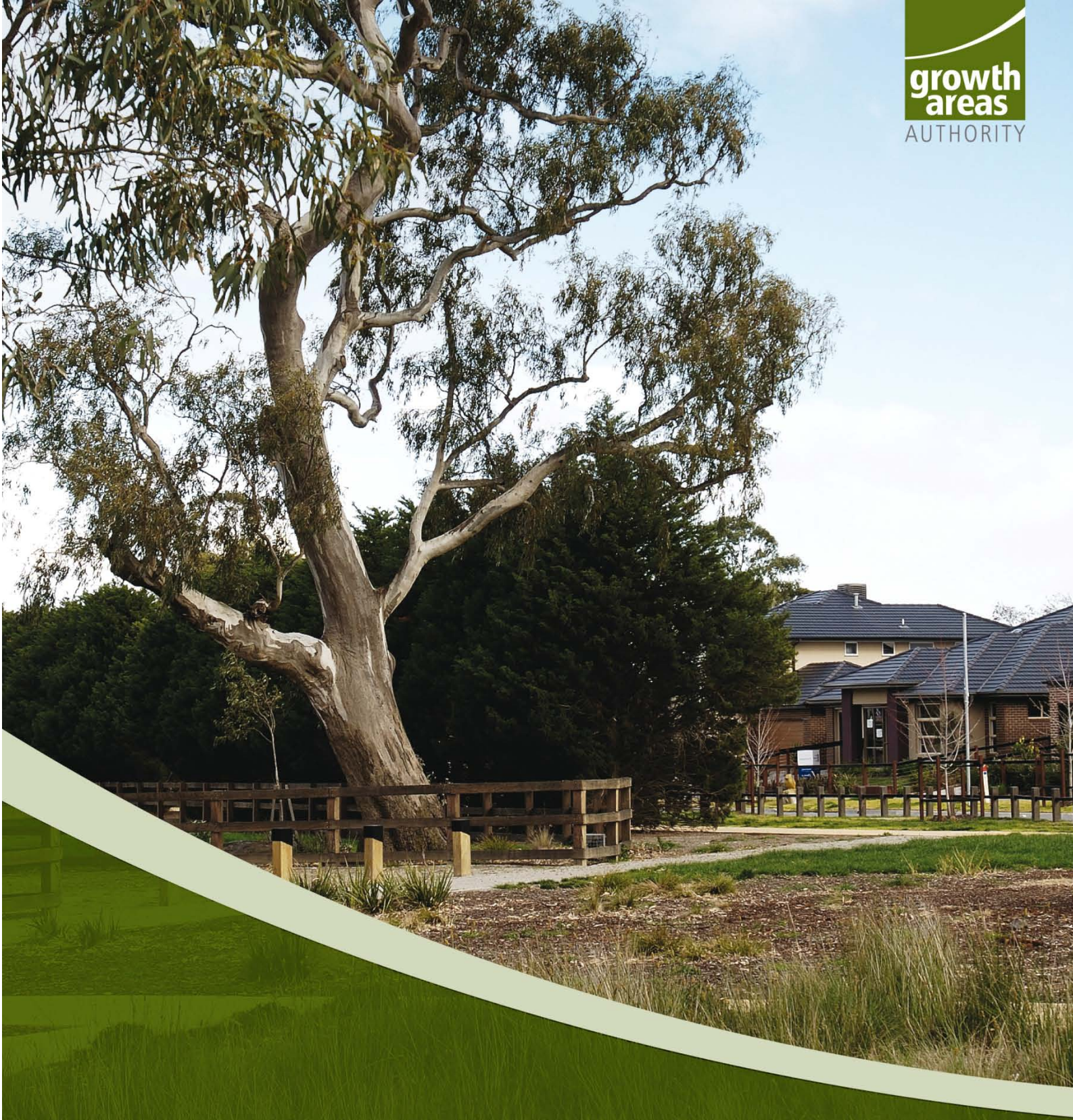

growth areas AUTHORITY

Biodiversity Assessment Report
Manor Lakes – PSP 41

August 2012

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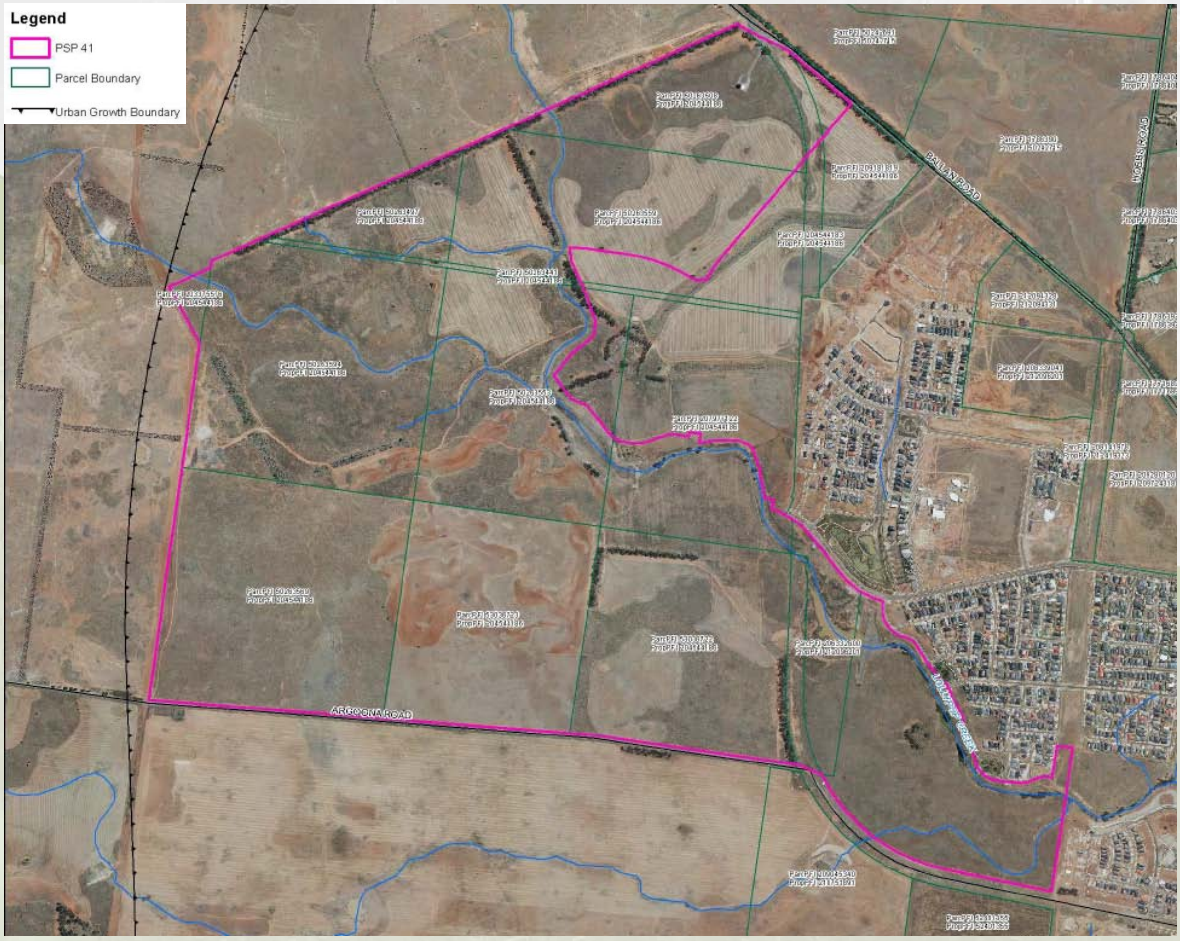
Biodiversity Assessment Report
Manor Lakes – PSP 41
August 2012



MAP: PSP 41 –Manor Lakes

Biodiversity Mapping Project
Quality Assurance – Verification Sheet
Manor Lakes – PSP 41

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BIOSIS
RESEARCH

Report to the Growth Areas Authority and Manor Lakes (Werribee) Pty Ltd

Biodiversity Assessment Report

Manor Lakes PSP 41

AUGUST 2011

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Manor Lakes (Werribee) Pty Ltd

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- Joseph Nasr

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Biosis Research

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- Jessica Davies for database searches and data entry.
- Matt Dell for review of draft report.

Others

- Peter Wlodarczyk for advice regarding rare and threatened flora localities.

CONTENTS

BIODIVERSITY REPORT OVERVIEW

This Biodiversity Report was prepared by Biosis Research Pty. Ltd. and commissioned by the Growth Areas Authority and Manor Lakes (Werribee) Pty Ltd. Information gathered and presented in this report is intended to inform the possible future preparation of Precinct Structure Plans and Native Vegetation Precinct Plans for this area.

Initial Vegetation Quality Assessments were conducted by AECOM between 12 November 2008 and 30 April 2009. Biosis Research undertook additional biodiversity assessments between September 2010 and March 2011. The survey methodologies used in preparation of this report are in accordance with guidelines and training provided by the Growth Areas Authority (GAA) and Department of Sustainability and Environment (Victoria) (DSE). Any limitations to the report or to the application of its findings are outlined in Section 2.5 of Part 2 of this report.

SUB-REGIONAL SPECIES SURVEYS

Sub-Regional surveys were conducted for the Growling Grass Frog (GGF), the Golden Sun Moth (GSM), and the Southern Brown Bandicoot (SBB), as part of a separate project to the current Biodiversity Mapping Project 2009 – 2010. The purpose of the work was to inform and provide background information for the development of Sub-Regional strategies for each of these species.

Contractors were required to reference and use the Sub-Regional survey information as part of the preparation of the Biodiversity Assessment Reports. Accordingly, no targeted surveys were carried out for these species as part of the Biodiversity Mapping Project 2009 – 2010.

The Sub-Regional survey information referenced in the Biodiversity Assessment report will be superseded by the Sub-Regional Strategies for the relevant species and ultimately the Biodiversity Conservation Strategy once endorsed by the Federal Government.

EXECUTIVE SUMMARY

Introduction

Biosis Research was commissioned by the Growth Areas Authority (GAA) and Manor Lakes (Werribee) Pty Ltd to undertake a biodiversity assessment within Manor Lakes PSP 41 (Figure i). The field assessments including general flora and fauna assessment, targeted searches for threatened flora and fauna and a revision of the vegetation quality assessment undertaken by AECOM in 2008/2009. Additional field assessments were undertaken by Biosis Research between 20 September 2010 and 28 March 2011 within Manor Lakes PSP 41.

Manor Lakes PSP 41 is located within Wyndham Vale City Council and is bounded to the north by Ballan Road, to the south by Greens Road, to the west by private property and to the east by the proposed regional rail link and Armstrong Road. It includes a section of Lollypop Creek and several associated tributaries.

Methods

Field assessment and mapping methods follow the Biodiversity Precinct Structure Planning Kit (DSE 2010), GAA (2009a) and specifically the Biodiversity Assessment Template for 2009–2011 Biodiversity Mapping Projects.

In summary:

- Potential habitat for a number of rare or threatened species, known to or likely to occur within the precinct, were searched for those species using a range of survey of methods appropriate for each.
- General flora and fauna surveys were undertaken within Manor Lakes PSP 41.
- Targeted surveys for significant flora species were undertaken in suitable habitat within Manor Lakes PSP 41.
- Targeted surveys for Growling Grass Frog and Yarra Pygmy Perch were conducted within ephemeral wetlands, along Lollypop Creek and associated tributaries.

- Targeted Plains-wanderer surveys at one location in the Western Balance area of Manor Lakes PSP 41.
- Targeted Golden Sun Moth surveys were undertaken in native and exotic grassland patches.
- Patches of native vegetation mapped by AECOM in 2008/2009 were reviewed and habitat scores were amended to correct differences in the vegetation quality assessment. Native vegetation quality was scored in accordance with DSE (2004).

Results

Access

Manor Lakes PSP 41 covers 438.61 ha and all of this area was accessed during the current assessment (Figure ii).

Ecological Vegetation Classes

Two Ecological Vegetation Class (EVC) comprising Plains Grassland and Stony Knoll Shrubland were mapped by AECOM within Manor Lakes PSP 41 during the previous assessment in 2008/2009. During the recent assessment, only one EVC, *Low-rainfall* Plains Grassland was identified within the patch boundaries mapped by AECOM, therefore mapping and habitat scores were updated to reflect this (Figure iii).

Significant Species

Flora

One nationally significant flora species (nine Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*) was recorded during the current assessment. The Victorian Biodiversity Atlas (VBA) database contains records of two additional species of national conservation significance from within 5 km of the study area. The DSEWPaC database predicts the occurrence of, or suitable habitat for three additional plant species listed under the EPBC Act. The review of DSE data predicts the occurrence of seven additional species of national conservation significance (Table 2).

Nine flora species of state significance, eight Buloke *Allocasuarina luehmannii*, 19 Arching Flax-lily *Dianella* sp. aff *longifolia* (Benambra), 1089 Small Scurf-pea *Cullen parvum*, 15 Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis*, 108 Pale Spike-sedge *Eleocharis pallens*, approximately 182 Flat Spike-sedge *Eleocharis plana*, one Wimmera Woodruff *Asperula wimmerana*, 10 Pale-flower Crane's-bill *Geranium* sp. 3 and six Slender Tick-trefoil

Desmodium varians were recorded within Manor Lakes PSP 41 during the current assessment. The VBA database contains records of nine species of state conservation significance from the local area, including some of those recorded during the current assessment (within 5 km). The DSE review predicts the occurrence of six additional species of state conservation significance from the local area (Table 2).

Fauna

One fauna species of national significance, the Golden Sun Moth *Synemon plana*, was recorded during the current assessment. This species was found to be widespread throughout grassland habitat within the survey area. Targeted survey was carried out for three fauna species of national significance:

- Growling Grass Frog *Litoria raniformis*;
- Plains-wanderer *Pedionomus torquatus*; and
- Yarra Pygmy Perch *Nannoperca obscura*.

None of these species were recorded during these targeted surveys.

In addition, there were 19 fauna species of national significance and 24 of state significance that have previously been recorded from within 5 km of the site or within the Lollypop Creek catchment in the case of aquatic fauna (Table 7). A further 19 fauna species listed as near threatened or data deficient under the DSE Advisory List have also been recorded within the within 5 km radius of the site.

A total of 85ha of the EPBC Act listed ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain* and the FFG Act listed community Western (Basalt) Plains Grassland Community were recorded within Manor Lakes PSP 41 by AECOM.

Vegetation Quality Assessment

Of the 438 ha within Manor Lakes PSP 41, a total of 85 ha of indigenous vegetation (54 patches) were recorded by AECOM in 08/09.

This vegetation equates to 43.47 habitat hectares (hha) of *Low-rainfall* Plains Grassland within the area assessed.

Government legislation and policy

A large proportion of Manor Lakes PSP 41 supports matters of NES which would trigger the EPBC Act, in the event an action required an environmental approval under the Act. In response to this, the Victorian Government

has engaged with DSEWPaC to conduct a strategic assessment process in relation to the entire Investigation Area.

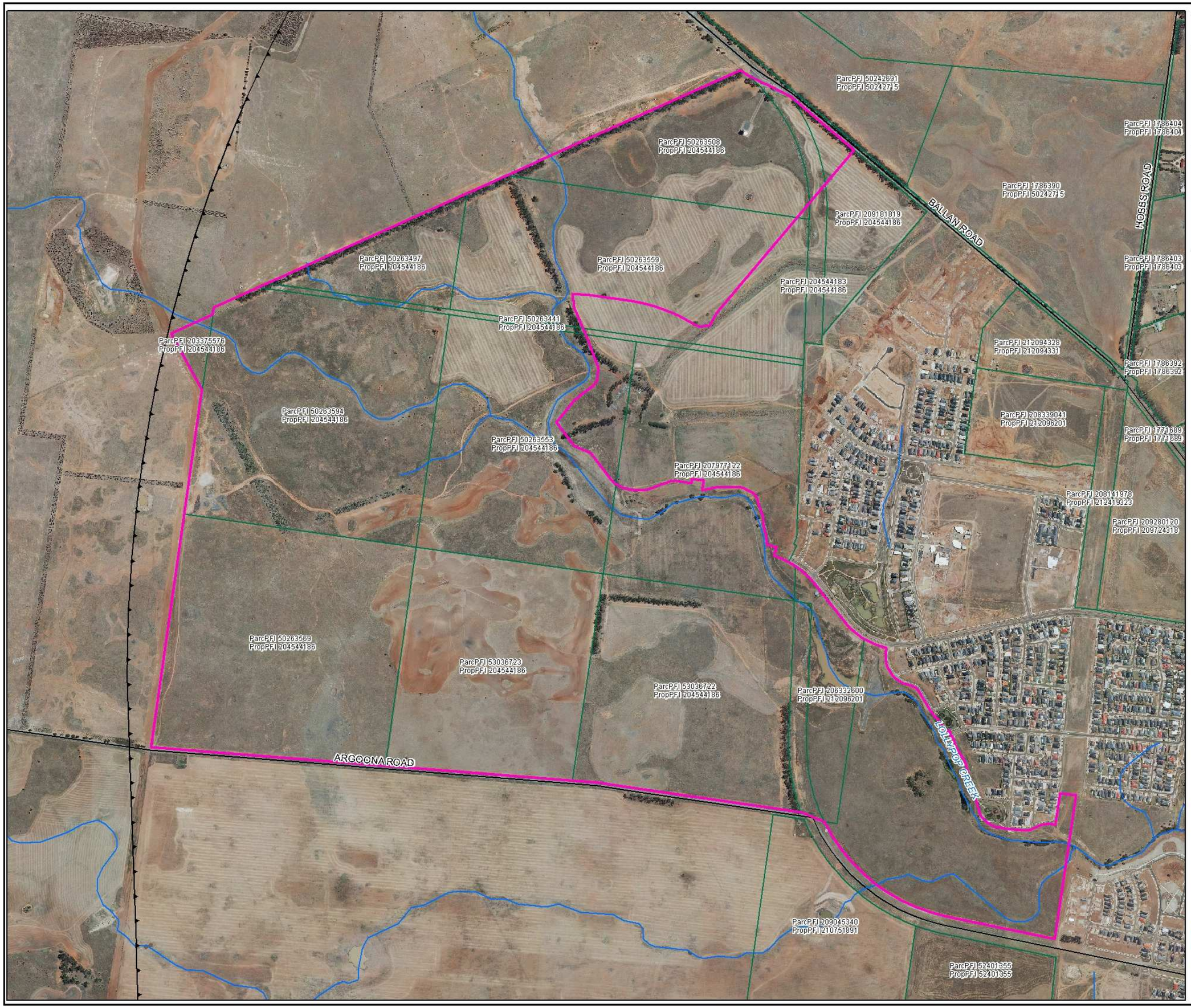
A planning permit to remove native vegetation would typically be required under the Wyndham Shire Planning Scheme (Clause 52.17). However, it is possible that some or all of Manor Lakes PSP 41 will be subject to a Native Vegetation Precinct Plan (NVPP) (Clause 52.16) which would negate the need for a permit under Clause 52.17 (or other relevant clause), if removal is in line with the NVPP.

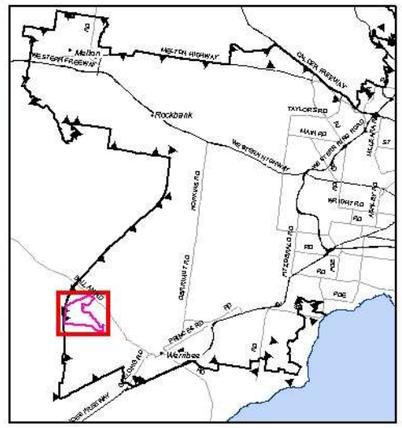
A permit will be required from DSE under the Victorian *Flora and Fauna Guarantee Act 1988* to remove protected flora from the public land (i.e. road reserves) within and surrounding Manor Lakes PSP 41.

Potential losses of native vegetation associated with any development of Manor Lakes PSP 41 will be subject to the guidelines provided by Victoria's Native Vegetation Management Framework (the Framework).

Conclusions

Manor Lakes PSP 41 contains significant areas of native vegetation comprised of one endangered EVC and includes the EPBC Act listed ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain* and the FFG Act listed community Western (Basalt) Plains Grassland Community. One EPBC Act (1999) listed fauna species, Golden Sun Moth *Synemon plana*, and one EPBC Act listed flora species Spiny Rice Flower *Pimelea spinescens* subsp. *spinescens*, was recorded on Manor Lakes PSP 41. Areas of Very High conservation significance have been identified within Manor Lakes PSP 41, based on their conservation significance, size, habitat for threatened species and habitat connectivity values. Ten significant flora species have been recorded within the study area. Identification of these areas provides opportunities for the precinct planning process to consider and implement the 3-step process of avoid, minimise and offset set out in the Framework.





Legend

- PSP 41
- Parcel Boundary
- Urban Growth Boundary

Figure i: Overview PSP 41

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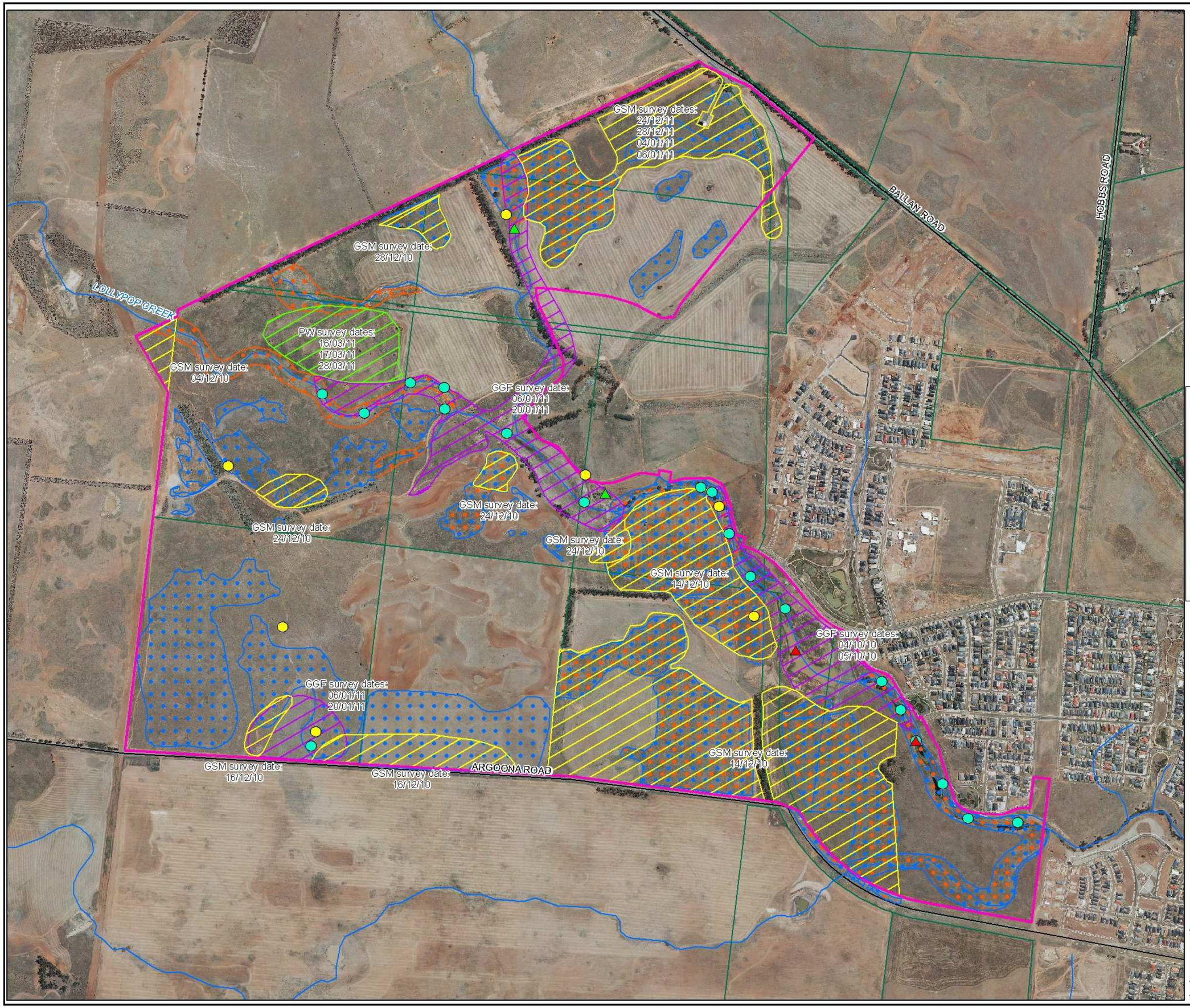

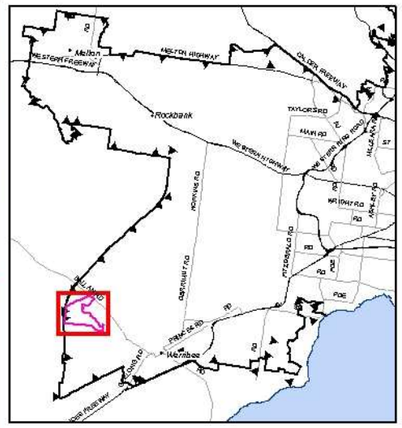

Legend

- Anabat survey location
- Bird census survey location
- Yarra Pygmy Perch targeted survey
- Growling Grass Frog playback location
- Spring targeted flora surveys
- Summer targeted flora surveys
- Plains Wanderer survey extent
- Golden Sun Moth survey extent
- Growling Grass Frog survey extent
- PSP 41

Access was approved and gained for all areas for all surveys. See Figure A2 for more detail.

Figure ii: Property Survey and Access Status, PSP 41

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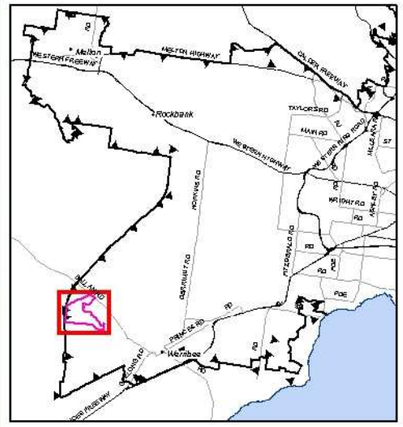

Legend

Scattered Trees (AECOM 2010)

- Very Large Old Tree
- Large Old Tree
- Medium Old Tree
- EPBC Listed Natural Temperate Grassland of the Victorian Volcanic Plain

Native vegetation recorded by AECOM between 2008 & 2010 (AECOM 2010)

- 132_63 Low-rainfall Plains Grassland

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

See Figure A4 for more detail

Figure iii: Vegetation, Manor Lakes PSP 41

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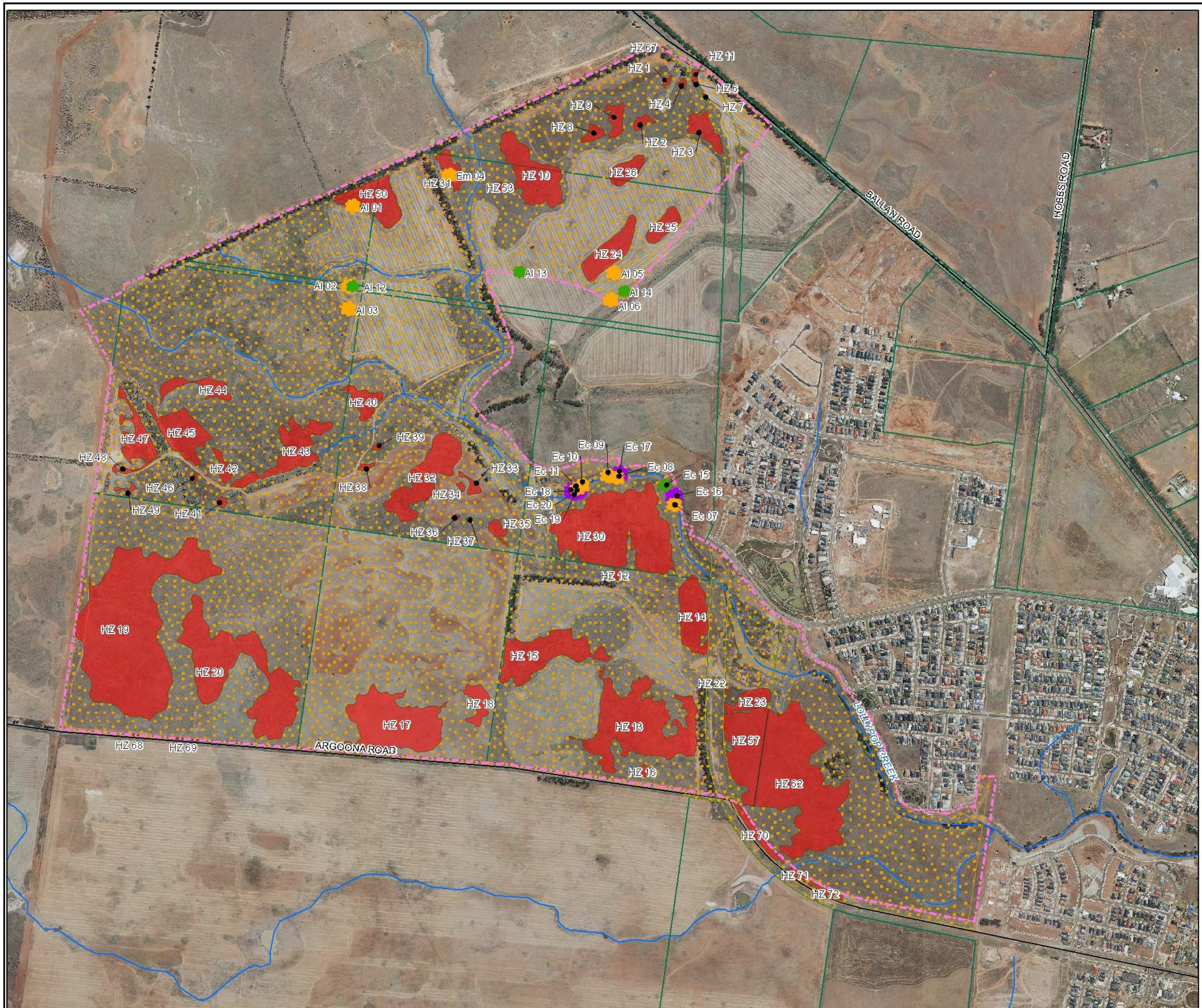

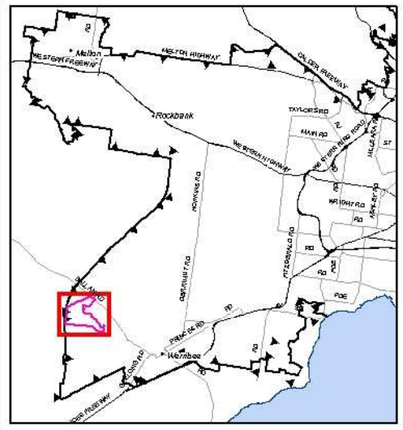

Legend

Scattered Trees (AECOM 2010)

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

Native vegetation

Conservation significance

- Very High

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

See Figure A6 for more detail

Figure iv: Conservation significance of habitat zones according to the Native Vegetation Framework (NRE 2002), Manor Lakes PSP 41

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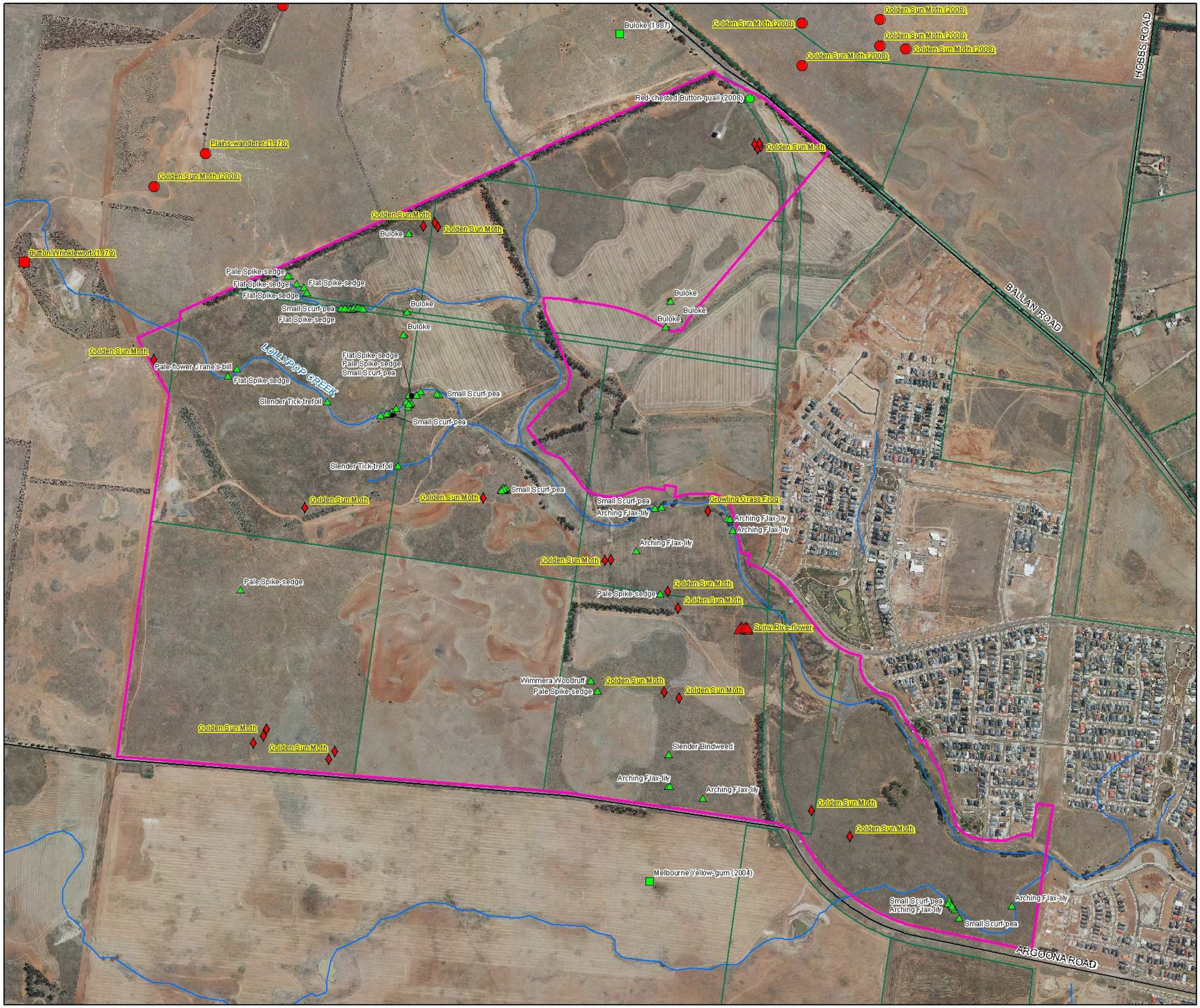

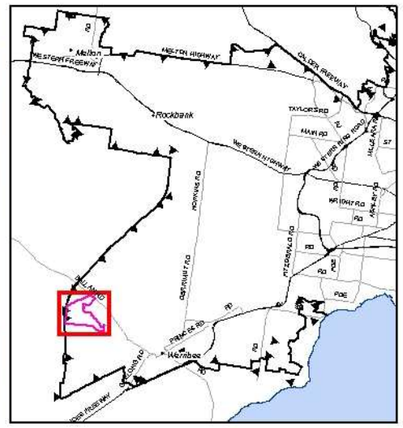

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PSP 41

Targeted and Current Flora results

Significance

- National
- State

Targeted and Current Fauna results

Significance

- National

Database Flora records

Significance

- National
- State

Database Fauna records

Significance

- National
- State

Targeted flora were recorded in 2010/11
Targeted fauna were recorded in 2011
See Figure A3 for more detail

Figure v: National and State Significant flora and fauna species locations, PSP 41

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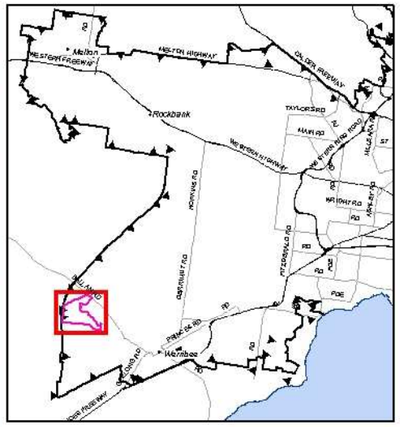

Legend

Fauna habitat

- Grassland –rocky
- Pasture/crop – not rocky
- Pasture/crop – rocky
- Planted Vegetation
- Remnant tree
- Rock walls/piles
- Shrubland/Escarpment Shrubland
- Wetland/watercourse

Plains Wanderer Habitat

- Potential

Striped Legless Lizard Habitat

- Potential

Growling Grass Frog Habitat

- Potential

Golden Sun Moth Habitat

- Known
- Potential

- PSP 41

See Figure A7 for more detail

Figure vi: Fauna Habitat, PSP 41

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1.0 INTRODUCTION

1.1 Project Background

Biosis Research was commissioned by the Growth Areas Authority (GAA) and Manor Lakes (Werribee) Pty Ltd to undertake a biodiversity assessment within Manor Lakes PSP 41 west of Melbourne (Figure 1). The purpose of this assessment was to identify the extent of biodiversity values that exist, particularly in the previously identified remnant patches of the AECOM report; to confirm if these remnant patches meet the ecological community threshold for Natural Temperate Grassland of the Victorian Volcanic Plain; and to further inform the precinct structure planning process of the biodiversity values of PSP 41 which is designated for future urban development.

Previous investigations

In December 2005, Brett Lane and Associates (BLA) undertook a net gain assessment of the study area (BLA 2005). This report provided information on the native vegetation identified on site to inform a planning application for the future residential and commercial use of the land. Further to this assessment, BLA have undertaken targeted surveys for Growling Grass Frog, Plains-wanderer, Golden Sun Moth and Spiny Rice-flower (BLA 2010a, b, c, d). Sub-regional surveys for Golden Sun Moth and Growling Grass Frog have also been carried out within and in the vicinity of Manor Lakes PSP 41 (Biosis Research 2010a; Ecology Australia 2010). Additional targeted searches for Spiny Rice-flower were not required for this assessment (DSE pers comm.; Appendix 1). However, additional survey for Golden Sun Moth and Plains-wanderer was required to comply with the methods outlined in the Biodiversity Precinct Structure Planning Kit (DSE 2010). Further survey for Growling Grass Frog was also required by DSE following periods of above average rainfall in the region.

In April 2010, AECOM produced the *Vegetation Assessment Reporting Wyndham Vale Precinct Structure Area 40* (AECOM 2010). This report covered the Wyndham Vale investigation area which included Manor Lakes PSP 41. It provided the mapping of areas of remnant vegetation and degraded treeless vegetation, and included the vegetation quality assessment for the investigation area.

The current report aims to provide a more detailed analysis of the biodiversity values of Manor Lakes PSP 41. It includes the results of the general flora and fauna assessment, targeted searches for threatened flora and fauna and provides a revision of the vegetation quality assessment undertaken by AECOM in 2008/2009.

1.2 Objectives

The objectives of the study are to:

- Identify, assess, and map all flora, fauna, and habitat and record the location and level of conservation significance of all significant flora, fauna and vegetation communities within Manor Lakes PSP 41;
- Collect data at sufficient detail and standard that enables a Precinct structure Plan and Biodiversity Plan to be developed;
- Provide advice on any works or management measures that may reduce adverse impacts of the development on species known or likely to occur in the precinct;
- Ensure that development of the precinct is able to comply with Government legislative and policy requirements on the protection of indigenous fauna and flora species and communities.

These objectives will be achieved by:

- Providing revised data regarding the quality of vegetation within the mapped Ecological Vegetation Classes (EVCs) assessed by AECOM;
- Undertaking searches for significant species and mapping their likely habitat and locations of any recorded occurrences;
- Assigning a conservation significance to all patches of native vegetation and providing net gain calculations as per the Native Vegetation Framework (NRE 2002) and Vegetation Quality Assessment Manual (DSE 2004);
- Mapping areas of ≤25% or >25% cover of high threat perennial grassy weeds;
- Providing a consolidated species list of flora and fauna recorded during the project and augmenting these with database records of threatened flora and fauna species provided by database searches within each area; and
- Identifying the limitations of the current assessment.

1.3 Study Site (Precinct)

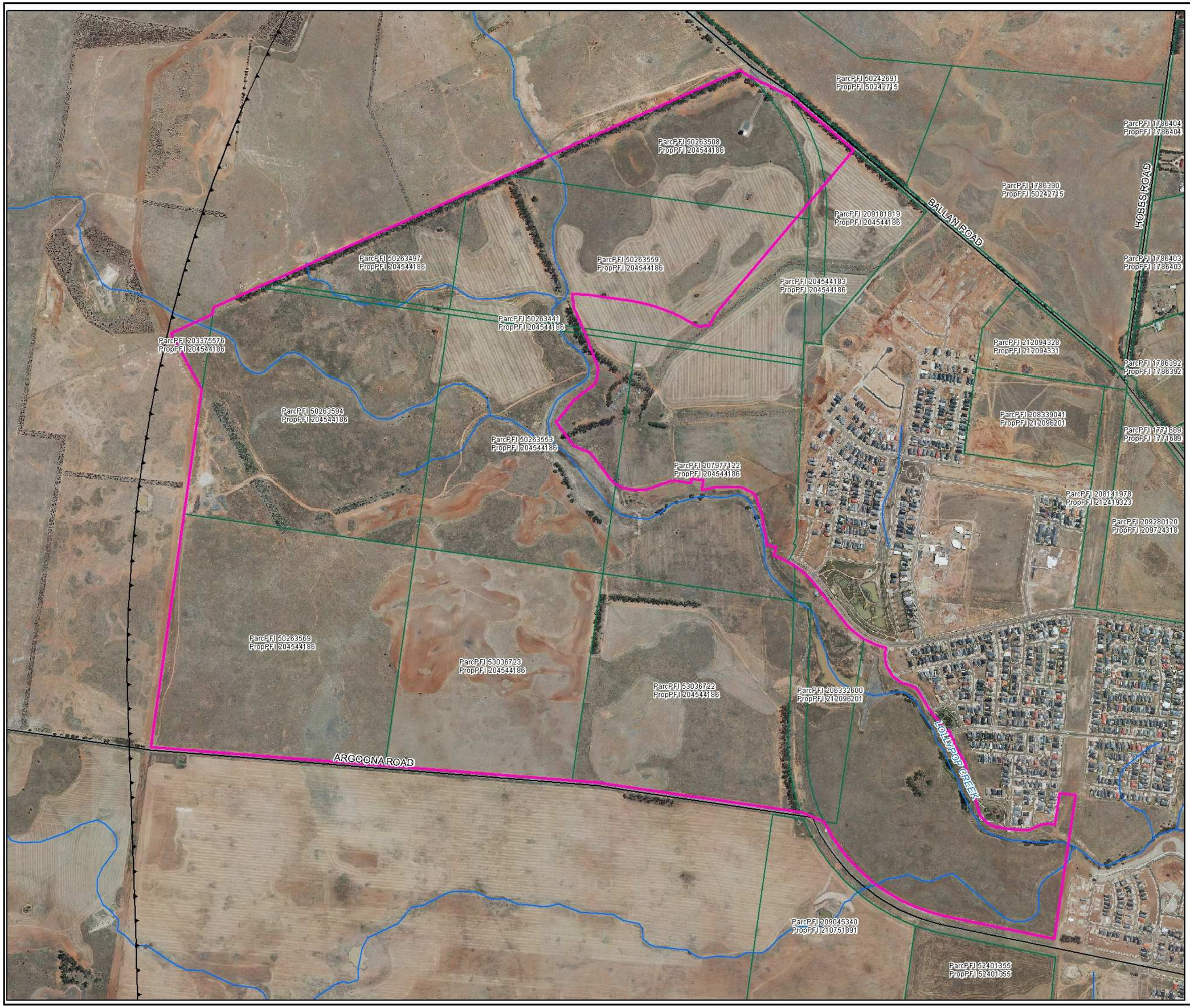
Manor Lakes PSP 41 is located on the western fringe of Melbourne in Wyndham Vale City Council (Figure 1). Manor Lakes PSP 41 covers an area of 438.61 ha and is within the Victorian Volcanic Plain bioregion. It is bounded to the north by Ballan Road, to the south by Greens Road, to the west by private property and to the east by the proposed regional rail link and Armstrong Road. It includes a

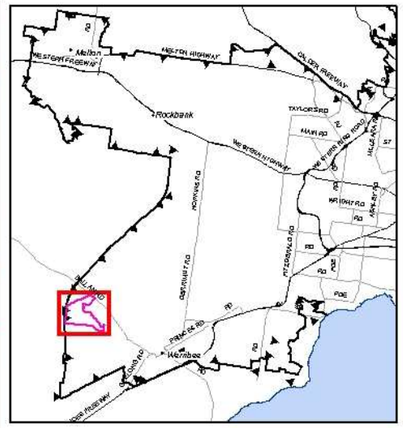
section of Lollypop Creek and associated tributaries.

The topography is generally flat to gently undulating, resulting from lava flows of the late Tertiary–early Quaternary periods.

The majority of land within Manor Lakes PSP 41 is privately owned and is subject to agricultural activities in the form of cropping and grazing livestock.

The study area lies within a landscape which is well documented for its association with a number of matters of national significance. It occurs within the range of the EPBC (*Environment Protection and Biodiversity Conservation*) Act listed ecological communities Natural Temperate Grassland of the Victorian Volcanic Plain and Grassy Eucalypt Woodland of the Victorian Volcanic Plain. In addition, there are several threatened species listed under the EPBC Act which have historical records from the precinct, or are otherwise predicted to occur within the precinct. These are discussed in detail under Section 3.





Legend

- PSP 41
- Parcel Boundary
- Urban Growth Boundary

Figure 1: Overview PSP 41

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2.0 METHODS

Field assessment and mapping methods follow the Biodiversity Precinct Structure Planning Kit (DSE 2010) and specifically the Biodiversity Assessment Template for 2009–2011 Biodiversity Mapping Projects (GAA 2011).

2.1 Terminology

Common and scientific names for flora and fauna follow the Victorian Biodiversity Atlas (VBA 2010) which is curated by DSE. The conservation status of species was determined from their listing in DSE advisory lists (DSE 2005, 2007, 2009) or their listing under the EPBC Act.

Classification and naming of native vegetation mapping units for planning purposes in Victoria follows a typology developed by DSE in which Ecological Vegetation Classes (EVCs) are the primary level of classification. An EVC contains one or more plant communities and represents a grouping of broadly similar environments (www.dse.vic.gov.au).

State (*Flora and Fauna Guarantee Act* 1988) and nationally (EPBC) listed ecological communities are classified and named by the DSE and the Department of Sustainability, Environment, Water, Populations and Communities (DSEWPaC) respectively (www.dse.vic.gov.au, http://www.environment.gov.au/biodiversity/threatened/index.html).

2.2 Literature and Database Review

Data from the DSE Victorian Biodiversity Atlas (VBA) (VBA_FLORA25, FLORA100 & FLORARestricted' August 2010 and VBA_FAUNA25, FAUNA100 & FAUNARestricted' August 2010), Victorian Aquatic Fauna database (2005), Melbourne Water Fish database (2008) were obtained and reviewed for Manor Lakes PSP 41. The contribution of the Royal Botanical Gardens Melbourne to the VBA database is acknowledged. Data was also requested and obtained from the Birds Australia database (7 March 2011). These data included historical records within 5 km of the study area.

The DSEWPAC online database for the EPBC Act Protected Matters Search Tool, was searched to include an area within 5 km of the precinct. This search produced details of matters of national significance including threatened species known or predicted to occur within the search area.

The modelled 2005 distribution and 1750 EVCs (DSE mapping of native vegetation present at these dates) within the precinct and their bioregional conservation status was reviewed using Biodiversity Interactive Maps (www.dse.vic.gov.au). Other relevant spatial data on Biodiversity Interactive

Maps was reviewed as well as aerial photography for the precinct and topographic maps.

The report written by AECOM for the Growth Areas Authority in April 2010 that is relevant to Manor Lakes PSP 41 was reviewed (AECOM 2010). Mapped habitat and locations of threatened flora and fauna species were reviewed and where relevant included in the current assessment. Other Biosis Research reports relevant to the precinct region were reviewed during the assessment process (Biosis Research 2009a, 2009b).

Botanist Peter Wlodarczyk was consulted regarding the likely presence of rare or threatened plant species within the precinct. This information was used in refining search efforts for particular species.

Other sources of biodiversity information reviewed, where relevant, included:

- DSE Biosites Register (DSE 2005b)
- Actions for Biodiversity Conservation (threatened species)
- Databases available through DataMart (vicmap.info@dse.vic.gov.au)
- EPBC Act Significant Impact Guidelines
- Environmental Reporting Tool (ERT)
- National Recovery Plans
- Conservation Advices
- Species Profiles and Threats Database (SPRAT)
- DSE Advisory Lists
- Conservation Status of Australian Fishes (ASFB 2004)
- Aerial photography
- Topographic maps

2.3 Field Survey Techniques

Field assessments undertaken by Biosis Research were undertaken by up to eight botanists, two zoologists and two aquatic ecologists. General flora surveys were conducted by up to three botanists on the 20 September 2010, 30 November 2010, 1 December 2010, 6 January 2011 and 7 January 2011. General fauna surveys and associated habitat assessments were conducted by up to two zoologists on 28 September, 16 and 21 December 2010. Targeted flora surveys were conducted by up to five botanists on 24, 28 and 29 September 2010;

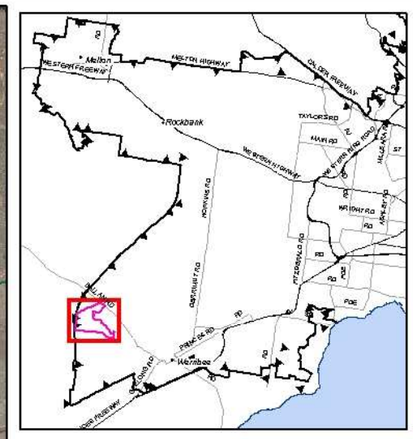
29-30 November 2010; 1–3, 6–8, 16-17 December 2010 and 7–11, 21–24 February 2011 (Table 7). Targeted Growling Grass Frog surveys were conducted by two zoologists on 4–5 October 2010 and 6, 20 January 2011 (Table 11). Targeted Golden Sun Moths surveys were conducted by (at least) two zoologists on the 14, 22, 24 December 2010 and 4, 6 January 2011 (Table 12). Plains-wanderer targeted surveys were conducted on 15, 16, 28 March 2011 (Table 13). Aquatic surveys were conducted on the lower section of Lollypop Creek by two aquatic ecologists on 23, 24 September 2010 (Table 14).

AECOM undertook the vegetation quality assessment and mapping of the area between 12 November 2008 and 30 April 2009. These data were updated on the 6 and 7 January 2011 by Biosis Research.

In total, approximately 438.61 ha of private land within Manor Lakes PSP 41 were inspected and the following surveys were undertaken.

2.3.1 General flora survey

A general flora survey was undertaken on Manor Lakes PSP 41 to produce a census of vascular plants. Vascular plants include all flowering plants, conifers, ferns and fern allies. Where some material could not be fully identified in the field, specimens were collected and examined in the lab to verify or check determinations made in the field. Keys and descriptions in Walsh and Entwisle (1994, 1996, 1999) were used in verifying the identification of samples unless more up-to-date published taxonomy was available. A list of vascular plants for each property was submitted to the FIS database (T25146 and T25162).



Legend

- Anabat survey location
- Bird census survey location
- Yarra Pygmy Perch targeted survey
- Growling Grass Frog playback location
- Spring targeted flora surveys
- Summer targeted flora surveys
- Plains Wanderer survey extent
- Golden Sun Moth survey extent
- Growling Grass Frog survey extent
- PSP 41

Access was approved and gained for all areas for all surveys. See Figure A2 for more detail.

Figure 2: Property Survey and Access Status, PSP 41

N

GDA 94 Zone 55
1:12 000 at A3

0 250 500
Meters

Biosis Research Pty. Ltd.
38 Bertie Street
(PO Box 489)
Port Melbourne
VICTORIA 3207

Offices also in: Ballarat, Sydney, Wollongong, Canberra, Wangaratta

Date: 11 August 2011, File number: 12649
Checked by: JRF, Drawn by: SKM
Location: ...12649\Mapping\Report Figures\12649 Fig ii Access & Survey effort.mxd

2.3.2 Native vegetation (habitat hectare assessment undertaken by AECOM)

The vegetation within Manor Lakes PSP 41 was inspected by AECOM between November 2008 and April 2009 (AECOM 2010). The inspection of each property where access was permitted focused on delineating the extent of areas definable as a patch of native vegetation. A patch is defined by DSE (2007a) as an area where at least 25% of the total understorey plant cover is native (excluding bare ground) or where three or more canopy trees in a group exceed 20% canopy cover (see Appendix 1).

For each patch identified by AECOM, a habitat hectare assessment was conducted and habitat score calculated (DSE 2004). A summary of this method is provided in Appendix 1. In instances where habitat hectares data collected by AECOM (2010) were incorrect or different, habitat hectares scores were recalculated and updated for this report. This update was undertaken on the 6 and 7 January 2011.

All areas that did not meet the definition criteria of a patch of native vegetation, but which contained at least one native flora species were mapped as Degraded Treeless Vegetation (DTV) by AECOM. Typically this included cropped sites, cultivated areas sown with exotic pasture species and other areas dominated by introduced species, but contain scattered native vegetation. No areas of Non-native Vegetation (NNV) were mapped within the study area.

Indigenous canopy trees were also assessed and mapped by AECOM in accordance with Victoria's Native Vegetation Management Framework (NRE 2002 – the Framework) and the relevant EVC benchmark for the definition of 'Large Old Tree' (AECOM 2010). For scattered trees, AECOM identified and recorded the location of individual indigenous trees encountered, including the species, size class and assessment to determine ecological/ habitat significance (AECOM 2010). The number of Very Large Old Trees (1.25 x benchmark size), Large Old Trees (1 x benchmark size), Medium Old Trees (0.75 x benchmark size) and Small Trees (<0.75 x benchmark size) was recorded within and outside patches of remnant native vegetation.

DSE have stipulated that consultants should utilise the Landscape Context Modelling Data layer (NV2005_QUAL_CSDL DSE 2008) provided in the Biodiversity Interactive Map 3.1 (http://mapshare2.dse.vic.gov.au/MapShare2EXT/imf.jsp?site=bim) to assign landscape scores for each patch of native vegetation within the investigation areas. The landscape context score for each habitat zone assessed by AECOM has been updated to reflect the Landscape Context Modelling Data for patches within Manor Lakes PSP 41.

2.3.3 High threat perennial grassy weeds assessment

Within each Habitat Zone and areas of DTV, the cover of high threat perennial grassy weeds was determined to be either:

- Less than or equal to (≤) 25% cover of high threat perennial grassy weeds present; or
- Greater than (>) 25% cover of high threat perennial grassy weeds present.

2.3.4 General fauna survey

All accessible land within the precinct was investigated on foot and by vehicle to determine the types and qualities of habitat(s) present within the precinct. General fauna surveys were then undertaken within these habitat types to produce a census of vertebrate fauna species for the precinct. All vertebrate species of fauna (including introduced and native birds, reptiles and frogs) observed during the assessments by means of direct observation, searching under rocks and logs, examination of tracks and scats and identifying calls were recorded. Particular attention was given to searching for significant species and their habitats. Fauna species were recorded with a view to characterising the values of the site and were not intended to provide a comprehensive survey of all fauna that has potential to utilise the site over time.

Terrestrial mammals

Surveys for terrestrial mammals were undertaken at each property, as part of the general surveys outlined above, and involved visual identification, searches for indirect evidence (e.g. scats, tracks) and identifying potential habitat. Survey time and effort depended on the size of the property and the types of habitat present.

Arboreal mammals

Arboreal surveys were not conducted on Manor Lakes PSP 41 due to the small and isolated nature of the remnant tree patches. The presence of tree hollows, distinctive scratchings and scats were noted during the diurnal general fauna and habitat assessment. Remnant trees were also opportunistically searched using hand-held spotlights and head lamps while conducting targeted Growling Grass Frog surveys along Lollypop Creek.

Bats

Anabat ultrasonic detectors (Titley Scientific, Australia) were used at two locations within the study area (Figure 2) to survey for microbats,

particularly to determine whether Southern Myotis *Myotis macropus* (DSE Advisory List – near threatened) occur within the study area. Anabat units remotely detect and record ultrasonic bat calls, and store all recorded calls onto a compact flash card from which files can be downloaded for analysis. Data were collected between dusk and dawn over three nights from 14–16 February 2011. Calls were analysed by Lindy Lumsden at the Arthur Rylah Institute, DSE.

Birds

Additional bird census surveys were conducted in the early morning and late afternoon at two different habitat types on 28 September, 4, 5 and 6 October 2010. Further bird census surveys were conducted in the early morning and late afternoon at five different habitat types on 14, 16, 17 and 21 January 2010, resulting in a total of 24 20-minute bird census surveys within the study area (Figure 2). Bird census surveys were conducted to ensure that any species active only during the early morning or late afternoon were recorded.

Reptiles

During general fauna surveys, areas of potential reptile habitat were actively searched by hand. In addition, random half-hour searches in each habitat type were also conducted, focusing on looking under rocks, logs, leaf litter and artificial items with potential to provide habitat. Random active searches were undertaken in remnant rocky grassland habitat, within rock walls, under leaf litter, in riparian areas and amongst artificial refuse (discarded timber, tin, etc).

Amphibians

During the general fauna surveys, all aquatic habitats (e.g. creeks, rivers, dams, wetlands) were mapped and actively searched to locate any frogs that may be present. In addition, a targeted survey for Growling Grass Frog was undertaken within the study area during which all observed frogs were noted.

Invertebrates

The only species of invertebrate for which targeted survey was undertaken was the nationally significant Golden Sun Moth. Targeted survey for other invertebrates was not undertaken as per agreement with the GAA and DSE.

Fish

Targeted fish surveys were undertaken at three sites on Lollypop Creek within and in the vicinity of the study area. Survey site selection was based on water depth/permanence, waterway connectivity, accessibility and location relative to the study area. Three fyke nets and eight bait traps were set overnight at each site. These techniques were utilised in order to maximise sampling efficacy in

accordance with site characteristics such as stream conductivity (similar to salinity), depth, width, and vegetation cover.

2.3.5 Targeted surveys for flora and fauna

Information on any populations of rare or threatened species (DSE 2005, DSE 2007b, DSE 2009) observed during a property site inspection was recorded during field assessments.

Flora

Spring and summer targeted surveys were conducted within Manor Lakes PSP 41 for designated threatened flora species. Winter targeted surveys for Spiny Rice-flower were not undertaken as per agreement with the GAA and DSE. Following discussions with DSE (Appendix 1), the following species were targeted during the current spring and summer targeted flora survey:

- Matted Flax-lily *Dianella amoena*;
- Small Scurf-pea *Cullen parvum*;
- Button Wrinklewort *Rutidosis leptorhynchoides*;
- River Swamp Wallaby-grass *Amphibromus fluitans*;
- Sunshine Diuris *Diuris fragrantissima*;
- Small Golden-moths *Diuris basaltica*;
- Tough Scurf-pea *Cullen tenax*;
- Swollen Swamp Wallaby-grass *Amphibromus pithogastrus*;
- Large-fruit Fireweed *Senecio macrocarpus*;
- Basalt Sun-orchid *Thelymitra gregaria*;
- Basalt Podolepis *Podolepis* sp. 1;
- Pale Swamp Everlasting *Helichrysum* aff. *rutidolepis* (Lowland Swamp);
- Swamp Everlasting *Xerochrysum palustre*;
- Slender Tick-trefoil *Desmodium varians*;
- Clover Glycine *Glycine latrobeana*;
- Small Milkwort *Comesperma polygaloides*;
- Basalt Peppercress *Lepidium hyssopifolium*; and
- Swamp Fireweed *Senecio psilocarpus*.

The first targeted surveys were conducted in spring (September, November and December) and the second were conducted in summer (February). Due to the wet weather conditions at the time, it was agreed with DSE and GAA to extend targeted spring surveys out to the end of December. Data collected

included a GPS waypoint, estimated distribution and estimated population size.

Suitable habitat for most threatened flora species generally consists of higher quality areas of remnant native vegetation. As such, these areas were prioritised for searches so that areas determined as higher quality representative habitat for each target species was systematically surveyed (Figure A4). Each search area was surveyed by a minimum of two botanists walking in parallel transect lines 3 m apart. Using this method, approximately 10 ha of habitat was searched per day.

Any incidental records of additional threatened flora species identified in the general flora or targeted surveys were recorded as described above.

Fauna

Fauna species identified for targeted survey in this assessment were Growling Grass Frog *Litoria raniformis,* Plains-wanderer *Pedionomus torquatus* and Golden Sun Moth *Synemon plana*. Other rare or threatened species have either been subject to separate targeted searches within PSP 41 (i.e. sub-regional surveys commissioned by the GAA), have been assessed as having a low likelihood of occurrence or have been assumed to be present following prescriptions for areas within the Urban Growth Boundary (UGB) in DSE (2009).

Targeted survey for Growling Grass Frog was conducted at eleven sites along Lollypop Creek on 4 and 5 October 2010 and 6 and 20 January 2011 (Figure 2). Several sites were dry at the time of assessment, despite recent above average rainfall in the area and therefore not assessed. This includes several small drainage lines that run into Lollipop Creek and a low-lying area near Greens Road. Survey effort instead focused on a number of sites along Lollypop Creek, which has also been recently surveyed for the species by Brett Lane & Associates (2010b) and Ecology Australia (2010). Nocturnal surveys were conducted by two experienced zoologists familiar with the identification of the species and its preferred habitat. Nocturnal targeted survey methodology followed DSE (2010) and included a combination of listening for calling males, call playback and systematic searching using spotlights. All non-target frog species recorded during the assessment were noted and active searching of rocks, logs and other debris was undertaken to locate inactive frogs.

Targeted survey for Plains-wanderer was conducted within suitable habitat located in the study area on 16, 17 and 28 March 2011. Suitable habitat was identified during the general fauna assessment and was defined using the Plains-wanderer Habitat Management Guide (NPWS 2002). Surveys were carried out under suitable conditions (no moon, calm wind) and involved spotlighting along transects through areas of potentially suitable habitat. Transects were spaced at approximately 15 m and were conducted in teams of two zoologists from a slow-

moving vehicle where rock cover permitted. Transects in rocky areas that could not be driven were carried out on foot. Hand-held spotlights were systematically swept back and forth over grassland habitat up to 15 m in front and either side of the observer in order to increase the likelihood of detecting animal movements.

Golden Sun Moth surveys were conducted on 14, 24 and 28 December 2010 and 4 and 6 January 2011. Surveys were conducted along transects until at least five flying male moths were observed. Transects were spaced at approximately 25 m apart and were conducted in teams of at least two zoologists. Surveys were conducted from 10.30am–3.00pm during suitable weather conditions. Surveys were carried out in each land parcel, excluding those subject to previous sub-regional surveys, until either a population (defined as five or more moths) were detected or until four surveys spaced at least one week apart were completed (population assumed to be absent).

In addition to targeted surveys for terrestrial fauna, targeted surveys were undertaken for one significant aquatic fauna species, Yarra Pygmy Perch *Nannoperca obscura*. Targeted survey was conducted at three sites on Lollypop Creek, including two within the study area and one downstream of the study area. The small, ephemeral tributary of Lollypop Creek in the eastern section of the study area was dry at the time of assessment and was not surveyed, however it is not likely to contain high quality habitat for Yarra Pygmy Perch.

The sampling techniques utilised for the targeted survey of Yarra Pygmy perch were selected to maximise sampling efficacy in accordance with site characteristics such as water electrical conductivity (EC), turbidity, depth, width, vegetation and other forms of instream cover (e.g. cobbles, boulders, logs, branches). Three fyke nets and eight bait traps were set overnight at each site. Dip netting was used as a supplementary method. Excessive depth precluded the use of electrofishing at all sites. A habitat assessment of all sites surveyed was undertaken, including *in situ* measurements of Dissolved Oxygen (DO), pH, Electrical Conductivity (EC), temperature and turbidity were made at both sites using a calibrated Horiba U-52 water quality meter. All water quality measurements were taken in accordance with EPA publication 441 (EPA, 2000).

2.3.6 Mapping

Mapping data were collected using a portable computer connected to a standard Global Positioning System (GSP) and databases for mapping with the software HabitAs developed by DSE. In addition, other GPS data were collected and field maps / aerial photographs were annotated.

Waypoints were collected for all individual rare or threatened species or defined area groups of rare or threatened species.

Mapping was refined and final maps were produced using ArcMap version 10. Recent aerial photography was used as base data to overlay HabitAs, scattered tree and threatened species data. These data were then checked for locational accuracy and completeness. Final maps were then presented using GDA94 with the VicGrid projection, according to style standards set by the GAA and DSE.

In conjunction with all areas of native vegetation being considered in line with the DSE requirements for this project, a minimum patch size of at least 5 m diameter was used to map all remnant vegetation, DTV and NNV. Mapping data collected are displayed at a scale of 1:10 000.

2.4 Determination of Conservation Significance

2.4.1 Remnant patch and tree significance under the Framework

The Framework (NRE 2002) defines conservation significance (Very High, High, Medium and Low) that relates to the bioregional level only. The primary measure used for determining the conservation significance of a patch of native vegetation as defined by the Framework is the Habitat Score, coupled with the bioregional conservation status (endangered, vulnerable, rare or depleted) of the EVC. As all EVCs within Manor Lakes PSP 41 are rated as endangered, all patches of native vegetation within the precinct are of at least High conservation significance. Any patches with a Habitat Score of 0.4 or more have Very High conservation significance.

DSE have stipulated that consultants should utilise the Landscape Context Modelling Data layer (NV2005_QUAL_CSDL DSE 2008) provided in the Biodiversity Interactive Map 3.1 (http://nremap-sc.nre.vic.gov.au/MapShare.v2/imf.jsp?site= bim external) to assign landscape scores for each patch of native vegetation within the Investigation Area. To ensure that the Habitat Score for each patch could accurately be applied to determine conservation significance landscape scores were reviewed on a patch scale and revised where appropriate based on ground-truthed knowledge.

The second measure used for determining the conservation significance of a patch of native vegetation as defined by the Framework is the presence of the best 50% of habitat for a threatened species (NRE 2002: Appendix 3). Criteria for determining the presence of such habitat are described by DSE (2007a: Table 2). Where a patch of native vegetation was not determined to be of Very High conservation significance based on its condition, all available data on the presence of threatened species were used to determine if that patch represented the best 50% of habitat for a threatened species.

The third measure used for determining the conservation significance of a patch of native vegetation as defined by the Framework is the presence of other attributes as defined by NRE (2002: Appendix 3). Where a patch of native vegetation was not already determined as Very High conservation significance because of its condition or the presence of the best 50% of threatened species habitat, the site was assessed for the presence of these other attributes.

2.4.2 Species and communities

The common language meaning of significance is 'importance; consequence' (Macquarie Dictionary). While the general meaning of this is clear, the term is further defined in ecological significance assessment. Significance of a species or community is determined relative to the scale at which it is considered. The sources used to categorise significance of species and communities in this report are given below:

- A taxon or community has national significance when it is listed as threatened (critically endangered, endangered, vulnerable or conservation dependent) under the Environment Protection and Biodiversity Conservation Act 1999.
- A taxon or community has state significance when it is listed as threatened under the Flora and Fauna Guarantee Act 1988.
- A taxon or community has state significance when it is listed as threatened (critically endangered, endangered or vulnerable) or near threatened, rare, data deficient or poorly known in Victoria on a DSE Advisory List (DSE 2005, 2007a).
- Biosis Research considers flora species to have significance at the bioregional level when they are recorded from less than 5% of sites within the Flora Information System.

2.5 Likelihood of occurrence

Database searches provide lists of species from the local area that have potential to occur on the site. Where database records of state and nationally significant species exist from the local area, but these species are not identified during field survey, it is necessary to consider the likelihood that they occur on the site. The DSEWPAC PMST may nominate EPBC Act-listed species and communities where the site lies within their broad geographic range.

Likelihood of particular species occurring at a site is determined by assessing factors including the quality of habitat present for the species. For fauna species that occur at low density across their ranges; are highly mobile; or are adapted to exploit rare or episodic resources, the history of past occurrence in the local area may also assist in evaluating the potential for future occurrence.

The likelihood of occurrence is a broad categorisation used by Biosis Research to indicate the potential for a species to occur within the site. It is based on expert opinion, using general categories such as those provided in Table 1 below. The determination of likelihood is expressed as negligible, low, medium or high. If the species has been identified on site during our assessment or by other confirmed records then it is documented here as having been 'recorded'. Information relating to these species is presented in the results and discussion section of the report.

Table 1: Likelihood of occurrence for significant species and examples of criteria

Likelihood of occurrence	Potential criteria
Recorded	• Species recorded on site during current or previous assessment • Aquatic species recorded from connected waterbodies in close proximity to the site during current or previous assessment.
High	• Sufficient good quality habitat is present on site • Sufficient good quality habitat is present in connected waterbodies in close proximity to the site. • Site is within species natural distributional range (if known). • Species has been recorded within 5 km or from the relevant catchment/basin since 1980.
Medium	• Records of terrestrial species within 5 km of the site or of aquatic species in the relevant basin/neighbouring basin but habitat limited in its capacity to support the species due to extent, quality, or isolation.
Low	• No records within 5 km of the site or for aquatic species, the relevant basin/neighbouring basin, since 1980. • Substantial loss of habitat since any previous record(s).
Negligible	• Habitat not present on site • Habitat for aquatic species not present in connected waterbodies in close proximity to the site. • Habitat present but sufficient targeted survey has been conducted at an optimal time of year and species wasn't recorded.

Species listed as rare or threatened on the DSE Advisory Lists and which have at least medium likelihood of occurrence are given further consideration (DSE 2005, DSE 2007c, DSE 2009a). These species are addressed in the assessment of conservation significance for Net Gain (DSE 2007b). The need for targeted survey for these species is also considered.

2.6 Limitations

The following limitations apply to the current assessment:

1. A number of differences in AECOM's 2008/2009 Vegetation Quality Assessment were noted during the recent assessment. Site condition scores for Plains Grassland were not standardised in accordance with the Vegetation Quality Assessment Manual (DSE 2004) and their scores did not match the condition and quality of the vegetation on site. In addition, landscape context scores did not correlate with the Landscape Context Modelling Data Layer. However, we have corrected the habitat hectares scores for those patches mapped by AECOM and have updated the landscape context score to be in line with the Landscape Context Modelling Data layer (NV2005_QUAL_CSDL DSE 2008) provided in the Biodiversity Interactive Map 3.1.

2. Vegetation condition in Manor Lakes PSP 41 was assessed using current DSE standards at the time (DSE 2004). All remnant patches mapped by AECOM are NTGVVP.
3. Significant species, both flora and fauna, can occur in areas that do not meet the DSE definition of remnant patches of native vegetation. Examples of such species include the nationally significant Golden Sun Moth, Striped Legless Lizard, Growling Grass Frog and Spiny Rice-flower. In some circumstances, areas not definable as a patch of native vegetation can support substantial populations of these species. It is therefore important to recognise that areas of degraded treeless vegetation and non-native vegetation may still contain biodiversity values.
4. Additional limitations are as follows:
    - The assessment includes only vascular flora (flowering plants, ferns, conifers) and vertebrate fauna (birds, mammals, reptiles, frogs, fish), with the exception of Golden Sun Moth, which was recorded when observed, and aquatic decapod crustaceans recorded during the targeted Yarra Pygmy Perch surveys. Non-vascular flora (e.g. mosses, liverworts) were not sampled although their presence is noted as part of the cover of native species in the definition of a patch.
    - The presence of threatened flora and fauna were noted where they were encountered or were identified through targeted threatened species surveys. However, such observations are still likely to underestimate the population sizes or distribution of these species, many of which are cryptic or only seasonally visible. Aquatic species will be temporarily absent if a waterbody is dry.
    - The current assessments were conducted in early spring and mid summer which is an optimal time for survey for some species. However, the unseasonally wet and humid climatic conditions in spring and summer made detection and/or identification of certain species difficult due to the unusually dense and tall grass cover. Furthermore, the targeted surveys for Plains-wanderer that were undertaken in March 2011 were unlikely to record this species due to the dense grass. This species prefers areas with low grassland vegetation. Therefore, this species may have either not been present or not detected during the survey due to difficult survey conditions. For future Plains-wanderer surveys, if similar grass densities are present, surveys should be undertaken with the aid of trained and muzzled dogs and handlers in late autumn and winter.

- Field mapping is conducted using hand-held (uncorrected) GPS units and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the GPS units (manufacturer states ±15 m but generally ±2–5 m) and dependent on the limitations of aerial photo resolution, rectification and registration. As such, these points should not be relied on for survey grade design purposes.
- Data from other assessments are generally available from the species records (including threatened species) and defined area species lists submitted by Biosis Research and other consultants to the VBA on a regular basis. Data collected post 2010 by other consultants were not included in the database version available at the time of species searches for this report.
- The presence or absence of significant native vegetation described in other reports is often dated and/or is otherwise superseded by the site inspections associated with this assessment. In that context a review of the more broadly available literature covering areas of land within Manor Lakes PSP 41 is not seen as critical to this assessment. However, a review of literature relating to the GAA investigation areas (including Manor Lakes PSP 41) has been undertaken.

3.0 RESULTS

3.1 General flora survey

3.1.1 Flora species recorded

A total of 180 plant taxa (109 indigenous and 71 introduced) were recorded from Manor Lakes PSP 41 during the current assessment (Appendix 2, Table A2.1). The VBA contains records of 430 plant taxa (230 indigenous and 200 introduced) from the defined search Manor Lakes PSP 41 comprising the study area and a
5 km buffer.

A map showing the extent of general flora surveys is shown in Figure 2.

3.1.2 Rare and threatened flora species

Of the species recorded in the VBA, three species have national significance and eight species have state significance. The DSEWPaC database also predicts the occurrence of, or suitable habitat for three additional listed flora species (Table 2).

Within the current investigation of Manor Lakes PSP 41, one species of national significance (Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*) and nine species of state significance (Small Scurf-pea *Cullen parvum*, Arching Flax-lily *Dianella* sp. aff. *longifolia* (Benambra), Buloke *Allocasuarina luehmennii*, Wimmera Woodruff *Asperula wimmerana*, Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis*, Pale Spike-sedge *Eleocharis pallens*, Flat Spike-sedge *Eleocharis plana*, Pale Flower Crane's-bill *Geranium* sp. 3 and Slender Tick-trefoil *Desmodium varians*) were recorded during the current assessment (Appendix 2, Table A2.1, Figure 3). Small Scurf-pea and Buloke are listed as threatened under the *Flora and Fauna Guarantee Act* 1988.

3.1.2.1 Nationally Significant Species

The VBA database contains records of three species of national conservation significance from the defined search area (Table 2). Two of these species (Large-headed Fireweed *Senecio macrocarpus* and Button Wrinklewort *Rutidosis leptorhynchoides*) were not recorded during the current assessment. Three of these species are considered to have at least a medium likelihood of occurrence in the study area based on the habitat present (Table 2).

The DSEWPaC database predicts the occurrence of three additional species listed under the EPBC Act (Clover Glycine *Glycine latrobeana*, Curly Sedge *Carex tasmanica* and Maroon Leek-orchid *Prasophyllum frenchii*) within 5 km of the study area or suitable habitat for them within the defined search area. Two of

these species have at least a medium likelihood of occurring within the precinct (Table 2).

3.1.2.2 State Significant Species

The VBA database contains records of nine additional species of state conservation significance from the local area (within 5 km) (Table 2). Two of these species, Buloke and Small Scurf-pea have been recorded during the present assessment.

Seven additional species have at least a medium likelihood of occurrence within Manor Lakes PSP 41 (Table 2).

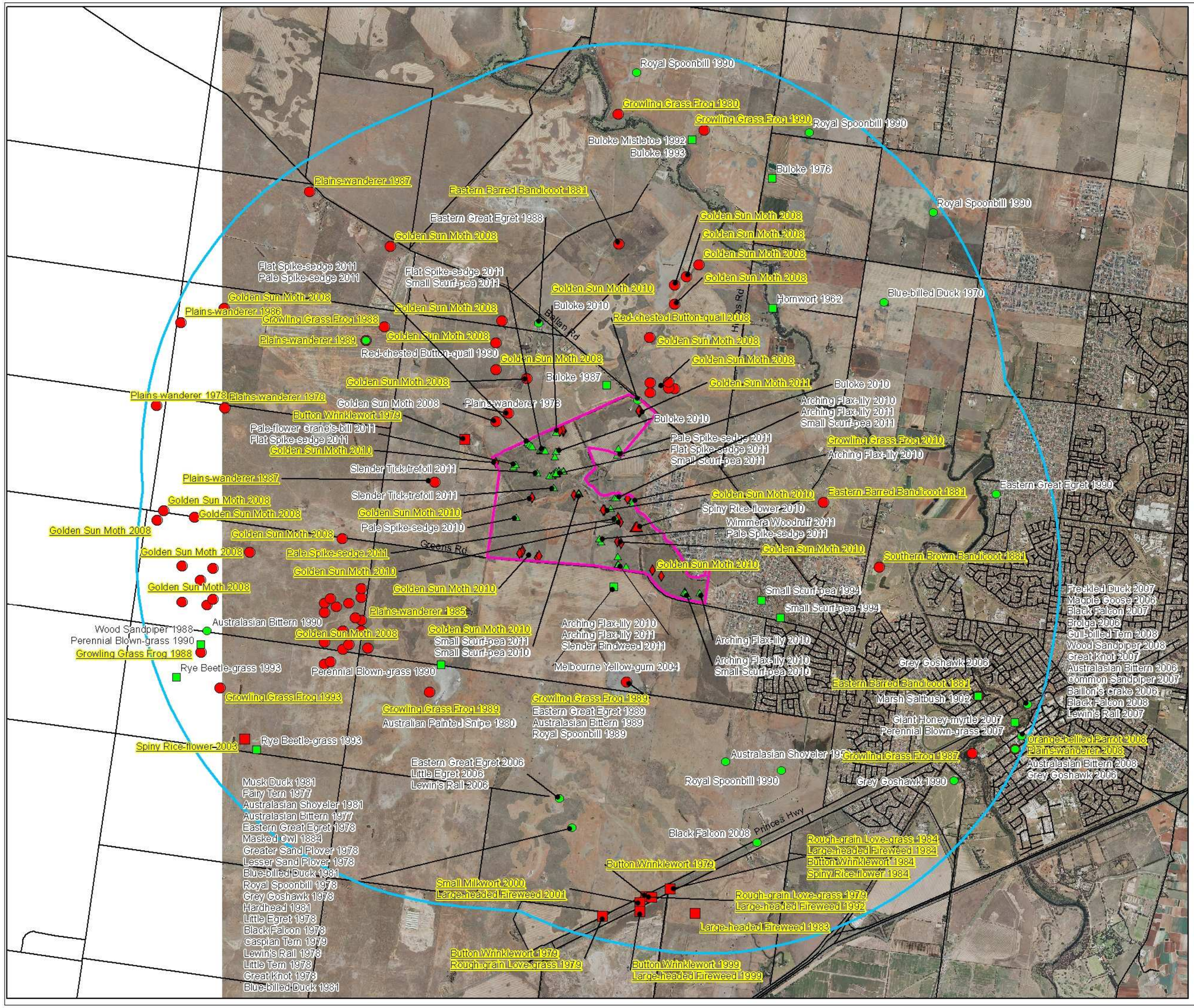


Figure 3: National and State Significant flora and fauna species locations, PSP 41

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Date: 30 March 2011, File number: 12741
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Location: P:\12600s\12649\Mapping\12649 Figure 3 Sig Records.mxd

Table 2. Rare or threatened flora species recorded or predicted to occur within 5 km of the precinct (likelihood of occurrence criteria in A2.2)

Lifeform	Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Database	Other Sources	Current Survey	Total No. of Documented Records*	Likely Occurrence in Study Area**	Likelihood reasoning	Habitat Description
				EPBC	DSE	FFG								
	National Significance													
Graminoid	*Amphibromus fluitans*	Poaceae	River Swamp Wallaby-grass	VU			✓		DSE Review		0	High	Areas of wetlands along Lollypop Creek, within the associated tributaries and within open wetland areas in Manor Lakes PSP 41 are potential habitat for this species. However, during targeted surveys this species was not recorded within Manor Lakes PSP 41 and it has not been recorded within 5 km of the study area.	River Swamp Wallaby-grass is an aquatic species which occupies waterways and seasonally inundated vegetation such as Plains Grassy Wetland.
Graminoid	*Carex tasmanica*	Cyperaceae	Curly Sedge	VU	v	L	✓	DSEWPaC			0	Medium	This species may be found in such vegetation types within Manor Lakes PSP 41, including drainage lines associated with Lollypop Creek, although it was not recorded during the current assessment. This species has not been recorded within 5km of the study area.	Curly Sedge is a small to medium size grass-like species which typically grows in seasonally damp grassland or grassy woodland (Carter 2010).
Graminoid	*Dianella amoena*	Hemerocallidaceae	Matted Flax-lily	EN	e		✓		DSE Review		0	Low	There are only a few confirmed records of this species occurring within the volcanic plains. The closest record is approximately 20 km north of Manor Lakes PSP 41 in Rockbank. It was not recorded during the current assessment.	The Matted Flax-lily is a rhizomatous plant which forms loose mats to 5 m wide (Carr and Horsfall 1995). It is found in lowland grassland and grassy woodland habitats, on well drained to seasonally waterlogged fertile sandy loam to heavy cracking clays (Carr and Horsfall 1995).

Lifeform	Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Database	Other Sources	Current Survey	Total No. of Documented Records*	Likely Occurrence in Study Area**	Likelihood reasoning	Habitat Description
				EPBC	DSE	FFG								
Graminoid	*Diuris basaltica*	Orchidaceae	Small Golden-moths	En	v	L	✓		DSE Review		0	Medium	The largest known population occurs on private land at Rockbank (Backhouse and Lester 2009). Suitable habitat within Manor Lakes PSP 41 was searched although this species was not recorded.	This orchid is endemic to Melbourne's west where it occurs in Plains Grassland dominated by tussock-forming perennial grasses (including Kangaroo Grass); often with embedded surface basalt (Backhouse & Lester 2009). Like most other terrestrial orchid species in Victoria, this species is summer deciduous. Its underground tuberoids may persist for several seasons but not produce leaves or flowers in the absence of suitable conditions.
Graminoid	*Diuris fragrantissima*	Orchidaceae	Sunshine Diuris	En	e	L	✓		DSE Review		0	Low	There are two known populations of this species, one in Sunshine and one in Altona. It is highly unlikely that this species occurs on site due to weed invasion and changes in landuse that have occurred on site. Suitable habitat within Manor Lakes PSP 41 was searched although this species was not recorded.	This orchid is one of the most threatened orchids in Australia. It used to be abundant on the grassy plains in Melbourne, but has suffered a significant decline in range and abundance. This species is now confined to two sites, one in Sunshine and one in Altona. This species is very close to extinction in the wild.
Forb	*Glycine latrobeana*	Fabaceae	Clover Glycine	VU	v	L	✓	DSEWPaC			0	Medium	Higher quality grassland within Manor Lakes PSP 41 may be suitable habitat for this species although it was not recorded during the current assessment.	Clover Glycine is a small herb. It occupies Kangaroo Grass dominated grassland and grassy woodland throughout western Victoria as well as a number of other vegetation type elsewhere (Carter and Sutter 2010).
Forb	*Lepidium hyssopifolium*	Brassicaceae	Basalt Peppercress	EN	e	L	✓		DSE Review		0	Low	There are no historical records of this species within 5km of Manor Lakes PSP 41 and it was not found during the current assessment.	Basalt Peppercress is a medium size herb which persists at very few sites in Victoria (Walsh and Entwisle 1996). It occupies a range of grassland and woodland communities and is dependent on particular disturbance regimes (Cropper 1993).

Lifeform	Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Database	Other Sources	Current Survey	Total No. of Documented Records*	Likely Occurrence in Study Area**	Likelihood reasoning	Habitat Description
				EPBC	DSE	FFG								
Shrub	*Pimelea spinescens* subsp. *spinescens*	Thymeleaceae	Spiny Rice-flower	CR	e		✓	DSEWPaC / DSE		Recorded	11	Recorded	Within Manor Lakes PSP 41, plants were found in high quality Plains Grassland in Habitat Zone 14.	This subspecies is a small shrub which typically occupies Plains Grassland between Keilor and Dunkeld in the state's west. It is able to occupy grassland in varying condition although it does not persist with ongoing soil disturbance such as ploughing. Areas where this species are more abundant include Plains Grassland with a moderate diversity of other native species and some open spaces between grass tussocks. However, this subspecies has also been observed in grassland dominated by introduced perennial grasses provided that other conditions allow it to persist.
Forb	*Prasophyllum frenchii*	Orchidaceae	Maroon Leek-orchid	EN	e	L	✓	DSEWPaC			0	Low	It has not been recorded within 10 km of the precinct. The nearest record is near Warrambine to the west. There is a low likelihood that this species would occur within the precinct.	Maroon Leek-orchid is a small to medium size herb which, like most other terrestrial orchid species in Victoria, is summer deciduous. It occupies a range of habitats types including grassland vegetation.
Forb	*Rutidosis leptorhynchoides*	Asteraceae	Button Wrinklewort	EN	e	L	✓	DSEWPaC / DSE			8	Medium	The most recent record of this species in the local area is from 1979. However, it is possible that this species may occupy high quality grassland within Manor Lakes PSP 41 although it was not found during the current assessment.	Button Wrinklewort occupies some higher quality Plains Grassland and Grassy Woodland in Western Victoria and is quite scarce in the Melbourne region. Some Plains Grassland within the precinct appear to be structurally suitable for this species but lacks the appropriate fire regime (DSE 2003) which is likely to be required for broader scale maintenance of this species' habitat requirements.

Lifeform	Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Database	Other Sources	Current Survey	Total No. of Documented Records*	Likely Occurrence in Study Area**	Likelihood reasoning	Habitat Description
				EPBC	DSE	FFG								
Forb	*Senecio macrocarpus*	Asteraceae	Large-headed Fireweed	VU	e	L	✓	DSEWPaC/DSE			8	High	There are two areas of grassland within Manor Lakes PSP 41 that may be suitable habitat for this species although it was not recorded during the current assessment.	This species grows on heavy soil in vegetation including grassland, shrubland and woodland but is typically associated with grassland in western Melbourne (DSE 2009). It is sensitive to inappropriate fire regimes and may persist in relatively long unburnt grassland.
Forb	*Senecio psilocarpus*	Asteraceae	Swamp Fireweed	VU	v		✓		DSE Review		0	Low	There may be potential habitat along Lollypop Creek, but the creek has been significantly modified. There are no historical records of this species from within 10 km of Manor Lakes PSP 41 and it was not recorded during the current assessment.	This species is a medium size herb with a cylindrical cluster of small yellow flowers. It grows in seasonally inundated grassy vegetation. Areas of Plains Grassy Wetland or related EVC are potential habitat for this species.
Forb	*Xerochrysum palustre*	Asteraceae	Swamp Everlasting	VU	v	L	✓		DSE Review		0	Low	There may be potential habitat along Lollypop Creek, but the creek has been significantly modified. There are no historical records of this species from within 10 km of Manor Lakes PSP 41 and it was not recorded during the current assessment.	This species is a relatively large yellow flowered daisy which grows in seasonally inundated sites or permanent wetland habitats. This species is endemic to south-east Australia.
	State Significance													
Tree	*Allocasuarina luehmannii*	Casuarinaceae	Buloke			L	✓	DSE		Recorded	8	Recorded	This species has been recorded within Manor Lakes PSP 41 and is scattered mainly in the northern section of the Western Balance of PSP 41.	Buloke is a medium size tree which occurs predominantly in the state's northwest. It occurs in scattered location on the volcanic plain west of Melbourne and has recorded from the precinct, but not within Manor Lakes PSP 41 .

Lifeform	Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Database	Other Sources	Current Survey	Total No. of Documented Records*	Likely Occurrence in Study Area**	Likelihood reasoning	Habitat Description
				EPBC	DSE	FFG								
Graminoid	*Amphibromus pithogastrus*	Poaceae	Swollen Swamp Wallaby-grass		e	L	✓		DSE Review		0	High	There is potential habitat for this species along Lollypop Creek within the precinct and the associated tributaries, although it was not recorded during the current assessment.	This medium to tall grass typically grows in seasonally damp depression in grassland or grassy wetland (Ashton and Morcom 2004).
Epiphyte	*Amyema linophylla* subsp. *orientale*	Loranthaceae	Buloke Mistletoe		v		✓	DSE			1	High	There is suitable habitat for this species to be growing within the canopy of the Buloke. However, this species was not recorded during the present assessment.	This parasitic shrub is host specific to Buloke *Allocasuarina leuhmannii*. It is likely to occur anywhere where its host is present.
Forb	*Asperula wimmerana*	Rubiaceae	Wimmera Woodruff		r		✓			Recorded	1	Recorded	This species was recorded within Habitat Zone 15. There is the potential for this species to be located elsewhere within the precinct.	This small herb has only recently been recognised as naturally occurring in grassland in outer eastern Melbourne, and is otherwise known from the mallee. Other populations within the precinct may have been overlooked due to similarities with the more common *Asperula conferta*.
Shrub	*Atriplex paludosa* subsp. *paludosa*	Chenopodiacea	Marsh Saltbush		r		✓	DSE			1	Low	There is no potential or suitable habitat for this species within Manor Lakes PSP 41. Coastal or near coastal Saltmarsh has not been recorded within the study area.	This is a sprawling shrub to 1.6 m tall. This species is commonly found on the fringes of coastal and near-coastal Saltmarsh (Walsh and Entwisle 1994).
	Ceratophyllum demersum		Hornwort		k			DSE			1	Low	There is no suitable habitat for this species. Wetlands within the study area were all ephemeral and were not permanent, still or deep waterbodies. In addition, current water within Lollypop Creek was fast flowing due to the current rain and the creek is also ephemeral.	A submerged, semi-aquatic herb which is scattered throughout Victoria. This species forms dense growth in fresh still, deep to slow flowing waters.

Lifeform	Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Database	Other Sources	Current Survey	Total No. of Documented Records*	Likely Occurrence in Study Area**	Likelihood reasoning	Habitat Description
				EPBC	DSE	FFG								
Forb	*Comesperma polygaloides*	Polygalaceae	Small Milkwort		v	L	✓	DSE	DSE Review		1	Medium	High quality Plains Grassland provides suitable habitat for this species although it has not been recorded within 5 km of the study area and was not recorded during the current assessment.	In western Melbourne, Small Milkwort grows in Kangaroo Grass dominated grassland where is occurs in localised patches (McIntyre et al. 2004).
Scrambler	*Convolvulus angustissimus* subsp. *omnigracilis*	Convolvulaceae	Slender Bindweed		k		✓			Recorded	15	Recorded	The species was recorded during the current assessment in the high quality patch of Plains Grassland in Habitat Zone 30. There is some likelihood that it occurs within other patches of Plains Grassland within the precinct. Other populations within the precinct may have been overlooked due to similarities with the more common *Convolvulus angustissimus*.	This small, trailing herb with pink flowers is endemic to Victoria. This taxon has been recorded throughout the western plains of Melbourne and is typically associated with Plains Grassland.
Forb	*Cullen parvum*	Fabaceae	Small Scurf-pea		e	L	✓	DSE	DSE Review	Recorded	1091	Recorded	Several plants of this species were recorded during the current assessment within sections of the upper reaches of Lollypop Creek and associated tributaries. It was also recorded in Habitat Zones 32 and 40.	Small Scurf-pea is a small trailing herb with three to five narrow leaves and pale purple or white flowers. This species typically occupies Plains Grassland and sites which are subject to irregular flooding.
Forb	*Cullen tenax*	Fabaceae	Tough Scurf-pea		e	L	✓		DSE Review		0	Medium	This species was not recorded within Manor Lakes PSP 41 during the current assessment and has not been recorded within 5 km of the study area. However, there is potential for it to be found in Plains Grassland patches following a change in conditions e.g. fire	Tough Scurf-pea is a medium size herb which typically occupies Plains Grassland, but may also be found in a number of other EVCs locally.

Lifeform	Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Database	Other Sources	Current Survey	Total No. of Documented Records*	Likely Occurrence in Study Area**	Likelihood reasoning	Habitat Description
				EPBC	DSE	FFG								
Forb	*Desmodium varians*	Fabaceae	Slender Tick-trefoil		k		✓		DSE Review	Recorded	6	Recorded	This species was recorded during the present assessment along an escarpment of Lollypop Creek and within a dry tributary.	Slender Tick-trefoil grows in a broad range of vegetation types within well drained soils. There are several records of this species scattered in Melbourne's western plains.
Graminoid	*Dianella* sp. aff. *longifolia* (Benambra)	Hemerocallidaceae	Arching Flax-lily		v		✓			Recorded	19	Recorded	It occurs in several locations within Manor Lakes PSP 41 within Plains Grassland patches and the creeklines. Any remnant grassland within the precinct is habitat for this species.	This species is scattered in grassland and woodland of varying condition within broader western Melbourne area and within the precinct. It is conspicuous and readily visible most times of the year.
Graminoid	*Eleocharis pallens*	Cyperaceae	Pale Spike-sedge		k		✓	DSE		Recorded	110	Recorded	This species has been recorded within the upper reaches of Lollypop Creek and associated tributaries. It has also been recorded within scattered wetland patches.	This medium herb grows in seasonally inundated areas such as Plains Grassy Wetland patches and dies back during drier periods.
Graminoid	*Eleocharis plana*	Cyperaceae	Flat Spike-sedge		v		✓			Recorded	182	Recorded	This species has been recorded within the upper reaches of Lollypop Creek and associated tributaries.	These medium non-tufted graminoids grow in seasonally inundated areas such as Plains Grassy Wetland patches. This species die back during drier periods and are often heavily grazed during wetter periods.
Tree	*Eucalyptus leucoxylon* subsp. *connata*	Myrtaceae	Melbourne Yellow-gum		v		✓	DSE			1	Low	This species has been recorded in an adjacent property south of Manor Lakes PSP 41. However, it has not been recorded during the current or past assessments in Manor Lakes PSP 41.	This is a subspecies which occurs on well drained slopes in a restricted area around Melbourne and Geelong.

Lifeform	Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Database	Other Sources	Current Survey	Total No. of Documented Records*	Likely Occurrence in Study Area**	Likelihood reasoning	Habitat Description
				EPBC	DSE	FFG								
Forb	*Geranium* sp. 3	Geraniaceae	Pale Flower Crane's-bill		r		✓			Recorded	10	Recorded	This species has been recorded within the Manor Lakes PSP 41 adjacent to Lollypop Creek.	Medium herbs found sometimes in grassy vegetation, but Pale-flower Crane's-bill tends to occupy somewhat wetter sites (Smith 1999). Given the relatively recent taxonomic revisions in this plant group, it is difficult to speculate further about the specific habitat requirements of each on the western basalt plain. As such, it is assumed that any grassland or grassy woodland is suitable habitat for these species within the precinct (where hydrology is not a limiting factor).
Forb	*Helichrysum* aff. *Rutidolepis* (Lowland Swamp)	Asteraceae	Pale Swamp Everlasting		v		✓		DSE Review		0	High	There is some potential habitat for this species within the precinct although it was not recorded during the present assessment.	This medium herb typically occupies seasonally inundated areas including wet depressions in Plains Grassland or Plains Grassy Wetland patches.
Forb	*Podolepis* sp. 1	Asteraceae	Basalt Podolepis		e		✓		DSE Review		0	Medium	There are several areas of suitable grassland habitat within the precinct for this species although it was not recorded during the present assessment.	Basalt Podolepis is a medium to large herb which grows in a range of grasslands and grassy woodlands. The majority of records for western Melbourne are located near Laverton, about 12 km to the west of the precinct.
Graminoid	*Thelymitra gregaria*	Orchidaceae	Basalt Sun-orchid		e	L	✓		DSE Review		0	Low	Habitat exists within the study area, but it has been modified and the species was not recorded during the present assessment. All records in western Melbourne are more than 50 years old and not within 5 km of Manor Lakes PSP 41.	Basalt Sun orchid is a medium size herb which grows in Kangaroo Grass dominated grassland with poorly draining soils (Coates 2003).

Lifeform	Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Database	Other Sources	Current Survey	Total No. of Documented Records*	Likely Occurrence in Study Area**	Likelihood reasoning	Habitat Description
				EPBC	DSE	FFG								
Graminoid	*Tripogon loliiformis*	Poaceae	Rye Beetle-grass		r		✓	DSE			2	High	This species may be found in Plains Grassland patches within the precinct and have been given high likelihood of occurrence as it has been recorded within 5 km of the study area. Although it was not recorded during the present assessment, this may have been due to the dense cover and height of vegetation at the time of assessment.	Rye Beetle-grass occurs predominantly in drier Plains Grassland and grassy woodlands (Walsh and Entwisle 1994) and is a short lived annual grass.

National significance – CE (critically endangered), EN (endangered), VU (vulnerable), R (rare), K (poorly known). State significance – e (endangered), v (vulnerable), r (rare), k (poorly known), L (*Flora and Fauna Guarantee Act* listed). * from review data only, refer to Figure 3 for records from the current assessment. ** Rationale for likelihood of occurrence is largely based on the amount and quality of habitat present within the precinct (A2.2).

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

The habitats within Manor Lakes PSP 41 generally comprise undulating grassland consisting of a mosaic of exotic pasture or crop, creeklines, wetlands and native grassland. The native grassland varies in condition and contains a mix of native and introduced herbs. Native grassland vegetation commonly contains sub-surface rocks where soil disturbance and grazing has been reduced. Some creekbeds or escarpment areas occur which also has a variable cover of native species.

Table 2 describes the general habitat requirements of rare or threatened species recorded during this investigation (Table 2). The presence of best or remaining 50% of habitat for these species within the bioregion was determined for Manor Lakes PSP 41 for species which are considered to have at least a medium likelihood of occurrence within the precinct (Table 3).

Table 3 provides detail of whether native vegetation zones delineated for assessing vegetation condition constitute the best 50% or remaining 50% of habitat for relevant rare or threatened species (in Table 2) within the Victorian Volcanic Plain bioregion; in sense of the Native Vegetation Framework. Species listed as poorly known (k) in Victoria warrant further study to determine their status, but as they are not currently deemed threatened or rare, therefore they are not considered in determining if the habitat zone is the best or remaining 50% habitat for those species under Table 5 of *Victoria's Native Vegetation Management - A Framework for Action* (DNRE 2002).

Table 3. Determination of best or remaining 50% of habitat for a rare or threatened plant species

Species	**Conservation Status**	**Habitat zone** (Figure 4)	**Steps***	**Outcome**	**Conservation Significance** (threatened species rating)	**Notes**
Curly Sedge	Threatened	71	A, D - F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		22	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		All other habitat zones	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Small Golden-moths	Threatened	1, 2, 3, 4, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 72	A, D - F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		6, 7, 11,12, 15, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		22, 33, 34, 41, 42,46, 47, 48, 49, 57, 62, 71	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Clover Glycine	Threatened	1, 2, 3, 4, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 72	A, D - F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.

Species	**Conservation Status**	**Habitat zone** (Figure 4)	**Steps***	**Outcome**	**Conservation Significance** (threatened species rating)	**Notes**
		6, 7, 11,12, 15, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		22, 33, 34, 41, 42, 46, 47, 48, 49, 57, 62, 71	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Spiny Rice-flower	Threatened	14	A, B, C	Best 50% habitat	Very High	Spiny Rice-flower has been recorded in this habitat zone. It is possible to discriminate between the importance of different populations of this species and the site contains an above average population size.
		1, 2, 3, 4, 8, 9, 10, 13, 15, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 72	A, D - F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		6, 7, 11,12, 15, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45, 57, 62	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		22, 33, 34, 41, 42, 46, 47, 48, 49, 71	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Button Wrinklewort	Threatened	1, 2, 3, 4, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 72	A, D - F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		6, 7, 11,12, 15, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45	A, D – F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.

Species	**Conservation Status**	**Habitat zone** (Figure 4)	**Steps***	**Outcome**	**Conservation Significance** (threatened species rating)	**Notes**
		22, 33, 34, 41, 42, 46, 47, 48, 49, 57, 62, 71	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Large-headed Fireweed	Threatened	1, 2, 3, 4, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 72	A, D – F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		6, 7, 11,12, 15, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45	A, D – F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		22, 33, 34, 41, 42, 46, 47, 48, 49, 57, 62, 71	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Swollen Swamp Wallaby-grass	Threatened	71	A, D - F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		22	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		All other habitat zones	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Buloke Mistletoe	Threatened	All habitat zones	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species. This species is host specific to Buloke and no Buloke were recorded within any of the habitat zones.

Species	**Conservation Status**	**Habitat zone** (Figure 4)	**Steps***	**Outcome**	**Conservation Significance** (threatened species rating)	**Notes**
Wimmera Woodruff	Rare	15	A, B, E-F	Remaining 50% habitat	Medium	Wimmera Woodruff has been recorded within this habitat zone. It is not possible to discriminate between the importances of different populations of this species, no habitat modelling has been undertaken for the species in this Bioregion and the site represents below-average condition and landscape context for the EVC.
		1, 2, 3, 4, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 72	A, D - F	Best 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		6, 7, 11,12, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45	A, D – F	Remaining 50% habitat	Medium	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		22, 33, 34, 41, 42, 46, 47, 48, 49, 57, 62, 71	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Flat Spike-sedge	Threatened	71	A, D - F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		22	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		All other habitat zones	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Small Milkwort	Threatened	1, 2, 3, 4, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 72	A, D – F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.

Species	**Conservation Status**	**Habitat zone** (Figure 4)	**Steps***	**Outcome**	**Conservation Significance** (threatened species rating)	**Notes**
		6, 7, 11,12, 15, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45	A, D – F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		22, 33, 34, 41, 42, 46, 47, 48, 49, 57, 62, 71	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Small Scurf-pea	Threatened	32, 40	A, B, C	Best 50% habitat	Very High	Small Scurf-pea has been recorded in these habitat zones. It is possible to discriminate between the importance of different populations of this species and the sites contain an above average population size.
		10, 14, 20, 30, 71	A, D - F	Best 50% habitat	Very High	Parts of these habitat zones have been subject to irregular flooding and habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		22, 23, 44, 62	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		1, 2, 3, 4, 6, 7, 8, 9, 11,12, 13, 15, 16, 17, 18, 19, 24, 25, 26, 31, 33, 34, 35, 36, 37, 38, 39, 41, 42, 43, 45, 46, 47, 48, 49, 50, 53, 57, 67, 68, 69, 70, 72	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species. Sites have not had irregular flooding or are very degraded.
Tough Scurf-pea	Threatened	1, 2, 3, 4, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 72	A, D - F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.

Species	**Conservation Status**	**Habitat zone** (Figure 4)	**Steps***	**Outcome**	**Conservation Significance** (threatened species rating)	**Notes**
		6, 7, 11,12, 15, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		22, 33, 34, 41, 42, 46, 47, 48, 49, 57, 62, 71	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Arching Flax-lily	Threatened	13, 16, 30	A, B, E, F	Best 50% habitat	Very High	Arching Flax-lily has been recorded in these habitat zones. It is not possible to discriminate between the importance of different populations of this species and no modelling has been undertaken for the species in this bioregion. This site represents above-average condition and landscape context for the EVC.
		1, 2, 3, 4, 8, 9, 10, 14, 17, 18, 19, 20, 32, 50, 53, 67, 68, 69, 70, 71, 72	A, D – F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		6, 7, 11,12, 15, 22, 23, 24, 25, 26, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 57, 62	A, D – F	Remaining 50% habitat	High	This species has very broad habitat requirements and can occur within disturbed sites. Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
Pale Flower Crane's-bill	Rare	1, 2, 3, 4, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 71, 72	A, D - F	Best 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		6, 7, 11,12, 15, 22, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45	A, D - F	Remaining 50% habitat	Medium	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		33, 34, 41, 42, 46, 47, 48, 49, 57, 62	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.

Species	**Conservation Status**	**Habitat zone** (Figure 4)	**Steps***	**Outcome**	**Conservation Significance** (threatened species rating)	**Notes**
Pale Swamp Everlasting	Threatened	71	A, D - F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		22	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		All other habitat zones	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Basalt Podolepis	Threatened	1, 2, 3, 4, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 71, 72	A, D – F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		6, 7, 11,12, 15, 22, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45	A, D – F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		33, 34, 41, 42, 46, 47, 48, 49, 57, 62	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.
Rye Beetle-grass	Rare	1, 2, 3, 4, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 30, 32, 50, 53, 67, 68, 69, 70, 72	A, D – F	Best 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context for the EVC.
		6, 7, 11,12, 15, 22, 23, 24, 25, 26, 31, 35, 36, 37, 38, 39, 40, 43, 44, 45	A, D – F	Remaining 50% habitat	Medium	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context for the EVC.
		33, 34, 41, 42, 46, 47, 48, 49, 57, 62, 71	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species.

***** Habitat assessment for threatened species taken from Table 2 of the Native Vegetation Guide for assessment of referred planning permit applications (DSE 2007).

A	Is the species, or has the species been recorded as 'resident' on site? or If the species is not 'resident' has it been recorded regularly (e.g. annually) on site?	Yes – go to B
		No – go to D
B	Is it possible to discriminate between the importance of different populations of the species? For example, can numbers be reasonably estimated and is there available knowledge on what are typical population sizes?	Yes – go to C
		No – go to E
C	Does the site contain a population that is above average size or importance for the bioregion?	Yes – Best 50% of habitat
		No – remaining 50% of habitat
D	Does the habitat on site clearly meet one or more of the habitat requirements of the species? Is it reasonable to expect that the species is present or would make significant use of the site in the medium term (e.g. within the next 10 years)?	Yes to both – go to F
		No to either – no further consideration required for that species
E	Has some form of habitat modelling been undertaken for the species in the bioregion?	Yes – use this information to determine Best50% of habitat or Remaining 50% of habitat
		No – go to F
F	Does the site represent above-average condition and landscape context for the relevant EVC or habitat type in the bioregion?	Yes – best 50% of habitat
		No – remaining 50% of habitat

3.1.4 Vegetation

3.1.4.1 Ecological Vegetation Classes

Two EVCs were recorded in the study area by AECOM; Plains Grassland and Stony Knoll Shrubland (AECOM 2010). However, upon review during the recent assessment all patches mapped by AECOM are consistent with Plains Grassland EVC represented by the floristic community *Low-rainfall* Plains Grassland (EVC 132_63). There is no evidence on site to suggest that Stony Knoll Shrubland occurs in the north of the study area. Scattered indigenous trees recorded are remnants of Plains Woodland (EVC 803) in the north and Creekline Grassy Woodland along Lollypop Creek.

Plains Grassland is endangered within the Victorian Volcanic Plain bioregion, due to its reduction in area of occupancy since 1750 (www.dse.vic.gov.au).

DSE mapping of 1750 vegetation (a 1:25,000 scale map of vegetation as at this date) models all of Manor Lakes PSP 41 as previously supporting Plains Grassland (EVC 132). The DSE 2005 EVC vegetation mapping indicates that approximately 15% of the native vegetation has been cleared since 1750.

AECOM mapped 54 habitat zones within Manor Lakes PSP 41. The following general description for Plains Grassland recorded in Manor Lakes PSP 41 is based on data collected during the recent assessment.

***Low-rainfall* Plains Grassland**

A total of **84.97 ha** of remnant patch vegetation was mapped in Manor Lakes PSP 41 by AECOM (AECOM 2010). Of the native species present in *Low-rainfall* Plains Grassland, this EVC was dominated by grasses such as Kangaroo-grass *Themeda triandra*, spear-grasses *Austrostipa* spp., wallaby-grasses *Austrodanthonia* spp., Red-leg Grass *Bothriochloa macra* and Windmill Grass *Chloris truncata* (Plate 1). Shrubs were typically very sparse in this EVC and the floristic composition is determined largely by annual rainfall and localised hydrology. Common forbs or shrub species present include Wingless Bluebush *Maireana enchylaenoides*, Spreading Crassula *Crassula decumbens* var. *decumbens*, Feather Heads *Ptilotis macrocephalus*, Blue Grass-lily *Caesia calliantha*, Yellow Rush-lily *Tricoryne elatior*, Sprawling Bluebell *Wahlenbergia gracilis*, Blue Devil *Eryngium ovinum*, Sheep's Burr *Acaena echinata*, Kidney Weed *Dichondra repens* and Blushing Bindweed *Convolvulus angustissimus*.

Above average condition patches of this EVC occur within Habitat Zones 10, 13, 14, 16, 19, 20, 30, 32, 43, 53 and 70. These patches have a greater diversity of native forbs and grasses compared with other examples within Manor Lakes PSP 41. Habitat Zone 14 has the highest species diversity and is in a condition which

is close to what would be expected for this EVC prior to European settlement (Plate 2). Indigenous species recorded within this patch include Kangaroo Grass, Narrow Plantain *Plantago gaudichaudii*, Spiny Rice-flower, Lemon Beauty-heads *Calocephalus citreus*, Scaly Buttons *Leptorhynchos squamatus*, Hairy Stylewort *Levenhookia dubia*, Plains Everlasting *Chrysocephalum* sp. 1, Pale Sundew *Drosera peltata*, and Narrow Rock-fern *Cheilanthes sieberi* subsp. *sieberi*.

Typical weeds include Wild Sage *Salvia verbenaca*, Patterson's Curse *Echium plantagineum*, Onion Grass *Romulea rosea*, Small-flower Onion-grass *Romulea minutiflora*, Cape Weed *Arctotheca calendula*, Wimmera Rye-grass *Lolium rigidum*, Cat's Ear *Hypochoeris radicata*, Buck's-horn Plantain *Plantago coronopus*, Artichoke Thistle *Cynara cardunculus* and Big Heron's-bill *Erodium botrys*. In some areas, the introduced grasses such as Serrated Tussock *Nassella trichotoma* were dominant.

Plate 1: Plains Grassland within PSP 41

Plate 2: Plains Grassland Habitat Zone 14. Spiny Rice-flower was recorded within this habitat zone

Other vegetation mapping units

Degraded Treeless Vegetation (DTV) is composed of highly disturbed agricultural and residential land consisting of predominantly introduced vegetation. By definition, it does not include vegetation where indigenous trees are present. It mainly consists of areas used for cereal crop production or sown pastures for grazing and as such is dominated by typical crop weed species, disturbance species and pasture grasses. DTV areas generally contain vegetation dominated by a mix of introduced herbs including annual grasses (Plate 3). Common species present include Serrated Tussock, Artichoke Thistle, Wimmera Rye-grass *Lolium rigidum*, Squirrel-tail Fescue *Vulpia bromoides*, Cape Weed, Onion Grass and Ribwort *Plantago lanceolata*. A low cover of indigenous herbs including spear grasses *Austrostipa* spp., wallaby-grasses *Austrodanthonia* spp., Slender Dock *Rumex brownii* and Berry Saltbush *Atriplex semibaccata* are often present within this vegetation. However the cover of these does not meet the definition threshold as a patch of native vegetation under the Native Vegetation Framework (NRE 2002).

A total of 353.32 ha of DTV were mapped in Manor Lakes PSP 41 by AECOM (AECOM 2010).

No areas of Non-native Vegetation were mapped or identified by AECOM.

Plate 3: Degraded Treeless Vegetation

3.1.4.2 Protected plant communities

The Australian Government Policy Statement 3.8 states that the listed ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP; critically endangered) is present within the western suburbs of Melbourne and extends to Hamilton in western rural Victoria, and follows most closely the floristics of Plains Grassland (EVC 132) and Creekline Tussock Grassland (EVC 654). Creekline Tussock Grassland has not been mapped during the current assessment within Manor Lakes PSP 41. However, Plains Grassland (and the EPBC-listed ecological community) is present within Manor Lakes PSP 41 (Figure 4).

Patches of Plains Grassland mapped by AECOM in 2008/2009 meets the definition criteria for the listed community. A total of 84.96 ha of NTGVVP have been mapped within Manor Lakes PSP 41 (Figure 4).

All areas identified as *Low-rainfall* Plains Grassland also meet the definition criteria for the FFG Act listed community Western (Basalt) Plains Grassland. The description contained within the relevant FFG Action Statement equates the community to Plains Grassland (EVC 132) present within the area bounded by the Plenty River (Melbourne) to the east, Hamilton to the west, Beaufort to the north and Colac to the south. Therefore, all Plains Grassland mapped within

Manor Lakes PSP 41are also considered to be the FFG Act-listed Western (Basalt) Plains Grassland Community (Figure 4).

All EVCs recorded in Manor Lakes PSP 41 are considered by DSE to be endangered within the Victorian Volcanic Plain bioregion.

3.1.4.3 High Threat Perennial Grassy Weeds

The cover of high threat perennial grassy weeds within Manor Lakes PSP 41 is mapped in Figure 5. The determination of high threat perennial grassy weed cover is divided into two categories – greater than (>) 25% cover and less than or equal to (≤) 25% cover. Areas with less than or equal to (≤) 25% cover of high threat perennial grassy comprises a total of 406 ha of vegetation (85 ha native vegetation; 321 ha DTV). Areas with greater than (>) 25% cover of high threat perennial grassy weeds comprises a total of 32 ha of vegetation (0.02 ha native vegetation; 32 ha DTV).

Typical high threat perennial grassy weeds documented within Manor Lakes PSP 41 include Chilean Needle-grass *Nasella neesiana,* Serrated Tussock, Couch *Cynadon dactylon*, Cocksfoot *Dactylis glomerata*, Cane Needle-grass *Nasella hyalina,* Toowoomba Canary-grass *Phalaris aquatica* and Perennial Rye-grass *Lolium perenne*.

3.1.4.4 Geographic context of native vegetation

The native vegetation within the precinct has an influence on the vegetation outside of the precinct. In a landscape context, the extant native vegetation provides a source and sink for species reproductive propagules and genetic material which, with availability of suitable habitat, is the basis for the ongoing persistence of populations.

Many species populations within the precinct will be connected in some way with those outside of the precinct (e.g. breeding between colonies, adjoining territories and complex population structures). Furthermore, some native vegetation and fauna habitats are contiguous with the same types on adjoining land.

Remnant native vegetation within the precinct provides habitat for a suite of native species. The majority of these species were not the subject of surveys undertaken for the current assessment but are vital for maintaining ecological processes which exist. They include fungi, lichens, non-vascular plants (mosses, liverworts and hornworts) and invertebrate animals. These species in addition to those recorded during the current assessment have evolved in conditions typically provided by intact native vegetation with a natural soil structure.

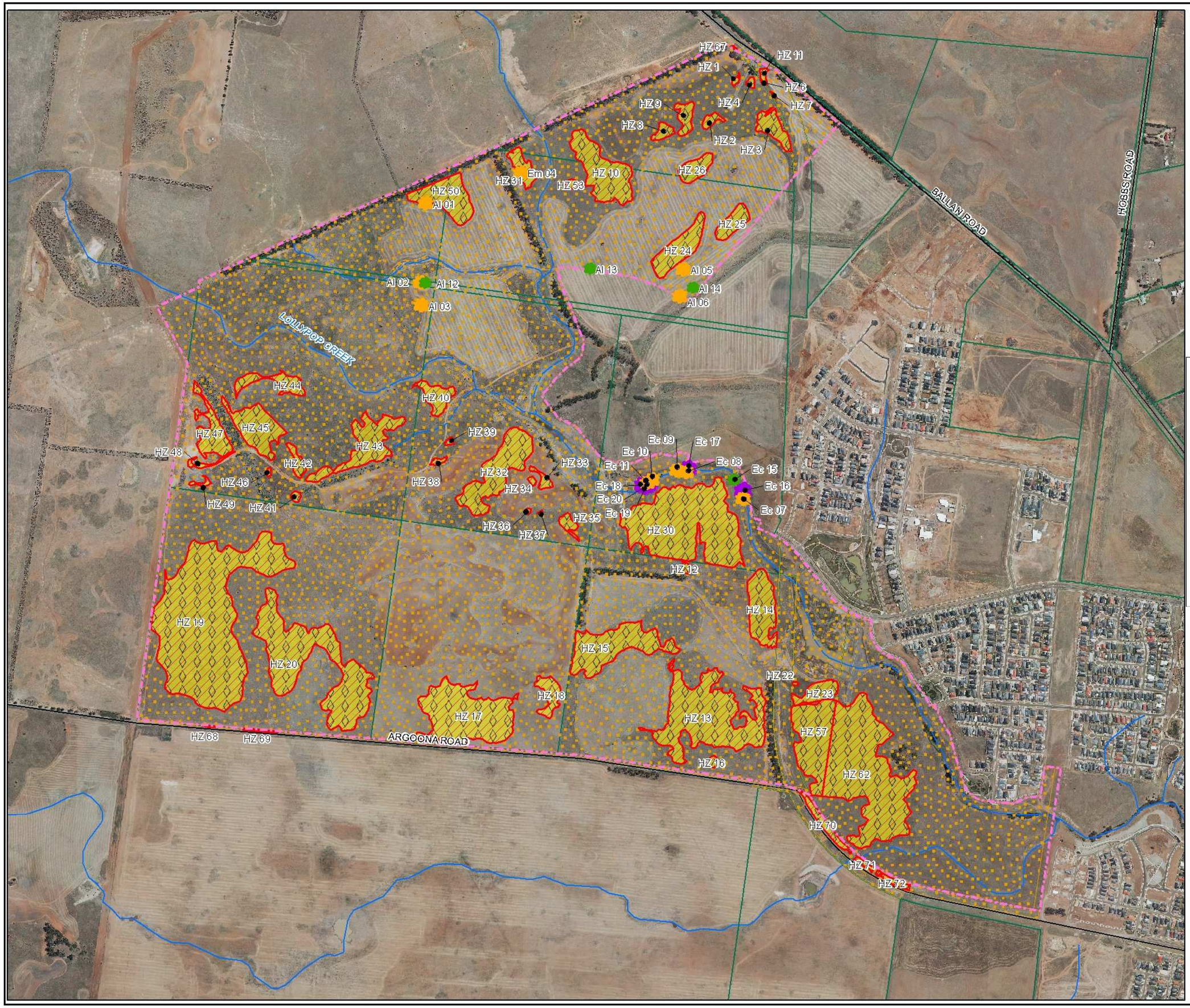
Manor Lakes PSP 41 contains one state significant BioSite (Lollypop Creek – middle and upper reaches – 4595).

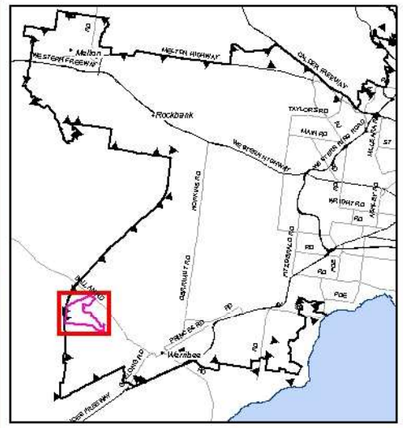
DSEs Interactive Maps show approximately 40% of the within 10 km surrounding the precinct as occupied by remnant native vegetation, the majority of which is Plains Grassland. This area includes significant Plains Grassland patches including the proposed Western Grassland Reserves, as well as the Werribee River, Lollypop Creek and a number of National, State and Regionally significant BioSites.

Lollypop Creek, which runs through the precinct, supplies water to estuarine lakes, saltmarsh and related habitats at the Melbourne Water Western Treatment Plant, which is part of the Ramsar Wetland Port Phillip Bay and Bellarine Peninsula.

In a regional and state context, the native vegetation present is significant as it:

- Provides habitat for a large number of state or nationally rare or threatened species;
- Includes one nationally threatened plant taxon –Spiny Rice-flower;
- Includes nine plant taxa of state significance;
- Includes 84.96 ha of EPBC listed community, Natural Temperate Grassland of the Victorian Volcanic Plain and state listed community Western (Basalt) Plains Grassland;
- Includes 84.97 ha of *Low-rainfall* Plains Grassland of very high conservation significance;
- Includes one state significant Biosite (Lollypop Creek, middle and upper reaches); and
- Contains corridors such as Lollypop Creek which assist the movement of species at the landscape level.





Legend

Scattered Trees (AECOM 2010)

- Very Large Old Tree
- Large Old Tree
- Medium Old Tree
- EPBC Listed Natural Temperate Grassland of the Victorian Volcanic Plain

Native vegetation recorded by AECOM between 2008 & 2010 (AECOM 2010)

- 132_63 Low-rainfall Plains Grassland

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

See Figure A4 for more detail

Figure 4: Vegetation, Manor Lakes PSP 41

N

VicGrid GDA94
1:12,000 at A3

0 50 100 200 300 400 500
Metres

Biosis Research Pty. Ltd.
38 Bertie Street
(PO Box 489)
Port Melbourne
VICTORIA 3207

Offices also in: Ballarat, Sydney, Wollongong, Canberra, Wangaratta

Date: 11 August 2011, File number: 12649
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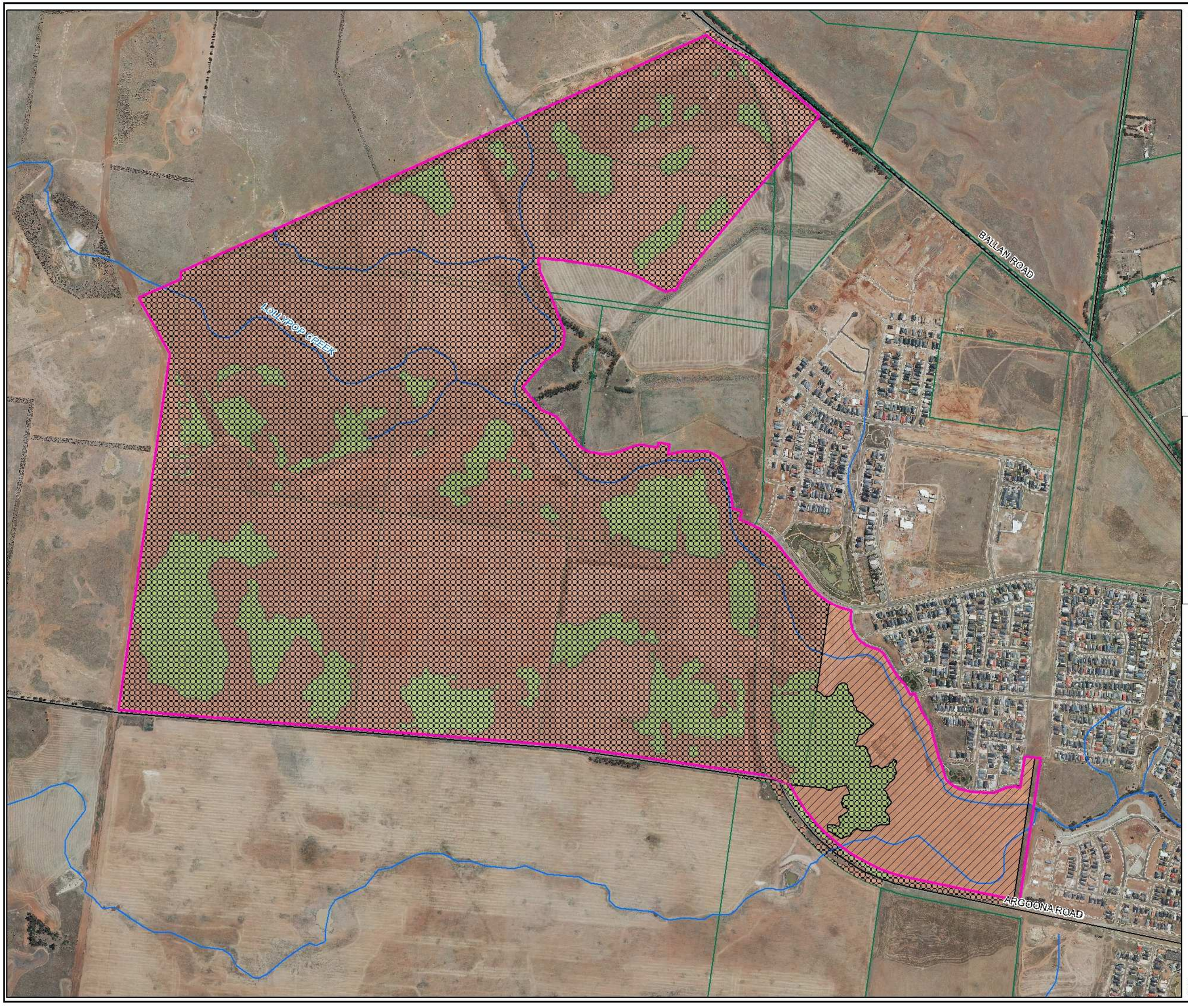

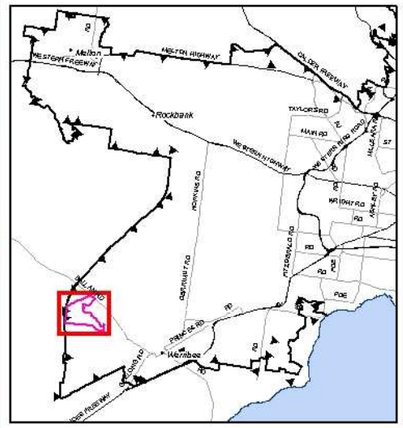

Legend

High Threat Perennial Grassy Weeds Status

- Greater than 25% of the understorey cover = HTPGW
- Less than or equal to 25% of the understorey cover = HTPGW

Vegetation

- Degraded Treeless Vegetation
- Remnant Patch
- PSP 41

Figure 5: High Threat Perennial Grassy Weeds Status, Manor Lakes PSP 41

N

VicGrid GDA94
1:12000 at A3

0 250 500
Metres

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Date: 15 August 2011, File number: 12649
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3.2 Habitat Hectare assessment

The benchmark for *Low-rainfall* Plains Grassland EVC recorded within Manor Lakes PSP 41 and benchmarks for Plains Woodland EVC and Creekline Grassy Woodland EVC for scattered trees is provided in Appendix 3.

3.2.1 Scattered Trees

The areas assessed within Manor Lakes PSP 41 by AECOM contained 20 scattered indigenous trees (Table 4).

Table 4: Scattered indigenous trees within Manor Lakes PSP 41 recorded by AECOM

									Datum: GDA94	
Tree number	**Scientific Name**	**Common Name**	**Size class**	**Conservation Status**	**EVC**	**Bioregion**	**Other Attributes**	**Conservation Significance**	**Longitude**	**Latitude**
1	*Allocasuarina luehmannii*	Buloke	LOT	Endangered	PW	VVP	N/A	High	144° 34' 58.29"	-37° 51' 51.69"
2	*Allocasuarina luehmannii*	Buloke	LOT	Endangered	PW	VVP	N/A	High	144° 34' 57.61"	-37° 52' 0.50"
3	*Allocasuarina luehmannii*	Buloke	LOT	Endangered	PW	VVP	N/A	High	144° 34' 57.62"	-37° 52' 3.03"
4	*Eucalyptus microcarpa*	Grey Box	LOT	Endangered	PW	VVP	N/A	High	144° 35' 11.67"	-37° 51' 48.28"
5	*Allocasuarina luehmannii*	Buloke	LOT	Endangered	PW	VVP	N/A	High	144° 35' 34.45"	-37° 51' 59.19"
6	*Allocasuarina luehmannii*	Buloke	LOT	Endangered	PW	VVP	N/A	High	144° 35' 34.00"	-37° 52' 2.13"
7	*Eucalyptus camaldulensis*	River Red-gum	LOT	Endangered	CGW	VVP	N/A	High	144° 35' 42.71"	-37° 52' 24.70"
8	*Eucalyptus camaldulensis*	River Red-gum	LOT	Endangered	CGW	VVP	N/A	High	144° 35' 34.78"	-37° 52' 21.72"
9	*Eucalyptus camaldulensis*	River Red-gum	LOT	Endangered	CGW	VVP	N/A	High	144° 35' 33.49"	-37° 52' 21.50"
10	*Eucalyptus camaldulensis*	River Red-gum	LOT	Endangered	CGW	VVP	N/A	High	144° 35' 29.97"	-37° 52' 22.54"
11	*Eucalyptus camaldulensis*	River Red-gum	LOT	Endangered	CGW	VVP	N/A	High	144° 35' 29.30"	-37° 52' 22.89"
12	*Allocasuarina luehmannii*	Buloke	MOT	Endangered	PW	VVP	N/A	High	144° 34' 58.15"	-37° 52' 0.58"
13	*Allocasuarina luehmannii*	Buloke	MOT	Endangered	PW	VVP	N/A	High	144° 35' 21.34"	-37° 51' 59.06"
14	*Allocasuarina luehmannii*	Buloke	MOT	Endangered	PW	VVP	N/A	High	144° 35' 35.83"	-37° 52' 1.23"
15	*Eucalyptus camaldulensis*	River Red-gum	MOT	Endangered	CGW	VVP	N/A	High	144° 35' 41.40"	-37° 52' 22.70"
16	*Eucalyptus camaldulensis*	River Red-gum	VLOT	Endangered	CGW	VVP	N/A	High	144° 35' 42.74"	-37° 52' 23.87"
17	*Eucalyptus camaldulensis*	River Red-gum	VLOT	Endangered	CGW	VVP	N/A	High	144° 35' 35.07"	-37° 52' 21.39"
18	*Eucalyptus camaldulensis*	River Red-gum	VLOT	Endangered	CGW	VVP	N/A	High	144° 35' 28.69"	-37° 52' 23.17"
19	*Eucalyptus camaldulensis*	River Red-gum	VLOT	Endangered	CGW	VVP	N/A	High	144° 35' 29.01"	-37° 52' 23.36"

Datum: GDA94

Tree number	Scientific Name	Common Name	Size class	Conservation Status	EVC	Bioregion	Other Attributes	Conservation Significance	Longitude	Latitude
20	*Eucalyptus camaldulensis*	River Red-gum	VLOT	Endangered	CGW	VVP	N/A	High	144° 35' 29.51"	-37° 52' 23.08"

PW: Plains Woodland, CGW: Creekline Grassy Woodland, MOT: Medium Old Tree, LOT: Large Old Tree, VLOT: Very Large Old Tree, VVP: Victorian Volcanic Plains.

3.2.2 Vegetation in Patches

AECOM identified a total of 54 habitat zones (or native vegetation polygons) within Manor Lakes PSP 41 in 2008/2009 (AECOM 2010, Table 5). The current extent, quality and conservation significance of these habitat zones is provided in Table 5 and 6.

For EVCs that are naturally treeless, the site condition scores were standardised (as appropriate) to maintain the relative weighting of site condition and landscape scores (DSE 2004).

A total of **84.97 hectares** (all Very High conservation significance) of native vegetation in habitat zones were mapped by AECOM within Manor Lakes PSP 41. The habitat hectares scores were updated in the present assessment to reflect the correct site condition and landscape context of the habitat zones. These habitat zones now comprise **43.47 habitat hectares (hha)** within Manor Lakes PSP 41 (Table 6).

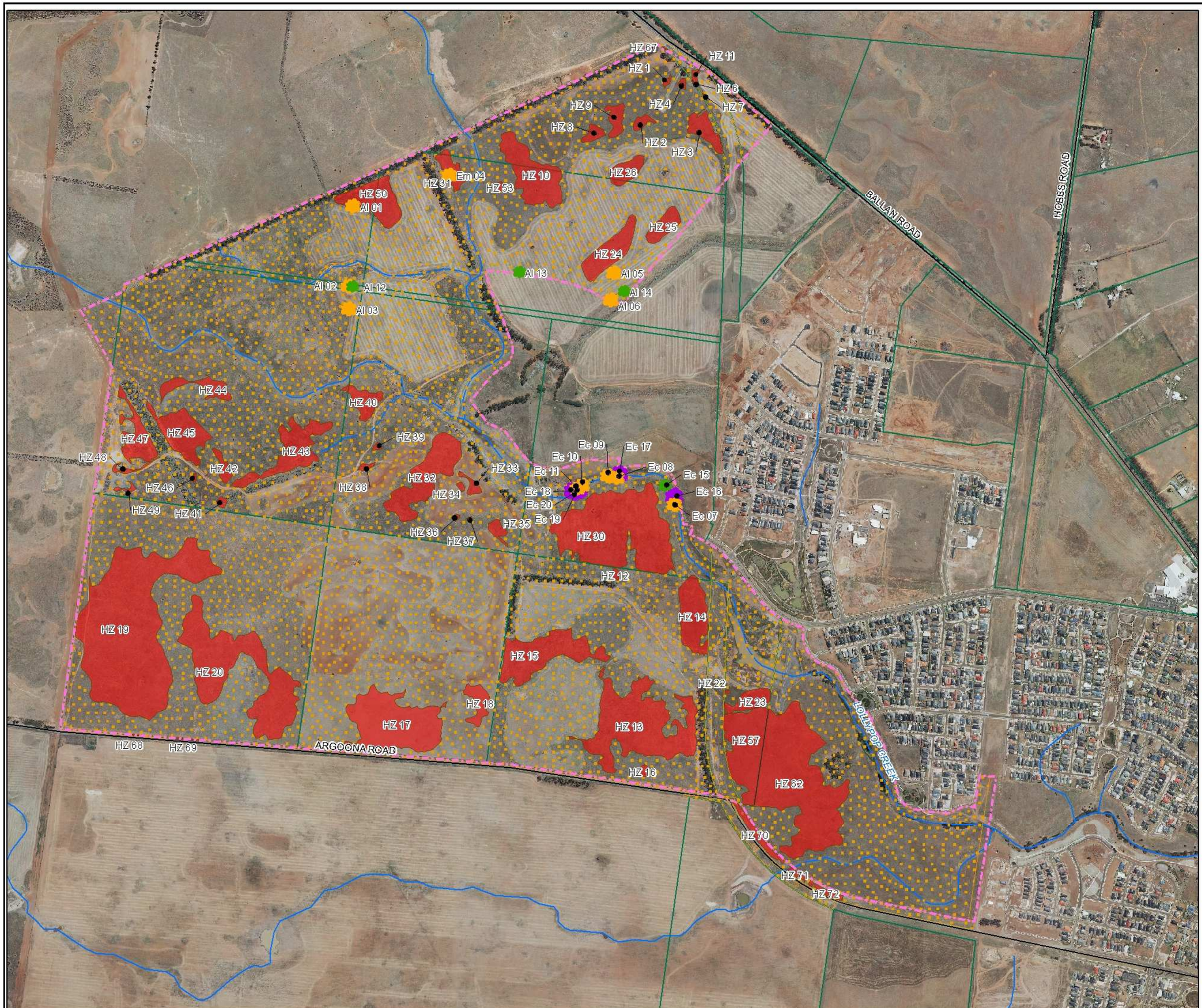
Conservation significance

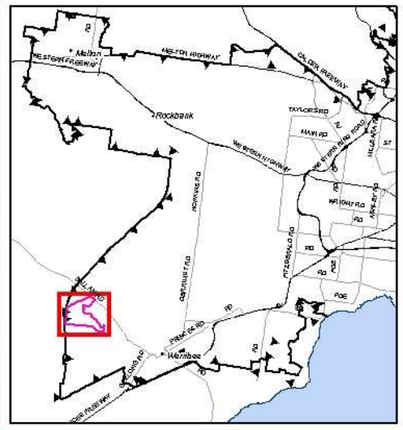
The conservation significance of each polygon of native vegetation within Manor Lakes PSP 41 is shown in Table 6. Manor Lakes PSP 41 supports **43.47 hha** of Very High conservation significance native vegetation (Figure 6).

Table 5. Summary of habitat hectares for each patch of Plains Grassland mapped by AECOM within Manor Lakes PSP 41. Habitat scores have been updated during the current assessment to correct differences associated with the previous results recorded by AECOM.

Habitat zone	Area of zone	EVC	Habitat Score	Habitat Hectares	Conservation Status	Conservation Significance
1	0.06	*Low Rainfall* Plains Grassland	0.45	0.03	Endangered	Very High
2	0.21	*Low Rainfall* Plains Grassland	0.45	0.09	Endangered	Very High
3	0.81	*Low Rainfall* Plains Grassland	0.45	0.36	Endangered	Very High
4	0.07	*Low Rainfall* Plains Grassland	0.45	0.03	Endangered	Very High
6	0.01	*Low Rainfall* Plains Grassland	0.41	0.00	Endangered	Very High
7	0.01	*Low Rainfall* Plains Grassland	0.41	0.00	Endangered	Very High
8	0.28	*Low Rainfall* Plains Grassland	0.45	0.13	Endangered	Very High
9	0.49	*Low Rainfall* Plains Grassland	0.45	0.22	Endangered	Very High
10	2.81	*Low Rainfall* Plains Grassland	0.55	1.55	Endangered	Very High
11	0.1	*Low Rainfall* Plains Grassland	0.41	0.04	Endangered	Very High
12	0.1	*Low Rainfall* Plains Grassland	0.38	0.04	Endangered	Very High
13	6.69	*Low Rainfall* Plains Grassland	0.55	3.7	Endangered	Very High
14	2.04	*Low Rainfall* Plains Grassland	0.76	1.5	Endangered	Very High
15	3.29	*Low Rainfall* Plains Grassland	0.36	1.2	Endangered	Very High
16	0.11	*Low Rainfall* Plains Grassland	0.55	0.1	Endangered	Very High
17	5.06	*Low Rainfall* Plains Grassland	0.51	2.6	Endangered	Very High
18	0.69	*Low Rainfall* Plains Grassland	0.51	0.36	Endangered	Very High
19	15.1	*Low Rainfall* Plains Grassland	0.62	9.42	Endangered	Very High
20	7.14	*Low Rainfall* Plains Grassland	0.62	4.45	Endangered	Very High
22	0.02	*Low Rainfall* Plains Grassland	0.38	0.01	Endangered	Very High
23	0.76	*Low Rainfall* Plains Grassland	0.38	0.3	Endangered	Very High
24	1.56	*Low Rainfall* Plains Grassland	0.41	0.64	Endangered	Very High
25	0.73	*Low Rainfall* Plains Grassland	0.41	0.3	Endangered	Very High
26	0.71	*Low Rainfall* Plains Grassland	0.39	0.28	Endangered	Very High
30	8.39	*Low Rainfall* Plains Grassland	0.51	4.3	Endangered	Very High
31	0.55	*Low Rainfall* Plains Grassland	0.3	0.16	Endangered	Very High
32	3.01	*Low Rainfall* Plains Grassland	0.6	1.8	Endangered	Very High
33	0.22	*Low Rainfall* Plains Grassland	0.28	0.06	Endangered	Very High
34	0.06	*Low Rainfall* Plains Grassland	0.28	0.02	Endangered	Very High
35	0.28	*Low Rainfall* Plains Grassland	0.28	0.08	Endangered	Very High
36	0.03	*Low Rainfall* Plains Grassland	0.27	0.01	Endangered	Very High
37	0.01	*Low Rainfall* Plains Grassland	0.32	0.00	Endangered	Very High
38	0.09	*Low Rainfall* Plains Grassland	0.32	0.03	Endangered	Very High
39	0.06	*Low Rainfall* Plains Grassland	0.32	0.02	Endangered	Very High
40	0.81	*Low Rainfall* Plains Grassland	0.42	0.34	Endangered	Very High
41	0.09	*Low Rainfall* Plains Grassland	0.38	0.03	Endangered	Very High
42	0.31	*Low Rainfall* Plains Grassland	0.38	0.12	Endangered	Very High
43	2.29	*Low Rainfall* Plains Grassland	0.57	1.3	Endangered	Very High
44	0.85	*Low Rainfall* Plains Grassland	0.38	0.32	Endangered	Very High
45	1.99	*Low Rainfall* Plains Grassland	0.38	0.75	Endangered	Very High

Habitat zone	Area of zone	EVC	Habitat Score	Habitat Hectares	Conservation Status	Conservation Significance
46	0.03	*Low Rainfall* Plains Grassland	0.38	0.01	Endangered	Very High
47	1.31	*Low Rainfall* Plains Grassland	0.35	0.46	Endangered	Very High
48	0.15	*Low Rainfall* Plains Grassland	0.38	0.06	Endangered	Very High
49	0.09	*Low Rainfall* Plains Grassland	0.38	0.03	Endangered	Very High
50	1.96	*Low Rainfall* Plains Grassland	0.47	0.93	Endangered	Very High
53	0.1	*Low Rainfall* Plains Grassland	0.53	0.05	Endangered	Very High
57	3.24	*Low Rainfall* Plains Grassland	0.38	1.2	Endangered	Very High
62	9.29	*Low Rainfall* Plains Grassland	0.38	3.5	Endangered	Very High
67	0.01	*Low Rainfall* Plains Grassland	0.43	0.00	Endangered	Very High
68	0.02	*Low Rainfall* Plains Grassland	0.47	0.01	Endangered	Very High
69	0.06	*Low Rainfall* Plains Grassland	0.39	0.02	Endangered	Very High
70	0.5	*Low Rainfall* Plains Grassland	0.61	0.31	Endangered	Very High
71	0.09	*Low Rainfall* Plains Grassland	0.46	0.04	Endangered	Very High
72	0.2	*Low Rainfall* Plains Grassland	0.5	0.1	Endangered	Very High





Legend

Scattered Trees (AECOM 2010)

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

Native vegetation

Conservation significance

- Very High

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

See Figure A6 for more detail

Figure 6: Conservation significance of habitat zones according to the Native Vegetation Framework (NRE 2002), Manor Lakes PSP 41

N

VicGrid GDA94
1:12,000 at A3

0 50 100 200 300 400 500
Metres

Biosis Research Pty. Ltd.
38 Bertie Street
(PO Box 489)
Port Melbourne
VICTORIA 3207

Offices also in: Ballarat, Sydney, Wollongong, Canberra, Wangaratta

Date: 11 August 2011, File number: 12649
Checked by: JAF, Drawn by: STF
Location: ...12649\Mapping\Report Maps\12649 Fig 6 Cons sig.mxd

Table 6: Quantification and significance of habitat zones of native vegetation mapped by AECOM in Manor Lakes PSP 41

AECOM Habitat Zone Number			**1**	**2**	**3**	**4**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Property PFI			204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186
Bioregion			VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP
EVC #: Name			LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	HSPG	HSPG	HSPG	HSPG
EVC Bioregional Conservation Status			E	E	E	E	E	E	E	E	E	E	E	E	E	E
		Max Score	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
Site Condition	Large Old Trees	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Canopy Cover	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Lack of Weeds	15	7	7	7	7	7	7	7	7	7	7	4	7	9	0
	Understorey	25	15	15	15	15	15	15	15	15	15	15	5	15	20	5
	Recruitment	10	3	3	3	3	3	3	3	3	6	3	3	3	10	6
	Organic Matter	5	2	2	2	2	2	2	2	2	5	2	4	4	5	4
	Logs	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Total Site Score		27	27	27	27	27	27	27	27	33	27	16	29	44	15
	EVC standardiser (x 75/55)		1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
	Adjusted Site Score		36.82	36.82	36.82	36.82	36.82	36.82	36.82	36.82	45.00	36.82	21.76	39.44	59.84	20.4
Total Landscape Score			8	8	8	8	4	4	8	8	10	4	16	16	16	16
HABITAT SCORE		**100**	44.82	44.82	44.82	44.82	40.82	40.82	44.82	44.82	55.00	40.82	37.76	55.44	75.84	36.4
Habitat points = #/100		**1**	**0.45**	**0.45**	**0.45**	**0.45**	**0.41**	**0.41**	**0.45**	**0.45**	**0.55**	**0.41**	**0.38**	**0.55**	**0.76**	**0.36**
Habitat Zone area (ha)			0.06	0.21	0.81	0.07	0.01	0.01	0.28	0.49	2.81	0.1	0.1	6.7	2.04	3.3
Habitat Hectares (Hha)			**0.03**	**0.09**	**0.36**	**0.03**	**0.00**	**0.00**	**0.13**	**0.22**	**1.55**	**0.04**	**0.04**	**3.7**	**1.5**	**1.2**
Conservation Significance	Conservation Status x Hab Score		VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	H	VH	VH	H
	Threatened Species Rating		VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH
	Other Site Attribute Rating		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Overall Conservation Significance (highest rating)		VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH
Number of Large Old Trees present			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

AECOM Habitat Zone Number			16	17	18	19	20	22	23	24	25	26	30	31	32	33
Property PFI			204544186	204544186	204544186	204544186	204544186	212096201	212096201	204544186	204544186	204544186	204544186	204544186	204544186	204544186
Bioregion			VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP
EVC #: Name			HSPG	LRPG	LRPG	LRPG	LRPG	HSPG	HSPG	LRPG	LRPG	LRPG	HSPG	LRPG	LRPG	LRPG
EVC Bioregional Conservation Status			E	E	E	E	E	E	E	E	E	E	E	E	E	E
		Max Score	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
Site Condition	Large Old Trees	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Canopy Cover	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Lack of Weeds	15	7	4	4	9	9	4	4	7	7	4	4	4	7	0
	Understorey	25	15	15	15	15	15	5	5	15	15	15	15	5	15	5
	Recruitment	10	3	3	3	6	6	3	3	3	3	3	3	3	6	0
	Organic Matter	5	4	4	4	4	4	4	4	2	2	4	4	4	4	4
	Logs	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Total Site Score		29	26	26	34	34	16	16	27	27	26	26	16	32	9
	EVC standardiser (x 75/55)		1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
	Adjusted Site Score		39.44	35.45	35.45	46.36	46.36	21.76	21.76	36.82	36.82	35.45	35.36	21.82	43.64	12.27
Total Landscape Score			16	16	16	16	16	16	16	4	4	4	16	8	16	16
HABITAT SCORE		**100**	55.44	51.45	51.45	62.36	62.36	37.76	37.76	40.82	40.82	39.45	51.36	29.82	59.64	28.27
Habitat points = #/100		**1**	**0.55**	**0.51**	**0.51**	**0.62**	**0.62**	**0.38**	**0.38**	**0.41**	**0.41**	**0.39**	**0.51**	**0.30**	**0.60**	**0.28**
Habitat Zone area (ha)			0.11	5.06	0.69	15.1	7.14	0.02	0.76	1.56	0.73	0.71	8.4	0.55	3.01	0.22
Habitat Hectares (Hha)			**0.1**	**2.60**	**0.36**	**9.42**	**4.45**	**0.01**	**0.3**	**0.64**	**0.30**	**0.28**	**4.3**	**0.16**	**1.80**	**0.06**
Conservation Significance	Conservation Status x Hab Score		VH	VH	VH	VH	VH	H	H	VH	VH	H	VH	H	VH	H
	Threatened Species Rating		VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH
	Other Site Attribute Rating		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Overall Conservation Significance (highest rating)		VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH
Number of Large Old Trees present			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

AECOM Habitat Zone Number			**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**
Property PFI			204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186	204544186
Bioregion			VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP
EVC #: Name			LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG
EVC Bioregional Conservation Status			E	E	E	E	E	E	E	E	E	E	E	E	E	E
		Max Score	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
Site Condition	Large Old Trees	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Canopy Cover	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Lack of Weeds	15	0	0	0	0	0	0	7	4	4	7	4	4	4	2
	Understorey	25	5	5	5	5	5	5	5	5	5	15	5	5	5	5
	Recruitment	10	0	0	3	3	3	3	3	3	3	3	3	3	3	3
	Organic Matter	5	4	4	0	4	4	4	4	4	4	5	4	4	4	4
	Logs	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Total Site Score		9	9	8	12	12	12	19	16	16	30	16	16	16	14
	EVC standardiser (x 75/55)		1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
	Adjusted Site Score		12.27	12.27	10.91	16.36	16.36	16.36	25.91	21.82	21.82	40.91	21.82	21.82	21.82	19.09
Total Landscape Score			16	16	16	16	16	16	16	16	16	16	16	16	16	16
HABITAT SCORE		**100**	28.27	28.27	26.91	32.36	32.36	32.36	41.91	37.82	37.82	56.91	37.82	37.82	37.82	35.09
Habitat points = #/100		**1**	**0.28**	**0.28**	**0.27**	**0.32**	**0.32**	**0.32**	**0.42**	**0.38**	**0.38**	**0.57**	**0.38**	**0.38**	**0.38**	**0.35**
Habitat Zone area (ha)			0.06	0.28	0.03	0.01	0.09	0.06	0.81	0.09	0.31	2.29	0.85	1.99	0.03	1.31
Habitat Hectares (Hha)			**0.02**	**0.08**	**0.01**	**0.00**	**0.03**	**0.02**	**0.34**	**0.03**	**0.12**	**1.30**	**0.32**	**0.75**	**0.01**	**0.46**
Conservation Significance	Conservation Status x Hab Score		H	H	H	H	H	H	VH	H	H	VH	H	H	H	H
	Threatened Species Rating		VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH
	Other Site Attribute Rating		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Overall Conservation Significance (highest rating)		VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH
Number of Large Old Trees present			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

AECOM Habitat Zone Number			48	49	50	53	57	62	67	68	69	70	71	72	Total
Property PFI			204544186	204544186	204544186	204544186	212096201	212096201	R204544186	R204544186	R204544186	R212096201	R212096201	R212096201	
Bioregion			VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	
EVC #: Name			LRPG	LRPG	LRPG	LRPG	HSPG	HSPG	LRPG	LRPG	LRPG	LRPG	LRPG	LRPG	
EVC Bioregional Conservation Status			E	E	E	E	E	E	E	E	E	E	E	E	
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	
Site Condition	Large Old Trees	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Canopy Cover	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Lack of Weeds	15	4	4	4	7	4	4	9	6	2	9	6	6	
	Understorey	25	5	5	15	15	5	5	10	10	10	15	10	10	
	Recruitment	10	3	3	0	6	3	3	3	3	3	6	3	6	
	Organic Matter	5	4	4	4	5	4	4	5	4	2	3	3	3	
	Logs	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Total Site Score		16	16	23	33	16	16	27	23	17	33	22	25	
	EVC standardiser (x 75/55)		1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	
	Adjusted Site Score		21.82	21.82	31.36	45.00	21.76	21.76	36.82	31.36	23.18	45.00	30.00	34.09	
Total Landscape Score			16	16	16	8	16	16	6	16	16	16	16	16	
HABITAT SCORE		100	37.82	37.82	47.36	53.00	37.76	37.76	42.82	47.36	39.18	61.00	46.00	50.09	
Habitat points = #/100		1	**0.38**	**0.38**	**0.47**	**0.53**	**0.38**	**0.38**	**0.43**	**0.47**	**0.39**	**0.61**	**0.46**	**0.50**	
Habitat Zone area (ha)			0.15	0.09	1.96	0.1	3.24	9.29	0.01	0.02	0.06	0.5	0.09	0.2	84.97
Habitat Hectares (Hha)			**0.06**	**0.03**	**0.93**	**0.05**	**1.2**	**3.5**	**0.00**	**0.01**	**0.02**	**0.31**	**0.04**	**0.10**	43.47
Conservation Significance	Conservation Status x Hab Score		H	H	VH	VH	H	H	VH	VH	H	VH	VH	VH	
	Threatened Species Rating		VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	
	Other Site Attribute Rating		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Overall Conservation Significance (highest rating)		VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	VH	
Number of Large Old Trees present			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

3.3 Targeted Flora Survey

The locations of all significant flora species records (including database records) within Manor Lakes PSP 41 are shown on Figure A3a–i (Appendix 5).

A total of 137.58 ha in spring and 85.34 ha in summer within Manor Lakes PSP 41 were searched for targeted flora species (Table 7; Figure 2). Eighteen flora species were selected as priority species (by DSE) to be surveyed using targeted search methods described in Section 2.3.4 (Appendix 1). These were:

- Matted Flax-lily *Dianella amoena*;
- Small Scurf-pea *Cullen parvum*;
- Button Wrinklewort *Rutidosis leptorhynchoides*;
- River Swamp Wallaby-grass *Amphibromus fluitans*;
- Sunshine Diuris *Diuris fragrantissima*;
- Small Golden-moths *Diuris basaltica*;
- Tough Scurf-pea *Cullen tenax*;
- Swollen Swamp Wallaby-grass *Amphibromus pithogastrus*;
- Large-fruit Fireweed *Senecio macrocarpus*;
- Basalt Sun-orchid *Thelymitra gregaria*;
- Basalt Podolepis *Podolepis* sp. 1;
- Pale Swamp Everlasting *Helichrysum* aff. *rutidolepis* (Lowland Swamp);
- Swamp Everlasting *Xerochrysum palustre*;
- Slender Tick-trefoil *Desmodium varians*;
- Clover Glycine *Glycine latrobeana*;
- Small Milkwort *Comesperma polygaloides*;
- Basalt Peppercress *Lepidium hyssopifolium*; and
- Swamp Fireweed *Senecio psilocarpus*.

One of the target species, Small Scurf-pea *Cullen parvum* was recorded during the spring and summer targeted searches. Approximately 1089 plants were identified within the study area. While none of the other species were recorded, nine additional threatened plant species were recorded: nine Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* plants, 15 Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis*, 108 Pale Spike-sedge *Eleocharis pallens*, 182 Flat Spike-sedge *Eleocharis plana*, one Wimmera Woodruff *Asperula wimmerana*, 10 Pale-flower Crane's-bill *Geranium* sp. 3, six Slender Tick-trefoil *Desmodium varians*, eight Buloke *Allocasuarina luehmannii* and 19 Arching

Flax-lily *Dianella* sp. aff. *longifolia* (Benambra) plants (Table 2).

Plate 4: Tributary of Lollypop Creek where Small Scurf-pea and Arching Flax-lily were recorded

Table 7. Targeted flora survey results

Assessor	Date	Time	Local climate conditions	Species recorded	Type of survey	Duration of survey
Julia Franco, Liz Fogarty, Sam Gilbert	24/09/2010	9am–4pm	Cold	*Cullen parvum* *Dianella* sp. aff. *longifolia* (Benambra) *Pimelea spinescens*	Spring Targeted	7hrs
Liz Fogarty, Sera Cutler, Victoria Allen	28/09/2010	9am–4pm	Cold, scattered showers	*Cullen parvum* *Dianella* sp. aff. *longifolia* (Benambra) *Pimelea spinescens*	Spring Targeted	7hrs
Julia Franco, Liz Fogarty, Sam Gilbert, Victoria Allen	29/09/2010	9am–5pm	Cold, scattered showers	*Cullen parvum* *Dianella* sp. aff. *longifolia* (Benambra) *Pimelea spinescens*	Spring Targeted	8hrs

Assessor	Date	Time	Local climate conditions	Species recorded	Type of survey	Duration of survey
Sera Cutler, Victoria Allen	29/11/2010	12.30pm –5pm	Scattered showers, mild	None recorded	Spring Targeted	4.5hrs
Julia Franco, Nicola Barnes, Kylie Payze	30/11/2010	9am–5pm	Warm	None recorded	Spring Targeted	8hrs
Julia Franco, Kylie Payze	1/12/2010	9am–5pm	Warm, cloudy	None recorded	Spring Targeted	8hrs
Julia Franco, Ryan Mueck, Katie Stevenson	2/12/2010	9am–5pm	Overcast	*Eleocharis pallens*	Spring Targeted	8hrs
Julia Franco, Ryan Mueck, Katie Stevenson, Kylie Payze, Vanessa Westcott	3/12/2010	9am–5pm	Warm, showers	None recorded	Spring Targeted	8hrs
Kylie Payze, Katie Stevenson, Ryan Mueck	6/12/2010	9am–5pm	Hot, overcast	None recorded	Spring Targeted	8hrs
Katie Stevenson, Ryan Mueck, Kylie Payze, Peter Clementson	7/12/2010	9am–5pm	Overcast, windy, hot	*Cullen parvum*	Spring Targeted	8hrs
Kylie Payze, Katie Stevenson, Ryan Mueck	8/12/2010	9am–5pm	Scattered showers, warm	None recorded	Spring Targeted	8hrs
Julia Franco, Kylie Payze	16/12/2010	9am–5pm	Sunny, mild	*Allocasuarina luehmannii*	Spring Targeted	8hrs
Julia Franco, Kylie Payze	17/12/2010	9am–5pm	Warm, sunny	None recorded	Spring Targeted	8hrs
Katie Stevenson, Kylie Payze	7/02/2011	9am–5pm	Sunny, cool	None recorded	Summer Targeted	8hrs
Katie Stevenson, Kylie Payze	8/02/2011	9am–5pm	Cloudy, cool	*Convolvulus angustissimus* subsp. *omnigracilis* *Dianella* sp. aff. *longifolia* (Benambra)	Summer Targeted	8hrs
Katie Stevenson, Kylie Payze, Julia Franco	9/02/2011	9am–5pm	Cloudy, warm	None recorded	Summer Targeted	8hrs

Assessor	Date	Time	Local climate conditions	Species recorded	Type of survey	Duration of survey
Katie Stevenson, Kylie Payze, Julia Franco	10/02/2011	9am–5pm	Sunny, hot	*Asperula wimmerana* *Eleocharis pallens*	Summer Targeted	8hrs
Katie Stevenson, Kylie Payze	11/02/2011	9am–5pm	Scattered showers	*Eleocharis pallens*	Summer Targeted	8hrs
Julia Franco, Kylie Payze	21/02/2011	9.30am–4pm	Sunny, warm	None recorded	Summer Targeted	6.5hrs
Katie Stevenson, Victoria Allen	21/02/2011	9am–5pm	Sunny, warm	*Dianella* sp. aff. *longifolia* (Benambra) *Cullen parvum*	Summer Targeted	8hrs
Julia Franco, Kylie Payze	22/02/2011	9am–4pm	Cloudy, cool	*Cullen parvum*	Summer Targeted	7hrs
Julia Franco, Kylie Payze	23/02/2011	9am–4pm	Mild, sunny	*Cullen parvum* *Eleocharis pallens* *Eleocharis plana* *Desmodium varians* *Geranium* sp. 3	Summer Targeted	7hrs
Julia Franco, Kylie Payze	24/02/2011	9am–4pm	Warm	*Desmodium varians* *Eleocharis pallens* *Eleocharis plana* *Cullen parvum*	Summer Targeted	7hrs

3.4 Fauna

3.4.1 Fauna habitats

Fauna habitats that occur within Manor Lakes PSP 41 can be characterised according to vegetation communities and other natural and artificial features such as wetlands and rock walls. Fauna habitats vary in size and quality throughout the study area. Fauna habitats identified within Manor Lakes PSP 41 are shown in Figure 7 and described in further detail below.

Plains grassland

Plains grassland was the most commonly encountered habitat type within the survey area. Plains grassland habitat is characterised by native perennial tussock grasses and other herbs growing within inter-tussock spaces. Trees and woody shrubs are typically absent. Much of the plains grassland habitat on the site contains a combination of loose surface rock and embedded rock (Plate 5). The quality of plains grassland habitat varied considerably across the site, which is likely to be a result of past disturbance and land-use practices both within the site and in adjacent areas.

Plains grassland provides habitat for a diverse range of terrestrial fauna, many of which are of national and state significance. There are a number of common bird species that forage within plains grassland habitat, such as Australasian Pipit *Anthus novaeseelandiae*, Stubble Quail *Coturnix pectoralis*, and Willie-wagtail *Rhipidura leucophrys*. Raptors also forage over these open plains grassland areas, with species observed during the present assessment including Brown Falcon *Falco berigora* and Nankeen Kestrel *Falco cenchroides*. Dense tussocks and rocky areas provide suitable habitat for a number of ground dwelling species including Fat-tailed Dunnart *Sminthopsis crassicaudata*, Common Blue-tongue Lizard *Tiliqua scincoides*, Little Whip-Snake *Suta flagellum* and the nationally significant Striped Legless Lizard *Delma impar*. Plains grassland habitat within the study area also provides suitable habitat for the nationally significant Golden Sun Moth *Synemon plana*.

Plate 5: Plains grassland habitat located within the study area

Remnant tree / standing dead tree

A number of remnant River Red-gums exist in small scattered patches along Lollypop Creek. In addition, several highly scattered Bulokes are located across the survey area and one large eucalypt is present on the far north western edge of the site. Remnant trees within the study area provide a nesting resource for hollow-dependant fauna species. Remnant trees and standing dead trees also provide microhabitats enabling fauna to roost, nest and forage among fallen limbs, bark and leaf litter. Several hollow utilising bird species were recorded during the present assessment including Galah *Eolophus roseicapilla*, Eastern Rosella *Platycercus eximius*, Red-rumped Parrot *Psephotus haematonotu*s and Common Myna *Acridotheres tristis*.

Wetlands and Waterways

Aquatic habitats were present within the study area in the form of low-lying ephemeral swamps, several minor ephemeral drainage lines, pools and dams associated with Lollypop Creek. Lollypop Creek is an ephemeral creekline with a series of permanent pools and flows in a west to east direction through the study area. A number of small minor drainage lines and low-lying areas located within the study area were dry at the time of assessment, but have the potential to provide ephemeral wetland habitat following periods of high rainfall. The upper reaches of Lollypop creek upstream of Greens Road have been previously

identified as a site of state faunal significance (Schulz *et al.* 1991).

Permanent and semi-permanent pools located along Lollypop Creek provide habitat for a number of bird, frog and fish species. The shallow creek gorges, escarpments and rocky ephemeral creekbeds along Lollypop creek also provide habitat for a number of reptile species. Welcome Swallows *Hirundo neoxena* and insectivorous microbats may forage for aerial insects over some of the larger pools along Lollypop Creek. Pools located along Lollypop Creek with a greater cover of emergent and fringing vegetation provide habitat for cryptic waterbirds such as Spotted Crake *Porzana fluminea*, and the state significant Baillon's Crake *Porzana pusilla*.

Exotic pasture or cropland

This habitat type is characterised by exotic pasture grasses, weeds and agricultural crops such as wheat. Due to its highly disturbed and modified nature, this habitat type contains few resources for fauna and consequently species diversity is generally poor in these areas. A considerable area of the study site is presently being used for crop production.

Open-country ground-foraging species such as Australian Magpie *Gymnorhina tibicen*, Little Raven *Corvus mellori*, European Skylark *Alauda arvensis* and Galah are common in these areas and were recorded throughout the study area during the current assessment. Birds of prey such as the Peregrine Falcon *Falco peregrinus* and Black-shouldered Kite *Elanus axillaris* were observed foraging above these disturbed areas. Due to the lack of suitable cover, exotic pasture and cropland generally provides poor habitat for reptiles, frogs and native small mammals.

Planted Vegetation

This habitat type is characterised by planted exotic and non-indigenous trees and shrubs typically found in wind-breaks and as scattered paddock trees. The non-indigenous Sugar Gum *Eucalyptus cladocalyx* was the most common species found in wind-break plantings and as scattered paddock trees within the study area.

Scattered trees are likely to be used by common woodland birds such as the Little Raven, Magpie-lark *Grallina cyanoleuca*, Galah and introduced birds such as Common Starling *Sturnus vulgaris*. Common raptors such as Nankeen Kestrel and Black-shouldered Kite are likely to use scattered paddock trees for perching and nesting. An active Wedge-tailed Eagle *Aquila audax* nest with two adult birds was located in a patch Sugar Gums along Lollypop Creek (Plate 6).

Exotic and non-indigenous flowering trees and shrubs within the study area provide additional food resources and habitat for a number of nectar feeding birds such as Red Wattlebird *Anthochaera carunculata* and White-plumed Honeyeater *Lichenostomus penicillatus,* which were observed foraging within flowering Sugar Gums during the current assessment. Some mature non-indigenous eucalypts may also provide foraging resources amongst fallen limbs, bark and leaf litter. These planted exotic or non-indigenous trees are unlikely to contain hollows. Many planted trees within the study area were often surrounded by an understorey of woody weeds, particularly Box-thorn. Box-thorn shrubs within the study area provide habitat for small birds including Superb Fairy Wren *Malurus cyaneus,* Zebra Finch *Taeniopygia guttata* and House Sparrow *Passer domesticus.* A pair of Black-shouldered Kites were observed using Box-thorn shrubs.

Plate 6: Active Wedge-tailed Eagle nest in a planted non-indigenous Sugar Gum

Rock Walls and Rock Piles

Rock walls are a common feature in the basalt plains to the west of Melbourne and there are a small number of loosely constructed rock walls and rock piles located within the study area. Large dams constructed of rock are also located at two points along Lollypop Creek (Figure 7). These large rock dams

provide refuge for common frog species such as Spotted Marsh Frog *Limnodynastes tasmaniensis*. Rock walls and rock piles identified within Manor Lakes PSP 41 provide habitat for reptiles, small mammals and invertebrates. Raised rocks in grassland and pasture are also used as a perching site by a number of common open-country bird species including Australasian Pipit and Australian Magpie. They are also likely to harbour introduced mammals including Red Fox *Vulpes vulpes*, European Rabbit *Oryctolagus cuniculus* and House Mouse *Mus musculus.*

Log piles

Several large piles of cut logs and tree stumps exist throughout the site. The majority of these piles of woody debris are present on the western boundary of the site, south of Lollypop Creek. These woody piles are created from cut Sugar Gums that had been planted in the area. White-fronted Chats *Epthianura albifrons* were observed foraging amongst these piles. Introduced mammals including Red Fox, European Rabbit and House Mouse could also utilise these piles.

3.4.2 Fauna species recorded

A total of 65 indigenous fauna species (47 birds, eight mammals, two reptiles, six frogs, one decapod crustacean and one endangered invertebrate) and 12 introduced fauna species (six birds, three mammals, and three fish) were recorded within Manor Lakes PSP 41 during the current assessment (Appendix 4, Table A4.1).

3.4.3 Threatened fauna species

One nationally significant species, Golden Sun Moth, was recorded within grassland habitat during the current assessment of Manor Lakes PSP 41. The presence of Golden Sun Moth near Greens Road, Manor Lakes PSP 41 has previously been identified by Biosis Research Pty. Ltd. (2010a). No other species of national or state significance were recorded during the present assessment of Manor Lakes PSP 41. One species of regional significance, Brown Quail *Coturnix ypsilophora* (near threatened) was recorded during the current assessment.

There are 10 fauna species of national significance and 23 species of state significance that appear on database records within 5 km of the site or within the Lollypop Creek catchment in the case of aquatic fauna (Table 8). The EPBC protected matters search tool also predicts the occurrence of, or suitable habitat for a further nine nationally significant species and one state significant species. An additional 19 species listed as ‘near threatened’ in Victoria have also been previously recorded or are predicted to occur within the vicinity of the study

area.

Of the state and nationally significant species that have been recorded or are predicted to occur within 5 km of the study area, 18 have a medium or higher likelihood of occurring within the study area. These include:

- Striped Legless Lizard – potential habitat identified in rocky grassland patches throughout the study area.
- Growling Grass Frog – potential habitat identified within Lollypop Creek, associated drainage lines and low-lying ephemeral wetlands.
- Golden Sun Moth – species identified within grassland habitat during current assessment.

The areas of potential habitat for these species are shown in Figure 7. The general habitat requirements and reasoning for likelihood of occurrence of all fauna species recorded or predicted to occur within 5 km of the study area are provided in Table 8.

Table 8. Rare or threatened fauna species occurring or predicted to occur within 5 km of the study site.

Scientific Name	Common Name	Conservation status			Most Recent Record	Database	Other source	Current survey	No. of database records	Likely occurrence in study area	Likelihood reasoning	Habitat description
		EPBC	DSE	FFG								
National Significance												
Pedionomus torquatus	Plains-wanderer	VU	cr	L	2008	VBA	-	-	11	Negligible	Grassland habitats too dense.	This species inhabits sparse native grasslands with a preference to areas with patches of open ground or where light grazing has occurred. Due to a range of threatening processes, the species has declined markedly from most of its range.
Sternula nereis	Fairy Tern	VU	en	L	2004	VBA / BA	-	-	3	Negligible	No habitat present.	This species occurs in a variety of sheltered coastal environments where they forage in the shallow waters. In Victoria, Fairy Terns mostly breed on beaches in Gippsland east of Lakes Entrance.
Rostratula australis	Australian Painted Snipe	VU	cr	L	#/1980	VBA / DSEWPaC	-	-	4	Negligible	Wetlands within study area offer marginal habiat.	This species occurs in shallow terrestrial freshwater wetlands, including lakes and swamps, waterlogged grassland or saltmarsh. Also uses modified habitats such as pasture, sewage farms, dams and irrigations schemes. They roost and loaf on the ground under clumps of lignum or dense ground cover.
Botaurus poiciloptilus	Australasian Bittern	EN	en	L	2008	VBA	-	-	6	Medium	Wetlands/ riparian areas	Australasian Bitterns have narrow habitat preferences, preferring shallow, tall and densely vegetated freshwater or brackish swamps. Dense swathe of sedges, rushes, reeds or cutting grasses is important to this species.
Neophema chrysogaster	Orange-bellied Parrot	CR	cr	L	2008	VBA	-	-	1	Negligible	No habitat present.	Orange-bellied Parrots migrate to mainland Australia to forage on coastal or near-coastal locations over the winter months. Saltmarshes, coastal dunes, pastures, shrublands, estuaries, islands, beaches and moorlands, usually within 10 km of the coast, make up the habitats used by Orange-bellied Parrots.
Lathamus discolor	Swift Parrot	EN	en	L	2002/#	VBA / DSEWPaC	-	-	3	Medium	Limited habitat present in the form of planted vegetation.	Swift Parrots migrate to south-east mainland Australia during the winter months. They prefer to inhabit box-ironbark forests but have been recorded in urban parks, gardens, street trees and golf courses with flowering ornamental trees and shrubs.
Anthochaera phrygia	Regent Honeyeater	EN	cr	L	#	DSEWPaC	-	-	2	Negligible	No habitat present.	This species inhabits dry woodlands and forests dominated by box and ironbark eucalypts. Breeding is mostly confined to a small number of sites in north-eastern Victoria and along the inland slopes of the Great Dividing Range in New South Wales.
Dasyurus maculatus	Spot-tailed Quoll	EN	en	L	#	DSEWPaC	-	-	1	Negligible	No habitat present.	This species occupies a range of natural habitats. Loss of habitat due to land clearing for agriculture has reduced the range of this species significantly. Recent records come from intact patches of vegetation (AVW). The species is considered to be locally extinct in much of agricultural Victoria.

Scientific Name	Common Name	Conservation status			Most Recent Record	Database	Other source	Current survey	No. of database records	Likely occurrence in study area	Likelihood reasoning	Habitat description
		EPBC	DSE	FFG								
Isoodon obesulus obesulus	Southern Brown Bandicoot	EN	nt		1881	VBA	-	-	1	Negligible	No habitat present.	This species occurs in dry heath, shrubland, heathy forest and woodland, usually associated with well drained soils. The species has also been recorded utilising rank pasture on occasions. A consistent feature of all these habitats is a dense ground layer of vegetation, which provides adequate protection and nesting sites.
Perameles gunnii	Eastern Barred Bandicoot	EN	cr	L	1982	VBA	-	-	6	Negligible	No habitat present.	Historically inhabited native grassland and grassy woodland habitats. On the mainland, the species is extinct across much of its previous range and is now restricted to a few isolated populations in western Victoria.
Pteropus poliocephalus	Grey-headed Flying-fox	VU	vu	L	#	DSEWPaC	-	-	1	Low	Limited habitat present in the form of planted vegetation.	This species is a large fruit bat which feeds on nectar and pollen from a range of flowering native trees (e.g. eucalypts, melaleucas and banksias), as well as supplementing its diverse diet with the fruit from introduced plants. In Victoria, colonies are currently established in Melbourne, Geelong and Mallacoota.
Pseudomys novaehollandiae	New Holland Mouse	VU	vu	L	#	DSEWPaC	-	-	1	Negligible	No habitat present.	This species occurs along the coast of south-eastern Australia in habitats ranging from coastal heath, heathy woodland and coastal scrub.
Delma impar	Striped Legless Lizard	VU	en	L	#	DSEWPaC	-	-	1	High	Grassland habitat with surface rock present	This species inhabits native and modified grasslands, where sufficient cover is available to provide protection from predators. Often associated with soils of cracking clays and with embedded and surface rocks.
Tympanocryptis pinguicolla	Grassland Earless Dragon	EN	cr	L	#	DSEWPaC	-	-	1	Low	Grassland habitats too dense.	This species typically occurs in native temperate grasslands and prefers sites with little or no grazing. The last confirmed sighting of the Grasslands Earless Dragon in Victoria was at Little River in 1967 (AVW), despite recent surveys for the species throughout its former range.
Litoria raniformis	Growling Grass Frog	VU	en	L	1993/#	VBA / DSEWPaC	Ecology Australia (2010)	-	12	High	Lollypop Creek and epithermal wetlands present	This species will occur in a variety of permanent and semi-permanent waterbodies which generally contain abundant submerged and emergent vegetation. The species will also occupy slow-moving sections of creeks and rivers.
Prototroctes maraena	Australian Grayling	VU	vu	L	#	DSEWPaC	-	-	1	Negligible	No habitat present.	Australian Grayling is a diadromous species and spends most of its life in freshwater within rivers and large creeks. Juveniles inhabit estuaries and coastal seas, whilst adults occur in freshwater habitats, typically rivers and streams with cool, clear waters and gravel substrates, but occasionally also in turbid waters.
Galaxiella pusilla	Dwarf Galaxias	VU	vu	L	#	DSEWPaC	-	-	1	Negligible	No habitat present.	This species occurs in still or slow flowing, usually ephemeral waterbodies (streams, wetlands, drains) that in many instances partially dry up over summer. The species usually occurs in relatively shallow waterbodies and typically requires abundant marginal and aquatic vegetation.

Scientific Name	Common Name	Conservation status			Most Recent Record	Database	Other source	Current survey	No. of database records	Likely occurrence in study area	Likelihood reasoning	Habitat description
		EPBC	DSE	FFG								
Nannoperca obscura	Yarra Pygmy Perch	VU	nt	L	-	-	**		0	Negligible	No habitat present.	This species prefers heavily vegetated, slow flowing or still habitats but is unlikely to occur in some of the smaller and more ephemeral waterways accessed by Dwarf Galaxias. This type of habitat is limited within and immediately downstream of Manor Lakes PSP 41. The presence of the introduced Redfin and Eastern Gambusia, which are thought to predate and / or outcompete Yarra Pygmy Perch, further reduces the likelihood of this species to be found here.
Synemon plana	Golden Sun Moth	CR	cr	L	2008/#	VBA / DSEWPaC	Biosis Research (2010a)	Recorded	46	Recorded	Suitable grassland habitat present	This small diurnal moth inhabits grassy woodlands and grasslands. Once thought to be a specialised species inhabiting grasslands dominated by wallaby grasses, it is now recognised that this species can occur in exotic grasslands dominated by Chilean Needle Grass.
State Significance							-	-				
Turnix pyrrhothorax	Red-chested Button-quail		vu	L	2008	VBA	AECOM (2010)	-	2	Medium	Grasslands provide potential habitat	This species occurs in grasslands and grassy woodlands of temperate and tropical Australia. In south-eastern Australia they prefer perennial, damp grasslands and also occur in irrigated pastures and crops.
Lewinia pectoralis	Lewin's Rail		vu	L	2007	VBA	-	-	5	Medium	Lollypop Creek and epithermal wetlands offer habitat.	This species occurs in a variety of densely vegetated wetlands, swamps, creeks and rivers, including freshwater, brackish and saline environments.
Porzana pusilla	Baillon's Crake		vu	L	2006	VBA	-	-	1	Medium	Lollypop Creek and epithermal wetlands offer habitat.	This species occurs in a variety of densely vegetated wetlands, swamps, creeks and rivers, including freshwater, brackish and saline environments.
Gelochelidon nilotica	Gull-billed Tern		en	L	2008	VBA	-	-	2	Negligible	No habitat present.	This species occurs in sheltered coastal embayments, including harbours, lagoons, and estuary and river deltas. Also occurs at sea.
Hydroprogne caspia	Caspian Tern		nt	L	1979	VBA	-	-	1	Negligible	No habitat present.	This species occurs in sheltered coastal embayments, including harbours, lagoons, and estuary and river deltas. Also occurs at sea.
Sternula albifrons	Little Tern		vu	L	1978	VBA	-	-	1	Negligible	No habitat present.	This species occurs in sheltered coastal embayments, including harbours, lagoons, and estuary and river deltas. Also occurs at sea.
Charadrius mongolus	Lesser Sand Plover		vu		1978	VBA	-	-	2	Negligible	No habitat present.	This species is a migrant to Australia from August to May. Lesser Sand Plovers occur in littoral and estuarine environments along the coast of Australia.
Charadrius leschenaultii	Greater Sand Plover		vu		1978	VBA	-	-	2	Negligible	No habitat present.	This species is a migrant to Australia from August to April. Greater Sand Plovers occur in littoral and estuarine environments along the coast of Australia.
Tringa glareola	Wood Sandpiper		vu		2008	VBA	-	-	3	Medium	Lollypop Creek and epithermal wetlands offer shabitat.	This species inhabits shallow freshwater wetlands which have abundant emergent and fringing vegetation. Also known to occur in inundated grasslands and irrigated crops.

Scientific Name	Common Name	Conservation status			Most Recent Record	Database	Other source	Current survey	No. of database records	Likely occurrence in study area	Likelihood reasoning	Habitat description
		EPBC	DSE	FFG								
Actitis hypoleucos	Common Sandpiper		vu		2007	VBA	-	-	1	Low	Lollypop Creek and epithermal wetlands offer marginal habitat.	This species is an uncommon migrant to Australia from July to April. Common Sandpipers occur in a wide range of coastal or inland wetlands, including dams.
Calidris tenuirostris	Great Knot		en	L	2007	VBA	-	-	5	Negligible	No habitat present.	A migrant to Australia from August to April, with some over-wintering birds. Great Knots inhabit sheltered coastal environments such as intertidal mudflats, sandflats and beaches. Rare occurrence on inland lakes and swamps.
Grus rubicunda	Brolga		vu	L	2006	VBA	-	-	2	Medium	Marginal habitat present.	In Victoria this species is most commonly found in the south-west, the Northern Plans and associated parts of the Murray River. Brolga predominantly feed on wetland plants, but also forage in grain and potato crops and improved pasture.
Platalea regia	Royal Spoonbill		vu		2004	VBA / BA	-	-	11	Medium	Lollypop Creek and epithermal wetlands offer habitat.	Prefer terrestrial wetlands and wet grassland areas, particularly large expanses of water such as lakes, swamps or lagoons. They will also forage along rivers and have also been regularly recorded in coastal habitats such as estuaries, inlets and intertidal mudflats.
Egretta garzetta	Little Egret		en	L	2006	VBA	-	-	4	Medium	Lollypop Creek and epithermal wetlands offer habitat.	Usually found in terrestrial or saline wetlands, estuarine and wet grassland habitats. Prefer permanent well-vegetated waterbodies but also use freshwater meadows, channels and farm dams. This species forages in shallow water, exposed banks and mudflats with abundant aquatic vegetation. Roost and breed in wetlands with fringing or flooded trees.
Ardea modesta	Eastern Great Egret		vu	L	2004/#	VBA / BA	-	-	13	Medium	Lollypop Creek and epithermal wetlands offer habitat.	Usually found in terrestrial wetland, estuarine and wet grassland habitats. They prefer permanent well-vegetated waterbodies but also use freshwater meadows, channels and larger dams. The species roost and breed in wetlands with fringing or flooded trees. Most Victorian breeding sites are in the Murray-Darling basin.
Anseranas semipalmata	Magpie Goose		nt	L	2006	VBA	-	-	1	Low	Lollypop Creek and epithermal wetlands offer marginal habitat.	This species inhabits large wetlands and to a lesser extent well-vegetated dams. Foraging occurs in wet pasture environments or on crop land. More common in tropical north Australia.
Anas rhynchotis	Australasian Shoveler		vu		2004	VBA / BA	-	-	16	Medium	Lollypop Creek and epithermal wetlands offer habitat.	Prefers large, deep permanent lakes and swamps with abundant aquatic vegetation. Less commonly recorded in small or shallow waters, such as billabongs, sewage ponds, freshwater rivers and densely vegetated farm dams. Open water is needed for foraging but birds nest in densely vegetated freshwater wetlands.

Scientific Name	Common Name	Conservation status			Most Recent Record	Database	Other source	Current survey	No. of database records	Likely occurrence in study area	Likelihood reasoning	Habitat description
		EPBC	DSE	FFG								
Stictonetta naevosa	Freckled Duck		en	L	2007	VBA	-	-	1	Medium	Lollypop Creek and epithermal wetlands offer habitat.	This species inhabits terrestrial wetlands, particularly freshwater swamps with dense vegetation. Prefer to feed in shallow waters, including creeks, channels and pools. When swamps dry up this species will move to large open waters.
Aythya australis	Hardhead		vu		2004	VBA / BA	**	-	12	Medium	Lollypop Creek and epithermal wetlands offer habitat.	A mainly aquatic species preferring large, deep freshwater environments with abundant aquatic vegetation, including slow moving areas of rivers. This species also occurs in brackish wetlands and can be found in deep dams and water storage ponds.
Oxyura australis	Blue-billed Duck		en	L	2004	VBA / BA	**	-	8	Medium	Lollypop Creek and epithermal wetlands offer habitat.	A largely aquatic species preferring deep, large permanent wetlands with abundant aquatic vegetation, including Melaleuca swamps. Can be found on large dams, generally with a good cover of rushes and sedges.
Biziura lobata	Musk Duck		vu		2004	VBA / BA	**	-	13	Medium	Lollypop Creek and epithermal wetlands offer habitat.	A largely aquatic species preferring deep water on large, permanent swamps, lakes and estuaries with abundant aquatic vegetation. Occasional, transient visitor to dams and other small shallow waters.
Accipiter novaehollandiae	Grey Goshawk		vu	L	2006	VBA	-	-	4	Low	Marginal habitat present.	Grey Goshawk typically inhabits woodland and wetter forests in near-coastal Victoria. Birds are most common in the Otway area of Victoria with occasional visits to central and Gippsland areas.
Haliaeetus leucogaster	White-bellied Sea-Eagle		vu	L	#	DSEWPaC	-	-	2	Negligible	No habitat present.	This species is mostly recorded along or near coastal areas in the east of the state, and around large inland rivers such as the Murray River.
Falco subniger	Black Falcon		vu		2008	VBA	AECOM (2010)	-	7	Low	Marginal habitat present.	This species will occur in woodlands, open country and around terrestrial wetlands, primarily in arid and semi-arid zones. In Victoria, the stronghold of this species is the inland north-west of the state. Individuals are occasionally recorded in southern Victoria, particularly during drought.
Tyto novaehollandiae	Masked Owl		en	L	1884	VBA	-	-	1	Low		Masked Owl typically inhabits woodland and wetter forests in near-coastal Victoria.
Other conservation categories												
Coturnix ypsilophora	Brown Quail		nt		2008	VBA	-	Recorded	8	Recorded	Grasslands provide phabitat.	Brown Quail are found in a variety of habitats including grasslands, croplands, heaths, rainforest edges, and woodlands. Habitat is generally wet with rank ground vegetation. This species can also occur on road verges provided paddocks are nearby.
Phalacrocorax varius	Pied Cormorant		nt		2004	VBA / BA	-	-	11	Low	Lollypop Creek and epithermal wetlands offer marginal habitat.	Occur in mainly marine environments and coastal waters where they can be abundant in estuaries. They also inhabit inland lakes, rivers and billabongs. Breed and roost in trees or bushes along estuaries and the edge of waterbodies, as well as in artificial structures such as pylons.

Scientific Name	Common Name	Conservation status			Most Recent Record	Database	Other source	Current survey	No. of database records	Likely occurrence in study area	Likelihood reasoning	Habitat description
		EPBC	DSE	FFG								
Chlidonias hybridus	Whiskered Tern		nt		2007	VBA	-	-	13	Low	Lollypop Creek and epithermal wetlands offer marginal habitat.	A breeding migrant to Australia from September to March where it occurs in wetlands, lakes, swamps, rivers, and other waterbodies with submerged and emergent vegetation such as grasses, sedges, reeds and rushes.
Thalaseus bergii	Crested Tern		nt		2004	VBA / BA	-	-	5	Negligible	No habitat present.	This species is mostly confined to coastal habitats such as ocean beaches, estuaries, lagoons, bays and harbours.
Haematopus fuliginosus	Sooty Oystercatcher		nt		2006	VBA	-	-	1	Negligible	No habitat present.	Sooty Oystercatchers are found within 50 m of the shore, in the intertidal zone. They forage on most intertidal areas including rocky outcrops, rock pools, reefs and beaches.
Larus pacificus pacificus	Pacific Gull		nt		1979	VBA	-	-	6	Negligible	No habitat present.	This species will occur on sandy and rocky coasts where they forage between the high water mark and shallow water. Rarely occur on adjacent farm land.
Pluvialis squatarola	Grey Plover		nt		1978	VBA	-	-	2	Negligible	No habitat present.	A migrant to Australia from August to April. Grey Plovers occur in most coastal environments, including inlets, estuaries, and lagoons with intertidal flats, or outcrops.
Pluvialis fulva	Pacific Golden Plover		nt		2007	VBA	-	-	5	Negligible	No habitat present.	A migrant to Australia from September to May. Pacific Golden Plovers occur in sandy, muddy or rocky coastal environments, including lagoons and estuaries and have been recorded in paddocks and crops.
Numenius madagascariensis	Eastern Curlew		nt		1978	VBA	-	-	5	Negligible	No habitat present.	A migrant to Australia from July to May. Eastern Curlews inhabit estuaries, mudflats, sandflats, lagoons, mangroves and saltmarshes.
Calidris canutus	Red Knot		nt		2006	VBA	-	-	4	Negligible	No habitat present.	A migrant to Australia from August to April, with some over-wintering birds. Red Knots inhabit coastal environments such as intertidal mudflats, sandflats and beaches. Rare occurrence on inland lakes and swamps.
Gallinago hardwickii	Latham's Snipe		nt		2006/#	VBA / DSEWPaC	AECOM (2010)	-	13	Low	Lollypop Creek and epithermal wetlands offer marginal habitat.	A migrant to Australia from July to April. Latham's Snipe occurs in a wide variety of wetlands with nearby cover. They forage in soft mud at edge of wetlands and roost in a variety of vegetation around wetlands including tussock grasslands, reeds and rushes, tea-tree scrub, woodlands and forests.
Stiltia isabella	Australian Pratincole		nt		1992	VBA	-	-	1	Medium	Grasslands provide habitat for this species.	Inhabits open plains, sparsely wooded plains and tussock grasslands in arid and semi-arid environments. In Victoria, mostly found in the north-west regions of the state.
Plegadis falcinellus	Glossy Ibis		nt		2008	VBA / DSEWPaC	**	-	5	Medium	Lollypop Creek and epithermal wetlands offer habitat.	This species will occur in a variety of moist environments such as wetlands, wet pasture environments and low lying wetland areas. Rare occurrence in dry grassland and in emergent aquatic vegetation such as Phragmites.

Scientific Name	Common Name	Conservation status			Most Recent Record	Database	Other source	Current survey	No. of database records	Likely occurrence in study area	Likelihood reasoning	Habitat description
		EPBC	DSE	FFG								
Nycticorax caledonicus	Nankeen Night Heron		nt		2007	VBA / BA	**	-	8	Low	Lollypop Creek and epithermal wetlands offer marginal habitat.	This species will occur in rivers, lakes, wetlands and grasslands. They prefer to forage in shallow margins, on banks and mudflats and in swamp vegetation of these environments. They will also use wet meadows and pastures, urban wetlands and ponds. Roost and nest in dense trees and shrubs, including exotic trees such as Pines and Cypresses.
Cereopsis novaehollandiae	Cape Barren Goose		nt		2004	VBA	-	-	3	Negligible	No habitat present.	Cape Barren Goose can be found grazing on short grass, pasture, and crops on the edges of low lying wetlands.
Circus assimilis	Spotted Harrier		nt		2006	VBA	-	-	4	Low	Marginal habitat present, may utilise the study area on rare occasions.	This species will occur in open and wooded country of inland and sub-inland Australia, where they hunt over flat or undulating country with low vegetation cover. In Victoria they are mostly common over the Murray Valley with occasional visits to coastal Victoria.
Calidris subminuta	Long-toed Stint		nt		2006	VBA	-	-	5	Negligible	No habitat present.	This species will occur in a variety of wetlands with shallow brackish or fresh water, such as coastal lagoons, lakes, swamps, streams and river floodplains. Prefer areas of muddy shoreline for foraging.
Calidris melanotos	Pectoral Sandpiper		nt		2007	VBA	-	-	5	Low	Lollypop Creek and epithermal wetlands offer habitat.	This species will occur in a variety of wetlands habitats such as bays, coastal lagoons, lakes, swamps, creeks, inundated grasslands, saltmarshes and artificial wetlands.
Sminthopsis crassicaudata	Fat-tailed Dunnart		nt		1990	VBA	-	-	3	High	Grasslands provide potential habitat.	This species Inhabits areas of sparse grassland with areas of bare ground and suitable refuge sites such as surface rocks or logs where it constructs nests of grass or other dried plant material.

National significance – CE (critically endangered), EN (endangered), VU (vulnerable). State significance – ce (critically endangered), en (endangered), vu (vulnerable), nt (near threatened), L (*Flora and Fauna Guarantee Act* listed). ** Rationale for likelihood of occurrence is largely based on the amount and quality of habitat present within the precinct.

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

Table 9 describes the general habitat requirements of threatened fauna species that have been recorded or are predicted to occur with 5 km of the study area. The presence of best or remaining 50% of habitat for these species within the bioregion was determined for Manor Lakes PSP 41 for species which are considered to have at least a medium likelihood of occurrence within the precinct.

Table 10 provides detail of whether native vegetation zones delineated for assessing vegetation condition constitute the best 50% or remaining 50% of habitat for relevant threatened fauna species (in Table 8) within the Victorian Volcanic Plain bioregion; in sense of the Native Vegetation Framework. The pathway for each decision made (in accordance with DSE's Table 2) is outlined in Table 10 below.

Fauna species listed as 'near threatened' or 'data deficient' under the DSE Advisory List are not considered for best or remaining 50% assessment under the framework.

Table 9. Determination of best or remaining 50% of habitat for threatened fauna

Species	**Conservation Status**	**Habitat zone** (Figure 4)	**Steps***	**Outcome**	**Conservation Significance** (threatened species rating)	**Notes**
Australasian Bittern	Threatened	All habitat zones	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species. Species is only likely to occur within densely vegetated waterbodies along Lollypop Creek and the low-lying ephemeral wetland north of Greens Road. No habitat zones have been mapped for these areas.
Striped Legless Lizard	Threatened	1-26, 30, 31, 32, 38, 39, 40-46, 50, 53	A, D - F	Best 50% habitat	Very High	Habitat zones have habitat that clearly meets the requirements of the species and the sites represent above-average condition and landscape context as habitat for the species.
		33-37, 47-49, 57, 62	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context as habitat for the species. This is due to the lack of rock cover and increased disturbance in these areas.
Swift Parrot	Threatened	All habitat zones	A, D	No further consideration	N/A	Swift Parrots are wide ranging and will utilise a range of flowering trees across the south-east mainland during the winter months. While the species has potential to occasionally forage in remnant and planted trees within the study area, no mapped habitat zones contain suitable habitat for the species.
Growling Grass Frog	Threatened	All habitat zones	A, D	No further consideration	N/A	Habitat on these sites does not meet the requirements for this species. Species is only likely to occur within Lollypop Creek and low-lying ephemeral wetland north of Greens Road. No habitat zones have been mapped for these areas.

Species	**Conservation Status**	**Habitat zone** (Figure 4)	**Steps***	**Outcome**	**Conservation Significance** (threatened species rating)	**Notes**
Golden Sun Moth	Threatened	All habitat zones	A, B, E	Best 50% habitat	Very High	Species has been recorded as resident within mapped habitat zones in the study area and neighbouring parcels during the present study and Biosis Research Pty. Ltd. (2010a). While no detailed information is available on the size and extent of the population within the study area, recent modelling by DSE confirms that habitat on the site has a medium to high contribution to species persistence.
Australasian Shoveler, Hardhead, Musk Duck, Blue-billed Duck and Freckled Duck	Threatened	All habitat zones	A, D	No further consideration	N/A	Habitat within these zones does not meet the requirements for these species. These species may occasionally forage within and around waterbodies along Lollypop Creek, the ephemeral wetland and farm dam. No habitat zones have been mapped for these areas.
Eastern Great Egret, Little Egret and Royal Spoonbill	Threatened	All habitat zones	A, D	No further consideration	N/A	Habitat within these zones does not meet the requirements for these species. These species may occasionally forage within and around waterbodies along Lollypop Creek, the ephemeral wetland and farm dam. No habitat zones have been mapped for these areas.
Brolga	Threatened	All habitat zones	A, D	No further consideration	N/A	Habitat zones contain habitat that meet the requirements of the species, however species is unlikely to make significant use of the site in the medium term.
Lewin's Rail and Baillon's Crake	Threatened	All habitat zones	A, D	No further consideration	N/A	Habitat within these zones does not meet the requirements for these species. Species have potential to occur within densely vegetated areas along Lollypop Creek and the low-lying ephemeral wetland north of Greens Road. No habitat zones have been mapped for these areas.

Species	**Conservation Status**	**Habitat zone** (Figure 4)	**Steps***	**Outcome**	**Conservation Significance** (threatened species rating)	**Notes**
Wood Sandpiper	Threatened	All habitat zones	A, D	No further consideration	N/A	Habitat within these zones does not meet the requirements for this species. Species has potential to occasionally utilise the low-lying ephemeral wetland north of Greens Road. No habitat zones have been mapped for these areas.
Red-chested Button-quail	Threatened	All habitat zones	A, D - F	Remaining 50% habitat	High	Habitat zones have habitat that clearly meets the requirements of the species, but the sites represent below-average condition and landscape context as habitat for this species.

Table 10.* Habitat assessment for threatened species taken from Table 2 of the Native Vegetation Guide for assessment of referred planning permit applications (DSE 2007).

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

3.4.5 Targeted fauna survey

Growling Grass Frog targeted survey results

Habitat assessment of waterbodies within Manor Lakes PSP 41 was carried out on 28 September 2010 and 7 October 2010. A total of 11 separate locations within low lying wetlands, farm dams and Lollypop Creek pools were assessed for their potential to support habitat for Growling Grass Frog (Table 10). At the time of the assessments, several sites (Sites 1, 2, 3 and 4) along Lollypop Creek were generally quite shallow and lacking aquatic vegetation. Sites located further downstream included a number of deep pools that are likely to hold water permanently. Some of these pools, including sites 8 and 11, also contain a diverse range of aquatic vegetation and appear to contain suitable habitat for Growling Grass Frog.

Additional Growling Grass Frog habitat assessment and nocturnal surveys were conducted on 17 December 2010. During the additional surveys, one wetland (near Greens Road), five pools associated with a tributary of Lollypop Creek and a large farm dam were assessed. The wetland and four pools were generally shallow and lacked water when the water sampling and nocturnal searches were conducted. All areas lacked dense riparian, emergent and sub-emergent aquatic and riparian vegetation. Targeted nocturnal surveys were conducted on 6 and 20 January 2011.

Targeted survey for Growling Grass Frog was carried out on 4 and 5 October 2010, 6 and 20 January 2011 (Table 11). Despite the presence of suitable habitat within Lollypop Creek, no Growling Grass Frogs were recorded during these targeted surveys. In order to confirm that Growling Grass Frogs were calling and detectable on the nights that targeted survey was carried out, a reference site at the Western Treatment Plant was visited following nocturnal survey of the study area on 5 October 2010. Results from the reference site confirm that Growling Grass Frogs were active and readily detectable at the time the surveys were conducted within Manor Lakes PSP 41. Targeted surveys were carried out at a suitable time of year and under suitable weather conditions when the species is active and readily detectable. While overnight temperatures were cooler than 12° C on 5 October 2010, results from the reference site on this night indicate that Growling Grass Frogs were still active and calling.

Growling Grass Frog has recently been recorded from a location on Lollypop Creek within Manor Lakes PSP 41 (Ecology Australia 2010). Only one individual was recorded from this location (Ecology Australia 2010). There are also a small number of VBA records for Growling Grass Frog from the surrounding area, all of which are from 1988–1989.

While the species was not recorded during the current assessment, the section of

Lollypop creek within the study area provides potential habitat for the species. This section of Lollypop Creek has been recently identified as a site of moderate importance for Growling Grass Frog within Precinct 41 (Ecology Australia 2010). Lollypop Creek provides opportunities for foraging and movement of individuals, particularly from known populations located downstream of the study site. Deep pools with suitable aquatic vegetation could potentially provide suitable breeding habitat for Growling Grass Frog.

Table 11: Growling Grass Frog targeted survey results

Assessor	Date	Time	Location	Site conditions	Species recorded	Type of survey	Duration of survey
Clare McCutcheon and Ian Smales	4/10/2010	8:00pm–12:30pm	Lollypop Creek	Mild, light wind, fine	Common Froglet, Spotted Marsh Frog, southern Bullfrog, Striped Marsh Frog, Peron's Tree Frog	Targeted	4.5hrs
Clare McCutcheon and Thea Shell	5/10/2010	8:00pm–12:30pm	Lollypop Creek	Cool, no wind, occasional showers	Common Froglet, Spotted Marsh Frog, southern Bullfrog, Striped Marsh Frog, Peron's Tree Frog	Targeted	4.5hrs
Rodney Armistead and Katrina Sofo	6/01/2011	8:50pm–9:30pm	Ephemeral wetland near Greens Road		Common Froglet, Spotted Marsh Frog, Southern Bullfrog	Targeted	40 mins
Rodney Armistead and Katrina Sofo	6/01/2011	9:40pm–12:45am	Lollypop Creek	Warm, no wind, no precipitation	Common Froglet, Spotted Marsh Frog, Southern Bullfrog, Striped Marsh Frog	Targeted	3hrs

Assessor	Date	Time	Location	Site conditions	Species recorded	Type of survey	Duration of survey
Rodney Armistead and Katrina Sofo	20/01/2011	9:05pm–9:35am	Ephemeral wetland near Greens Road		Common Froglet, Spotted Marsh Frog, Southern Bullfrog,	Targeted	30 minutes
Rodney Armistead and Katrina Sofo	20/01/2011	9:40pm–12:40am	Lollypop Creek	Warm, no wind, no precipitation	Common Froglet, Spotted Marsh Frog, Southern Bullfrog, Striped Marsh Frog,	Targeted	3 hrs

Golden Sun Moth targeted survey

Golden Sun Moth was recorded through out the Manor Lakes PSP 41 survey site (Figure A3). Targeted survey for this species was undertaken in accordance with DSE (2009) during the summer flight period. Golden Sun Moth surveys were conducted under suitable weather conditions (Table 12). Golden Sun Moth is likely to be far more widespread within the study area than indicated by the results of the current assessment. A detailed study of the distribution and size of the population on site would therefore be neccessary in order to determine the extent of offsetting required.

Table 12: Golden Sun Moth targeted survey results

Assessor	Date	Time	Site conditions	Species recorded	Type of survey	Duration of survey
Sally Koehler and Felicity Humann	14/12/2010	10:30am–2:00pm	Mild temperatures (max 24.3), little wind.	Golden Sun Moth	Targeted	3.5 hrs

Assessor	Date	Time	Site conditions	Species recorded	Type of survey	Duration of survey
Rodney Armistead and Daniel Gilmore	22/12/2010	12:30pm–2:30pm	Mild temperature (20.8), sunny, little breeze. Some cloud cover	Golden Sun Moth	Targeted	2 hrs
Rodney Armistead and George Appleby	24/12/2010	10:30pm–2:30pm	Mild temperatures (20.6), sunny, little breeze.	Golden Sun Moth	Targeted	4 hrs
Rodney Armistead and Aaron Harvey	28/12/2010	11:30pm–2:30pm	Mild temperatures (19.3), sunny, little breeze.	-	Targeted	3 hrs
Rodney Armistead, Katie Stevenson, Ryan Mueck and Katrina Sofo	4/01/2011	10:30pm–1:00pm	Mild temperatures (20.0), sunny, little breeze.	Golden Sun Moth	Targeted	2.5 hrs
Julia Franco and Kylie Payze	6/01/2011	12:30pm–1:00pm	Warm temperatures (26.1), sunny and little breeze	Golden Sun Moth	Incidental	0.5hrs

Plains-wanderer targeted survey

Details of surveys are given in Table 13. No Plains-wanderers were recorded during the current targeted survey. The weather conditions were considered optimal for the survey with minimum air temperatures of 12º Celsius and very little to no wind (Table 13). However, the present status of the grassland habitat was considered to be unsuitable for Plains-wanderer. An unusually wet

and mild 2010/2011 summer has encouraged excessive plant growth which has resulted in tall and very dense patches of native grass.

Table 13: Plains-wanderer targeted survey results

Assessor	Date	Time	Site conditions	Species recorded	Type of survey	Duration of survey
Rodney Armistead and Thea Shell	16/03/2011	8:00pm–9:00pm	Calm/little wind (<15km/hr), no moon, mild temperatures (>14º C)	8 x Stubble Quail	Targeted	1 hour
Rodney Armistead and Thea Shell	17/03/2011	10:00pm–11:00pm	Calm/little wind (<15km/hr), no moon, mild temperatures (>14º C)	6 x Stubble Quail, 1x Southern Bullfrog	Targeted	1 hour
Rodney Armistead and Daniel Gilmore	28/03/2011	9:50pm–10:40pm	Calm, no wind. Mild temperatures (>12 º C). New moon.	1 x Brown Quail, 1 x Sudell's Frog	Targeted	1 hour

Bird census surveys

A total of 52 bird species were recorded from these surveys (46 native and six introduced). Seven species were recorded during the bird census surveys that were not recorded during the general fauna survey (Eurasian Coot *Fulica atra*, Red-rumped parrot *Psephotus haematonotus*, Brown Falcon *Falco berigora*, Black-shouldered Kite *Elanus axillaris*, White-fronted Chat *Epthianura albifrons*, Crested Pigeon *Ocyphaps lophotes* and Zebra Finch *Taeniopygia guttata*).

Results from the bird census surveys are incorporated into Appendix 4, Table 4.1.

Yarra Pygmy Perch targeted survey results

Targeted Yarra Pygmy Perch surveys were conducted on 23–24 September,

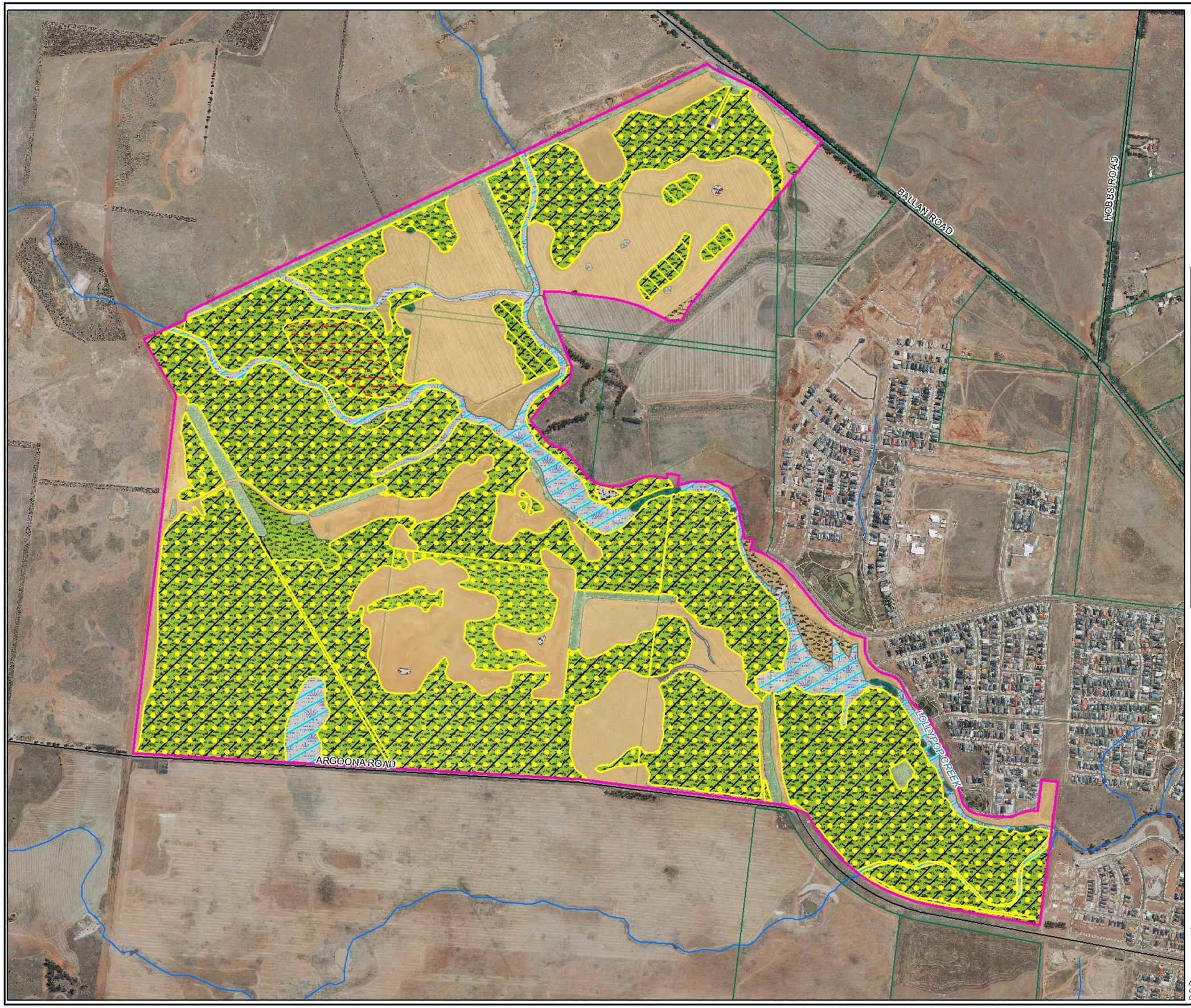
2010. All three sites were located on isolated pools of Lollypop Creek, including two sites within Manor Lakes PSP 41 and one site downstream of Manor Lakes PSP 41 in order to take into account downstream impacts of development in Manor Lakes PSP 41 (Table 14).

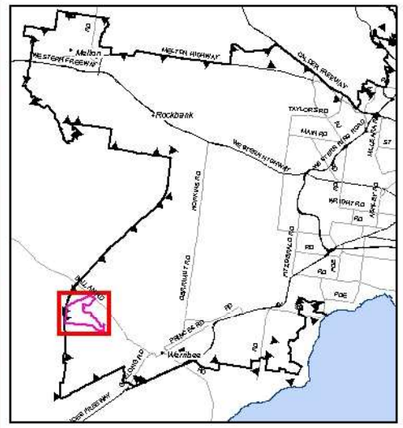
No Yarra Pygmy Perch were recorded during the surveys. Three introduced fish species were recorded: Goldfish *Carassius auratus*, Eastern Gambusia *Gambusia holbrooki* and Redfin *Perca fluviatilis*. One native decapod crustacean, *Common Yabby* Cherax destructor, was recorded.

Yarra Pygmy Perch appear to require slow-flowing or still waters with abundant aquatic vegetation (Saddlier and Hammer, 2010). However, this type of habitat is limited within and immediately downstream of Manor Lakes PSP 41. The presence of the introduced Redfin and Eastern Gambusia, which are thought to predate and / or outcompete Yarra Pygmy Perch, further reduces the likelihood of this species to be found here.

Table 14: Yarra Pygmy Perch targeted survey results

Assessor	Date	Time	Site conditions	Species recorded	Type of survey	Duration of survey
David Mossop and Anthony Byrne	23–24/09/2010	3:45pm–12.30pm	Water levels and aquatic habitat conditions were acceptable for survey.	Common Froglet, Common Yabby, Eastern Gambusia, Goldfish, Redfin, Southern Bullfrog	Targeted aquatic	20.75 hours





Legend

Fauna habitat

- Grassland –rocky
- Pasture/crop – not rocky
- Pasture/crop – rocky
- Planted Vegetation
- Remnant tree
- Rock walls/piles
- Shrubland/Escarpment Shrubland
- Wetland/watercourse

Plains Wanderer Habitat

- Potential

Striped Legless Lizard Habitat

- Potential

Growling Grass Frog Habitat

- Potential

Golden Sun Moth Habitat

- Known
- Potential
- PSP 41

See Figure A7 for more detail

Figure 7: Fauna Habitat, PSP 41

N

GDA 94 Zone 55
1:12 000 at A3

0 250 500
Meters

Biosis Research Pty. Ltd.
38 Bertie Street
(PO Box 489)
Port Melbourne
VICTORIA 3207

Offices also in: Ballarat, Sydney, Wollongong, Canberra, Wangaratta

Date: 11 August 2011, File number: 12649
Checked by: CPM, Drawn by: STF
Location: ...12649\Mapping\Report Figures\12649 Fig 7 Habitat.mxd

4.0 BIODIVERSITY LEGISLATION AND GOVERNMENT POLICY

Biodiversity legislation and government policy that is relevant to Manor Lakes PSP 41 are discussed below.

4.1 Commonwealth

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) applies to developments and associated activities that have the potential to significantly impact on matters protected under the Act.

Under the Act, unless exempt, actions require approval from the Australian Government Minister for Environment, Heritage and the Arts (the Minister) if they are likely to significantly impact on a 'matter of national environmental significance'. There are currently seven matters of national environmental significance (NES):

- World Heritage properties;
- National Heritage places;
- nationally listed threatened species and ecological communities;
- listed migratory species;
- Ramsar wetlands of international importance;
- Commonwealth marine areas; and
- nuclear actions (including uranium mining).

The EPBC Act also applies to the environment in general if actions are taken on Commonwealth land, or if actions that are taken outside Commonwealth land will impact on the environment on Commonwealth land.

Any person proposing to take an action that may, or will, have a significant impact on a matter of national environmental significance must refer the action to the Minister for determination as to whether the action is a 'controlled action' or is not approved. 'Significant impacts' are defined in *EPBC Act Policy Statement 1.1 Significant Impact Guidelines: Matters of National Environmental Significance* (DEH 2006).

NES matters relevant to Manor Lakes PSP 41

There are three matters of national significance that are of relevance to the proposed development:

- listed threatened species and ecological communities;
- listed migratory species; and
- wetlands of international importance (Ramsar sites).

These are summarised below.

Listed threatened species and/or ecological communities

Ecological communities: One listed ecological communities, *Natural Temperate Grassland of the Victorian Volcanic Plain* occurs within the study area.

Listed flora species: Flora species listed under the Act are discussed in Section 3.1.2 and listed in Table 1. In summary, one listed species (seven Spiny Rice-flower plants) was recorded within Manor Lakes PSP 41 (Figure A3). There is also suitable habitat within Manor Lakes PSP 41 for six additional species of national significance (Table 1).

Listed fauna species: Fauna species listed under the Act are discussed in Section 3.4.4 and listed in Table 6. In summary one listed species, the Golden Sun Moth was recorded within Manor Lakes PSP41. Seven other species have at least medium likelihood of occurring within the precinct.

Listed migratory species

The list of migratory species under the EPBC Act is a compilation of species listed under four international conventions: China-Australia Migratory Bird Agreement (CAMBA), Japan-Australia Migratory Bird Agreement (JAMBA), Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

Species listed under the 'migratory' provisions of the EPBC Act are listed in Appendix 4, Table A4.3 and summarised below:

- The VBA contains records for 40 migratory species from within a 5km radius of Manor Lakes PSP 41.

While some of these species would be expected to use the study area on occasions, and some of them may do so regularly or may be resident, it does not provide important habitat for an ecologically significant proportion of any of these species.

Wetlands of International Importance (Ramsar sites)

The study area is identified by the DSEWPaC database as being within the catchment of a Wetland of International Significance (Ramsar site): Port Phillip Bay (western shoreline) and Bellarine Peninsula. The Lower reaches of Lollypop Creek are within the Port Phillip Bay (western shoreline) and Bellarine Peninsula Ramsar site. However, this is approximately 9km downstream of Manor Lakes PSP 41. Significant impacts on the Ramsar site are not expected if sediment control and stormwater guidelines are followed.

4.1.1.1 Delivering Melbourne's Newest Sustainable Communities - Strategic Impact Assessment Report

The land within Manor Lakes PSP 41 contains matters of NES which would trigger the EPBC Act in the event an action required an environmental approval under the Act. In response to this, the GAA has engaged with DSEWPAC to conduct a strategic assessment process to address changes to the Melbourne Urban Growth Boundary.

An agreement under the Strategic Assessment provision of the EPBC Act (Section 146(1) Agreement, Part 10 Strategic Assessment (EPBC Act)) was made between the Commonwealth of Australia and the State of Victoria on 16th June 2009 (DSE 2009c). The Strategic Assessment provides an opportunity to align State and Commonwealth requirements and approval standards for issues of common interest. The prescriptions for listed species and communities identified in the Strategic Impact Assessment report will be used to determine if clearing is permitted under the SIAR.

Where prescriptions are specified, these must be followed. Where treatments are not yet defined they will be developed in accordance with the process outlined in the Strategic Assessment.

4.1.2 Recovery Plans

DSEWPaC may make or adopt and implement recovery plans for threatened species or communities under the EPBC Act. Precinct planning for Manor Lakes PSP 41 should have regard to the Recovery Plans for the following species:

- Curly Sedge *Carex tasmanica*;
- Small Golden-moths *Diuris basaltica*;
- Clover Glycine *Glycine latrobeana*;
- Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*; and

- Large-headed Fireweed *Senecio macrocarpus*.

4.1.3 Conservation Advices

When a native species or ecological community is listed as threatened under the EPBC Act, Conservation Advice is developed to assist in the species or communities recovery. Conservation Advice provides information on key threats, priority conservation actions and threat abatement actions for listed threatened species and communities. Precinct planning for Manor Lakes PSP 41 should have regard to the Conservation Advice for River Swamp Wallaby-grass *Amphibromus fluitans* and the listed threatened community Natural Temperate Grassland of the Victorian Volcanic Plains.

4.1.4 Threat Abatement Plans

Threat abatement plans provide for the research, management and other actions necessary to reduce the impact of a listed key threatening process on native species and ecological communities. Implementing the plan should assist the long term survival in the wild of affected native species or ecological communities. Precinct planning for Manor Lakes PSP 41 should have regard to the Threat Abatement Plans for:

- Competition and Land Degradation by rabbits;
- Infection of amphibians with chytrid fungus resulting in chytridiomycosis;
- Predation by European red fox; and
- Predation by feral cats.

4.1.5 Policy Statements

Policy statements provide the public with practical guidance on the EPBC Act. Policy statement guidelines have been written to provide guidance on specific threatened species and ecological communities and should be read in conjunction with the significant impact guidelines. Precinct planning for Manor Lakes PSP 41 should have regard to Policy Statements for:

- Natural Temperate Grassland of the Victorian Volcanic Plain;
- Spiny Rice Flower;
- Golden Sun Moth; and
- Growling Grass Frog.

4.2 State

4.2.1 Planning and Environment Act 1987 - Victorian Planning Provisions

A planning permit may be required to remove, destroy or lop native vegetation under the relevant local government planning scheme (e.g. Clause 52.17) unless exemptions in a clause apply or if the removal, destruction or lopping of vegetation is in accordance with a Native Vegetation Precinct Plan (Clause 52.16) that has been incorporated into the planning scheme. A Native Vegetation Precinct Plan may form part of a Precinct Structure Plan and may also determine whether exemptions to the requirement of a permit under Clause 52.16–4 apply. It is possible that some or all of Manor Lakes PSP 41 will be the subject of a Native Vegetation Precinct Plan, drawing on information collected by this and other ecological surveys. Such a plan would identify which areas of native vegetation are to be retained and which are permitted to be cleared and offset.

4.2.2 Flora and Fauna Guarantee Act 1988

The *Flora and Fauna Guarantee Act* 1988 (FFG Act) is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes.

A permit is required from DSE to 'take' protected flora species from public land. Taking protected flora from private land requires the permission of the landowner and not DSE unless the land is declared ‘critical habitat’. Most native vegetation contains some protected flora species.

Protected flora are native plants or communities of native plants that have legal protection under the FFG Act. The protected flora list has three sources:

- plant taxa (species, subspecies or varieties) listed as threatened;
- plant taxa belonging to communities listed as threatened; and
- plant taxa which are not threatened but require protection for other reasons.

Some species which are attractive or highly sought after, such as orchids and grass-trees, are protected so that removal of these species from the wild can be controlled. Not all of these species are rare in the wild or highly significant. Protection includes living (e.g. flowers, seeds, shoots, roots) and non-living (e.g. bark, leaves, other litter) plant material (DSE website).

A permit is also required for the taking, trading or keeping of fish that are members of taxa or communities of flora and fauna on the Threatened List. The controls mean that authorisation under the FFG Act is required to catch, possess, keep or sell listed fish (DSE website).

Much of land in Manor Lakes PSP 41 is privately owned and is not declared

'critical habitat'. Therefore a permit to 'take' listed flora and fauna species is not required under the FFG Act on these lands.

One threatened community, Western (Basalt) Plains Grassland Community, is present within Manor Lakes PSP 41. This community is mapped as *Low-rainfall* Plains Grassland on Figure A4.

Parts of Manor Lakes PSP 41 that are public land (road reserves) require a permit from DSE under the FFG Act to remove listed and protected flora species. Listed threatened and protected species recorded in Manor Lakes PSP 41 during the current assessment are identified in Appendix 2, Table A2.1. All species that are component of the Western (Basalt) Plains Grassland Community are also protected under the Act.

Decisions on permits issued under the FFG Act should have regard to the Action Statements prepared under the FFG Act for:

- Plains-wanderer
- Striped Legless Lizard
- Golden Sun Moth
- Little Egret
- Eastern Great Egret
- Blue-billed Duck
- Fragrant Leek-orchid
- Large-headed Fireweed
- Curly Sedge
- Small Golden Moths
- Clover Glycine
- Button Wrinklewort
- Plump Swamp Wallaby-grass
- Small Milkwort
- Small Scurf-pea
- Swollen Swamp Wallaby-grass
- Tough Scurf-pea
- Western (Basalt) Plains Grassland

4.2.3 Environment Effects Act 1978

The *Environment Effects Act* 1978 is the legislation in Victoria which is used by the Minister for Planning to make a decision on the need for an Environment Effects Statement (EES) for projects with potentially significant environmental effects. The Act enables Ministers, local government and statutory authorities to make an informed decision about whether a project with potentially significant environmental impact should proceed. If required by the Minister for Planning, an EES will need to be prepared by the proponent for the development site.

4.2.4 Environment Protection Act 1970: State Environmental Protection Policy (Waters of Victoria) 2003

This policy provides a legal framework for state and local government agencies, businesses and communities to work together to protect and rehabilitate Victoria's surface water environments.
Beneficial uses of waterways need to be protected. Uses to be protected include:

- Maintenance of natural aquatic ecosystems and aquatic wildlife.
- Passage of indigenous fish.
- Maintenance of indigenous riparian vegetation.
- Water based recreation.
- Commercial and recreational use of edible fish and crustacea.
- Agricultural water supply.
- Other commercial purposes.

Impacts to surface water quality must not exceed water quality objectives specified to protect beneficial uses. Relevant clauses must be adhered to. Of particular relevance are:

- 43 - surface water management and works.
- 53 - vegetation protection and rehabilitation.
- 56 - construction activities.

Construction managers need to monitor affected surface waters to assess if beneficial uses are being protected. The GAA may need to consult with the EPA and Melbourne Water with regard to establishing appropriate water quality objectives and monitoring requirements.

4.2.5 Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act* 1994 (CaLP) is legislation in Victoria that establishes a framework for the management of catchments in order to maintain and enhance the long term productivity of the land while conserving the environment and to ensure that the quality of the State's land and water resources, including plant and animal life, are maintained and enhanced.

Amongst other things, the Act addresses the management of the environment within catchments by establishing a system of controls on noxious weeds and pest animals. The CaLP Act is the principal legislation relating to weed management in Victoria. It contains provisions relating to land management and noxious weeds, stating that land managers must take all reasonable steps to meet their obligations under the Act. It provides for the declaration of plants as

noxious weeds if they have the potential to become a threat to primary production, the environment or community health.

Under the CaLP Act, certain plants are declared as noxious weeds in Victoria. These plants cause environmental or economic harm or have the potential to cause such harm. They can also present risks to human health. The CaLP Act defines four categories of noxious weeds:

- State Prohibited Weeds;
- Regionally Prohibited Weeds;
- Regionally Controlled Weeds; and
- Restricted Weeds.

Declared noxious weeds identified on Manor Lakes PSP 41 are listed in Appendix 2.

4.2.6 Wildlife Act 1975 and associated Regulations

The *Wildlife Act* 1975 is the primary legislation in Victoria providing for protection and management of wildlife. For the purposes of the Act, wildlife means indigenous vertebrate species (except those declared as pest animals), invertebrate species listed under the FFG Act, and some introduced game species.

The Wildlife Regulations 2002 of the Act prescribe penalties for the purposes of the Wildlife Act. These include penalties for persons who wilfully damage, disturb or destroy any wildlife habitat without appropriate authorisation (Section 9 of the Wildlife Regulations 2002). Authorisation for habitat removal may be obtained under the Wildlife Act; through a licence granted under the *Forests Act* 1958; or under any other Act.

Authorisation to destroy or possess wildlife may be required under Sections 41– 47 of the *Wildlife Act* 1975. Permits under the Act may be needed where it is expected that wildlife will need to be destroyed or moved.

A permit will be required for removal of habitat at the site. It may be that removal of habitat will be covered by a permit to remove native vegetation and therefore a separate permit under the Wildlife Act would not be required.

If construction activities are likely to result in the death of wildlife or the need to move wildlife short distances, permits will be required.

4.2.7 Native Vegetation Management Framework

The Native Vegetation Management Framework (the Framework) is State Government policy for the protection, enhancement and revegetation of native vegetation in Victoria (NRE 2002). Native vegetation provisions were introduced to all planning schemes in 1989 and the Framework was incorporated into the Victoria Planning Provisions in 2003. The primary goal of the Framework is:

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

In association with the regional Native Vegetation Plans, the Framework provides decision-making tools for native vegetation management.

Where an application is made to remove native vegetation, a proponent for a development must explain the steps that have been taken to:

- Avoid the removal of native vegetation, where possible.
- Minimise the removal of native vegetation.
- Appropriately offset the loss of native vegetation, if required.

A proponent for a development must demonstrate that the option to avoid and minimise vegetation clearance has been fully explored before considering offsets.

An offset may be achieved by improvements in the quality or extent of native vegetation in a selected 'offset area', either within a project area or off-site. An area that is revegetated and protected or set aside for natural regeneration may provide some, or all, of the required offset. The conservation significance of vegetation to be removed is also taken into account when offsets are determined.

Offsets are typically generated by managing an area of remnant vegetation on private land. Active ecological management of such areas will generally yield a gain in habitat score of 20 % (approximately) over the nominated 10 years.

The net gain implications for native vegetation within Manor Lakes PSP 41 are not discussed within this report.

4.2.8 Port Phillip and Westernport Native Vegetation Plan

This document (PPWCMA 2006) has been prepared to develop a strategic and co-ordinated approach to the management of native vegetation within the region. The plan is designed to complement the Native Vegetation Management Framework and contains specific information and objectives relating to the region.

The information in the plan is centred on four strategic directions:

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

Responses and offset requirements for clearing native vegetation are outlined in Appendix 3.4 of the document (PPWCMA 2006: pg 52).

The objectives of the Native Vegetation Plan are similar to those of the Native Vegetation Management Framework and should be met if the three step approach to achieving a Net Gain outcome is followed.

Offsets for unavoidable tree losses that are not covered by the Framework replacement ratios are calculated using the Port Phillip and Westernport Native Vegetation Plan.

4.2.9 Victoria's Biodiversity Strategy

Actions to ensure biodiversity is managed in a manner that is both ecologically sound and sustainable is identified in *Victoria's Biodiversity – Directions in Management* (NRE 1997). The key goal of that Strategy is the principle of 'no net loss' of native vegetation. The native vegetation goals of the strategy are implemented through Victoria's Native Vegetation Management Framework (NRE 2002).

4.3 Local

4.3.1 Local planning scheme matters

Some local government planning zones and overlay relate directly to biodiversity matters. Most land within the precinct falls under Wyndham City Council's Residential Zone 1. There is also a Development Contribution Overlay Schedule 2 over the whole area, and an Environmental Significance Overlay – Schedule 1 and Heritage Overlay covering some of Manor Lakes PSP 41. The objectives of Wyndham City Council's zoning and overlays can be found at http://www.dse.vic.gov.au/planningschemes/.

Planning applications within areas covered by these overlays will need to consider the objectives of these overlays.

Clause 52.16 applies to land where a native vegetation precinct plan, corresponding to that land, is incorporated into this scheme. Where an NVPP applies, a permit is required to remove, destroy or lop native vegetation, except where it is in accordance with that NVPP. Though an NVPP can stand alone, it

may form part of a more general strategic or precinct structure plan. The purpose of an NVPP is to protect and conserve native vegetation, to reduce the impact of land and water degradation and provide habitat for plants and animals, and to enable other areas of native vegetation to be removed in accordance with the NVPP. The NVPP may require specified works to be provided or specified payments to be made to offset the removal, destruction or lopping of native vegetation. Where an NVPP is incorporated and listed in the schedule to clause 52.17 Native Vegetation, no permit is required under c52.17.

4.3.2 Local Planning Policies/Strategies

No additional local planning policies with regards to native flora and fauna occur within the Wyndham City Council's planning schemes. Precinct planning for Manor Lakes PSP 41 should have regard to the Wyndham City Council's Environment and Sustainability Strategy 2011-2015.

5.0 KEY BIODIVERSITY ISSUES AND IMPLICATIONS IDENTIFIED FROM THE ASSESSMENT

The future proposed land use within Manor Lakes PSP 41 may result in significant impacts to existing biodiversity values by (amongst other factors):

- the permanent removal of some native species and their habitats;
- the fragmentation of native species populations into genetically and geographically isolated smaller populations;
- changes to wildlife behaviour;
- increased invasion by exotic species and garden escapes;
- disturbance to soil;
- alterations to the hydrological regime of Lollypop Creek and its tributaries within and downstream of the study area; and
- alterations to water quality of Lollypop Creek and its tributaries within and downstream of the study area.

It is important that biodiversity values within Manor Lakes PSP 41 be maintained in the long term and that more mobile species (particularly rare or threatened species) should have access to a network of suitable environments connected through a series of habitat corridors.

The Victorian Volcanic Plain Bioregion supports nationally significant ecosystems and species values including Natural Temperate Grasslands (listed as critically endangered), Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*, Golden Sun Moth *Synemon plana* (listed as critically endangered), Grassland Earless Dragon *Tympanocryptis pinguicolla*, Swift Parrot *Lathamus discolor* (listed as endangered), Striped Legless Lizard *Delma impar*, Plains-wanderer *Pedionomus torquatus*, Australian Painted Snipe *Rostratula australis*, Large-fruit Fireweed *Senecio macrocarpus*, River Swamp Wallaby-grass *Amphibromus fluitans* and Growling Grass Frog *Litoria raniformis*. Many of these values remain due to the persistence of native vegetation and habitats within a predominantly agricultural landscape.

At a regional level, there are significant landscape components within Manor Lakes PSP 41 such as Lollypop Creek, high quality grassland, large trees and wetlands.

5.1 Opportunities to reduce potential impacts

The following general recommendations have been made regarding opportunities to reduce potential impacts to biodiversity values within Manor Lakes PSP 41. These recommendations should be considered during the preparation of

the Manor Lakes PSP process and have regard to the Strategic Impact Assessment Report (SIAR) requirements (DSE 2009c):

- Retain corridors of vegetation for the movement of fauna species, providing connectivity for flora species populations and for the fauna species on which some plant species rely for pollination and dispersal. Priority connections include the Lollypop Creek corridor. Plains Grassland in the west of Manor Lakes PSP 41 is also likely to provide important habitat connectivity with the same EVC on private land further west and potentially to the proposed Western Grassland Reserve (outside of the precinct).
- Maintain and protect creekline vegetation within the precinct. Incorporate these creekline areas into development designs ensuring that natural hydrology is maintained. That is, ephemeral and seasonal waterbodies should be maintained so that they are inundated following sufficient rainfall, and allowed to dry out over summer. Therefore, they would not be suitable for stormwater runoff collection or treatment.
- Retain all high scoring Very High conservation significance native vegetation, particularly Habitat Zones 10, 14, 13, 16, 19, 20, 30, 32 and 43.
- Retain and protect all sites containing populations of rare or threatened plant taxa, in particular Habitat Zone 14 which is the highest quality remnant in the PSP and contains a population of Spiny Rice-flower. This is to be consistent with the SIAR prescriptions for Spiny Rice-flower.
- Where appropriate prepare translocation plans for rare or threatened plant taxa which will be otherwise displaced by development.
- Maintain and fence a minimum 50 m buffer between all retained native vegetation and wetlands, with a minimum 200 m either side of a creek or tributary which provides habitat for Growling Grass Frog and land developed for residential use or other purpose. This is to be consistent with the Significant Impact Guidelines for the Growling Grass Frog (DSEWPaC 2009).
- Retain Lollypop Creek and its tributaries within open space and minimise alterations to hydrological regime and runoff water quality via use of water sensitive urban design.
- Minimise disturbance to Lollypop Creek and its tributaries. Stormwater treatment wetlands should be located adjacent to (offline), rather than located within (online) these waterways.

5.2 Opportunities to protect and enhance local and regional biodiversity values

The following general recommendations have been made regarding opportunities to protect and enhance biodiversity values within Manor Lakes PSP 41:

- Prepare conservation management plans for the ongoing management of native vegetation and the Lollypop Creek corridor. This should include the provision for management consistent with Plains Grassland environment and allowances should be made for this when planning residential areas.

- Prepare conservation management plans for Spiny Rice-flower, Small Scurf-pea, Arching Flax-lily, Wimmera Woodruff, Pale-flower Crane's-bill, Slender Tick-trefoil, Buloke, Slender Bindweed, Pale Spike-sedge, Golden Sun Moth and Growling Grass Frog for Manor Lakes PSP 41. Undertake monitoring of populations during and following development.

- Prepare a roadside vegetation management plan for road reserves containing remnant native vegetation.

- Identify no-go zones during the design phase to limit construction access and damage to retained areas. Investigate alternative alignments for road upgrades.

6.0 CONCLUSION

The areas assessed within Manor Lakes PSP 41 as part of the Growth Areas Authority biodiversity assessment contain a significant area of native vegetation. A total of **84.97 hectares** of native vegetation in habitat zones were mapped within Manor Lakes PSP 41 by AECOM which comprises **43.47 habitat hectares** (hha) comprising the endangered EVC *Low-rainfall* Plains Grassland.

All patches of *Low-rainfall* Plains Grassland mapped by AECOM in 2008/2009 meet the definition criteria for the EPBC Act listed ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain* (critically endangered).

All patches of *Low-rainfall* Plains Grassland are Western (Basalt) Plains Grassland Community listed under the FFG Act.

In addition, the area provides valuable habitat for the nationally significant species Golden Sun Moth, Growling Grass Frog and Spiny Rice-flower; and provides potential habitat for Striped Legless Lizard. State significant species have also been recorded within Manor Lakes PSP 41including Slender Bindweed, Pale Spike-sedge, Flat Spike-sedge, Wimmera Woodruff, Pale-flower Crane's-bill, Slender Tick-trefoil, Buloke, Small Scurf-pea and Arching Flax-lily. A number of national and state significant species have potential to occur within Manor Lakes PSP 41.

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GLOSSARY & ABBREVIATIONS

Items marked with an asterisk (*) are cited from DSE (2007b).

BA (Birds Australia)

Birds Australia is a non-government organisation that maintains an independent database of bird records throughout Australia.

Benchmark*

A standard vegetation –quality reference point, dependent on vegetation type, which is applied in habitat hectare assessments. Represents the average characteristics of a mature and apparently long undisturbed state of the same vegetation type.

Biodiversity*

The variety of all life-forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part. The Framework applies this definition to those native species indigenous to or expected to visit the site.

Biodiversity Interactive Map (BIM)

Web based interactive map available on the DSE website that provides information on the biodiversity of Victoria and displays flora and fauna data from the Victorian Biodiversity Atlas.

Bioregion*

Biogeographic areas that capture the patterns of ecological characteristics in the landscape or seascape, providing a natural framework for recognising and responding to biodiversity values. A landscape based approach to classifying the land surface using a range of environmental attributes such as climate, geomorphology, lithology and vegetation.

Bioregional conservation status (of an EVC)*

A state-wide classification of the degree of depletion in the extent and/or quality of an Ecological Conservation Class (EVC) within a bioregion in comparison to the State's estimation of its pre-1750 extent and condition. The assessment takes account of how commonly it originally occurred, the current level of depletion due to clearing, and the level of degradation of condition typical of remaining stands. There are 6 classes: Presumed Extinct, Endangered, Vulnerable, Depleted, Rare and Least Concern as described on page 51 of the Framework (NRE 2002).

CAMBA (China – Australia Migratory Bird Agreement)

An international agreement relating to protection of migratory birds that range between China and Australia.

Conservation status (see Bioregional conservation status)

Degraded treeless vegetation*

Vegetation that is neither a wetland, a remnant patch nor scattered tree(s).

DEWHA (Department of the Environment, Water, Heritage and the Arts). Now DSEWPAC.

DBH (Diameter at Breast Height)*

The diameter of the main trunk of a tree measured 1.3 m above ground level.

DSE (Department of Sustainability & Environment)

DSEWPAC (Department of Sustainability, Environment, Water, Population and Communities). Formerly DEWHA.

Ecological Vegetation Class (EVC)*

A type of native vegetation classification that is described through a combination of its floristic, life form and ecological characteristics, and though an inferred fidelity to particular environmental attributes. Each EVC includes a collection of floristic communities (i.e. lower level in the classification that is based solely on groups of the same species) that occur across a biogeographic range, and although differing in species, have similar habitat and ecological processes operating.

EPBC (Environment Protection and Biodiversity Conservation Act 1999)

EVC (see Ecological vegetation class)*

FIS (Flora Information System)

Database produced by Viridans Biological Databases (2009), containing flora data and information from throughout Victoria. Used

until December 2010 then superseded by the Victorian Biodiversity Atlas.

Forb

A herbaceous flowering plant that is not a graminoid (grass, sedge or rush).

FFG (Flora and Fauna Guarantee Act 1988 (Vic.))

Gain*

An increase in the extent and/or quality of a site either by management or maintenance commitments and actions.

Gain Target*

The amount of gain that needs to be achieved to offset a loss measured in habitat hectares.

Habitat hectare*

A site based measure of quality and quantity of native vegetation that is assessed in the context of the relevant native vegetation.

Habitat score*

The score assigned to a habitat zone that indicates the quality of the vegetation relative to the ecological vegetation class benchmark – sum of the site condition score and landscape context score, usually expressed as a percentage or on a scale of 0 to 1.

Habitat zone*

A discrete area of native vegetation consisting of a single vegetation type (EVC) within an assumed similar quality. This is the base spatial unit for conducting a habitat hectare assessment. Separate *Vegetation Quality Assessments* (or habitat hectare assessments) are conducted for each habitat zone within the designated assessment area.

Improvement gain*

This is gain resulting from management commitments beyond existing obligations under legislation to improve the current vegetation quality. Achieving improvement gain is predicated on maintenance commitments being already in place. For example, control of any threats such as grazing that could otherwise damage the native vegetation must already be agreed. Typical actions leading to an improvement gain include reducing or eliminating environmental weeds, enhancement planting or revegetation over a 10-year management period. If the vegetation is to be used as an offset, a commitment to maintain the improvement gain (i.e. no subsequent decline in quality) will be required in perpetuity.

Indigenous vegetation*

The type of native vegetation that would have normally been expected to occur on the site prior to European settlement.

IUCN (International Union for Conservation of Nature)

JAMBA (Japan – Australia Migratory Bird Agreement)

An international agreement relating to protection of migratory birds that range between Japan and Australia.

Large Old Tree (LOT)*

A tree with a DBH equal to or greater than the large tree diameter as specified in the relevant EVC benchmark.

Like-for-like*

These are part of the criteria for determination of an offset and provide a direct link between the loss and the offset gain, in terms of vegetation type or landscape function. There are more specific requirements for higher conservation significance vegetation and more flexible requirements for lower significance.

Maintenance Gain*

This is gain from commitments that contribute to the maintenance of the current vegetation quality over time (i.e. avoiding any decline). Includes foregoing certain entitled activities that could otherwise damage or remove native vegetation, such as grazing or firewood collection. Also typically requires a commitment to ensure no further spread of environmental weeds that may otherwise result in the loss of vegetation quality over time. If the vegetation is to be used as an offset, a commitment to maintain the vegetation quality will be required in perpetuity.

Medium Old Tree (MOT)*

A tree with a DBH equal to or greater than 0.75 of the large tree diameter in the relevant EVC benchmark but less than the DBH for a large old tree.

MWF (Melbourne Water Fish database)

Database provided by Melbourne Water containing fish data within Melbourne

Water's management area to 2009.

Native (indigenous) vegetation*

Native vegetation is plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses (as defined in Clause 72 of the planning scheme).

Net Gain*

Where, over a specified area and period of time, losses of native vegetation and habitat, as measured by a combined quality-quantity measure (habitat-hectare), are reduced, minimised and more than balanced by commensurate gains.

Net outcome*

The result of applying conservation significance criteria to protection, investment and offset decisions. This results in a range of outcomes from short term losses for Low conservation significance to substantial net gain for Very High conservation significance. For offsets, the Framework (Table 6) specifies a multiplier on the calculated loss (in habitat hectares) to achieve the net outcome. This is graded according to conservation significance.

Offset Management Plan (OMP)

A document which sets out the requirements for establishment, protection and management of a Net Gain offset site.

Old tree*

A tree with a DBH equal to or greater than 0.75 of the large tree diameter as specified in the relevant EVC benchmark. Includes medium old trees and large old trees (see separate definitions). Some Regional Native Vegetation Plans additionally define very large old trees (1.5 times large tree diameter).

Offset*

A native vegetation offset is any works, or other actions to make reparation for the loss of native vegetation arising from the removal or destruction of native vegetation. The gains achieved must be permanent and ongoing, and linked to a specific clearing site. See also on-site offset and third-party offset.

On-site offset*

An offset located on the same property as the clearing.

Third-party offset*

An offset located on a property owned by a person other than the landowner who incurs the native vegetation loss being offset.

Patch (see Remnant Patch)

Prior management gain

This gain acknowledges actions to manage vegetation since State-wide planning permit controls for native vegetation removal were introduced in 1989.

Property Vegetation Plan*

A plan which relates to the management of native vegetation within a property, and which is contained within an agreement made pursuant to section 69 of the Conservation, Forests and Lands Act 1987.

Protection (of a tree) *

An area with twice the canopy diameter of the tree(s) fenced and protected from adverse impacts: grazing, burning and soil disturbance not permitted, fallen timber retained, weeds controlled, and other intervention and/or management if necessary to ensure adequate natural regeneration or planting can occur.

Recruitment*

The production of new generations of plants, either by allowing natural ecological processes to occur (regeneration etc), by facilitating such processes such as regeneration to occur, or by actively revegetating (replanting, reseeding). See Revegetation.

Remnant patch or patch*

An area of vegetation, with or without trees, where native plants constitute more than 25% of the total understorey plant cover (bare ground is not included); or an area of treed vegetation where the density of the trees is such that canopy tree cover is at least at benchmark canopy cover.

Remnant vegetation*

Native vegetation that is established or has regenerated on a largely natural landform. The species present are those normally expected in that vegetation community. Largely natural landforms may have been subject to some past surface disturbance such as some clearing or cultivation (or even the activities of the nineteenth century gold rushes) but do not include man-made

structures such as dam walls and quarry floors.

Revegetation*

Establishment of native vegetation to a minimum standard in formerly cleared areas, outside of a remnant patch.

ROKAMBA (Republic of Korea – Australia Migratory Bird Agreement)

An international agreement relating to protection of migratory birds that range between the Republic of Korea and Australia.

Scattered trees*

Canopy trees within an area where total understorey plant cover comprises at least 75% of weeds or non-native plants and the overall canopy cover for a group (i.e. Three or more trees) is less than 20%.

Section 173 agreements*

A management agreement primarily between a landowner and the responsible authority according to section 173 of the Planning and Environment Act 1987.

Security Gain

This is gain from actions to enhance security of the on-going management and protection of native vegetation at the offset site, either by entering into an on-title agreement (for example under Section 173 of the *Planning and Environment Act 1987*), or by locating the offset on land that has greater security than the clearing site, or by transferring private land to a secure public conservation reserve.

Small tree*

A tree with a DBH equal to or greater than 0.25 of the large tree diameter in the relevant EVC benchmark but less than the DBH for a medium old tree.

sp.

Species (one species).

spp.

Species (more than one species).

Supplementary planting

Establishment of overstorey and/or understorey plants within a remnant patch. Typically includes the planting or direct-seeding of understorey life forms.

Taxon (plural taxa)

A term used to describe any taxonomic unit. This term is typically used when referring broadly to any scientifically recognised species, subspecies or variety.

Understorey*

Understorey is all vegetation other than mature trees – includes immature trees, shrubs, grasses, herbs, mosses, lichens and soil crust. It does not include dead plant material that is not attached to a living plant. More information on understorey life forms is set out in the Vegetation Quality Assessment Manual (DSE 2004).

VAF (Victorian Aquatic Fauna database)

Database provided by DSE containing aquatic fauna data throughout Victoria to 2003. Used until December 2010 then superseded by the Victorian Biodiversity Atlas.

VBA (Victorian Biodiversity Atlas)

Government database for species distribution and abundance information. Accessed on line via DSE's Biodiversity Interactive Map. Refer to Section 2.1 for list of databases used in this report.

Vegetation Quality Assessment

The standard DSE method for assessing remnant patches of vegetation. Details of the method are outlined in the Vegetation Quality Assessment Method (DSE 2004). The results of the assessment are expressed in habitat hectares. Also referred to as a 'habitat hectare assessment'.

Very Large Old Tree (VLOT)

A tree with a DBH of at least 1.5 times that of the large tree DBH as specified in the relevant EVC benchmark.

VFD (Victorian Fauna Database)

Database produced by Viridans Biological Databases (2009), containing fauna data and information from throughout Victoria. Used until December 2010 then superseded by the Victorian Biodiversity Atlas.

APPENDICES

APPENDIX 1
DSE Vegetation Assessment Methodology

A1.1 Habitat hectares

Habitat hectares are calculated where at least 25 % of the understorey cover is native or a group (i.e. at least 3) of trees where the tree canopy cover is at least 20% (DSE 2007). Such sites are termed 'patches' of native vegetation.

Each vegetation patch has one or more habitat quality zones. Each habitat zone consists of one ecological vegetation class (EVC) and has uniform quality within limits.

The assessment process compares the vegetation of the habitat zone against a DSE 'benchmark' description of the EVC, using methods described in the DSE assessment manual (DSE 2004). A habitat score for the habitat zone is calculated by this method.

Each habitat zone has a habitat score of between 0 and 100, with extensive intact vegetation having a theoretical score of 100. Habitat score is calculated using ten components: large trees, tree canopy cover, understorey, weediness, recruitment, organic litter, logs, patch size, neighbourhood context and distance to core area. In naturally treeless vegetation, or vegetation that can exist in different structural forms, the score is standardised to account for the absence of some or all 'woody' criteria.

The habitat hectare value of a habitat zone is given by its habitat score (expressed as a decimal between 0 and 1) multiplied by its land area in hectares. For example, 4 hectares of vegetation with a habitat score of 50 contain 2.0 habitat hectares.

Habitat hectares are used to measure losses arising from clearing, and also gains obtained through protection measures and active management of existing vegetation.

A1.2 Indigenous canopy trees

The following information on indigenous canopy trees does not apply if the subject land contains only treeless vegetation types.

Large Old Trees within patches

'Large Old Trees' within native vegetation patches are subject to offset requirements, as outlined in the Native Vegetation Management Framework (NRE 2002: Table 6, p 55). Trees smaller than benchmark size within patches are not included in this assessment, as they are addressed in the habitat hectare analysis.

Scattered trees outside patches

Trees over predominantly introduced understoreys are offset through tree protection/ replacement ratios.

Trees in areas where less than 25 % of the understorey cover is native are assessed as 'scattered old trees'. Trees are offset by the protection of other old trees and/or recruitment of new trees.

For land parcels (usually a title boundary) where tree density is greater than eight per hectare, the offset ratios are outlined in the Native Vegetation Management Framework (NRE 2002, p 55). For areas where tree density is less, the offset ratios are specified in the Regional Native Vegetation Plan. Offsets for small trees are also included in the Native Vegetation Plan.

A1.3 Targeted surveys required

PSP/AREA	NAME	AREA	REGION
Priority 1 PSPs			
40	Wyndham	1897	W

NOTE:

This List is prepared by Mark Winfield and Bram Mason of DSE Port Phillip Area.

This list is tailored for resolving Area C of Manor Lakes only and not to be used for other sites.

15-Sep-10

FAUNA LEGEND

PW	Plains Wanderer
GGF	Growling Grass Frog
GSM	Golden Sun Moth

FLORA LEGEND

MFL	Matted Flax Lily
SSP	Small Scurf Pea
BW	Button Wrinklewort
RSWG	River Swamp Wallaby Grass
SD	Sunshine Diuris
SGM	Small Golden Moths
TSP	Tough Scurf Pea
SSWG	Swollen Swamp Wallaby Grass
LFF	Large Fruit Fireweed
BSO	Basalt Sun Orchid
BP	Basalt Podolepis
PSE	Pale Swamp Everlasting
SE	Swamp Everlasting
STT	Slender Tick Trefoil
CG	Clover Glycine
SM	Small Milkwort
~~NP~~	~~Narrow Plantain~~
BP	Basalt Peppercress
SF	Swamp Fireweed

Species not required to be surveyed

SRF	Spiny Rice Flower

APPENDIX 2
Manor Lakes PSP 41 flora data

A.2.1. Indigenous Flora Results

Flora species (109 indigenous species, 71 introduced species) recorded within Manor Lakes PSP 41 during the current assessment.

Significance of species (Source: DSE Flora Information System which follows DSE advisory lists)

National status:

CE	Listed under EPBC Act as critically endangered
E	Listed under EPBC Act as endangered
V	Listed under EPBC Act as vulnerable

Victorian status (FFG Act, DSE Advisory list):

e	Endangered
v	Vulnerable
r	Rare
k	Poorly known in Victoria
f	Listed as threatened under the Flora and Fauna Guarantee Act 1988
P	Protected species on public land listed under the FFG Act (Note: all species part of the Western (Basalt) Plains Grassland Community are also protected in addition to those shown here)

Species of regional significance recorded in Manor Lakes PSP 41 during the current investigation are identified below**.** These species are those recorded in less than 5% of sites (quadrats/defined area lists) from the Victorian Volcanic Plain Bioregion in the Flora Information System unless there is reason to believe they are undersampled in the available data.

All indigenous species have at least local significance.

Table A2.1 Indigenous flora recorded as part of the general flora and targeted flora surveys within Manor Lakes PSP 41 during the current assessment

	Indigenous Flora Species		**Conservation Status**			
Life form	**Scientific Name**	**Common Name**	**EPBC**	**DSE**	**FFG**	**Regional**
Tree	**Casuarinaceae**					
	Allocasuarina luehmannii	Buloke			f, P	✓
	Myrtaceae					
	Eucalyptus camaldulensis	River Red-gum				
	Eucalyptus microcarpa	Grey Box				✓
Shrub	**Chenopodiaceae**					
	Enchylaena tomentosa var. *tomentosa*	Ruby Saltbush				✓
	Maireana decalvans	Black Cotton-bush				✓
	Maireana enchylaenoides	Wingless Bluebush				✓
	Rhagodia candolleana subsp. *candolleana*	Seaberry Saltbush				✓
	Sclerolaena muricata var. *villosa*	Grey Roly-poly				✓
	Malvaceae					
	Sida corrugata	Variable Sida				✓
	Pittosporaceae					
	Bursaria spinosa subsp. *spinosa*	Sweet Bursaria				
	Thymelaeaceae					
	Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	CE	e		✓
Forb	**Amaranthaceae**					
	Ptilotus macrocephalus	Feather Heads				✓
	Ptilotus spathulatus f. *spathulatus*	Pussy Tails				✓
	Apiaceae					
	Eryngium ovinum	Blue Devil				
	Eryngium vesiculosum	Prickfoot				✓
	Asteraceae					
	Brachyscome dentata	Lobe-seed Daisy			P	✓
	Brachyscome sp.	Daisy			P	✓
	Calocephalus citreus	Lemon Beauty-heads			P	
	Chrysocephalum sp. 1	Plains Everlasting			P	✓
	Euchiton collinus	Creeping Cudweed			P	✓
	Leptorhynchos squamatus	Scaly Buttons			P	
	Senecio quadridentatus	Cotton Fireweed			P	
	Solenogyne dominii	Smooth Solenogyne			P	✓
	Campanulaceae					
	Lobelia pratioides	Poison Lobelia				
	Wahlenbergia communis	Tufted Bluebell				✓
	Wahlenbergia gracilis	Sprawling Bluebell				✓
	Wahlenbergia luteola	Bronze Bluebell				✓
	Wahlenbergia sp.	Bluebell				✓
	Wahlenbergia stricta subsp. *stricta*	Tall Bluebell				✓
	Chenopodiaceae					

	Indigenous Flora Species		Conservation Status			
Life form	Scientific Name	Common Name	EPBC	DSE	FFG	Regional
	Atriplex semibaccata	Berry Saltbush				
	Einadia nutans subsp. *nutans*	Nodding Saltbush				
	Convolvulaceae					
	Dichondra repens	Kidney-weed				
	Crassulaceae					
	Crassula decumbens var. *decumbens*	Spreading Crassula				✓
	Crassula helmsii	Swamp Crassula				✓
	Crassula sieberiana	Sieber Crassula				✓
	Droseraceae					
	Drosera peltata subsp. *peltata*	Pale Sundew				✓
	Euphorbiaceae					
	Chamaesyce drummondii	Flat Spurge				✓
	Fabaceae					
	Cullen parvum	Small Scurf-pea		e	f	✓
	Desmodium varians	Slender Tick-trefoil		k		✓
	Glycine tabacina	Variable Glycine				✓
	Geraniaceae					
	Erodium crinitum	Blue Heron's-bill				✓
	Geranium sp. 3	Pale-flower Crane's-bill		r		✓
	Goodeniaceae					
	Goodenia pinnatifida	Cut-leaf Goodenia				✓
	Haloragaceae					
	Haloragis heterophylla	Varied Raspwort				
	Hemerocallidaceae					
	Caesia calliantha	Blue Grass-lily				✓
	Tricoryne elatior	Yellow Rush-lily				
	Hypericaceae					
	Hypericum gramineum	Small St John's Wort				
	Hypoxidaceae					
	Hypoxis hygrometrica var. *villosisepala*	Golden Weather-glass				✓
	Juncaginaceae					
	Triglochin procera	Common Water-ribbons				✓
	Lythraceae					
	Lythrum hyssopifolia	Small Loosestrife				
	Onagraceae					
	Epilobium billardierianum	Variable Willow-herb				✓
	Oxalidaceae					
	Oxalis perennans	Grassland Wood-sorrel				
	Polygonaceae					
	Persicaria prostrata	Creeping Knotweed				✓
	Rumex brownii	Slender Dock				
	Rumex dumosus	Wiry Dock				
	Potamogetonaceae					
	Potamogeton sp.	Pondweed				
	Rosaceae					

	Indigenous Flora Species		Conservation Status			
Life form	Scientific Name	Common Name	EPBC	DSE	FFG	Regional
	Acaena echinata	Sheep's Burr				
	Rubiaceae					
	Asperula conferta	Common Woodruff				
	Asperula sp.	Woodruff				
	Asperula wimmerana	Wimmera Woodruff		r		✓
	Stackhousiaceae					
	Stackhousia monogyna	Creamy Stackhousia				✓
	Stackhousia subterranea	Plains Stackhousia				✓
	Stylidiaceae					
	Levenhookia dubia	Hairy Stylewort				✓
	Veronicaceae					
	Plantago gaudichaudii	Narrow Plantain				
	Plantago varia	Variable Plantain				✓
Graminoid	**Cyperaceae**					
	Carex appressa	Tall Sedge				✓
	Carex inversa	Knob Sedge				
	Carex tereticaulis	Poong'ort				✓
	Eleocharis acuta	Common Spike-sedge				
	Eleocharis pallens	Pale Spike-sedge		k		✓
	Eleocharis plana	Flat Spike-sedge		v		✓
	Hemerocallidaceae					
	Dianella sp. aff. *longifolia* (Benambra)	Arching Flax-lily		v		✓
	Juncaceae					
	Juncus sp.	Rush				
	Poaceae					
	Amphibromus nervosus	Common Swamp Wallaby-grass				✓
	Amphibromus spp.	Swamp Wallaby-grass				✓
	Austrodanthonia auriculata	Lobed Wallaby-grass				✓
	Austrodanthonia bipartita	Leafy Wallaby-grass				
	Austrodanthonia duttoniana	Brown-back Wallaby-grass				
	Austrodanthonia geniculata	Kneed Wallaby-grass				
	Austrodanthonia setacea	Bristly Wallaby-grass				
	Austrodanthonia sp.	Wallaby Grass				
	Austrostipa bigeniculata	Kneed Spear-grass				
	Austrostipa blackii	Crested Spear-grass				✓
	Austrostipa curticoma	Short-crown Spear-grass				
	Austrostipa gibbosa	Spurred Spear-grass				✓
	Austrostipa nodosa	Knotty Spear-grass				✓
	Austrostipa oligostachya	Fine-head Spear-grass				✓
	Austrostipa scabra	Rough Spear-grass				✓
	Austrostipa setacea	Corkscrew Spear-grass				✓
	Bothriochloa macra	Red-leg Grass				✓
	Chloris truncata	Windmill Grass				
	Elymus scaber var. *scaber*	Common Wheat-grass				

	Indigenous Flora Species		Conservation Status			
Life form	Scientific Name	Common Name	EPBC	DSE	FFG	Regional
	Enneapogon nigricans	Nigger-heads				✓
	Microlaena stipoides var. *stipoides*	Weeping Grass				
	Panicum effusum	Hairy Panic				✓
	Poa labillardierei	Common Tussock-grass				
	Poa sieberiana var. *sieberiana*	Grey Tussock-grass				✓
	Themeda triandra	Kangaroo Grass				
	Walwhalleya proluta	Rigid Panic				
	Xanthorrhoeaceae					
	Lomandra filiformis	Wattle Mat-rush				
	Lomandra micrantha.	Small-flower Mat-rush				✓
Scambler / Climber	**Convolvulaceae**					
	Convolvulus angustissimus	Blushing Bindweed				
	Convolvulus angustissimus subsp. *omnigracilis*	Slender Bindweed		k		✓
Fern	**Adiantaceae**					
	Adiantum aethiopicum	Common Maidenhair				✓
	Cheilanthes austrotenuifolia	Green Rock-fern				✓
	Cheilanthes sieberi subsp. *sieberi*	Narrow Rock-fern				✓
	Aspleniaceae					
	Pleurosorus rutifolius	Blanket Fern				✓
	Azollaceae					
	Azolla sp.	Azolla				✓
	Marsileaceae					
	Marsilea costulifera	Narrow-leaf Nardoo				✓
	Marsilea drummondii	Common Nardoo				

Table A2.2 Non-indigenous native and exotic flora recorded as part of the general flora and targeted flora surveys within Manor Lakes PSP 41 during the current assessment

Life form	Scientific Name	Common Name	Listed Status			
Non-indigenous native species			**EPBC**	**DSE**	**FFG**	**Regional**
Tree	**Myrtaceae**					
	Eucalyptus cladocalyx	Sugar Gum				
Shrub	**Chenopodiaceae**					
	Rhagodia spinescens	Hedge Saltbush				
Exotic species			**CaLP Act Listed Weeds**			
Shrub	**Aizoaceae**					
	Galenia pubescens var. *pubescens*	Galenia				
	Solanaceae					
	Lycium ferocissimum	African Box-thorn			✓	
Forb	**Asteraceae**					
	Arctotheca calendula	Cape Weed				
	Carthamus lanatus	Saffron Thistle			✓	
	Cirsium vulgare	Spear Thistle			✓	
	Conyza bonariensis	Flaxleaf Fleabane				
	Cynara cardunculus	Artichoke Thistle			✓	
	Gamochaeta calviceps	Silky Cudweed				
	Gamochaeta purpurea	Spiked Cudweed				
	Hypochoeris glabra	Smooth Cat's-ear				
	Hypochoeris radicata	Flatweed				
	Leontodon taraxacoides subsp. *taraxacoides*	Hairy Hawkbit				
	Silybum marianum	Variegated Thistle			✓	
	Sonchus asper	Rough Sow-thistle				
	Sonchus oleraceus	Common Sow-thistle				
	Xanthium spinosum	Bathurst Burr			✓	
	Boraginaceae					
	Echium plantagineum	Paterson's Curse			✓	
	Brassicaceae					
	Brassica fruticulosa	Twiggy Turnip				
	Capsella bursa-pastoris	Shepherd's Purse				
	Lepidium africanum	Common Peppercress				
	Lepidium draba	Hoary Cress				
	Sisymbrium erysimoides	Smooth Mustard				
	Caryophyllaceae					
	Cerastium glomeratum	Sticky Mouse-ear Chickweed				
	Petrorhagia dubia	Velvety Pink				
	Polycarpon tetraphyllum	Four-leaved Allseed				
	Fabaceae					

Life form	Scientific Name	Common Name	Listed Status
	Medicago polymorpha	Burr Medic	
	Trifolium angustifolium var. *angustifolium*	Narrow-leaf Clover	
	Trifolium arvense var. *arvense*	Hare's-foot Clover	
	Trifolium fragiferum var. *fragiferum*	Strawberry Clover	
	Trifolium resupinatum	Shaftal Clover	
	Trifolium sp.	Clover	
	Vicia sativa subsp. *sativa*	Common Vetch	
	Gentianaceae		
	Centaurium tenuiflorum	Slender Centaury	
	Cicendia quadrangularis	Square Cicendia	
	Geraniaceae		
	Erodium botrys	Big Heron's-bill	
	Erodium cicutarium	Common Heron's-bill	
	Lamiaceae		
	Marrubium vulgare	Horehound	
	Salvia verbenaca	Wild Sage	
	Malvaceae		
	Malva nicaeensis	Mallow of Nice	
	Malva sp.	Mallow	
	Onagraceae		
	Epilobium ciliatum	Glandular Willow-herb	
	Oxalidaceae		
	Oxalis sp. (naturalised)	Wood Sorrel	
	Polygonaceae		
	Polygonum aviculare	Hogweed	
	Scrophulariaceae		
	Verbascum thapsus subsp. *thapsus*	Great Mullein	✓
	Solanaceae		
	Physalis viscosa	Sticky Ground-cherry	✓
	Urticaceae		
	Urtica urens	Small Nettle	
	Veronicaceae		
	Plantago coronopus	Buck's-horn Plantain	
	Plantago lanceolata	Ribwort	
Graminoid	**Cyperaceae**		
	Cyperus eragrostis	Drain Flat-sedge	
	Iridaceae		
	Romulea minutiflora	Small-flower Onion-grass	
	Romulea rosea	Onion Grass	
	Poaceae		
	Aira sp.	Hair Grass	
	Avena sp.	Oat	
	Bromus hordeaceus subsp. *hordeaceus*	Soft Brome	
	Dactylis glomerata	Cocksfoot	
	Echinochloa crus-galli	Barnyard Grass	
	Ehrharta erecta var. *erecta*	Panic Veldt-grass	

Life form	Scientific Name	Common Name	Listed Status
	Ehrharta longiflora	Annual Veldt-grass	
	Hordeum leporinum	Barley-grass	
	Hordeum marinum	Sea Barley-grass	
	Lolium rigidum	Wimmera Rye-grass	
	Nassella hyalina	Cane Needle-grass	
	Nassella neesiana	Chilean Needle-grass	✓
	Nassella trichotoma	Serrated Tussock	✓
	Paspalum distichum	Water Couch	
	Pentaschistis airoides subsp. *airoides*	False Hair-grass	
	Vulpia bromoides	Squirrel-tail Fescue	
	Vulpia sp.	Fescue	

APPENDIX 3
EVC Benchmarks

Low-rainfall Plains Grassland (EVC 132_61)

Department of Sustainability and Environment

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Victorian Volcanic Plain bioregion

EVC 132_63: *Low-rainfall* Plains Grassland

Description:
Treeless vegetation mostly < 1 m tall dominated by largely graminoid and herb life forms. Occupies cracking basalt soils prone to seasonal waterlogging in areas receiving < 500 mm annual rainfall.

Life forms:

Life form	#Spp	%Cover	LF code
Small Shrub*	1	5%	SS
Prostrate Shrub	1	5%	PS
Large Herb*	2	5%	LH
Medium Herb	8	20%	MH
Small or Prostrate Herb*	3	10%	SH
Large Tufted Graminoid	1	5%	LTG
Medium to Small Tufted Graminoid	10	30%	MTG
Medium to Tiny Non-tufted Graminoid*	2	5%	MNG
Bryophytes/Lichens and Soil Crust**	na	20%	BL

* Largely seasonal life form
** Note: treat as one life form in this EVC

LF Code	Species typical of at least part of EVC range	Common Name
SS	*Pimelea curviflora* s.s.	Curved Rice-flower
PS	*Atriplex semibaccata*	Berry Saltbush
LH	*Ptilotus macrocephalus*	Feather-heads
MH	*Acaena echinata*	Sheep's Burr
MH	*Plantago gaudichaudii*	Narrow Plantain
MH	*Maireana enchylaenoides*	Wingless Bluebush
MH	*Calocephalus citreus*	Lemon Beauty-heads
SH	*Solenogyne dominii*	Smooth Solenogyne
SH	*Oxalis perennans*	Grassland Wood-sorrel
SH	*Chamaesyce drummondii*	Flat Spurge
SH	*Goodenia pinnatifida*	Cut-leaf Goodenia
LTG	*Austrostipa bigeniculata*	Kneed Spear-grass
MTG	*Austrostipa scabra*	Rough Spear-grass
MTG	*Austrostipa nodosa*	Knotty Spear-grass
MTG	*Whalleya proluta*	Rigid Panic
MTG	*Austrodanthonia duttoniana*	Brown-back Wallaby-grass
TTG	*Centrolepis strigosa* ssp. *strigosa*	Hairy Centrolepis
TTG	*Centrolepis aristata*	Pointed Centrolepis
SC	*Convolvulus erubescens* spp. agg.	Pink Bindweed

Recruitment:
Episodic/Fire or Grazing. Desirable period between disturbances is 5 years.

Organic Litter:
10% cover

Ecological Vegetation Class bioregion benchmark

Victoria
The Place To Be

EVC 132_63: *Low-rainfall* Plains Grassland - Victorian Volcanic Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	*Plantago lanceolata*	Ribwort	high	low
LH	*Cirsium vulgare*	Spear Thistle	high	high
LH	*Sonchus oleraceus*	Common Sow-thistle	high	low
MH	*Hypochoeris radicata*	Cat's Ear	high	low
MH	*Leontodon taraxacoides* ssp. *taraxacoides*	Hairy Hawkbit	high	low
MH	*Trifolium subterraneum*	Subterranean Clover	high	low
MH	*Plantago coronopus*	Buck's-horn Plantain	high	low
MH	*Trifolium striatum*	Knotted Clover	high	low
MH	*Trifolium dubium*	Suckling Clover	high	low
MTG	*Romulea rosea*	Onion Grass	high	low
MTG	*Vulpia bromoides*	Squirrel-tail Fescue	high	low
MTG	*Briza minor*	Lesser Quaking-grass	high	low
MTG	*Bromus hordeaceus* ssp. *hordeaceus*	Soft Brome	high	low
MTG	*Briza maxima*	Large Quaking-grass	high	low
MTG	*Lolium rigidum*	Wimmera Rye-grass	high	low
MTG	*Lolium perenne*	Perennial Rye-grass	high	low
MTG	*Nassella neesiana*	Chilean Needle-grass	high	high
MNG	*Cynosurus echinatus*	Rough Dog's-tail	high	low
MNG	*Juncus capitatus*	Capitate Rush	high	low

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For more information contact: Customer Service Centre, 136 186

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Creekline Grassy Woodland (EVC 68)

EVC 68: Creekline Grassy Woodland

Description:
Eucalypt-dominated woodland to 15 m tall with occasional scattered shrub layer over a mostly grassy/sedgy to herbaceous ground-layer. Occurs on low-gradient ephemeral to intermittent drainage lines, typically on fertile colluvial/alluvial soils, on a wide range of suitably fertile geological substrates. These minor drainage lines can include a range of graminoid and herbaceous species tolerant of waterlogged soils, and are presumed to have sometimes resembled a linear wetland or system of interconnected small ponds.

Large trees:

Species	DBH(cm)	#/ha
Eucalyptus spp.	80 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
15%	*Eucalyptus camaldulensis*	River Red-gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	2	10%	T
Medium Shrub	5	10%	MS
Small Shrub	1	1%	SS
Large Herb	2	5%	LH
Medium Herb	6	10%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	2	10%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	10	25%	MTG
Medium to Tiny Non-tufted Graminoid	3	10%	MNG
Scrambler or Climber	3	10%	SC
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	*Acacia melanoxylon*	Blackwood
T	*Acacia retinodes*	Wirilda
MS	*Hymenanthera dentata s.l.*	Tree Violet
SS	*Rubus parvifolius*	Small-leaf Bramble
SS	*Enchylaena tomentosa var. tomentosa*	Ruby Saltbush
MH	*Oxalis perennans*	Grassland Wood-sorrel
SH	*Azolla filiculoides*	Pacific Azolla
SH	*Lemna disperma*	Common Duckweed
LTG	*Austrostipa bigeniculata*	Kneed Spear-grass
LTG	*Poa labillardierei*	Common Tussock-garss
LNG	*Phragmites australis*	Common Reed
MTG	*Austrodanthonia racemosa var. racemosa*	Stiped Wallaby-grass
MTG	*Austrodanthonia caespitosa*	Common Wallaby-grass
MNG	*Microlaena stipoides var. stipoides*	Weeping Grass
SC	*Glycine clandestina*	Twining Glycine

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Ecological Vegetation Class bioregion benchmark

EVC 68: Creekline Grassy Woodland - Victorian Volcanic Plain bioregion

Recruitment:
Continuous

Organic Litter:
40 % cover

Logs:
20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	*Salix fragilis*	Crack Willow	high	high
MS	*Lycium ferocissimum*	African Box-thorn	high	high
MS	*Genista monspessulana*	Montpellier Broom	high	high
MS	*Rosa rubiginosa*	Sweet Briar	high	high
MS	*Rubus sp. aff. armeniacus*	Blackberry	high	high
LH	*Plantago lanceolata*	Ribwort	high	low
LH	*Sonchus oleraceus*	Common Sow-thistle	high	low
LH	*Hirschfeldia incana*	Buchan Weed	high	high
LH	*Verbena bonariensis s.l.*	Purple-top Verbena	high	high
LH	*Rumex crispus*	Curled Dock	high	high
LH	*Rumex conglomeratus*	Clustered Dock	high	high
LH	*Conium maculatum*	Hemlock	high	high
LH	*Helminthotheca echioides*	Ox-tongue	high	low
LH	*Aster subulatus*	Aster-weed	high	low
LH	*Sonchus asper s.l.*	Rough Sow-thistle	high	low
LH	*Solanum nigrum sensu Willis (1972)*	Black Nightshade	high	high
MH	*Brassica fruticulosa*	Twiggy Turnip	high	high
MH	*Hypochoeris radicata*	Cat's Ear	high	low
MH	*Foeniculum vulgare*	Fennel	high	high
SH	*Modiola caroliniana*	Red-flower Mallow	high	low
LTG	*Phalaris aquatica*	Toowoomba Canary-grass	high	high
LTG	*Piptatherum miliaceum*	Rice Millet	high	high
MTG	*Ehrharta erecta var. erecta*	Panic Veldt-grass	high	high
MTG	*Paspalum dilatatum*	Paspalum	high	high
MTG	*Bromus catharticus*	Prairie Grass	high	low
MTG	*Romulea rosea*	Onion Grass	high	low
MTG	*Bromus diandrus*	Great Brome	high	low
MTG	*Briza maxima*	Large Quaking-grass	high	low
MTG	*Agrostis capillaris s.l.*	Brown-top Bent	high	high
MNG	*Dactylis glomerata*	Cocksfoot	high	high
MNG	*Paspalum distichum*	Water Couch	high	high
SC	*Tradescantia fluminensis*	Wandering Jew	high	high

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Plains Woodland (EVC 803)

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Victorian Volcanic Plain bioregion

EVC 803: Plains Woodland (*syn.* EVC 55 *Riverina* Plains Grassy Woodland)

Description:
Grassy or sedgy woodland to 15 m tall with large inter-tussock spaces potentially supporting a range of annual or geophytic herbs adapted to low summer rainfall, with low overall biomass. Mostly occurs on terrain of low relief in areas receiving <600 mm rainfall per annum. Fertile, sometimes seasonally waterlogged, mostly silty, loamy or clay topsoils, with heavy subsoils, derived largely from former Quaternary swamp deposits.

Large trees:

Species	DBH(cm)	#/ha
Eucalyptus spp.	70 cm	15 / ha
Allocasuarina luehmannii	40 cm	

Tree Canopy Cover:

%cover	Character Species	Common Name
15%	*Eucalyptus microcarpa*	Grey Box
	Allocasuarina luehmannii	Buloke
	Eucalyptus melliodora	Yellow Box
	Eucalyptus leucoxylon	Yellow Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Medium Shrub	2	5%	MS
Small Shrub	2	5%	SS
Prostrate Shrub	1	1%	PS
Large Herb	1	1%	LH
Medium Herb	20	20%	MH
Small or Prostrate Herb	4	10%	SH
Large Tufted Graminoid	1	1%	LTG
Large Non-tufted Graminoid	1	1%	LNG
Medium to Small Tufted Graminoid	16	45%	MTG
Medium to Tiny Non-tufted Graminoid	3	5%	MNG
Bryophytes/Lichens	na	10%	BL
Soil Crust	na	10%	S/C

Recruitment:
Continuous

Organic Litter:
10 % cover

Logs:
10 m/0.1 ha.

Victoria
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Ecological Vegetation Class bioregion benchmark

EVC 803: Plains Woodland (*syn.* EVC 55 *Riverina* Plains Grassy Woodland) - Victorian Volcanic Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
MS	*Acacia pycnantha*	Golden Wattle
MS	*Acacia acinacea s.l.*	Gold-dust Wattle
SS	*Eutaxia microphylla* var. *microphylla*	Common Eutaxia
PS	*Astroloma humifusum*	Cranberry Heath
LH	*Senecio quadridentatus*	Cotton Fireweed
MH	*Acaena echinata*	Sheep's Burr
MH	*Plantago gaudichaudii*	Narrow Plantain
MH	*Maireana enchylaenoides*	Wingless Bluebush
MH	*Calocephalus citreus*	Lemon Beauty-heads
SH	*Solenogyne dominii*	Smooth Solenogyne
SH	*Oxalis perennans*	Grassland Wood-sorrel
SH	*Daucus glochidiatus*	Austral Carrot
SH	*Goodenia pinnatifida*	Cut-leaf Goodenia
LTG	*Austrostipa bigeniculata*	Kneed Spear-grass
MTG	*Austrostipa scabra*	Rough Spear-grass
MTG	*Austrodanthonia setacea*	Bristly Wallaby-grass
MTG	*Dianella revoluta* s.s.	Black-anther Flax-lily
MTG	*Austrodanthonia caespitosa*	Common Wallaby-grass
MNG	*Wurmbea dioica*	Common Early Nancy
TTG	*Centrolepis strigosa* ssp. *strigosa*	Hairy Centrolepis
TTG	*Centrolepis aristata*	Pointed Centrolepis
EP	*Amyema miquelii*	Box Mistletoe
SC	*Thysanotus patersonii*	Twining Fringe-lily
SC	*Convolvulus erubescens* spp. agg.	Pink Bindweed

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	*Sonchus oleraceus*	Common Sow-thistle	high	low
MH	*Hypochoeris radicata*	Cat's Ear	high	low
MH	*Trifolium angustifolium* var. *angustifolium*	Narrow-leaf Clover	high	low
MH	*Hypochoeris glabra*	Smooth Cat's-ear	high	low
MH	*Arctotheca calendula*	Cape Weed	high	low
MH	*Petrorhagia velutina*	Velvety Pink	high	low
MH	*Trifolium dubium*	Suckling Clover	high	low
MH	*Anagallis arvensis*	Pimpernel	high	low
SH	*Trifolium glomeratum*	Cluster Clover	high	low
LNG	*Avena fatua*	Wild Oat	high	low
MTG	*Romulea rosea*	Onion Grass	high	low
MTG	*Briza minor*	Lesser Quaking-grass	high	low
MTG	*Briza maxima*	Large Quaking-grass	high	low
MTG	*Lolium rigidum*	Wimmera Rye-grass	high	low
MTG	*Vulpia bromoides*	Squirrel-tail Fescue	high	low
MNG	*Vulpia myuros*	Rat's-tail Fescue	high	low
MNG	*Juncus capitatus*	Capitate Rush	high	low
MNG	*Bromus rubens*	Red Brome	high	low

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APPENDIX 4
Manor Lakes PSP 41 fauna data

A.4.1. Indigenous Fauna Results

National status (EPBC Act):

CR	critically endangered
EN	endangered
VU	vulnerable
CD	conservation dependent
Mi	listed migratory species

Victorian status (FFG Act, DSE Advisory list):

cr	critically endangered (DSE 2007b)
e	endangered (DSE 2007b)
v	vulnerable (DSE 2007b)
L	listed under Flora and Fauna Guarantee Act

Regional status (DSE Advisory list):

cd	conservation dependent (DSE 2007b)
nt	near threatened (DSE 2007b)
dd	data deficient (DSE 2007b)

Type of record:

Direct observation	seen and/or heard
Indirect observation	scat/digging/scratch marks
Active	hand searching

All indigenous species have at least local significance

Table A4.1. Indigenous fauna species recorded as part of the general surveys in the study area.

Scientific Name	Common Name	Conservation status				Type of record	Survey Method	Comments
		EPBC	DSE	FFG	Regional			
Birds								
Acanthiza chrysorrhoa	Yellow-rumped Thornbill					Direct observation	General Fauna, Bird Census	
Acanthiza pusilla	Brown Thornbill					Direct observation	General Fauna, Bird Census	
Anas castanea	Chestnut Teal					Direct observation	General Fauna	
Anas gracilis	Grey Teal					Direct observation	General Fauna	
Anas superciliosa	Pacific Black Duck					Direct observation	General Fauna, Bird Census	
Anthus novaeseelandiae	Australasian Pipit					Direct observation	General Fauna, Bird Census	
Aquila audax	Wedge-tailed Eagle					Direct observation	General Fauna, Bird Census	Active nest present near Lollypoop Creek
Cacatua tenuirostris	Long-billed Corella					Direct observation	General Fauna	
Chenonetta jubata	Australian Wood Duck					Direct observation	General Fauna, Bird Census	
Cincloramphus cruralis	Brown Songlark					Direct observation	General Fauna, Bird Census	
Coracina novaehollandiae	Black-faced Cuckoo-shrike					Direct observation	General Fauna	
Corvus coronoides	Australian Raven					Direct observation	General Fauna, Bird Census	
Corvus mellori	Little Raven					Direct observation	General Fauna, Bird Census	
Coturnix pectoralis	Stubble Quail					Direct observation	General Fauna, Bird Census	
Coturnix ypsilophora	Brown Quail		nt			Heard	Plains-wanderer Survey	
Cygnus atratus	Black Swan					Direct observation	General Fauna, Bird Census	
Egretta novaehollandiae	White-faced Heron					Direct observation	General Fauna, Bird Census	

Scientific Name	Common Name	Conservation status				Type of record	Survey Method	Comments
		EPBC	DSE	FFG	Regional			
Elanus axillaris	Black-shouldered Kite					Direct observation	General Fauna, Bird Census	Breeding pair seen on dead stag
Elseyornis melanops	Black-fronted Dotterel					Direct observation	General Fauna, Bird Census	
Eolophus roseicapilla	Galah					Direct observation	General Fauna, Bird Census	
Epthianura albifrons	White-fronted Chat					Direct observation	General Fauna, Bird Census	Present around fallen log piles
Falco berigora	Brown Falcon					Direct observation	General Fauna, Bird Census	Common in area
Falco cenchroides	Nankeen Kestrel					Direct observation	General Fauna	
Falco peregrinus	Peregrine Falcon					Direct observation	General Fauna, Bird Census	Breeding pair seen on water tank near Ballan Road
Fulica atra	Eurasian Coot					Direct observation	General Fauna	
Grallina cyanoleuca	Magpie-lark					Direct observation	General Fauna, Bird Census	
Gymnorhina tibicen	Australian Magpie					Direct observation	General Fauna, Bird Census	
Himantopus himantopus	Black-winged Stilt					Direct observation	General Fauna	
Hirundo neoxena	Welcome Swallow					Direct observation	General Fauna, Bird Census	
Hirundo nigricans	Tree Martin					Direct observation	General Fauna, Bird Census	
Lichenostomus penicillatus	White-plumed Honeyeater					Direct observation	General Fauna, Bird Census	
Malurus cyaneus	Superb Fairy-wren					Direct observation	General Fauna, Bird Census	
Microcarbo melanoleucos	Little Pied Cormorant					Direct observation	General Fauna	
Mirafra javanica	Horsfield's Bushlark					Direct observation	General Fauna, Bird Census	
Ninox novaeseelandiae	Southern Boobook					Heard	General Fauna	

Scientific Name	Common Name	Conservation status				Type of record	Survey Method	Comments
		EPBC	DSE	FFG	Regional			
Ocyphaps lophotes	Crested Pigeon					Direct observation	General Fauna, Bird Census	
Pelecanus conspicillatus	Australian Pelican					Direct observation	General Fauna	
Platycercus eximius	Eastern Rosella					Direct observation	General Fauna	
Porzana fluminea	Australian Spotted Crake					Direct observation	Growling Grass Frog survey	
Psephotus haematonotus	Red-rumped Parrot					Direct observation	General Fauna, Bird Census	
Rhipidura leucophrys	Willie Wagtail					Direct observation	General Fauna, Bird Census	
Tachybaptus novaehollandiae	Australasian Grebe					Direct observation	General Fauna, Bird Census	
Taeniopygia guttata	Zebra Finch					Direct observation	General Fauna, Bird Census	
Threskiornis molucca	Australian White Ibis					Direct observation	General Fauna, Bird Census	
Threskiornis spinicollis	Straw-necked Ibis					Direct observation	General Fauna, Bird Census	
Todiramphus sanctus	Sacred Kingfisher					Direct observation	General Fauna	
Vanellus miles	Masked Lapwing					Direct observation	General Fauna, Bird Census	
Mammals								
Macropus giganteus	Eastern Grey Kangaroo					Direct observation	General Fauna	
Chalinolobus gouldii	Gould's Wattled Bat					Call recording	Anabat Survey	
Chalinolobus morio	Chocolate Wattled Bat					Call recording	Anabat Survey	
Mormopterus sp. (sp. 4)	Southern Freetail Bat					Call recording	Anabat Survey	
Nyctophilus geoffroyi	Lesser Long-eared Bat					Call recording	Anabat Survey	
Tadarida australis	White-striped Freetail Bat					Call recording	Anabat Survey	
Vespadelus darlingtoni	Large Forest Bat					Call recording	Anabat Survey	

Scientific Name	Common Name	Conservation status				Type of record	Survey Method	Comments
		EPBC	DSE	FFG	Regional			
Vespadelus vulturnus	Little Forest Bat					Call recording	Anabat Survey	
Reptiles								
Notechis scutatus	Tiger Snake					Direct observation	General Fauna	
Tiliqua scincoides	Common Blue-tongue Lizard					Direct observation	General Fauna	
Amphibians								
Limnodynastes dumerilii	Southern Bullfrog					Direct observation	General Fauna, Growling Grass Frog survey	
Limnodynastes peronii	Striped Marsh Frog					Direct observation	General Fauna, Growling Grass Frog survey	
Limnodynastes tasmaniensis	Spotted Marsh Frog					Direct observation	General Fauna, Growling Grass Frog survey	
Neobactrachis sudelli	Sudell's Frog					Direct observation	Plains-wanderer survey	
Crinia signifera	Common Froglet					Direct observation	General Fauna, Growling Grass Frog survey	
Litoria peronii	Peron's Tree Frog					Heard	Growling Grass Frog survey	
Decapod crustaceans								
Cherax destructor	Common Yabby					Direct observation	General Aquatic	
Endangered invertebrates								
Symenon plana	Golden Sun Moth	CR	cr,L			Direct observation	General Fauna, Golden Sun Moth	Recorded on numerous occasions

A.4.2. Exotic Fauna Results

Table A4.2. Exotic fauna species recorded as part of the general surveys in the study area.

Scientific Name	Common Name	CaLP Act Status	Type of record	Survey Method	Comments
Birds					
Acridotheres tristis	Common Myna		Direct observation	General Fauna	
Alauda arvensis	European Skylark		Direct observation	General Fauna	
Passer domesticus	House Sparrow		Direct observation	General Fauna	
Streptopelia chinensis	Spotted Turtle-Dove		Direct observation	General Fauna	
Sturnus vulgaris	Common Starling		Direct observation	General Fauna	
Turdus merula	Common Blackbird		Direct observation	General Fauna	
Mammals					
Mus musculus	House Mouse		Direct observation	General Fauna	
Oryctolagus cuniculus	European Rabbit	Established	Direct observation	General Fauna	
Vulpes vulpes	Red Fox	Established	Scats and tracks	General Fauna	
Fish					
Carassius auratus	Goldfish		Direct observation	General Aquatic	
Gambusia holbrooki	Eastern Gambusia		Direct observation	General Aquatic	
Perca fluviatilis	Redfin		Direct observation	General Aquatic	

Table A4.3. Fauna species listed under the migratory provisions of the EPBC Act and predicted to occur in Manor Lakes PSP 41

Includes records from the following sources:

- DSE Victorian Biodiversity Atlas
- DSEWPaC database (PMST accessed on 23.09.10)
- Current survey

Search area is 5 km radius.

Most recent record:

#	species predicted to occur by the DSEWPAC database (not recorded on other databases unless dated)
Year	recorded on databases listed above
This study	recorded during current survey

Scientific Name	Common Name	Family Name	Conservation Status			Most recent record	Database	No. of database records
			EPBC	DSE	FFG			
Hydroprogne caspia	Caspian Tern	Laridae	Mi	nt	L	1979	VBA	1
Sternula albifrons	Little Tern	Laridae	Mi	vu	L	1978	VBA	1
Arenaria interpres	Ruddy Turnstone	Scolopacidae	Mi			1979	VBA	3
Arenaria interpres	Ruddy Turnstone	Scolopacidae	Mi			1977	VBA	3
Pluvialis squatarola	Grey Plover	Charadriidae	Mi	nt		1978	VBA	2
Pluvialis fulva	Pacific Golden Plover	Charadriidae	Mi	nt		2007	VBA	5
Charadrius mongolus	Lesser Sand Plover	Charadriidae	Mi	vu		1978	VBA	2
Charadrius bicinctus	Double-banded Plover	Charadriidae	Mi			2008/#	VBA/PMST	7
Charadrius leschenaultii	Greater Sand Plover	Charadriidae	Mi	vu		1978	VBA	2
Numenius madagascariensis	Eastern Curlew	Scolopacidae	Mi	nt		1978	VBA	5
Numenius minutus	Little Curlew	Scolopacidae	Mi			2008	VBA	7
Limosa lapponica	Bar-tailed Godwit	Scolopacidae	Mi			1978	VBA	5
Tringa glareola	Wood Sandpiper	Scolopacidae	Mi	vu		2008	VBA	3
Actitis hypoleucos	Common Sandpiper	Scolopacidae	Mi	vu		2007	BA	1
Tringa nebularia	Common Greenshank	Scolopacidae	Mi			2004	VBA/BA	9
Tringa stagnatilis	Marsh Sandpiper	Scolopacidae	Mi			2006	VBA	3

Scientific Name	Common Name	Family Name	Conservation Status			Most recent record	Database	No. of database records
			EPBC	DSE	FFG			
Calidris ferruginea	Curlew Sandpiper	Scolopacidae	Mi			#/1981	VBA/PMST	12
Calidris ruficollis	Red-necked Stint	Scolopacidae	Mi			2004/#	VBA/BA/PMST	10
Calidris ruficollis	Red-necked Stint	Scolopacidae	Mi			1977	VBA/BA/PMST	10
Calidris acuminata	Sharp-tailed Sandpiper	Scolopacidae	Mi			2006/#	VBA	17
Calidris canutus	Red Knot	Scolopacidae	Mi	nt		2006	VBA	4
Calidris tenuirostris	Great Knot	Scolopacidae	Mi	e	L	2007	VBA	5
Gallinago hardwickii	Latham's Snipe	Scolopacidae	Mi	nt		2006/#	VBA/PMST	13
Rostratula australis	Australian Painted Snipe	Rostratulidae	Mi	VU, cr	L	#/1980	VBA/PMST	4
Plegadis falcinellus	Glossy Ibis	Threskiornithidae	Mi	nt		2008	VBA	5
Ardea modesta	Eastern Great Egret	Ardeidae	Mi	vu	L	2004/#	VBA/BA/PMST	13
Haliaeetus leucogaster	White-bellied Sea-Eagle	Accipitridae	Mi	vu	L	#	PMST	2
Neophema chrysogaster	Orange-bellied Parrot	Psittacidae	Mi	CR, cr	L	2008	VBA	1
Merops ornatus	Rainbow Bee-eater	Meropidae	Mi			#/1988	VBA/PMST	3
Hirundapus caudacutus	White-throated Needletail	Apodidae	Mi			#/1990	VBA/PMST	4
Apus pacificus	Fork-tailed Swift	Apodidae	Mi			#	PMST	2
Rhipidura rufifrons	Rufous Fantail	Dicruridae	Mi			#/1989	VBA/PMST	3
Myiagra cyanoleuca	Satin Flycatcher	Dicruridae	Mi			#	PMST	2
Acrocephalus stentoreus	Clamorous Reed Warbler	Sylviidae	Mi			2007	VBA	9
Anthochaera phrygia	Regent Honeyeater	Meliphagidae	Mi	EN, c	L	#	PMST	2
Phalaropus lobatus	Red-necked Phalarope	Scolopacidae	Mi			2006	VBA	3
Philomachus pugnax	Ruff	Scolopacidae	Mi			2007	VBA	1
Calidris subminuta	Long-toed Stint	Scolopacidae	Mi	nt		2006	VBA	5
Ardea ibis	Cattle Egret	Ardeidae	Mi			#/1990	VBA/PMST	17
Calidris melanotos	Pectoral Sandpiper	Scolopacidae	Mi	nt		2007	VBA	5

APPENDIX 5
FIGURES

Figure A1: Overview of Manor Lakes PSP 41

Figure A2: Property Survey and Access Status, Manor Lakes PSP 41

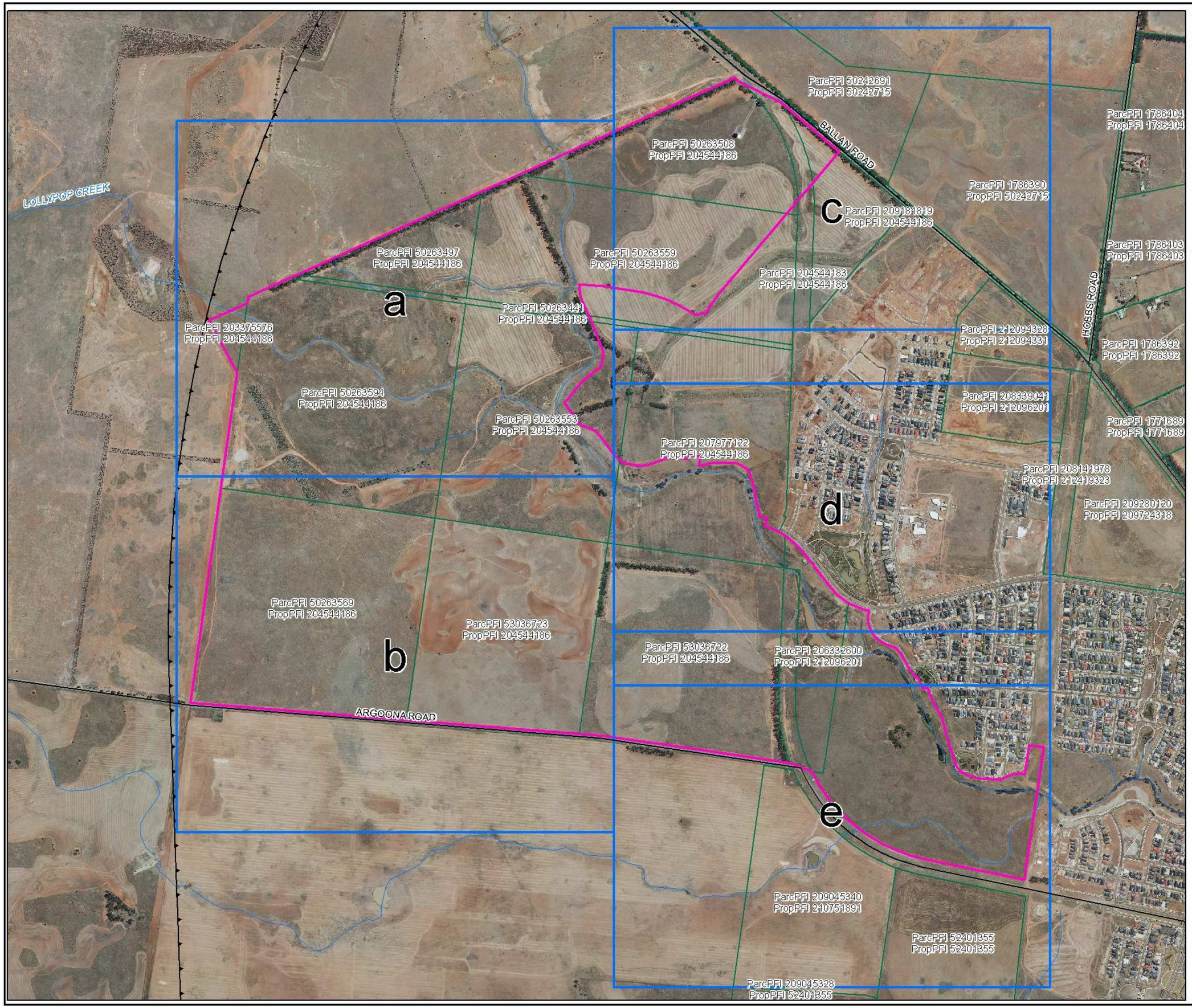
Figure A3: National and State Significant flora and fauna species locations, Manor Lakes PSP 41

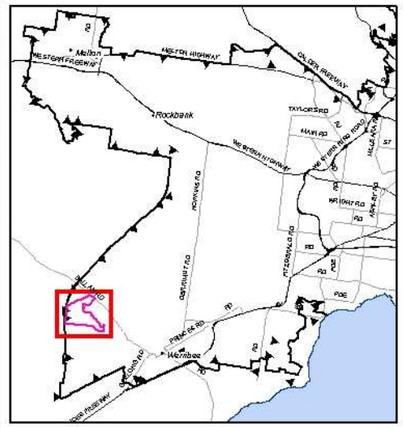
Figure A4: Vegetation, Manor Lakes PSP 41

Figure A5: High Threat Perennial Grassy Weed Cover, Manor Lakes PSP 41

Figure A6: Conservation significance of habitat zones according to the Native Vegetation Framework (NRE 2002), Manor Lakes PSP 41

Figure A7: Fauna Habitat, Manor Lakes PSP 41





Legend

- Map sheets
- PSP 41
- Parcel Boundary
- Urban Growth Boundary

Figure 1: Overview PSP 41

N

VicGrid GDA94
1:13,000 at A3

0 50100 200 300 400 500
Meters

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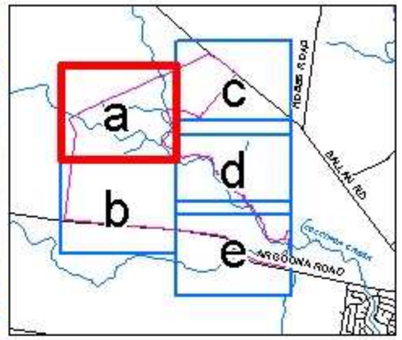

Legend

- Anabat survey location
- Bird census survey location
- Yarra Pygmy Perch targeted survey
- Growling Grass Frog playback location
- Spring targeted flora surveys
- Summer targeted flora surveys
- Plains Wanderer survey extent
- Growling Grass Frog survey extent
- Golden Sun Moth survey extent
- PSP 41

Access was approved and gained for all areas for all surveys

Figure A2a : Property Survey and Access Status, PSP 41

N

GDA 94 Zone 55
1:5000 at A3

0 125 250
Meters

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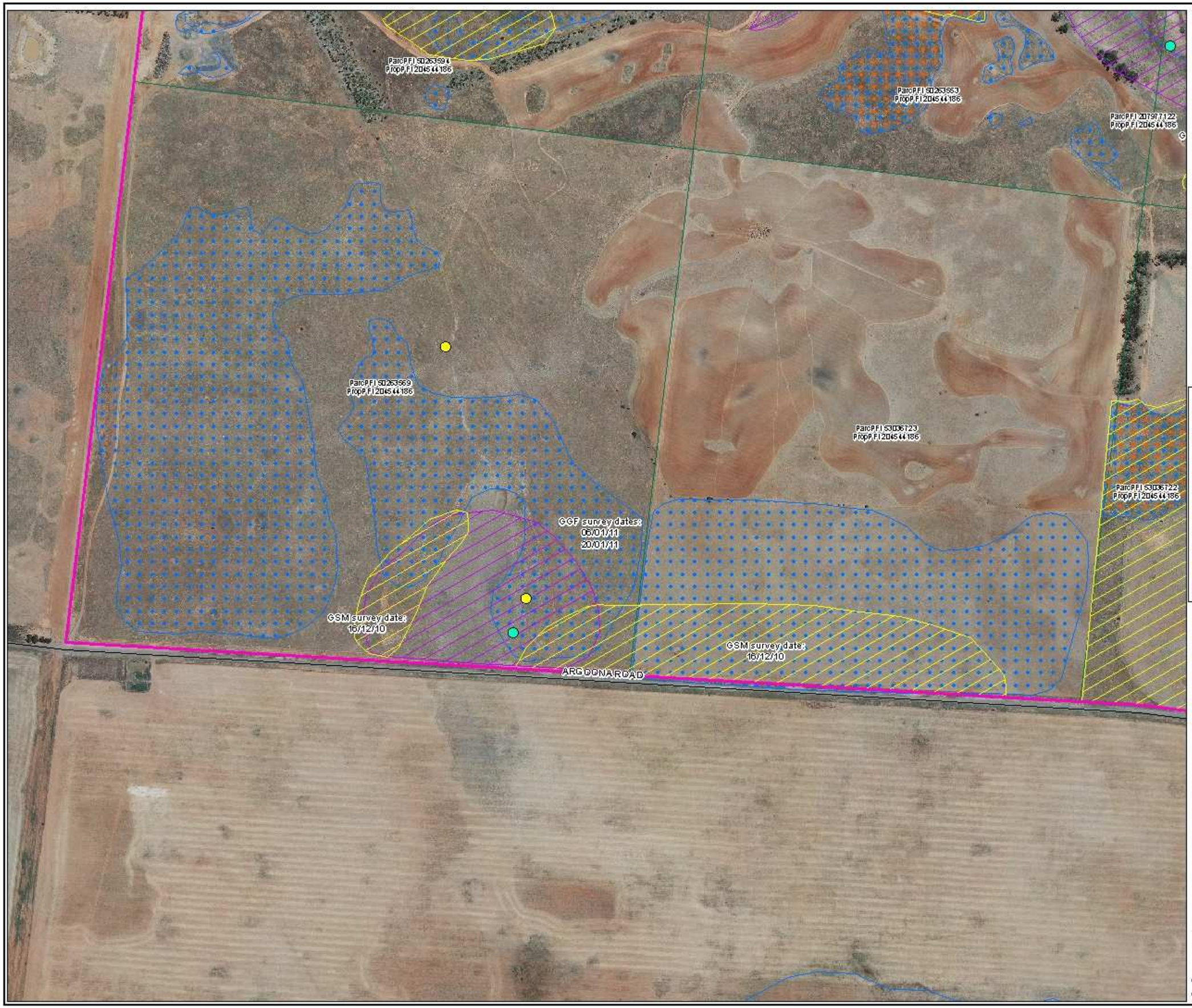

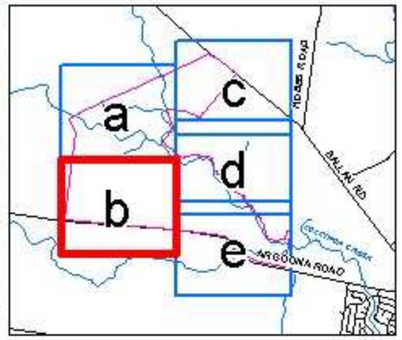

Legend

- Anabat survey location
- Bird census survey location
- Yarra Pygmy Perch targeted survey
- Growling Grass Frog playback location
- Spring targeted flora surveys
- Summer targeted flora surveys
- Plains Wanderer survey extent
- Growling Grass Frog survey extent
- Golden Sun Moth survey extent
- PSP 41

Access was approved and gained for all areas for all surveys

Figure A2b : Property Survey and Access Status, PSP 41

N

GDA 94 Zone 55
1:5000 at A3

0 125 250
Meters

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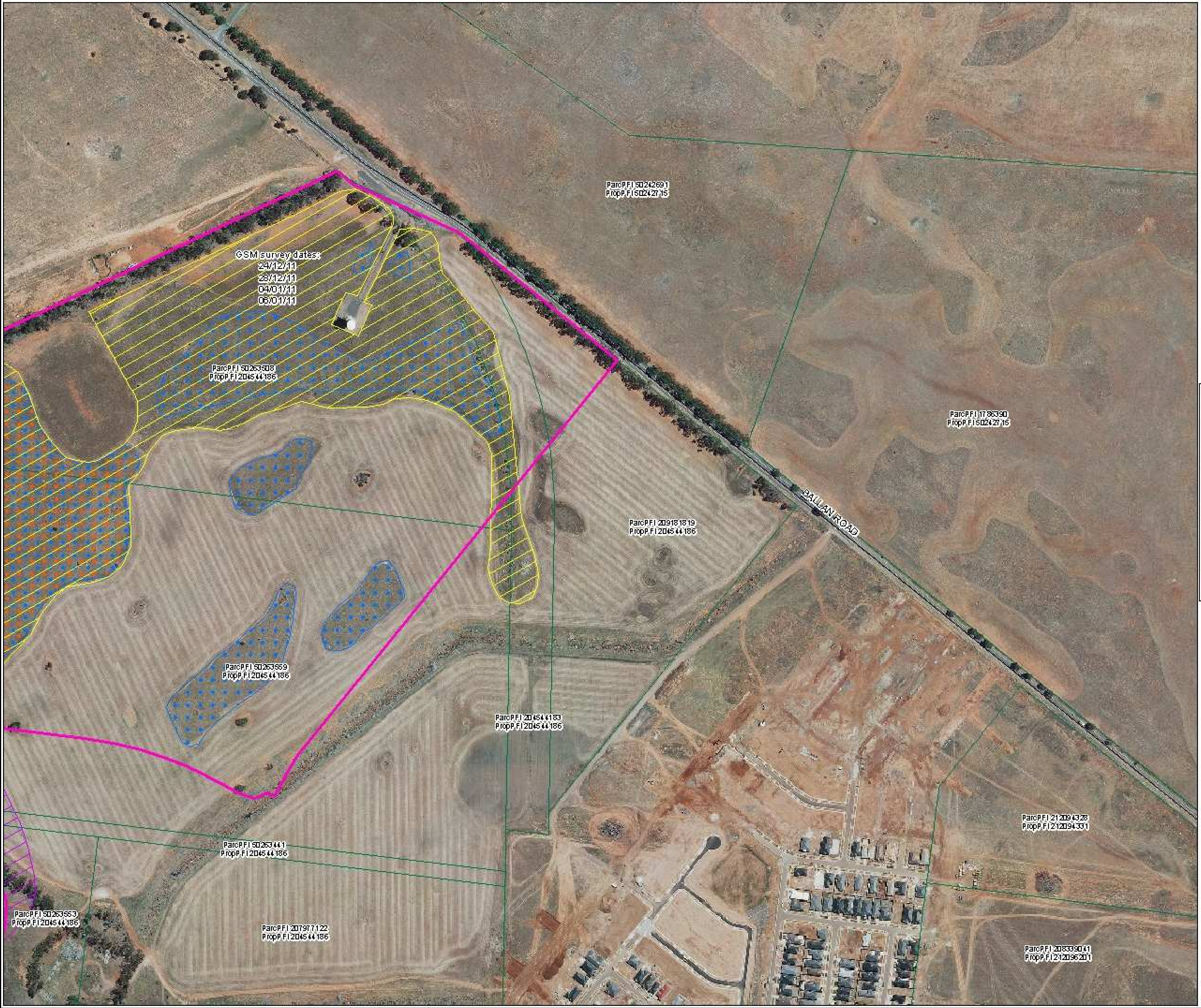

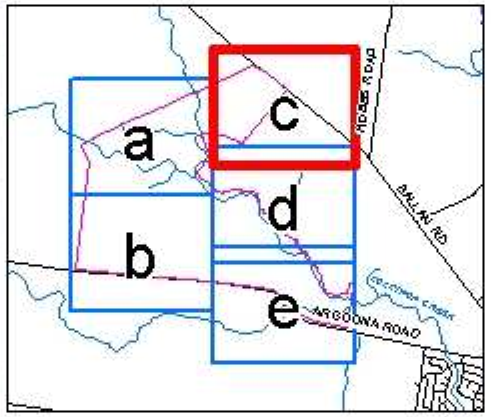

Legend

- Anabat survey location
- Bird census survey location
- Yarra Pygmy Perch targeted survey
- Growling Grass Frog playback location
- Spring targeted flora surveys
- Summer targeted flora surveys
- Plains Wanderer survey extent
- Growling Grass Frog survey extent
- Golden Sun Moth survey extent
- PSP 41

Access was approved and gained for all areas for all surveys

Figure A2c : Property Survey and Access Status, PSP 41

N

GDA94 Zone 55
1:5000 at A3

0 125 250
Meters

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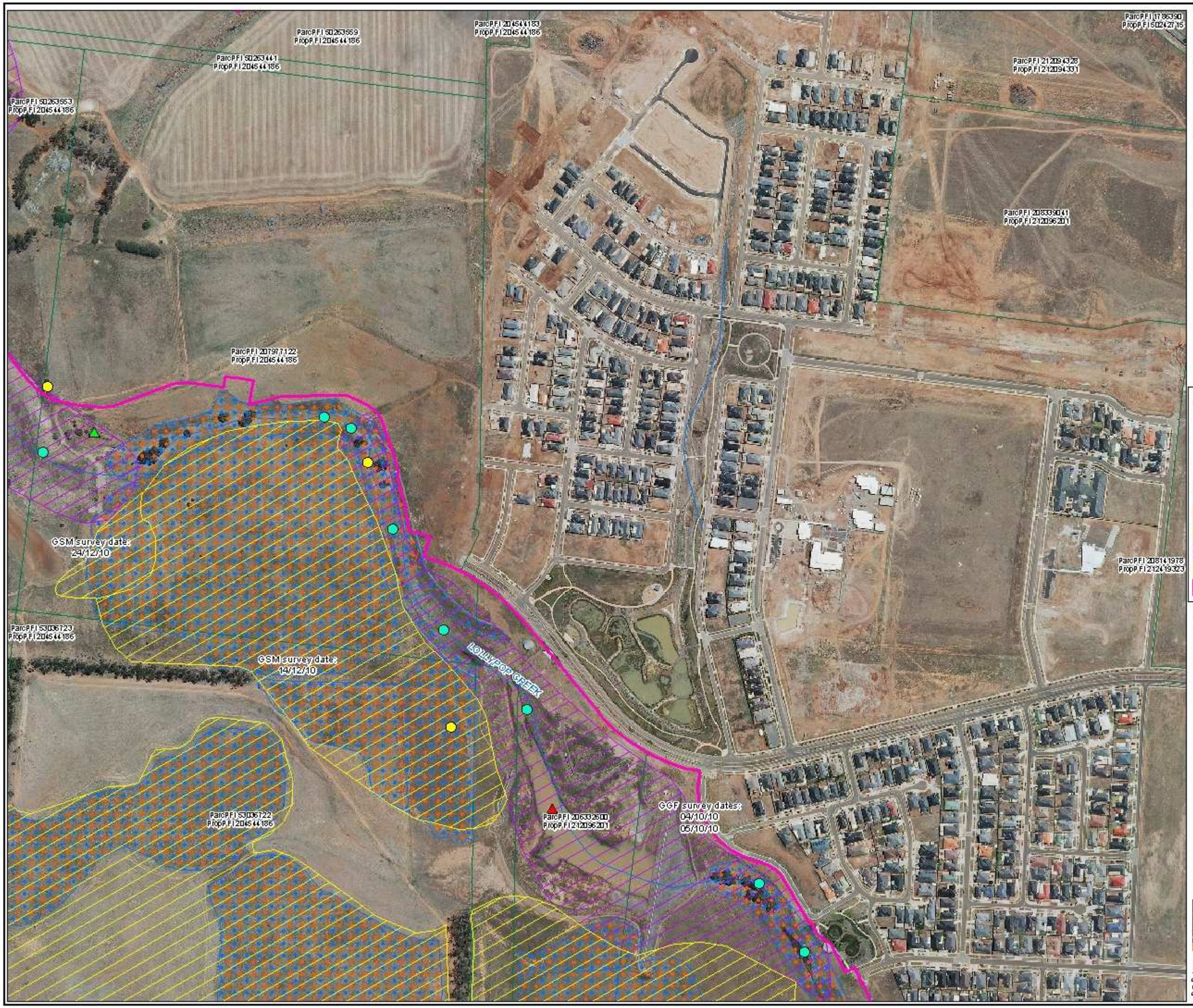
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ParcPFI 2083390 41
PropPFI 2120962 01
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GSM survey date:
24/12/10
ParcPFI 2081419 78
PropPFI 2120419 323
ParcPFI 530367 23
PropPFI 2045441186
GSM survey date:
14/12/10
LOLLYPOP CREEK
ParcPFI 530367 22
PropPFI 2045441186
ParcPFI 2063326 00
PropPFI 2120962 01
GCF survey dates:
04/10/10
05/10/10
a
b
c
d
e
BALLAN RD
GEELONG-BALLAN ROAD
ARGOONA ROAD
Legend
Anabat survey location
Bird census survey location
Yarra Pygmy Perch targeted survey
Growling Grass Frog playback location
Spring targeted flora surveys
Summer targeted flora surveys
Plains Wanderer survey extent
Growling Grass Frog survey extent
Golden Sun Moth survey extent
PSP 41
Access was approved and gained for all areas for all surveys
Figure A2d : Property Survey and Access Status, PSP 41
N
GDA 94 Zone 55
1:5000 at A3
0
125
250
Meters
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VICTORIA 3207
BIOSIS
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GGF survey dates:
04/10/10
05/10/10

LOLLYPOP CREEK

ParcPFI 53006722
PropPFI 2045144186

ParcPFI 2063926000
PropPFI 2120962011

GSM survey date:
14/12/10

ARGOONA ROAD

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ParcPFI 2090453281
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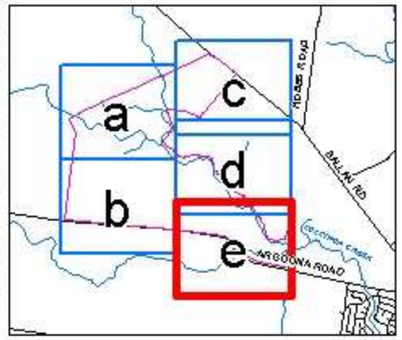
ParcPFI S2401365
PropPFI S2401365



Legend

- Anabat survey location
- Bird census survey location
- Yarra Pygmy Perch targeted survey
- Growling Grass Frog playback location
- Spring targeted flora surveys
- Summer targeted flora surveys
- Plains Wanderer survey extent
- Growling Grass Frog survey extent
- Golden Sun Moth survey extent
- PSP 41

Access was approved and gained for all areas for all surveys

Figure A2e : Property Survey and Access Status, PSP 41

N

GDA 94 Zone 55
1:5000 at A3

0 125 250
Meters

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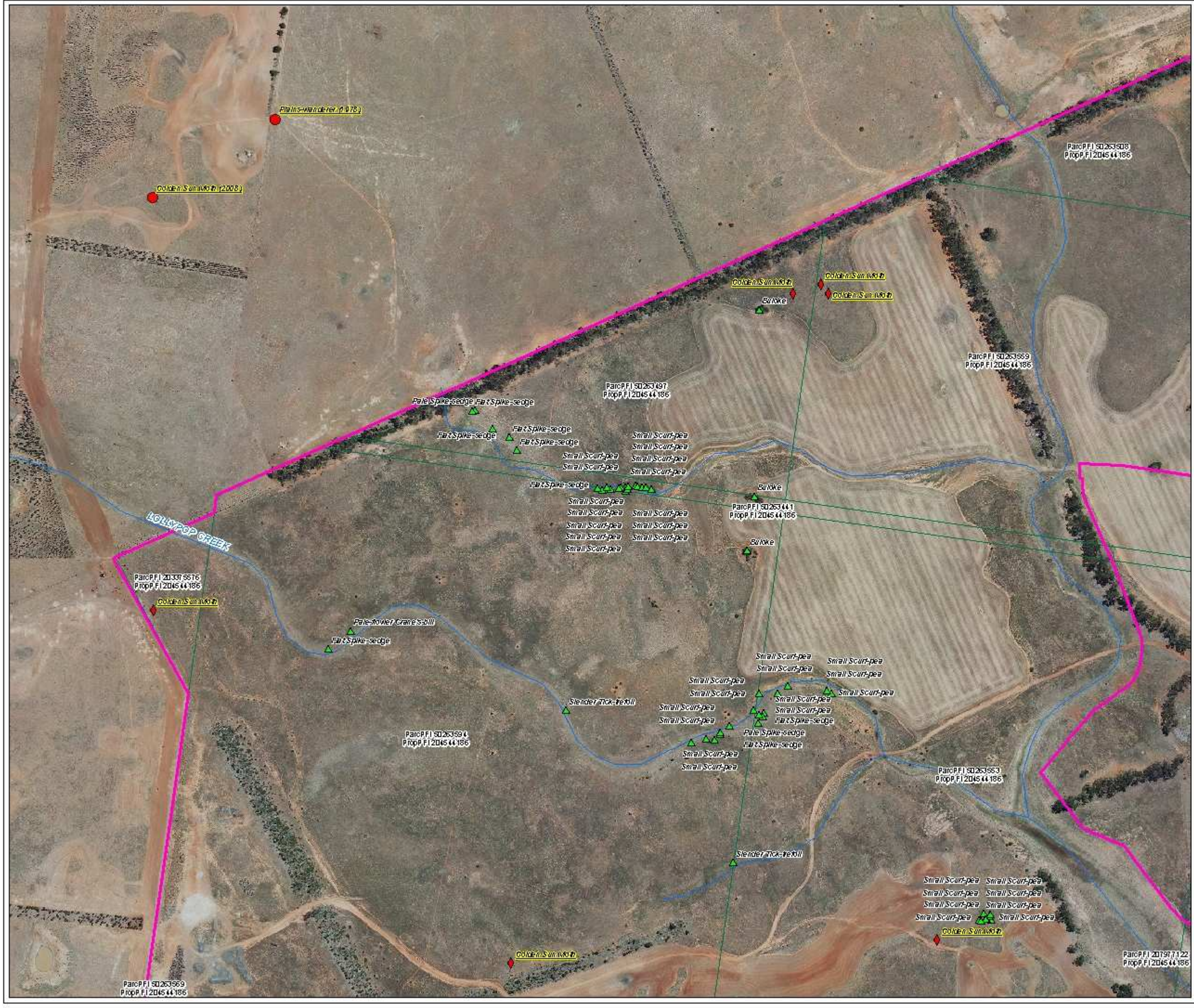

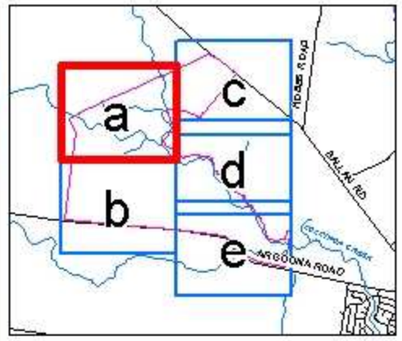

Legend

PSP 41

Parcels

Targeted and Current Flora results

Significance

National

State

Targeted and Current Fauna results

Significance

National

Database Flora records

Significance

National

State

Database Fauna records

Significance

National

State

Targeted flora were recorded in 2010/11
Targeted fauna were recorded in 2011

Figure A3a: National and State Significant flora and fauna species locations, PSP 41

N

1:5000 at A3

0 100 200

Meters

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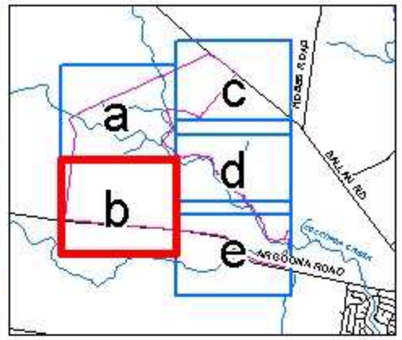

Legend

- PSP 41
- Parcels

Targeted and Current Flora results

Significance

- National
- State

Targeted and Current Fauna results

Significance

- National

Database Flora records

Significance

- National
- State

Database Fauna records

Significance

- National
- State

Targeted flora were recorded in 2010/11
Targeted fauna were recorded in 2011

Figure A3b: National and State Significant flora and fauna species locations, PSP 41

N

1:5000 at A3

0 100 200

Meters

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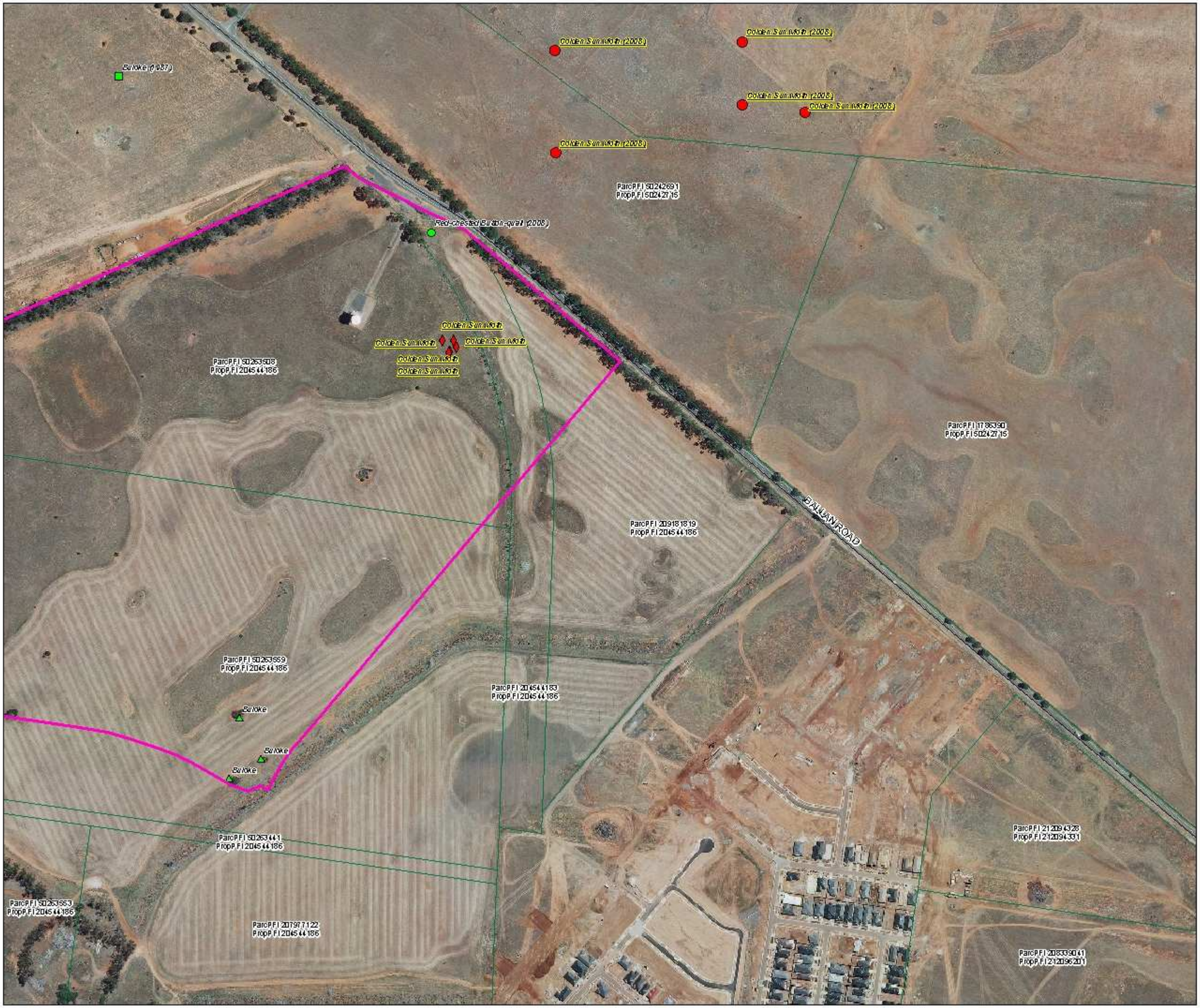

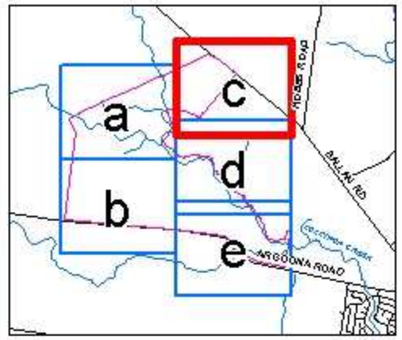

Legend

PSP 41

Parcels

Targeted and Current Flora results

Significance

National

State

Targeted and Current Fauna results

Significance

National

Database Flora records

Significance

National

State

Database Fauna records

Significance

National

State

Targeted flora were recorded in 2010/11
Targeted fauna were recorded in 2011

Figure A3c: National and State Significant flora and fauna species locations, PSP 41

N

1:5000 at A3

0 100 200

Meters

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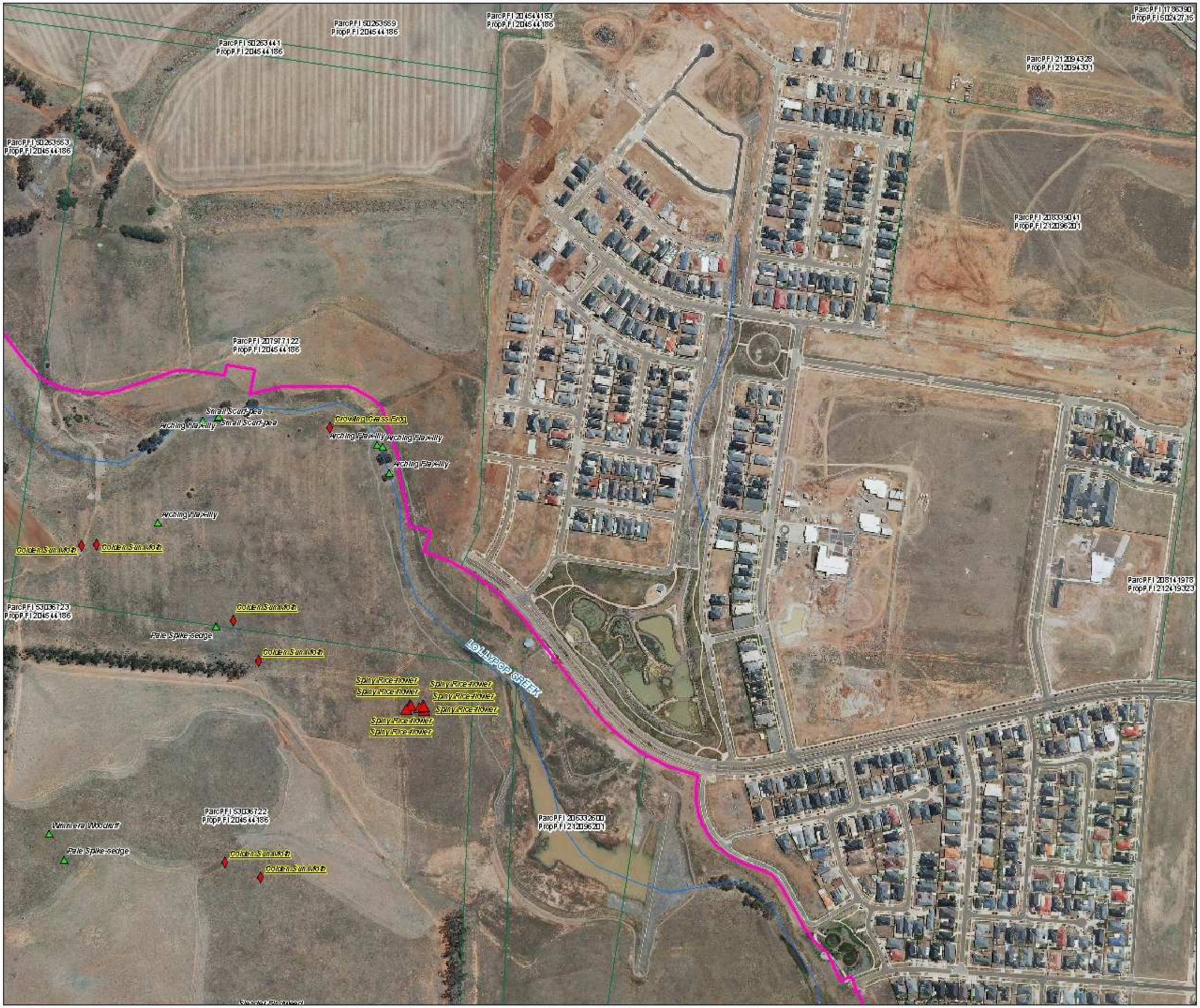

Legend

PSP 41

Parcels

Targeted and Current Flora results

Significance

National

State

Targeted and Current Fauna results

Significance

National

Database Flora records

Significance

National

State

Database Fauna records

Significance

National

State

Targeted flora were recorded in 2010/11
Targeted fauna were recorded in 2011

Figure A3d: National and State Significant flora and fauna species locations, PSP 41

N

1:5000 at A3

0 100 200

Meters

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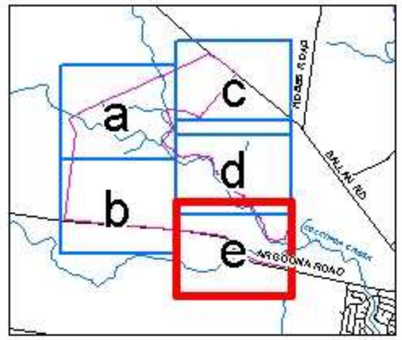

Legend

PSP 41

Parcels

Targeted and Current Flora results

Significance

National

State

Targeted and Current Fauna results

Significance

National

Database Flora records

Significance

National

State

Database Fauna records

Significance

National

State

Targeted flora were recorded in 2010/11
Targeted fauna were recorded in 2011

Figure A3e: National and State Significant flora and fauna species locations, PSP 41

N

1:5000 at A3

0 100 200

Meters

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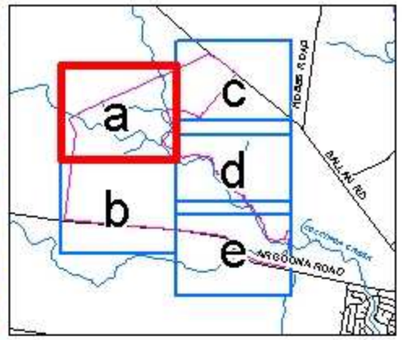

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HZ 38
HZ 32
HZ 34
HZ 33

Em 04
AI 01
AI 02
AI 12
AI 03
AI 13

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Parc PFI 2033755 76 Prop PFI 2045 44 186
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Parc PFI 5D263563 Prop PFI 2045 44 186
Parc PFI 5D263569 Prop PFI 2045 44 186
Parc PFI 20797 7122 Prop PFI 2045 44 186

LERDERDERG RIVER

Legend

Scattered Trees (AECOM 2010)

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

EPBC listed communities

- EPBC Listed Natural Temperate Grassland of the Victorian Volcanic Plain

Native vegetation recorded by AECOM between 2008 & 2010 (AECOM 2010)

- 132_63 Low-rainfall Plains Grassland

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

Figure A4 a
Vegetation,
Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

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Metres

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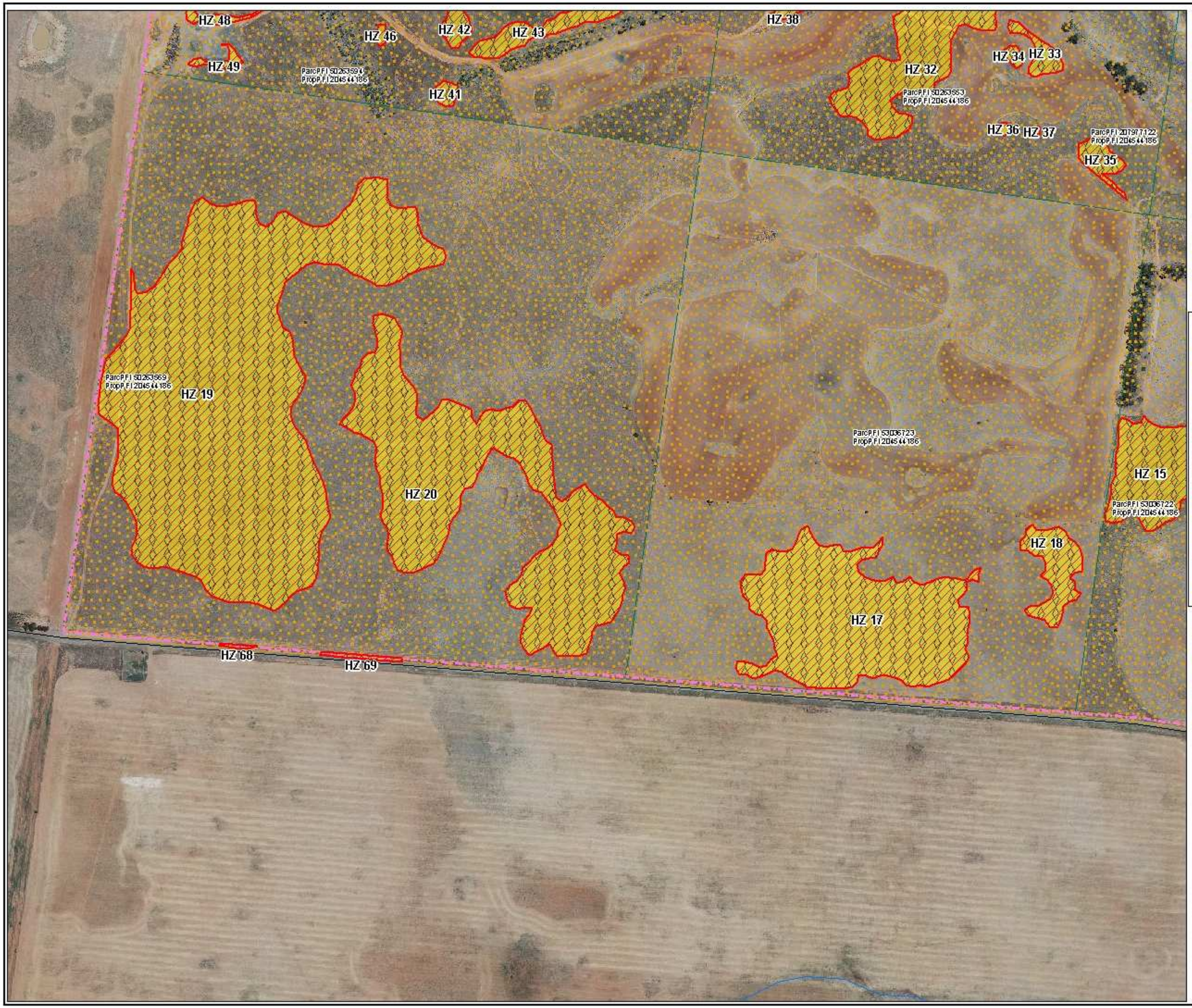

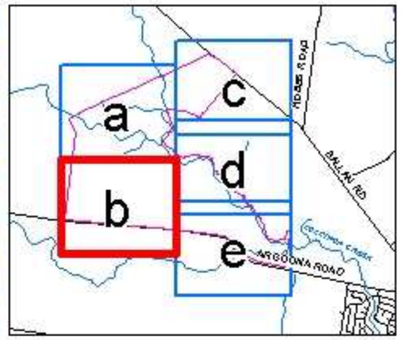

Legend

Scattered Trees (AECOM 2010)

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

EPBC listed communities

- EPBC Listed Natural Temperate Grassland of the Victorian Volcanic Plain

Native vegetation recorded by AECOM between 2008 & 2010 (AECOM 2010)

- 132_63 Low-rainfall Plains Grassland

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

Figure A4b
Vegetation,
Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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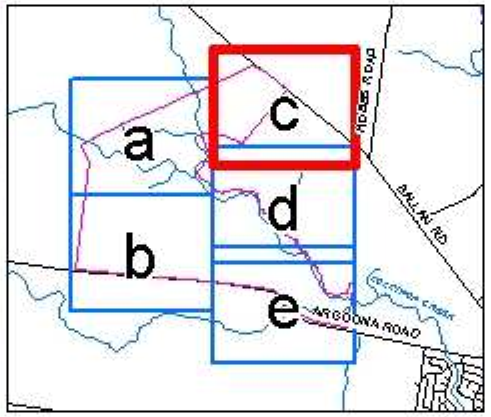

Legend

Scattered Trees (AECOM 2010)

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

EPBC listed communities

- EPBC Listed Natural Temperate Grassland of the Victorian Volcanic Plain

Native vegetation recorded by AECOM between 2008 & 2010 (AECOM 2010)

- 132_63 Low-rainfall Plains Grassland

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

Figure A4 c
Vegetation,
Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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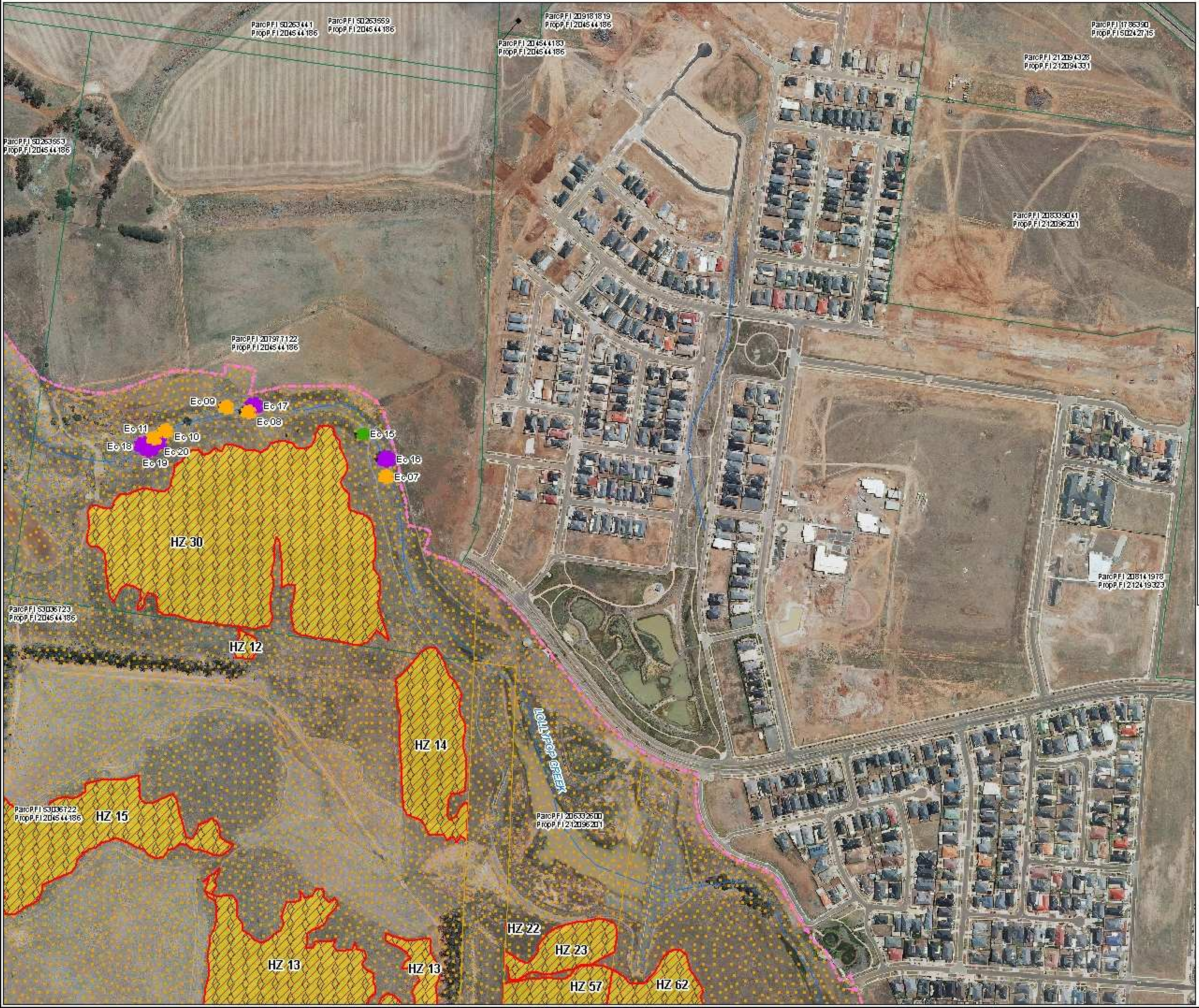

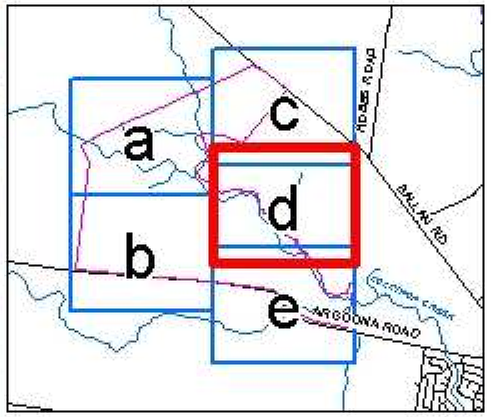

Legend

Scattered Trees (AECOM 2010)

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

EPBC listed communities

- EPBC Listed Natural Temperate Grassland of the Victorian Volcanic Plain

Native vegetation recorded by AECOM between 2008 & 2010 (AECOM 2010)

- 132_63 Low-rainfall Plains Grassland

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
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Al = *Allocasuarina luehmannii*

Figure A4 d
Vegetation,
Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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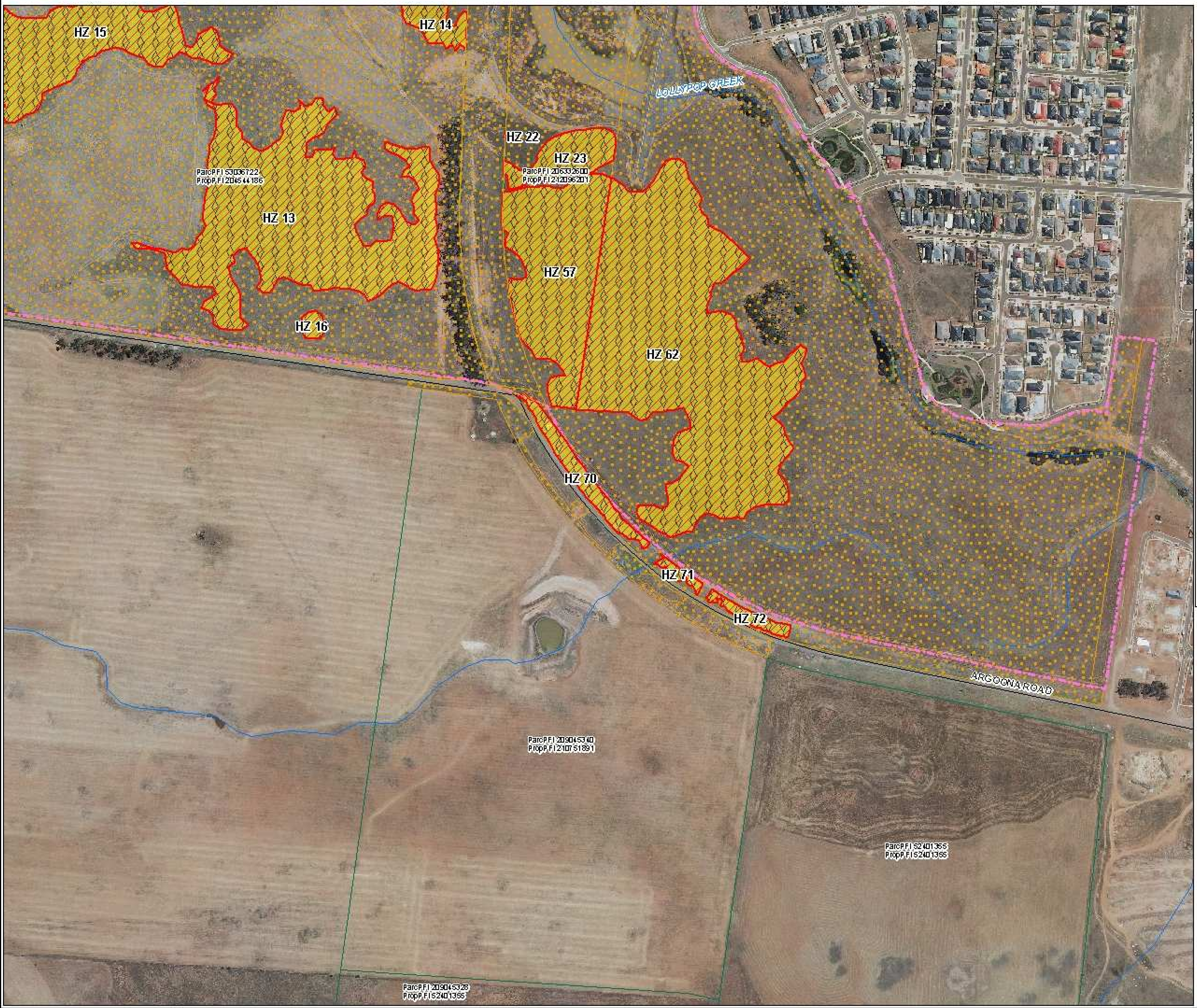

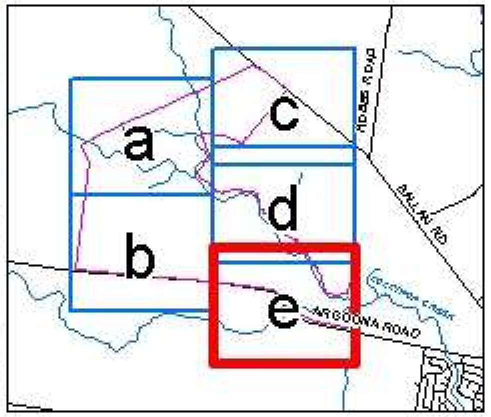

Legend

Scattered Trees (AECOM 2010)

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

EPBC listed communities

- EPBC Listed Natural Temperate Grassland of the Victorian Volcanic Plain

Native vegetation recorded by AECOM between 2008 & 2010 (AECOM 2010)

- 132_63 Low-rainfall Plains Grassland

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

Figure A4 e
Vegetation,
Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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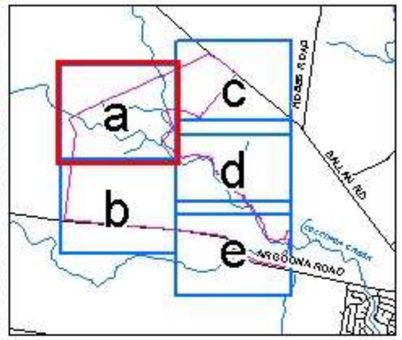

Legend

High Threat Perennial Grassy Weeds Status

- Greater than 25% of the understorey cover = HTPGW
- Less than or equal to 25% of the understorey cover = HTPGW

Vegetation

- Degraded Treeless Vegetation
- Remnant Patch
- PSP 41

Figure A5a: High Threat Perennial Grassy Weeds Status, Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

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Metres

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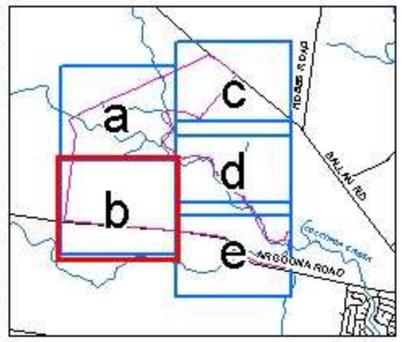

Legend

High Threat Perennial Grassy Weeds Status

- Greater than 25% of the understorey cover = HTPGW
- Less than or equal to 25% of the understorey cover = HTPGW

Vegetation

- Degraded Treeless Vegetation
- Remnant Patch
- PSP 41

Figure A5b: High Threat Perennial Grassy Weeds Status, Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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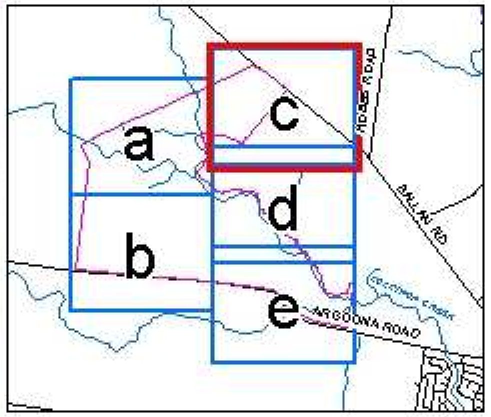

Legend

High Threat Perennial Grassy Weeds Status

- Greater than 25% of the understorey cover = HTPGW
- Less than or equal to 25% of the understorey cover = HTPGW

Vegetation

- Degraded Treeless Vegetation
- Remnant Patch
- PSP 41

Figure A5c: High Threat Perennial Grassy Weeds Status, Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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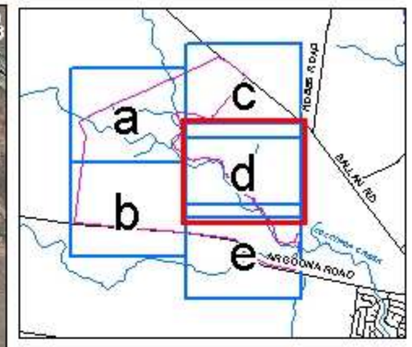

Legend

High Threat Perennial Grassy Weeds Status

- Greater than 25% of the understorey cover = HTPGW
- Less than or equal to 25% of the understorey cover = HTPGW

Vegetation

- Degraded Treeless Vegetation
- Remnant Patch
- PSP 41

Figure A5d: High Threat Perennial Grassy Weeds Status, Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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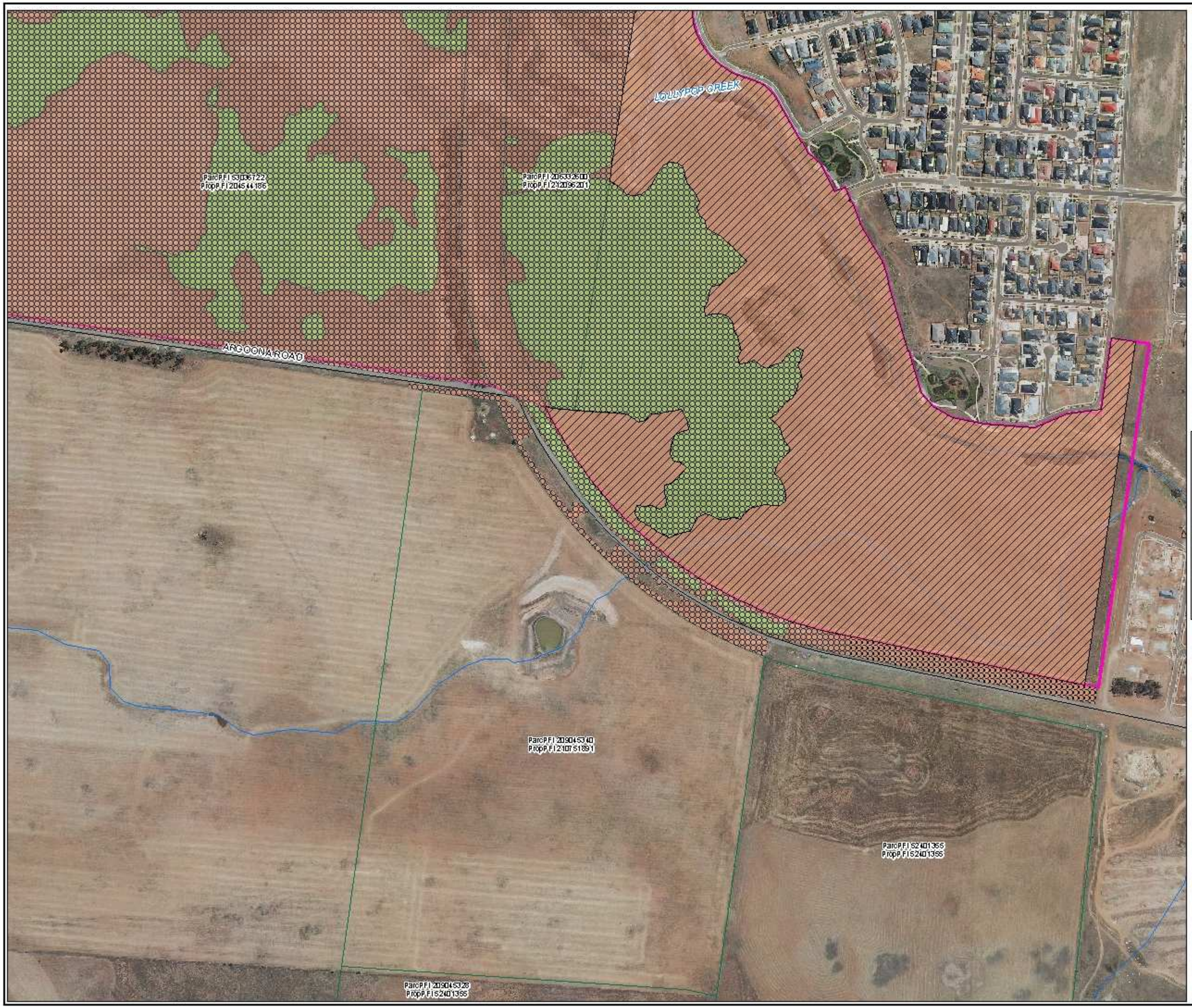

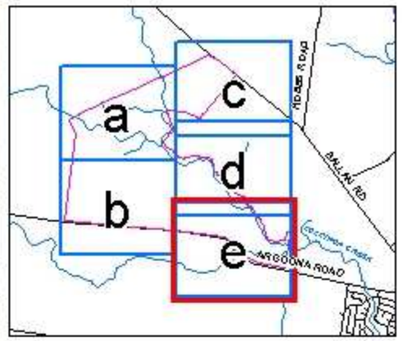

Legend

High Threat Perennial Grassy Weeds Status

- Greater than 25% of the understorey cover = HTPGW
- Less than or equal to 25% of the understorey cover = HTPGW

Vegetation

- Degraded Treeless Vegetation
- Remnant Patch
- PSP 41

Figure A5e: High Threat Perennial Grassy Weeds Status, Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

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Metres

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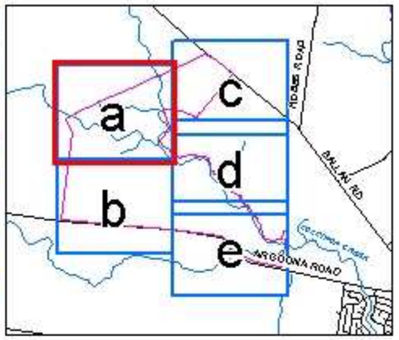

Legend

Scattered Trees (AECOM 2010)

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

Conservation significance

- Very High

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

Figure A6a: Conservation significance of habitat zones according to the Native Vegetation Framework (NRE 2002), Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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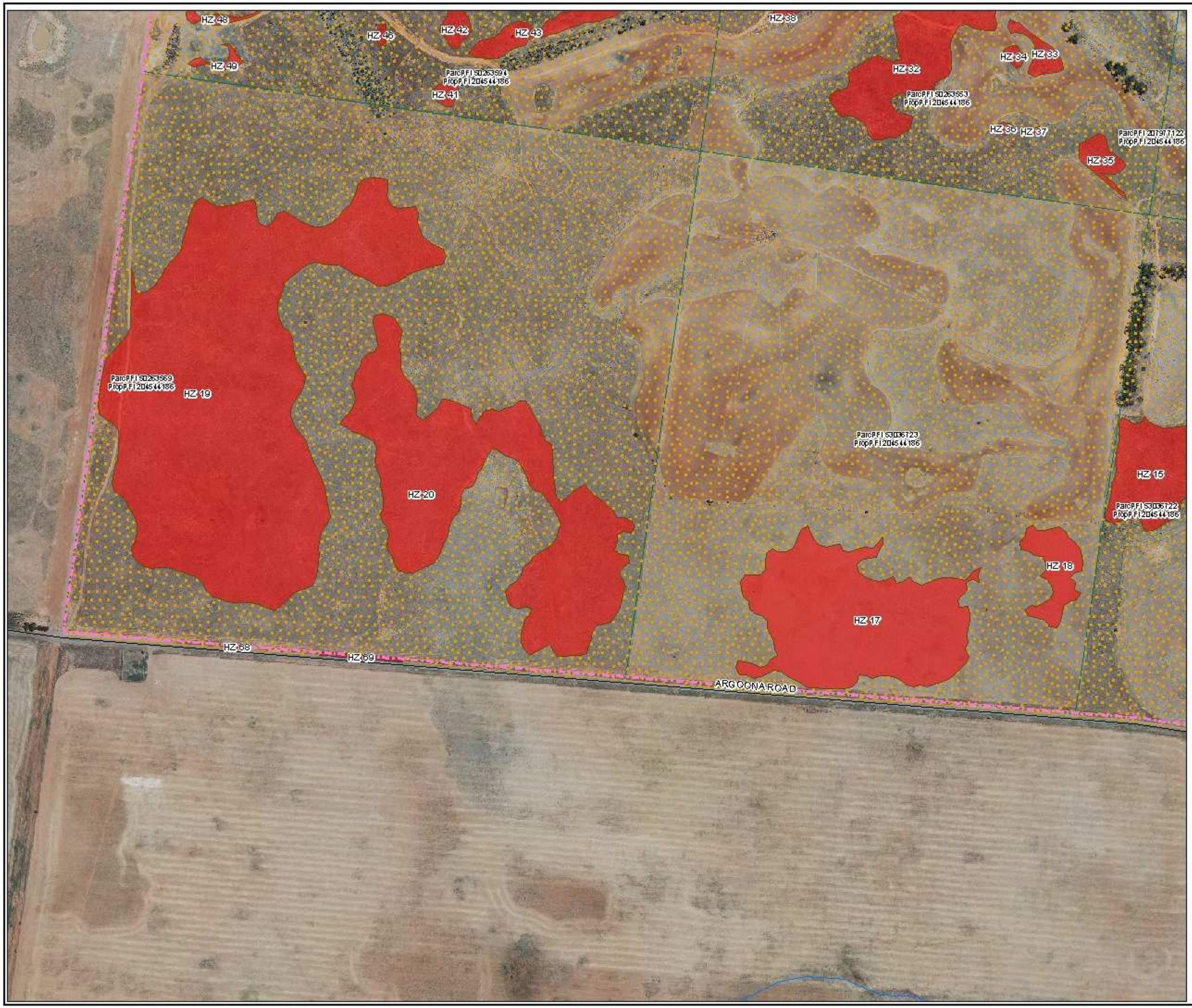

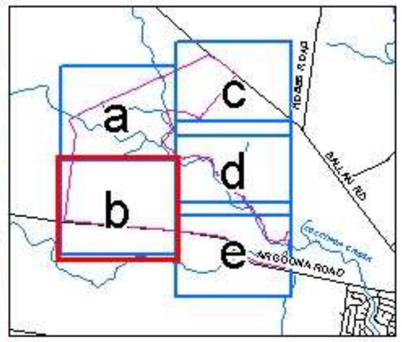

Legend

Scattered Trees (AECOM 2010)

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

Conservation significance

- Very High

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

Figure A6b: Conservation significance of habitat zones according to the Native Vegetation Framework (NRE 2002), Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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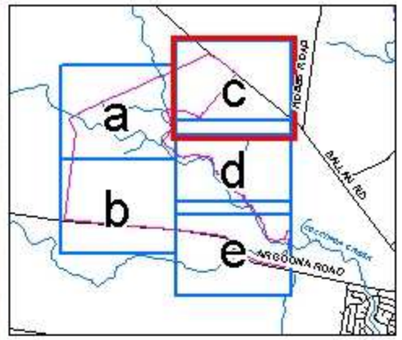

Legend

Scattered Trees (AECOM 2010)

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

Conservation significance

- Very High

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

Figure A6c: Conservation significance of habitat zones according to the Native Vegetation Framework (NRE 2002), Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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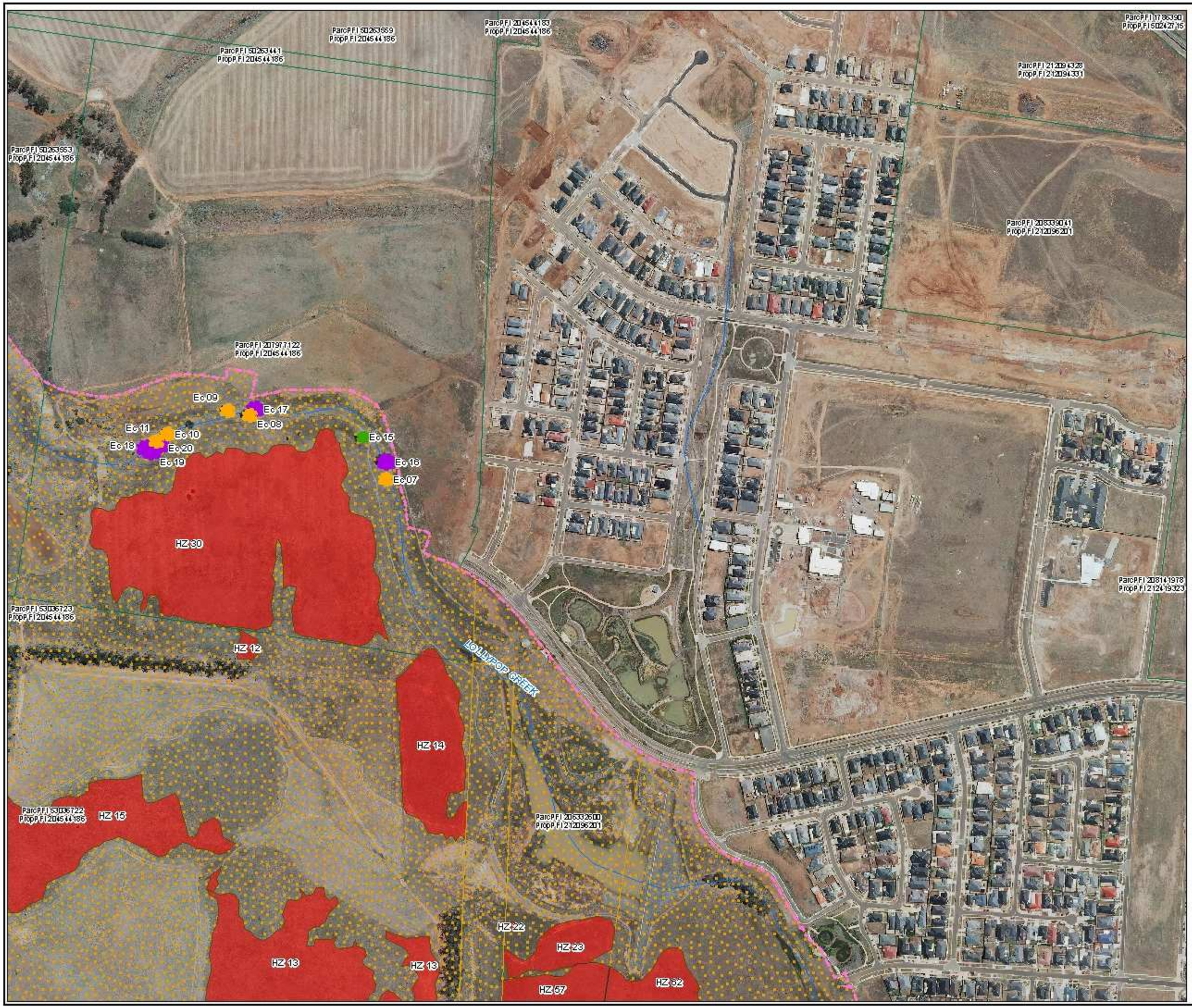
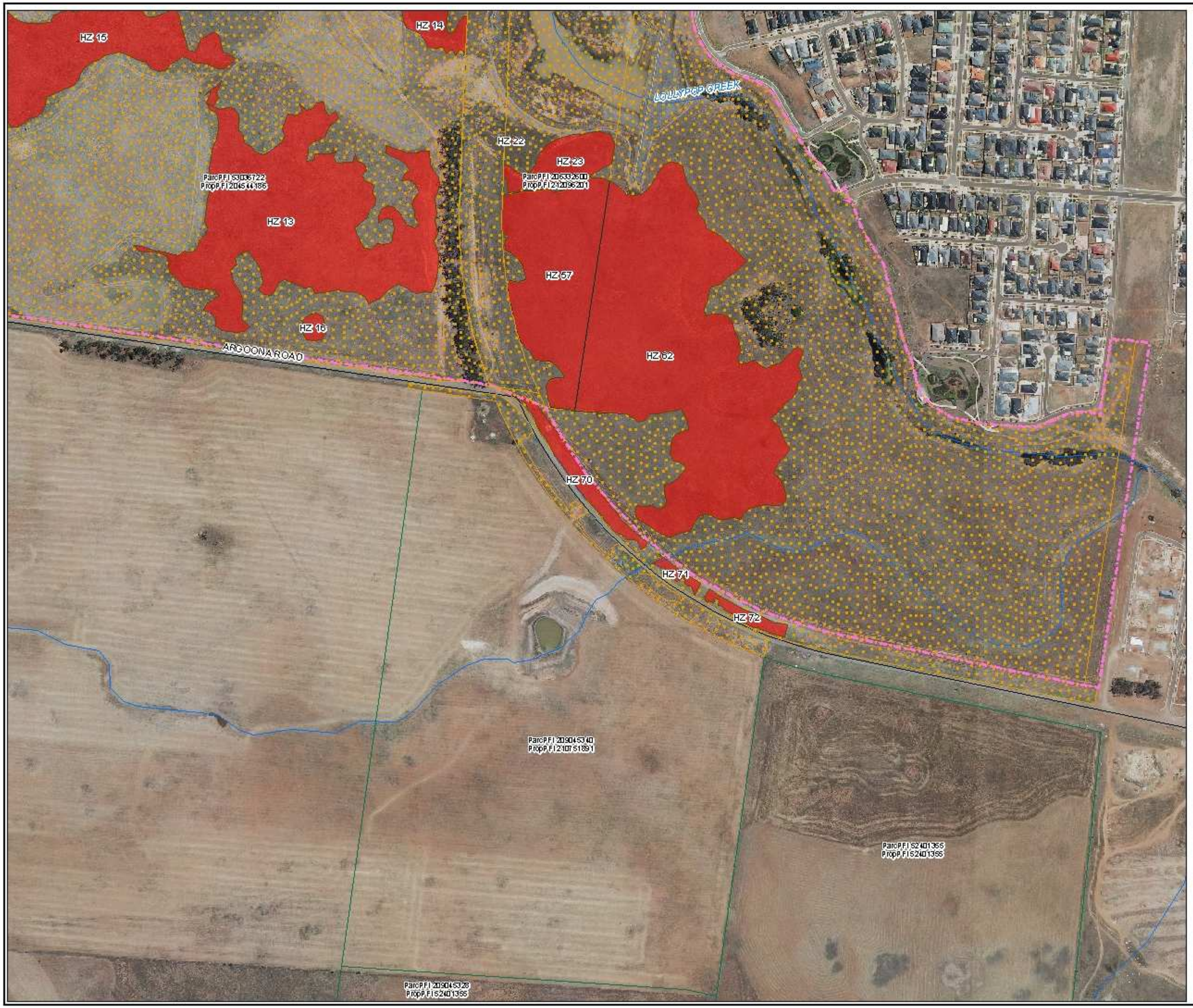
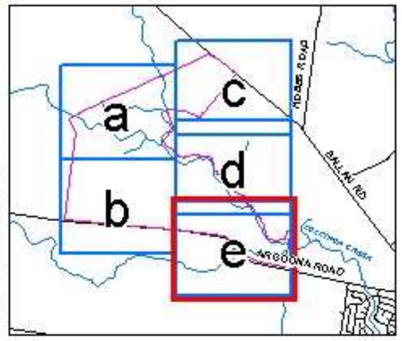


Figure A6d: Conservation significance of habitat zones according to the Native Vegetation Framework (NRE 2002), Manor Lakes PSP 41





Legend

Scattered Trees (AECOM 2010)

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

Conservation significance

- Very High

Other vegetation

- Degraded Treeless Vegetation
- PSP 41

Ec = *Eucalyptus camaldulensis*
Em = *Eucalyptus microcarpa*
Al = *Allocasuarina luehmannii*

Figure A6e: Conservation significance of habitat zones according to the Native Vegetation Framework (NRE 2002), Manor Lakes PSP 41

N

VicGrid GDA94
1:5,000 at A3

0 25 50 100 150 200 250
Metres

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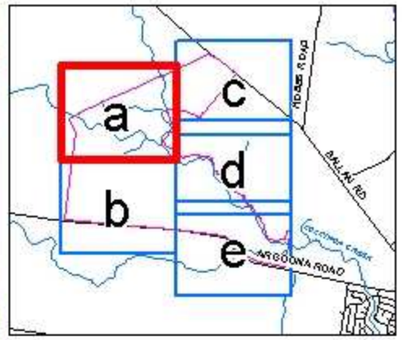

Legend

Fauna habitat

- Grassland –rocky
- Pasture/crop – not rocky
- Pasture/crop – rocky
- Planted Vegetation
- Remnant tree
- Rock walls/piles
- Shrubland/Escarpment Shrubland
- Wetland/watercourse

Plains Wanderer Habitat

- Potential

Striped Legless Lizard Habitat

- Potential

Growling Grass Frog Habitat

- Potential

Golden Sun Moth Habitat

- Known
- Potential
- PSP 41

Figure A7a: Fauna Habitat, PSP 41

N

GDA 94 Zone 55
1:5000 at A3

0 125 250
Meters

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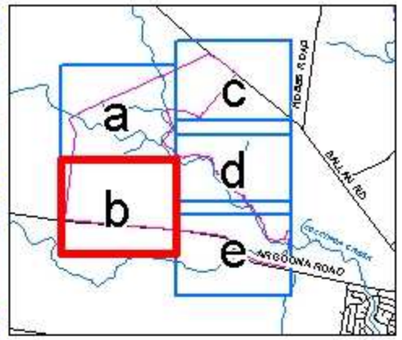

Legend

Fauna habitat
- Grassland –rocky
- Pasture/crop – not rocky
- Pasture/crop – rocky
- Planted Vegetation
- Remnant tree
- Rock walls/piles
- Shrubland/Escarpment Shrubland
- Wetland/watercourse

Plains Wanderer Habitat
- Potential

Striped Legless Lizard Habitat
- Potential

Growling Grass Frog Habitat
- Potential

Golden Sun Moth Habitat
- Known
- Potential
- PSP 41

Figure A7b: Fauna Habitat, PSP 41

N

GDA 94 Zone 55
1:5000 at A3

0 125 250
Meters

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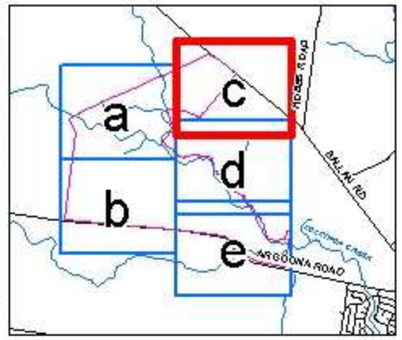

Legend

Fauna habitat

- Grassland –rocky
- Pasture/crop – not rocky
- Pasture/crop – rocky
- Planted Vegetation
- Remnant tree
- Rock walls/piles
- Shrubland/Escarpment Shrubland
- Wetland/watercourse

Plains Wanderer Habitat

- Potential

Striped Legless Lizard Habitat

- Potential

Growling Grass Frog Habitat

- Potential

Golden Sun Moth Habitat

- Known
- Potential
- PSP 41

BALLAN ROAD

ParcPFI 5024691
PropP FI 5024271 5

ParcPFI 5026 3508
PropP FI 2045 44 186

ParcPFI 1785390
PropP FI 5024271 5

ParcPFI 2091818 19
PropP FI 2045 44 186

ParcPFI 5026 3559
PropP FI 2045 44 186

ParcPFI 2045 44 183
PropP FI 2045 44 186

ParcPFI 5026 3441
PropP FI 2045 44 186

ParcPFI 5026 3553
PropP FI 2045 44 186

ParcPFI 2079771 22
PropP FI 2045 44 186

ParcPFI 2120943 28
PropP FI 2120943 31

ParcPFI 2083390 41
PropP FI 2120962 01

Figure A7c: Fauna Habitat, PSP 41

N

GDA 94 Zone 55
1:5000 at A3

0 125 250

Meters

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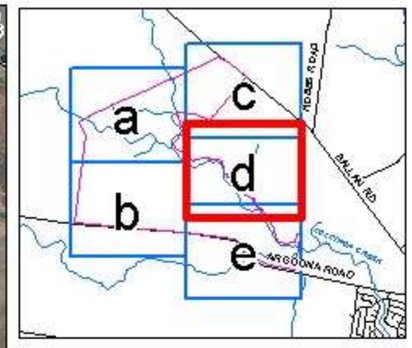

Legend

Fauna habitat

- Grassland –rocky
- Pasture/crop – not rocky
- Pasture/crop – rocky
- Planted Vegetation
- Remnant tree
- Rock walls/piles
- Shrubland/Escarpment Shrubland
- Wetland/watercourse

Plains Wanderer Habitat

- Potential

Striped Legless Lizard Habitat

- Potential

Growling Grass Frog Habitat

- Potential

Golden Sun Moth Habitat

- Known
- Potential

PSP 41

Figure A7d Fauna Habitat, PSP 41

N

GDA 94 Zone 55
1:5000 at A3

0 125 250
Meters

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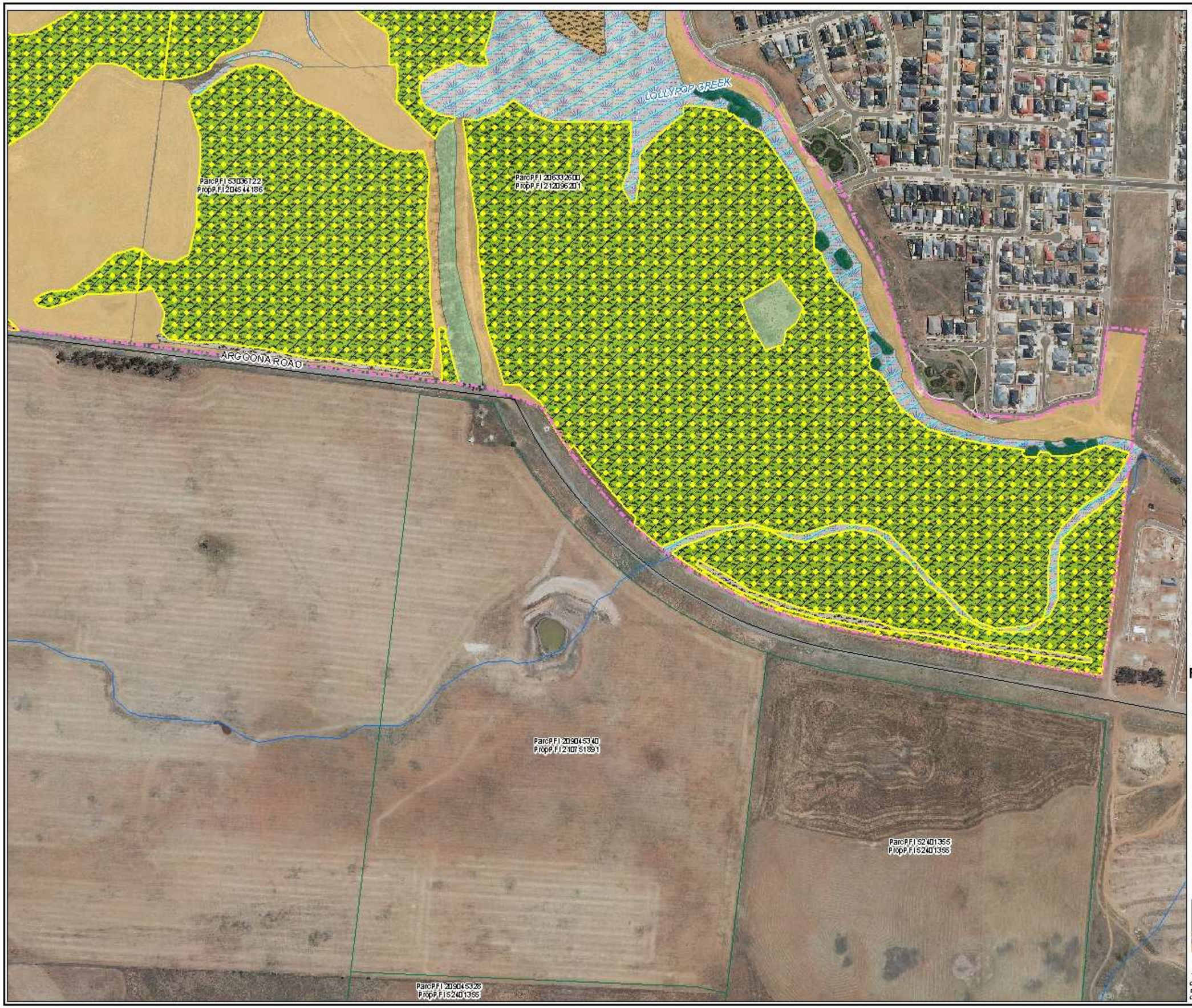

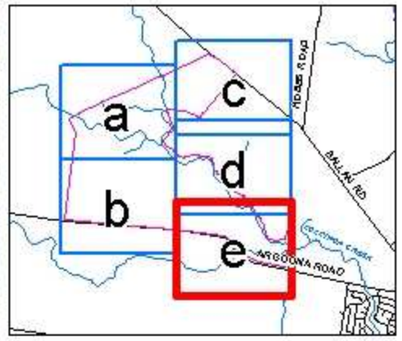

Legend

Fauna habitat
- Grassland –rocky
- Pasture/crop – not rocky
- Pasture/crop – rocky
- Planted Vegetation
- Remnant tree
- Rock walls/piles
- Shrubland/Escarpment Shrubland
- Wetland/watercourse

Plains Wanderer Habitat
- Potential

Striped Legless Lizard Habitat
- Potential

Growling Grass Frog Habitat
- Potential

Golden Sun Moth Habitat
- Known
- Potential
- PSP 41

Figure A7e: Fauna Habitat, PSP 41

N

GDA 94 Zone 55
1:5000 at A3

0 125 250
Meters

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