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland
EVC No.	71	71	71	71	71	55_61	55_61	55_61	55_61	55_61	55_61	55_61	55_61	71	71	71	71	71
EVC Conservation Status	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable
Genera	Eucalyptus	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Acacia	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalyptus	Eucalypt	Eucalyptus	Eucalyptus
Number of Trees in Size Category	2 VLOT, 1 ST	1 MOT	1 MOT 1 ST	1 VLOT	1 MOT	1 MOT	2 MOT	1 LOT	2 VLOT 1 ST	2 LOT	1 MOT	1 LOT	2 ST	45 ST	1 LOT	1 VLOT 1 MOT	1 LOT 1 ST	1 MOT
Conservation Significance	Medium	Medium	Medium	Medium	Medium	High	High	High	High	High	High	High	High	Medium	Medium	Medium	Medium	Medium
Map Number (location of Patch)	Figure 1.3 (B1)	Figure 1.3 (B1)	Figure 1.2 (B5)	Figure 1.3 (B1)	Figure 1.2 (A3)	Figure 1.2 (A2)	Figure 1.2 (A1)	Figure 1.2 (A1)	Figure 1.2 (C4)	Figure 1.2 (C4)	Figure 1.2 (A2)	Figure 1.2 (A2)	Figure 1.2 (B2)	Figure 1.3 (C5)	Figure 1.3 (D1)	Figure 1.4 (E4)	Figure 1.3 (E3)	Figure 1.3 (E2)

Habitas Layer Property ID Number	MICKLEHAM	MICKLEHAM	MICKLEHAM	MICKLEHAM	MICKLEHAM	PROVIDENCE	PROVIDENCE	PROVIDENCE	PROVIDENCE	SECTION	SECTION	SECTION	SOMERTON	WOODLANDS
Site Number	6	7	8	9	10	1	2	3	5	2	3	4	1	2
Habitat Zone	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Size of Zone (Ha)	0.02	0.01	0,01	0.01	0.01	0.02	0.01	0.04	0.01	0.01	0.02	0.07	0.09	0.03
EVC	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills- Herb Rich Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Hills Herb-rich Woodland	Plains Grassy Woodland	Hills Herb-rich Woodland
EVC No.	71	71	71	71	55_61	71	71	71	71	71	71	71	55_61	71
EVC Conservation Status	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Endangered	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Vulnerable	Endangered	Vulnerable
Genera	Eucalyptus	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalyptus	Eucalyptus	Eucalyptus	Eucalyptus	Eucalypt	Eucalypt	Eucalypt	Eucalypt	Eucalypt
Number of Trees in Size Category	3 MOT, 2 ST	1 LOT	1 VLOT	1 VLOT 3 MOT 8 ST	1 VLOT	2 MOT 4 ST	1 LOT	2 MOT 13 ST	1 MOT	1 LOT	1 LOT 2 MOT 2 ST	3 MOT 45 ST	8 ST	2 MOT 1 ST
Conservation Significance	Medium	Medium	Medium	Medium	High	Medium	Medium	Medium	Medium	Medium	Medium	Medium	High	Medium
Map Number (location of Patch)	Figure 1.3 (D2)	Figure 1.3 (D2)	Figure 1.2 (D5)	Figure 1.2 (D5)	Figure 1.1 (E5)	Figure 1.2 (C5)	Figure 1.2 (C5)	Figure 1.2 (B5)	Figure 1.2 (D5)	Figure 1.2 (A4)	Figure 1.2 (A3)	Figure 1.2 (A2)	Figure 1.1 (B5)	Figure 1.3 (D2)

Appendix E: Maps Associated with Flora Assessment





FINAL

1:5,000 0 35 70 140 Metres

CONSULTANT:

SMEC

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T + 61 3 9514 1500 F + 61 3 9514 1502
Website: www.smec.com.au

PROJECT:
GAA Native Vegetation Mapping Project

TITLE:
Figure 1.1
Native Vegetation within Precinct Structure Plan Area 23

DRAWN BY: Christopher White DATE: 10/12/2009
CHECKED BY: Cameron Miller DATE: 10/12/2009
PROJECT MANAGER: Christopher White

DATA SOURCE:
'VICMAP_IMAGERY' © The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

DRAWING NUMBER: 1 of 3

REVISION: 3 SHEET SIZE: A3

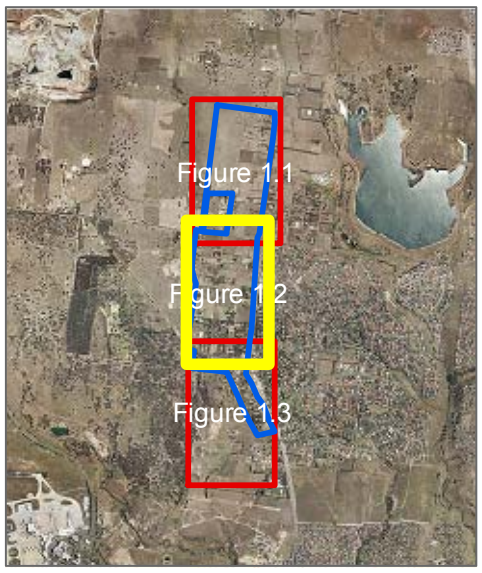
Legend

Roads
- Minor
- Major

Scattered Tree Sizes
- LT
- VL

Native Vegetation EVCs
- Degraded Treeless Vegetation

EVC Name
- 55 Plains Grassy Woodland
- 71 Hills Herb-rich Woodland
- Greenvale Boundary
- Scattered Tree Polygons



FINAL

1:5,000 0 35 70 140 Metres

CONSULTANT:

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T + 61 3 9514 1500 F + 61 3 9514 1502
Website: www.smec.com.au

PROJECT: GAA Native Vegetation Mapping Project

TITLE: Figure 1.2
Native Vegetation within Precinct Structure Plan Area 23

DRAWN BY: Christopher White DATE: 10/12/2009

CHECKED BY: Cameron Miller DATE: 10/12/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:
'VICMAP_IMAGERY'© The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) ©The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) ©The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE)© The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

DRAWING NUMBER: 2 of 3

REVISION: 3 SHEET SIZE: A3

Legend

Roads

- Minor
- Major

Scattered Tree Sizes

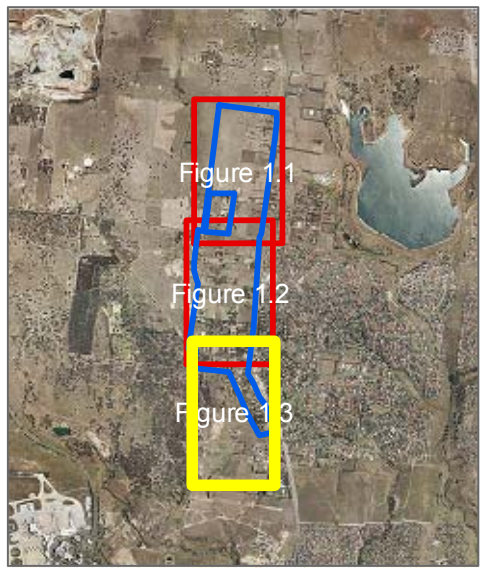
- LT
- VL

Native Vegetation EVCs

- Degraded Treeless Vegetation

EVC Name

- 55 Plains Grassy Woodland
- 71 Hills Herb-rich Woodland
- Greenvale Boundary
- Scattered Tree Polygons



FINAL

1:5,000 0 35 70 140 Metres

CONSULTANT:

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Level 5/71 Queens Road, Melbourne VIC 3004
T + 61 3 9514 1500 F + 61 3 9514 1502
Website: www.smec.com.au

PROJECT:
GAA Native Vegetation Mapping Project

TITLE:
Figure 1.3
Native Vegetation within Precinct Structure Plan Area 23

DRAWN BY: Christopher White DATE: 10/12/2009

CHECKED BY: Cameron Miller DATE: 10/12/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:
'VICMAP_IMAGERY' © The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

DRAWING NUMBER: 3 of 3

REVISION: 3 SHEET SIZE: A3

Legend

Roads

- Minor
- Major

Scattered Tree Sizes

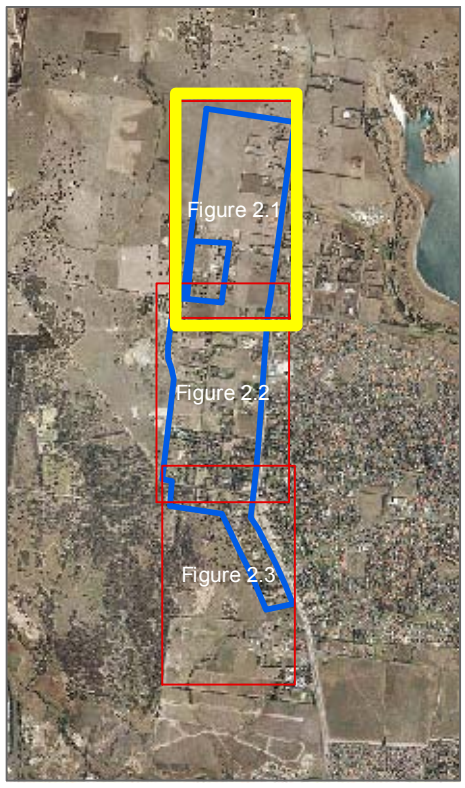
- LT
- VL

Native Vegetation EVCs

- Degraded Treeless Vegetation

EVC Name

- 55 Plains Grassy Woodland
- 71 Hills Herb-rich Woodland
- Greenvale Boundary
- Scattered Tree Polygons



FINAL

1:5,000

0 25 50 100 Metres

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Website: www.smec.com.au

PROJECT:
GAA Native Vegetation Mapping Project

TITLE:
Figure 2.1
Vegetation Quality of Habitat Zones within Precinct Structure Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009
CHECKED BY: Cameron Miller **DATE:** 14/09/2009
PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY' © The State of Victoria, Department of Sustainability and Environment Cadastral Line - Vicmap Property (VMPROP_CAD_LINE') © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 1 of 3

Revision. 3 **Sheet Size.** A3

LEGEND

Roads

Minor

Major

Site Condition Score

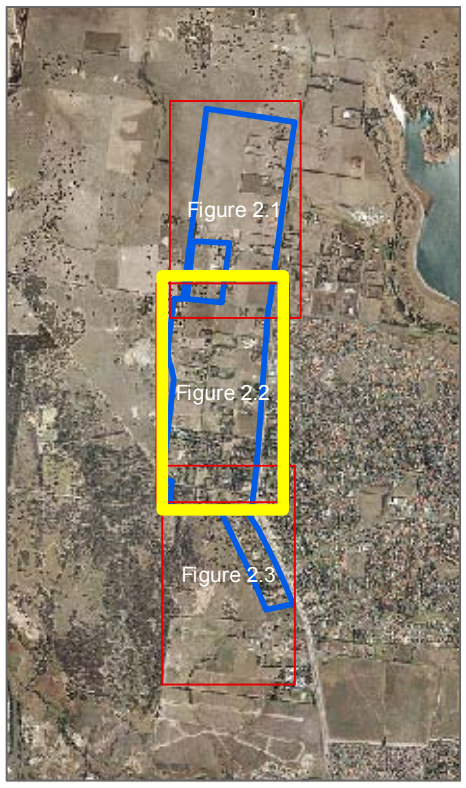
1-19.99

20-29.99

30-75

Parcel Boundaries

PSP 23 Boundary



FINAL

1:5,000

0 25 50 100
Metres

CONSULTANT:

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Website: www.smec.com.au

PROJECT:

GAA Native Vegetation Mapping Project

TITLE:

Figure 2.2
Vegetation Quality of Habitat Zones within Precinct Structure Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009

CHECKED BY: Cameron Miller **DATE:** 14/09/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY' © The State of Victoria, Department of Sustainability and Environment Cadastral Line - Vicmap Property (VMPROP_CAD_LINE') © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 2 of 3

Revision. 3 **Sheet Size.** A3

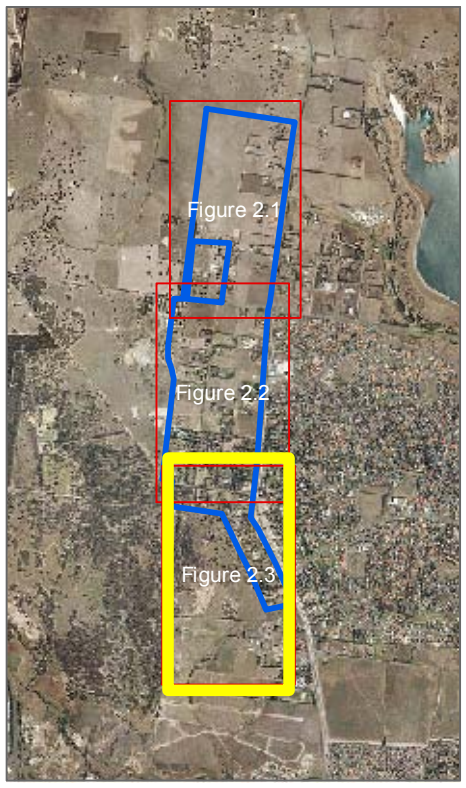
LEGEND

Roads

- Minor
- Major

Site Condition Score

- 1-19.99
- 20-29.99
- 30-75
- Parcel Boundaries
- PSP 23 Boundary



FINAL

1:5,000

0 25 50 100
Metres

CONSULTANT:

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Website: www.smec.com.au

PROJECT:
GAA Native Vegetation Mapping Project

TITLE:
Figure 2.3
Vegetation Quality of Habitat Zones within Precinct Structure Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009

CHECKED BY: Cameron Miller **DATE:** 14/09/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY' © The State of Victoria, Department of Sustainability and Environment Cadastral Line - Vicmap Property (VMPROP_CAD_LINE') © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 3 of 3

Revision. 3 **Sheet Size.** A3

LEGEND

Roads

Minor

Major

Site Condition Score

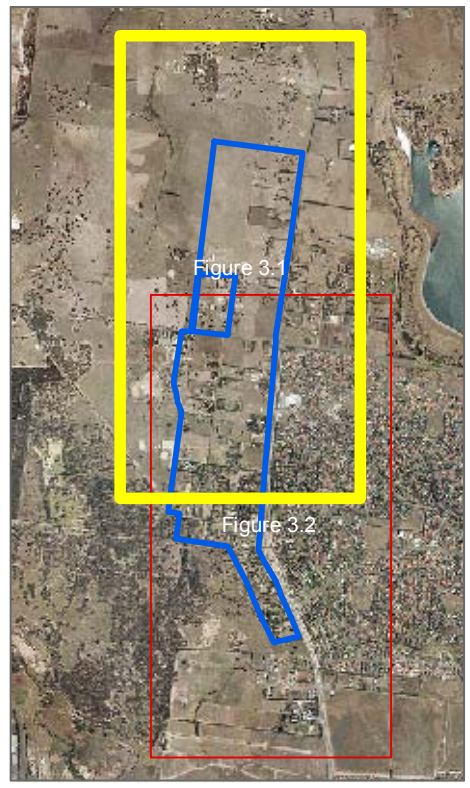
1-19.99

20-29.99

30-75

Parcel Boundaries

PSP 23 Boundary



FINAL

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Metres

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Website: www.smec.com.au

PROJECT:

GAA Native Vegetation Mapping Project

TITLE:

Figure 3.1
National and State Significant and DSE Advisory List (VROT) Flora Species within Precinct Structure Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009

CHECKED BY: Cameron Miller **DATE:** 14/09/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY' © The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 1 of 2

Revision. 3 **Sheet Size.** A3

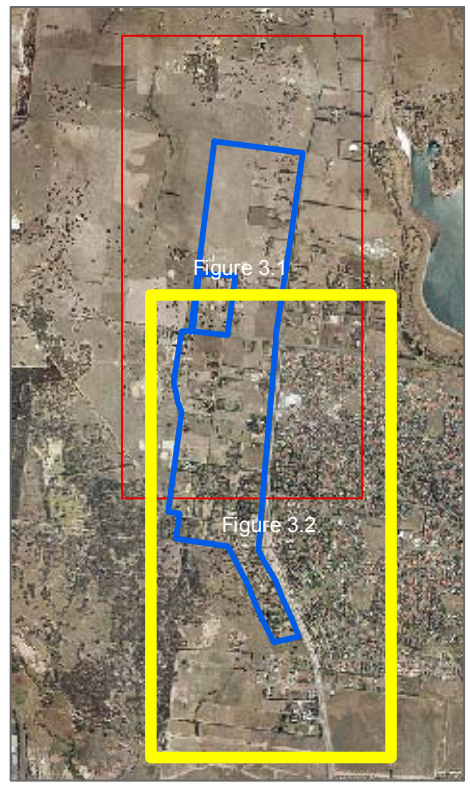
LEGEND

Roads

- Minor
- Major
- PSP 23 Boundary
- Parcel Boundaries

Database Flora Records

- Nationally Significant Species
- State Significant Species
- properties not assessed
- properties assessed



FINAL

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0 85 170 340 Metres

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Website: www.smec.com.au

PROJECT:

GAA Native Vegetation Mapping Project

TITLE:

Figure 3.2
National and State Significant and DSE Advisory List (VROT) Flora Species within Precinct Structure Plan Area 23

DRAWN BY: Christopher White DATE: 14/09/2009

CHECKED BY: Cameron Miller DATE: 14/09/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY' © The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 2 of 2

Revision. 3 | Sheet Size. A3

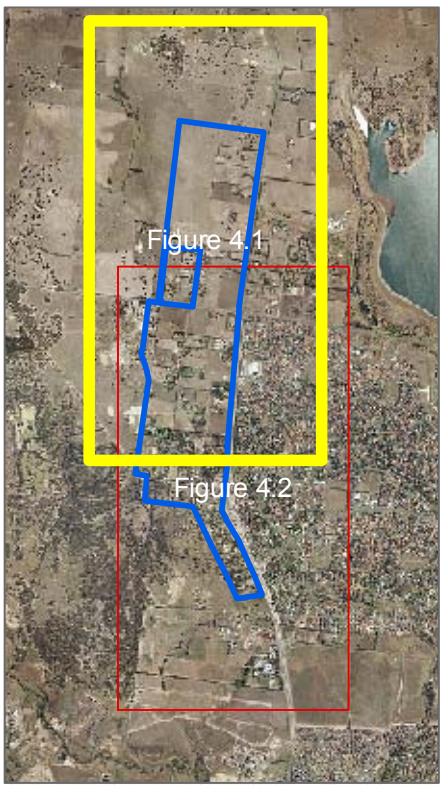
LEGEND

Roads

- Minor
- Major
- PSP 23 Boundary
- Parcel Boundaries

Database Flora Records

- Nationally Significant Species
- State Significant Species
- properties not assessed
- properties assessed



FINAL

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Metres

CONSULTANT:

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Website: www.smec.com.au

PROJECT:

GAA Native Vegetation Mapping Project

TITLE:

Figure 4.1
Conservation Significance of Habitat Zones within Precinct Structure Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009

CHECKED BY: Cameron Miller **DATE:** 14/09/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY'© The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 1 of 2

Revision. 3 **Sheet Size.** A3

LEGEND

PSP 23 Boundary

scattered trees

Conservation Significance

High

Medium

Remnant Vegetation

Degraded Treeless Vegetation

Conservation Significance

High

Medium

Roads

Minor

Major

Parcel Boundaries

properties not assessed

FINAL

1:10,000 (0, 60, 120, 240 Metres)

CONSULTANT:

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Website: www.smec.com.au

PROJECT:

GAA Native Vegetation Mapping Project

TITLE:

Figure 4.2

Conservation Significance of Habitat Zones within Precinct Structure Plan Area 23

DRAWN BY: Christopher White DATE: 14/09/2009

CHECKED BY: Cameron Miller DATE: 14/09/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY'© The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 2 of 2

Revision. 3 | Sheet Size. A3

LEGEND

PSP 23 Boundary

scattered trees

Conservation Significance

- High
- Medium

Remnant Vegetation

- Degraded Treeless Vegetation

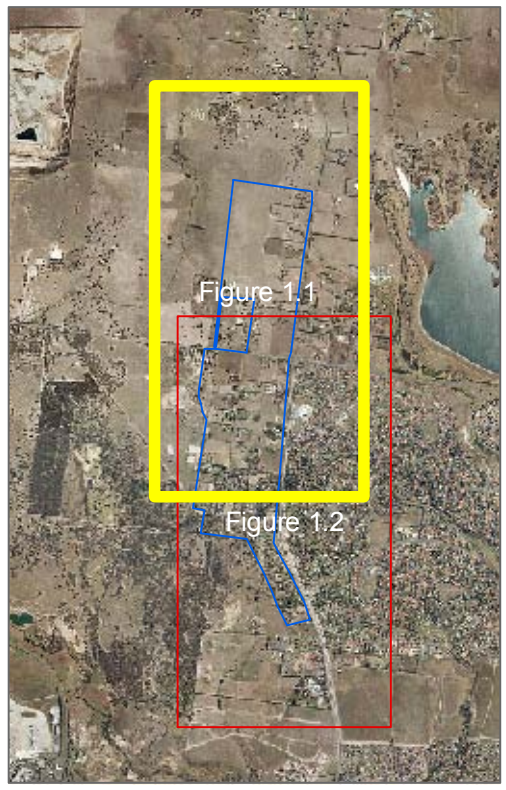
Conservation Significance

- High
- Medium

Roads

- Minor
- Major
- Parcel Boundaries
- properties not assessed

Appendix F- Maps Associated with Fauna Assessment



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Metres

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Website: www.smec.com.au

PROJECT:

GAA Native Vegetation Mapping Project

TITLE: Figure 1.1

National and State Significant and DSE Advisory List (VROT) Fauna Species within Precinct Structure Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009

CHECKED BY: Cameron Miller **DATE:** 14/09/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY' © The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 1 of 2

Revision. 3 **Sheet Size.** A3

LEGEND

Roads

- Minor
- Major

Database Records of Fauna

- State Significant Species
- Nationally Significant Species

Incidental records of fauna

- State Significant Species
- Nationally Significant Species
- PSP 23 Boundary
- properties assessed
- properties not assessed
- Parcel Boundaries

A B C D E

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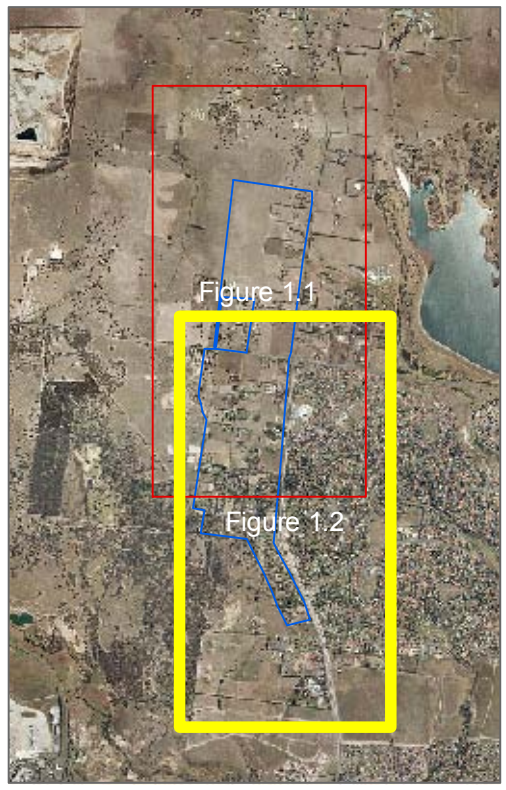
Golden Sun Moth
19.11.2009
1

Golden Sun Moth
20061128

Eastern Barred Bandicoot
20030605



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CONSULTANT:

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T + 61 3 9514 1500 F + 61 3 9514 1502
Website: www.smec.com.au

PROJECT:

GAA Native Vegetation Mapping Project

TITLE: Figure 1.2

National and State Significant and DSE Advisory List (VROT) Fauna Species within Precinct Structure Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009

CHECKED BY: Cameron Miller **DATE:** 14/09/2009

PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY' © The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 2 of 2

Revision. 3 **Sheet Size.** A3

LEGEND

Roads

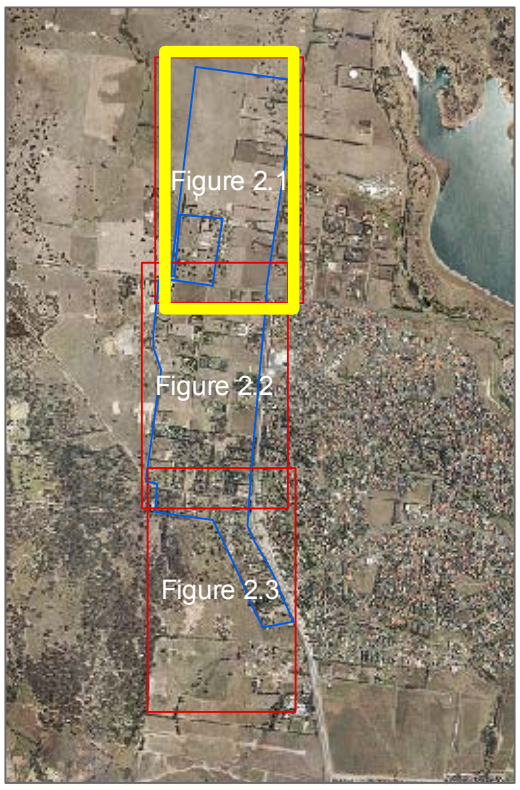
- Minor
- Major

Database Records of Fauna

- State Significant Species
- Nationally Significant Species

Incidental records of fauna

- State Significant Species
- Nationally Significant Species
- PSP 23 Boundary
- properties assessed
- properties not assessed
- Parcel Boundaries



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Metres

CONSULTANT:

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PROJECT:

GAA Native Vegetation Mapping Project

TITLE:

Figure 2.1
Areas of High Faunal Habitat for Significant Species within Precinct Structure Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009

CHECKED BY: Cameron Miller **DATE:** 14/09/2009

Project Manager: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY© The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 1 of 3

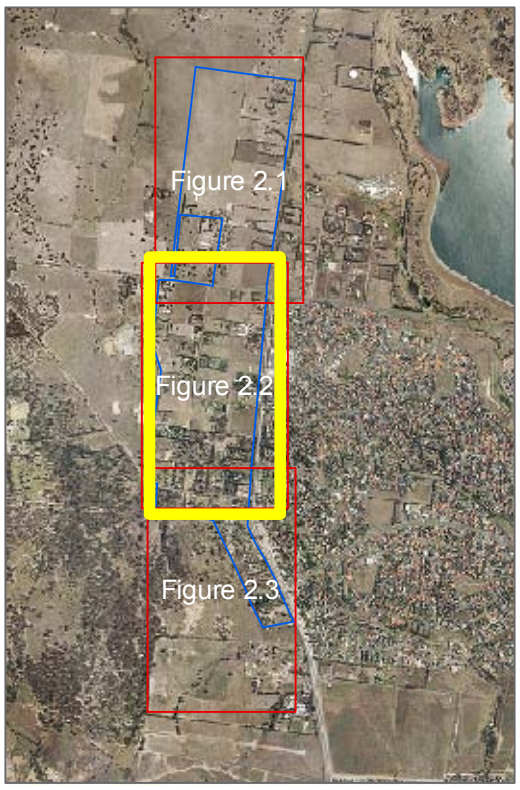
Revision. 3 **Sheet Size.** A3

LEGEND

- PSP 23 Boundary

Roads

- Minor
- Major
- key fauna habitat Woodland
- Key Fauna Habitat Grassland
- Properties assessed
- Properties not assessed
- Parcel Boundaries



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TITLE:

Figure 2.2
Areas of High Faunal Habitat for Significant Species within Precinct Structure Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009

CHECKED BY: Cameron Miller **DATE:** 14/09/2009

Project Manager: Christopher White

DATA SOURCE:

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GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 2 of 3

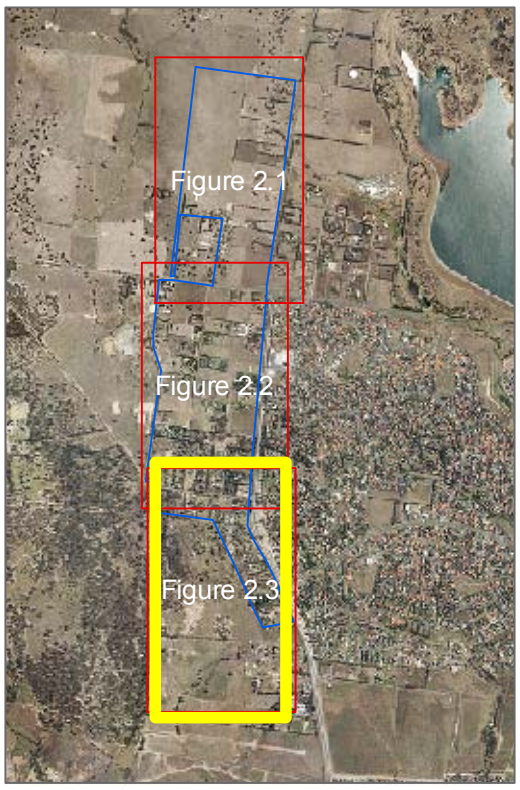
Revision. 3 **Sheet Size.** A3

LEGEND

- PSP 23 Boundary

Roads

- Minor
- Major
- key fauna habitat Woodland
- Key Fauna Habitat Grassland
- Properties assessed
- Properties not assessed
- Parcel Boundaries



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PROJECT:

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TITLE:

Figure 2.3
Areas of High Faunal Habitat for Significant Species within Precinct Structure Plan Area 23

DRAWN BY: Christopher White **DATE:** 14/09/2009

CHECKED BY: Cameron Miller **DATE:** 14/09/2009

Project Manager: Christopher White

DATA SOURCE:

Data Source: 'VICMAP_IMAGERY'© The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE/) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. 'VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

GEOGRAPHIC COORDINATE SYSTEM: GCS_GDA_1994

DATUM: D_GDA_1994

Drawing No. 3 of 3

Revision. 3 **Sheet Size.** A3

LEGEND

- PSP 23 Boundary

Roads

- Minor
- Major
- key fauna habitat Woodland
- Key Fauna Habitat Grassland
- Properties assessed
- Properties not assessed
- Parcel Boundaries

Appendix G: List of fauna Species and their Conservation Status

List of fauna species recorded during the current assessment

Common Name	*Scientific Name*	*Conservation Status*
Birds		
Australian Wood Duck	*Chenonetta jubata*	
Pacific Black Duck	*Anas superciliosa*	
Australian Magpie	*Gymnorhina tibicen*	
Crested Pigeon	*Ocyphaps lophotes*	
Common Bronzewing	*Phaps chalcoptera*	
*Spotted Turtledove	**Streptopelia chinensis*	
*Domestic/Rock Pigeon	**Columba livia*	
Galah	*Cacatua roseicapilla*	
Sulphur Crested Cockatoo	*Cacatua galerita*	
Rainbow Lorikeet	*Trichoglossus haematodus*	
Musk Lorikeet	*Glossopsitta concinna*	
Eastern Rosella	*Platycercus eximius*	
Laughing Kookaburra	*Dacelo novaeguineae*	
Noisy Miner	*Manorina melanocephala*	
Superb Fairy-wren	*Malurus cyaneus*	
Red Wattle Birds	*Anthochaera carunculata*	
New Holland Honeyeater	*Phylidonyris novaehollandiae*	
White Plumed Honeyeater	*Lichenostomus penicillata*	
Yellow-faced Honeyeater	*Lichenostomus chrysops*	
Grey Butcherbird	*Cracticus torquatus*	
Australian Raven	*Corvus coronoides*	
*House Sparrow	**Passer domesticus*	
*Indian Mynah	**Acridotheres tristis*	
*Common Starling	**Sturnus vulgaris*	
Mammals		
European Rabbit	*Oryctolagus cuniculus*	
Amphibians		
Spotted Marsh Frog	*Limnodynastes tasmaniensis*	
Common Toadlet	*Crinia signifera*	
Insects		
Golden Sun Moth	*Synemon plana*	FFG Listed, Critically endangered (EPBC)

The Atlas of Victoria Wildlife 5 km buffer on PSP Area 23

Species	Scientific Name	VROT Status	FFG Status	EPBC Status
Musk Duck	*Biziura lobata*	Vulnerable		
Blue-billed Duck	*Oxyura australis*	Endangered	FFG Listed	
Eastern Barred Bandicoot	*Perameles gunnii*	Critically Endangered	FFG Listed	Endangered
Golden Sun Moth	*Synemon plana*	Endangered	FFG Listed	Critically Endangered

EPBC Protected Matters Search Tool 5km search Buffer on PSP Area 23

Species	Latin Name	EPBC Status
Birds		
Regent Honeyeater	*Anthochaera phrygia*	Endangered
Swift Parrot	*Lathamus discolor*	Endangered
Australian Painted Snipe	*Rostratula australis*	Vulnerable
Frogs		
Growling Grass Frog	*Litoria raniformis*	Vulnerable
Insects		
Golden Sun Moth	*Synemon plana*	Critically Endangered
Mammals		
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	Endangered
Eastern Barred Bandicoot	*Perameles gunnii*	Endangered
Smoky Mouse	*Pseudomys fumeus*	Endangered
Grey-Headed Flying Fox	*Pteropus poliocephalus*	Vulnerable
Ray-finned fishes		
Eastern Dwarf Galaxias	*Galaxiella pusilla*	Vulnerable
Australian Grayling	*Prototroctes maraena*	Vulnerable
Reptiles		
Striped Legless Lizard	*Delma impar*	Vulnerable
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	Endangered
Migratory Terrestrial Species		
Birds		
White-bellied Sea Eagle	*Haliaeetus leucogaster*	Migratory
White-throated Needletail	*Hirundapus caudacutus*	Migratory
Rainbow Bee-eater	*Merops ornatus*	Migratory
Satin Flycatcher	*Myiagra cyanoleuca*	Migratory
Rufous Fantail	*Rhipidura rufifrons*	Migratory
Regent Honeyeater	*Xanthomyza phrygia*	Migratory
Migratory Wetland Bird Species		
Great Egret	*Ardea alba*	Migratory
Cattle Egret	*Ardea ibis*	Migratory
Latham's Snipe	*Gallinago hardwickii*	Migratory
Painted snipe	*Rostratula benghalensis*	Migratory
Migratory Marine Birds		
Fork-tailed swift	*Apus Pacificus*	Migratory
Great Egret	*Ardea alba*	Migratory
Cattle egret	*Ardea ibis*	Migratory

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