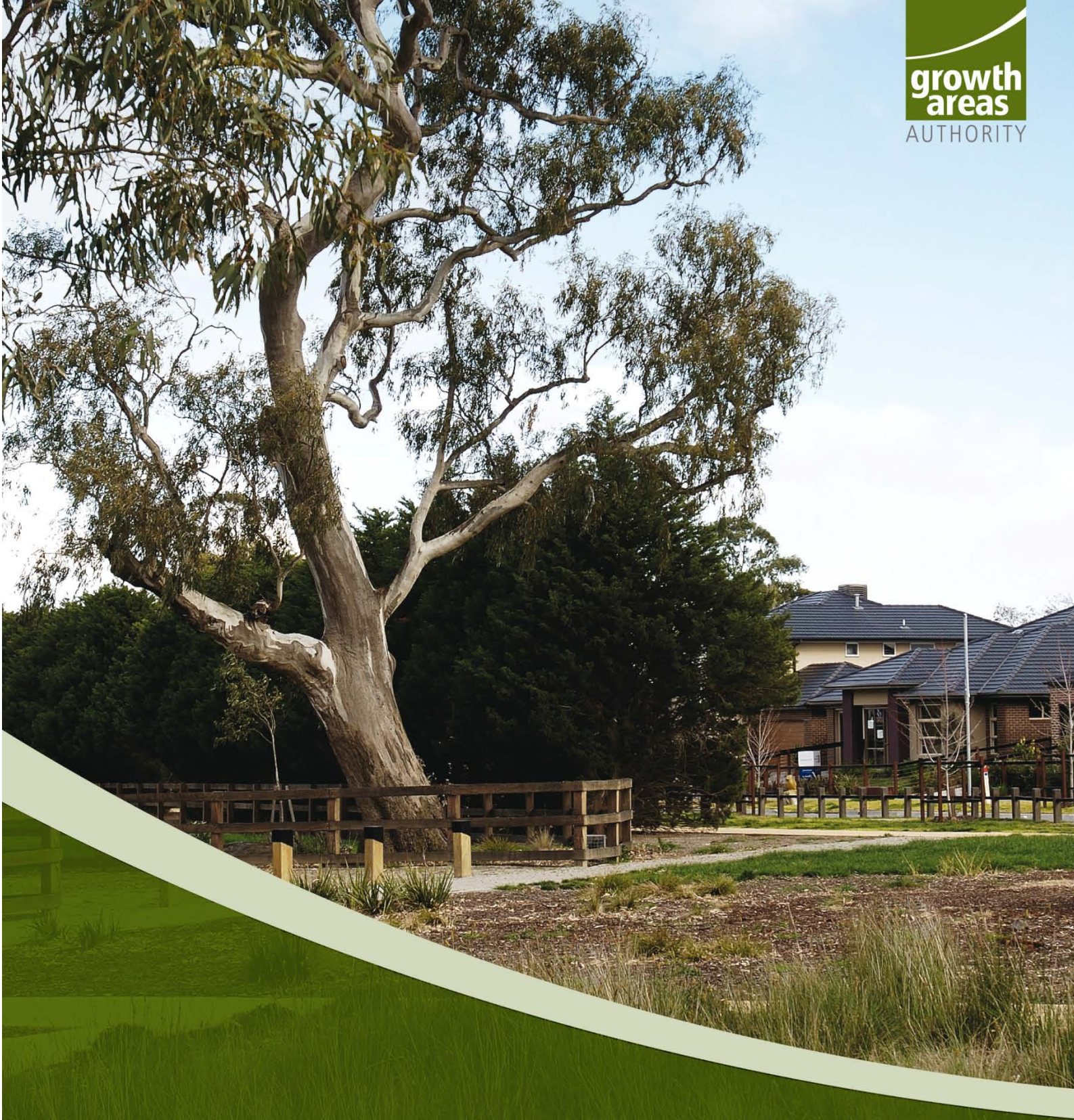

growth areas AUTHORITY

Biodiversity Assessment Report
Alfred Road – PSP 43

August 2012

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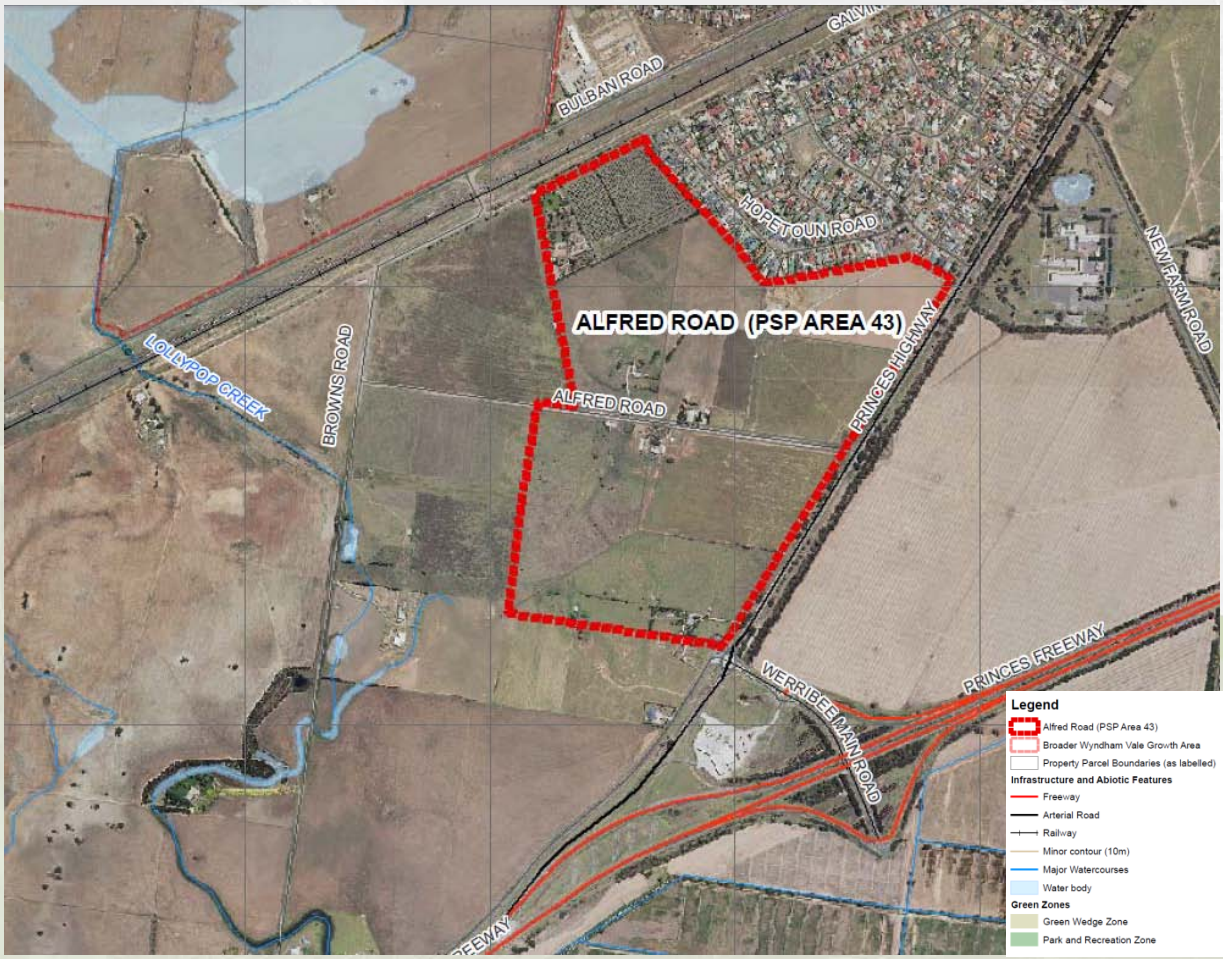

MAP: PSP 43 – Alfred Road

Biodiversity Mapping Project
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Alfred Road – PSP 43

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Biodiversity Assessment Report

Alfred Road (PSP 43)

Prepared for

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Glossary of Terms

EVC	Ecological Vegetation Class
GAA	Growth Areas Authority
DSE	Department of Sustainability and Environment
DTV	Degraded Treeless Vegetation
DEWHA	Department of Environment, Water, Heritage and the Arts
VFSD	Victorian Flora Site Database
PDA	Personal Digital Assistant
GIS	Geographic Information System
EPBC Act	*Environment Protection and Biodiversity Conservation Act* 1999
FFG Act	*Flora and Fauna Guarantee Act* 1988
VROTS	Victorian, Rare or Threatened Species
CMA	Catchment Management Authority
CaLP Act	*Catchment and Land Protection Act* 1994
VPP	Victoria Planning Provisions
VVP	Victoria Volcanic Plains
Hha	Habitat Hectares
ha	hectare
HZ	Habitat Zone
LOT	Large Old Tree
MOT	Medium Old Tree
VLOT	Very Large Old Tree
PSP	Precinct Structure Plan
Habitat Hectare	A site based measure of quality and quantity of native vegetation that is assessed in the context of the relevant native vegetation type
Habitat Zone	A discrete area of native vegetation consisting of a single vegetation type (EVC) with an assumed similar averaged quality. This is the base spatial unit for conducting a habitat hectare assessment
Bioregion	A landscape classification unit based on a range of environmental attributes such as climate, geomorphology, lithology and vegetation.
Bioregional Conservation Status	An assessment of the conservation status of the native vegetation type (EVC) in the context of a particular bioregion, taking account of how commonly it originally occurred, the current level of depletion and the level of degradation of condition typical of remaining stands.
Ecological Vegetation Class	A type of native vegetation classification that is described through a combination of its floristics, life form and ecological characteristics, and through an inferred fidelity to particular environment attributes. Each EVC includes a collection of floristic communities that occurs across a biogeographic range, and although differing in species, have similar habitat and ecological processes operating.

Net Gain	Is where, over a specified area and period of time, losses of native vegetation and habitat, as measured by a habitat hectares assessment, are reduced, minimised and more than offset by commensurate gains.
Remnant Patch	A continuous area of native vegetation, with or without trees, where less than 75% of the total understorey plant cover is weeds or non-native plants (bare ground not included), or a group (i.e. three or more) of trees where the tree canopy cover is at least 20%. Patches may occur across one or more land tenures, and may consist of one or more habitat zones.
Scattered Tree	Scattered trees are those canopy trees within an area where at least 75% of the total understorey plant cover is weeds or non-native plants and the overall canopy cover for a group (i.e. three or more) of trees is less than 20%.
Non-native Vegetation	Includes areas that contain no indigenous understorey vegetation (i.e. the area only contains understorey plants that are non-indigenous to the site). In addition, indigenous canopy trees occurring in non-native vegetation sites, that meet scattered tree Diameter at Breast Height thresholds, but do not meet the remnant patch cover thresholds for canopy trees, are recorded as scattered trees.
Degraded Treeless Vegetation	Vegetation that is not a remnant patch or scattered trees, nor a wetland should be treated as degraded treeless vegetation.

Sub-Regional Species Surveys

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

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

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

Executive Summary

AECOM was engaged by the GAA to prepare a Biodiversity Assessment Report for the Wyndham Vale Precinct Structure Plan. In April 2010, this precinct was divided into four, the Alfred Road Precinct (43) (the Precinct) is one of these.

Project Background

The role of the GAA is to plan for the new suburbs on the periphery of metropolitan Melbourne, to improve planning process and achieve better outcomes for new communities.

The GAA has undertaken detailed scale flora and fauna assessment and mapping to determine biodiversity values within Melbourne's growth areas. This is an essential input into the planning process and informs the environmental outcomes that can be achieved from the process. The project provides biodiversity information which is needed to carry out the detailed planning for future urban precincts. This information (which includes determination of 'habitat hectares' of native vegetation in areas surveyed within each precinct) will enable the application of the Victorian Native Vegetation Management Framework principles of 'avoid, minimise and offset' and the achievement of 'net gain' outcomes. The purpose of the GAA Biodiversity Assessment and Mapping Project is to:

- Undertake detailed field surveys of native vegetation and targeted flora and fauna species and to assess and map the ecological significance of these.
- Prepare Biodiversity Reports (covering native vegetation and flora and fauna habitat) as essential background input into precinct structure planning at an early stage in the planning process.
- Inform the preparation of precinct structure plans in areas designated for future urban development.
- Assist the long term planning of Melbourne's growth areas, including working with infrastructure authorities to ensure their requirements are met over the next 30-50 years.

Overview of the Precinct

The Precinct is approximately 30 kilometres west of the Melbourne CBD (**Figure E1**) and falls within the Victorian Volcanic Plains bioregion and is characterised by flat to undulating plains with areas of agricultural and horticultural lands and few native open grassland remnants. Planted non-indigenous tree species are present, acting as windbreaks within private properties. While the site contains a few farm dams no watercourses or natural waterbodies occur within the Precinct. However Lollipop Creek is located within approximately 400 m to the south west.

The Precinct covers 92.95 ha (based on supplied cadastre) and includes nine properties varying in size from 0.04 ha to 12.92 ha, all of which were privately owned. The northern boundary abuts existing residential development of Werribee. The southern boundary of the Precinct is a paddock fence that extends west from the intersection of West Road and the Princes Highway to Galvin Road (**Figure E1**).

Summary of key findings

The following section provides a summary of the key results within the area assessed by AECOM. The Precinct was found to contain:

- 92.95 ha (99% of the Precinct) of degraded treeless vegetation.
- Seven remnant patches on one property (Princes Highway road reserve), covering 1.11 ha.
- 0.33 Hha for all habitat zones.
- The seven remnant patches are Lighter-soils Plains Grassland (EVC 132_62), which under the FFG Act is a threatened community, Western (Basalt) Plains Grassland (**Figure E4**).
- No threatened species, populations or ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Protection Act* 1999.
- One Large Old scattered tree (River Red Gum).
- No listed flora and fauna species.

Opportunities to Reduce Potential Impacts

The Precinct represents a highly modified and fragmented agricultural landscape. Generally remnants that remain are small, degraded, of low diversity, contain significant cover of weeds, are 'secondary grasslands', fragmented and have low habitat scores. There are no habitat zones, based on their intrinsic values, which warrant retention (avoidance) at the exclusion of all other land uses and planning considerations. For this reason and without understanding other planning constraints and opportunities it is problematic to prescribe which remnants should be prioritised for incorporation into public open spaces. Structure Planning does however need to provide for passive and active open space, often linked by drainage corridors which provide for multiple objectives such as flood protection, stormwater detention (wetland habitat), landscape amenity, pedestrian and cyclist permeability and flora and fauna habitat. On this basis the opportunity for 'avoidance' is to identify and incorporate where practical selective remnants (part or whole) into the open space and drainage network taking into account other urban design and planning considerations.

AECOM recommends the GAA prioritise the retention of some remnants in open space based their size, condition, connectivity and presence of listed species and communities. These principles are expanded on below:

- Retention, restoration and management of habitat zones in which threatened species have been recorded or have the potential to reside or make significant use of the habitat zone.
- If present, prepare Conservation Management Plans for threatened species recorded within the Precinct. Where areas known to support threatened species are proposed to be cleared, translocation plans may need to be prepared, assuming translocation has been shown to be successful for that species.
- Since European settlement most native trees have been removed from the landscape. Replanting locally occurring long lived native trees as part of the urban landscape will provide multiple benefits including fauna habitat, shade, recreation and visual amenity. Anticipating a warmer dryer climate trees, open spaces, green corridors and stormwater detention can also play an important role in mitigating the effect of an anticipated drier and warmer climate.

This approach with sustainable development will remove on-going impacts caused by agricultural, establish a mechanism to retain and protect viable areas in public ownership, contribute to large sustainable and managed offset sites, and provide resources for long term management and restoration.

Opportunities to Protect and Enhance Local and Regional Biodiversity Values

The following opportunities for the protection and enhancement of biodiversity values at the Precinct include:

- Protection and enhancement of the seven Plains Grassland habitat zones along the western side of the Princes Highway. This could be done by incorporating the extent and location of the existing habitat zones into a grassland roadside reserve. This roadside reserve could be developed into a Native Vegetation Precinct Plan. Enhancement plantings of native grassland species could also be emplaced to boost natural biodiversity values within these areas.
- Where possible, native vegetation linkage corridors could be established between the Princes Highway road reserve and the Manor rail reserve on the western side of the Precinct where various threatened flora species are known to occur. Where possible, habitat linkage corridors could also be established to connect habitats of the Precinct with those of the Lollipop Creek, approximately 400 m to the south-west of the Precinct.

Limitations

The followign section provides an overview of some of the limitations associated with the project:

- AECOM was not able to commence field assessments until 2 December 2008 due to time delays with gaining site access from property owners. As a result, several properties were not assessed or were surveyed during late summer, which is outside the main flowering period for many native species (particularly certain herbs and lilies) that occur in grassland vegetation.

- There were several issues with the initial round of assessments due to faults in the mapping software. Initial habitat hectare results failed to calculate the ~1.36 x standardised multiplier required for treeless EVCs when scoring site condition. This has been rectified for this report. Additionally, there is variation in landscape scores between the two rounds.
- The assessments were conducted during prolonged dry (dought) conditions in southern Victoria. The total rainfall at Laverton RAAF (the nearest weather station with continuous online data) in 2008 was 369.4 mm and in 2009 was 360.4 mm (BOM, 2010). This compares with the long-term mean of 538.8 mm.
- There is also the potential for some vegetation classified as degraded treeless vegetation during the 08/09 survey period to actually contain non-native vegetation. Under the first GAA/AECOM contract (08/09), AECOM was not commissioned to record non-native vegetation; rather any vegetation that was not a scattered tree or remnant vegetation was recorded as degraded treeless vegetation.
- Species lists have been agregated for the full Wyndham Vale precinct from observations made during net gain, general and targetted surveys over the two contract periods. With the exception of listed species it has not been possible to develop separate species lists for each of the four smaller precincts (split occurred after survey work was complete), the species lists therefore represents the combined species list (all the species) recorded for the wider Wyndham Vale precinct.
- The habitat hectare assessment methodology under the 08/09 contract did not include a specific method to record data which would allow the presence or absence of Commonwealth listed communities to be determined in all cases (DEWHA 2008a and 2008b). Each Commonwealth ecological community has specific diagnostic criteria. Depending on these criteria and the data collected in 08/09 from the habitat hectare assessment, it has been possible to assess whether a Commonwealth community is present or not for some habitat zones, however, it has not been possible in all cases.
- Given no private properties could be accessed for survey work in 09/10 this would under most circumstances constitute a significant limitation and warrant further survey work (i.e. general flora and fauna and targeted surveys), however given the results of the desktop assessment, remnant patches were not recorded in 08/09 and experience, further survey work is unlikely to reveal significant species or habitat. If encountered, populations of species are likely to be small (e.g. transient individuals) and likewise remnant patches (habitat) small and degraded. For these reasons further survey work within Precinct 43 is not warranted. Accordingly targeted surveys were not conducted at the Alfred Road Precinct, as agreed between the GAA, DSE and AECOM.

Figure E1: Location and Overview Map

Figure E2: Property Access

Figure E3: Location of Ecological Vegetation Classes and Scattered Trees

Figure E4: EVC Location and Conservation Significance

Figure E5: Significant Flora and Fauna and Potential Fauna Habitat

1.0 GAA Forward

The following text has been provided by the Growth Areas Authority (GAA) for inclusion in this AECOM report.

1.1 Background

The role of the GAA is to plan for the new suburbs on the periphery of metropolitan Melbourne, to improve planning process and achieve better outcomes for new communities.

The GAA has undertaken detailed scale flora and fauna assessment and mapping to determine biodiversity values within Melbourne's growth areas. This is an essential input into the planning process and informs the environmental outcomes that can be achieved from the process. Assessment and mapping of biodiversity values, as part of Melbourne's planning, has never been undertaken on this scale before.

The project provides biodiversity information which is needed to carry out the detailed planning for future urban precincts. This information (which includes determination of 'habitat hectares' of native vegetation in areas surveyed within each precinct) will enable the application of the Victorian Native Vegetation Management Framework principles of 'avoid, minimise and offset' and the achievement of 'net gain' outcomes.

Planning of new precincts in Melbourne must also meet National objectives for the conservation of matters of National Environmental Significance as described by the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999. The biodiversity reports prepared by the GAA are a tool in Victoria meeting its obligations under Commonwealth legislation and achieving these national environmental objectives.

The purpose of the GAA Biodiversity Assessment and Mapping Project is to:

- Undertake detailed field surveys of native vegetation and targeted flora and fauna species and to assess and map the ecological significance of these.
- Prepare Biodiversity Reports (covering native vegetation and flora and fauna habitat) as essential background input into precinct structure planning at an early stage in the planning process.
- Inform the preparation of precinct structure plans in areas designated for future urban development
- Assist the long term planning of Melbourne's growth areas, including working with infrastructure authorities to ensure their requirements are met over the next 30-50 years;

The project has been undertaken over two consecutive years covering a total of 43,577 hectares, using prescribed survey techniques to map native vegetation, and targeted flora and fauna species. Experienced botanists and zoologists have been contracted by the GAA to undertake field surveys according to standards established by the GAA and the Victorian Department of Sustainability and Environment (DSE).

The total areas surveyed during the first year of the project (2008/2009) was 32,899 hectares of which 6,070 hectares was inside the Urban Growth Boundary; 20,320 hectares was within investigation areas (proposed Urban Growth Boundary); and 6,509 hectares of western grassland areas - resulting in the production and publication of 13 Biodiversity Reports.

The second year of the project (2009/2010) assessed and mapped an additional area of 10,678 hectares of land proposed for future urban development and will result in the preparation of a further 20 Biodiversity Reports.

1.2 Biodiversity Reports

These Biodiversity Reports will inform the preparation of precinct structure plans in areas designated for future urban development. In particular, the reports provide data about the quality, type, extent and significance of native vegetation and flora and fauna habitat within each planning precinct. Additionally, the Reports provide data used for preparation of Native Vegetation Precinct Plans and, in some cases, for preparation of Conservation Management Plans.

This process enables the planners and other professionals working on the Precinct plan to understand the ecological value of habitat existing within the Precinct and to make decisions about the future urban structure and provision of infrastructure within the Precinct using the principles contained in Victoria's Native Vegetation Management Framework of 'avoid, minimise and offset'.

The State Government's goal for conserving native vegetation in Victoria is 'to achieve a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a Net Gain'. The assessment and mapping of Victoria's biodiversity values make a significant contribution to the State Government's goal in the context of planning for Melbourne's growth areas.

1.3 Streamlining Initiative

Detailed assessment and mapping of biodiversity prior to precinct planning is an initiative intended to improve both planning and environmental outcomes in Victoria by the following:

- The assessments are carried out early in the planning cycle so that they can inform design and decision making.
- The field work is undertaken at the correct time of the year according to ecological standards and according to survey techniques established and agreed by GAA and DSE.
- Multiple field surveys are conducted concurrently by qualified practitioners, which is a more efficient method of collecting the biodiversity data.
- Economies of scale are achieved by contractors covering large land areas (at the Precinct scale), reducing the cost and time required.
- The resulting Biodiversity Reports provide all stakeholders with consistent and reliable information about flora, fauna and habitat values within the Precinct to enable better decision making and environmental outcomes to be achieved.
- GAA carrying out this work reduces the burden on local governments and land owners and provides greater certainty for urban development and biodiversity outcomes.

As a streamlining initiative, the project follows GAA principles of carrying out the necessary background research competently and early in the process. By the GAA establishing the survey and reporting standards required up front and by doing the research early in the process, it avoids others having to repeat or rectify the research later in the process. Repeat surveys and inadequate quality of surveys has often occurred in the past and the GAA seeks to avoid this occurring in current planning work.

1.4 Standards of Practice

The GAA Biodiversity Mapping and Assessment Project endeavours to establishes a consistent standard in the integration of biodiversity conservation in the planning of new suburbs in growth areas by:

- Determining up front with the DSE the prescribed survey techniques to be used by contractors working in the field.
- Establishing up front with the DSE which targeted surveys (for which species of flora and fauna) are required in each precinct according to known or likely habitat.
- Agreements between GAA and DSE mean that a more strategic approach has been taken to surveys for specific species – using either an 'assumed' presence model (e.g. Striped Legless Lizard) and a sub-regional survey approach(for Southern Brown Bandicoot, Growling Grass Frog and Golden Sun Moth).
- Use of hand-held GPS field mapping devices and a common approach to map presentation to provide consistent and quality mapping standards to be achieved.
- All contractors, while being experienced and qualified scientists, were required to undergo three days of compulsory training in habitat hectare assessment techniques and a competency check (managed by DSE) and field based quality checks of their work.

The GAA flora and fauna mapping and assessment project was undertaken in close association with the DSE which is the regulator for biodiversity protection and conservation in Victoria. This collaborative and proactive approach by the GAA to work with the DSE has added significant value to the quality and reliability of the project outcomes. The data collected by the project and it assessment and mapping adds to the protection, management and restoration of the environment through the Precinct planning process.

The Biodiversity Reports prepared for each planning precinct are a key input into the detailed planning for the Precinct. They support the preparation of key documents such as:

- The Biodiversity Plan (setting out the key biodiversity issues and implications) included within the Precinct Structure Plan.
- Native Vegetation Precinct Plan (setting out the native vegetation to be retained, removed and offset within the Precinct).
- A Conservation Management Plan if required (which sets out the management prescriptions for matters of national environmental significance).
- Collaboration by GAA with the Victorian DSE throughout the project has enabled the development of a robust methodology and a biodiversity template for the production of reports.

1.5 Quality

- The GAA approach has established appropriate standards at the outset of the project and ensured that the work is done to meet these standards, to avoid re-work and future delays. Measures have been put in place throughout this project to ensure quality standards are met and reflected in the final reports. These can be summarised as follows:
- A project governance structure has been used by the project from start to finish involving both the GAA (undertaking the project) and DSE (the regulator for biodiversity matters under Victorian legislation) in establishing the project scope and standards to be achieved.
- A project scope was prepared and reflected within the Tender specification used by the GAA to ensure that contractors who were selected by the GAA had the experience and skill required to carry out the project and meet the required quality standards.
- Contractors working on the project were required to undertake 3 days of compulsory training and to meet a competency check.
- Contractors were required to submit monthly reports of the data collected to GAA and DSE to enable checking of data and mapping integrity. This quality check provided confidence in the information collected and rectification of any deficiencies prior to acceptance of the results.
- Biodiversity Reports which explain and interpret the data collected in the field were prepared by qualified ecologists and are designed to enable planners, engineers, designers and others to understand the information and use it in practical applications.
- Quality assurance of draft reports by another qualified ecological consultant has been used to ensure work is accurate and consistent in meeting project standards. The quality assurance process provides a streamlined approach to checking and amending reports before they are finalised and accepted by GAA and DSE.

2.0 Introduction

AECOM was engaged by the GAA to prepare a Biodiversity Assessment Report for the Wyndham Vale Precinct Structure Area. In April 2010, this precinct was divided into four, the Precinct (43) (the Precinct) is one of these.

AECOM completed Vegetation and Mapping Assessment for the Precinct 2008 and 2009. Further surveys were undertaken in 2009/10 including general flora and fauna surveys, Vegetation and Mapping Assessment and targeted flora and fauna surveys. Project field work for both contract periods was undertaken between 17 October 2008 and 6 June 2010.

The report presents the results of the mapping and survey work for the Precinct for both survey periods. This report has been prepared in accordance with the Precinct Structure Planning Guidelines and the DSE biodiversity assessment template (DSE 2010c).

2.1 Study Site (the Precinct)

The Precinct is approximately 30 kilometres west of the Melbourne CBD **(Figure F1)** and falls within the Victorian Volcanic Plains bioregion and is characterised by flat to undulating plains with areas of agricultural and horticultural lands and few native open grassland remnants. Planted non-indigenous tree species are present, acting as windbreaks within private properties. While the site contains a few farm dams no watercourses or natural waterbodies occur within the Precinct. However Lollipop Creek is located within approximately 400 m to the south west.

Public parkland and drainage reserves associated with the Werribee West Drain and Lollipop Creek are located approximately 0.5 km to the north and north west of the Precinct, including the Wyndham Vale Reserve and the Gordon O'Keeffe Reserve.

Mean annual rainfall at RAAF Laverton (the nearest weather station with a publically available online dataset continuous from 1941 to present) is 538.8 mm (BOM 2009).

The Precinct covers 92.95 ha (based on supplied cadastre) and includes nine properties varying in size from 0.04 ha to 12.92 ha, all of which were privately owned. The northern boundary abuts existing residential development of Werribee. The southern boundary of the Precinct is a paddock fence that extends west from the intersection of West Road and the Princes Highway to Galvin Road (**Figure F1**). Roadside reserves along the boundaries of these properties are also included within the Precinct. The bulk of the properties have a history of agricultural land-use, several of which are currently used for agriculture or horticulture (e.g. livestock grazing and cropping). Surrounding land-use includes horticulture, light industrial and residential development. The Manor rail reserve is located beside the Melbourne-Geelong railway line closely to the west of the site.

3.0 Methods

3.1 Terminology and Nomenclature

A full glossary of acronyms and terms used throughout this document can be found in the preliminary pages of this report. The nomenclature of common and scientific names of vascular plants follows the Victorian Flora Site Database (VFSD) supplied by the Department of Sustainability and Environment (DSE) (DSE, 2010a). Zoological nomenclature follows the Atlas of Victorian Wildlife (AVW) also supplied by the DSE (2010b).

3.2 Literature and Database Review

Flora, fauna, habitat and related environmental values previously recorded within the assessment area were assessed via a literature and dataset review. The following databases, reports, spatial data and search results were used to complete this assessment:

- Victorian Ecological Vegetation Class (EVC) mapping provided online by DSE (2009b) and benchmark quality values (DSE, 2010d) for the EVC's that have been modelled as occurring within or surrounding the site;
- Data from the VFSD and AVW supplied by the DSE (DSE, 2010a; 2010b);
- Aquatic Fauna Database (DSE, 2010e);
- Wetlands Spatial Database – Wetland 1994;
- Aerial photography supplied by the GAA;
- Biosites Maps and Reports: Sites of biodiversity significance (Biosites) for the Port Phillip Region (DSE 2005a);
- Commonwealth *EPBC Act* Protected Matters Search Tool (PMST): Searched initially on 14 May 2009 and again on 8 April 2010;
- EPBC Act Significant Impact Guidelines 1.1 and species specific relevant policy statements;
- Species Profiles and Threats Database (SPRAT), and Environmental Reporting Tool (ERT);
- National species recovery plans and conservation advice for species listed by the PMST;
- Sub-regional surveys for the Growling Grass Frog (Ecology Australia, 2010); and
- Sub-regional fauna surveys: Golden Sun Moth (Biosis Research, 2010).

3.3 Mapping and Assessment Training

AECOM staff initially undertook training with GAA and DSE from 27 to 29 August 2008. Training focused specifically on vegetation assessment and mapping, practical field assessment, recording data, using equipment and assessment programs, downloading and processing data, data requirements and quality control. During the 2009/10 contract there was additional training on 26/27 August 2009. During all field surveys, in which habitat hectare assessments were undertaken each AECOM survey team contained at least one individual certified to conduct these assessments.

3.4 Field Survey Techniques

Where appropriate the field survey generally followed procedures developed by the DSE (2004 & 2009b). The site was surveyed over two years between 17 October 2008 and 6 June 2010. Access to properties was dependent landowner approval.

Most surveys were conducted during late spring to early summer which is generally considered to be the optimal period for ecological surveys given many plants are in flower and many animals are more active at this time of year. Due to its late autumn flowering, the Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* was surveyed for in May-June 2010.

3.4.1 Data Capture

Field survey teams used a Trimble Nomad TDS Personal Digital Assistant (PDA) unit, which features a Global Positioning System (GPS) (accuracy +/- 5 m). Features on each PDA unit included a colour aerial map and cadastral layers of each property. Hard copies of aerial photographs for each property were also taken into the field as a backup. These PDAs were also enabled with the 'habitas' software developed by the DSE for recording and assessing native vegetation.

3.4.2 General Flora Survey

Prior to conducting field work ecologists familiarised themselves with desktop information, aerial photography and potential listed species with the objective of identifying areas more likely to contain remnant native vegetation (habitat) and native species. During the 2009/10 contract the Random Meander Method (Cropper, 1993) was adopted to search for the presence of native flora. This involved ecologists conducting the native vegetation assessments and collating a list of plants (native and exotic) for properties accessed within the Precinct. A complete flora list was created for the Precinct rather than a list on a site by site basis.

Where flora identification was difficult in the field, a sample of the species was taken to aid in later identification. A number of authoritative texts (Walsh and Entwisle, 1994, 1996, 1999; Australian Plants Society Maroondah, 2001) and databases (Viridans, 2005; AECOM herbarium samples) were utilised to identify flora samples.

3.4.3 Native Vegetation (Habitat Hectare) Assessment

Potential habitats identified during the literature and dataset review were targeted during the field assessment. Where present, remnant patches of native vegetation (as defined by DSE) were identified and mapped using Victoria's Native Vegetation: A Framework for Action (the Framework) (DSE 2006).

A vegetation quality assessment of remnant patches was undertaken using the Habitat Hectares methodology (DSE 2004) and scattered trees assessed following the Framework guidelines. The conservation significance of native vegetation was classified in accordance with the Framework.

Remnant patches of vegetation were assessed and mapped using the 'habitas' software developed by the DSE.

The presence of State and Nationally listed ecological communities was assessed during native vegetation (Habitat Hectare) assessments conducted during the 09/10 contract.

3.4.4 General Fauna Survey

The method involved recording terrestrial vertebrate fauna observed during all field survey work. Where suitable habitat for species was indentified specific observations were made, for example tree hollows or rocky knolls. The following methods were used for different taxonomic groups of fauna:

3.4.4.1 Birds

20 minute bird surveys in available habitat types (i.e. Plains Grassland) within the road reserve along the western edge of the Princes Highway were undertaken. These surveys were conducted as part of the native vegetation assessments (**Table 2**). Bird surveys were conducted during on the same day as vegetation surveys. Birds were identified on the basis of visual observation and/or call.

3.4.4.2 Terrestrial Mammals

Habitat features potentially suitable for terrestrial mammals (e.g. rock formations, fallen timber, soil cracks) whilst conducting native vegetation assessments were noted. The only remnant vegetation present within the Precinct included was a few small patches of Plains Grassland and a total of 20 minutes was spent visually assessing these patches for potential terrestrial mammal habitat. Any such features were noted using hand-held GPS. Trapping was not conducted; however, AECOM ecologists opportunistically searched under rocks and other potential habitat features. A large farm dam in the north-western section of the site was also briefly inspected for the presence of fauna during the previous contract period.

3.4.4.3 Arboreal Mammals and Bats

Potential habitat for arboreal mammals was noted during assessments of native vegetation. Sign surveys were also used to detect evidence of presence (e.g. scats, scratching, diggings, tracks and footprints) of vertebrate species. However, due to the low abundance of scattered trees or treed native vegetation no opportunities were identified for spotlighting and the site was considered to have few natural values for arboreal mammals and bats.

3.4.4.4 Reptiles and Amphibians

Ecologists undertook opportunistic surveys for reptiles and amphibians by searching under rocks, around rock formations and fallen timber. These searches were conducted simultaneously to the native vegetation assessments in the habitat zones of Plains Grassland in the Princes Highway road reserve (**Table 2**). Areas of potential reptile and amphibian habitat were noted and located using GPS (where present).

3.4.4.5 Fishes

There were no opportunities to survey for fishes as no standing water was present in natural waterbodies or watercourses. Farm dams in the precinct were either dry or appeared to be highly degraded with poor water quality (e.g. high algal levels) or low levels of stagnant water.

3.4.4.6 Invertebrates

Surveys for invertebrates (including butterflies) were not conducted, but potential areas of habitat for the threatened Golden Sun Moth were noted.

3.4.5 Targeted Surveys

A desktop search was conducted in conjunction with site habitat observations to identify significant species for targeted surveys. Following further consultation with GAA and DSE it was agreed that no areas within the Precinct were suitable for targeted flora and fauna surveys.

3.4.6 Presence/Absence Likelihood

As with most biological assessments, the presence or absence of particular species of flora or fauna over time cannot be definitively determined by a single site assessment. AECOM has developed a method to assess the likelihood of the presence of national and state listed threatened species within a site. This method identifies the habitat requirements of species of conservation significance with the potential to occur on site, as identified during the desktop assessment. Based on the outcomes of the field survey AECOM then examines whether the site contains any suitable habitat for individual species and then assesses the likelihood of species occurrence based on those results.

Likelihood categories provided include:

- Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.
- Low: Some of the preferred habitat is present on the site. Species may infrequently visit the site on-route for foraging but will not roost or otherwise depend on habitats on the site for their survival. Migratory and aerial foraging birds may overfly the site.
- Moderate: Site contains some of the preferred habitat to support a population of the species.
- High: Site contains the preferred habitat which is likely to support a population of the species, including roost sites.
- Present: Species directly observed on the site or recently recorded at the site. Preferred habitat is present on the site.

This process is to be used as a guide and is not to be used as indicating species presence or absence.

3.5 Limitations

AECOM was not able to commence field assessments until 2 December 2008 due to time delays with gaining site access from property owners. As a result, several properties were not assessed or were surveyed during late summer, which is outside the main flowering period for many native species (particularly certain herbs and lilies) that occur in grassland vegetation. However, it does provide an optimal time to sample native grasses. Spring is the preferred time of year to undertake flora and fauna assessments in Victoria. It is possible to undertake an assessment at other times of the year, however, the limitations of seasonal influence on the presence / absence of several species must be considered.

There were several issues with the initial round of assessments due to faults in the mapping software. Initial habitat hectare results failed to calculate the ~1.36 x standardised multiplier required for treeless EVCs when scoring site condition. This has been rectified for this report. Additionally, there is variation in landscape scores between the two rounds. Traditionally landscape scores have been calculated via desktop analysis, which was employed in the first round. However, DSE have developed a model to calculate the landscape score which has been incorporated in the second round. Landscape scores may need to be standardised to reflect similar scores across the two rounds.

The assessments were conducted during prolonged dry (dought) conditions in southern Victoria. The total rainfall at Laverton RAAF (the nearest weather station with continuous online data) in 2008 was 369.4 mm and in 2009 was 360.4 mm (BOM, 2010). This compares with the long-term mean of 538.8 mm.

There is also the potential for some vegetation classified as degraded treeless vegetation during the 08/09 survey period to actually contain non-native vegetation. Under the first GAA/AECOM contract (08/09), AECOM was not commissioned to record non-native vegetation; rather any vegetation that was not a scattered tree or remnant vegetation was recorded as degraded treeless vegetation. Subsequently, during the 09/10 contract the guidelines and contract changed to also incorporate non-native vegetation. As a result, non-native vegetation may be under-represented.

Species lists have been agregated for the full Wyndham Vale precinct from observations made during net gain, general and targetted surveys over the two contract periods. With the exception of listed species it has not been possible to develop separate species lists for each of the four smaller precincts (split occurred after survey work was complete), the species lists therefore represents the combined species list (all the species) recorded for the wider Wyndham Vale precinct. This is not a signficant limitation as the landscape and ecological character is relatively homegenous across all four precincts and any overrepresentation is likely to apply to common species.

The habitat hectare assessment methodology under the 08/09 contract did not include a specific method to record data which would allow the presence or absence of Commonwealth listed communities to be determined in all cases (DEWHA 2008a and 2008b). Each Commonwealth ecological community has specific diagnostic criteria. Depending on these criteria and the data collected in 08/09 from the habitat hectare assessment, it has been possible to assess whether a Commonwealth community is present or not for some habitat zones, however, it has not been possible in all cases. For example, the habitat hectare method recognises remnant patches with greater than 50% cover of weeds as one category, however, a key diagnostic criterion for some Commonwealth ecological communities is whether patches contain greater or less than 70% cover of particular types of weeds (e.g. non-grassy weeds). The habitat hectare methodology carried out in 09/10 contract included an assessment of Commonwealth threatened ecological communities.

Given no private properties could be accessed for survey work in 09/10 this would under most circumstances constitute a significant limitation and warrant further survey work (i.e. general flora and fauna and targeted surveys), however given the results of the desktop assessment, remnant patches were not recorded in 08/09 and experience, further survey work is unlikely to reveal significant species or habitat. If encountered, populations of species are likely to be small (e.g. transient individuals) and likewise remnant patches (habitat) small and degraded. For these reasons further survey work within Precinct 43 is not warranted. Accordingly targeted surveys were not conducted at the Alfred Road Precinct, as agreed between the GAA, DSE and AECOM

4.0 Results

4.1 Flora

4.1.1 Species

In total 114 flora species were recorded across the Wyndham Vale precincts (Precinct 40, 41, 42, 43) including 66 indigenous and 48 non-indigenous species. **Appendix A** and **Appendix B** provide complete lists of flora species recorded from the Wyndham Vale precincts surveyed by AECOM in 2008-2010.

4.1.1.1 Threatened Flora Species

The VFSD (DSE, 2010a) and EPBC Act Protected Matters Search Tool (DEWHA, 2010) (**Appendix C**) contains 16 threatened flora species, which were recorded or predicted to occur within 5 km of the Precinct.

These are:

- Marsh Saltbush *Atriplex paludosa* subsp. *paludosa;*
- Southern Shephard's Purse *Ballantinia antipoda;*
- Curly Sedge *Carex tasmanica;*
- Small Milkwort *Comesperma polygaloides;*
- Small Scurf-pea *Cullen parvum;*
- Rough-grain Love-grass *Eragrostis trachycarpa;*
- Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata;*
- Clover Glycine *Glycine latrobeana;*
- Austral Trefoil *Lotus australis* var. *australis;*
- Giant Honey-myrtle *Melaleuca armillaris armillaris#;*
- Spiny Rice-flower *Pimelea spinescens* subsp*. spinescens;*
- Maroon Leek-orchid *Prasophyllum frenchii;*
- Fragrant Leek-orchid *Prasophyllum suaveolens;*
- Button Wrinklewort *Rutidosis leptorrhynchoides;*
- Large-fruit Fireweed *Senecio macrocarpus;* and
- Southern Swainson-pea *Swainsona behriana.*

No threatened flora species were recorded during field survey work.

4.1.1.2 Best or Remaining 50% Assessment

Best or remaining 50% habitat was determined in accordance with the *Native Vegetation Guide for Assessment of Referred Planning Permit Applications* (Table 2, DSE, 2007b). The majority of habitat zones within the Precinct failed to meet best 50% or remaining 50% habitat requirements for threatened species listed under the FFG Act.

Species predicted as unlikely to occur within the Precinct have been considered as not having the required habitat and therefore surveyed areas within the Precinct fail to meet the best 50% or remaining 50% habitat requirements for threatened species (**Appendix C**).

The remaining State threatened flora species (not rare or near-threatened) with at least a low likelihood of occurrence are assessed for best and remaining 50% per habitat zone below.

Small Milkwort

While habitat attributes exist for this species, specifically in habitat zones 1-7 along the western side of the Princes Highway road reserve, the habitat zones do not represent above-average condition and the species was not recorded during the habitat assessments. Consequently there is unlikely to be habitat pertaining to either the best or remaining 50% of this species' habitat across all habitat zones within the Alfred Road Precinct. Assessment steps followed included A → D; No further consideration required.

Small Scurf-pea

While habitat attributes exist for this species, specifically in habitat zones 1-7 along the western side of the Princes Highway road reserve and particularly in habitat zone 7, the habitat zones do not represent above-average condition and the species was not recorded during the habitat assessments. In following the DSE (2007b) assessment steps it is determined unlikely that habitat at the Precinct constitutes the best or remaining 50% of habitat for this threatened species. Assessment steps followed included A → D; No further consideration required.

Clover Glycine

While habitat attributes exist for this species, specifically in habitat zones 1-7 along the western side of the Princes Highway road reserve and particularly in habitat zone 7, the habitat zones do not represent above-average condition and the species was not recorded during the habitat assessments. In following the DSE (2007b) assessment steps it is determined unlikely that habitat at the Precinct constitutes the best or remaining 50% of habitat for this threatened species. Assessment steps followed included A → D; No further consideration required.

Rough-grain Love-grass

While habitat attributes exist for this species, specifically in habitat zones 1-7 along the western side of the Princes Highway road reserve and particularly in habitat zone 7, the habitat zones do not represent above-average condition and the species was not recorded during the habitat assessments. In following the DSE (2007b) assessment steps it is determined unlikely that habitat at the Precinct constitutes the best or remaining 50% of habitat for this threatened species. Assessment steps followed included A → D; No further consideration required.

Austral Trefoil

While habitat attributes exist for this species, specifically in habitat zones 1-7 along the western side of the Princes Highway road reserve and particularly in habitat zone 7, the habitat zones do not represent above-average condition and the species was not recorded during the habitat assessments. In following the DSE (2007b) assessment steps it is determined unlikely that habitat at the Precinct constitutes the best or remaining 50% of habitat for this threatened species. Assessment steps followed included A → D; No further consideration required.

Spiny Rice-flower

While habitat attributes exist for this species, specifically in habitat zones 1-7 along the western side of the Princes Highway road reserve and particularly in habitat zone 7, the habitat zones do not represent above-average condition and the species was not recorded during the habitat assessments. In following the DSE (2007b) assessment steps it is determined unlikely that habitat at the Precinct constitutes the best or remaining 50% of habitat for this threatened species. Assessment steps followed included A → D; No further consideration required.

Fragrant Leek-orchid

Given the highly disturbed nature of the vegetation the habitat requirements for this species have not been met. In following the DSE (2007b) assessment steps it is determined unlikely that habitat at the Precinct constitutes the best or remaining 50% of habitat for this threatened species. Assessment steps followed included A → D; No further consideration required.

Button Wrinklewort

This species is known to occur in the Manor rail reserve closely to the west of the Precinct. While habitat attributes exist for this species, specifically in habitat zones 1-7 along the western side of the Princes Highway road reserve, the habitat zones do not represent above-average condition and the species was not recorded during the habitat assessments. In following the DSE (2007b) assessment steps it is determined unlikely that these habitat zones constitute the best or remaining 50% of habitat for this threatened species. Assessment steps followed included A → D; No further consideration required within the surveyed area.

Large-fruit Fireweed

This species is known to occur in the Manor rail reserve closely to the west of the Precinct. Habitat attributes may exist for this species on the Precinct, specifically in habitat zones 1-7 along the western side of the Princes Highway road reserve. However, these habitat zones do not represent above-average condition and the species was not recorded during the habitat assessments. In consideration of the data currently available to AECOM, it is determined that there is unlikely to be either the best or remaining 50% across all habitat zones within the precinct. Assessment steps followed included A → D; No further consideration required within the surveyed area.

Southern Swainson-pea

While habitat attributes exist for this species, specifically in habitat zones 1-7 along the western side of the Princes Highway road reserve, the habitat zones do not represent above-average condition and the species was not recorded during the habitat assessments. Consequently there is unlikely to be either the best or remaining 50% across these habitat zones. DSE (2007b) assessment steps followed included A → D; No further consideration required.

Western (Basalt) Plains Grassland

This community is deemed by DSE (2003) to be equivalent to EVC 132 Plains Grassland. As such, remnant patches of Plains Grassland in the Precinct qualify as the Western (Basalt) Plains Grassland Community, which is listed under the FFG Act. Habitat zones within the Precinct are not of above average quality (i.e. below the average habitat score of 45 out of 100) and are hence considered to be the remaining 50%.

4.1.2 Vegetation Communities

The DSE Biodiversity Interactive Map (DSE, 2010) models the pre-1750 EVC's (**Table 1**) to have consisted of:

- Plains Grassland (EVC 132)
- Plains Grassy Woodland (EVC 55).

EVC mapping by DSE (2005) (**Table 1**) suggests no EVC's are present. Within the Precinct, seven remnant patches of native vegetation were recorded along the Princes Highway road reserve, covering 1.11 ha or 1.2% of the Precinct. The remnant vegetation on the site comprised one EVC, Lighter-soils Plains Grassland (EVC 132_62) (refer to **Plates 1** and **2**). A description of this EVC and its extent within the site is outlined in **Table 1** and shown in **Figures F2A – F2B**. The seven habitat zones of Lighter-soils Plains Grassland EVC were of low quality with all seven remnant patches having a habitat score less than 0.35. Three of the remnant patches had a Habitat Score exceeding 0.30 (**Table 3**). Which is lower than the average Habitat Score for grasslands of 0.45 (DSE, 2007a).

The native vegetation patches all lie on the western side of the Princes Highway and are degraded. There is currently no connectivity between these patches and other native vegetation within the Precinct.

The Bioregional Conservation Status (BCS) of Lighter-soils Plains Grassland (EVC 132_62) in the Precinct is Endangered (DSE, 2008a). Under Victoria's *Native Vegetation Management: A Framework for Action* (the Framework) (DNRE, 2002), the minimum conservation significance of Endangered EVC's is High. As all remnant patches recorded in the Precinct have a Habitat Hectare score of <0.4, none qualify as vegetation of Very High conservation significance (DNRE, 2002; Appendix 3).

One Large Old scattered tree was recorded on the site in an area formerly modelled to feature Plains Grassland EVC. Therefore, this scattered tree is determined to have a conservation significance of High (**Table 4**).

The properties within the Precinct have been subject to previous and current land uses resulting in loss of native vegetation and the dominance of introduced flora species. In general, long-term agricultural land use has resulted in the nearly complete loss of native vegetation in the Precinct and the only remaining elements of the original flora of the area found were in the habitat zones mapped along the western side of the Princes Highway.

Degraded treeless vegetation (DTV) was recorded on all properties, covering 91.04 ha of the Precinct. DTV within the Precinct was dominated by introduced grass and herb species, including Perennial Rye-grass *Lolium perenne* and Wild Oat *Avena fatua.*

Several noxious weeds listed under the CaLP Act were also recorded in this vegetation, including Serrated Tussock *Nassella trichotoma* and Chilean Needle-grass *Nassella neesiana*. Galenia *Galenia pubescens* was a dominant environmental weed across much of the private land in the Precinct.

Planted Sugar Gum *Eucalyptus cladocalyx* trees (including non-local eucalypts) occurred along the western side of the Princes Highway adjacent to the Plains Grassland habitat zones.

Table 1: Description and Extent of EVCs Recorded in the Alfred Road Precinct.

EVC Number	EVC Name	Bioregion	Bioregional Conservation Status	Pre-1750 EVC model	2005 EVC model	Presence (current surveys)	Area (Ha)	Habitat Hectares of EVC	Precinct EVC Description
132	Plains Grasslands	Victorian Volcanic Plain	Endangered	✓		✓	1.11	0.33	EVC 132_62 Lighter-soils Plains Grassland, a sub-class of EVC 132 Plains Grassland, was identified, assessed and mapped in the Precinct along the western road reserve of the Princes Highway. Characteristics of this EVC included treeless vegetation less than one metre tall dominated largely by graminoid life forms and occasional herbs. A lighter surface-soil substrate was observed in this location. Climatic records (BOM, 2009) indicate this area receives at least 500 mm annual rainfall. Habitat zones of this EVC were observed to be in a modified state and consisted primarily of Wallaby Grass *Austrodanthonia* spp., with some Spear Grass *Austrostipa* spp. and Windmill Grass *Chloris truncata*.

4.1.3 Habitat Hectare Assessments

The following section presents survey details relating to the habitat hectare assessment conducted within the Precinct. **Table 2** presents the survey dates and conditions. All surveys were conducted between 7:30am and 5:30pm. **Table 3** presents results of habitat zones observed within the Precinct.

One Large Old scattered tree was recorded on the Precinct during the survey period (**Table 4**).

Table 2: Survey dates and conditions

Date	Site conditions	Properties assessed
December 2008		
2/12/2008	Fine and sunny	212341641
31/12/2008	Mainly fine and mild	44460
		1770357
		1770359
		1770360
		1783067
		1783071
		2051356
January 2010		
14/01/2010	Fine and Mild	R1770357
		R1770359
		R1770360
		R1783067
		R1783071
		R212341641
		R44460

Table 3: Remnant Patches within the Alfred Road Precinct

Habitat Zone	Area of Zone (ha)	EVC	Habitat Score	Habitat Hectare	Conservation. Status[1]	Conservation Significance[2]	No. of MOT[3]	No. of LOT[4]	No. of VLOT[5]
01	0.01	VVP_0132_62	21.04	0.002	Endangered	High	0	0	0
02	0.10	VVP_0132_62	34.64	0.035	Endangered	High	0	0	0
03	0.42	VVP_0132_62	29.20	0.123	Endangered	High	0	0	0
04	0.08	VVP_0132_62	29.20	0.023	Endangered	High	0	0	0
05	0.04	VVP_0132_62	33.28	0.013	Endangered	High	0	0	0
06	0.08	VVP_0132_62	33.28	0.027	Endangered	High	0	0	0
07	0.38	VVP_0132_62	29.20	0.111	Endangered	High	0	0	0

1 Conservation Status as defined by DSE
2 Conservation Significance as defined under the Framework
3 Number of Medium Old Trees (MOT)
4 Number of Large Old Trees (LOT)
5 Number of Very Large Old Trees (VLOT)

Table 4: Scattered Trees within the Precinct

Scattered Tree Number	Species	Common name	Size of Tree ()	Conservation Status	Bioregion	Other attributes	Conservation Significance	Datum: Zone 54		Map No. (location)
								Lat	**Long**	
01	*Eucalyptus camaldulensis*	River Red Gum	LOT	Endangered	VVP	NA	High	144°37'46.484 E	37°55'13.708"S	Fig 3.D4

LOT = Large Old Tree
VVP = Victorian Volcanic Plains
NA = Not Applicable

4.1.4 Targeted Flora

No targeted flora species were found opportunistically in the Precinct. As agreed between GAA, DSE and AECOM no targeted flora surveys were undertaken.

4.2 Fauna

4.2.1 Fauna Habitats

The Precinct is considered to contain the following habitat types (**Figure E3**):

- Cleared agricultural land;
- Small patches of remnant grassland;
- A scattered native tree; and
- Planted non indigenous native trees.

The section below is an expanded description of potential fauna habitats identified within the Precinct.

Cleared Agricultural Land

Agricultural land is the dominant habitat in the Precinct. The ground layer and soil profile were highly modified from historical and present agricultural activity. This habitat generally lacked structural diversity and provided few opportunities for fauna, other than bird, mammal and reptile species common to agricultural environments.

Most areas were exposed and void of shelter for common ground-dwelling fauna. Vegetation cover was minimal and was dominated by cultivated crop species or weeds such as Galenia. This habitat has been assessed as being of low quality for fauna due to its extensive modification and the removal of most natural habitat elements.

Remnant Grassland

The fragmented nature and small size of remnant grassland patches remaining within the Precinct indicates a highly disturbed habitat (**Figures F3A** and **B**). Their proximity to the highway, lack of connectivity with other areas of remnant vegetation and low Habitat Scores (**Table 3** (<0.35)), suggest the remnant Plains Grassland in the Precinct is generally of limited value for fauna may. The paucity of soils cracks and rocks within these remnant patches also suggests that faunal habitat values are very limited here.

Scattered Trees

One scattered tree, a Large Old River Red Gum *Eucalyptus camaldulensis*, was mapped in the Precinct during the previous contract period. This tree was surrounded by degraded treeless vegetation. The tree had a number of small hollows which are potentially suitable for hollow-dependent birds and microchiropteran bats.

Planted Non-indigenous Native Trees

This habitat is present on several properties within the Precinct (**Figures F3A – F3B**) and s dominated by planted non-indigenous eucalypts, including mature Sugar Gums. Since these trees provide the main source of overstorey vegetation within the Precinct, they are considered to provide some woodland fauna habitat values. These trees provide potential habitat for birds (native and exotic) common to farmland environments.

Additional habitat opportunities may exist for the Grey-headed Flying-fox *Pteropus poliocephalus* which is listed as vulnerable under the EPBC Act and Listed under the FFG Act. Several planted Sugar Gum trees line the Princes Highway western road reserve which is in close proximity to known sightings of the Grey-headed Flying-fox (**Figure E5**). This species may occasionally utilise the limited food and habitat resources offered by these trees, however, none were observed here during the field surveys. These planted trees did not feature hollow formations and are therefore unlikely to provide nesting habitat for hollow-dependant birds.

Since these trees provide the main source of overstorey vegetation within the Precinct, this fauna habitat was considered to be of low to moderate quality.

4.2.2 Fauna Species

The Atlas of Victorian Wildlife (AVW) (DSE, 2007b) contains records of 50 fauna species, comprising 49 indigenous species and one Nationally listed native species (the Grey-headed Flying-fox) within a 5 km of the Precinct. The Aquatic Fauna Database (DSE, 2010e) does not contain any records of threatened species.

A total of 38 indigenous and 10 exotic fauna species were found across the broader Wyndham Vale Precinct Structure Area (**Appendix E** and **Appendix F**). During the current contract period, only three indigenous and three exotic fauna species were documented occurring on the Precinct. No rare or threatened fauna species were recorded.

4.2.2.1 Threatened Fauna Species

Based on a desktop assessment, a total of 50 threatened fauna species are known to occur or are predicted to occur within 5 km of the area. These threatened species are listed in **Appendix G**. None of these threatened fauna species were recorded. The likelihood of occurrence of threatened fauna species is also assessed in **Appendix G**.

4.2.2.2 Best or Remaining 50% Habitat for Rare and Threatened Fauna Species

Eight threatened fauna species (listed under the DSE's Advisory Listings) were recorded as having a low or above likelihood of occurring within 5 km of the Precinct (**Appendix G**), these include:

- Australasian Shoveler *Anas rhynchotis*
- Eastern Great Egret *Ardea modesta*
- Black Falcon *Falco subniger*
- Plains Wanderer *Pedionomus torquatus*
- Red-chested Button-quail *Turnix pyrrhothorax*
- Grey-headed Flying-fox *Pteropus poliocephalus*
- Striped Legless Lizard *Delma impar*
- Golden Sun Moth *Synemon plana*

Best or remaining 50% habitat was determined in accordance with Table 2 of the *Native Vegetation Guide for assessment of referred planning permit applications* (DSE, 2007b). Habitat zones within the Precinct failed to meet best 50% or remaining 50% habitat requirements for threatened species. Species predicted as unlikely to occur within the Precinct have been considered as not having the required habitat and therefore the Precinct fails to meet the best 50% or remaining 50% habitat requirements for threatened species (**Appendix G**).

The best or remaining habitat for rare and threatened fauna species (considered to have low or above likelihood of occurrence) are assessed below.

A total of 15 threatened fauna species were recorded as having a low or above likelihood of occurring within 5 km of the area (**Appendix G**). Of these, the following list represents those State listed threatened species (not rare or near threatened [DSE 2007b]) to be assessed for best and remaining 50%:

Australasian Shoveler

The Precinct generally lacks suitable habitat for this species and as a result the species would not make significant use of the site in the medium term (i.e. within the next 10-years). AECOM has assessed the available habitats at the Precinct in accordance with the DSE (2007a) assessments steps (assessment steps followed included A → D; No further consideration required). As a result it is unlikely there is either the best or remaining 50% of habitat for the species within the precinct.

Eastern Great Egret

The Precinct is largely devoid of any suitable habitat for this species. The larger farm dam in the northern section of the Precinct may develop fringing vegetation after periods of good rain. It is possible the species would occasionally make use of the site in the medium term (i.e. within the next 10 years).

However, it is not anticipated the species would make significant use (i.e. regular occurrence, breeding, presence in substantial numbers) of the precinct. As a result it is unlikely there is either the best or remaining 50% of habitat for the species within the precinct. The sequence of DSE (2007a) assessment steps followed to arrive at this conclusion included A → D; No further consideration required.

Black Falcon

This species was previously recorded in the Manor Lakes Precinct 41 to the north-west and may occasionally fly over or hunt on the Alfred Road Precinct. As only two individual sightings were made in the broader Wyndham Vale precincts surveyed by AECOM, the population size cannot be easily estimated. As a result it is considered that the remnant habitat zones in the precinct represent the remaining 50% of habitat for the Black Falcon. The sequence of DSE (2007a) assessment steps followed to arrive at this conclusion included A → D → F; No – remaining 50% of habitat.

Plains Wanderer

The Precinct generally lacks suitable habitat for this species and as a result the species would not make significant use of the site in the medium term (i.e. within the next 10-years). Optimal habitat for the species (i.e. breeding habitat or habitat regularly used by the species) comprises open, low native grassland with a relatively diverse cover or herbs and forbs, lichens present and 50% bare ground cover (Parker and Oliver, 2006). The grassland habitat within the Precinct lacks such habitat features and is not contiguous with suitable habitat elsewhere and is adjacent to the busy Princes Highway. As a result it is unlikely there is either the best or remaining 50% of habitat for the species within the precinct (DSE (2007a) assessment steps followed included A → D; No further consideration required).

Red-chested Button-quail

The Precinct generally lacks suitable habitat for this species and as a result the species would not make significant use of the site in the medium term (i.e. within the next 10-years). The small habitat zones mapped along the western side of the Princes Highway are unlikely to provide suitable habitat for the species, at least not on any regular basis, and are not contiguous with suitable habitat elsewhere. As a result it is unlikely that there is either the best or remaining 50% of habitat for the species in the habitat zones within the precinct. DSE (2007a) assessment steps followed included A → D; No further consideration required).

Grey-headed Flying-fox

The Precinct is generally devoid of suitable habitat for this species. There are planted nn-indigenous eucalypts present, but it is considered the species would be unlikely to make significant use of this habitat in the medium term. As a result it is unlikely there is either the best or remaining 50% of habitat for the species within the precinct. DSE (2007a) assessment steps followed included A → D; No further consideration required).

Striped Legless Lizard

The Precinct generally lacks suitable habitat for this species and as a result the species would not make significant use of the site in the medium term (i.e. within the next 10-years). The small Plains Grassland habitat zones 1 to 7 are of poor quality and lack suitable habitat features (such as rocks and cracking soils) favoured by the species. As a result AECOM considers it unlikely that there is either the best or remaining 50% of habitat for the species in the habitat zones within the precinct. DSE (2007a) assessment steps followed included A → D; No further consideration required). AECOM is aware that an ‘assumed presence model’ is being prepared for this species. This model was not available at the time of writing and has not been considered within this assessment.

Golden Sun Moth

The Precinct generally lacks suitable habitat for this species. The small Plains Grassland habitat zones are of poor quality, are very small and have no connectivity with other remnant grassland areas, suggesting the species would not make significant use of the site in the medium term (i.e. within the next 10-years). No suitable habitat for the species has been detected in the Precinct by subregional surveys or modelling (Biosis 2010). As a result it is unlikely there is either the best or remaining 50% of habitat for the species in the habitat zones within the Precinct. DSE (2007a) assessment steps followed included A → D; No further consideration required).

4.2.3 Targeted Fauna

It was agreed between AECOM, GAA and DSE that targeted threatened fauna surveys would not be required for the Precinct and it would problematic given the limited landowner access approval.

Only the Black Falcon was considered to have higher than a low likelihood of occurrence (this would probably occur as occasional birds foraging over the area). Targeted survey methods for this species are not well-developed (the species is typically seen flying overhead or occasionally hunting over grasslands in the region and has a large home range) and no nesting sites were recorded by AECOM during the field survey. Rather, it should be assumed that the species does occur from time to time in the Precinct, but it is probable that more suitable habitat for the species occurs in the Manor Lakes Precinct to the north-west of the Alfred Road Precinct.

5.0 Relevant Policy and Legislation

5.1 Commonwealth

5.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) addresses nationally and internationally important matters of National Environmental Significance (NES). As applicable to this assessment these matters of NES include:

- World Heritage properties
- National Heritage Places
- Ramsar wetlands of international significance
- Nationally listed threatened species and ecological communities
- Listed migratory species
- Commonwealth marine areas.

A desktop assessment of the online EPBC Act Protected Matters Search Tool (DEWHA, 2010) has indicated the potential for various matters of NES to occur in the Precinct. These findings are presented in **Table 5** and are discussed below.

Table 5: Commonwealth Matters of National Environmental Significance Considered Likely to Occur in the Precinct

Matter of NES	Number of Occurrences
World Heritage Properties	-
National Heritage Places	-
Wetlands of International Significance (Ramsar Sites)	1
Commonwealth Marine Areas	-
Threatened Ecological Communities	2
Threatened Species	18
Migratory Species	18

5.1.1.1 Wetlands of International Significance (Ramsar Sites)

The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar wetland has been identified as occurring within the Precinct catchment. This Ramsar site occurs adjacent to, and southeast of the Precinct, and the two are separated by the Princes Highway. The terrestrial portion of this Ramsar site consists of both agricultural land and wetlands within the Western Treatment Plant. Port Phillip Bay lies approximately 7.5 km south-east of the site.

5.1.1.2 Threatened Ecological Communities

One threatened ecological communities potentially occur on site:

- Natural Temperate Grasslands of the Victorian Volcanic Plain (NTG VVP) (Critically Endangered national conservation status as of 16 July 2000). Two EVCs provide components of the NTG VVP; EVC 132 Plains Grassland and EVC 654 Creekline Tussock Grassland.

Subject to the limitations (**Section 3.5**) the presence of these ecological communities was assessed using the field survey data collected from the habitat hectare method.

Natural Temperate Grasslands of the Victorian Volcanic Plain (NTG VVP)

The Precinct contains seven remnant patches of Plains Grassland. Some of these patches have the potential to meet the key diagnostic features of Natural Temperate Grassland of the Victorian Volcanic Plain (NTG VVP) as defined in the NTG VVP EPBC Policy Statement 3.8 (DEWHA, 2008). According to the policy statement, remnant patches qualify as NTG VVP according to the following criteria:

- Where a remnant is one hectare or smaller, the grassland patch is at least 0.05 ha in size and the crown cover of shrubs and trees greater than 1 m tall should not exceed 5% projective canopy cover.

OR

- Where a remnant is more than one hectare, the grassland patch is at least 0.5 ha in size and the density of mature trees does not exceed two trees per hectare.

And where:

- The species assemblage is dominated by native species *Themeda triandra*, *Austrodanthonia* sp., *Austrostipa* sp. or *Poa* sp
- The total perennial tussock cover of the above grasses is greater than or equal to 50% of the total vegetation cover during spring-summer. If less than 50%, then the ground cover of native wildflowers (forbs) is at least 50% of the total vegetation cover during spring-summer

OR

- Cover of non-grassy weeds is less than 30% of the total vegetation cover at any time of the year.

All of the habitat zones assessed within the Precinct were assessed under the 2009/10 contract. In total, seven grassland patches were assessed. While five habitat zones meet the size criteria they did not meet the condition criteria to qualify as NTG VVP. The native vegetation components did not have at least 50% perennial tussock cover and some habitat zones had more than 30% non-grassy weed cover. On this basis the NTG VVP was not recorded within the Precinct.

5.1.1.3 Threatened and Migratory Species

Commonwealth listed threatened and migratory species detected during the desktop assessment are listed in **Appendices C** and **G**. Of the threatened and migratory species five flora and four fauna species have a low likelihood, and three flora and 11 fauna species are unlikely to occur due to a lack of suitable habitat. None of these species were recorded during the field surveys. No Commonwealth listed threatened species have a moderate or higher likelihood of occurrence in the Precinct.

The Cattle Egret *Ardea ibis* is listed as a Migratory species and has a moderate likelihood of occurring at the Alfred Road Precinct. However, since this species is migratory and highly mobile by nature it is not expected to be highly reliant on habitats present and would likely use other extensive areas of better quality habitat in the locality (e.g. the Western Treatment Plant and extensive crop and pasturelands to the north, west and south).

The White-throated Needletail *Hirundapus caudacutus* and Fork-tailed Swift *Apus pacificus* have a moderate likelihood of occurrence in the Precinct, but these occurrences would be as seasonal, overhead visitors and are not expected to be significantly impacted by the development of the Precinct.

5.2 State

5.2.1 Environmental Effects Act 1978

Under Victoria's *Environmental Effects Act* 1978 (EEA), projects that could have a 'significant effect' on Victoria's environment can potentially require an Environmental Effect Statement (EES). This Act applies to any public works 'reasonably considered to have or be capable of having a significant effect on the environment. The Minister for Planning and Environment is the responsible person for assessing whether this Act applies. Before commencing any public works to which this Act applies, the proponent must cause an EES to be prepared and submit it to the Minister for the Minister's assessment of the environmental effects of the works.

5.2.2 Environment Protection Act 1970

The *Environment Protection Act 1970* aims to prevent pollution and environmental damage by setting environmental quality objectives and establishing programs to meet them.

The Act establishes the powers, duties and functions of Environment Protection Authority (EPA). These include the administration of the Act and any regulations and orders made pursuant to it, recommending State Environment Protection Policies (SEPPs) and Industrial Waste Management Policies (IWMP) to the Governor in Council, issuing works approvals, licences, permits, pollution abatement notices and implementing National Environment Protection Measures (NEPMs).

5.2.3 Flora and Fauna Guarantee Act 1988

The *Victorian Flora and Fauna Guarantee Act 1988* (FFG Act) was established to provide a legal framework for enabling and promoting the conservation of all Victoria's native flora and fauna, and to enable management of potentially threatening processes. The Act provides a listing process, whereby native species and communities of flora and fauna, and the processes that threaten native flora and fauna, are listed in the schedules of the Act. This process assists in identifying those species and communities that require management regimes to survive, and highlights the processes required to minimise the threat to native flora and fauna species and communities within Victoria.

A permit from DSE is required under the following circumstances:

- To 'take' listed protected flora species or any flora species from listed communities on public land. Some species which are attractive or highly sought after, such as orchids and grass-trees, are protected so that removal of these species from the wild can be controlled. Not all of these species are rare in the wild or highly significant. Protection includes living (e.g. flowers, seeds, shoots, roots) and non-living (e.g. bark, leaves, other litter) plant material.
- If the site is declared 'critical habitat' for the species.
- A permit is also required for the taking, trading or keeping of fish that are members of taxa or communities of flora and fauna on the Threatened List. The controls mean that authorisation under the FFG Act is required to catch, possess, keep or sell listed fish

The site is not listed as critical habitat for any species listed under the FFG Act. However, where vegetation removal occurs on public land (i.e. within roadside reserves) a permit from the DSE will be required.

The threatened community, Western (Basalt) Plains Grassland is deemed by DSE (2003) to be equivalent to EVC 132. As such, remnant patches of Plains Grassland in the Precinct qualify as Western (Basalt) Plains Grassland Community listed under the FFG Act.

5.2.4 Wildlife Act 1975 and Wildlife Regulations 2002

The *Wildlife Act* forms the procedural, administrative and operational basis for the protection and conservation of native wildlife within Victoria. This Act often sits as the default reference for other associated legislation, and is the basis for the majority of Wildlife permit / licensing requirements within the state.

The Wildlife Regulations 2002 of the Act prescribe penalties for the purposes of the Wildlife Act. These include penalties for persons who wilfully damage, disturb or destroy any wildlife habitat without appropriate authorisation (Section 9 of the Wildlife Regulations 2002). Authorisation for habitat removal may be obtained under the Wildlife Act; through a licence granted under the *Forests Act* 1958; or under any other Act. Authorisation to destroy or possess wildlife may be required under Sections 41– 47 of the *Wildlife Act 1975*. Permits under the Act may be needed where it is expected that wildlife will need to be destroyed or moved.

In accordance with this Act, if any wildlife are located within vegetation proposed for clearing, salvage and translocation of such wildlife may be needed and a subsequent permit under the Wildlife Act required.

5.2.5 Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act 1994* (CaLP Act) is the principal legislation relating to the management of pest plants and animals in Victoria. Under this Act, landowners have a responsibility to avoid causing or contributing to land degradation, including taking all reasonable steps to conserve soil, protect water resources, eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds and where possible, eradicate established pest animals, as declared as "noxious" under the Act.

The CaLP Act is similar to the FFG Act in that it may be used by DSE (or other bodies) to advise the Minister on the appropriateness of the development.

Nine noxious weeds listed under the CaLP Act were recorded during the assessment of the broader Wyndham Vale Precinct Structure Area, including:

- African Box-thorn *Lycium ferocissimum*;
- Bathurst Burr *Xanthium spinosum;*
- Chilean Needle-grass *Nassella neesiana;*
- Scotch Thistle *Cirsium vulgare;*

- Paterson's Curse *Echium plantagineum;*
- Horehound *Marrubium vulgare*;
- Serrated tussock *Nassella trichotoma*;
- Sharp (Spiny) Rush *Juncus acutus;*
- Artichoke Thistle *Cynara cardunculus*.

Any development works that occur within the Precinct must prevent the growth and spread of these noxious weeds.

5.2.6 Planning and Environment Act 1987

The *Planning and Environment Act 1987* (P&E Act) is the primary legislation that provides the foundation of the planning schemes in Victoria. The planning schemes set out policies and provisions for the use and development of land. Each municipality in Victoria is covered by a planning scheme. The objectives of the Act are to establish a system of planning schemes and to integrate land use and development planning and policy with environmental, social, economic, conservation and resource management policies at State, regional and municipal levels. The Act also establishes a clear procedure for public participation in decision making in amending planning schemes.

The *Planning and Environment Act 1996* (Planning Schemes) provides for the Minister for Planning to prepare a set of standard provisions for planning schemes called the Victoria Planning Provisions (VPP). The VPP is a State-wide reference document or template from which planning schemes are sourced and constructed. It is a statutory device to ensure that consistent provisions for various matters are maintained across Victoria and that the construction and layout of planning schemes is always the same.

5.2.6.1 Clause 15.09-2 General implementation

Planning authorities should have regard to the National Strategy for the Conservation of Australia's Biological Diversity (Department of Environment, Sport and Territories 1996), any Strategy, relevant Governor-in-Council orders and Action Statements prepared under the FFG Act, and any relevant regional catchment strategy and associated implementation plans and strategies, particularly regional vegetation plans and roadside management strategies, as well as special area plans approved under the CaLP Act, when preparing planning scheme amendments or municipal strategic statements affecting native vegetation, flora, fauna, waterways or wetlands.

Decision-making by planning and responsible authorities should:

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

Within the Precinct, patches of native grassland are considered consistent with Western (Basalt) Plains Grassland identified in the FFG Action Statement 182. However, none of the land identified within the Precinct is considered to be a 'key site' of this community (DSE 2003). Identified threats include clearing of grassland patches, over-grazing, soil compaction, weed invasion, loss associated with infrastructure and roads and inappropriate management.

Further loss of remnant grasslands or loss of condition associated with residential development has the potential to further exacerbate existing threats and should be pursued in consideration of the Action Statement.

5.2.6.2 Native Vegetation Management – A Framework for Action

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

Clause 52.17 facilitates the following objectives:

Step 1: Avoid adverse impacts, particularly through vegetation clearance

The objective of the first step in the 'Three-step Approach' to achieving Net Gain, is to avoid adverse impacts, particularly through avoidance of vegetation clearance

Step 2: Minimise impacts to native vegetation

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

Step 3: Identify Offsets

Identify appropriate offset options for the permitted clearance of native vegetation.

In addition to planning overlays, under Clause 52.17 of the Wyndham City Council Planning Scheme, DSE is to be a mandatory referral authority for vegetation clearance which involves:

- Removal of more than 15 trees with a diameter less than 40 cm at 1.3 m above ground
- Removal of more than five trees with a diameter more than 40 cm at 1.3 m above ground
- Removal of more than 0.5 hectare of vegetation in an Ecological Vegetation Class with Bioregional Conservation Status of Endangered, Vulnerable or Rare
- Removal of more than one hectare of vegetation in an Ecological Vegetation Class with Bioregional Conservation Status of Depleted or Least Concern;
- Any vegetation clearance on Crown Land or where a property vegetation plan applies to the site; or
- Any vegetation clearance where a Vegetation Protection Overlay applies to the site.

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

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

Under Clause 52.16 a native vegetation precinct plan must:

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

5.2.6.3 Port Phillip and Western Port Native Vegetation Plan

The Port Phillip and Western Port Native Vegetation Plan (PPWPNVP) implements a co-ordinated and strategic approach to managing native vegetation within the PPWCMA region. This approach is consistent with the Framework (DNRE 2002). The PPWPNVP sets out four key strategic directions and associated aspirational targets and management actions for the region.

Broadly, these management actions are:

- To minimise clearance of native vegetation
- Permanently protect at least 15% of the current area of each EVC
- Maintain and improve the quality of native vegetation by the total 'Habitat Hectares' within the region being increased by 10% by 2030; and
- Increase the total extent of native vegetation to at least 35% of the region's area; and at least 95% of the region's EVC's represented to at least 10% if their pre-1750 extent by 2030.

Under the Framework, regional vegetation plans are required to be used as a reference document in providing guidelines for responsible authorities (usually local councils) in determining permit applications to remove, destroy or lop native vegetation. The Framework further allows for the regional vegetation plans to increase the minimum requirements for any vegetation offsets in response to vegetation removal.

In particular, the proponent must demonstrate that:

- The removal of native vegetation has been avoided where practical;
- Where avoidance of native vegetation cannot be achieved, techniques to minimise impacts have been implemented; and
- Native vegetation offsets have been provided where necessary to compensate for the removal of native vegetation.

The GAA will need to consider the PPWPNVP when developing a PSP for the Precinct and should aim to avoid, minimise and offset in line with the Native Vegetation Plan.

5.2.6.4 DSE Advisory List of Threatened Species

The *Advisory List of Rare or Threatened Plants in Victoria – 2005* (DSE 2005b) and the *Advisory List of Threatened Vertebrate Fauna in Victoria* (DSE 2007) provide a significance rating for flora and fauna species within Victoria. The purpose of these lists is to assist regulators (i.e. DSE) to make decisions regarding planning processes. These lists have no formal or legal status.

Species listed within these documents have been addressed in the relevant sections of this report and are also listed in **Appendices C** and **G**.

5.3 Local Government

Under the Wyndham Planning Scheme, the Precinct is zoned as Urban Growth Boundary (UGZ) (DPCD, 2010). An Environmental Significance Overlay Schedule 1 (ESO1) occurs on the south west edge of the precinct. This ESO1 is relevant to the Lollipop Creek Waterway Corridor. This overlay aims to provide protection between identified environmental values and urban development and acts to regulate the type, intensity and impacts of development adjacent to the waterway.

As per the Schedule to this ESO1, permitting and approval, including specific environmental analyses with regard to the Wyndham Vale Waterways Strategy Plan, is required where development of lands occurring within this overlay is desired.

No Vegetation Protection Overlays or Significant Landscape Overlays occur within the Precinct.

6.0 Key Issues and Implications

The Melbourne @ 5 Million Strategic Environmental Impact Assessment Report and associated approved prescriptions provide the primary policy direction on how precinct planning should respond to ecological values and the extent to which impacts of development should pursue opportunities to avoid and reduce impacts. Further, when considering these opportunities planning needs to be undertaken cognisant of the outcomes that the Melbourne @ 5 Million Strategic Impact Assessment (pg.124) has already achieved, these include:

- Avoided many important areas (revision to the UGB and infrastructure corridors).
- Fine tuned planning to minimise native grassland clearing.
- Identified a number of large (15,000 ha) strategic offset areas to be secured and managed as grassland reserves. These are intended to offset the worst case clearing of 6,918 ha or 3,093 habitat hectares, assuming all native vegetation in all precincts and transport corridors will be cleared.

More broadly the wider environmental benefits with this approach include greater certainty, efficient use of infrastructure, reasonably compact sustainable urban form and reduced greenhouse gas emissions.

This strategic approach aims to achieve better environmental outcomes compared to a series of smaller, ad-hoc, and disconnected offsets and retention areas which are typical of the normal planning process and are practically a challenge to manage.

The Strategic Assessment also includes a number of specific prescriptions which "*guide all future decisions regarding retaining or clearing"* (pg. 125). The prescriptions for grasslands and Golden Sun Moth are most relevant, however none of the habitat zones are likely to trigger the application of these prescriptions and therefore there is a presumption that all native vegetation may be cleared and offset.

6.1 Opportunities to Reduce Potential Impacts

The Precinct represents a highly modified and fragmented agricultural landscape. Generally remnants that remain are small, degraded, of low diversity, contain significant cover of weeds, are 'secondary grasslands', fragmented and have low habitat scores. There are no habitat zones, based on their intrinsic values, which warrant retention (avoidance) at the exclusion of all other land uses and planning considerations. For this reason and without understanding other planning constraints and opportunities it is problematic to prescribe which remnants should be prioritised for incorporation into public open spaces. Structure Planning does however need to provide for passive and active open space, often linked by drainage corridors which provide for multiple objectives such as flood protection, stormwater detention (wetland habitat), landscape amenity, pedestrian and cyclist permeability and flora and fauna habitat. On this basis the opportunity for 'avoidance' is to identify and incorporate where practical selective remnants (part or whole) into the open space and drainage network taking into account other urban design and planning considerations.

On this basis AECOM recommends the GAA prioritise the retention of some remnants in open space based their size, condition, connectivity and presence of listed species and communities. These principles are expanded on below:

- Retention, restoration and management of habitat zones in which threatened species have been recorded or have the potential to reside or make significant use of the habitat zone. These zones may be improved through revegetation and weed management where appropriate, and could be incorporated into future reserves as part of the NVPP or alternative process.
- If present, prepare Conservation Management Plans for threatened species recorded within the Precinct. Where areas known to support threatened species are proposed to be cleared, translocation plans may need to be prepared, assuming translocation has been shown to be successful for that species. All open space corridors may include multiple uses such as cycling and pedestrian paths, drainage/flood control and recreation.

- Scattered trees (including Sugar Gums which may have landscape, habitat and amenity value) should be surveyed by an arboriculturalist to identify trees worth retaining based on their age, condition, health, size and associated ecological value. Once a final list of trees has been identified they should be retained and incorporated into the urban form as part of the structure planning process and consistent with relevant local government policies. Wherever possible and practicable, trees should be retained together and connected with other ecological features (e.g. knolls, habitat zones or waterways).
- Since European settlement most native trees have been removed from the landscape. Replanting locally occurring long lived native trees as part of the urban landscape will provide multiple benefits including fauna habitat, shade, recreation and visual amenity. Anticipating a warmer dryer climate trees, open spaces, green corridors and stormwater detention can also play an important role in mitigating the effect of an anticipated drier and warmer climate.

This approach with sustainable development will remove on-going impacts caused by agricultural, establish a mechanism to retain and protect viable areas in public ownership, contribute to large sustainable and managed offset sites, and provide resources for long term management and restoration.

6.2 Opportunities to Protect and Enhance Local and Regional Biodiversity Values

The Precinct is significantly disturbed and includes small remnants of native vegetation and habitat that is degraded and lacks connectivity to other vegetation within and outside the Precinct.

The following opportunities for the protection and enhancement of biodiversity values at the Precinct include:

- Protection and enhancement of the seven Plains Grassland habitat zones along the western side of the Princes Highway. This could be done by incorporating the extent and location of the existing habitat zones into a grassland roadside reserve. This roadside reserve could be developed into a Native Vegetation Precinct Plan. Enhancement plantings of native grassland species could also be emplaced to boost natural biodiversity values within these areas. A Precinct-specific weed management program could be developed with initial focus afforded to the management and of CaLP Act listed noxious species and invasive environmental weeds detected within the Precinct and known from the broader Wyndham Vale Precinct Structure Area.
- Where possible, native vegetation linkage corridors could be established between the Princes Highway road reserve and the Manor rail reserve on the western side of the Precinct where various threatened flora species are known to occur. Where possible, habitat linkage corridors could also be established to connect habitats of the Precinct with those of the Lollipop Creek, approximately 400 m to the south-west of the Precinct.

Cessation of agricultural land use, sustainable residential development and the offsetting, retention, rehabilitation, enhancement and long term management of native vegetation values presents an opportunity to improve local and regional biodiversity values.

7.0 Conclusions

AECOM completed Vegetation Quality Assessment (Habitat Hectares) (AECOM, 2010) for the greater Wyndham Vale Precinct Structure Area 40 in 2008/09. Surveys were also conducted in 2009/10. In April 2010 Area 40 was divided into four, the Alfred Road precinct is one of these. AECOM assessed approximately 92.95 ha or 9 properties varying in size from 12.92 ha to 0.04 ha (**Figure E2**). For properties where access was provided over the two survey periods and where appropriate a Vegetation Quality Assessment (Habitat Hectares), general flora and fauna survey and targeted flora and fauna surveys were undertaken. For the 09/10 contract period, access was not granted to (re)survey any private properties within the Precinct surveyed in 08/09. Therefore, the only areas assessed during the 09/10 contract period were publically accessible roadside reserves (shown in **Figure E2**). Key survey findings include:

- 91.04 ha (99% of the Precinct) of degraded treeless vegetation.
- Seven remnant patches on one property (Princes Highway road reserve), covering 1.11 ha.
- 0.33 Hha for all habitat zones.
- The seven remnant patches are Lighter-soils Plains Grassland (EVC 132_62), which under the FFG Act is a threatened community, Western (Basalt) Plains Grassland (**Figure E4**).
- No threatened species, populations or ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Protection Act* 1999.
- One Large Old scattered tree (River Red Gum).
- No listed flora and fauna species.

The following opportunities for the protection and enhancement of biodiversity values at the Precinct include:

- Trees should be surveyed by an arboriculturalist to identify trees worth retaining based on their age, condition, health, size and associated ecological value. The single Large Old scattered tree (River Red Gum) on the Precinct should be retained and adopted into the Native Vegetation Precinct Plan. Habitat values could be elevated by additional plantings of River Red Gums. River Red Gums are indigenous hollow-bearing trees that provide important habitat resources for fauna such as microchiropteran bats, arboreal mammals and birds. Planted Sugar Gums may present landscape and amenity value and where practical could be retained and connected within a public open space network.
- Protection and enhancement of the seven Plains Grassland habitat zones along the western side of the Princes Highway. This could be done by incorporating the extent and location of the existing habitat zones into a grassland roadside reserve. This roadside reserve could be developed into a Native Vegetation Precinct Plan. Enhancement plantings of native grassland species could also be emplaced to boost natural biodiversity values within these areas. A Precinct-specific weed management program could be developed with initial focus afforded to the management and of CaLP Act listed noxious species and invasive environmental weeds detected within the Precinct and known from the broader Wyndham Vale Precinct Structure Area.
- Where possible, native vegetation linkage corridors could be established between the Princes Highway road reserve and the Manor rail reserve on the western side of the Precinct where various threatened flora species are known to occur. Where possible, habitat linkage corridors could also be established to connect habitats of the Precinct with those of the Lollipop Creek, approximately 400 m to the south-west of the Precinct.

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Figures

Figure 1: Alfred Road Precinct

Figure 2A: Location of Ecological Vegetation Classes and Scattered Trees

Figure 2B: Location of Ecological Vegetation Classes and Scattered Trees

Figure 3A: Potential Fauna Habitat

Figure 3B: Potential Fauna Habitat

Appendices

Appendix A

Indigenous Flora Species Recorded within the Wyndham Vale Precincts

Appendix A: Indigenous Flora Species Recorded within the Wyndham Vale Precincts

Life form	Scientific name	Family	Common name	Conservation Status			
				EPBC	DSE	FFG	Regional
Tree	*Eucalyptus camaldulensis*	Myrtaceae	River Red-gum				
	Eucalyptus polyanthemos	Myrtaceae	Red Box				
Fern	*Cheilanthes sieberi*	Adiantaceae	Narrow Rock-fern				
Shrub	*Melicytus dentata*	Violaceae	Tree Violet				
	Sclerolaena muricata	Chenopodiaceae	Black Roly-poly				
Herb/Forb	*Acaena echinata*	Rosaceae	Sheep's Burr				
	Asperula conferta	Rubiaceae	Common Woodruff				
	Atriplex semibaccata	Chenopodiaceae	Berry Saltbush				
	Brachyscome sp.	Asteraceae	Daisy				
	Calocephalus citreus	Asteraceae	Lemon Beauty-heads				
	Chrysocephalum apiculatum	Asteraceae	Common Everlasting				
	Crassula helmsii	Crassulaceae	Swamp Stonecrop				
	Crassula sieberana	Crassulaceae	Austral Stonecrop				
	Dichondra repens	Kidney Weed	Convolvulaceae				
	Einadia hastata	Chenopodiaceae	Saloop				
	Eryngium ovinum	Apiaceae	Blue Devil				
	Galium australe	Rubiaceae	Bedstraw				
	Geranium retrorsum	Geraniaceae	Grassland Crane's Bill				
	Goodenia paniculata	Goodeniaceae	Branched Goodenia				
	Hypericum gramineum	Hypericaceae	Small St. John's Wort				
	Leptorhynchos tenuifolius	Asteraceae	Wiry Buttons				
	Lobelia pratioides	Campanulaceae	Poison Lobelia				
	Lomandra filiformis	Xanthorrhoeaceae	Wattle Mat-rush				
	Lythrum hyssopifolia	Lythraceae	Small Loosestrife				
	Maireana enchylaenoides	Chenopodiaceae	Wingless Bluebush				
	Marsilea drummondii	Marsileaceae	Nardoo				
	Myriophyllum sp.	Haloragaceae	Water-milfoil				
	Oxalis perennans	Oxalidaceae	Grassland Wood-sorrel				
	Persicaria sp.	Polygonaceae	Knotweed				
	Pimelea glauca	Thymeleaceae	Smooth Rice-flower				
	Portulaca oleracea	Polygonaceae	Common Purslane				
	Ptilotus macrocephalus	Amaranthaceae	Feather Heads				

Life form	Scientific name	Family	Common name	Conservation Status			
				EPBC	DSE	FFG	Regional
	Ptilotus spathulatus	Amaranthaceae	Pussy Tails				
	Rumex sp.	Polygonaceae	Dock				
	Senecio quadridentatus	Asteraceae	Cotton Fireweed				
	Tricoryne elatior	Liliaceae	Yellow Rush-lily				
	Vittadinia sp.	Asteraceae	Fuzzweed				
	Wahlenbergia stricta	Campanulaceae	Tall Bluebell				
	Wahlenbergia sp.	Campanulaceae	Bluebell				
Graminoid	*Austrodanthonia caespitosa*	Poaceae	Common wallaby grass				
	Austrodanthonia duttoniana	Poaceae	Brown-back Wallaby-grass				
	Austrodanthonia setacea	Poaceae	Bristly Wallaby-grass				
	Austrodanthonia racemosa	Poaceae	Stiped Wallaby-grass				
	Austrostipa bigeniculata	Poaceae	Tall Spear-grass				
	Austrostipa scabra	Poaceae	Rough Spear-grass				
	Austrostipa sp.	Poaceae	Spear-grass				
	Bothriochloa macra	Poaceae	Red-leg Grass				
	Carex sp.	Cyperaceae	Sedge				
	Chloris truncata	Poaceae	Windmill grass				
	Cyperis sp.	Cyperaceae	Flat Sedge				
	Eleocharis acuta	Cyperaceae	Common Spike-sedge				
	Eragrostis brownii	Poaceae	Common Love-grass				
	Juncus pallidus	Juncaceae	Pale Rush				
	Juncus subsecundus	Juncaceae	Finger Rush				
	Juncus sp.	Juncaceae	Rush				
	Lachnagrostis filiformis	Poaceae	Common Blown-grass				
	Lomandra filiformis	Xanthorrhoeaceae	Wattle Mat-rush				
	Microlaena stipoides	Poaceae	Weeping Grass				
	Panicum effusum	Poaceae	Hairy Panic				
	Poa seiberiana	Poaceae	Grey Tussock Grass				
	Schoenus apogon	Cyperaceae	Common Bog-sedge				
	Themeda triandra	Poaceae	Kangaroo Grass				
Scrambler	*Convolvulus remotes*	Convolvulaceae	Grassy Bindweed				
	Glycine tabacina	Fabaceae	Variable Glycine				

Appendix B

Non-indigenous and Exotic Flora Species Recorded within the Wyndham Vale Precincts

Appendix B: Non-indigenous and Exotic Flora Species Recorded within the Wyndham Vale Precincts

Life form	Scientific name	Common name	Conservation Status		
NON-INDIGENOUS NATIVE SPECIES			**EPBC**	**DSE**	**FFG**
Tree	**Myrtaceae**				
	Eucalyptus cladocalyx	Sugar Gum			
EXOTIC SPECIES			**CaLP ACT LISTED SPECIES**		
Tree	**Anacardiacae**				
	Schinus molle	Peppercorn			
Shrub	**Solanaceae**				
	Lycium ferocissimum	African Box-thorn	✓		
Herb/forb	**Aizoaceae**				
	Galenia pubescens var. *pubescens*	Galenia			
	Asteraceae				
	Arctotheca calendula	Capeweed			
	Cirsium vulgare	Spear Thistle	✓		
	Conyza bonariensis	Flaxleaf Fleabane			
	Cynara cardunculus	Spanish Artichoke	✓		
	Helminthotheca echioides	Ox-tongue			
	Hypochoeris radicata	Cat's Ear			
	Senecio sp.	Fireweed			
	Sonchus oleraceus	Common Sow-thistle			
	Taraxicum officinale	Garden Dandelion			
	Xanthium spinosum	Bathurst Burr	✓		
	Boraginaceae				
	Echium plantagineum	Patterson's Curse	✓		
	Brassicaceae				
	Lepidium africanum	Common Peppercress			
	Nasturtium officinale	Watercress			
	Raphanus raphanistrum	Wild Radish			
	Sysymbrium officinale	Hedge Mustard			
	Chenopodiaceae				
	Chenopodium murale	Sowbane			
	Gentianaceae				
	Centaurium erythraea	Common Centaury			
	Geraneaceae				
	Erodium botrys	Big Heron's-bill			
	Iridaceae				
	Romulea rosea	Onion grass			
	Lamiaceae				
	Marrubium vulgare	Horehound	✓		
	Plantaginaceae				
	Plantago lanceolata	Ribwort			
	Plantago coronopus	Bucks-horn Plantain			
	Fabaceae				

Life form	Scientific name	Common name	Conservation Status
	Medicago polymorpha	Burr Medic	
	Trifolium angustifolium var. *angustifolium*	Narrow-leaf clover	
	Trifolium arvense	Hare's-foot clover	
	Trifolium campestre	Hop Clover	
	Polygonaceae		
	Acetosella vulgaris	Sheep's Sorrel	
	Polygonum aviculare	Wireweed	
	Rumex sp.	Dock	
	Solanaceae		
	Solanum nigrum	Black Nightshade	
Graminoid	**Cyperaceae**		
	Cyperus eragrostis	Drain Flat-sedge	
	Juncaceae		
	Juncus acutus	Sharp (Spiny) Rush	✓
	Poaceae		
	Avena sp.	Oat	
	Avena fatua	Wild oat	
	Bromus catharticus	Prairie Grass	
	Ehrharta longiflora	Annual veldt grass	
	Hainardia cylindrica	Common Barb-grass	
	Holcus lanatus	Yorkshire Fog	
	Lolium perenne	Perennial Rye-grass	
	Nassella hyalina	Cane Needle-grass	
	Nassella neesiana	Chilean Needle-grass	✓
	Nassella trichotoma	Serrated tussock	✓
	Paspalum dilitatum	Paspalum	
	Pennisetum clandestinum	Kikuyu	
	Phalaris aquatica	Toowoomba Canary-grass	
	Vulpia sp.	Fescue	

Appendix C

Threatened Flora Species Recorded and/or Predicted to occur within a Radius of 5 km of the Precinct

Appendix C: Threatened Flora Species Recorded and/or Predicted to occur within a Radius of 5 km of the Precinct

Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Data-base	Other Sources	Present Survey	Total No. of Documented Records	Likely Occurrence in Precinct	Habitat Description
			EPBC	DSE	FFG							
Atriplex paludosa subsp. *paludosa*	Chenopod-inaceae	Marsh Saltbush		Rare			VFSD			2	Unlikely. No habitat on site. Closest VFSD (2010) record approx. 2.5km north-east of site. Recorded 1902	Saline soils in coastal and near-coastal saltmarshes and tidal flats (Australian Plants Society Maroondah 2001)
Ballantinia antipoda	Brassicaceae	Southern Shepherd's Purse	Endangered	Endangered	✓		VFSD			1	Unlikely. t. No habitat on site. Closest VFSD (2010) VFSD record approx. 3km north west of the site. Recorded 1866	Seasonally moist moss mats on granite rock faces. These rock faces characteristically receive run-off from surrounding granite boulders which saturates the moss mats in spring, and have very little soil development (Cook 1998). It is rare or absent from moss mats found on deeper soils in depressions or cracks in rocks, and has never been seen in the inter-tussock spaces of grassy understorey of surrounding open forest (Alexander 1999). Southern Shepherd's Purse shares this moss mat habitat with a diversity of other indigenous annual and geophytic vascular plants which are typical of seasonally moist or rocky sites in central and northern Victoria, e.g. *Triglochin centrocarpa*, *Brachyscome* sp.
Carex tasmanica	Cyperaceae	Curly Sedge	Vulnerable	Vulnerable	✓		PMST			0	Unlikely. No habitat on site. Closest VFSD (2010) VFSD record approx. 42km north west of the site. Recorded 1985	Native sedge that occurs in grassy wetlands in heavy wet soils north of Melbourne, disjunct from populations in western Victoria (Australian Plants Society Maroondah 2001)

Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Data-base	Other Sources	Present Survey	Total No. of Documented Records	Likely Occurrence in Precinct	Habitat Description
			EPBC	DSE	FFG							
Comesperma polygaloides	Polygalaceae	Small Milkwort		Vulnerable	✓		VFSD			1	Low.Insufficient quality habitat on site. Closest VFSD (2010) record approx. 2.5km east of the site. Recorded 1900	Occurs in small remnants of native grassland in road and railway reserves on the Western (Basalt) Plains. The grassland remnants are typically dominated by *Themeda triandra*, *Poa labillardieri* and less commonly *Austrodanthonia* spp. and *Austrostipa* spp. (DSE 2004).
Cullen parvum	Fabaceae	Small Scurf-pea		Endangered	✓		VFSD			2	Low. Insufficient habitat quality on site and not recorded from remnant grassland patches surveyed. Closest VFSD (2010) record approx. 3km north west of site (no record date available)	Generally occurs in grassy woodlands or plains grasslands and often associated with alluvial plains, creeks, ephemeral pools and river channels. It has also been reported from artificial drains and other disturbed sites.
Eragrostis trachycarpa	Poaceae	Rough-grain Love-grass		Rare	✓		VFSD			1	Low. Insufficient habitat quality on site. Closest VFSD (2010) record approx. 5km south of the site, Recorded 1984	Grows in woodlands and native pastures (Royal Botanic Gardens & Domain Trust 2010)
Eucalyptus leucoxylon subsp. *connata*	Myrtaceae	Melbourne Yellow-gum		Vulnerable			VFSD			1	Unlikely. No habitat on site. Closest VFSD (2010) record approx. 4.5km north east. No record date available	Box ironbark, red gum and box woodlands, chenopod rocky open scrub and dry sclerophyll forest (Australian Plants Society Maroondah 2001)

Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Data-base	Other Sources	Present Survey	Total No. of Documented Records	Likely Occurrence in Precinct	Habitat Description
			EPBC	DSE	FFG							
Glycine latrobeana	Fabaceae	Clover Glycine, Purple Clover	Vulnerable	Vulnerable	✓		PMST			1	Low. Insufficient habitat quality on site and not recorded in remnant patches surveyed. Closest VFSD (2010) record approx. 2.5km east. No record date available.	Endemic in Victoria and sporadically dispersed. Found in sclerophyll woodlands, plains grasslands and stony rises dominated by *Themeda triandra* above elevations of 190m ASL and in areas of at least 500mm annual rainfall (DSE 2007; Australian Plants Society Maroondah 2001).
Lotus australis var. australis	Fabaceae	Austral Trefoil		Poorly known	✓		VFSD			2	Low. Insufficient habitat on site and not recorded in remnant patches surveyed. Closest VFSD (2010) record approx. 2.5km east. Herbarium record	In grassy woodland, open grassy forests or grassland habitat, light shade to full sun.
Melaleuca armillaris subsp. *armillaris* [#]	Myrtaceae	Giant Honey-myrtle		Rare			VFSD			1	Unlikely: non-indigenous to area. Closest VFSD (2010) record approx. 3.5km north east of site. No record date available.	Coastal and near-coastal sandy heath and scrub communities above saltmarshes and riparian scrubs (Royal Botanic Gardens and Domain Trust 2010). Often planted locally for windbreaks and occurs as naturalised populations arising from cultivated stock.
Pimelea spinescens subsp. *spinescens*	Thymel-aeaceae	Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea	Critically Endangered	Vulnerable	✓		PMST / VFSD			1	Low. Insufficient habitat quality on site not recorded in remnant patches surveyed. Closest VFSD (2010) record approx. 2km west. No record date available.	In the locality it is found in grassland habitats of the basalt plains, including grasslands, grassy woodland and open shrublands with a ground layer commonly dominated by *Themeda triandra* (DEWHA 2009)

Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Data-base	Other Sources	Present Survey	Total No. of Documented Records	Likely Occurrence in Precinct	Habitat Description
			EPBC	DSE	FFG							
Prasophyllum frenchii	Orchidaceae	Maroon Leek-orchid, Slaty Leek-orchid	Endangered	Endangered	✓		PMST			0	Unlikely. Outside the current known distributional range (DSE 2003). Closest VFSD (2010) record approx. 57km east. No record date available	Native grasslands, open grassy or heathy woodlands on basalt soils to the east and south east of Melbourne (DSE 2003).
Prasophyllum suaveolens	Orchidaceae	Fragrant Leek-orchid	Endangered	Endangered	✓		PMST/VFSD			1	Low. Insufficient quality habitat on site not recorded in remnant patches surveyed. Closest VFSD (2010) record approx. 2.5km east. Herbarium record.	Open and species rich native grasslands dominated by *Themeda triandra* with perennial herbs and lilies on poorly drained red-brown soil derived from basalt (Coates, Jeanes and Pritchard 2002).
Rutidosis leptorrhynchoides	Asteraceae	Button Wrinklewort	Endangered	Endangered	✓		PMST / VFSD			12	Low. Poor habitat quality on site and not recorded in remnant patches surveyed. Closest VFSD (2010) record approx. 2km west. Recorded 1984.	In Victoria occurs in grasslands of the fertile volcanic plains at altitudes between 10-80m ASL. It usually occupies sites on low rises with shallow soil and low moisture and in association with *Themeda triandra* (DEWHA 2010; Royal Botanic Gardens and Domain Trust 2010).
Senecio macrocarpus	Asteraceae	Large-fruit Fireweed, Large-fruit Groundsel	Vulnerable		✓		PMST / VFSD			12	Low. Poor habitat quality on site and not recorded in remnant patches surveyed. Closest VFSD (2010) record approx. 1.5km west. Recorded 1983.	Largely confined to remnant *Themeda triandra* dominated grasslands on loamy grey soils derived from Basalt.

Scientific Name	Family Name	Common Name	Conservation Status			Regional Significance	Data-base	Other Sources	Present Survey	Total No. of Documented Records	Likely Occurrence in Precinct	Habitat Description
			EPBC	DSE	FFG							
Swainsona behriana	Fabaceae	Southern Swainson-pea		Rare			VFSD			1	Low. Marginal quality habitat available on site, but not recorded in remnant patches surveyed. Closest VFSD (2010) record approx. 2.5km east. Herbarium record.	Widespread but sporadic in Victoria, usually found in areas of light soils in moist grasslands, especially in woodland and forest clearings (Royal Botanic Gardens and Domain Trust 2010).

Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.

Low: Some of the preferred habitat present on the site. Species may occur at the site but will not depend on habitats on the site for the persistence of the species.

Moderate: Site contains some of the preferred habitat to support a population of the species

Likely: Site contains the preferred habitat which is likely to support a population of the species, including roost sites

Present: Species directly observed on the site or recently recorded at the site. Preferred habitat is present on the site

Appendix D

Quantification and Significance of Habitat Zones of Native Vegetation

Habitat Zone Number			01	02	03	04	05	06	07
Map Reference			2B C3	2B D2	2B B4	2A E5	2B D2	2B D2	2B A5
PFI			R1770357	R1770357	R1783067	R212341641	R1770357	R1783071	R212341641
Site ID			1.00	2.00	1.00	2.00	3.00	1.00	1.00
Zone ID									
EVC Name (initials)			LSPG	LSPG	LSPG	LSPG	LSPG	LSPG	LSPG
EVC Number			VVP_0132_62	VVP_0132_62	VVP_0132_62	VVP_0132_62	VVP_0132_62	VVP_0132_62	VVP_0132_62
Total Area of Habitat Zone (ha)		**(#.#)**	0.01	0.10	0.42	0.08	0.04	0.08	0.38
		Max Score							
Site Condition	**Large Old Trees**	**10**	0	0	0	0	0	0	0
	Canopy Cover	**5**	0	0	0	0	0	0	0
	Lack of Weeds	**15**	2	6	2	2	2	2	2
	Understorey	**25**	5	10	10	10	10	10	10
	Recruitment	**10**	3	3	3	3	6	6	3
	Organic matter	**5**	4	5	5	5	5	5	5
	Logs	**5**	0	0	0	0	0	0	0
	Total Score	**75**	19.09	32.73	27.27	27.27	31.36	31.36	27.27
Landscape Score		**25**	2	2	2	2	2	2	2
Habitat Score #		**100**	21.09	34.73	29.27	29.27	33.36	33.36	29.27
Habitat Score as above = #/100		**0.##**	0.21	0.35	0.29	0.29	0.33	0.33	0.29
Habitat Hectares		**(#.#)**	0.00	0.03	0.12	0.02	0.01	0.03	0.11
Bioregion			VVP_	VVP_	VVP_	VVP_	VVP_	VVP_	VVP_
EVC Conservation Status			Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered
Conservation Significance	**Conservation Status x Habitat Hectare Score**		High	High	High	High	High	High	High
	Threatened Species Rating		Remaining 50%	Remaining 50%	Remaining 50%	Remaining 50%	Remaining 50%	Remaining 50%	Remaining 50%
	Other Site Attribute Rating		NP	NP	NP	NP	NP	NP	NP
	Overall Conservation Significance (highest rating)		High	High	High	High	High	High	High
No. of Large Old trees in each Habitat Zone			0	0	0	0	0	0	0

* Multiplier applied as appropriate to all treeless EVCs

LSPG = Lighter-soils Plains Grassland

VVP = Victorian Volcanic Plains

Appendix E

Indigenous Fauna Species Recorded in the Wyndham Vale Precincts

Appendix E: Indigenous Fauna Species Recorded in the Wyndham Vale Precincts

Scientific name	Common name	Conservation Status				Type of record	Comments
		EPBC	DSE	FFG	Regional		
Birds							
Acanthiza chrysorrhoa	Yellow-rumped Thornbill					Observed	
Acrocephalus stentoreus	Australian (Clamorous) Reed Warbler					Heard	In reeds on creekline
Anas castanea	Chestnut Teal					Observed	5+
Anthus novaeseelandiae	Australasian (Richard's) Pipit					Observed	
Anas superciliosa	Black Duck					Observed	10+
Cacatua roseicapilla	Galah					Observed	
Cincloramphus cruralis	Brown Songlark					Observed	
Coracina novaehollandiae	Black-faced Cuckoo-shrike					Observed	
Corvus mellori	Little Raven					Observed	
Coturnix pectoralis	Stubble Quail					Observed	Several
Cuculus pallidus	Pallid Cuckoo					Observed	
Cygnus atratus	Black Swan					Heard	Flying overhead at night
Elseyornis melanops	Black-faced Dotteral					Observed	2
Falco cenchroides	Nankeen Kestrel					Observed	
Falco subniger	Black Falcon			☐		Observed	1+ , observed hunting Stubble Quails
Falco longipennis	Australian Hobby					Observed	

Scientific name	Common name	Conservation Status				Type of record	Comments
		EPBC	DSE	FFG	Regional		
Gallinago hardwickii	Latham's Snipe	Migratory	Near-threatened			Observed	6+
Grallina cyanoleuca	Magpie-lark					Observed	3
Gymnorhina tibicen	Australian Magpie					Observed	
Himantopus himantopus	Pied Stilt					Observed	2
Hirundo neoxena	Welcome Swallow					Observed	
Lichenostomus penicillatus	White-plumed Honeyeater					Observed	
Malacorhynchus membranaceus	Pink-eared Duck					Observed	2+; heard flying over at night from dam on adjacent property
Malurus cyaneus	Superb Fairy-wren					Observed	2+ groups in garden areas around houses
Mirafra javanica	Singing Bushlark					Observed	
Taeniopygia guttata	Zebra Finch					Observed	6+
Trichoglossus haematodus	Rainbow Lorikeet					Observed	8+
Threskiornis spinicollis	Straw-necked Ibis					Observed	
Turnix pyrrhothorax	Red-chested Button-quail		Vulnerable	☐		Observed	1 flushed from native grassland (mainly Spear-grass, Wallaby-grass, Windmill Grass, Kangaroo Grass) just west of Ballan Road in December 2008; full description in J. Matthew's notebook
Vanellus miles	Masked Lapwing					Observed	1
Mammals							
Tadarida australis	White-striped Freetail Bat					Heard	Heard flying overhead at night on several locations (calls audible to human ear)

Scientific name	Common name	Conservation Status				Type of record	Comments
		EPBC	DSE	FFG	Regional		
Reptiles							
Ctenotus robusta	Large Striped Skink						1 under rocks along River Red Gum-lined creekline
Lampropholis guichenoti	Garden Skink					Observed	2
Pseudonaja textilis	Eastern Brown Snake					Observed	1
Tiliqua scincoides scincoides	Common Blue-tongue					Observed	1
Amphibians							
Crinia signifera	Common Froglet					Heard	Numerous in creekline
Limnodynastes tasmaniensis	Spotted Marsh Frog					Heard	Numerous in creekline
Gastropods							
	Land Snail					Observed	Grassland habitats

EPBC: Environmental Protection And Biodiversity Conservation Act listed species
DSE: Refers to species listed under 'the advisory list of rare and threatened species'
FFG: Refers to species listed under the Victorian Flora and Fauna Guarantee Act

Appendix F

Exotic Fauna Species Recorded in the Wyndham Vale Precincts

Appendix F: Exotic Fauna Species Recorded in the Wyndham Vale Precincts

Scientific name	Common name	Status	Type of record	Comments
Birds				
Acridotheres tristis	Common Myna		Observed	
Alauda arvensis	European Skylark		Observed	
Carduelis carduelis	European Goldfinch		Observed	
Columba livia	Rock Dove		Observed	
Passer domesticus	House Sparrow		Observed	
Streptopelia chinensis	Spotted Turtle-dove		Observed	
Sturnus vulgaris	Common Starling		Observed	
Mammals				
Felis catus	Cat (feral)	EPBC Threatening process	Observed	
Lepus capensis	Brown Hare		Observed	
Oryctolagus cuniculus	European Rabbit	EPBC Threatening process	Observed	
Vulpes vulpes	Red Fox	EPBC Threatening process	Observed	

Appendix G

Threatened Fauna Species Recorded and/or Predicted to occur within a Radius of 5 km of the Precinct

Appendix G: Threatened Fauna Species Recorded and/or Predicted to occur within a Radius of 5 km of the Precinct

Scientific Name	Family Name	Common Name	Conservation Status			Database	Number of Records	Likely Occurrence in Precinct / Reasoning	Habitat Description
			EPBC	DSE	FFG				
BIRDS									
Accipiter novaehollandiae	Accipitridae	Grey Goshawk		Vulnerable	✓	AVW	4	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Found in most forest types, especially tall closed forests, including rainforests. Also tall woodlands and timbered watercourses.
Actitis hypoleucos	Scolopacidae	Common Sandpiper	Migratory	Vulnerable	✓	PMST/AVW	1	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Found in coastal or inland wetlands, both saline or fresh. It is found mainly on muddy edges or rocky shores. During the breeding season in the northern hemisphere, it prefers freshwater lakes and shallow rivers.
Anas rhynchotis	Anatidae	Australasian Shoveler		Vulnerable	☐	AVW	22	Low: Some of the preferred habitat present on the site. Species may infrequently visit the site on-route for foraging but will not roost or otherwise depend on habitats on the site for their survival.	Inhabits many kinds of wetlands, preferring large undisturbed heavily vegetated freshwater swamps, but occasionally artificial waterbodies such as sewage treatment ponds and dams. Also found on open waters and occasionally along the coast.
Anthochaera phrygia	Meliphagidae	Regent Honeyeater	Endangered / Migratory	Critically Endangered	✓	PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Mainly Box Ironbark forests, occasionally other forests and eucalypt woodlands.
Anseranas semipalmata	Anseranatidae	Magpie Goose		Near Threatened	✓	AVW	6	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Natural populations no longer occur in Victoria. Some recently released back into the wild favour wetter coastal plains. Breed colonially in platform nests over open water.
Apus pacificus	Apodidae	Fork-tailed Swift	Migratory			PMST		Moderate (seasonal visitor, flying overhead only)	Aerial over a wide range of habitats, particularly in the lowlands and foothills of northern Victoria. Seasonal (spring-summer) non-breeding migrant to Victoria.

Scientific Name	Family Name	Common Name	Conservation Status			Database	Number of Records	Likely Occurrence in Precinct / Reasoning	Habitat Description
			EPBC	DSE	FFG				
Ardea ibis	Ardeidae	Cattle Egret	Migratory			PMST		Moderate - migratory and highly mobile species, it is not expected to be highly reliant on habitats present and would likely use other areas of habitat in the locality	Grasslands, woodlands and wetlands and also pastures and croplands, especially where drainage is poor.
Ardea intermedia	Ardeidae	Intermediate Egret		Critically Endangered	✓	AVW	2	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Intertidal mudflats, inland lakes, swamps and rivers; also farm dams and artificial wetlands
Ardea modesta	Ardeidae	Eastern Great Egret	Migratory	Vulnerable	✓	PMST/AVW	23	Low: Some of the preferred habitat present on the site. Species may infrequently visit the site on-route for foraging but will not roost or otherwise depend on habitats on the site for their survival.	Various wetlands and waterbodies including intertidal mudflats, inland lakes, swamps and rivers; also farm dams, ephemeral waterbodies and artificial wetlands.
Aythya australis	Anatidae	Hardhead		Vulnerable	✓	AVW	15	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Deep, permanent open freshwater wetlands with dense fringing vegetation. Sometimes artificial wetlands used during dry periods.
Biziura lobata	Anatidae	Musk Duck		Vulnerable	✓	AVW	18	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Permanent swamps with dense vegetation, more open waters in non breeding season. Occasionally artificial waterbodies such as sewage treatment ponds and dams.
Botaurus poiciloptilus	Ardeidae	Australasian Bittern		Endangered	✓	AVW	4	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Reed-beds and tall standing vegetation in freshwater swamps, streams and estuaries in south-eastern Australia.
Calidris acuminata	Scolopacidae	Sharp-tailed Sandpiper	Migratory		✓	PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Various saline and freshwater coastal and inland wetlands, tidal mudflats and salt-marshes, flooded grasslands and irrigated areas and artificial water-bodies. On various substrates including mud, sand and rocky areas. Mainly common spring-summer migrant, but some over-wintering birds.

Scientific Name	Family Name	Common Name	Conservation Status			Database	Number of Records	Likely Occurrence in Precinct / Reasoning	Habitat Description
			EPBC	DSE	FFG				
Calidris canutus	Scolopacidae	Red Knot	Migratory	Near Threatened		PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Gather in large flocks on the coast in sandy estuaries with tidal mudflats. Spring-summer migrant.
Calidris ferruginea	Scolopacidae	Curlew Sandpiper	Migratory			PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Mainly spring-summer migrant to Australia with small numbers over-wintering here. Typically on various saline to brackish wetlands and waterbodies.
Calidris melanotos	Scolopacidae	Pectoral Sandpiper	Migratory	Near Threatened		PMST / AVW	1	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Typically well-vegetated, shallow freshwater swamps and lagoons with exposed muddy surfaces, also shallow sewage treatment ponds with muddy exposed surface and occasionally estuarine areas. Uncommon spring-summer visitor.
Calidris ruficollis	Scolopacidae	Red-necked Stint	Migratory			PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Saline and freshwater coastal and inland wetlands, tidal mudflats and salt-marshes, typically on muddy or sandy substrate. Mainly common spring-summer migrant, but some over-wintering birds.
Calidris subminuta	Scolopacidae	Long-toed Stint	Migratory	Near Threatened		PMST / AVW	2	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Typically well-vegetated, shallow freshwater swamps and lagoons with exposed muddy surfaces, also shallow sewage treatment ponds with muddy exposed surfaces. Uncommon spring-summer visitor.
Calidris tenuirostris	Scolopacidae	Great Knot	Migratory	Endangered	✓	PMST / AVW	2	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Individuals have often been recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. A small proportion of individuals have also been sighted in inland fresh and salt water lakes.
Cereopsis novaehollandiae	Anatidae	Cape Barren Goose		Near Threatened	☐	AVW	4	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Offshore islands, usually granite, in areas of pasture, tussock grass or low heathy scrub. Often on grassy or herbaceous edges of open waterbodies. Distributed across southern Australia.

Scientific Name	Family Name	Common Name	Conservation Status			Database	Number of Records	Likely Occurrence in Precinct / Reasoning	Habitat Description
			EPBC	DSE	FFG				
Charadrius bicinctus	Charadriidae	Double-banded Plover	Migratory			PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Mainly autumn-winter migrant to Victoria. Occurs on littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture. It occurs on muddy, sandy, shingled or sometimes rocky beaches, bays and inlets, harbours and margins of fresh or saline terrestrial wetlands such as lakes, lagoons and swamps, shallow estuaries and rivers.
Charadrius leschenaultii	Charadriidae	Greater Sand Plover	Migratory	Vulnerable		PMST / AVW	2	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Recorded on inshore reefs, rock platforms, small rocky islands and sand cays on coral reefs. Occasional sightings have also occurred on near-coast saltlakes, brackish swamps, shallow freshwater wetlands and grassed paddocks
Charadrius mongolus	Charadriidae	Lesser Sand Plover	Migratory	Vulnerable		PMST / AVW	3	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	The species is seldom recorded away from the coast, at margins of lakes, soaks and swamps associated with artesian bores. On its breeding grounds it occurs in alpine valleys
Chlidonias hybridus	Sternidae	Whiskered Tern		Near Threatened		AVW	6	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Lakes, swamps with emergent or floating plants, low bushes in saltmarsh and estuaries. Also over irrigated pastures and wet grasslands.
Chrysococcyx osculans	Cuculidae	Black-eared Cuckoo		Near Threatened		AVW	2	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Typically found in drier country where mulgas and mallees form open woodlands and shrublands, often along watercourses. Sometimes in box-ironbark forests and woodlands, but rarely in coastal or near-coastal regions of Victoria.
Circus assimilis	Accipitridae	Spotted Harrier		Near Threatened		AVW	3	Moderate (foraging or as an overhead visitor to this area)	Grassland, open grassy woodlands and sometimes crops and pastures. Usually seen foraging or flying over this habitat.
Coturnix ypsilophora	Phasianidae	Brown Quail		Near Threatened	☐	AVW	3	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Widespread in grass and sedge flats, particularly in rank, dense low vegetation adjacent to ephemeral drainages, creeks, rivers and swamps.

Scientific Name	Family Name	Common Name	Conservation Status			Database	Number of Records	Likely Occurrence in Precinct / Reasoning	Habitat Description
			EPBC	DSE	FFG				
Egretta garzetta	Ardeidae	Little Egret		Endangered	✓	AVW	6	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Frequents tidal mudflats and freshwater and saltwater wetlands, and mangroves.
Falco subniger	Falconiidae	Black Falcon		Vulnerable		AECOM (recorded in other precincts of Wyndham Vale)	2	Likely. Observed by AECOM approximately 1 km from PSP 43	Open woodlands and scrubs, timbered watercourses and grassland types often in drier environs such as open plains, arid and semi-arid areas. Species has a large home range and is likely to forage within and outside of the Precinct. No targeted survey methodology has been established for this species, with observations recorded opportunistically.
Gallinago hardwickii	Scolopacidae	Latham's Snipe, Japanese Snipe	Migratory	Near Threatened		PMST / AVW	14	Low: Some of the preferred habitat present on the site. Species may infrequently visit the site on-route for foraging but will not roost or otherwise depend on habitats on the site for their survival.	Spring-summer migrant, occurring on wet or seasonally inundated grasslands and well-vegetated fringes of swamps.
Haliaeetus leucogaster	Accipitridae	White-bellied Sea-Eagle	Migratory	Vulnerable	✓	PMST	1	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Coastal islands, coastal lakes and along some inland rivers and lakes.
Hirundapus caudacutus	Apodidae	White-throated Needletail	Migratory			PMST / AVW	1	Moderate (seasonal visitor, flying overhead only)	Aerial, spring-summer migrant to Australia often in coastal and sub-coastal regions of south-eastern Australia.
Hydroprogne caspia	Sternidae	Caspian Tern	Migratory	Near Threatened	✓	PMST / AVW	4	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Usually found near the coast, in extensive wetlands, on coastal and interior beaches and sheltered estuaries. In fresh water and saline environments.
Lathamus discolor	Psittacidae	Swift Parrot	Endangered	Endangered	✓	PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Breeds in Tasmania. Autumn-winter (mainly March to September) migrant to mainland south-eastern Australia where generally preferring Box Ironbark forests and woodlands inland of the Great Dividing Range during winter. Occasionally in coastal forests and woodlands and parklands with mature eucalypts.

Scientific Name	Family Name	Common Name	Conservation Status			Database	Number of Records	Likely Occurrence in Precinct / Reasoning	Habitat Description
			EPBC	DSE	FFG				
Larus pacificus pacificus	Laridae	Pacific Gull		Near Threatened	✓	AVW	14	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Intertidal mudflats, estuaries and beaches. Coastal and sub-coastal areas, occasionally rubbish dumps. Open roosts on boats.
Lewinia pectoralis	Rallidae	Lewin's Rail		Vulnerable	✓	AVW	3	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Well vegetated freshwater to saline swamps, saltmarshes and occasionally wet heathy swamps.
Limosa limosa	Scolopacidae	Black-tailed Godwit	Migratory	Vulnerable		PMST/AVW	1	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Typically freshwater to brackish waterbodies, including sewage treatment ponds and occasionally estuarine areas. Spring-summer migrant.
Merops ornatus	Meropidae	Rainbow Bee-eater	Migratory			PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Summer migrants to Victoria where they occur in many wooded habitats with an annual rainfall of less than 800mm, especially north of the Great Divide.
Myiagra cyanoleuca	Monarchidae	Satin Flycatcher	Migratory			PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Spring-summer migrant, occurring in forests, riparian woodland and occasionally treed parklands.
Neophema chrysogaster	Psittacidae	Orange-bellied Parrot	Critically Endangered /Migratory	Critically Endangered	✓	PMST/AVW	8	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	On mainland Australia, autumn to early spring non-breeding migrant. Occurs in coastal salt-marshes and adjacent coastal pastures or grasslands, golf courses or low shrub-lands. Breed sin Tasmania in spring-summer.
Ninox connivens	Strigidae	Barking Owl		Endangered	✓	AVW	2	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Dry woodlands, wooded farmlands and dry forests, often along or near watercourses, lagoons and billabongs.
Numenius madagascariensis	Scolopacidae	Eastern Curlew	Migratory	Near Threatened	☐	PMST/AVW	6	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Typically saline and brackish coastal waterbodies, especially estuaries, tidal sandflats and mudflats. Spring-summer migrant.

Scientific Name	Family Name	Common Name	Conservation Status			Database	Number of Records	Likely Occurrence in Precinct / Reasoning	Habitat Description
			EPBC	DSE	FFG				
Nycticorax caledonicus	Ardeidae	Nankeen Night Heron		Near Threatened		AVW	5	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	A wide range of wetlands, particularly in riparian vegetation fringing water-bodies.
Oxyura australis	Anatidae	Blue-billed Duck		Endangered	✓	AVW	1	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Mainly open, deeper freshwater bodies with dense fringing vegetation, including lakes and artificial wetlands such as sewage ponds.
Pedionomus torquatus	Pedion-omidae	Plains-wanderer	Vulnerable	Critically Endangered	✓	AVW	5	Low: Some of the preferred habitat present on the site. Species may infrequently visit the site on-route for foraging but will not roost or otherwise depend on habitats on the site for their survival.	Low, open native grasslands, sometimes in unimproved pastures, typically where bare ground cover is high, cover of grasses is low and there is a diversity of native herbs and forbs.
Phalacrocorax varius	Phalacroc-oridae	Pied Cormorant		Near Threatened		AVW	1	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Large freshwater and saline wetlands and tidal bays along the coast. Sometimes on inland water-bodies.
Platalea regia	Threskiornithi dae	Royal Spoonbill		Vulnerable		AVW	5	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Larger shallow waters (inland and coastal), well vegetated shallow freshwater wetlands, floodplains, billabongs, sewage ponds, irrigation storages, tidal mudflats, estuaries, salt marshes, salt fields, mangroves, islands.
Plegadis falcinellus	Threskiornithi dae	Glossy Ibis	Migratory	Near Threatened	✓	PMST/AV W	2	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Mainly summer migrants to vegetated or muddy margins of freshwater wetlands and nearby grasslands and pastures.
Pluvialis fulva	Charadriidae	Pacific Golden Plover	Migratory	Near Threatened	✓	PMST/AV W	6	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Coastal and subcoastal wetlands and marshes, including saltmarshes or saline herblands or grassy areas, often also rocky ledges. Spring-summer migrant.

Scientific Name	Family Name	Common Name	Conservation Status			Database	Number of Records	Likely Occurrence in Precinct / Reasoning	Habitat Description
			EPBC	DSE	FFG				
Pluvialis squatarola	Charadriidae	Grey Plover	Migratory	Near Threatened	✓	PMST/AVW	3	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Typically saline and brackish coastal waterbodies, especially estuaries, tidal sandflats and mudflats. Spring-summer migrant.
Rhipidura rufifrons	Rhipiduridae	Rufous Fantail	Migratory			PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Inhabits and breeds in wet forests, particularly gullies. Seasonal (mainly autumn-winter) dispersal to more open habitat (e.g. woodlands, parklands and drier forests).
Rostratula australis	Rostratulidae	Australian Painted Snipe	Vulnerable / Migratory	Critically Endangered	✓	PMST		Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Lowland shallow freshwater or brackish swamps and wetlands with dense emergent vegetation, including lignum swamps and flooded saltmarshes.
Stagonopleura guttata	Estrildidae	Diamond Firetail		Vulnerable	✓	AVW	2	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Open grassy woodland, heath and farmland or grassland with scattered trees. Endemic to south-eastern Australia.
Sternula albifrons	Sternidae	Little Tern	Migratory	Vulnerable	✓	PMST/AVW	1	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Shallow coastal bays and estuaries, sandy beaches, rarer west of Port Phillip and Western Port Bays.
Sternula nereis	Sternidae	Fairy Tern		Endangered	✓	AVW	5	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Shallow coastal bays and estuaries, sandy beaches.
Stiltia isabella	Glareolidae	Australian Pratincole		Near Threatened		AVW	1	Low: Some of the preferred habitat present on the site. Species may infrequently visit the site on-route for foraging but will not roost or otherwise depend on habitats on the site for their survival.	Open low grassland, stony plains and herbfields.

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			EPBC	DSE	FFG				
Tringa glareola	Scolopacidae	Wood Sandpiper	Migratory	Vulnerable	✓	PMST/AVW	2	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Typically well-vegetated, shallow freshwater swamps and lagoons with exposed muddy surfaces, also shallow sewage treatment ponds with muddy exposed surfaces. Spring-summer visitor.
Turnix pyrrhothorax	Turnicidae	Red-chested Button-quail		Vulnerable	✓	AVW	1	Low: Some of the preferred habitat present on the site. Species may infrequently visit the site on-route for foraging but will not roost or otherwise depend on habitats on the site for their survival.	Typically dense native grassland and open grassy woodlands in low rainfall areas.
Tyto novaehollandiae	Tytonidae	Masked Owl		Endangered	✓	AVW	1	Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.	Inhabits forests, woodlands, timbered waterways and open country on the fringe of these areas. Found in a band around coastal and sub-coastal Australia, generally not more than 300km inland.
MAMMALS									
Dasyurus maculatus maculatus (SE mainland population)	Dasyuridae	Spot-tailed Quoll	Endangered	Endangered	✓	PMST		Unlikely – no suitable habitat was recorded on the site.	Wet sclerophyll forest, rainforest, dry sclerophyll forest and woodland, coastal heath and scrub. Generally a forest dependent species requiring large intact areas of vegetation for foraging and suitable den sites (e.g. hollows, logs or rock crevices).
Isoodon obesulus obesulus	Peramelidae	Southern Brown Bandicoot	Endangered	Near Threatened	✓	PMST		Unlikely – no preferred habitat (regenerating vegetation or refuge habitat) was recorded on the site.	Occurs in a variety of habitats in south-eastern Australia including heathland, swamp habitat, open forest, dry sclerophyll forest with heathy understorey and grasslands. Preferred habitat includes areas which are occasionally burnt, promoting increased insect populations and regenerating habitat.
Perameles gunnii	Peramelidae	Eastern Barred Bandicoot	Endangered	Critically Endangered	✓	AVW	5	Unlikely - this species has not been recently recorded in the greater area, and no suitable habitat recorded on site.	Open woodlands and forests, grasslands. Currently, wild populations are largely restricted to Tasmania, with the species' distribution in Victoria limited primarily to four reintroduced populations in the west of the State.
Pteropus poliocephalus	Pteropodidae	Grey-headed Flying-fox	Vulnerable	Vulnerable	✓	AVW	3	Low – no preferred habitat occurs on the site.	Roost sites commonly occur on emergent trees in gullies, vegetation with dense canopy cover and close to water.

Scientific Name	Family Name	Common Name	Conservation Status			Database	Number of Records	Likely Occurrence in Precinct / Reasoning	Habitat Description
			EPBC	DSE	FFG				
Sminithopsis crassicaudata	Dasyuridae	Fat-tailed Dunnart		Near Threatened		AVW	9	Low - some grassland areas occur on the site, however these are small, degraded and do not constitute preferred habitat.	Open habitats, especially tussock and hummock grasslands. Preferred habitat includes logs or rocks providing nesting resources and cover.
REPTILES									
Delma impar	Pygopodidae	Striped Legless Lizard	Vulnerable	Endangered	✓	PMST / AVW	3	Low – this species has not been recorded in the precinct and there were few areas of suitable habitat recorded on site.	All occupied sites have a grassy ground cover, often with a mixture of native and exotic perennial and annual species. Preferred habitat appears to consist of cracking clays soils with surface rocks and tussock-style vegetation structure.
Tympanocryptis pinguicolla	Agamidae	Grassland Earless Dragon	Endangered	Critically Endangered	✓	PMST		Unlikely – no suitable habitat was recorded on site.	Rocky native tussock grasslands with sparse cover, on clay-type soils. No extant populations known from Victoria.
AMPHIBIANS									
Litoria raniformis	Hylidae	Growling Grass Frog	Vulnerable	Endangered	✓	PMST / AVW	6	Unlikely – no suitable habitat was recorded on site.	Permanent lakes, swamps, dams and lagoons, particularly those with dense standing emergent, floating and fringing vegetation; occasionally very wet areas in woodland and shrubland. Foraging often occurs in adjacent grasslands.
FISH									
Galaxiella pusilla	Galaxiidae	Eastern Dwarf Galaxias, Dwarf Galaxias	Vulnerable	Vulnerable	✓	PMST		Unlikely – no suitable waterbodies were recorded on site	Suitable habitat consists of stagnant or swampy environments, usually consisting of shallow water with abundant aquatic vegetation. Habitat utilised by this species may be ephemeral, partly or completely drying up during summer months.
Prototroctes maraena	Retropinnidae	Australian Grayling	Vulnerable	Vulnerable	✓	PMST		Unlikely – no suitable waterways were recorded on site	Spends part of its life cycle in freshwater in rivers, typically in gravel bottom pools. Often forming aggregations below barriers to upstream movement such as waterfalls.
INSECTS									
Synemon plana	Castniidae	Golden Sun Moth	Critically Endangered	Critically Endangered	✓	PMST		Low – this species has not been recorded in the precinct and there were few areas of suitable habitat recorded on site.	Occurs in grasslands and woodlands with a grassy understorey, particularly those dominated by *Austrodanthonia* species, as well as other native grasses (e.g. *Bothriocloa macra*, *Austrostipa* spp., *Poa* spp.) and introduced Chilean Needle-grass.

PLATES

Plate 1 Plains Grassland within the Wyndham Vale Precinct

Plate 2 Plains Grassland within the Wyndham Vale Precinct

Plate 3 Roadside vegetation within the Wyndham Vale Precinct

Plate 4 *Ptilotus macrocephalus* recorded within the Wyndham Vale Precinct

Plate 5 *Hypericum gramineum* recorded within the Wyndham Vale Precinct

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