ecology & heritage partners

Final report

Flora and Fauna Assessment of the Williams Landing Conservation Reserves, Williams Landing, Victoria

Prepared for

Cedar Woods Properties Limited

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Ecology and Heritage Partners Pty Ltd

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GLOSSARY

Acronym	Description
AVW	Atlas of Victorian Wildlife
CALP	*Catchment and Land Protection Act 1994*
CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authority
CMP	Conservation Management Plan
DBH	Diameter at Breast Height
DTV	Degraded Treeless Vegetation
DEPI	Victorian Department of Environment and Primary Industries
DPCD	Victorian Department of Planning and Community Development
EES	Environment Effects Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988*
FIS	Flora Information System
HabHa	Habitat Hectare
MinTV	Minor Treeless Vegetation
ModTV	Modified Treeless Vegetation
MOT	Medium Old Tree
NES	National Environmental Significance
PMST	Protected Matters Search Tool (DoE)
DoE	Department of Environment
TRZ	Tree Retention Zone
VBA	Victorian Biodiversity Atlas (DEPI)
VLOT	Very Large Old Tree

SUMMARY

Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by Cedar Woods Properties Limited on behalf of Galaway Holdings, to conduct a Flora and Fauna Assessment, and desktop analysis of previous literature and monitoring reports associated with the Williams Landing Conservation Reserves, Williams Landing, Victoria. The assessment was undertaken as part of an investigation by Galaway Holdings to pursue the possibility of overturning the existing conservation agreement for Reserves A & B, based on the provision that additional development rights should be granted for the site as a result of the evolving residential infrastructure and consumer demand in the greater Williams Landing area.

Methods

A field assessment was undertaken on 21 March 2014 to obtain information on terrestrial flora and fauna values within the reserves. A habitat hectare assessment was undertaken in conjunction with the flora survey. Vegetation within the reserves was assessed according to the habitat hectare methodology, which is described in the Vegetation Quality Assessment Manual.

Results

Flora

Sixty-seven flora species (38 indigenous and 29 non-indigenous) were recorded within the reserves during the field assessment. The total includes two nationally significant flora species, Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* and Large-headed Fireweed *Senecio macrocarpus* and one State listed flora species Basalt Podolepis. Both remnant and translocated Spiny Rice-flower and Large-headed Fireweed individuals were recorded within the reserves.

Fauna

Thirty fauna species were recorded within the reserves during the field assessment, including: three introduced mammals, 26 birds (22 native, four introduced) and two native reptiles. No significant fauna species were recorded during the site assessment; however there is potential habitat within the reserves for fauna species of National (Striped Legless Lizard *Delma impar*, Golden Sun Moth *Synemon plana* and Growling Grass Frog *Litoria raniformis*), State (Tussock Skink *Pseudemoia pagenstecheri*) and Regional (Fat-tailed Dunnart *Sminthopsis crassicaudata*) conservation significance.

Communities

Vegetation within the reserves was consistent with the diagnostic characteristics and condition thresholds for one ecological community of national conservation significance (Natural Temperate Grassland of the Victorian Volcanic Plain) and one community of State conservation significance (Western [Basalt] Plains Grassland).

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act - Federal)

There is a possibility that the Conservation Agreement pertaining to Reserves A and B may be terminated between the Commonwealth Environment Minister and Galaway Holdings Pty Ltd in accordance with subsection 308(3) of the EPBC Act. However, a referral to the Commonwealth Environment Minister would

be required for any proposed action that would impact the reserves (including modification or termination of the agreement) which is not in accordance with the Conservation Management Plan (Biosis 1998). Five species listed under the EPBC Act (Spiny Rice-flower, Large-headed Fireweed, Golden Sun Moth, Striped Legless Lizard and Growling Grass Frog) have previously been recorded within the reserves. However, Growling Grass Frog habitat is restricted to Reserve C, which is not proposed to be disturbed. While it is considered unlikely that there would be a significant impact to Golden Sun Moth and Striped Legless Lizard, or to critical habitat for either species, the significant impact thresholds for Spiny Rice-flower would be breached as a result of any proposed changes to Reserves A and B.

Targeted surveys would be required to further determine the exact distribution and abundance of all relevant matters of National Environmental Significance. Furthermore, any proposals for the translocation of significant species will require referral to the DEPI Translocation Evaluation Panel (TEP), and any proposal for the translocation of Spiny Rice-flower also requires referral to the Pimelea spinescens Recovery Team (PsRT).

Flora and Fauna Guarantee Act 1988 (FFG Act - Victoria)

One FFG listed community was recorded (Western [Basalt] Plains Grassland Community), and there is suitable habitat within the reserves for several species listed or protected under the FFG Act. However, the reserves are privately owned, as such a permit under the FFG Act is not required.

Environment Effects Act 1978 (Victoria)

DEPI should be consulted as to whether the proposed removal of vegetation is likely to trigger an EES.

Planning and Environment Act 1987

A Planning Permit from Wyndham City Council is required to clear and/or disturb any native vegetation within the reserves.

Other Legislation and Policy

The offset requirements for native vegetation removal as prescribed by the State's native vegetation policy, *Native Vegetation Permitted Clearing Regulations: Biodiversity Assessment Guidelines*, have not been calculated as part of this report, as the Department of Environment and Primary Industries (DEPI), at the time of writing this report, have not released all of the information required to accurately determine offset obligations. All data is required to be submitted to the Department of Environment and Primary Industries in order to determine offset requirements.

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CONTENTS

1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by Cedar Woods Properties Limited on behalf of Galaway Holdings, to conduct a flora and fauna assessment, and desktop analysis of previous literature and monitoring reports associated with the Williams Landing Conservation Reserves, Williams Landing, Victoria. The assessment was undertaken as part of an investigation by Galaway Holdings to pursue the possibility of overturning the existing conservation agreement for Reserves A & B, based on the provision that additional development rights should be granted for the site as a result of the evolving residential infrastructure and consumer demand in the greater Williams Landing area.

The flora and fauna assessment was required to provide up to date information on the current state and condition of the reserves, including the quantity and quality of remnant native vegetation (i.e. habitat hectare analysis) as this process has never been completed for the three conservation reserves. A habitat hectare analysis is required for any proposal to remove greater than one hectare of remnant vegetation in accord with the requirements of Clause 52.17 of the City of Wyndham Planning Provisions.

The following report presents the results of both the desktop study and the flora and fauna assessment, and discusses the potential ecological and legislative implications associated with any proposed future changes to the reserves.

1.2 Scope and Objectives

The objectives of the flora and fauna assessment were to:

- Review the relevant flora and fauna databases and available literature;
- Conduct a site assessment to identify flora and fauna values within the reserves;
- Conduct a habitat hectare analysis of areas of remnant vegetation as per the VQA method (DSE 2004);
- Provide maps showing any areas of remnant native vegetation and locations of any significant flora and fauna species, and/or fauna habitat (if present);
- Classify any flora and fauna species and vegetation communities identified or considered likely to occur within the reserves in accordance with Commonwealth and State legislation;
- Identify relevant environmental legislation and policy; and,
- Advise whether any additional flora and/or fauna surveys are required (e.g. targeted surveys for significant flora and fauna species).

1.3 Reserves

The reserves is located at the Williams Landing Conservation Reserves, Williams Landing, Victoria, approximately 20 kilometres south-west of Melbourne's CBD (Figure 1). The site covers three conservation reserves, Reserve A, Reserve B and Reserve C, approximately 9.75 hectares, 9.29 hectares and 36.42 hectares in size, respectively. The reserves are located in close proximity to each other, separated by approximately 50-150 metres (Figure 1).

The three reserves are privately owned by Galaway Holdings and were established by the Department of Defence, prior to the sale of the RAAF base and the eventual rezoning of the land for residential development. The reserves include nationally significant flora species, some of which were translocated from adjacent areas of land recently zoned for residential development.

According to the Department of Environment and Primary Industries (DEPI) Biodiversity Interactive Map (DEPI 2014a), the reserves occurs within the Victorian Volcanic Plains bioregion. The reserves is located within the jurisdiction of the Port Phillip and Western Port Catchment Management Authority (CMA) and the municipality of Wyndham City Council. Section 7.4.1 discusses zoning and overlays relevant to the reserves.

2 METHODS

2.1 Nomenclature

Common and scientific names of vascular plants follow the Victorian Biodiversity Atlas (VBA) (DEPI 2014a) and the Census of Vascular Plants of Victoria (Walsh and Stajsic 2007). Vegetation community names follow DEPI's Ecological Vegetation Classes (EVC) benchmarks (DEPI 2013a). The names of aquatic and terrestrial vertebrate and invertebrate fauna follow the VBA (DEPI 2014a).

2.2 Desktop Assessment

Relevant literature, online-resources and numerous databases were reviewed to provide an assessment of flora and fauna values associated with the reserves. The following information sources were reviewed:

- The DEPI Biodiversity Interactive Map (DEPI 2013a) for:
    - Modelled data for remnant vegetation patches, scattered trees and habitat for rare or threatened species;
    - The extent of historic and current EVCs; and,
    - The location of sites of biological significance within the region.
- The VBA (DEPI 2014a), Flora Information System (FIS) (Viridans 2013a) and Atlas of Victorian Wildlife (AVW) (Viridans 2013b) for previously documented flora and fauna records within the project locality;
- The Commonwealth Department of Environment's (DoE) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the EPBC Act (DoE 2014);
- The Victorian Department of Planning and Community Development's (DPCD) Planning Maps Online to ascertain current zoning and environmental overlays (DPCD 2014);
- Aerial photography of the reserves; and,
- Relevant environmental legislation and policies.

2.2.1 Literature Review

A literature review was undertaken as part of the desktop analysis to summarise the results of previous ecological surveys and ongoing monitoring works for significant flora and fauna species and ecological communities within the Williams Landing Conservation Reserves. The review focuses on previous survey methods and survey effort for significant species, as well as the survival rates of remnant, planted and translocated flora species throughout Reserves A, B and C. Actions associated with the management of the reserves (e.g. biomass reduction/prescribed burns, pest animal and weed control) are noted where appropriate, but do not provide the basis of the literature review.

The following reports were examined as part of the literature review:

- Biosis Research Pty Ltd 1997 (August). A Conservation Management Plan for three rare species reserves RAAF Williams, Laverton.

- Ecology Australia Pty Ltd 1998 (March). A review of the Biosis Research Pty Ltd Plan for Rare Species Reserves, RAAF Williams Laverton.
- Biosis Research Pty Ltd 1998 (May). A Conservation Management Plan for three rare species reserves RAAF Williams, Laverton.
- Mueck, S. 2000. The distribution of Small Golden Moths *Diuris basaltica* at Westpoint Business Park.
- Ecology Australia Pty Ltd 2004 (March). Re: Former Laverton Airfield - Striped Legless Lizard salvage during archaeological surveys works.
- Cedar Woods Properties Limited 2005 (August). Salvage plan for rare and threatened species on the Laverton Airfield site
- Practical Ecology Pty Ltd 2006 (December). Conservation Management Plan for Grassland and Wetland Reserves at Laverton.
- Practical Ecology Pty Ltd 2006 (March). Laverton Airfield Reserves Monitoring Report.
- Practical Ecology Pty Ltd 2007 (September). Draft Williams Landing Salvage Plan 2007. Central Precinct and Infrastructure Corridor.
- Practical Ecology Pty Ltd 2008 (March). Flora and fauna salvage - Williams Landing Stages 1 and 2 Progress Report.
- Practical Ecology Pty Ltd 2008 (May). Williams Landing (Laverton Airfield) Reserves Monitoring Data & Analysis & Annual Report.
- Practical Ecology Pty Ltd 2009 (July). Williams Landing Reserves Monitoring and Annual Report.
- Practical Ecology Pty Ltd 2010 (July). Williams Landing Reserves Monitoring and Annual Report.
- Practical Ecology Pty Ltd 2011 (May). Annual Report and Monitoring Report for Williams Landing Conservation Reserves.
- Practical Ecology Pty Ltd 2012 (June). Annual Report and Monitoring Report for Williams Landing Conservation Reserves.
- Practical Ecology Pty Ltd 2013 (May). Annual Report and Monitoring Report for Williams Landing Conservation Reserves.
- Practical Ecology Pty Ltd 2014 (April). Annual Report and Monitoring Report for Williams Landing Conservation Reserves.

2.3 Flora Assessment

A flora assessment was undertaken on 21 March 2014 to obtain information on terrestrial flora values within the reserves. The entire reserves was walked, with all observed flora species recorded, any significant records mapped and the overall condition of vegetation noted.

EVCs were determined with reference to DEPI pre-1750 and extant (2005) EVC mapping and their published descriptions (DEPI 2013b). The significance assessment criteria of taxa and vegetation communities are presented below (Appendix 1).

2.4 Fauna Assessment

A fauna assessment was undertaken on 21 March 2014 to obtain information on terrestrial fauna values within the reserves. The reserves was visually assessed and active searching under and around ground debris for reptiles, frogs and small mammals was undertaken. Binoculars were also used to scan the area for birds, and observers listened for calls and searched for other signs of fauna such as nests, remains of dead animals, droppings and footprints. Potential habitat for fauna was assessed, with a particular emphasis on habitats that may provide shelter, food or other resources for significant species.

2.5 Permitted Clearing of Native Vegetation - Biodiversity Assessment Guidelines

In December 2013 the Victorian Government integrated the *Native Vegetation Permitted Clearing Regulations - Biodiversity Assessment Guidelines* (The Guidelines) (DEPI 2013c) into the Victorian Planning Provisions, replacing the Framework (NRE 2002). The keystone of the new regulations is a Risk-based Assessment, with all proposals involving the removal of vegetation to be assessed through one of three risk-based pathways (Low, Moderate or High) (Table 1), and the three-step process of 'avoid, minimise and offset' variable depending on the applicable pathway. Risk pathways are dependent on the location and extent of clearing proposed.

2.5.1 Risk-based Pathway

The planning system manages the impacts on biodiversity from native vegetation removal using a risk-based approach. Two factors – extent risk and location risk – are used to determine the risk associated with an application for a permit to remove native vegetation (Table 1). The extent risk is determined by the extent of native vegetation (in hectares) or the number of scattered trees that are proposed to be removed. The location risk (A, B or C) has been determined for all areas in Victoria and is available on DEPI's Native Vegetation Information Management (NVIM) Tool (DEPI 2014b). The risk-based pathway is determined by combining the extent risk and the location risk of the vegetation to be removed (Table 1). If the risk pathway for vegetation differs to that for scattered trees, the higher of the two options must be applied.

Table 1. Risk-based pathways for applications to remove native vegetation (DEPI 2013c)

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

* For the purpose of determining the risk-based pathway of an application to remove native vegetation the extent includes any other native vegetation that was permitted to be removed on the same contiguous parcel of land with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before and application to remove native vegetation is lodged.

2.5.2 Vegetation Assessment

The 'habitat hectare' is a unit of measurement which combines the condition and extent of native vegetation. The methodology for undertaking a habitat hectare assessment is described in the Vegetation Quality Assessment Manual (DSE 2004) and summarised in Table 2. Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'. Under the Biodiversity Assessment Guidelines, native vegetation is classified into two categories, remnant patches of native vegetation and scattered trees (Table 2).

For Low Risk pathways:

- The extent (in hectares) of native vegetation is determined by a site assessment; and,
- The condition of native vegetation is based on modelled data (although a proponent may commission on-ground assessments), available on DEPI's NVIM Tool (DEPI 2014b).

For Moderate and High Risk pathways:

- Extent (in hectares) and condition score are calculated based on a detailed habitat hectare assessment conducted by a qualified ecologist.

Table 2. Assessment of remnant native vegetation under Moderate and High Risk pathways (DEPI 2013c)

Category	Definition	Extent	Condition
Remnant patch of native vegetation	An area of native vegetation where at least 25 per cent of the total perennial understorey plant cover is native plants. OR An area with three or more native canopy trees where the canopy foliage cover is at least 20 per cent of the area.	Measured in hectares. Based on hectare area of the remnant patch.	Vegetation Quality Assessment Manual (DSE 2004).
Scattered tree	A native canopy tree that does not form part of a patch.	Measured in hectares. Each scattered tree is assigned an extent of 0.071 hectares (30m diameter).	Scattered trees are assigned a default condition score of 0.2.

In accordance with the Biodiversity Assessment Guidelines (DEPI 2013c), a detailed site assessment by a qualified ecologist was undertaken and the following information recorded:

- Site and vegetation information including:
    - The address of the property;
    - Recent photographs of the native vegetation to be removed;
    - Copy of any property vegetation plan that applies to the site and details of any other native vegetation that was permitted to be removed from the site (this may require input from the client).
    - A habitat hectares assessment of the native vegetation within the reserves, in accordance with the Vegetation Quality Assessment Manual (DSE 2004);
- Recommended steps to ensure that impacts on biodiversity from the removal of native vegetation is minimised;

- Maps or plans showing:
    - North point and property boundaries;
    - All areas of native vegetation; and,
    - All scattered trees to be removed.

2.5.3 Avoid and Minimise

Avoid and minimise requirements are summarised in Table 3.

Table 3. Avoid, minimise and offset requirements

Risk Pathway	Avoid	Minimise	Offset
Low	X	X	✓
Moderate	X	✓	✓
High	✓*	✓	✓

*Where native vegetation makes a significant contribution to Victoria's biodiversity

2.5.4 Offset

When the removal of native vegetation has a significant impact on habitat for a rare or threatened species[1], the offset must compensate for the removal of that species' habitat. Offsets are divided into two categories: General and Specific. General offsets are based on the contribution a site makes to biodiversity overall, while Specific offsets consider the contribution a site makes to the persistence of rare or threatened species.

General offsets require an offset multiplier (Risk Factor) of 1.5 with restrictions on location (same Catchment Management Authority boundary or municipal district) and biodiversity value (strategic biodiversity score at least 80% that of the vegetation to be removed). A Specific offset is applied a risk-factor multiplier of 2, with no location or biodiversity value restrictions, and must support habitat for each rare or threatened species for which an offset is required (currently designated by DEPI).

The offset requirements for native vegetation removal as prescribed by the Biodiversity Assessment Guidelines have not been calculated as part of this report as DEPI, at the time of writing, have not released all of the information required to accurately determine offset obligations. All data relating to remnant vegetation is required to be submitted to DEPI who will complete relevant calculations and supply an offset obligation report.

2.6 Assessment Qualifications and Limitations

Data and information held within the ecological databases and mapping programs reviewed in the desktop assessment (e.g. VBA, PMST, Biodiversity Interactive Maps etc.) are unlikely to represent all flora and fauna observations within, and surrounding, the reserves. Although the reserves has been regularly monitored as part of the Conservation Agreement, it is important to acknowledge that a lack of documented records does

[1] Only species listed as 'critically endangered', 'endangered', 'vulnerable' or 'rare' on DEPI's advisory lists (DSE 2005; DSE 2013) for flora and fauna are considered a rare or threatened species.

not necessarily indicate that a particular species or community is absent, but instead may reflect a lack of survey effort.

The flora and fauna assessment was undertaken in early autumn. For species that emerge, flower or are most active outside this season, detection may be reduced. The 'snap shot' nature of a standard flora and fauna assessment reduces the likelihood of mobile, migratory, seasonal, cryptic, nocturnal or uncommon species being detected. Therefore, an absence of such species from the results does not necessarily indicate that these species are not present or do not use the reserves. Generally, targeted or repeated surveys, at specific times of the year, are required to detect such species.

Notwithstanding the above, terrestrial flora and fauna data collected during the field assessment, and information obtained from relevant sources (e.g. biological databases and relevant literature) are considered adequate to provide an accurate assessment of the ecological values within the reserves.

3 LITERATURE REVIEW

3.1 Literature Review

The following section provides a chronological history of the management plans, targeted surveys, translocation and revegetation actions, as well as ongoing monitoring reports and management actions pertaining to each of the three Williams Landing conservation reserves. An overview of the key documents is presented below along with a brief discussion of the key ecological aspects and findings for each reserve. A tabulated summary of the contents of each report is also provided in Appendix 5.

Overarching Conservation Management Plans

The original Conservation Management Plan (CMP) for the three Williams Landing conservation reserves was prepared by Biosis Research Pty Ltd (1997). The plan outlined the specific location and ecological requirements for the reserves and formed part of the contract of sale for the former Royal Australian Airforce (RAAF) Williams Landing site. The CMP was revised in 1998 following the discovery of a population of Basalt Sun-orchid (*Thelymitra* sp. aff. *pauciflora*) (Biosis Research Pty Ltd 1998).

The CMP was reviewed and endorsed by Ecology Australia Pty Ltd (1998). However, the review recommended a number of changes to the CMP such as more modernised vermin control measures and the need for further studies regarding the nationally significant Striped Legless Lizard *Delma impar*.

The CMP was again reviewed and updated in 2006 to refine management actions and revise the action implementation schedules for each of the three reserves (Practical Ecology Pty Ltd 2006).

3.2 Reserve A

3.2.1 Nationally significant species

The following species of national significance are relevant to Conservation Reserve A at Williams Landing:

3.2.1.1 Small Golden Moth *Diuris basaltica*

One Small Golden Moth plant was detected in Reserve A in September 2000 (Mueck 2000). Systematic targeted surveys in both the area of impact for the current Williams Landing estate (Mueck 2000) and also within Reserve A (Smith and Mueck 2000) have failed to detect any further Small Golden Moth plants. Mueck (2000) highlighted the importance of the individual plant in Reserve A as it was considered to be the 'only remaining plant occurring in its natural environment'. Although further targeted surveys for Small Golden Moths have not been conducted, regular monitoring reports contain no reference to this species since the initial detection of a single plant in 2000, and it is likely that this species is now locally extinct.

Likelihood of Significant Impact

There is likely to be no significant impact to this species given that the species is likely to be locally extinct.

3.2.1.2 Spiny Rice-flower *Pimelea spinescens subsp. spinescens*

The original CMP identifies a total of 528 Spiny Rice-flower plants located within the vicinity of Reserve B, although it is unclear how many of these plants occur in Reserve A. Detailed surveys undertaken in Reserve

A located 50 individuals (Smith and Mueck 2000). However, additional monitoring by Practical Ecology identified 70 plants in 2006, 136 plants in 2008 and 131 plants in 2009, suggesting there had been a substantial amount of natural recruitment within Reserve A for approximately 10 years. In contrast, Practical Ecology recorded just 52 plants for the 2010-2011 monitoring period, and records for the Spiny Rice-flower population are absent in recent reports. This sharp decrease in population size from 2009 to 2010 is likely to be an artefact of rapid survey methods, as the ongoing reports shift in focus toward the monitoring of translocated plants, rather than *in-situ* plants.

Forty Spiny Rice-flower plants were translocated into Reserve A as part of the Salvage and Translocation Plan for the Williams Landing conservation reserves (Practical Ecology Pty Ltd 2009). Two recipient sites were used, containing 20 plants each. Four additional plots were also positioned within Reserve A (Grids 15-18) each containing 25 seedlings.

Survivorship has been poor for both translocated individuals and seedlings. Monitoring for the 2013-2014 period reports a survival rate of 20% for the 40 translocated plants and 7% for the 100 seedlings planted within Reserve A (Practical Ecology Pty Ltd 2014). Explanations proposed for the low survival rates included: the susceptibility of undeveloped root systems to dry conditions; clay soils and deep cracks under rapidly drying conditions exposing the growing medium to air; and seedlings being killed by the burrowing of small animals or large insects (Practical Ecology Pty Ltd 2011).

Likelihood of Significant Impact

Any proposal to overturn Reserve A will have a significant impact on Spiny Rice-flower. Impacts would include up to 130 remnant plants, as well as translocated individuals and planted seedlings. Given the poor survival rate of both translocated Spiny Rice-flower plants and seedlings, there is a high risk that further translocation of these individuals (into Reserve C) would significantly impact the overall population.

Assuming a total population of less than 500 plants within Reserves A and B (this figure needs to be confirmed) and a state-wide population of approximately 100,000 individuals, the proposed impact would have an estimated proportional loss of less than 0.5% of the total abundance of SRF.

3.2.1.3 Large-headed Fireweed *Senecio macrocarpus*

A total of 290 Large-headed Fireweed plants were identified within Reserve A in the original CMP, although this was considered to be a conservative estimate (Biosis Research Pty Ltd 1998). Large-headed Fireweed plants appeared to be closely associated with areas dominated by Kangaroo Grass *Themeda triandra*.

Ongoing monitoring of the reserves confirmed that all populations had increased in size by 2006 and by 2009, the population was thought to contain between 550-600 plants (Practical Ecology Pty Ltd 2006; 2009). However, in 2011, the number of plants was estimated at approximately 150 (Practical Ecology Pty Ltd 2011).

Targeted surveys identified a total of 36 Large-headed Fireweed plants outside of Reserves A, B and C, that would be impacted as part of the development of Stages 1 and 2 of the Williams Landing Estate. Seed collection from these plants was subsequently used to grow 400 seedlings for planting into Reserves A and B (Practical Ecology Pty Ltd 2007). An initial total of 2 x 100 seedling plots were created in Reserve A (Grids 3: C7-C8 and Grids 4: C3-C2). The management plan required six hundred Large-headed Fireweed seedlings to be planted overall (Practical Ecology Pty Ltd 2009).

Survival rates for Large-headed Fireweed during the initial 2009-10 monitoring period were low at 37% (Practical Ecology Pty Ltd 2010). However, it should be noted that approximately 100 seedlings were accidently destroyed during an ecological burn and were replaced into an additional survey grid (# 5). A total of 750 seedlings were planted in September 2010 to replace any plants that had died during the previous two monitoring seasons (Practical Ecology Pty Ltd 2011).

Survival rates for the 2011 monitoring period were subsequently much higher with an average of 72% for Reserve A (Grids 3-5). The suggestion was made that only grids with a survival rate greater than 50% may be viable for future management, as grids below this survival rate may be indicative of unsuitable habitat (Practical Ecology Pty Ltd 2011). Survival rates fell from 72% to 43% during the 2011-2012 monitoring period (Practical Ecology Pty Ltd 2012). A revised management action suggested that the replacement of any dead seedlings should occur in conjunction with an appropriate fire regime to reduce biomass. The revised management method appeared to stabilise the population, as survival rates were documented at 43% in December 2012 and 45% in February 2013. Only Grid 6 was monitored in 2014, with a survival rate of 40% (Practical Ecology Pty Ltd 2014).

Likelihood of Significant Impact

Any proposal to overturn Reserve A will have a significant impact on the current Large-headed Fireweed population, although it will not have a significant impact on the overall habitat extent for this species. Large-headed Fireweed is relatively easy to propagate and can be successfully reintroduced into suitable recipient sites with an appropriate management regime.

3.2.1.4 Striped Legless Lizard *Delma impar*

Habitat for Striped Legless Lizard is limited within Reserve A as it has been subject to historical rock removal and ongoing slashing for at least 50 years (Biosis Reserch Pty Ltd 1998). However, areas dominated by Kangaroo Grass *Themeda triandra* are considered to provide suitable habitat for Striped Legless Lizard and one record exists for the species in Reserve A, although details regarding the detection method are unclear (Biosis Reserch Pty Ltd 1998).

Salvage and translocation was undertaken during archaeological surveys in 2004 which involved the ripping and scraping of 11 transects outside Reserves A, B and C; however, no Striped Legless Lizard were detected (Ecology Australia Pty Ltd 2004).

Further salvage and translocation was undertaken during the implementation of Stages 1 and 2 of the adjacent development in 2007 (Practical Ecology Pty Ltd 2007). Salvage activities focused on the scraping of top-soil in areas dominated by native vegetation (i.e. Spear-grasses *Austrostipa* spp. and Wallaby-grasses *Rytidosperma* spp.). Salvage precautions involved the presence of three zoologists monitoring the grading of vegetation over a single day in order to detect the species. No Striped Legless Lizard was detected during these operations.

Further salvage and translocation was undertaken in 2009 for Stages 3–7 using a similar method of scraping and ripping topsoil layers. No Striped Legless Lizard were detected, however, four state listed Tussock Skink *Pseudemoia pagenstecheri* were salvaged and relocated into Reserve A.

The use of tile grids for the detection of Striped Legless Lizard was not undertaken within any of the three conservation reserves until 2007. A single tile grid (10 x 5) was laid in both Reserves A and B in 2007 and with an additional grid installed in 2009. Tile grids were placed in areas of high quality to annually monitor

reptile and small mammal species (Practical Ecology Pty Ltd 2007; 2009). Monitoring during 2009 identified two Striped Legless Lizard skins within Reserve A, which were later confirmed by Dr Megan O'Shea (an expert on Striped Legless Lizard).

Further tile checks are documented for 17th December 2010 and 15th January 2013, with no individuals detected (Practical Ecology Pty Ltd 2011; 2013) No fauna surveys were undertaken during the 2011-2012 and 2013-2014 monitoring periods.

Likelihood of Significant Impact

Given that three previous records are documented for Striped Legless Lizard within Reserve A and suitable habitat for the species is also present, it is possible that any future proposal to disturb Reserve A may have a significant impact on Striped Legless Lizard. While there have been several targeted surveys and salvage efforts (via ripping and tyning) outside of the current reserve system as part of Stages 1 and 2 of the current Williams Landing Estate (including within Reserve A & B), the overall survey effort for Striped Legless Lizard within the three conservation reserves appears to have been relatively low. Tile grids were typically checked outside the recommended time of year (September to October) and also infrequently (only two documented tile grid checks between 2010 and 2013). Despite evidence of historical rock removal, Striped Legless Lizard may still reside within Reserve A (albeit at low densities).

3.2.1.5 Golden Sun Moth *Synemon plana*

One female Golden Sun Moth was detected within Reserve A in 2009 (Practical Ecology Pty Ltd 2009). Additional surveys for Golden Sun Moth within Reserves A appear to be restricted to a single day (22 December 2010). No individuals were detected. No further surveys for Golden Sun Moth were undertaken.

Likelihood of Significant Impact

One previous record for Golden Sun Moth exists within Reserve A. Based on the low level of targeted survey effort for this species, it is possible that any proposal to disturb remnant vegetation (especially areas dominated by Wallaby Grass) within Reserve A may have a significant impact on Golden Sun Moth. However, the lack of additional records for this species (prior to 2009) and in the intervening years of management and monitoring, suggests that any proposal to impact remnant vegetation within Reserve A is unlikely to have a significant impact on Golden Sum Moth. Furthermore, the proposed action is not expected to have a significant impact on critical habitat for Golden Sun Moth.

3.2.2 State Listed Species

The following matters of State significance are relevant to conservation Reserve A:

3.2.2.1 Basalt Podolepis *Podolepis sp. 1*

Reserve A was originally documented as having one of the largest known populations of Basalt Podolepis *Podolepis* sp. 1, with an estimated 15,000 plants (Biosis Research Pty Ltd 1998). Basalt Podolepis was thought to be spreading within Reserve A and was documented in over 70% of grid cells in 2005/06 (Practical Ecology Pty Ltd 2006). However, the species remained in only 25% of grid cells during the 2008/09 monitoring period (Practical Ecology Pty Ltd 2009).

Basalt Podolepis is not discussed within monitoring reports between 2010-2014 (Practical Ecology Pty Ltd 2011; 2012; 2013; 2014).

Likelihood of Significant Impact

The lack of recent monitoring data for Basalt Podolepis makes it is difficult to estimate the current population size within Reserve A, and therefore the level of impact to the species. However, survey results during the current assessment, regularly observed the senescent flower stalks of Basalt Podolepis throughout Reserve A, therefore it is highly likely that the species persists in relatively high numbers and that any proposal to disturb remnant vegetation within Reserve A will have a significant impact on the species. The impact associated with the proposed removal of Basalt Podolepis habitat within Reserve A would lead to a proportionally low impact on a population national level.

3.2.2.2 Basalt Sun-orchid *Thelymitra* sp. aff. *pauciflora* [Basalt Plains]

In 1998, Reserve A was found to support approximately 200 Basalt Sun-orchid individuals (Biosis Research Pty Ltd 1998). A further six Basalt Sun-orchids were located during pre-clearance targeted surveys relating to Stages 1 and 2, and were translocated (to Reserve B) during summer in 2007/2008 (Practical Ecology Pty Ltd 2007).

No further records are apparent for Basalt Sun-orchid in any of the monitoring or salvage reports beyond 2007. However, recommendations were made in 2009 for ongoing monitoring as it was considered possible that the population had moved into a dormant phase due to continued drought conditions (Practical Ecology Pty Ltd 2009).

Several specimens of Short Sun-orchid *Thelymitra exigua* (syn. *Thelymitra* sp. aff. *nuda*) were also detected in Reserve A during 2005/06 monitoring (Practical Ecology Pty Ltd 2006). However, a follow up survey on 30 October 2006 failed to positively relocate the population.

Likelihood of Significant Impact

Several targeted surveys have been undertaken by Practical Ecology Pty Ltd for this species (more recently over the past 3 years) and it is likely that the population has become locally extinct. Although it is acknowledged that the Basalt Sun-orchid is highly cryptic and may persist via underground tubers for extended periods of time, it is considered unlikely that the population would persist in this fashion for greater than five to ten years without detection of any above ground parts. While the existence of Basalt Sun-orchid within Reserve A cannot be categorically ruled out, any proposal to disturb remnant vegetation within Reserve A is not expected to have a significant impact on Basalt Sun-orchid.

3.2.2.3 Tussock Skink *Pseudemoia pagenstecheri*

Four Tussock Skink individuals were relocated into Reserve A during salvage works for Stages 3–7 and a population of this species may still occur within the reserve.

Likelihood of Significant Impact

Based on the lack of recent monitoring for this species, it is impossible to determine whether this species still resides within Reserve A. However, the presence of suitable habitat for Tussock Skink suggests that any proposal to disturb remnant vegetation may locally impact the species, although is unlikely to cause a significant impact on the overall population or habitat significance modelling.

3.3 Reserve B

3.3.1 Nationally significant species

The following species of national significance are relevant to Conservation Reserve B at Williams Landing:

3.3.1.1 Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*

A total of 528 Spiny Rice-flower were recorded in close proximity to Reserve B, with 377 inside the reserve and 151 plants scattered outside the Reserve B boundary. All 151 plants were later translocated into carefully chosen disturbed areas of Reserve B (Biosis Research Pty Ltd 1998). One additional Spiny Rice-flower was also translocated from a small area later excised from Reserve B (Biosis Research Pty Ltd 1998).

Approximately 300 cuttings were taken for propagation and approximately 222 individual plants were translocated into Reserve B during January and May 1998 (Mueck 2000). A total of 100 cuttings established a root system and were successfully planted into the reserves, although all later died as a result of drought (Mueck 2000).

Of the 144 translocated individuals comprehensively surveyed in 2000, survival rates were greater than 60% and translocation was therefore considered to be successful. In 2003, the entire population was estimated at 187 individuals. although it was suggested that this figure required a re-assessment as it was significantly lower than the original estimate of greater than 500 plants in 1998 (Mueck *et al.* 1998). Further targeted surveys detected 153 individuals (Practical Ecology Pty Ltd 2006), suggesting a population decline, although it remains unclear whether the entire reserve was surveyed during the census (Practical Ecology Pty Ltd 2006). One small cluster of three previously unrecorded Spiny Rice-flower plants was also located (Practical Ecology Pty Ltd 2006).

Targeted surveys in 2008 recorded 317 Spiny Rice-flower plants, while surveys in 2009 detected 283 individuals (Practical Ecology Pty Ltd 2008; 2009). Variation in survey effort and ongoing drought conditions were cited as reasons for the fluctuating population numbers (Practical Ecology Pty Ltd 2009). Sections of Reserve B were also artificially inundated due to a major pipe leakage and it was estimated that 34 Spiny Rice-flower plants died as a result of flooding in this area (Practical Ecology Pty Ltd 2009).

Two plants were translocated into Reserve B as part of salvage works undertaken for Stages 3-7 of the Williams Landing Estate under the approved Salvage Plan. The plants were relocated into the same recipient site in addition to four grids of 25 seedlings each (Grids 19-22).

Survivorship has been poor for both translocated individuals and seedlings. Monitoring for the 2013/14 period reports a survival rate of 14% for the translocated plants and 7% for the 100 seedlings planted within Reserve B (Practical Ecology Pty Ltd 2014).

Likelihood of Significant Impact

Any proposal to overturn Reserve B will have a significant impact on Spiny Rice-flower. Impacts would include several hundred remnant plants, as well as translocated individuals and planted seedlings. Given the poor survival rate of both translocated Spiny Rice-flower plants and seedlings, there is a high risk that further translocation of any remaining individuals (into Reserve C) would significantly impact the overall population.

Assuming a total population of less than 500 plants within Reserves A and B (this figure needs to be confirmed) and a state-wide population of approximately 100,000 individuals, the proposed impact would have an estimated proportional loss of less than 0.5% of the total abundance of Spiny Rice-flower.

3.3.1.2 Large-headed Fireweed *Senecio macrocarpus*

No Large-headed Fireweed plants were recorded in the original assessment of Reserve B (Biosis Research 1998). However, 15 individuals were located in targeted surveys in 2009 that provided seed for the propagation of new plants (Practical Ecology Pty Ltd 2009). A total of 2 x 100 seedling plots were created in Reserve B (Grids: C29-C38 and Grids: C34-C43) as part of the approved salvage works for Stages 3–7.

Survival rates during the initial 2009 monitoring period were documented at 86%, although this figure decreased to 45% in 2009-2010 (Practical Ecology Pty Ltd 2010). Despite supplementary planting (750 seedlings across all reserves) the average survival rate of Large-headed Fireweed dropped to 43% within Reserve B in the following year (Practical Ecology Pty Ltd 2011). This finding was highly influenced by the poor condition of plants in Grid 1, which had a survival rate of only 3%. Water logging via poor drainage is suspected to have driven the high mortality rate (Practical Ecology Pty Ltd 2011).

The survival rate fell from 43% to 27% in 2011-2012 (Practical Ecology Pty Ltd 2012) and remained at 27% in during 2012-2013 (Practical Ecology Pty Ltd 2013). Only Grid 6 was monitored in 2014 which had a survival rate of 40% (Practical Ecology Pty Ltd 2014).

Likelihood of Significant Impact

Any proposal to overturn Reserve B will have a significant impact on the current Large-headed Fireweed population, although it will not have a significant impact on the overall habitat extent for this species. Large-headed Fireweed is relatively easy to propagate and can be successfully reintroduced into suitable recipient sites with an appropriate management regime.

Less than 1% of the total number of known plants. However, approximately 20% of the remaining population when the Messent Conservation Park population is excluded (DSE 2010).

3.3.1.3 Striped Legless Lizard *Delma impar*

Striped Legless Lizard has not previously been detected within Reserve B, nor has it been found in areas adjacent to Reserve B as part of the implementation of Stages 1–7 of the Williams Landing Estate. A single tile grid check on 17 December 2010 failed to detect the species. No fauna surveys were undertaken during the 2011/12 monitoring period. A single tile check on 15 January 2013 also failed to detect any Striped Legless Lizards. No fauna surveys were undertaken during the 2013-2014 monitoring period. Salvage was also undertaken in the reserve during previous activities and no Striped Legless Lizard were detected at this time.

Likelihood of Significant Impact

Suitable habitat for Striped Legless Lizard is less prevalent in Reserve B compared to Reserve A. Given the lack of previous records for the species within Reserve B, it is unlikely that any future proposal to disturb Reserve B would have a significant impact on Striped Legless Lizard. However, based on available information the overall survey effort for Striped Legless Lizard appears to have been low. Tile grids were typically checked outside the recommended time of year (September to October) and also infrequently.

3.3.1.4 Golden Sun Moth *Synemon plana*

A single survey on 22 December 2010 detected no individuals within Reserve B. No further surveys for Golden Sun Moth have been undertaken within Reserve B.

Likelihood of Significant Impact

The lack of records for this species throughout the past 15 years of management and monitoring, suggests that any proposal to impact remnant vegetation within Reserve B is unlikely to have a significant impact on Golden Sum Moth. However, if the species is present then any proposed removal of suitable grassland habitat will constitute a 'significant impact' under the EPBC Act (i.e. will meet the significant impact thresholds under the EPBC Act for a critically endangered species).

3.3.2 State Listed Species

3.3.2.1 Basalt Sun-orchid *Thelymitra* sp. aff. *pauciflora* [Basalt Plains]

Approximately 60 Basalt Sun-orchids were identified within Reserve B and 10 plants identified west of the previous Taxiway F were translocated into Reserve B (Mueck 1998). An additional six Sun-orchids were located during pre-clearance targeted surveys relating to Stages 1 and 2 of the Williams Landing Estate and were relocated into Reserve B during summer in 2007/08 (Practical Ecology Pty Ltd 2007).

No further records are apparent for Basalt Sun-orchid in any of the monitoring or salvage reports beyond 2007. However, recommendations were made in 2009 for ongoing monitoring as it was considered possible that the population had moved into a dormant phase due to continued drought conditions (Practical Ecology Pty Ltd 2009).

Several Short Sun-orchid *Thelymitra exigua* specimens were also detected in Reserve B during 2005/06 monitoring (Practical Ecology Pty Ltd 2006). However, a follow up survey on 30 October 2006 failed to relocate the population.

Likelihood of Significant Impact

Several targeted surveys have been undertaken by Practical Ecology Pty Ltd for this species (more recently over the past three years) and it is likely that the population has become locally extinct. Although it is acknowledged that the Basalt Sun-orchid is highly cryptic and may persist via underground tubers for extended periods of time, it is considered unlikely that the population would persist in this fashion for greater than five to ten years without detection of any above ground parts. While the existence of Basalt Sun-orchid within Reserve A cannot be categorically ruled out, any proposal to disturb remnant vegetation within Reserve A is not expected to have a significant impact on Basalt Sun-orchid.

3.3.2.2 Arching Flax-lily *Dianella* sp. aff. *longifolia* (Benambra)

Five Arching Flax-lily individuals were located during pre-clearance targeted surveys relating to Stages 1 and 2 of the current Williams Landing Estate. All plants were translocated and propagules taken during winter 2007 (Practical Ecology Pty Ltd 2007).

Three previously identified Arching Flax-lily plants were relocated in 2009 and remained in good condition, while a further two plants were located in 2010/11 monitoring (Practical Ecology Pty Ltd 2009; 2011). No further details have been provided for Arching Flax-lily within recent monitoring reports (Practical Ecology Pty Ltd 2012; 2013; 2014).

Likelihood of Significant Impact

It is uncertain whether Arching Flax-lily remains in Reserve B. However, should all previously recorded plants remain the loss of approximately ten individuals as part of any proposed disturbance to Reserve B would not be considered as a significant impact to the species or to critical habitat for the species.

3.4 Reserve C

Reserve C had not been subjected to a detailed flora assessment until 2006, with only incidental sightings of significant species previously documented along with a baseline wetland species list (Practical Ecology Pty Ltd 2006). Detailed flora surveys were recommended as part of future monitoring to identify the presence and extent of all significant species within Reserve C, especially in the event of substantial rainfall (Practical Ecology Pty Ltd 2006; 2007). In 2007 an effort was made to identify the location and distribution of significant flora species, however, the timing of the survey was sub-optimal and the weather extremely dry (Practical Ecology Pty Ltd 2007).

3.4.1 Nationally significant species

The following species of national significance are relevant to Conservation Reserve A at Williams Landing

3.4.1.1 Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*

Targeted surveys in 2010 located nine Spiny Rice-flower plants within Reserve C (Practical Ecology Pty Ltd 2010). Eighty nine Spiny Rice-flower individuals were translocated into Reserve C s part of the approved Salvage Plan for the implementation of Stages 3–7 (2009) of the current Williams Landing Estate. Four separate grids containing 25 Spiny Rice-flower seedlings each (Grids 23-26), were also installed into Reserve C.

Monitoring of the translocated plants in 2013 documented a survival rate of 31%, which further decreased to 17% in 2014 (Practical Ecology Pty Ltd 2013; 2014). Survival rates for the 100 planted seedlings have been steadily dropping within Reserve C with averages of 58% (2011), 45% (2012), 39% (2013) and 28% (2014).

Likelihood of Significant Impact

As Reserve C is not proposed to be disturbed, there is considered to be no risk of significant impact to the existing population of Spiny Rice-flower. However, as discussed in Sections 3.2.1.2 and 3.3.1.1. there is potential risk for a further decline in the abundance and genetic diversity of the overall population of Spiny Rice-flower at Williams Landing should the existing plants within Reserves A and B be proposed for translocation into Reserve C. Any future disturbance to Reserve C that may result from the proposed translocation of significant flora from Reserves A and B would be restricted to highly modified areas dominated by introduced vegetation and would not impact areas of remnant vegetation or significant species.

3.4.1.2 Large-headed Fireweed *Senecio macrocarpus*

Targeted surveys for Large-headed Fireweed in 2010, documented nine small remnant areas of up to 50 plants within Reserve C (Practical Ecology Pty Ltd 2011). No further monitoring of these populations appears to have been undertaken since 2010 (Practical Ecology Pty Ltd 2011; 2012; 2013; 2014).

Two plots of 100 Large-headed Fireweed seedlings each were planted in Reserve C (Grids 7–10) as part of salvage works for Stages 3–7 for the current Williams Landing Estate. The initial survival rate for these plantings was poor, with just 17% of seedlings surviving the first year (Practical Ecology Pty Ltd 2010). As a result of supplementary planting (750 additional seedlings across all reserves) the average survival rate for Large-headed Fireweed seedlings increased to 72% in Reserve C during 2010 (Practical Ecology Pty Ltd 2011). Survival rates dropped significantly in 2011 from 72% to 25% (Practical Ecology Pty Ltd 2012), before stabilising at 26% and 27% during 2012 and 2013 respectively (Practical Ecology Pty Ltd 2013; 2014).

Likelihood of Significant Impact

As Reserve C is not proposed to be disturbed, there is considered to be no risk of significant impact to the existing population of Large-headed Fireweed or critical habitat for the species. Any future disturbance to Reserve C that may result from the proposed translocation of significant flora from Reserves A and B would be restricted to highly modified areas dominated by introduced vegetation and would not impact areas of remnant vegetation or significant species.

3.4.1.3 Striped Legless Lizard *Delma impar*

Striped Legless Lizard was not detected during tile grid checks undertaken on 17 December 2010 and 15 January 2013. No fauna surveys were undertaken during the 2011/12 and 2013/14 monitoring periods.

Likelihood of Significant Impact

As Reserve C is not proposed to be disturbed, there is considered to be no risk of significant impact to Striped Legless Lizard or critical habitat for the species.

3.4.1.4 Golden Sun Moth *Synemon plana*

A single survey on 22 December 2010 detected no Golden Sun Moth individuals within Reserve C. No further surveys for Golden Sun Moth have been undertaken within Reserve C.

Likelihood of Significant Impact

As Reserve C is not proposed to be disturbed, there is considered to be no risk of significant impact to Golden Sun Moth or suitable habitat for the species. Any future disturbance to Reserve C that may result from the proposed translocation of significant flora from Reserves A and B would be restricted to highly modified areas dominated by introduced vegetation and would not impact areas of remnant vegetation or significant species. However, it is acknowledged that Golden Sun Moth may utilise introduced vegetation such as Chilean Needle-grass therefore any proposed translocation activities would occur outside of the known flight period (i.e. active season) for Golden Sun Moth and disturbed areas (soil and grass roots) would need to be inspected for Golden Sun Moth pupae..

3.4.1.5 Growling Grass Frog *Litoria raniformis*

A single survey on 27 January 2010 detected no Growling Grass Frog individuals within Reserve C. No further surveys for Growling Grass Frog have been undertaken within Reserve C.

Likelihood of Significant Impact

As remnant vegetation and the existing wetland within Reserve C are not proposed to be disturbed, there is considered to be no risk of significant impact to Growling Grass Frog or sitable habitat for the species.

3.4.2 State Listed Species

3.4.2.1 Basalt Podolepis *Podolepis* sp.1

A large population of approximately 4,000 Basalt Podolepis plants was originally recorded in Reserve C (Biosis Research Pty Ltd 1998). Reference to these plants in all monitoring reports since 1998 has been scant. The 2010 monitoring report notes twelve small areas containing between 50-100 Basalt Podolepis plants each within Reserve C (Practical Ecology Pty Ltd 2010) and a general observation noting that Basalt Podolepis occurs extensively within the northern grassland area of Reserve C is made in the 201/11 monitoring report (Practical Ecology Pty Ltd 2011). Basalt Podolepis is not discussed within monitoring reports between 2012 and 2014 (Practical Ecology Pty Ltd 2012; 2013; 2014).

Likelihood of Significant Impact

As Reserve C is not proposed to be disturbed, there is considered to be no risk of significant impact to Basalt Podolepis or critical habitat for the species. Any future disturbance to Reserve C that may result from the proposed translocation of significant flora from Reserves A and B would be restricted to highly modified areas dominated by introduced vegetation and would not impact areas of remnant vegetation or significant species.

4 RESULTS

4.1 Flora and Fauna

Sixty-seven flora species (38 indigenous and 29 non-indigenous) were recorded within the reserves during the field assessment. A consolidated list of flora species recorded is provided in Appendix 2.1.

Thirty fauna species were recorded within the reserves during the field assessment, including: three introduced mammals, 26 birds (22 native, four introduced) and two native reptiles. A consolidated list of fauna species recorded is provided in Appendix 3.1.

4.2 Existing Conditions

The reserves supports four broad vegetation and habitat types: native grassland, introduced grassland, woodland, and wetland. Vegetation within Reserve A was in good condition throughout, with very low weed cover. Reserves B and C contained a mosaic of vegetation in poor, moderate and good condition, with moderate to high weed cover. Vegetation condition and habitat types are discussed in further detail below.

4.2.1 Native Grassland

4.2.1.1 Vegetation Condition

Vegetation within the reserves is dominated by native grassland, which is located throughout all of Reserve A, the majority of Reserve B and large areas of Reserve C surrounding the wetland. Based on the field assessment, native grassland within the reserves is consistent with *Heavier-soils* Plains Grassland (EVC 132_61). This is consistent with extant DEPI mapping which shows these areas are dominated by Plains Grassland (DEPI 2013b).

Heavier-soils Plains Grassland (EVC 132_61)

Heavier-soils Plains Grassland within the reserves ranged from low to high condition (Appendix 4). Dominant native species included Kangaroo Grass *Themeda triandra*, Kneed Spear-grass *Austrostipa bigeniculata* and Common-Wallaby-grass *Rytidosperma caespitosa*. Areas of high condition habitat (HZ1) contained low weed cover, whereas, areas of moderate (HZ2) to low (HZ3) condition habitat contained moderate to high cover of high threat weeds, particularly Chilean Needle-grass *Nassella neesiana* and Serrated Tussock *Nassella trichotoma* (Figure 2). Shrubs and herbs present included Drooping Cassinia *Cassinia arcuata*, Nodding Saltbush *Einadia nutans*, Blue Devil *Eryngium ovinum*, Common Everlasting *Chrysocephalum apiculatum*, Woolly New Holland Daisy *Vittadinia gracilis*, and Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis.*

4.2.1.2 Fauna Habitat

Patches of native grassland (Plains Grassland) occur throughout the reserves. The patches vary in quality and floristic composition according to the varying historical land use practices for each reserve.

There is a moderate likelihood that areas of native grassland, particularly those with a high cover of wallaby grasses *Austrodanthonia* spp., currently support the nationally significant Golden Sun Moth *Synemon plana.* One female Golden Sun Moth was detected within Reserve A during site monitoring in 2008/09 (Practical Ecology Pty Ltd 2009). In addition, areas which have cracking soils or embedded rock provide sheltering habitat for the nationally listed Striped Legless Lizard *Delma impar.* This species was incidentally recorded during site monitoring in 2008/09 in Reserve A (two skins recorded under separate tiles) and not in Reserve B (Practical Ecology Pty Ltd 2009). A range of common reptiles and small mammals are also likely to occur within the reserves, including Tussock Skink *Pseudemoia pagenstecheri*, Blue-tongue Lizards *Tiliqua* spp., Tiger Snake *Notechis scutatus*, Eastern Brown Snake *Pseudonaja textilis*, Little Whip Snake *Suta flagellum* and Fat-tailed Dunnart *Sminthopsis crassicaudata.* These species have either been previously detected on site during monitoring works, or suitable habitat is present for these species within in each reserve (Practical Ecology Pty Ltd 2009).

4.2.2 Woodland

Small areas within the western section of Reserve C are dominated by Golden Wattle *Acacia pycnantha.* Based on the field assessment, these areas are consistent with Plains Grassy Woodland (EVC 55). The adoption of Plains Grassy Woodland EVC is broadly consistent with extant (2005) DEPI mapping which shows the reserves dominated by Plains Grassland with scattered areas of Plains Grassy Woodland (DEPI 2013b).

4.2.2.1 Vegetation Condition

Plains Grassy Woodland (EVC 55)

Plains Grassy Woodland within the reserves is in poor to moderate condition (Appendix 4). The overstorey is dominated by Golden Wattle, with a sparse understorey of native species including Kneed Spear-grass and Common Wallaby-grass. Moderate to high weed cover is present, especially Chilean Needle-grass. The non-indigenous Golden Wreath Wattle *Acacia saligna* is also present within areas of woodland and adjacent areas.

4.2.2.2 Fauna Habitat

Remnant understory trees occur in Reserve C and provide foraging, roosting and nesting habitat for mobile generalist fauna including common gregarious birds and microbats. When flowering, this vegetation may provide temporary foraging habitat for nomadic nectarivorous birds.

4.2.3 Wetland

Low lying areas of Reserve C subject to seasonal inundation were dominated by aquatic and semi-aquatic flora species. Based on the field assessment, these areas are consistent with Plains Sedgy Wetland (EVC 647). This finding is broadly consistent with extant (2005) DEPI mapping, which shows the reserves dominated by Plains Grassland with patches of Plains Grassy Wetland in areas subject to inundation (DEPI 2013b).

4.2.3.1 *Vegetation Condition*

Plains Sedgy Wetland (EVC 647)

Plains Sedgy Wetland within the reserves (Reserve C) is in good condition (Appendix 4). Native sedges and rushes dominate the wetland, including Pale Rush *Juncus pallidus*, Gold Rush *Juncus flavidus,* Tall Sedge *Carex appressa* and Common Spike-rush *Eleocharis acuta*. A diversity of native herbs is also present, including Common Nardoo *Marsilea drummondii*, Prickfoot *Eryngium vesiculosum*, Slender Knotweed *Persicaria decipiens*, Floating Pondweed *Potamogeton tricarinatus* and Amphibious Water-milfoil *Myriophyllum simulans*. Tangled Lignum *Muehlenbeckia florulenta* and Common Tussock-grass *Poa labillardierei* fringe the wetland. Low weed cover is present, and species include Drain Flat-sedge *Cyperus eragrostis* and Kikuyu *Pennisetum clandestinum*.

4.2.3.2 *Fauna Habitat*

A large ephemeral wetland occurs within Reserve C and provides habitat for a range of locally common waterbirds. During the current survey a range of species including Pacific Black Duck *Anas superciliosa*, Australian Wood Duck *Chenonetta jubata* and Australian White Ibis *Threskiornis molucca* were noted. This wetland provides good quality habitat for waterbirds and when full may also act as temporary foraging or dispersal habitat for a range of State listed species (Appendix 3.2).

The high cover of aquatic vegetation within the pond also makes it suitable breeding habitat for a range of frog species. However, there is a low likelihood that the wetland currently provides permanent breeding habitat for Growling Grass Frog (see Section3.3.2 below).

4.2.4 Introduced Grassland

Vegetation within the reserves, excluding areas mapped as Plains Grassland, Plains Sedgy Wetland or Plains Grassy Woodland are dominated by introduced grasses and herbs, predominantly highly invasive weeds such Chilean Needle-grass and Serrated Tussock. Based on the field assessment, areas of introduced grassland are likely to have previously supported *Heavier-soils* Plains Grassland EVC (EVC 132_61).

4.2.4.1 *Fauna Habitat*

Areas of introduced grassland are likely to be used by locally common birds adapted to open modified habitats. A number of bird species within modified, grassy or open habitats were recorded during the current assessment including Australian Magpie *Gymnorhina tibicen*, Little Raven *Corvus mellori*, and Willie Wagtail *Rhipidura leucophrys*. Diurnal raptors including Whistling Kite *Haliastur sphenurus*, Nankeen Kestrel *Falco cenchroides* and Brown Falcon *Falco berigora* are likely to forage over open areas and were observed hovering over this habitat type.

4.3 National Significance Assessment

National significance for flora and fauna is defined in Appendix 1.2.

4.3.1 Flora

The VBA and FIS contain records of 13 nationally listed flora species previously recorded within 10 kilometres of the reserves (DEPI 2014a; Viridans 2013a) (Appendix 2.2; Figure 3). The PMST nominates an additional two nationally significant species which have not been recorded in the local area but have the potential to occur (DoE 2014) (Appendix 2.2).

Excluding translocated plants, two nationally significant flora species (Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* and Large-headed Fireweed *Senecio macrocarpus*) are known to occur within all three conservation reserves (Figure 2). Previous records exist for Small Golden Moths *Diuris basaltica*, Button Wrinklewort *Rutidosis leptorhynchoides* and Matted Flax-lily *Dianella amoena* within three to five kilometres from the study area, and suitable habitat is present for all three species within the reserves (indeed Small Golden Moths has prevouly been recorded in Reserve A in 2000). However, records for both Small Golden Moths and Button Wrinklewort are all greater than 10 years old and data for Matted Flax-lily is restricted to a single record approximately five kilometres to the north-west. Given the high level of monitoring and management over the past 15 years, it is considered unlikely that these three species are present within the reserves. All other nationally listed flora species are considered unlikely to occur within the reserves (Appendix 2.2).

Spiny Rice-flower

The Williams Landing conservation reserves contain one of the largest known populations of Spiny Rice-flower. The species occurs within all three reserves, including remnant and translocated plants, as well as propagated specimens (Practical Ecology Pty Ltd 2006). Over the past five years monitoring reports for all three reserves have largely focussed on the survival rate of translocated and propagated Spiny Rice flower specimens. While the data shows a clear downward trend for translocation and propagation trials, it is unclear whether this trend is also true for the remnant population. From a total of 528 remnant plants in 1998, the most recent population estimates suggested that 283 plants remained in Reserve B in 2009, while in the following year Reserves A and C contained 52 and nine individuals respectively (Practical Ecology Pty Ltd 2010; 2011). Targeted surveys would be required at an appropriate time of year (late autumn and winter) to determine the exact distribution and abundance of remnant Spiny Rice-flower plants throughout all three reserves.

Large-headed Fireweed

Large-headed Fireweed has previously been recorded within Reserves A, B and C (including both remnant and translocated specimens). The current population size of Large-headed Fireweed is unknown as annual monitoring within the reserves has focused on translocated specimens and monitoring of the remnant Large-headed Fireweed population has not been undertaken during recent years. Targeted surveys would be required at an appropriate time of year (spring/summer) to determine the current population sizes within Reserves A and B to determine the current population size. .

4.3.2 Fauna

The VBA and AVW contain records for 16 nationally listed fauna species previously recorded within 10 kilometres of the reserves (DEPI 2014b; Viridans 2013b) (Appendix 3.2; Figure 4). The PMST nominates an

additional three nationally significant species which have not been recorded in the local area but have the potential to occur (DoE 2014).

Of these species, a limited amount of suitable habitat is present for Striped Legless Lizard and Golden Sun Moth within Reserves A, B and C, and for Growling Grass Frog within Reserve C. All remaining nationally listed fauna species are considered unlikely to occur within the reserves.

Striped Legless Lizard

The VBA and AVW contain 63 records for Striped Legless Lizard within a 10 kilometre radius of the reserves (DEPI 2014b; Viridans 2013b). One incidental sighting and two shed skins have been recorded for Striped Legless Lizard within Reserve A (Biosis Research Pty Ltd 1998; Practical Ecology Pty Ltd 2009). Although the likelihood of occurrence of Striped Legless Lizard remaining in the conservation reserves is considered low, the presence of this species cannot be categorically ruled out.

Golden Sun Moth

The VBA and AVW contain 27 records for Golden Sun Moth within a 10 kilometre radius of the reserves (DEPI 2014b; Viridans 2013b) and one Golden Sun Moth observation (dated 2009) is known from within Reserve A (Practical Ecology Pty Ltd 2009). Although the likelihood of occurrence of Golden Sun Moth remaining within the conservation reserves is considered low, the presence of this species cannot be categorically ruled out.

Growling Grass Frog

Growling Grass Frog has been recorded historically (ca. 1988) within the Forsyth Road Wetland within Reserve C, but has not been detected since. More recent records from 2007 occur within the Skeleton Creek system (Figure 4). Given the lack of connectivity to known population sources (e.g. Skeleton Creek) and the ephemeral nature of the wetland within Reserve C, this area is unlikely to support Growling Grass Frog on a permanent basis for breeding purposes. No suitable habitat for Growling Grass Frog is present with Reserves A and B.

4.3.3 Communities

Four nationally listed ecological communities are predicted to occur within 10 kilometres of the reserves (DoE 2013):

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- Natural Temperate Grassland of the Victorian Volcanic Plain
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains)

One nationally listed ecological community was recorded within the reserves: Natural Temperate Grassland of the Victorian Volcanic Plain. This community is located within all three of the reserves, including all of Reserve A (9.75 hectares), and fragmented occurrences within Reserve B (2.80 hectares) and Reserve C (5.37 hectares). Remaining areas of grassland did not meet the condition thresholds of the nationally listed vegetation community.

Plains Grassy Woodland within the reserves does not meet the condition thresholds of the nationally listed vegetation community Grassy Eucalypt Woodland of the Victorian Volcanic Plain, and vegetation within the reserves does not match the diagnostic characteristics for any other nationally listed ecological communities.

4.4 State Significance Assessment

State significance for flora and fauna is defined in Appendix 1.2.

4.4.1 Flora

The VBA and FIS contain records of 47 State-significant flora species within 10 kilometres of the reserves (Viridans 2013a) (Appendix 2.2; Figure 3). One state listed species (Basalt Podolepis) was recorded during the current survey. Four state listed flora have previously been recorded within the conservation reserves during annual monitoring: Basalt Sun-orchid, Short Sun-orchid, Basalt Podolepis and Pale Flax-lily. All remaining State significant species are considered to have a low likelihood of occurrence within the reserves.

Sun Orchids

Approximately 300 Basalt Sun-orchid and Short Sun-orchid plants have previously been recorded within Reserves A and B, and both reserves have been used as recipient sites for translocation (Biosis Research Pty Ltd 1998; Practical Ecology Pty Ltd 2005). However, subsequent surveys for these populations have failed to relocate this species and it is now generally considered to be locally extinct.

Arching Flax-lily

Three records exist for Arching Flax-lily within Reserve B (Practical Ecology Pty Ltd 2009). The VBA and FIS also contain previous records for Arching Flax-lily within 500 metres of Reserve C in the adjacent rail reserve (DEPI 2014b; Viridans 2013a).

Basalt Podolepis

Reserves A and B are known to contain large populations of Basalt Podolepis. This species has been regularly noted within annual monitoring reports and many senesced flower stems for this species were recorded during the current field assessment.

4.4.2 Fauna

The VBA and AVW contain records of 52 State-significant fauna species within 10 kilometres of the reserves (Viridans 2013b) (Appendix 2.2; Figure 4).

Of these species, suitable habitat is present within the reserves for Tussock Skink. This species was previously detected during salvage works for Stages 3–7 of the current Williams Landing Estate and four individuals were relocated into Reserve A. There is a moderate likelihood that Tussock Skink may still occur within the reserves. Several State-significant waterbirds such as Hardhead *Aythya australis* may also occasionally visit the site on route to preferred habitats (i.e. the Western Treatment Plant).

4.4.3 Communities

Plains Grassland within the reserves is consistent with the State listed Western (Basalt) Plains Grassland Community.

4.5 Regional Significance Assessment

Regional significance for fauna is defined in Appendix 1.2.

The VBA and AVW contain records of 23 regionally significant fauna species within 10 kilometres of the reserves (Viridans 2013b) (Appendix 2.2; Figure 4). Based on the condition of the current habitat, the landscape context and the proximity of previous records, regionally significant fauna species are considered unlikely to occur within the reserves (Appendix 3.2). However, Fat-tailed Dunnart may reside within the reserves as suitable habitat is present and the species has previously been detected within the local area (Figure 4).

Several regionally listed bird species may forage within the reserves on an occasional basis; however, these species are unlikely to make significant use of the reserves for breeding purposes as no suitable habitat is present.

4.6 Site Ecological Significance

The criteria adopted for assessing the ecological significance of the reserves is presented in Appendix 1.3. Based on available information and the results of the site assessment, the reserves are considered to be of National ecological significance for the following reasons:

- Known presence for two nationally listed significant flora species (Spiny Rice-flower and Large-headed Fireweed), and potential habitat for two additional nationally listed flora species (Small Golden Moths and Matted Flax-lily);
- Presence of the nationally significant ecological community Natural Temperate Grasslands of the Victorian Volcanic Plain;
- Habitat for three nationally listed significant fauna species (Striped Legless Lizard, Golden Sun Moth and Growling Grass Frog [habitat for Growling Grass Frog only within Reserve C]);
- Remnant vegetation associated with three EVCs (Plains Grassland, Plains Grassy Woodland and Plains Sedgy Wetland) listed as Endangered in the Victorian Volcanic Plain bioregion; and,
- Habitat for several state and regionally significant mammal, reptile and bird species.

5 BIODIVERSITY ASSESSMENT GUIDELINES

Based on the modelled data available on the Biodiversity Interactive Maps (DEPI 2013a), the reserves falls within Location Risk A, B and C. Given the extent of Location Risk C within the reserves, and the proposed extent of remnant vegetation removal from Reserves A and B, the investigation would be assessed under a High Risk-pathway.

Under the High Risk-pathway, any proposal to remove remnant vegetation requires the submission of shape files and habitat scores to DEPI in order to determine offset requirements as per the Biodiversity Assessment Guidelines (DEPI 2013a).

The quality and quantity of native vegetation within the reserves is provided below (Table 4). A summary of vegetation relevant to each reserve, including the nationally significant ecological community Natural Temperate Grassland of the Victorian Volcanic Plain is provided in Table 5.

Table 4. Habitat hectares of native vegetation within the reserves

Reserve		Reserve A	Reserve B	Reserve B	Reserve C	Reserve C	Reserve C	Reserve C
Vegetation Zone		PG1	PG2	PG3	PG2	PG3	PGW1	PGwe1
Bioregion		VVP	VVP	VVP	VVP	VVP	VVP	VVP
EVC / Tree		PG(LS)	PG(LS)	PG(LS)	PG(LS)	PG(LS)	PGW	PSWe
EVC Number		132_62	132_62	132_62	132_62	132_62	55_61	647
EVC Conservation Status		En	En	En	En	En	En	En
Patch Condition	Large Old Trees /10	0	0	0	0	0	0	0
	Canopy Cover /5	0	0	0	0	0	0	0
	Understorey /25	15	10	5	10	5	5	15
	Lack of Weeds /15	9	6	2	6	2	0	13
	Recruitment /10	6	6	3	6	3	5	3
	Organic Matter /5	5	3	2	3	2	3	5
	Logs /5	0	0	0	0	0	0	0
	Treeless EVC Multiplier	1.36	1.36	1.36	1.36	1.36	1	1.36
	Subtotal =	47.6	34	16.32	34	16.32	13	48.96
Landscape Value /25		8	10	10	10	10	8	8
Habitat Points /100		55.6	44	26.32	44	26.32	21	56.96
Habitat Score		0.56	0.44	0.26	0.44	0.26	0.21	0.57
Total Area (ha)		9.75	6.10	0.15	5.37	4.60	0.15	15.23
Total habitat hectares		5.46	2.68	0.04	2.36	1.20	0.03	8.68

Note: VVP = Victorian Volcanic Plain; PG(LS) = Lighter Soils Plains Grassland; PGW = Plains Grassy Woodland; PSWe = Plains Sedgy Wetland; En = Endangered

Table 5. Summary of Vegetation within each reserve,

Reserve	Total area (hectares)	Total area of vegetation (hectares)	Total habitat hectares	Total NTGVVP (hectares)
A	9.75	9.75	5.46	9.75
B	9.29	6.25	2.72	2.80
C	36	25.35	12.27	5.37

Notes: NTGVVP= Natural Temperate Grassland of the Victorian Volcanic Plain.

6 POTENTIAL IMPACTS

Any proposal to overturn Reserves A and B will directly impact several significant flora and fauna species, and also ecological communities known to be present within the reserves, including:

- Loss of nationally significant flora species (Spiny Rice-flower and Large-headed Fireweed) and state significant flora species (Basalt Podolepis);
- Loss of National (Natural Temperate Grassland of the Victorian Volcanic Plain) and State (Western [Basalt] Plains Grassland Community) listed ecological communities;
- Loss of habitat for the nationally listed Matted Flax-lily and Small Golden Moths, and a range of state significant flora species;
- Loss of habitat for the nationally listed Golden Sun Moth and Striped Legless Lizard, and State listed Tussock Skink, as well as the regionally significant fauna species Fat-tailed Dunnart;
- Loss of one Endangered EVC (Plains Grassland); and,
- Potential for the spread of weeds and soil pathogens due to on-site activities.

An accurate determination of the potential impacts to significant species as a result of any proposal to disturb Reserves A and B, would require detailed targeted surveys throughout each reserve. At a minimum, targeted surveys would be required for Spiny Rice-flower and Large-headed Fireweed to determine the exact distribution and abundance of any individuals. This data would then be used to inform a salvage and translocation plan within the relevant authorities and the formulation of an offset strategy to the Commonwealth Department of Environment (DoE).

7 LEGISLATIVE AND POLICY IMPLICATIONS

This section identifies biodiversity policy and legislation relevant to the proposed development, principally:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth);
- *Flora and Fauna Guarantee Act 1988* (FFG Act) (Victoria);
- *Environment Effects Act 1978* (Victoria)
- *Planning and Environment Act 1987* (Victoria);
    - Local Planning Schemes;
    - *Victoria's Native Vegetation Framework – A Framework for Action*; and,
    - Victoria's Native Vegetation Permitted Clearing Regulations.
- *Wildlife Act 1975* and *Wildlife Regulations 2002* (Victoria);
- *Catchment and Land Protection Act 1994* (CALP Act) (Victoria); and,
- *Water Act 1989* (Victoria).

7.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

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

- World Heritage properties;
- National heritage places;
- Ramsar wetlands of international significance;
- Threatened species and ecological communities;
- Migratory and marine species;
- Commonwealth marine area;
- Nuclear actions (including uranium mining);
- Great Barrier Reef Marine Park; or,
- Water resources impacted by coal seam gas or mining development.

7.1.1 Ramsar wetlands of international significance

The reserves occur upstream of one Ramsar wetland (DoE 2014):

- Port Phillip Bay (Western Shoreline) and Bellarine (six kilometres from reserves);

This wetland is unlikely to be impacted as it is situated a considerable distance from the Williams Landing conservation reserves. Provided management practices and construction techniques are consistent with *Construction Techniques for Sediment Pollution Control* (EPA 1991) and *Environmental Guidelines for Major Construction Sites* (EPA 1996), the project is unlikely to affect the ecological character of any Ramsar wetland.

7.1.2 Threatened species and ecological communities

Flora: Two flora species listed under the EPBC Act (Spiny Rice-flower and Large-headed Fireweed) occur within the reserves. There is also suitable habitat within the reserves for two additional flora species listed under the EPBC Act (Matted Flax-lily and Small Golden Moths) (Section 4.3.1).

Fauna: Three fauna species listed under the EPBC Act (Golden Sun Moth, Striped Legless Lizard and Growling Grass Frog) have been historically recorded within the local area and the conservation reserves, or have suitable habitat present. Suitable Growling Grass Frog habitat is restricted to Reserve C.

Communities: One ecological community listed under the EPBC Act (Natural Temperate Grassland of the Victorian Volcanic Plain) was recorded within all three reserves (Section 4.3.3).

7.1.3 Conservation Agreements

The three reserves are covered by a Conservation Agreement between the Commonwealth Minister for Environment and Galaway Holdings Pty Ltd (dated 27 June 2007). The agreement relates to the:

> *Protection and conservation of certain listed threatened species under the Environmental Protection and Biodiversity Conservation Act 1999* relevant to the *Conservation Management Plan for Grassland and Wetland Reserves at Laverton* (Biosis 1998).

7.1.4 Migratory and marine species

A total of 110 Migratory and/or Marine species have been recorded within 10 kilometres of the reserves (Appendix 3.2). However, the reserves would not be classed as 'important habitat' for migratory or marine species as defined under the EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines (DEWHA 2009).

7.1.5 Implications

There is a possibility that the Conservation Agreement pertaining to Reserves A and B may be terminated between the Commonwealth Environment Minister and Galaway Holdings Pty Ltd in accordance with subsection 308(3) of the EPBC Act. However, a referral to the Commonwealth Environment Minister would be required for any proposed action that would impact the reserves (including modification or termination of the agreement) which is not in accordance with the Conservation Management Plan (Biosis 1998). Five species listed under the EPBC Act (Spiny Rice-flower, Large-headed Fireweed, Golden Sun Moth, Striped Legless Lizard and Growling Grass Frog) have previously been recorded within the reserves. However, Growling Grass Frog habitat is restricted to Reserve C, which is not proposed to be disturbed. The significant impact thresholds for Spiny Rice-flower would be breached as a result of any proposed changes to Reserves A and B (DEWHA 2009a).

Significant impact thresholds for Spiny Rice-flower include:

- The fragmentation of an existing population;
- The loss of greater than five individuals from a population; and,
- The loss of individuals from any population which occurs on the edge of the known distribution for the species.

Targeted surveys would be required to further determine the exact distribution and abundance of all relevant matters of National Environmental Significance. Furthermore, any proposals for the translocation of significant species will require referral to the DEPI Translocation Evaluation Panel (TEP), and any proposal for the translocation of Spiny Rice-flower also requires referral to the *Pimelea spinescens* Recovery Team (PsRT).

7.2 Flora and Fauna Guarantee Act 1988 (Victoria)

The FFG Act is the primary Victorian legislation providing for the conservation of threatened species and ecological communities, and for the management of processes that are threatening to Victoria's native flora and fauna. The FFG Act contains protection procedures such as the listing of threatened species and/or communities, and the preparation of action statements to protect the long-term viability of these values.

Proponents are required to apply for an FFG Act Permit to 'take' listed and/or protected[2] flora species, listed vegetation communities and listed fish species in areas of public land (i.e. within road reserves, drainage lines and public reserves). An FFG Act permit is generally not required for removal of species or communities on private land, or for the removal of habitat for a listed terrestrial fauna species.

Flora: Two 'listed' flora species (Spiny Rice-flower and Large-headed Fireweed) and two 'protected' flora species (Golden Wattle *Acacia pycnantha* and Common Everlasting *Chrysocephalum apiculatum*) were recorded within the reserves during the field assessment. There is suitable habitat within the reserves for several additional flora species listed under the FFG Act.

Fauna: Forty-six fauna species listed under the FFG Act were recorded within the reserves during the field assessment. There is suitable habitat within the reserves for three additional fauna species listed under the FFG Act (Golden Sun Moth, Striped Legless Lizard and Growling Grass Frog) (Section 3.3.2).

Communities: One ecological communities listed under the FFG Act (Western [Basalt] Plains Grassland Community) was recorded within the reserves.

[2] In addition to 'listed' flora species, the FFG Act identifies 'protected' flora species. This includes any of the Asteraceae (Daisies), all orchids, ferns (excluding *Pteridium esculentum*) and Acacia species (excluding *Acacia dealbata*, *Acacia decurrens*, *Acacia implexa*, *Acacia melanoxylon* and *Acacia paradoxa*), as well as any taxa that may be a component of a listed ecological community. A species may be both listed and protected.

7.2.1 Implications

Under Clause 12.01 of the State Planning Policy Framework the local planning authority should have regard for flora, fauna and communities listed under the FFG Act when making decisions regarding the use and development of land.

One FFG listed community was recorded (Western [Basalt] Plains Grassland Community), and there is suitable habitat within the reserves for several species listed or protected under the FFG Act. However, the reserves are privately owned, as such a permit under the FFG Act is not required.

7.3 Environment Effects Act 1978 (Victoria)

The *Environment Effects Act 1978* provides for assessment of proposed actions that are capable of having a significant effect on the environment via the preparation of an Environment Effects Statement (EES). A project with potential adverse environmental effects that, individually or in combination, could be significant in a regional or State context should be referred. An action may be referred for an EES decision where:

- one of the following occurs:
    - Potential clearing of 10 hectares or more of native vegetation from an area that:
        - Is of an EVC identified as endangered by the DEPI;
        - Is, of Very High conservation significance; or,
        - Is not authorised under an approved Forest Management Plan or Fire Protection Plan.
    - Potential long-term loss of a significant proportion (1-5% depending on conservation status of species) of known remaining habitat or population of a threatened species within Victoria.
- or where two or more of the following occur:
    - Potential clearing of 10 hectares or more of native vegetation, unless authorised under an approved Forest Management Act or Fire Protection Plan;
    - Matters listed under the FFG Act:
        - Potential loss of a significant area of a listed ecological community;
        - Potential loss of a genetically important population of an endangered or threatened species;
        - Potential loss of critical habitat; or,
        - Potential significant effects on habitat values of a wetland supporting migratory birds.

7.3.1 Implications

DEPI should be consulted as to whether the proposed removal of vegetation is likely to trigger an EES.

7.4 Planning and Environment Act 1987 (Victoria)

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17 which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation on a site of more than 0.4 hectares, unless an exemption clause under 52.17-6 of the Victorian Planning Schemes applies or a subdivision is proposed with lots less than 0.4 hectares[3]. Local planning schemes may contain other provisions in relation to the removal of native vegetation (Section 7.4.1).

7.4.1 Local Planning Schemes

The reserves are located within the Wyndham City Council municipality. The reserves are zoned Priority Development Zone 1 (PDZ1), and no overlays apply (DPCD 2014).

7.4.1.1 Implications

A Planning Permit from Wyndham City Council is required to remove or disturb any native vegetation.

7.4.2 Biodiversity Assessment Guidelines

As outlined above (Section 5), the Victorian Government recently integrated the Biodiversity Assessment Guidelines (DEPI 2013c) into the Victorian Planning Provisions, replacing the Framework (NRE 2002). The keystone of the new regulations is a Risk-based Assessment, with all proposals involving the removal of vegetation to be assessed through one of three risk-based pathways (Low, Moderate or High) (Table 1). Risk pathways are dependent on the location and extent of clearing proposed.

7.4.2.1 Implications

Areas of remnant native vegetation for rare or threatened species must be offset if they are proposed to be disturbed as part of any proposal to overturn Reserves A and B. The offset requirements for native vegetation removal as prescribed by the Guidelines have not been calculated at this stage of proceedings. Spatial vegetation data will need to be submitted to DEPI in order for the generation of a Biodiversity Impact and Offset Requirements (BIOR) report that will outline both General and Specific offsets in biodiversity equivalence units. The BIOR report would then need to be submitted to council along with the current flora and fauna report.

7.5 Wildlife Act 1975 and Wildlife Regulations 2002 (Victoria)

The *Wildlife Act 1975* (and associated Wildlife Regulations 2002) is the primary legislation in Victoria providing for protection and management of wildlife. The Act requires people engaged in wildlife research

[3] In accordance with the Victorian Civil and Administrative Tribunal's (VCAT) decision Villawood v Greater Bendigo CC (2005) VCAT 2703 (20 December 2005) all native vegetation is considered lost where proposed lots are less than 0.4 hectares in area and must be offset at the time of subdivision.

(e.g. fauna surveys, salvage and translocation activities) to obtain a permit under the Act to ensure that these activities are undertaken in a manner consistent with the appropriate controls.

The *Wildlife Act 1975* has the following objectives:

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

7.5.1 Implications

Authorisation for habitat removal may be obtained under the *Wildlife Act 1975* through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*. Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under *the Wildlife Act 1975*.

7.6 Water Act 1989 (Victoria)

The purposes of the *Water Act 1989* are manifold but (in part) relate to the orderly, equitable, efficient and sustainable use of water resources within Victoria. This includes the provision of a formal means of protecting and enhancing environmental qualities of waterways and their in-stream uses as well as catchment conditions that may affect water quality and the ecological environments within them.

One designated waterway is present within Reserve C; no designated waterways are present within Reserves A and B.

7.6.1 Implications

A 'works on waterways' permit from the Port Phillip and Western Port CMA is likely to be required where any action impacts on waterways within the reserves (Reserve C). Additionally, where structures are installed within or across waterways that potentially interfere with the passage of fish or the quality of aquatic habitat, these activities should be referred to DEPI with the Port Phillip and Western Port CMA included for comment.

7.7 Catchment and Land Protection Act 1994 (Victoria)

The *Catchment and Land Protection Act 1994* (CaLP Act) contains provisions relating to catchment planning, land management, noxious weeds and pest animals. The Act also provides a legislative framework for the management of private and public land and sets out the responsibilities of land managers, stating that they must take all reasonable steps to:

- Avoid causing or contributing to land degradation which causes or may cause damage to land of another land owner;
- Protect water resources;
- Conserve soil;
- Eradicate regionally prohibited weeds;

- Prevent the growth and spread of regionally controlled weeds; and,
- Prevent the spread of, and as far as possible eradicate, established pest animals.

7.7.1 Implications

A number of weeds listed as noxious under the CaLP Act were recorded during the assessment (Spear Thistle *Cirsium vulgare*, Artichoke Thistle *Cynara cardunculus*, African Box-thorn *Lycium ferocissimum*, Chilean Needle-grass *Nassella neesiana* and Serrated Tussock *Nassella trichotoma*) (Appendix 2.1). Similarly, there is evidence that the reserves are currently occupied by several pest fauna species listed under the CaLP Act (Fox *Vulpes vulpes* and European Rabbit *Oryctolagus cuniculus*).

These matters are currently being addressed by Practical Ecology Pty Ltd, who have been conducting pest plant and animal control works as required under the approved Conservation Management Plan, in order to address the requirements of the CaLP Act and minimise any effects on ecological values.

8 FURTHER REQUIREMENTS

Further requirements associated with any proposed changes to the reserves are provided below (Table 4).

Table 4. Further requirements associated with development of the reserves

Relevant Legislation	Implications	Further Action
Environment Protection and Biodiversity Conservation Act 1999	There is a possibility that the Conservation Agreement pertaining to the site may be terminated between the Commonwealth Environment Minister and Galaway Holdings Pty Ltd in accordance with subsection 308(3) of the EPBC Act. However, a referral to the Commonwealth Environment Minister will be required for any action impacting the reserves (including termination of the agreement) which is not in accordance with the Conservation Management Plan (Biosis 1998). Five species listed under the EPBC Act (Spiny Rice-flower, Large-headed Fireweed, Golden Sun Moth, Striped Legless Lizard and Growling Grass Frog) have previously been recorded within the reserves. However, Growling Grass Frog habitat is restricted to Reserve C that will not be impacted. There is suitable habitat within the reserves for two additional species (Matted Flax-lily and Small Golden Moths). Targeted surveys may be required to further determine the exact distribution and abundance of all matters of National Environmental Significance. One EPBC Act-listed ecological community (Natural Temperate Grassland of the Victorian Volcanic Plain) is also present within all three of the reserves. A referral to the Minister for Environment will be required if the conservation agreement for Reserves A and B is proposed to be overturned. Furthermore, any proposals for the translocation of significant species will require referral to the DEPI Translocation Evaluation Panel (TEP), and proposals for the translocation of Spiny Rice-flower also require referral to the Pimelea spinescens Recovery Team (PsRT).	Conduct targeted surveys for flora and fauna species listed under the EPBC Act (Section 7.1.5). Liaise with DEPI/DoE regarding the possibility of terminating the Conservation Agreement.
Flora and Fauna Guarantee Act 1988	One FFG listed community was recorded (Western [Basalt] Plains Grassland Community), and there is suitable habitat within the reserves for several species listed or protected under the FFG Act. However, the reserves are privately owned, as such a permit under the FFG Act is not required.	No further action required.
Environment Effects Act 1978	DEPI should be consulted as to whether the proposed removal of vegetation is likely to trigger an EES, although based on the current thresholds it is possible that an EES will be required for removal of all vegetation within Reserves A and B.	Liaise with DEPI to determine whether an EES is required.
Planning and Environment Act 1987	A Planning Permit from Wyndham City Council is required to remove or disturb any native vegetation. The responsible authority may consider the biodiversity objectives of the Port Phillip and Western Port Native Vegetation Plan. Any development within	Prepare and submit a Planning Permit application. Planning Permit conditions are likely to include a requirement for: • Demonstration of impact avoidance and minimisation.

Relevant Legislation	Implications	Further Action
	the reserves should incorporate these objectives.	• Vegetation offsets. • Targeted surveys for significant flora and fauna species. • A Significant Species CMP (as required).
Catchment and Land Protection Act 1994	Several weed species listed under the CaLP Act were recorded within the reserves. To meet requirements under the CaLP Act, listed noxious weeds should be appropriately controlled throughout the reserves.	Noxious weeds should continue to be appropriately controlled throughout the reserves.
Water Act 1989	A 'works on waterways' permit is likely to be required from the Port Phillip and Western Port CMA where any action impacts on waterways within the reserves.	No further action required, unless waterways in Reserve C are impacted.
Wildlife Act 1975	Any persons engaged to conduct salvage and translocation or general handling of terrestrial fauna species must hold a current Management Authorisation.	Ensure wildlife specialists hold a current Management Authorisation.

8.1 Future Considerations

The ongoing management of the Reserves at Williams Landing will present several challenges in the future, and this is particularly pertinent given the future context in which these Reserves are located (i.e. surrounded by residential development. It is well known that one of the most important requirements for the long-term viability of grassland remnants in an urban context is the type and intensity of future management, and having sufficient funding and resources to achieve this. As stated in Williams (2012), it is acknowledged that as the landscape surrounding remnant grasslands change from agricultural to industrial or residential, the impacts of the landscape will also change (e.g. increase in the exotic species from suburban gardens). Conversely, the extent of infestation by exotic grasses may decrease in situations where the grassland is completely surrounded by urban development (i.e. lack of, or reduced sources of infestations) (Williams 2012).

If Reserves A and B are not adequately managed, and threatening processes such as weed invasion, increase nutrient inputs from urban stormwater runoff rom impervious surfaces, rubbish dumping, accumulation of biomass, and unrestricted access from the surrounding development, are not prevented or reduced in the future, species richness and diversity is likely to decrease. Although recent research into grassland management has shown that small isolated grassland reserves can sustain populations of grassland plants in the long term (McCarthy *et al.* 2006), this depends on the type and intensity of management. In a similar study, Williams *et al.* (2006) assessed how both the spatial attributes of remnant patches (area and isolation) and landscape (extent of urbanisation and maximum interface interval) influence the persistence of native species in grasslands west of Melbourne. They found that on average 26% of populations of native species became locally extinct over two decades, and that native grasslands are relatively insensitive to the area and isolation of the remnant, but 'road density and changes to fire regimes (long maximum fire intervals) have greater influence on the local extinction of plants in grassland remnants' (Williams *et al.* 2006)..

It is well documented that grassland communities function on a shorter ecological timeframe compared with other vegetation communities such as forests and woodlands. Grasslands require disturbance regimes or biomass reduction such as grazing and/or fire to maintain floristic diversity and composition, and this is frequently difficult to achieve in an urban context. Given the spatial context and the current weed levels in Reserve A and B, there is likely to be a requirement for a substantially greater management commitment by the land manage in the future, including regularly biomass control (i.e. burning).

Despite the inherent difficulty and long-term management requirements for smaller grassland remnants in urban areas, there are several similar species-rich grasslands that have been reserved and successfully managed for conservation (e.g. William Angliss Grassland, Mt Derrimut Grassland, Laverton Creek Grassland Reserve north of Boundary Road, Central Creek and Denton Avenue Grassland Reserves). In addition, Stuwe (1986) and Kilkpatrick *et al.* (1995) provide further evidence of the persistence of highly diverse grassland remnants in small cemeteries, and narrow road and rail reserves since the surrounding landscape was developed for agriculture in the mid-nineteenth century (In: Williams *et al.* 2006).

A broader strategic perspective / approach may be considered by DEPI and DoE as part of Cedar Woods Properties' proposed removal of Reserve A and B. For example, the security, protection and management of a substantially larger grassland (i.e. several times the area of the Reserves) may be considered by the Government to compensate for any permitted removal of the Reserves. Indeed, the current approach under Melbourne's Strategic Assessment and the recently approved Biodiversity Conservation Strategy (BCS) under Part 10 of the EPBC Act (i.e. approval under the Commonwealth) will result in the security of smaller grassland reserves within the Urban Growth Boundary (UGB), and lead to the protection and future management of the 15,000 hectare Western Grassland Reserve located outside the UGB.

Finally, for any proposal to overturn Reserve A and B a suitable offset site(s) will need be sourced and secured (i.e. on-title agreement), and the offset site(s) would need to: 1) be as large as possible, 2) be of high quality (high species diversity), 3) ideally be connected to other grassland remnants, and 4) support populations of significant flora and fauna grassland species. An offset site(s) would preferably be located outside the UGB, in a rural context, where threatening processes are not present or lower than at Williams Landing, and where ecological burns can be undertaken without disrupting large numbers of residents.

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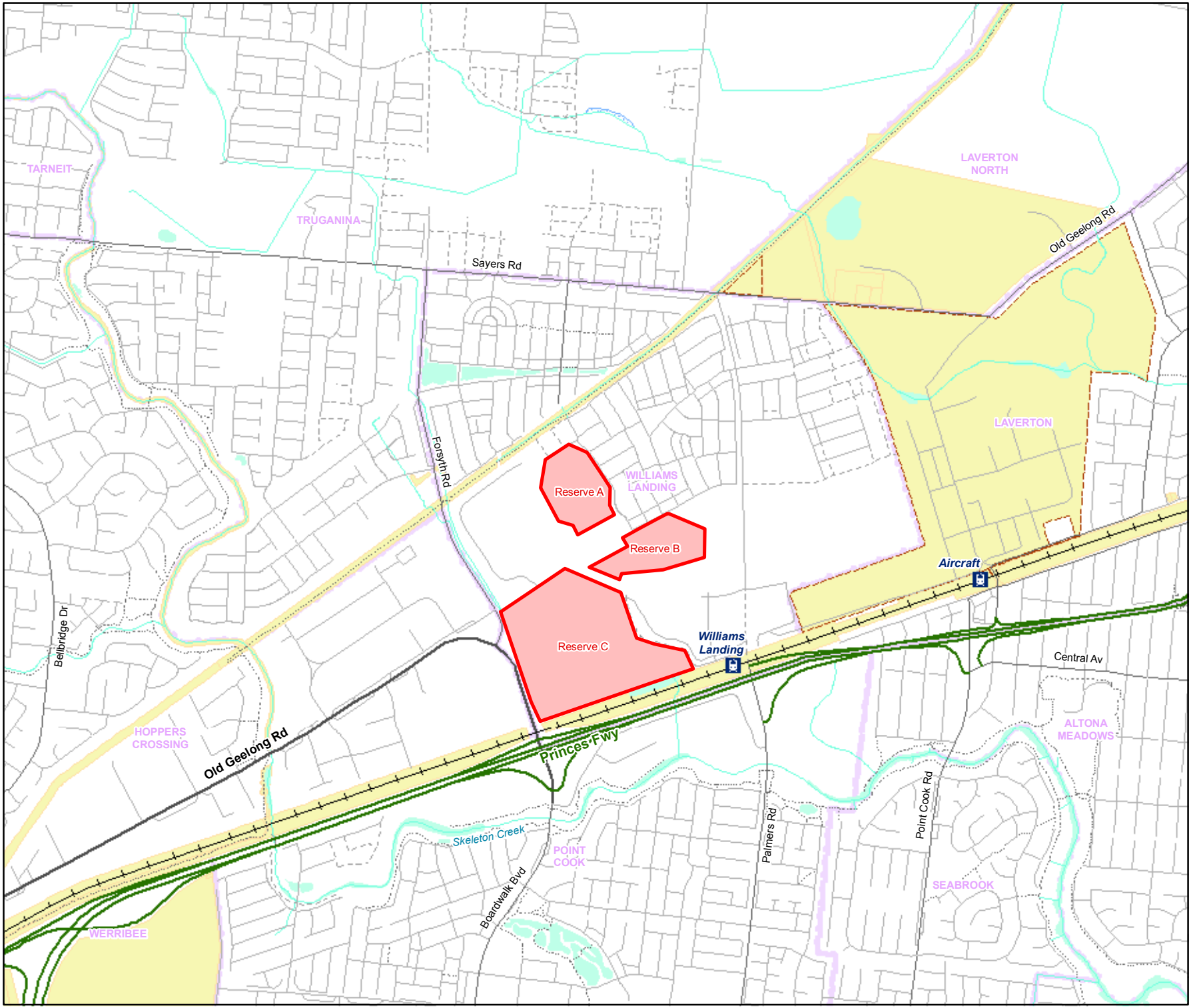
FIGURES



Legend

- Study Area
- Freeway
- Major Road
- Collector Road
- Minor Road
- Proposed Road
- Walking Track
- Minor Watercourse
- Permanent Waterbody
- Land Subject to Inundation
- Crown Land
- Localities

Figure 1

Location of the study area

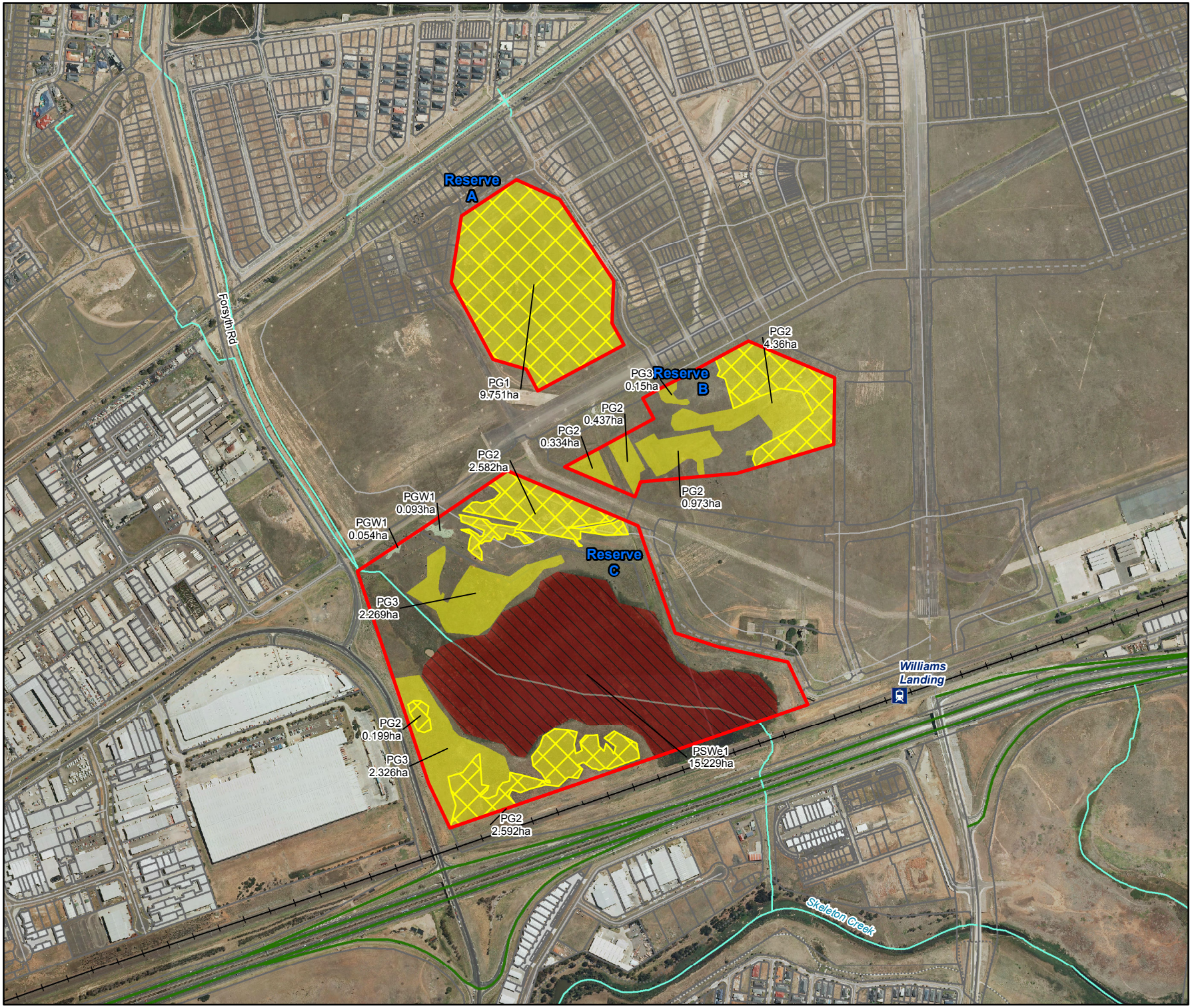
Williams Landing

N

0 250 500

Metres

ecology & heritage partners



Legend

Study Area

Vegetation

- Plains Grassland
- Plains Grassy Woodland
- Plains Sedgy Wetland
- Natural Temperate Grassland of the Victorian Volcanic Plain

Figure 2

Remnant Vegetation within the study area

Williams Landing

N

0 105 210

Metres

ecology & heritage partners

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Legend

- Arching Flax-lily
- Austral Crane's-bill
- Basalt Podolepis
- Buloke
- Button Wrinklewort
- Coast Hollyhock
- Coast Saltwort
- Coast Wirilda
- Creeping Rush
- Large-headed Fireweed
- Matted Flax-lily
- Pale Swamp Everlasting
- Pale-flower Crane's-bill
- Plump Swamp Wallaby-grass
- River Swamp Wallaby-grass
- Salt Lawrencia
- Sand Brome
- Small Golden Moths
- Spiny Rice-flower
- Sunshine Diuris
- Tough Scurf-pea
- Study Area

Figure 3

Previously documented significant flora within 5km of the study area

Williams Landing

N

0 0.75 1.5

Kilometres

ecology & heritage partners

Legend

- Australasian Bittern
- Australasian Shoveler
- Baillon's Crake
- Black Falcon
- Black-eared Cuckoo
- Black-faced Cormorant
- Black-tailed Godwit
- Blue-billed Duck
- Brown Quail
- Cape Barren Goose
- Caspian Tern
- Common Sandpiper
- Eastern Curlew
- Eastern Great Egret
- Fairy Tern
- Glossy Ibis
- Golden Sun Moth
- Great Knot
- Grey Plover
- Grey-tailed Tattler
- Growling Grass Frog
- Hardhead
- Intermediate Egret
- Latham's Snipe
- Lesser Sand Plover
- Lewin's Rail
- Little Egret
- Little Tern
- Long-toed Stint
- Magpie Goose
- Musk Duck
- Nankeen Night Heron
- Pacific Golden Plover
- Pacific Gull
- Pectoral Sandpiper
- Pied Cormorant
- Red Knot
- Royal Spoonbill
- Sanderling
- Sooty Oystercatcher
- Spotted Harrier
- Striped Legless Lizard
- Swift Parrot
- Terek Sandpiper
- Whiskered Tern
- White-winged Black Tern
- Wood Sandpiper
- Yellow Sedge-skipper
- Study Area

Figure 4

Previously documented significant fauna within 5km of the study area

Williams Landing

N

0 0.75 1.5

Kilometres

ecology & heritage partners

APPENDICES

APPENDIX 1

Appendix 1.1 – Rare or Threatened Categories for Listed Victorian Taxa

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

Rare or Threatened Categories
Conservation Status in Australia (Based on the EPBC Act 1999)
EX - Extinct: Extinct is when there is no reasonable doubt that the last individual of the species has died.
CR - Critically Endangered: A species is critically endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
EN - Endangered: A species is endangered when it is not critically endangered but is facing a very high risk of extinction in the wild in the near future.
VU - Vulnerable: A species is vulnerable when it is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term future.
R* - Rare: A species is rare but overall is not currently considered critically endangered, endangered or vulnerable.
K* - Poorly Known: A species is suspected, but not definitely known, to belong to any of the categories extinct, critically endangered, endangered, vulnerable or rare.
Conservation Status in Victoria (Based on DSE 2005, DSE 2009, DSE 2013)
x - Presumed Extinct in Victoria: not recorded from Victoria during the past 50 years despite field searches specifically for the plant, or, alternatively, intensive field searches (since 1950) at all previously known sites have failed to record the plant.
e - Endangered in Victoria: at risk of disappearing from the wild state if present land use and other causal factors continue to operate.
v - Vulnerable in Victoria: not presently endangered but likely to become so soon due to continued depletion; occurring mainly on sites likely to experience changes in land-use which would threaten the survival of the plant in the wild; or, taxa whose total population is so small that the likelihood of recovery from disturbance, including localised natural events such as drought, fire or landslip, is doubtful.
r - Rare in Victoria: rare but not considered otherwise threatened - there are relatively few known populations or the taxon is restricted to a relatively small area.
k - Poorly Known in Victoria: poorly known and suspected, but not definitely known, to belong to one of the above categories (x, e, v or r) within Victoria. At present, accurate distribution information is inadequate.

Appendix 1.2 – Defining Ecological Significance

Table A1.2. Criteria for defining Ecological Significance ratings for significant flora, fauna and communities

National Significance
Flora: National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. extinct, critically endangered, endangered, vulnerable).
Fauna: National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. Extinct, Critically Endangered, Endangered, Vulnerable). Fauna listed as Extinct, Critically Endangered, Endangered, Vulnerable, or Rare under National Action Plans for terrestrial taxon prepared for DoE: threatened marsupials and monotremes (Maxwell *et al.* 1996), rodents (Lee 1995), bats (Duncan *et al.* 1999), birds (Garnett and Crowley 2000), reptiles (Cogger *et al.* 1993), amphibians (Tyler 1997) and butterflies (Sands and New 2002).
Communities: Vegetation communities considered critically endangered, endangered or vulnerable under the EPBC Act and considering vegetation condition.
State Significance
Flora: Threatened taxa listed under the provisions of the FFG Act. Flora listed in the State Government's Advisory List of Rare or Threatened Plants in Victoria (DSE 2005).
Fauna: Threatened taxon listed under Schedule 2 of the FFG Act. Fauna listed as Extinct, Critically Endangered, Endangered and Vulnerable on the State Government's Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013). Listed as Lower Risk (Near Threatened, Conservation Dependent or Least concern) or Data Deficient under National Action Plans for terrestrial species prepared for the DoE: threatened marsupials and monotremes (Maxwell *et al.* 1996), rodents (Lee 1995), bats (Duncan et al. 1999), birds (Garnett and Crowley 2000), reptiles (Cogger *et al.* 1993), amphibians (Tyler 1997) and butterflies (Sands and New 2002).
Communities: Ecological communities listed as threatened under the FFG Act. EVC listed as threatened (i.e. endangered, vulnerable) or rare in a Native Vegetation Plan for a particular bioregion (DSE 2013c) and considering vegetation condition.
Regional Significance
Fauna: Fauna with a disjunct distribution, or a small number of documented recorded or naturally rare in the particular Bioregion in which the reserves is located. A particular taxon that is has an unusual ecological or biogeographical occurrence or listed as Lower Risk – Near Threatened, Data Deficient or Insufficiently Known on the State Government's Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013).
Communities: EVC listed as depleted or least concern in a Native Vegetation Plan for a particular bioregion (DSE 2013c) and considering vegetation condition. EVC considered rare by the author for a particular bioregion.
Local Significance
Local significance is defined as flora, fauna and ecological communities indigenous to a particular area, which are not considered rare or threatened on a national, state or regional level.

Appendix 1.3 – Defining Site Significance

Table A1.3. Criteria for defining Site Significance ratings

National Significance
A site is of National significance if: • It regularly supports, or has a high probability of regularly supporting individuals of a taxon listed as 'Critically Endangered' or 'Endangered' under the EPBC Act and/or under National Action Plans for terrestrial taxon prepared for the DoE. • It regularly supports, or has a high probability of supporting, an 'important population' as defined under the EPBC Act of one or more nationally 'vulnerable' flora and fauna taxon. • It is known to support, or has a high probability of supporting taxon listed as 'Vulnerable' under National Action Plans. • It is known to regularly support a large proportion (i.e. greater than 1%) of a population of a taxon listed as 'Conservation Dependent' under the EPBC Act and/or listed as Rare or Lower Risk (near threatened, conservation dependent or least concern) under National Action Plans. • It contains an area, or part thereof designated as 'critical habitat' under the EPBC Act, or if the site is listed under the Register of National Estate compiled by the Australian Heritage Commission. • It is a site which forms part of, or is connected to a larger area(s) of remnant native vegetation or habitat of national conservation significance such as most National Park, and/or a Ramsar Wetland(s).
State Significance
A site is of State significance if: • It occasionally (i.e. every 1 to 5 years) supports, or has suitable habitat to support taxon listed as 'Critically Endangered' or 'Endangered' under the EPBC Act and/or under National Action Plans. • It regularly supports, or has a high probability of regularly supporting (i.e. high habitat quality) taxon listed as 'Vulnerable', 'Near threatened', 'Data Deficient' or 'Insufficiently Known' in Victoria (DSE 2005, 2013), or species listed as 'Data Deficient' or 'Insufficiently Known' under National Action Plans. • It contains an area, or part thereof designated as 'critical habitat' under the FFG Act. • It supports, or likely to support a high proportion of any Victorian flora and fauna taxa. • It contains high quality, intact vegetation/habitat supporting a high species richness and diversity in a particular bioregion. • It is a site which forms part of, or connected to a larger area(s) of remnant native vegetation or habitat of state conservation significance such as most State Parks and/or Flora and Fauna Reserves.
Regional Significance
A site is of Regional significance if: • It regularly supports, or has a high probability of regularly supporting regionally significant fauna as defined in Table 1.2. • Is contains a large population (i.e. greater than 1% or 5%) of flora considered rare in any regional native vegetation plan for a particular bioregion. • It supports a fauna population with a disjunct distribution, or a particular taxon that has an unusual ecological or biogeographical occurrence. • It is a site which forms part of, or is connected to a larger area(s) of remnant native vegetation or habitat of regional conservation significance such as most Regional Parks and/or Flora and Fauna Reserves.
Local Significance
Most sites are considered to be of at least local significant for conservation, and in general a site of local significance can be defined as: • An area which supports indigenous flora species and/or a remnant EVC, and habitats used by locally significant fauna species. • An area which currently acts, or has the potential to act as a wildlife corridor linking other areas of higher conservation significance and facilitating fauna movement throughout the landscape.

Appendix 1.4 – Defining Vegetation Condition

Table A1.4. Defining Vegetation Condition ratings

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

Appendix 1.5 – Defining Habitat Quality

Table A1.5. Defining Habitat Quality

Criteria for defining Habitat Quality
High Quality: • High degree of intactness (i.e. floristically and structurally diverse), containing several important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component. • High species richness and diversity (i.e. represented by a large number of species from a range of fauna groups). • High level of foraging and breeding activity, with the site regularly used by native fauna for refuge and cover. • Habitat that has experienced, or is experiencing low levels of disturbance and/or threatening processes (i.e. weed invasion, introduced animals, soil erosion, salinity). • High contribution to a wildlife corridor, and/or connected to a larger area(s) of high quality habitat. • Provides known, or likely habitat for one or more rare or threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DSE 2005; 2009 or 2013.
Moderate Quality: • Moderate degree of intactness, containing one or more important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component. • Moderate species richness and diversity - represented by a moderate number of species from a range of fauna groups. • Moderate levels of foraging and breeding activity, with the site used by native fauna for refuge and cover. • Habitat that has experienced, or is experiencing moderate levels of disturbance and/or threatening processes. • Moderate contribution to a wildlife corridor, or is connected to area(s) of moderate quality habitat. • Provides potential habitat for a small number of threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DSE 2005; 2009 or 2013.
Low Quality: • Low degree of intactness, containing few important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component. • Low species richness and diversity (i.e. represented by a small number of species from a range of fauna groups). • Low levels of foraging and breeding activity, with the site used by native fauna for refuge and cover. • Habitat that has experienced, or is experiencing high levels of disturbance and/or threatening processes. • Unlikely to form part of a wildlife corridor, and is not connected to another area(s) of habitat. • Unlikely to provide habitat for rare or threatened species listed under the EPBC Act, FFG Act, or considered rare or threatened according to DSE 2005; 2009 or 2013.

Appendix 1.6 – Permit Exemptions and Vegetation Offsets

Table A1.6.1. Permit exemptions (from Victorian Planning Provisions Clause 52.17 -6)

No permit is required to remove, destroy or lop native vegetation to the minimum extent necessary if any of the following apply:	
Property size	A permit is not required for removal of native vegetation if the native vegetation is on land which, together with all contiguous land in one ownership, has an area of less than 0.4 hectares. This exemption does not apply to native vegetation within a road reservation.
Lopping or pruning	Generally, minor lopping or pruning of up to a third of the foliage (not including the trunk) that does not affect the continued health of the tree does not require a permit or attract an offset requirement.
Regrowth	A permit is not generally not required for removal of native vegetation that is For regrowth which has naturally established or regenerated on land lawfully cleared of naturally established native vegetation and is: a) Less than 10 years old; or, b) Bracken (*Pteridium esculentum*); or, c) Less than ten years old at the time of a Property Vegetation Plan being signed by the Secretary of the Department of Environment and Primary Industries (as constituted under Part 2 of the *Conservation, Forest and Lands Act 1987*), and is shown on that Plan as being 'certified regrowth', and is on land that is to be used or maintained for cultivation or pasture during the term of that Plan; or, d) Within the boundary of a timber production plantation, as indicated on a Plantation Development Notice or other documented record, and has established after the plantation. This exemption does not apply to land on which native vegetation has been cleared or otherwise destroyed or damaged as a result of flood, fire or other natural disaster.
Weeds	A permit is not required for removal of native vegetation to enable the removal or destruction of a weed listed in the schedule to the clause. The maximum extent of native vegetation removed, destroyed or lopped under this exemption on contiguous land in the same ownership in a five year period must not exceed any of the following: a) 1 hectare of native vegetation which does not include a tree; or, b) 15 native trees if each tree has a DBH of less than 20.
Planted vegetation	The removal of planted trees does not require a permit or attract an offset requirement, except if public funding was provided to assist in planting or managing the native vegetation and the terms of the funding did not anticipate removal or harvesting of the vegetation.
Other	Numerous additional exemptions apply to works relating to approvals granted prior to 15 September 2008, fencing, mowing, stone exploration / extraction, utility maintenance, crown land, emergency works, works in Farming Zone and Rural Activity Zone, fire protection, geothermal energy exploration, grazing, greenhouse gas sequestration, harvesting timber, mineral exploration / extraction, pest animal burrow removal, road safety, stock movement on roads and surveying. See Clause 52.17 -6 for details.

APPENDIX 2 - FLORA

Appendix 2.1 – Flora Results

Table A2.1. Flora recorded within the reserves

Scientific Name	Common Name
Acacia pycnantha	Golden Wattle
Acacia saligna	Golden Wreath Wattle
Aira elegantissima	Delicate Hair-grass
Amphibromus nervosus	Common Swamp Wallaby-grass
Austrodanthonia caespitosa	Common Wallaby-grass
Austrodanthonia duttoniana	Brown-back Wallaby-grass
Austrodanthonia racemosa var. *racemosa*	Slender Wallaby-grass
Austrodanthonia setacea	Bristly Wallaby-grass
Austrostipa bigeniculata	Kneed Spear-grass
*Avena fatua**	Wild Oat
*Brassica rapa**	White Turnip
*Briza maxima**	Large Quaking-grass
*Bromus hordeaceus**	Soft Brome
*Carex appressa**	Tall Sedge
Cassinia arcuata	Drooping Cassinia
*Centaurium erythraea**	Common Centaury
Chrysocephalum apiculatum s.s.	Common Everlasting
*Cirsium vulgare***	Spear Thistle
Clematis microphylla s.s.	Small-leaved Clematis
Convolvulus angustissimus subsp. *angustissimus*	Blushing Bindweed
*Conyza bonariensis**	Flaxleaf Fleabane
*Cynara cardunculus***	Artichoke Thistle
*Cynodon dactylon**	Couch
*Cyperus eragrostis**	Drain Flat-sedge
Dianella admixta	Black-anther Flax-lily
Dichondra repens	Kidney-weed
Einadia nutans subsp. *nutans*	Nodding Saltbush
Eleocharis acuta	Common Spike-sedge
Epilobium billardierianum	Variable Willow-herb
Eragrostis australasica	Cane Grass
Eryngium ovinum	Blue Devil

Scientific Name	Common Name
Eryngium vesiculosum	Prickfoot
Euchiton sphaericus	Annual Cudweed
*Helminthotheca echioides**	Ox-tongue
Juncus flavidus	Gold Rush
Juncus pallidus	Pale Rush
Juncus spp.	Rush
Lachnagrostis filiformis s.s.	Common Blown-grass
*Lactuca serriola**	Prickly Lettuce
Leontodon taraxacoides subsp. *taraxacoides**	Hairy Hawkbit
*Lycium ferocissimum***	African Box-thorn
Marsilea drummondii	Common Nardoo
Muehlenbeckia florulenta	Tangled Lignum
Myriophyllum spp.	Water Milfoil
*Nassella neesiana***	Chilean Needle-grass
*Nassella trichotoma***	Serrated Tussock
Oxalis perennans	Grassland Wood-sorrel
*Pennisetum clandestinum**	Kikuyu
Persicaria decipiens	Slender Knotweed
*Phalaris aquatica**	Toowoomba Canary-grass
*Phalaris minor**	Lesser Canary-grass
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower
Plantago coronopus subsp. *commutata**	Buck's-horn Plantain
*Plantago lanceolata**	Ribwort
Poa labillardierei	Common Tussock-grass
Potamogeton tepperi	Floating Pondweed
*Romulea rosea**	Onion Grass
*Rosa rubiginosa**	Sweet Briar
*Salvia verbenaca**	Wild Sage
Sclerolaena muricata	Black Roly-poly
Senecio macrocarpus	Large-headed Fireweed
*Sonchus oleraceus**	Common Sow-thistle
Themeda triandra	Kangaroo Grass
Trifolium angustifolium var. *angustifolium**	Narrow-leaf Clover
Typha domingensis	Narrow-leaf Cumbungi
Vittadinia gracilis	Woolly New Holland Daisy
*Vulpia myuros**	Rat's-tail Fescue

Notes: * = Exotic species, ** = Noxious weed

Appendix 2.2 – Significant Flora Species

Table A2.2 Significant flora recorded within 10 kilometres of the reserves

Key:

X	Extinct
e	Endangered
v	Vulnerable
r	Rare
k	Poorly Known
L	Listed
EX	Extinct
CR	Critically endangered
EN	Endangered
VU	Vulnerable
K	Poorly Known (Briggs and Leigh 1996)
#	Records identified from EPBC Act Protected Matters Search Tool.
*	Records identified from the FIS
^	Records identified from Meredith et al (1992)

EPBC	Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
FFG	Flora and Fauna Guarantee Act 1988 (FFG Act)
DSE	Advisory List of Threatened Flora in Victoria (DSE 2005)
1	Known Occurrence: Recorded within the reserves recently (i.e. within ten years)
2	High Likelihood: Previous records of the species in the local vicinity; and/or, the reserves contains areas of high quality habitat.
3	Moderate Likelihood: Limited previous records of the species in the local vicinity; and/or, the reserves contains poor or limited habitat.
4	Low Likelihood: Poor or limited habitat for the species however other evidence (such as a lack of records or environmental factors) indicates there is a very low likelihood of presence.
5	Unlikely: No suitable habitat and/or outside the species range.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DSE	Likelihood of occurrence
NATIONAL SIGNIFICANCE							
# *Amphibromus fluitans*	River Swamp Wallaby-grass	2	1991	VU	-	-	4
Ballantinia antipoda	Southern Shepherd's Purse	1	1866	EN	L	e	4
# *Carex tasmanica*	Curly Sedge	-	-	VU	L	v	4
# *Dianella amoena*	Matted Flax-lily	1	2004	EN	L	e	3 (previous recorded within the reserve in 2000)
# *Diuris basaltica*	Small Golden Moths	5	2000	EN	L	v	3
# *Diuris fragrantissima*	Sunshine Diuris	5	2005	EN	L	e	4
# *Glycine latrobeana*	Clover Glycine	1	1899	VU	L	v	4
**Goodenia macbarronii*	Narrow Goodenia	1	2009	VU	L	v	4
Lepidium hyssopifolium	Basalt Peppercress	3	1984	EN	L	e	4
# *Pimelea spinescens* subsp. *spinescens*	Spiny Rice-flower	57	2008	CR	L	e	1
# *Prasophyllum frenchii*	Maroon Leek-orchid	-	-	EN	L	e	4
Prasophyllum suaveolens	Fragrant Leek-orchid	4	1953	EN	L	e	4
# *Rutidosis leptorhynchoides*	Button Wrinklewort	15	2004	EN	L	e	3
# *Senecio macrocarpus*	Large-headed Fireweed	11	2006	VU	L	e	1
Thesium australe	Austral Toad-flax	1	1906	VU	L	v	4
STATE SIGNIFICANCE							
Acacia uncifolia	*Coast Wirilda*	*1*	*1990*	-	-	*r*	*5*
Allocasuarina luehmannii	*Buloke*	*1*	*1981*	-	*L*	-	*5*
Alternanthera sp. 1 (Plains)	*Plains Joyweed*	*10*	*2006*	-	-	*k*	*5*
Amphibromus pithogastrus	*Plump Swamp Wallaby-grass*	*3*	*2004*	-	*L*	*e*	*4*

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DSE	Likelihood of occurrence
**Asperula wimmerana*	*Wimmera Woodruff*	1	2011	-	-	r	5
Asplenium obtusatum subsp. *northlandicum*	*Shore Spleenwort*	1	1996	-	-	v	5
Atriplex paludosa subsp. *paludosa*	*Marsh Saltbush*	5	1996	-	-	r	5
Avicennia marina subsp. *australasica*	*Grey Mangrove*	5	1996	-	-	r	5
Bromus arenarius	*Sand Brome*	2	1984	-	-	r	5
**Clematis decipiens*	*Slender Clematis*	1	1902	-	-	k	5
Comesperma polygaloides	*Small Milkwort*	15	2002	-	L	v	5
Convolvulus angustissimus subsp. *omnigracilis*	*Slender Bindweed*	39	2008	-	-	k	2
Cullen parvum	*Small Scurf-pea*	2	2004	-	L	e	4
Cullen tenax	*Tough Scurf-pea*	6	2006	-	L	e	3
**Cuscuta australis*	*Australian Dodder*	1	1900	-	-	k	3
Desmodium varians	*Slender Tick-trefoil*	1	1986	-	-	k	3
Dianella sp. aff. *longifolia* (Benambra)	*Arching Flax-lily*	5	2006	-	-	v	2
Diuris behrii	*Golden Cowslips*	1	1900	-	-	v	3
Diuris palustris	*Swamp Diuris*	1	1900	-	L	v	3
Eleocharis macbarronii	*Grey Spike-sedge*	6	2006	-	-	k	3
Eleocharis pallens	*Pale Spike-sedge*	3	1999	-	-	k	3
**Eleocharis plana*	*Flat Spike-sedge*	1	1900	-	-	v	3
Eucalyptus globulus subsp. *globulus*	*Southern Blue-gum*	1	1984	-	-	r	5
Geranium solanderi var. *solanderi* s.s.	*Austral Crane's-bill*	2	2005	-	-	v	3
Geranium sp. 3	*Pale-flower Crane's-bill*	4	2006	-	-	r	3
Helichrysum aff. *rutidolepis* (Lowland Swamps)	*Pale Swamp Everlasting*	16	2008	-	-	v	3
Heterozostera tasmanica	*Tasman Grass-wrack*	4	1996	-	-	r	4
Juncus revolutus	*Creeping Rush*	10	1996	-	-	r	3
Lachnagrostis perennis spp. agg.	*Perennial Blown-grass*	8	2007	-	-	k	3
Lawrencia spicata	*Salt Lawrencia*	9	2007	-	-	r	4
Lepidium pseudohyssopifolium	*Native Peppercress*	3	1984	-	-	k	4

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DSE	Likelihood of occurrence
**Lotus australis* var. *australis*	*Austral Trefoil*	*1*	*1900*	-	-	*k*	*4*
Maireana aphylla	*Leafless Bluebush*	*3*	*2002*	-	-	*k*	*4*
Malva preissiana s.s. (white-flowered coastal form)	*Coast Hollyhock*	*1*	*2007*	-	-	*v*	*4*
Nicotiana suaveolens	*Austral Tobacco*	*1*	*1770*	-	-	*r*	*5*
**Myoporum montanum*	*Waterbush*	*1*	*1985*	-	-	*r*	*5*
**Parietaria australis*	*Western Pellitory*	*1*	*1900*	-	-	*r*	*5*
Podolepis sp. 1	*Basalt Podolepis*	*18*	*2006*	-	-	*e*	*1*
**Ranunculus diminutus*	*Brackish Plains Buttercup*	*1*	*2010*	-	-	*r*	*4*
**Rhagodia parabolica*	*Fragrant Saltbush*	*5*	*2010*	-	-	*r*	*4*
Ruppia tuberosa	*Tuberous Tassel*	*1*	*1961*	-	-	*k*	*5*
Salsola tragus subsp. *pontica*	*Coast Saltwort*	*4*	*1987*	-	-	*r*	*5*
Senecio campylocarpus	*Floodplain Fireweed*	*1*	*1905*	-	-	*r*	*4*
Swainsona behriana	*Southern Swainson-pea*	*1*	*1894*	-	-	*r*	*4*
Thelymitra exigua	*Short Sun-orchid*	*1*	*2000*	-	-	*k*	*4*
**Triglochin minutissima*	*Tiny Arrowgrass*	*2*	*1903*	-	-	*r*	*4*
Tripogon loliiformis	*Rye Beetle-grass*	*21*	*2006*	-	-	*r*	*4*

APPENDIX 3 - FAUNA

Appendix 3.1 – Fauna Results

Table A3.1. Fauna recorded within the reserves, and previously recorded within 10 kilometres of the reserves

Key:

H	Heard	Mi	Migratory
S	Seen	Ma	Marine
I	Incidental (feathers, bones, scats etc)	*	Introduced species
T	Trapped / handheld		

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
	MAMMALS					
Platypus	*Ornithorhynchus anatinus*	2006	33	-	-	-
Short-beaked Echidna	*Tachyglossus aculeatus*	2008	6	-	-	-
Fat-tailed Dunnart	*Sminthopsis crassicaudata*	2006	21	-	-	-
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	1881	1	-	-	-
Eastern Barred Bandicoot	*Perameles gunnii*	1982	5	-	-	-
Koala	*Phascolarctos cinereus*	2006	4	-	-	-
Common Brushtail Possum	*Trichosurus vulpecula*	2008	26	Total	-	-
Sugar Glider	*Petaurus breviceps*	2006	1	Total	-	-
Common Ringtail Possum	*Pseudocheirus peregrinus*	2008	7	Partial	-	-
Eastern Grey Kangaroo	*Macropus giganteus*	2006	2	-	-	-
Black Wallaby	*Wallabia bicolor*	2008	2	-	-	-
Grey-headed Flying-fox	*Pteropus poliocephalus*	2006	4	-	-	-
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	1993	2	Total	-	-
White-striped Freetail Bat	*Tadarida australis*	2006	15	Total	-	-
Gould's Wattled Bat	*Chalinolobus gouldii*	2006	2	Total	-	-
Chocolate Wattled Bat	*Chalinolobus morio*	2006	1	Total	-	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Southern Myotis	*Myotis macropus*	2006	1	Partial	-	-
Lesser Long-eared Bat	*Nyctophilus geoffroyi*	2006	8	Total	-	-
Large Forest Bat	*Vespadelus darlingtoni*	2006	2	Total	-	-
Southern Forest Bat	*Vespadelus regulus*	2006	2	Total	-	-
Little Forest Bat	*Vespadelus vulturnus*	2006	5	Total	-	-
Water Rat	*Hydromys chrysogaster*	2007	10	-	-	-
Eastern water rat	*Hydromys chryogaster*	2006	2	-	-	-
House Mouse*	*Mus musculus*	2006	60	-	-	-
Brown Rat*	*Rattus norvegicus*	2001	3	-	-	-
Black Rat*	*Rattus rattus*	2006	15	-	-	-
Dog*	*Canis lupus*	1992	1	-	-	-
Red Fox*	*fam. Canidae gen. Vulpes*	2008	94	-	-	I
Cat*	*Felis catus*	2008	14	-	-	-
Subantarctic Fur Seal	*Arctocephalus tropicalis*	1989	2	-	Ma	-
Australian Fur Seal	*Arctocephalus pusillus*	2005	3	-	Ma	-
Leopard Seal	*Hydrurga leptonyx*	1968	1	-	Ma	-
Crabeater Seal	*Lobodon carcinophagus*	1954	1	-	Ma	-
European Rabbit*	*Oryctolagus cuniculus*	2008	121	-	-	S
European Hare*	*Lepus europeaus*	2008	57	-	-	S
	BIRDS					
Emu	*Dromaius novaehollandiae*	2004	1	-	-	-
Stubble Quail	*Coturnix pectoralis*	2008	43	-	Ma	-
Brown Quail	*Coturnix ypsilophora australis*	2008	64	-	-	-
Chukar Partridge*	*Alectoris chukar*	2008	1	-	-	-
Magpie Goose	*Anseranas semipalmata*	2007	3	-	Ma	-
Musk Duck	*Biziura lobata*	2006	57	-	Ma	-
Freckled Duck	*Stictonetta naevosa*	2007	8	-	-	-
Cape Barren Goose	*Cereopsis novaehollandiae*	2006	10	-	Ma	-
Black Swan	*Cygnus atratus*	2008	473	-	-	-
Australian Shelduck	*Tadorna tadornoides*	2007	227	Total	-	-
Australian Wood Duck	*Chenonetta jubata*	2007	44	Total	-	S
Pink-eared Duck	*Malacorhynchus membranaceus*	2007	48	Partial	-	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Australasian Shoveler	*Anas rhynchotis*	2007	127	-	-	-
Grey Teal	*Anas gracilis*	2007	383	Total	-	-
Chestnut Teal	*Anas castanea*	2007	416	Total	-	-
Northern Mallard*	*Anas platyrhynchos*	2004	24	-	-	-
Pacific Black Duck	*Anas superciliosa*	2008	414	-	-	S
Hardhead	*Aythya australis*	2006	88	-	-	-
Blue-billed Duck	*Oxyura australis*	2002	29	-	-	-
Australasian Grebe	*Tachybaptus novaehollandiae*	2008	144	-	-	-
Hoary-headed Grebe	*Poliocephalus poliocephalus*	2007	287	-	-	-
Great Crested Grebe	*Podiceps cristatus*	2006	28	-	-	-
Rock Dove*	*Columba livia*	2008	156	-	-	S
Spotted Turtle-Dove*	*Streptopelia chinensis*	2008	193	-	-	S
Common Bronzewing	*Phaps chalcoptera*	2006	5	-	-	-
Peaceful Dove	*Geopelia striata*	1950	1	-	-	-
Tawny Frogmouth	*Podargus strigoides*	2006	2	-	-	-
Australian Owlet-nightjar	*Aegotheles cristatus*	2006	1	Total	-	-
White-throated Needletail	*Hirundapus caudacutus*	2008	13	-	Mi/Ma	-
Fork-tailed Swift	*Apus pacificus*	2007	11	-	Mi/Ma	-
White-faced Storm-Petrel	*Pelagodroma marina*	2007	4	-	Ma	-
Shy Albatross	*Thalassarche cauta*	1956	2	-	Mi/Ma	-
Southern Fulmar	*Fulmarus glacialoides*	1987	2	-	Ma	-
Fairy Prion	*Pachyptila turtur*	1999	2	-	Ma	-
Short-tailed Shearwater	*Puffinus tenuirostris*	2007	10	-	Mi/Ma	-
Fluttering Shearwater	*Puffinus gavia*	2007	7	-	Ma	-
Hutton's Shearwater	*Puffinus huttoni*	1950	1	-	Ma	-
Common Diving-Petrel	*Pelecanoides urinatrix*	1999	1	-	Ma	-
Little Penguin	*Eudyptula minor*	1992	12	-	-	-
Australasian Gannet	*Morus serrator*	2006	43	-	Ma	-
Darter	*Anhinga novaehollandiae*	2007	12	-	-	-
Little Pied Cormorant	*Microcarbo melanoleucos*	2008	329	-	-	-
Great Cormorant	*Phalacrocorax carbo*	2006	124	-	-	-
Little Black Cormorant	*Phalacrocorax sulcirostris*	2007	259	-	-	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Pied Cormorant	*Phalacrocorax varius*	2006	195	-	-	-
Black-faced Cormorant	*Phalacrocorax fuscescens*	2008	6	-	Ma	-
Australian Pelican	*Pelecanus conspicillatus*	2008	324	-	Ma	-
Australasian Bittern	*Botaurus poiciloptilus*	2008	24	-	-	-
Little Bittern	*Ixobrychus minutus dubius*	1980	3	-	-	-
White-necked Heron	*Ardea pacifica*	2008	48	-	-	-
Eastern Great Egret	*Ardea modesta*	2007	176	-	Mi/Ma	-
Intermediate Egret	*Ardea intermedia*	2007	12	-	Ma	-
Cattle Egret	*Ardea ibis*	2007	38	-	Mi/Ma	-
White-faced Heron	*Egretta novaehollandiae*	2008	425	-	-	-
Little Egret	*Egretta garzetta nigripes*	2007	148	-	Ma	-
Nankeen Night Heron	*Nycticorax caledonicus hillii*	2007	21	-	Ma	-
Glossy Ibis	*Plegadis falcinellus*	2008	22	-	Mi/Ma	-
Australian White Ibis	*Threskiornis molucca*	2008	296	-	Ma	S
Straw-necked Ibis	*Threskiornis spinicollis*	2008	149	-	Ma	-
Royal Spoonbill	*Platalea regia*	2008	153	-	-	-
Yellow-billed Spoonbill	*Platalea flavipes*	2008	100	-	-	-
Black-shouldered Kite	*Elanus axillaris*	2008	144	-	-	-
Letter-winged Kite	*Elanus scriptus*	1978	2	-	-	-
Black-breasted Buzzard	*Hamirostra melanosternon*	1998	1	-	-	-
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	2008	4	-	Mi/Ma	-
Whistling Kite	*Haliastur sphenurus*	2007	51	-	Ma	S
Black Kite	*Milvus migrans*	2006	7	-	-	-
Brown Goshawk	*Accipiter fasciatus*	2006	53	-	Ma	-
Collared Sparrowhawk	*Accipiter cirrhocephalus*	1983	7	-	-	-
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	2006	4	-	-	-
Spotted Harrier	*Circus assimilis*	2007	20	-	-	-
Swamp Harrier	*Circus approximans*	2007	109	-	Ma	-
Wedge-tailed Eagle	*Aquila audax*	2007	14	-	-	-
Little Eagle	*Hieraaetus morphnoides*	2008	39	-	-	-
Nankeen Kestrel	*Falco cenchroides*	2007	133	Partial	Ma	S
Brown Falcon	*Falco berigora*	2006	145	-	-	S

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Australian Hobby	*Falco longipennis*	2008	40	-	-	-
Black Falcon	*Falco subniger*	2008	29	-	-	-
Peregrine Falcon	*Falco peregrinus*	2007	19	Partial	-	-
Brolga	*Grus rubicunda*	2006	3	-	-	-
Purple Swamphen	*Porphyrio porphyrio*	2007	177	-	-	-
Lewin's Rail	*Lewinia pectoralis pectoralis*	2008	39	-	Mi	-
Buff-banded Rail	*Gallirallus philippensis*	2006	27	-	-	-
Baillon's Crake	*Porzana pusilla palustris*	2008	29	-	Ma	-
Australian Spotted Crake	*Porzana fluminea*	2008	67	-	-	-
Spotless Crake	*Porzana tabuensis*	2008	37	-	Ma	-
Black-tailed Native-hen	*Gallinula ventralis*	2008	37	-	-	-
Dusky Moorhen	*Gallinula tenebrosa*	2008	241	-	-	-
Eurasian Coot	*Fulica atra*	2008	277	-	-	-
Pied Oystercatcher	*Haematopus longirostris*	2008	106	-	-	-
Sooty Oystercatcher	*Haematopus fuliginosus*	2007	25	-	Ma	-
Red-necked Avocet	*Recurvirostra novaehollandiae*	2007	128	-	Ma	-
Banded Stilt	*Cladorhynchus leucocephalus*	2008	72	-	-	-
Pacific Golden Plover	*Pluvialis fulva*	2007	36	-	Mi/Ma	-
Grey Plover	*Pluvialis squatarola*	1992	9	-	Mi/Ma	-
Red-capped Plover	*Charadrius ruficapillus*	2008	219	-	Ma	-
Double-banded Plover	*Charadrius bicinctus*	2008	50	-	Mi/Ma	-
Lesser Sand Plover	*Charadrius mongolus*	1994	9	-	Mi/Ma	-
Greater Sand Plover	*Charadrius leschenaultii*	1978	3	-	Mi/Ma	-
Oriental Plover	*Charadrius veredus*	1950	1	-	Mi/Ma	-
Black-fronted Dotterel	*Elseyornis melanops*	2006	84	-	-	-
Hooded Plover	*Thinornis rubricollis rubricollis*	1950	2	-	Ma	-
Red-kneed Dotterel	*Erythrogonys cinctus*	2006	49	-	-	-
Banded Lapwing	*Vanellus tricolor*	2008	50	-	-	-
Masked Lapwing	*Vanellus miles*	2008	416	-	-	H
Plains-wanderer	*Pedionomus torquatus*	2008	14	-	-	-
Australian Painted Snipe	*Rostratula benghalensis australis*	1985	8	-	Mi/Ma	-
Latham's Snipe	*Gallinago hardwickii*	2008	48	-	Mi/Ma	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Black-tailed Godwit	*fam. Scolopacidae gen. Limosa*	1986	12	-	Mi/Ma	-
Bar-tailed Godwit	*Limosa lapponica*	2008	31	-	Mi/Ma	-
Little Curlew	*Numenius minutus*	2008	3	-	-	-
Whimbrel	*Numenius phaeopus*	1986	3	-	Mi/Ma	-
Eastern Curlew	*Numenius madagascariensis*	1997	27	-	Mi/Ma	-
Terek Sandpiper	*Xenus cinereus*	1997	8	-	Mi/Ma	-
Common Sandpiper	*Actitis hypoleucos*	2007	28	-	Mi/Ma	-
Grey-tailed Tattler	*Tringa brevipes*	2006	6	-	Mi/Ma	-
Common Greenshank	*Tringa nebularia*	2008	213	-	Mi/Ma	-
Marsh Sandpiper	*Tringa stagnatilis*	2008	89	-	Mi/Ma	-
Wood Sandpiper	*Tringa glareola*	2008	25	-	Mi/Ma	-
Ruddy Turnstone	*Arenaria interpres*	2006	17	-	Mi/Ma	-
Great Knot	*Calidris tenuirostris*	2007	12	-	Mi/Ma	-
Red Knot	*Calidris canutus*	2006	19	-	Mi/Ma	-
Sanderling	*Calidris alba*	1987	9	-	Mi/Ma	-
Little Stint	*Calidris minuta*	2006	2	-	Mi/Ma	-
Red-necked Stint	*Calidris ruficollis*	2008	202	-	Mi/Ma	-
Long-toed Stint	*Calidris subminuta*	2007	13	-	Mi/Ma	-
Pectoral Sandpiper	*Calidris melanotos*	2007	27	-	Mi/Ma	-
Sharp-tailed Sandpiper	*Calidris acuminata*	2008	190	-	Mi/Ma	-
Curlew Sandpiper	*Calidris ferruginea*	2008	166	-	Mi/Ma	-
Stilt Sandpiper	*Calidris himantopus*	2008	332	-	-	-
Buff-breasted Sandpiper	*Tryngites subruficollis*	1984	4	-	Mi/Ma	-
Broad-billed Sandpiper	*Limicola falcinellus*	1986	6	-	Mi/Ma	-
Ruff	*Philomachus pugnax*	2007	9	-	Mi/Ma	-
Wilson's Phalarope	*Steganopus tricolor*	1981	6	-	Ma	-
Red-necked Phalarope	*Phalaropus lobatus*	2006	8	-	Mi/Ma	-
Painted Button-quail	*Turnix varia*	2006	4	-	-	-
Red-chested Button-quail	*Turnix pyrrhothorax*	2006	3	-	-	-
Little Button-quail	*Turnix velox*	1950	1	-	-	-
Oriental Pratincole	*Glareola maldivarum*	1962	2	-	Mi/Ma	-
Australian Pratincole	*Stiltia isabella*	1950	2	-	Ma	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Welcome Swallow	*Petrochelidon neoxena*	2008	342	Partial	-	S
Great Skua	*Stercorarius skua*	1950	1	-	-	-
Pomarine Jaeger	*Stercorarius pomarinus*	2007	5	-	Mi/Ma	-
Arctic Jaeger	*Stercorarius parasiticus*	2008	19	-	Mi/Ma	-
Little Tern	*Sternula albifrons sinensis*	2006	35	-	Mi/Ma	-
Fairy Tern	*Sternula nereis nereis*	1996	28	-	Ma	-
Gull-billed Tern	*Gelochelidon nilotica macrotarsa*	2008	5	-	Ma	-
Caspian Tern	*Hydroprogne caspia*	2008	29	-	Mi/Ma	-
Whiskered Tern	*Chlidonias hybridus javanicus*	2008	127	-	Ma	-
White-winged Black Tern	*Chlidonias leucopterus*	2007	32	-	Mi/Ma	-
White-fronted Tern	*Sterna striata*	1975	1	-	Ma	-
Common Tern	*Sterna hirundo*	2007	81	-	Mi/Ma	-
Pacific Gull	*Larus pacificus pacificus*	2007	257	-	Ma	-
Kelp Gull	*Larus dominicanus*	1977	4	-	Ma	-
Silver Gull	*Chroicocephalus novaehollandiae*	2008	515	-	Ma	-
Galah	*Eolophus roseicapilla*	2008	101	Total	-	H
Long-billed Corella	*Cacatua tenuirostris*	2006	4	Total	-	-
Little Corella	*Cacatua sanguinea*	2006	1	Total	-	-
Sulphur-crested Cockatoo	*Cacatua galerita*	2007	37	Total	-	S
Cockatiel	*Nymphicus hollandicus*	2006	2	Total	-	-
Rainbow Lorikeet	*Trichoglossus haematodus*	2008	14	Total	-	-
Musk Lorikeet	*Glossopsitta concinna*	2007	27	-	-	-
Little Lorikeet	*Glossopsitta pusilla*	2007	15	-	-	-
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*	2007	37	Total	-	-
Australian King-Parrot	*Alisterus scapularis*	1983	2	Total	-	-
Crimson Rosella	*Platycercus elegans*	2008	15	Total	-	-
Eastern Rosella	*Platycercus eximius*	2008	21	Total	-	-
Australian Ringneck	*Barnardius zonarius zonarius*	2008	1	-	-	-
Swift Parrot	*Lathamus discolor*	2006	4	Total	Ma	-
Red-rumped Parrot	*Psephotus haematonotus*	2007	29	-	-	-
Budgerigar	*Melopsittacus undulatus*	1950	1	Partial	-	-
Blue-winged Parrot	*Neophema chrysostoma*	2008	29	Partial	-	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Elegant Parrot	*Neophema elegans*	1950	1	Total	-	-
Orange-bellied Parrot	*Neophema chrysogaster*	2008	18	-	Mi/Ma	-
Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*	2008	71	-	Ma	-
Black-eared Cuckoo	*Chrysococcyx osculans*	2006	3	-	Ma	-
Shining Bronze-Cuckoo	*Chrysococcyx lucidus*	2006	7	-	Ma	-
Pallid Cuckoo	*Cuculus pallidus*	2008	25	-	Ma	-
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	2008	20	-	-	-
Brush Cuckoo	*Cacomantis variolosus*	1929	1	-	-	-
Southern Boobook	*Ninox novaeseelandiae*	2008	12	Total	Ma	-
Masked Owl	*Tyto novaehollandiae novaehollandiae*	2006	1	Total	-	-
Pacific Barn Owl	*Tyto javanica*	2006	18	Partial	-	-
Eastern Grass Owl	*Tyto longimembris*	2007	1	Total	-	-
Laughing Kookaburra	*Dacelo novaeguineae*	2006	15	Total	-	-
Red-backed Kingfisher	*Todiramphus pyrropygia pyrropygia*	1978	1	Partial	-	-
Sacred Kingfisher	*Todiramphus sanctus*	2008	20	Partial	Ma	-
Rainbow Bee-eater	*Merops ornatus*	2006	3	-	Mi/Ma	-
Dollarbird	*Eurystomus orientalis*	2006	1	Total	Ma	-
White-throated Treecreeper	*Cormobates leucophaeus*	2006	1	Total	-	-
Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*	1976	5	Total	-	-
Satin Bowerbird	*Ptilonorhynchus violaceus*	1931	1	-	-	-
Superb Fairy-wren	*Malurus cyaneus*	2008	255	-	-	S
White-browed Scrubwren	*Sericornis frontalis*	2008	54	-	-	-
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	1978	1	-	-	-
Speckled Warbler	*Chthonicola sagittatus*	2006	1	-	-	-
Weebill	*Smicrornis brevirostris*	2006	1	-	-	-
Striated Thornbill	*Acanthiza lineata*	2006	3	-	-	-
Yellow Thornbill	*Acanthiza nana*	2006	18	-	-	-
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	2008	175	-	-	S
Buff-rumped Thornbill	*Acanthiza reguloides*	2006	2	-	-	-
Brown Thornbill	*Acanthiza pusilla*	2006	22	-	-	-
Southern Whiteface	*Aphelocephala leucopsis*	2006	5	-	-	-
Spotted Pardalote	*Pardalotus punctatus*	2006	11	-	-	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Striated Pardalote	*Pardalotus striatus*	2006	12	Partial	-	-
Eastern Spinebill	*Acanthorhynchus tenuirostris*	2008	8	-	-	-
Yellow-faced Honeyeater	*Lichenostomus chrysops*	2006	6	-	-	-
Singing Honeyeater	*Lichenostomus virescens*	2008	38	-	-	-
White-eared Honeyeater	*Lichenostomus leucotis*	1976	3	-	-	-
Yellow-tufted Honeyeater	*Lichenostomus melanops*	2006	1	-	-	-
Fuscous Honeyeater	*Lichenostomus fuscus*	2006	2	-	-	-
White-plumed Honeyeater	*Lichenostomus penicillatus*	2008	226	-	-	S
Bell Miner	*Manorina melanophrys*	1994	1	-	-	-
Noisy Miner	*Manorina melanocephala*	2006	10	-	-	-
Sooty Shearwater	*Puffinus grisea*	1950	1	-	Mi/Ma	-
Little Wattlebird	*Anthochaera chrysoptera*	2008	14	-	-	-
Regent Honeyeater	*Anthochaera phrygia*	1950	2	-	Mi	-
Red Wattlebird	*Anthochaera carunculata*	2008	172	-	-	H
White-fronted Chat	*Epthianura albifrons*	2007	206	-	-	-
Black Honeyeater	*Sugamel niger*	2006	1	-	-	-
Tawny-crowned Honeyeater	*Phylidonyris melanops*	1985	6	-	-	-
Crescent Honeyeater	*Phylidonyris pyrrhoptera*	2006	2	-	-	-
New Holland Honeyeater	*Phylidonyris novaehollandiae*	2008	96	-	-	S
Black-chinned Honeyeater	*Melithripterus gularis gularis*	2006	2	-	-	-
Brown-headed Honeyeater	*Melithreptus brevirostris*	2006	2	-	-	-
White-naped Honeyeater	*Melithreptus lunatus*	2006	5	-	-	-
Little Friarbird	*Philemon citreogularis*	1950	1	-	-	-
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	1902	1	-	-	-
White-browed Babbler	*Pomatostomus superciliosus*	1930	1	-	-	-
Varied Sittella	*Daphoenositta chrysoptera*	2006	4	-	-	-
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	2008	55	-	Ma	-
White-bellied Cuckoo-shrike	*Coracina papuensis*	1999	1	-	Ma	-
White-winged Triller	*Lalage sueurii*	2008	7	-	-	-
Crested Shrike-tit	*Falcunculus frontatus*	2006	8	-	-	-
Olive Whistler	*Pachycephala olivacea*	1950	1	-	-	-
Golden Whistler	*Pachycephala pectoralis*	2008	21	-	-	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Rufous Whistler	*Pachycephala rufiventris*	2008	10	-	-	-
Grey Shrike-thrush	*Colluricincla harmonica*	2006	6	Partial	-	H
Crested Pigeon	*Ocyphaps lophotes*	2008	39	-	-	-
Olive-backed Oriole	*Oriolus sagittatus*	2007	5	-	-	-
White-breasted Woodswallow	*Artamus leucorynchus*	1991	1	-	-	-
Masked Woodswallow	*Artamus personatus*	2006	2	-	-	-
White-browed Woodswallow	*Artamus superciliosus*	2006	6	-	-	-
Dusky Woodswallow	*Artamus cyanopterus*	2007	10	Partial	-	-
Grey Butcherbird	*Cracticus torquatus*	2003	3	-	-	-
Australian Magpie	*Gymnorhina tibicen*	2008	319	-	-	S
Grey Currawong	*Strepera versicolor*	2006	3	-	-	-
Spangled Drongo	*Dicrurus bracteatus*	1950	1	-	-	-
Rufous Fantail	*Rhipidura rufifrons*	2008	7	-	Mi/Ma	-
Grey Fantail	*Rhipidura albiscarpa*	2008	81	-	-	-
Willie Wagtail	*Rhipidura leucophrys*	2008	335	-	-	S
Australian Raven	*Corvus coronoides*	2006	50	-	-	-
Little Raven	*Corvus mellori*	2008	311	-	Ma	S
Leaden Flycatcher	*Myiagra rubecula*	1950	1	-	-	-
Satin Flycatcher	*Myiagra cyanoleuca*	1950	1	-	Mi/Ma	-
Restless Flycatcher	*Myiagra inquieta*	2006	8	-	-	-
Magpie-lark	*Grallina cyanoleuca*	2008	324	-	-	-
White-winged Chough	*Corcorax melanorhamphos*	2006	4	-	-	-
Jacky Winter	*Microeca fascinans*	2006	6	-	-	-
Scarlet Robin	*Petroica boodang*	2008	11	-	-	-
Red-capped Robin	*Petroica goodenovii*	2006	7	-	-	-
Flame Robin	*Petroica phoenicea*	2008	78	-	-	-
Rose Robin	*Petroica rosea*	2000	2	-	-	-
Pink Robin	*Petroica rodinogaster*	1999	6	-	-	-
Hooded Robin	*Melanodryas cucullata cucullata*	2006	2	-	-	-
Eastern Yellow Robin	*Eopsaltria australis*	2006	2	-	-	-
Horsfield's Bushlark	*Mirafra javanica*	2008	33	-	-	-
European Skylark*	*Alauda arvensis*	2008	269	-	-	S

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Golden-headed Cisticola	*Cisticola exilis*	2008	160	-	-	H
Clamorous Reed Warbler	*Acrocephalus stentoreus*	2008	58	-	Mi/Ma	-
Little Grassbird	*Megalurus gramineus*	2008	130	-	-	-
Rufous Songlark	*Cincloramphus mathewsi*	1984	5	-	-	-
Brown Songlark	*Cincloramphus cruralis*	2008	39	-	-	-
Silvereye	*Zosterops lateralis*	2008	96	-	Ma	-
White-backed Swallow	*Cheramoeca leucosternus*	2006	1	-	-	-
Fairy Martin	*Petrochelidon ariel*	2008	50	Partial	-	-
Tree Martin	*Petrochelidon nigricans*	2006	25	Total	Ma	-
Bassian Thrush	*Zoothera lunulata*	1950	1	-	-	-
Common Blackbird*	*Turdus merula*	2008	208	-	-	-
Song Thrush*	*Turdus philomelos*	2008	9	-	-	-
Common Starling*	*Sturnus vulgaris*	2008	379	Partial	-	S
Common Myna*	*Acridotheres tristis*	2008	240	-	-	S
Mistletoebird	*Dicaeum hirundinaceum*	2006	11	-	-	-
Zebra Finch	*Taeniopygia guttata*	2008	14	-	-	-
Red-browed Finch	*Neochmia temporalis*	2007	34	-	-	-
Diamond Firetail	*Stagonopleura guttata*	2006	5	-	-	-
House Sparrow*	*Passer domesticus*	2008	346	-	-	-
Eurasian Tree Sparrow*	*Passer montanus*	2008	54	-	-	-
Australasian Pipit	*Anthus novaeseelandiae*	2008	190	-	Ma	H
European Greenfinch*	*Carduelis chloris*	2008	132	-	-	-
European Goldfinch*	*fam. Fringillidae gen. Carduelis*	2008	244	-	-	-
Domestic Goose*	*fam. Anatidae gen. Anser*	2006	8	-	-	-
Crested Tern	*Thalasseus bergii*	2006	185	-	-	-
	REPTILES					
Long neck tortoise	*Chelodina longicollis*	2008	5	-	-	-
Murray Short-necked Turtle	*Emydura macquarii*	2008	2	-	-	-
Marbled Gecko	*Christinus marmoratus*	2006	3	Partial	-	-
Striped Legless Lizard	*Delma impar*	2008	63	-	-	-
Tree Dragon	*Amphibolurus muricatus*	2006	1	Partial	-	-
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	2006	2	-	-	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Large Striped Skink	*Ctenotus robustus*	2006	7	-	-	-
Cunningham's Skink	*Egernia cunninghami*	2006	12	-	-	-
Black Rock Skink	*Egernia saxatilis intermedia*	2006	1	Partial	-	-
Southern Water Skink	*Eulamprus tympanum tympanum*	2006	1	-	-	-
Garden Skink	*Lampropholis guichenoti*	2006	9	-	-	-
Bougainville's Skink	*Lerista bougainvillii*	2006	2	-	-	-
Tussock Skink	*Pseudemoia pagenstecheri*	2008	19	-	-	-
Eastern Three-lined Skink	*Bassiana duperreyi*	2006	5	-	-	-
Metallic Skink	*Niveoscincus metallicus*	1988	3	-	-	-
Common Blue-tongued Lizard	*Tiliqua scincoides*	2008	96	-	-	S
Stumpy-tailed Lizard	*Tiliqua rugosa*	2006	2	-	-	-
Lowland Copperhead	*Austrelaps superbus*	1987	1	-	-	-
White-lipped Snake	*Drysdalia coronoides*	1994	8	-	-	-
Tiger Snake	*Notechis scutatus*	2006	70	-	-	-
Eastern Brown Snake	*Pseudonaja textilis*	2006	11	-	-	S
Little Whip Snake	*Suta flagellum*	2006	112	-	-	-
	AMPHIBIANS					
Common Froglet	*Crinia signifera*	2008	91	-	-	-
Pobblebonk Frog	*Limnodynastes dumerilii dumerilii*	1965	1	-	-	-
Striped Marsh Frog	*Limnodynastes peronii*	2004	5	-	-	-
Spotted Marsh Frog (race unknown)	*Limnodynastes tasmaniensis*	2008	108	-	-	-
Common Spadefoot Toad	*Neobatrachus sudelli*	2006	14	-	-	-
Southern Brown Tree Frog	*Litoria ewingii*	2006	3	-	-	-
Growling Grass Frog	*Litoria raniformis*	2006	24	-	-	-
Whistling Tree Frog	*Litoria verreauxii verreauxii*	2006	1	-	-	-
	FISH					
Pouched Lamprey	*Geotria australis*	1995	5	-	-	-
Short-headed Lamprey	*Mordacia mordax*	1995	6	-	-	-
Short-finned Eel	*Anguilla australis*	2008	46	-	-	-
Sandy Sprat	*Hyperlophus vittatus*	1989	1	-	-	-
Common Galaxias	*Galaxias maculatus*	2008	45	-	-	-
Spotted Galaxias	*Galaxias truttaceus*	2006	1	-	-	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
Australian Smelt	*Retropinna semoni*	2008	9	-	-	-
Brown Trout*	*Salmo trutta*	1981	3	-	-	-
Yellow-eye Mullet	*Aldrichetta forsteri*	2006	4	-	-	-
Smallmouthed Hardyhead	*Atherinosoma microstoma*	2006	16	-	-	-
Goldfish*	*Carassius auratus*	2006	23	-	-	-
Gambusia*	*Gambusia holbrooki*	2008	32	-	-	-
Carp*	*Cyprinus carpio*	2008	10	-	-	-
Oriental Weatherloach*	*Misgurnus anguillicaudatus*	1990	7	-	-	-
Roach*	*Rutilus rutilus*	1995	5	-	-	-
Southern Pygmy Leatherjacket	*Brachaluteres jacksonianus*	2005	2	-	-	-
Black Bream	*Acanthopagrus butcheri*	2006	4	-	-	-
Tamar River Goby	*Afurcagobius tamarensis*	2006	6	-	-	-
Bridled Goby	*Arenigobius bifrenatus*	2006	2	-	-	-
Silver Perch	*fam. Percichthyidae gen. Bidyanus*	1992	6	-	-	-
Dusky Morwong	*Dactylophora nigricans*	2005	3	-	-	-
River Blackfish	*Gadopsis marmoratus*	1981	1	-	-	-
Glass Goby	*Gobiopterus semivestitus*	2006	1	-	-	-
Southern Pygmy Perch	*Nannoperca australis*	1990	1	-	-	-
Purple Wrasse	*Notolabrus tetricus*	2005	3	-	-	-
Redfin*	*Perca fluviatilis*	2006	15	-	-	-
Flat-headed Gudgeon	*Philypnodon grandiceps*	2008	39	-	-	-
Blue-spotted Goby	*Pseudogobius olorum*	2004	4	-	-	-
-	*Pseudogobius* sp. 9	2008	6	-	-	-
Tupong	*Pseudaphritis urvillii*	2008	15	-	-	-
Tench*	*fam. Cyprinidae gen. Tinca*	2006	3	-	-	-
Greenback Flounder	*Rhombosolea tapirina*	1989	4	-	-	-
Toothbrush Leatherjacket	*Acanthaluteres vittiger*	2005	4	-	-	-
Smooth Toadfish	*Tetractenos glaber*	2005	3	-	-	-
Spotshoulder Weedfish	*Heteroclinus perspicillatus*	2003	3	-	-	-
MUSSELS & CRUSTACEANS						
Common Freshwater Shrimp	*Paratya australiensis*	2008	29	-	-	-
Yabby	*Cherax destructor*	1989	2	-	-	-

Common name	Scientific name	Last documented record	Total # of documented records	Hollow use	Mi/ Ma	Present survey
	INVERTEBRATES					
Golden Sun Moth	*Synemon plana*	2007	27	-	-	-
Yellow Sedge-skipper	*Hesperilla flavescens flavescens*	1989	179	-	-	-

Appendix 3.2 – Significant Fauna Species

Table A3.2. Significant fauna within 10 kilometres of the reserves

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

EPBC	*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
FFG	*Flora and Fauna Guarantee Act 1988* (FFG Act)
DSE	Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2007); Advisory List of Threatened Invertebrate Fauna in Victoria (DSE 2009)
NAP	National Action Plan (Cogger et al 1993; Duncan et al. 1999; Garnet and Crowley 2000; Lee 1995; Maxwell et al. 1996; Sands and New 2002; Tyler 1997)

EX	Extinct
RX	Regionally extinct
CR	Critically endangered
EN	Endangered
VU	Vulnerable
RA	Rare
NT	Near threatened
CD	Conservation dependent
LC	least concern

DD	Data deficient (insufficiently or poorly known
L	Listed as threatened under FFG Act
I	Invalid or ineligible for listing under the FFG Act
#	Listed on the Protected Matters Search Tool
*	Additional information from the Victorian Fauna Database

Common name	Scientific name	Last documented record	Total # of documented records	EPBC	DSE	FFG	NAP	Likely use of reserves
			NATIONAL SIGNIFICANCE					
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	1881	1	EN	NT	L	NT	4
Eastern Barred Bandicoot	*Perameles gunnii*	1982	5	EN	RX	L	CR	4
Grey-headed Flying-fox	*Pteropus poliocephalus*	2006	4	VU	VU	L	VU	3
Fairy Prion	*Pachyptila turtur*	1999	2	VU	VU	-	-	4
Australasian Bittern	*Botaurus poiciloptilus*	2008	24	EN	EN	L	VU	3
Hooded Plover	*Thinornis rubricollis rubricollis*	1950	2	-	VU	L	VU	4
Plains-wanderer	*Pedionomus torquatus*	2008	14	VU	CR	L	EN	4
Australian Painted Snipe	*Rostratula benghalensis australis*	1985	8	EN	CR	L	VU	4
Fairy Tern	*Sternula nereis nereis*	1996	28	VU	EN	L	-	4
Swift Parrot	*Lathamus discolor*	2006	4	EN	EN	L	EN	4
Orange-bellied Parrot	*Neophema chrysogaster*	2008	18	CR	CR	L	CR	4
Regent Honeyeater	*Anthochaera Phrygia*	1950	2	EN	CR	L	EN	4
Striped Legless Lizard	*Delma impar*	2008	63	VU	EN	L	VU	1
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	2006	2	EN	CR	L	VU	4
Growling Grass Frog	*Litoria raniformis*	2006	24	VU	EN	L	VU	2
Golden Sun Moth	*Synemon plana*	2007	27	CR	CR	L	-	1
# Australian Grayling	*Prototroctes maraena*	-	-	VU	VU	L	VU	4
# Dwarf Galaxias	*Galaxiella pusilla*	-	-	VU	VU	L	VU	4
# New Holland Mouse	*Pseudomys novaehollandiae*	-	-	VU	VU	L	-	4
			STATE SIGNIFICANCE					
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	2006	4	-	VU	L	-	4
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	1993	2	-	DD	L	LC	4
Southern Myotis	*Myotis macropus*	2006	1	-	NT	-	NT	4
Magpie Goose	*Anseranas semipalmata*	2007	3	-	NT	L	-	4
Musk Duck	*Biziura lobata*	2006	57	-	VU	-	-	4
Freckled Duck	*Stictonetta naevosa*	2007	8	-	EN	L	-	4
Australasian Shoveler	*Anas rhynchotis*	2007	127	-	VU	-	-	3
Hardhead	*Aythya australis*	2006	88	-	VU	-	-	3

Common name	Scientific name	Last documented record	Total # of documented records	EPBC	DSE	FFG	NAP	Likely use of reserves
Blue-billed Duck	*Oxyura australis*	2002	29	-	EN	L	-	3
White-throated Needletail	*Hirundapus caudacutus*	2008	13	-	VU	-	-	4
White-faced Storm-Petrel	*Pelagodroma marina*	2007	4	-	VU	-	-	4
Little Bittern	*Ixobrychus minutus dubius*	1980	3	-	EN	L	-	4
Eastern Great Egret	*Ardea modesta*	2007	176	-	VU	L	-	3
Intermediate Egret	*Ardea intermedia*	2007	12	-	EN	L	-	3
Little Egret	*Egretta garzetta nigripes*	2007	148	-	EN	L	-	3
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	2008	4	-	VU	L	-	3
Black Falcon	*Falco subniger*	2008	29	-	VU	-	-	3
Brolga	*Grus rubicunda*	2006	3	-	VU	L	-	4
Lewin's Rail	*Lewinia pectoralis pectoralis*	2008	39	-	VU	L	NT	3
Baillon's Crake	*Porzana pusilla palustris*	2008	29	-	VU	L	-	3
Pacific Golden Plover	*Pluvialis fulva*	2007	36	-	VU	-	-	4
Grey Plover	*Pluvialis squatarola*	1992	9	-	EN	-	-	4
Lesser Sand Plover	*Charadrius mongolus*	1994	9	-	CR	-	-	4
Greater Sand Plover	*Charadrius leschenaultii*	1978	3	-	CR	-	-	4
Black-tailed Godwit	*fam. Scolopacidae gen. Limosa*	1986	12	-	VU	-	-	4
Whimbrel	*Numenius phaeopus*	1986	3	-	VU	-	-	4
Eastern Curlew	*Numenius madagascariensis*	1997	27	-	VU	-	-	4
Terek Sandpiper	*Xenus cinereus*	1997	8	-	EN	L	-	4
Common Sandpiper	*Actitis hypoleucos*	2007	28	-	VU	-	-	4
Grey-tailed Tattler	*Tringa brevipes*	2006	6	-	CR	L	-	4
Common Greenshank	*Tringa nebularia*	2008	213	-	VU	-	-	4
Marsh Sandpiper	*Tringa stagnatilis*	2008	89	-	VU	-	-	4
Wood Sandpiper	*Tringa glareola*	2008	25	-	VU	-	-	4
Ruddy Turnstone	*Arenaria interpres*	2006	17	-	VU	-	-	4
Great Knot	*Calidris tenuirostris*	2007	12	-	EN	L	-	4
Red Knot	*Calidris canutus*	2006	19	-	EN	-	-	4
Red-chested Button-quail	*Turnix pyrrhothorax*	2006	3	-	VU	L	-	3
Little Tern	*Sternula albifrons sinensis*	2006	35	-	VU	L	-	4

Common name	Scientific name	Last documented record	Total # of documented records	EPBC	DSE	FFG	NAP	Likely use of reserves
Gull-billed Tern	*Gelochelidon nilotica macrotarsa*	2008	5	-	EN	L	-	4
Caspian Tern	*Hydroprogne caspia*	2008	29	-	NT	L	-	4
Elegant Parrot	*Neophema elegans*	1950	1	-	VU	-	-	4
Masked Owl	*Tyto novaehollandiae novaehollandiae*	2006	1	-	EN	L	NT	4
Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*	1976	5	-	NT	-	NT	4
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	1978	1	-	VU	L	-	4
Speckled Warbler	*Chthonicola sagittatus*	2006	1	-	VU	L	NT	4
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	1902	1	-	EN	L	NT	4
Hooded Robin	*Melanodryas cucullata cucullata*	2006	2	-	NT	L	NT	4
Diamond Firetail	*Stagonopleura guttata*	2006	5	-	NT	L	NT	4
Tussock Skink	*Pseudemoia pagenstecheri*	2008	19	-	VU	-	-	1
Silver Perch	*fam. Percichthyidae gen. Bidyanus*	1992	6	-	VU	L	-	4
Southern Pygmy Perch	*Nannoperca australis*	1990	1	-	VU	-	-	4
Yellow Sedge-skipper	*Hesperilla flavescens flavescens*	1989	179	-	VU	L	LC	4
REGIONAL SIGNIFICANCE								
Fat-tailed Dunnart	*Sminthopsis crassicaudata*	2006	21	-	NT	-	-	2
Common Diving-Petrel	*Pelecanoides urinatrix*	1999	1	-	NT	-	-	4
Pied Cormorant	*Phalacrocorax varius*	2006	195	-	NT	-	-	3
Black-faced Cormorant	*Phalacrocorax fuscescens*	2008	6	-	NT	-	-	4
Nankeen Night Heron	*Nycticorax caledonicus hillii*	2007	21	-	NT	-	-	4
Glossy Ibis	*Plegadis falcinellus*	2008	22	-	NT	-	-	2
Royal Spoonbill	*Platalea regia*	2008	153	-	NT	-	-	2
Spotted Harrier	*Circus assimilis*	2007	20	-	NT	-	-	2
Sooty Oystercatcher	*Haematopus fuliginosus*	2007	25	-	NT	-	-	4
Latham's Snipe	*Gallinago hardwickii*	2008	48	-	NT	-	-	2
Sanderling	*Calidris alba*	1987	9	-	NT	-	-	4
Long-toed Stint	*Calidris subminuta*	2007	13	-	NT	-	-	4
Pectoral Sandpiper	*Calidris melanotos*	2007	27	-	NT	-	-	4

Common name	Scientific name	Last documented record	Total # of documented records	EPBC	DSE	FFG	NAP	Likely use of reserves
Little Button-quail	*Turnix velox*	1950	1	-	NT	-	-	4
Australian Pratincole	*Stiltia Isabella*	1950	2	-	NT	-	-	4
Whiskered Tern	*Chlidonias hybridus javanicus*	2008	127	-	NT	-	-	3
White-winged Black Tern	*Chlidonias leucopterus*	2007	32	-	NT	-	-	4
White-fronted Tern	*Sterna striata*	1975	1	-	NT	-	-	4
Pacific Gull	*Larus pacificus pacificus*	2007	257	-	NT	-	-	4
Black-eared Cuckoo	*Chrysococcyx osculans*	2006	3	-	NT	-	-	4
Red-backed Kingfisher	*Todiramphus pyrropygia pyrropygia*	1978	1	-	NT	-	-	4
Black-chinned Honeyeater	*Melithripterus gularis gularis*	2006	2	-	NT	-	-	4
River Blackfish	*Gadopsis marmoratus*	1981	1	-	DD	-	-	4

Data source: Victorian Biodiversity Atlas (DEPI 2011b); Victorian Fauna Database (Viridans 2011b); Protected Matters Search Tool (DoE 2014).

Taxonomic order: Mammals (Strahan 1995 *in* Menkhorst and Knight 2004); Birds (Christidis and Boles, 2008); Reptiles and Amphibians (Cogger *et al.* 1983 *in* Cogger 1996); Fish (Nelson 1994); Mussels and Crustaceans (Alphabetical); Invertebrates (Alphabetical).

Appendix 4 – Photographs of reserves

Plate 1 Plains Grassland in good condition (HZ1).

Plate 2 Plains Grassland in moderate condition (HZ2).

Plate 3 Plains Grassland in poor condition (HZ3).

Plate 4 Plains Grassy Woodland in poor to moderate condition (PGW1).

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Plate 5 Plains Sedgy Wetland in good condition (PSW1).

Appendix 5 – Literature Review Summary Table

1997	Report Title	
	Biosis Research Pty Ltd 1997 (August). A Conservation Management Plan for three rare species reserves RAAF Williams, Laverton	
	Reserve # (species)	Outcomes
	Reserve A, B, C	See notes for revised version below: Biosis Research Pty Ltd 1998 (May). A Conservation Management Plan for three rare species reserves RAAF Williams, Laverton
1998	Report Title	
	Ecology Australia Pty Ltd 1998 (March). A review of the Biosis Research Pty Ltd Plan for Rare Species Reserves, RAAF Williams Laverton.	
	Reserve # (species)	Outcomes
	Reserve A, B, C (Striped Legless Lizard)	**a)** Review questions whether trapping had been undertaken and historical effects of slashing **b)** mentions notes on land use should be included in monitoring reports **c)** include a fire management plan **d)** replace SLL habitat such as rocks (i.e. those removed during building of RAAF base) **e)** Undertake an intensive active search **f)** recommends one day of salvaging for all areas of high quality grassland within Reserves A, B and C **g)** recommends annual pit-fall trapping
	Reserve A, B and C (Basalt Podolepis)	**a)** translocating individuals from outside the reserves not supported rather seed collection and propagation during Autumn
	Reserve A, B and C (Button Wrinklewort)	**a)** reserves are likely to provide suitable habitat for the re-establishment of this species
	Reserve A - Site Enlargement	**a)** Reserve A was enlarged at the southern end to include a population of Basalt Sun-orchid **b)** additional area proposed for Reserve A was considered to be weedy with Chilean Needle Grass ca. 20 metre diameter
	Reserve B (Spiny Rice-flower)	**a)** total of 528 Spiny Rice-flower **b)** 100 x smaller Spiny Rice-flower and Basalt Sun-orchid from outside were moved into Reserve B **c)** larger plants were not moved as they were unlikely to survive **d)** translocated into Reserve B with 90% success rate however it was costly **e)** weed control needed
	Reserve B (Basalt Sun-orchid)	**a)** Basalt Sun-orchid translocated into Reserve B **b)** weed control needed
	Reserve B - Site Excision	**a)** habitat assessment located a single Spiny Rice-flower in an area of Reserve B to be excised b) translocation of this individual plant would be required

Report Title	
Biosis Research Pty Ltd 1998 (May). A Conservation Management Plan for three rare species reserves RAAF Williams, Laverton	
Reserve # (species)	**Outcomes**
Reserve A, B, C	**a)** All significant flora and fauna species are to be monitored annually
Reserve A, B, C (Basalt Podolepis)	**a)** 20,000 plants located within the three reserves (A) 15,000 (B) 1000 and (C.) 4,000 in the north-east corner (Figure 2) **b)** seed collection and ecological burning recommended for management **c)** collect seed from species outside Reserves A, B and C prior to habitat removal
Reserve A, B and C (Basalt Sun-orchid)	**a)** 300 plants across 3 x locations: 200 plants in Reserve A, 60 plants in Reserve B and 10 plants just west of Taxiway F which were moved into Reserve (B) **b)** newly defined species **c)** any species recorded outside reserves to be translocated **d)** seed collection required
Reserve A, B and C (Button Wrinklewort)	**a)** species previously located in rail reserve **b)** unlikely to be found in dense *Themeda* grassland **c)** extant populations may re-establish after fire in the three reserves and should be encouraged
Reserve A, B, C	**a)** translocation of regionally significant species should also be undertaken via seed collection and/or before habitat is removed / degraded
Reserve A (Striped Legless Lizard)	**a)** Striped Legless Lizard *Delma impar* detected in Reserve A (Figure 1) and is likely to utilise habitat dominated by Kangaroo Grass *Themeda triandra* **b)** areas surrounding Kangaroo Grass dominated by *Stipa - Danthonia* grassland has been regularly slashed for at least 50 years **c)** the site has also be subject to rock removal **d)** a burning regime is the preferred management tool **e)** pit-fall trapping not recommended **f)** salvage during scraping the top-soil is the salvage method proposed for outside the reserve in *Stipa - Danthonia* grassland - scraping to root level with 3 staff present over 1 day **g)** if no lizards are found over one day - this method can be discontinued

	Reserve A (Large-headed Groundsel)	**a)** Approximately 290 plants (conservative estimate) occur in Reserve A - may range between 300-400 **b)** largely confined to *Themeda* grasslands with most in the easternmost patch **c)** two plants were located in the area added to Reserve A to protect the Basalt Sun-orchid **d)** seed collection and ecological burning recommended for management
	Reserve B (Spiny Rice-flower)	**a)** total of 528 Spiny Rice-flower (Figure 3) Reserve B contains 377 plants **b)** remaining 151 plants in the population outside Reserve B were transplanted by Department of Defence into disturbed areas of Reserve B
2000	Report Title	
	Mueck, S. 2000. The distribution of Small Golden Moths *Diuris basaltica* at Westpoint Business Park.	
	Reserve # (species)	Outcomes
	Reserve A (Small Golden Moths)	**a)** during September 2000 a single individual was detected in Reserve A **b)** this record was considered to be the only known population of this species **c)** given the species was not considered as part of setting up the reserves - species presence elsewhere was possible **d)** targeted surveys failed to locate any further individuals
2004	Report Title	
	Ecology Australia Pty Ltd 2004 (March). Re: Former Laverton Airfield - Striped Legless Lizard salvage during archaeological surveys works	
	Reserve # (species)	Outcomes
	Outside Reserve A, B, C (Striped Legless Lizard)	**a)** ripping and scraping occurred for 3 of the 11 sites required for archaeological surveys. Geoff Heard assisted with the ripping and scraping of the remaining 8 transects **b)** no Striped Legless Lizard were detected
2005	Report Title	
	Cedar Woods Properties Limited 2005 (August). Salvage plan for rare and threatened species on the Laverton Airfield site	
	Reserve # (species)	Outcomes
	Reserve A, B, C	**a)** areas outside Reserves A, B and C were salvaged for regional significant flora during a single salvage operation **b)** salvage was in the form of seed collection although cuttings were taken from any Spiny Rice-flower found and any Sun-orchids found were relocated into Reserve A.

	Reserve A, B, C (Striped Legless Lizard)	**a)** ripping and scraping by Cedar Woods Properties Limited was considered to fulfil obligations regarding the salvage of Striped Legless Lizard pertaining to the site
2006	Report Title	
	Practical Ecology Pty Ltd 2006 (December). Conservation Management Plan for Grassland and Wetland Reserves at Laverton	
	Reserve # (species)	Outcomes
	Reserve A, B, C	**a)** monitoring for all 3 reserves has not been undertaken at the regularity foreshadowed by the original CMP **b)** a monitoring report for Reserve A was undertaken in 2000 (Smith and Mueck 2000) and another for Reserve B in 2003 (Mueck 2003). Monitoring of all three reserves was undertaken in spring 2005 and reported on by Cameron (2006);
	Reserve A, B, C	**a)** monitoring grids for Reserves A and B were established and Reserve C at a later stage (2004) **b)** a review of the monitoring was undertaken in 2006 **c)** monitoring was to occur annually for three years under agreement with DoE and DEPI
	Reserve B (Spiny Rice-flower)	**a)** approximately 300 cuttings were taken for propagation and approximately 222 individual plants were translocated in January and May 1998 **b)** approximately 100 of the cuttings produced a root system and were subsequently planted in the reserves but have since died as a result of drought (Mueck 2000) **c)** Mueck (2000) stated that 144 translocated individuals had survived when monitored in February 2000 **d)** translocated Spiny Rice flower were comprehensively surveyed in 2000 **e) t**he survival rate was greater than 60% and was considered successful **f)** due to the inability to distinguish remnant from translocated specimens such a long time after the translocation event, this survey has not been repeated
	Report Title	
	Practical Ecology Pty Ltd 2006 (March). Laverton Airfield Reserves Monitoring Report	
	Reserve # (species)	Outcomes
	Reserve A, B, C	**a)** quadrat and grid sampling were used to systematically sample the occurrence and extent of high threat weeds and significant flora species **b)** detailed survey required in all reserves to document presence and distribution of orchid species

Reserve A	**a)** the presence of significant flora species outlined by Smith & Mueck (2000) for reserve A were recorded for presence or absence within previously documented grid squares to identify their current extent
Reserve A (Basalt Podolepis)	**a)** Figure 3 within the monitoring report shows that Basalt *Podolepis* occurred in over 70% of grid cells varying in numbers between one and several hundred. Comparisons with the grid notes and maps produced by Smith and Mueck 2000, suggests the species abundance has increased
Reserve A (Spiny Rice-flower)	**a)** Figure 3 within the monitoring report shows several new populations of Spiny Rice-flower identified within Reserve A and an increase in abundance within all populations except population (C1D1-C2D2) which unable to be re-located **b)** population in Reserve A estimated at between 50 and **70** plants
Reserve A (Large-headed Fireweed)	**a)** Large-headed Fireweed observed within all previously recorded locations, and overall population estimated to have increased **b)** additional scattered occurrences found throughout the reserve, with the largest populations in grids F4G4-F5G5 and F5G5-E6G6 (~ 50 plants in each grid) **c)** overall population within Reserve A estimated at around 150-200 individuals
Reserve A (Short Sun-orchid)	**a)** distribution of Short Sun-orchid species (x2) could not be adequately determined, as both species had finished flowering and many previously documented individuals could not be found **b)** only 5 *Thelymitra* spp. plants were located within two grid squares, however it is likely that many plants were not observed
Reserve B	**a)** significant flora species outlined for reserve B by Mueck (2003) were recorded for presence or absence within previously documented grid squares to identify their current extent
Reserve B (Basalt Podolepis)	**a)** Figure 6 within monitoring report indicates population size and distribution is considerably lower than reserve A (distribution limited to ~ 20% of the grid cells) **b)** the number of individuals found within grid cells varied between one and several hundred and comparisons with the grid notes and maps produced by Mueck (2003), suggest the species may be spreading throughout the reserve

	Reserve B (Spiny Rice-flower)	**a)** Figure 6 within monitoring report indicates population estimated at 187 individuals during the 2003 survey, although it was suggested that this estimate required re-assessment as it was significantly lower than the previous estimate of approximately 500 in the 1998 survey (Mueck et al. 1998) **b)** only 153 individuals were located during 2006 surveys **c)** unclear whether the population has suffered a decline or whether those individuals were missed during the census, though a combination of these two factors is suggested. One new population of 3 individuals was found **d)** recommendation to continue to assess populations in Reserve B
	Reserve B (Arching Flax-lily)	**a)** the three plants of Arching Flax-*lily Dianella longifolia var. grandis* previously located appeared in good condition
	Reserve C	**a)** Reserve C had not been subjected to a detailed flora assessment at the time of this report, incidental sightings of significant species were documented and mapped and a baseline wetland species list produced **b)** targeted surveys for significant flora species were not undertaken for reserve C **c)** recommendation to conduct a detailed survey in future
	Reserve C-Grassland (Basalt Podolepis)	**a)** recorded throughout the site, with the largest concentrations found within Block A **b)** populations documented are not exhaustive. The species was found scattered throughout grassland areas, but due to limitations only those larger populations in the north were mapped, hence the species is likely to be much more widespread then outlined in report.
2007	Report Title	
	Practical Ecology Pty Ltd 2007 (March). Laverton Airfield Reserves Monitoring Report	
	Reserve # (species)	Outcomes
	Reserves A, B and C	**a)** the same short-term (1-3 years) monitoring and survey goals were outlined as the 2006 monitoring report

Reserve A	**a)** report notes that the distribution and abundance of significant flora species was very difficult to determine. Likely due to sub-optimal timing of surveys and the extremely dry year **b)** targeted surveys recommended to identify the presence and extent of all significant species within this reserve, especially in the event of substantial rainfall
Reserve A (Short Sun-orchid)	**a)** survey conducted on 30th of October with primary focus on the presence of the Short Sun-orchid. No specimens identified.
Reserve B	**a)** report notes that the distribution and abundance of significant flora species was very difficult to determine. Likely due to sub-optimal timing of surveys and the extremely dry year **b)** targeted surveys recommended to identify the presence and extent of all significant species within this reserve, especially in the event of substantial rainfall
Reserve B (Short Sun-orchid)	**a)** survey conducted on 30th of October with the primary focus on the presence of the Short Sun-orchid. No specimens identified.
Reserve C	**a)** report notes that the distribution and abundance of significant flora species was very difficult to determine. Likely due to sub-optimal timing of surveys and the extremely dry year **b)** targeted surveys recommended to identify the presence and extent of all significant species within this reserve, especially in the event of substantial rainfall
Report Title	
Practical Ecology Pty Ltd 2007 (September). Draft Williams Landing Salvage Plan 2007. Central Precinct and Infrastructure Corridor	
Reserve # (species)	Outcomes
Outside Reserves A, B and C (Stages 1 and 2)	**a)** conducted targeted surveys using transects across the 'Central Neighbourhood' block to mark locations of significant flora during late winter
Outside Reserves A, B and C (Stages 1 and 2) - Threatened Flora	**a)** No Spiny Rice-flower individuals located **b)** 6 x Sun-orchids (translocated in summer 07/2008) **c)** 5 x Flax-lilies (translocated plants and propagules during winter 2008) **d)** 36 x Large-headed Fireweed (seed collection)
Outside Reserves A, B and C (Stages 1 and 2) - Striped Legless Lizard	**a)** ripping and grading across a waffle grid over the site (50 metre spacing x 30 cm deep) **b)** relocate any individuals to Reserves B and C (maps 3 and 4)

	Reserve B and C (Large-headed Fireweed)	**a)** two new populations in Reserve B and C created to replace the loss of 36 plants. 400 seeds propagated from salvaged plants **b)** each new population grid accompanied by native vegetation (100 seedlings) **c)** Reserve B **Grids 29-38** and **34-43** Reserve C **Grids 263-252** and **261-250** used as base centre lines for the new populations **d)** plants were eventually moved into Reserve A (and further translocated into Reserve C in 2010)
	Reserve A, B, C (Striped Legless Lizard)	**a)** no monitoring currently occurs (i.e. tile grids) **b)** tile grids to be laid within high quality habitat areas of each Reserve and monitored annually in Spring **c)** the number of grid checks is not provided between October-December
	Reserve B (Sun-orchids)	**a)** species to be transplanted on the day of salvage directly into prepared plots in Reserve B
	Reserve C (Striped Legless Lizard)	**a)** if found salvage individuals to be relocated to an area of Reserve C **Grids 253-241**
2008	Report Title	
	Practical Ecology Pty Ltd 2008 (March). Flora and fauna salvage - Williams Landing Stages 1 and 2 Progress Report	
	Reserve # (species)	Outcomes
	Reserve B and C (Large-headed Fireweed)	**a)** numbers increased from 36 to 44 due to natural recruitment prior to salvaging
	Outside Reserves A, B and C (Stages 1 and 2) - Striped Legless Lizard	**a)** no Striped Legless Lizard detected during ripping **b)** contingency measures implemented to ensure any individuals detected during construction would be treated appropriately
	Reserve B (Sun-orchids)	**a)** Creamy Candles and Goodenia sp. translocated successfully into Reserve B as proposed in the Salvage Plan 2007
	Report Title	
	Practical Ecology Pty Ltd 2008 (May). Williams Landing (Laverton Airfield) Reserves Monitoring Data & Analysis & Annual Report	
	Reserve # (species)	Outcomes

	Reserve A (Spiny Rice-flower)	**a)** numbers estimated at approximately 70 (2006) increased to **136** during targeted surveys in Reserve A **b)** suggested reasons for the increase include **i)** the cryptic nature of this plant and dense vegetation reducing detectability **ii)** plants able to reshoot from lateral roots and some regeneration of dormant plants may have occurred **iii)** site has one of the few known populations of Spiny Rice-flower of varied age cohorts; natural recruitment may have occurred over the last two years
	Reserve B (Spiny Rice-flower)	**a)** prior to this survey the most recent count of individual plant numbers in Reserve B by Cameron (2006) recorded 153 of the approximate 500 translocated, remnant, and planted seedlings previously recorded by Mueck (2000) **b)** this survey recorded **317** individual Spiny Rice-flowers **c)** reasons for the increase in abundance are suggested to be the same as above for Reserve A
2009	Report Title	
	Practical Ecology Pty Ltd 2009 (July). Williams Landing Reserves Monitoring & Annual Report	
	Reserve # (species)	Outcomes
	Reserves A, B and C	**a)** the same short-term (1-3 years) monitoring and survey goals were outlined as the 2008 monitoring report
	Outside Reserves A, B and C (Stages 3-7) - Striped Legless Lizard	**a)** no Striped Legless Lizard were detected during ripping and tyning **b) 4 x Tussock Skink** were detected during ripping and translocated into Reserve A
	Reserves A, B and C (Striped Legless Lizard)	**a)** two tile grids were laid in each reserve to monitor reptile and small mammal species **b) two Striped Legless Lizard** skins identified from Reserve A **c)** data was used to determine presence / absence of Striped Legless Lizard and suitability as recipient sites for future construction works **d)** monitored twice in December 2008 and March 2009
	Outside Reserves A, B and C (Stages 3-7) - Spiny Rice-flower	**a)** the translocation of 152 Spiny Rice-flower plants from stages 3-7 of the Williams Landing

	development into the reserves as per the approved Salvage Plan took place during the week of 15 to 19 June 2009 **b) Reserve A** has 2 recipient sites x **20** parent plants + **25** seedlings x 4 separate grids (Grids 15-18) as per the salvage plan **c) Reserve B** has 1 recipient site x **29** parent plants (rather than 20) + 25 seedlings x 4 separate grids (Grids 19-22) **d) Reserve C** has 1 recipient site x **83** parent plants (rather than 92) + 25 seedlings x 4 separate grids (Grids 23-26) **f)** the 300 x seedlings outlined above to be planted in winter 2010 to fulfil the requirements of the approved salvage plan for Stages 3-7 for this species
Outside Reserves A, B and C (Stages 3-7) - Large-headed Fireweed	**a)** 600 x seedlings of Large-headed Fireweed are to be planted into the reserves to complete the salvage for this species for Stages 3-7 **b)** 400 x seedlings grown from seed collected from the 36 salvaged plants will provide both adequate replacement for the translocated plants salvaged and appropriate numbers for the amount of space available in Reserves A and B **c)** 2 x 100 seedling plots in Reserve A (Grid 3: C7-C8 and Grid 4: C3-C2)) **d)** 2 x 100 seedling plots in Reserve B (Grid 1: C29-C38 and Grid 2: C34-C43) **e)** survival rates exceeded 70% (actually 86%)
Reserve A (Spiny Rice-flower)	**a)** population estimated at approx. 70 (2006) and 136 (2008). **131** individuals identified during targeted surveys in Reserve A in 2009 monitoring report
Reserve A (Large-headed Fireweed)	**a)** overall population within the reserve is estimated at be around **550 to 600** individuals which is a marked increase on the 150-200 individuals observed by Cameron (2006)
Reserve A (Basalt Podolepis)	**a)** Basalt Podolepis *Podolepis* sp. aff. *jaceoides* (Basalt Podolepis), which occurred in over 70% of grid cells in Cameron (2006), reduced to only 25% of grid cells in this survey period
Reserve A (Short Sun-orchid)	**a)** abundance and distributions not been adequately determined over recent surveys **b)** possible that individuals are not flowering due to continued drought **c)** monitoring recommended over upcoming years
Reserve A (Golden Sun Moth)	**a) One female Golden Sun Moth** detected in Reserve A
Reserve A (Striped Legless Lizard)	**a)** two SLL skins were located and confirmed by Dr Megan O'Shea **b)** identification confirms previous record for the site for this species noted by Mueck (1998)

	Reserve B (Spiny Rice-flower)	**a)** 2009 survey recorded **283** individual plants **b)** fluctuation in numbers may be explained by variation in survey effort or as a result of the ongoing drought **c)** Report notes that up to a third of the western area of Reserve B was artificially inundated for a prolonged period due to substantial water pipe leakage. Up to 34 individual Spiny Rice-flower plants estimated to have succumbed to flooding in this area **d)** apparent that some of the plants lost included those translocated by Mueck (2000) into box trenches, which had previously survived almost 10 years
	Reserve B (Large-headed Fireweed)	**a)** species not previously been mapped in reserve B **b) 15** individuals located in this survey **c)** two grids of 100 individuals planted into the reserve as part of the requirement for stages 1 and 2 of the development outside the reserve system
	Reserve B (Basalt Podolepis)	**a)** estimated to contain **1,200** individual Basalt Podolepis - most abundant and significant species within Reserve B **b)** species distributed in **47%** of grid cells as opposed to 20% in Cameron (2006) **b)** result suggests that the species is spreading throughout the reserve
	Reserve B (Arching Flax-lily)	**a)** three plants of Arching Flax-lily *Dianella longifolia var. grandis* previously located remain in good condition
	Reserve C	**a)** time constraints did not allow similar survey effort for threatened species in Reserve C as conducted in Reserves A and B
2010	Report Title	
	Practical Ecology Pty Ltd 2010 (July). Williams Landing Reserves Monitoring & Annual Report	
	Reserve # (species)	Outcomes
	Reserves A, B and C	**a)** ecological burn across a portion of all three Reserves in May 2009 (Australian Ecosystems)
	Reserve A, B and C (Large-headed Fireweed)	**a)** monitoring showed a sharp decline in survival rate in 2010 compared to previous year. Reserve B (Grid 1) at 65% survival rate was the best result achieved for all three Reserves (with an overall survival rate of 27%). Survival success rate is far lower than the 70% figure suggested by Vallee *et al.* (2004). **b)** concerted efforts are required to increase success rate to 70% through replanting to 100% of original numbers, installing rabbit guards and monitoring as per the salvage plan

	Reserve A, B and C (Spine Rice-flower)	**a)** survival rates estimated at 33% at time of survey, however, suggested that many plants may re-sprout over winter/spring 2010 **b)** 300 x Spiny Rice-flower seedlings to be planted in winter 2010 **c)** additional measures such as further planting to reach 70% survival rate may also be undertaken
	Reserves A (Large-headed Fireweed)	**a)** 100 x seedlings destroyed accidently during an ecological burn **b)** no regeneration noted so plants will be replaced in winter 2010
	Reserve C (Spiny Rice-flower)	**a)** targeted survey for Spiny Rice-flower located **9** individual plants in Reserve C
	Reserve C (Large-headed Fireweed)	**a)** 9 x patches of Large-headed Fireweed were recorded during targeted surveys in Reserve C with two populations having > 50 plants each
	Reserve C (Basalt Podolepis)	**a)** 12 x patches of Basalt Podolepis located in Reserve C ranging from one individual to 50-100+
	Reserve C (Growling Grass Frog)	**a)** no Growling Grass Frog detected
2011	Report Title	
	Practical Ecology Pty Ltd 2011 (May). Annual Report and Monitoring Report for Williams Landing Conservation Reserves	
	Reserve # (species)	Outcomes
	Reserve A, B and C (Large-headed Fireweed)	**a)** 750 seedlings planted in September 2010 to replace plants which had died during previous two seasons **b)** survival rate overall was 63% for all three reserves **c)** if numbers do not improve it is recommended that seedlings be replaced in grids that have shown a greater than 50% survival rate to achieve the 70% overall survival rate **d)** grids that have consistently shown very low rates of survival are most likely unsuitable habitat for this species

	Reserve A, B and C (Spiny Rice-flower)	**a)** overall survival rate for translocated plants in all three reserves in November 2010 was 56% **b)** only 261 of the proposed 300 x Spiny Rice-flower seedlings were planted in the last two weeks of October 2010 **c)** resurveyed in January 2011 - overall survival rate 49%: reasons for decline may include **i)** the small size and relatively undeveloped root systems of plants making them vulnerable to dry conditions **ii)** the clay soils in the reserves crack deeply under rapidly drying conditions exposing the growing medium to air **iii)** a number of the seedlings appear to have been killed by burrowing from small animals or large insects **d)** recommended that dead seedlings be replaced as soon as possible
	Reserves A, B and C (Striped Legless Lizard)	**a)** a single tile check on 17th December 2010 detected no individuals
	Reserves A, B and C (Growling Grass Frog)	**a)** a nocturnal survey on 16th December 2010 detected no individuals
	Reserves A, B and C (Golden Sun Moth)	**a)** a single survey on 22nd December 2010 detected no individuals
	Reserves A (Large-headed Fireweed)	**a) 150+** individuals recorded within Reserve A
	Reserves A (Spiny Rice-flower)	**a) 52** individuals recorded within Reserve A
	Reserves A (Basalt Podolepis)	**a)** species not recorded during monitoring
	Reserve B (Spiny Rice-flower)	**a) 93** individuals recorded within Reserve B
	Reserve B (Large-headed Fireweed)	**a) 89** individuals recorded within Reserve B
	Reserve B (Basalt Podolepis)	**a)** species not recorded during monitoring
	Reserve B (Arching Flax-lily)	**a) 2** Arching Flax-lily individuals recorded within Reserve B
	Reserve C (Basalt Podolepis)	**a)** no significant species were recorded in Reserve C, however Basalt Podolepis occurs extensively in the northern grassland area of the reserve
2012	Report Title	
	Practical Ecology Pty Ltd 2012 (June). Annual Report and Monitoring Report for Williams Landing Conservation Reserves	
	Reserve # (species)	Outcomes
	Reserve A, B and C (Fauna)	**a)** no fauna monitoring was undertaken during the 2011-2012 period

	Reserve A, B and C (Large-headed Fireweed)	**a)** plants were monitored in late February 2012 **b)** survival rate halved from 63% to **31%** with the biggest decrease in Reserve C **c)** it is not clear why the planted Large-headed Fireweeds have shown a continued decline in survival **d)** dead seedlings should be replaced to attain 70% survival rate **e)** observations of earlier planting outcomes suggest that replacement is unlikely to be effective in the longer term and resources would be better directed towards ensuring appropriate fire regimes and biomass reduction for the continued persistence of Large-headed Fireweed **f)** recommend monitoring of seedlings generated from salvaged plants.
	Reserve A, B and C (Spiny Rice-flower)	**a)** monitoring of survival rates for translocated plants in February 2012 (overall result was **27%**) – decrease may be associated with an increase in rabbit numbers **b)** survival rates of Spiny Rice-flower seedlings continued to decline (reduced to **19%**); suggested reasons for the decline as outlined above **c)** recommended that any dead seedlings be replaced as soon as possible in areas dominated by Red-Leg Grass as these areas appear to be conducive to higher survival rates
2013	Report Title	
	Practical Ecology Pty Ltd 2013 (May). Annual Report and Monitoring Report for Williams Landing Conservation Reserves	
	Reserve # (species)	Outcomes
	Reserve A, B and C (Striped Legless Lizard)	**a)** Striped Legless Lizard surveys undertaken on 15th January 2013 - none were detected
	Reserve A, B and C (Large-headed Fireweed)	**a)** plants were monitored in late December 2012 **b)** survival rates stabilised from 31% to **32%** **c)** some recruitment observed in several grids and possible that other grids had recruitment **d)** success may be associated with efforts to reduce biomass **e)** biomass reduction recommended for future management

	Reserve A, B and C (Spiny Rice-flower)	**a)** monitoring of survival rates for translocated plants occurred in February 2013 (overall result dropped from 28% to **23%**) **b)** survival rates of planted Spiny Rice-flower seedlings continued to decline (dropping from ~20% to **18%**) **c)** trends for the survival rates of the two salvage techniques (translocation and replanting seedlings) appear similar for the entire site **d)** the much higher cost of translocating remnant plants suggests that establishing new populations from seed may be a better technique for similar projects in the future **e)** seeds were collected from Reserves A and B. Final germination numbers were yet to be determined, although were estimated to be unlikely to be sufficient to replace all dead plants
2014	Report Title	
	Practical Ecology Pty Ltd 2014 (April). Annual Report and Monitoring Report for Williams Landing Conservation Reserves	
	Reserve # (species)	Outcomes
	Reserve A, B and C (Striped Legless Lizard)	**a)** no fauna monitoring was undertaken during the 2013-2013 period
	Reserve A, B and C (Large-headed Fireweed)	**a)** plants were monitored in late February 2014 **b) four** grids were not surveyed as the monitoring requirement had been completed **c)** survival rates had declined slightly from 32% to **30% c)** timing of monitoring might skew results along with high levels of biomass making detection of new plants difficult **e)** recommendations for future management regimes consistent with previous years

	Reserve A, B and C (Spiny Rice-flower)	**a)** monitoring of the survival rates for translocated plants occurred in late February 2014 (overall results dropped from 23% to **13%**) **b)** survival rates of Spiny Rice-flower seedlings continued to decline (dropping from 20% to **18%**) **c)** the overall survival rates of the two salvage techniques, translocation and replanting seedlings, appear similar for the entire site **d)** the much higher cost of translocating remnant plants suggests that establishing new populations from seed may be a better technique for similar projects in the future **e)** seeds were again collected from Reserves A and B. Final germination numbers are yet to be determined, although are estimated to be insufficient to replace all dead plants **f)** this process of seed collection and germination may need to continue over a number of years as there is only a limited amount of viable seed available from the small population of remaining plants. **It is important to collect only a small fraction of available seed to allow the natural population the opportunity to expand**