ecology & heritage partners

Final Report

# Biodiversity Assessment for the Greater Avalon (Employment) Precinct, Avalon, Victoria

Prepared for

**Victorian Planning Authority**

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Ecology and Heritage Partners acknowledge the Traditional Owners of the country we live and work on, and we pay our respect to Elders past, present and emerging.

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# GLOSSARY

| Acronym | Description |
|---|---|
| AVW | Atlas of Victorian Wildlife |
| BCS | Biodiversity Conservation Strategy |
| CaLP Act | *Catchment and Land Protection Act 1994* |
| CAMBA | China Australia Migratory Bird Agreement |
| CoGG | City of Greater Geelong |
| CMA | Catchment Management Authority |
| DAWE | (former) Commonwealth Department of Agriculture, Water and the Environment |
| DCCEEW | Department of Climate Change, Energy, the Environment and Water |
| DEECA | Department of Energy, Environment and Climate Action |
| DELWP | (former) Department of Environment, Land, Water and Planning |
| DoEE | (former) Commonwealth Department of the Environment and Energy |
| DPO | Development Plan Overlay |
| DSE | (former) Department of Sustainability and Environment |
| EES | Environment Effects Statement |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999* |
| EVC | Ecological Vegetation Class |
| FFG Act | *Flora and Fauna Guarantee Act 1988* |
| GA(E)N | Greater Avalon (Employment) North |
| GA(E)P | Greater Avalon (Employment) Precinct |
| GA(E)W | Greater Avalon (Employment) West |
| GGF | Growling Grass Frog *Litoria raniformis* |
| GSM | Golden Sun Moth *Synemon plana* |
| HabHa | Habitat Hectare |
| JAMBA | Japan Australia Migratory Bird Agreement |
| MFL | Matted Flax-lily *Dianella amoena* |
| MSA | Melbourne Strategic Assessment |
| NES | National Environmental Significance |
| NTGVVP | Natural Temperate Grassland of the Victorian Volcanic Plain ecological community |
| NVR Map | Native Vegetation Regulation Map (DEECA) |
| NVIM Tool | Native Vegetation Information Management Tool (DELWP/DEECA) |
| NVPP | Native Vegetation Precinct Plan |
| PMST | Protected Matters Search Tool |
| PSP | Precinct Structure Plan |
| SRF | Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* |
| SLL | Striped Legless Lizard *Delma impar* |

| Acronym | Description |
|---|---|
| Study Area | Refers to areas within the GA(E)N and GA(E)W that were subject to the on-ground assessments |
| TRZ | Tree Retention Zone |
| VBA | Victorian Biodiversity Atlas |
| VGED | Victorian Grassland Earless Dragon *Tympanocryptis pinguicolla* |
| VPA | Victorian Planning Authority |
| WoNS | Weeds of National Significance |

# EXECUTIVE SUMMARY

## Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by the Victorian Planning Authority (VPA) to undertake detailed ecological investigations within the future Greater Avalon (Employment) Precinct (GA[E]P), encompassing an overall area of approximately 3,435 hectares (inclusive of Avalon Airport land). The precinct is identified in the Avalon Corridor Strategy (ACS) (Hansen Partnership 2022), which provides strategic planning direction for the corridor between Geelong and Werribee and identifies the GA(E)P as a strategic opportunity to leverage from planned expansion of the Avalon Airport. The GA(E)P has since been split into two precincts, known as Greater Avalon (Employment) North (GA[E]N) and Greater Avalon (Employment) West (GA[E]W). These precincts comprise land located outside of the Avalon Airport boundary and comprise an area of approximately 1,580 hectares (the study area). The GA(E)N is approximately 639.8 hectares in size and bound by the Princes Freeway to the north and west, Western Road to the east and Beach Road to the south. The GA(E)W is approximately 940.8 hectares in size and is bound by the Princes Freeway to the north, Avalon Airport to the east, the boundary of Avalon Coastal Reserve to the south and Avalon Road to the west.

## Methods

Relevant literature, online-resources and databases were reviewed to determine the flora and fauna values across the study area. This included EPBC Act policy statements for listed species and ecological communities, FFG Act Action Statements, National Recovery Plans, and State Advisory Lists.

A review of several ecological assessments that have previously been undertaken within the GA(E)P that describe the known or likely ecological values present, was undertaken to determine the potential occurrence of listed species and ecological communities, and to inform where targeted significant species surveys should be undertaken.

The field surveys were undertaken by qualified ecologists within the GA(E)P study area between July 2023 and June 2024. The field surveys sought primarily to assess the extent and condition of native vegetation and potential flora and fauna habitat, with particular consideration given to significant species and ecological communities. Ecological surveys were undertaken to optimise the survey timing, methods and frequency to enable sampling of those flora and fauna species that are detectable at certain time of the year.

All fieldwork was carried out under the appropriate licences, including a Research Permit (1008283) and Scientific Procedures Fieldwork Licence (SPFL20005) issued by DELWP under the *Wildlife Act 1975,* and an Animal Research permit issued by the Wildlife and Small Institutions Animal Ethics Committee (05.17).

Targeted surveys were undertaken for nationally significant flora (Matted Flax-lily *Dianella amoena,* Button Wrinklewort *Rutidosis leptorhynchoides*, Large-headed Fireweed *Senecio macrocarpus*¸ Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* and River Swamp Wallaby Grass *Amphibromus fluitans*) and nationally significant fauna (Golden Sun Moth *Synemon plana,* Growling Grass Frog Litoria *raniformis,* Orange-bellied Parrot *Neophema chrysogaster,* Blue-winged Parrot *Neophema chrysostoma,* Latham's Snipe *Gallinago hardwickii*, Curlew Sandpiper *Calidris ferruginea*, Common Greenshank *Tringa nebularia* and Striped Legless

Lizard *Delma impar*) between July 2023 and June 2024. Targeted surveys were also undertaken for State-significant flora and fauna species during this time.

Surveys for native vegetation, ecological communities and significant flora and fauna species were undertaken over 45 separate days.

The ecological site assessment was restricted to parcels/properties where access was permitted (Figure 2). This resulted in a total of 256.92 hectares out of a total of 639.76 hectares (approximately 40%) of the GA(E)N not being subject to on-ground assessments.

It is recommended that VPA further investigates the possibility to gain access to parcels that have not been surveyed to document the quality and extent of native vegetation, and to determine the presence or otherwise of any significant species (e.g. Spiny Rice-flower, Striped Legless Lizard and/or Golden Sun Moth), and listed ecological communities [e.g. *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP)]. If suitable habitat for significant flora or fauna is present, then targeted surveys would need to be undertaken in accordance with the relevant survey guidelines.

Ecological values of the GA(E)N and GA(E)W, as determined through field assessments and targeted surveys undertaken within the accessible property parcels, are summarised below (Table S1).

## Results

**Table S1.** Summary of the ecological values that occur within the assessed areas of the GA(E)N and GA(E)W.

| | |
|---|---|
| **Species diversity** | Moderate assemblage of plants and animals, with 90 flora species and 48 fauna species recorded during the ecological surveys |
| **Native vegetation** | **GA(E)N**<br>• 2 hectares of native vegetation represented by two EVCs:<br>o 1.83 hectares of Plains Grassland (EVC 132)<br>o 0.17 hectares of Plains Grassy Woodland (EVC 55)<br>**GA(E)W**<br>• 177.40 hectares of native vegetation represented by eight EVCs:<br>o 29.95 hectares of Plains Grassland (EVC 132)<br>o 0.78 hectares of Plains Grassy Woodland (EVC 55)<br>o 130.57 hectares of Coastal Saltmarsh (EVC 9)<br>o 4.47 hectares of Plains Sedgy Wetland (EVC 647)<br>o 4.44 hectares of Plains Grassy Wetland ((EVC 125)<br>o 4.95 hectares of Brackish Wetland (EVC 656)<br>o 2.13 hectares of Brackish Grassland (EVC 934)<br>o 0.11 hectares of Tall Marsh (EVC 821) |
| **Wetlands** | • The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site is located immediately adjacent to the GA(E)N and GA(E)W within the Avalon Airport land and immediately east of GA(E)N and immediately to the south of GA(E)W |

| | |
|---|---|
| **Significant ecological communities** | • A total of 4.75 hectares of the nationally significant ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP) is present in the study area (Figure 2):<br>o 0.84 hectares within the GA(E)N<br>o 3.91 within the GA(E)W<br>• A total of 31.77 hectares of the State-significant *Western (Basalt) Plains Grassland Community* is present in the study area (PG1 and PG2 on Figure 2)<br>• A total of 0.13 hectares of the State-significant *Western Basalt Plains (River Red Gum) Grassy Woodland* within GA(E)W (Figure 2f) |
| **Significant flora species** | • One nationally significant flora species was recorded within the study area<br>o A total of eight specimens of Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* were recorded within the council road easement adjacent to the south-eastern boundary of the GA(E)W (Figure 2)<br>• No State-significant flora were recorded within the study area |
| **Significant fauna species** | • Known presence of five nationally significant fauna:<br>o Blue-winged Parrot *Neophema chrysotoma*<br>o Curlew Sandpiper *Caladris ferruginea* (Biosis 2023)<br>o Common Greenshank *Tringa nebularia* (Biosis 2023)<br>o Sharp-tailed Sandpiper *Calidris acuminata* (Biosis 2023)<br>o Growling Grass Frog *Litoria raniformis major* (Biosis 2023)<br>o Golden Sun Moth *Synemon plana*<br>• Potential habitat for Victorian Grassland Earless Dragon<br>• Known presence of three State-significant fauna:<br>o Tussock Skink *Pseudemoia pagenstecheri*<br>o Fat-tailed Dunnart *Sminthopsis crassicaudata* (Biosis 2023)<br>o Little Eagle *Hieraaetus morphnoides* |

## Legislative and Policy Implications

***Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)**

The EPBC Act offers two pathways to achieve approval for actions that are likely to have a significant impact on matters of NES. The first of those is the referral (Part 7), assessment (Part 8) and approval process (Part 9 of the EPBC Act). The second is the strategic assessment process (under Part 10 of the EPBC Act).

- As part of a Part 9 referral, individual landowners/developers would be required to submit a referral for their proposed development where the proposed development impacts on a matter of NES within the GA(E)N or GA(E)W.
- As part of a Part 10 strategic assessment, the whole GA(E)N and GA(E)W could be submitted by the VPA (or other responsible authority) for strategic assessment of impacts to matters of NES.

The rezoning of land within the GA(E)P would not constitute a significant impact to any matter of NES identified within the study area.

***Environment Effects Act 1978* (Victoria)**

Actions undertaken in accordance with a prescribed DPO are exempt from the requirements of the EE Act. Provided a DPO is prepared guiding future development within the GA(E)P, then a referral under the EE Act is not required.

***Flora and Fauna Guarantee Act 1988* and *Flora and Fauna Guarantee Amendment Act 2019* (Victoria)**

The VPA and CoGG are a public authority under the FFG Act. Public authorities have a duty under the FFG Act to consider potential biodiversity impacts when exercising their functions. The FFG Act-listed Spiny Rice-flower, Blue-winged Parrot, Curlew Sandpiper (Biosis 2023), Common Greenshank (Biosis 2023), Sharp-tailed Sandpiper (Biosis 2023), Tussock Skink, Fat-tailed Dunnart (Biosis 2023), Growling Grass Frog (Biosis 2023), Golden Sun Moth, *Western (Basalt) Plains Grassland* community and *Western Basalt Plains (River Red Gum) Grassy Woodland* was recorded within the GA(E)P. A permit under the FFG Act will be required where impacts to listed FFG Act matters occur on public land.

***Planning and Environment Act 1987* (Victoria)**

All planning schemes contain native vegetation provisions at Clause 52.17 which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation, unless an exemption applies.

Clause 12.01 requires planning authorities to consider *Protecting Victoria's Environment – Biodiversity 2037* (DELWP 2017c) and the Flora and Fauna Guarantee Strategy under section 17 of the FFG Act when preparing a DPO and associated Native Vegetation Precinct Plan (NVPP).

## Conclusions and Recommendations

At a broad scale, the following measures should be considered as part of the strategic planning and future development process for the GA(E)N and GA(E)W:

- Retain areas of high conservation value. High value conservation areas are defined as:
    - Areas supporting confirmed/suitable habitat for matters of NES and associated buffer areas;
    - Patches of native vegetation; and,
    - Large trees and scattered trees.
- Large areas of native vegetation should be protected in habitat nodes;
- Provide a variety of flora and fauna habitats to promote and retain biodiversity;
- Undertake habitat creation (i.e. waterways, drainage lines and designated revegetation areas);
- Provide linear corridors of vegetation along walking/cycling tracks;
- Create linear habitat corridors along waterways/drainage lines/tributaries whilst implementing Water Sensitive Urban Design whilst ensuring no off-site impacts;
- Incorporating drainage lines into habitat corridors and open public spaces;
- Interpret/educate residents about values of grasslands through signage;

- Undertake feral pest animal and plant control;
- Retain native trees in urban active and passive open space areas;
- Feature waterways/landscaping combination of a series of smaller connected basins rather than one large isolated basin.
- Investigate methods to interconnect spaces through Open Space Links to create more complete habitat;
- Rehabilitate and protect significant native vegetation;
- Ensure stormwater treatment is designed to provide habitat(s) for significant flora and fauna species;
- Investigate options to achieve additional canopy coverage on public (open space areas) and private land (industrial/commercial lots, nature strips) to achieve urban greening; and,
- Connect biodiversity sites with parks/open spaces so they are separated from development.

Retained ecological values should be enhanced and managed to assist in creating a more diverse, connected and resilient natural environment through improving ecosystem health, and develop a more ecologically connected urban landscape. It is important that the enhancement of ecological values within the GA(E)P are not undermined through unrestricted and uncontrolled public access throughout retained areas.

Undertake targeted surveys for VGED within areas of potential habitat. Additionally, access was not permitted in several parcels within the GA(E)N, with approximately 40% (256.92 hectares) of the overall GA(E)N land unable to be assessed on-ground (Figure 2). It is recommended that the VPA further investigate the possibility to gain access to parcels that have not been surveyed to enable the quality and extent of native vegetation to be confirmed, determine the presence of any significant ecological communities. If potential habitat for significant flora or fauna is observed, then targeted surveys should be undertaken in accordance with the relevant survey guidelines.

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# 1 INTRODUCTION

Ecology and Heritage Partners was commissioned by Victorian Planning Authority (VPA) to undertake detailed ecological investigations for the Greater Avalon (Employment) Precinct (GA[E]P; 'the Precinct'). The Precinct is identified in the Avalon Corridor Strategy (ACS) (Hansen Partnership 2022), which provides strategic planning direction for the corridor between Geelong and Werribee and identifies the GA(E)P, as a strategic opportunity to leverage from planned expansion of the Avalon Airport. Together with the Development Plan Overlay (DPO) and Native Vegetation Precinct Plan (NVPP), the Biodiversity Assessment Report will guide appropriate development within the Precinct and streamline Victorian approvals for any required vegetation removal resulting from future development.

This report details the suite of ecological investigations undertaken across the Precinct. Through the course of the ecological investigations, the GA(E)P was split into two precincts, the Greater Avalon (Employment) North (GA[E]N) and Greater Avalon (Employment) West (GA[E]W), excluding the Avalon Airport land (the VPA has no jurisdiction to undertake strategic planning for Avalon Airport, and upon commencement of the ecological investigations, had instructed Ecology and Heritage Partners not to investigate or undertake any surveys within the Avalon Airport landholding).

As such, this Biodiversity Assessment report presents the detailed results of the ecological investigations, identifies and describes measures which may be undertaken to avoid and/or mitigate potential adverse impacts on flora and fauna values, and discusses the potential legislative implications associated with the proposed action. In addition, the findings outlined in this report will be used as part of any necessary approvals under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

## 1.1 Study Area

The study area is located at Avalon, Victoria, and is approximately 54 kilometres south-west of Melbourne (Figure 1). The study area an overall area approximately 1,580 hectares, comprising the proposed GA(E)N and GA(E)W. The GA(E)N is bound by the Princes Freeway to the north and west, Western Road to the east, and Beach Road to the south. The GA(E)W is bound by the Princes Freeway to the north, Avalon Airport to the east, the boundary of Avalon Coastal Reserve to the south and Avalon Road to the west.

According to the Victorian Department of Energy, Environment and Climate Action (DEECA) NatureKit Map (DEECA 2024a), the study area is located within the Victorian Volcanic Plain bioregion, and both the Corangamite and Melbourne Water Catchment Management Authorities (CMA) and City of Greater Geelong municipality.

Assessed properties and properties where access was not permitted for on-ground assessments are listed below (Table 1).

**Table 1.** Property parcels and on-ground assessment status within the GA(E)N and GA(E)W study area.

| Address | Access |
|---|---|
| **GA(E)N** | |
| 1860 Princes Highway, Point Wilson, 3212 | Yes |
| 35 Pousties Road, Point Wilson, 3212 | **No** |
| 40-80 Pousties Road, Avalon, 3212 | Yes |
| 130 Pousties Road, Avalon, 3212 | Yes |
| 135 Pousties Road, Avalon, 3212 | **No** |
| 65 Beach Road, Avalon, 3212 | Yes |
| 55 Beach Road, Avalon, 3212 | Yes |
| **GA(E)W** | |
| 15 Avalon Road, Avalon, 3212 | Yes |
| 25 Avalon Road, Avalon, 3212 | Yes |
| 75-95 Avalon Road, Avalon, 3212 | Yes |
| 255-275 Avalon Road, 160-240 Dandos Road (MAB land) Avalon, 3212 | Yes |

The extent of parcels not assessed (as shown in Figure 2) comprises 256.92 hectares, equating to approximately 40% of the GA(E)N.

## 1.2 Objectives

The objective of this report is to inform decisions regarding the future planning and development of the GA(E)N and GA(E)W. The information presented in this report is based on a detailed desktop review and field assessment of accessible land within the study area undertaken between July 2023 and February 2024. Specifically, the following have been undertaken as part of the project:

- Identification, assessment, and mapping of areas supporting native vegetation and flora and fauna habitat, including a determination of conservation significance;
- Data collection at sufficient detail and standard that enables a biodiversity assessment and associated NVPPs to be prepared in accordance with DELWP's – *Preparing a Native Vegetation Precinct Plan* (DELWP 2017a);
- Collection and presentation of biodiversity values to allow integration with the planning and development of each precinct;
- Provision of management measures that should be implemented to reduce adverse impacts on biodiversity values known to, or likely to occur in the precincts;
- Identify areas of degraded vegetation that are likely to support suitable habitat for significant species that may be suitable for retention and management in the future; and,
- Identify potential legislative implications under the relevant environmental acts, such as the EPBC Act, EE Act, FFG Act and *Planning and Environment Act 1987* (namely the Victoria Planning Provisions).

# 2 METHODS

This chapter details the desk-based and field methods used in surveying the current environment as well as the methods used to assess the likelihood of significant flora and fauna species occurring within the GA(E)P, including how the survey effort, design and methodology for each of the relevant ecological values are informed by Commonwealth and Victorian flora and fauna survey guidelines. It is noted that the methodology detailed below is in accordance with the standard ecological assessment requirements used to inform the precinct structure planning process.

## 2.1 Nomenclature

Common and scientific names of vascular plants follow the Victorian Biodiversity Atlas (VBA) (DEECA 2024d). Vegetation patch names follow DEECA's EVC benchmarks (DEECA 2024c). The names of aquatic and terrestrial vertebrate and invertebrate fauna follow the VBA (DEECA 2024d).

## 2.2 Desktop Assessment

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

- The DEECA NatureKit Map (DEECA 2024a) and Native Vegetation Regulation (NVR) Map (DEECA 2024b) for:
    - Modelled data for location risk, native vegetation patches, scattered trees and habitat for rare or threatened species; and,
    - The extent of historic and current Ecological Vegetation Classes (EVCs).
- EVC benchmarks (DEECA 2024c) for descriptions of EVCs within the relevant bioregion;
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DEECA 2024d);
- Birdata Platform Extract (Birdlife Australia 2023) for previously documented bird records within the project locality;
- The Atlas of Living Australia (ALA) (ALA 2024) for assistance with the distribution of fauna and flora species;
- The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DCCEEW 2024a);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened (DEECA 2024e) and Declared Protected (DEECA 2024f) Lists;

- The online VicPlan Map (Department of Transport and Planning [DTP] 2024) to ascertain current zoning and environmental overlays in the study area;
- Relevant environmental legislation and policies pertaining to target species including EPBC Act Policy Statements, FFG Act Action Statements, National Recovery Plans, Advisory Lists, including;
    - DCCEEW 2023a. Conservation Advice for *Neophema chrysostoma* (blue-winged parrot);
    - DCCEEW 2023b. Conservation Advice for *Tympanocryptis pinguicolla* (Victorian grassland earless dragon);
    - DAWE 2021. Conservation Advice for *Synemon plana* (Golden Sun Moth);
    - DoE 2013. Significant Impact Guidelines 1.1. Matters of National Environmental Significance. Commonwealth Department of the Environment, Canberra, ACT;
    - TSSC 2012. Commonwealth Listing Advice on Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains;
    - DSEWPaC 2011a. *Environment Protection and Biodiversity Conservation Act 1999*. Referral guidelines for the vulnerable striped legless lizard, Delma impar;
    - DSEWPaC 2011b. Survey Guidelines for Australia's threatened reptiles. Guidelines for detecting reptiles listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*;
    - DSEWPaC 2011c. Nationally Threatened Ecological Communities of the Victorian Volcanic Plain: Natural Temperate Grassland and Grassy Eucalypt Woodland A guide to the identification, assessment and management of nationally threatened ecological communities *Environment Protection and Biodiversity Conservation Act 1999*;
    - DEWHA 2010. Survey Guidelines for Australia's threatened frogs. Guidelines for detecting frogs listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*;
    - DEWHA 2009a. Significant impact guidelines for the critically endangered spiny rice-flower (*Pimelea spinescens* subsp. *spinescens*);
    - DEWHA 2009b. Significant impact guidelines for the critically endangered Golden Sun Moth (*Synemon plana*);
    - DEWHA 2009c. Background Paper to EPBC Act Policy Statement 3.12 – Nationally Threatened Species and Ecological Communities Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (*Synemon plana*);
    - DEWHA 2009d. Significant impact guidelines for the vulnerable growling grass frog (*Litoria raniformis*);
    - Robertson and Evans 2009. National Recovery Plan for the Grassland Earless Dragon *Tympanocryptis pinguicula*;
    - TSSC 2008. Commonwealth Listing Advice on Natural Temperate Grassland of the Victorian Volcanic Plain;

- Aerial photography of the study area; and,
- Previous ecological assessments relevant to the study area; including;
    - Arboricultural Assessment and Report: Greater Avalon Employment Precinct PSP (Treelogic 2023);
    - 75-95 Avalon Road: Biodiversity Assessment (Biosis 2023);
    - Vopak Victoria Energy Terminal: Terrestrial Flora and Fauna Assessment (Aurecon 2022);
    - Avalon Corridor Strategy: Existing Conditions Report, Flora and Fauna (Ecology and Heritage Partners 2021);
    - Ecological (Flora & Fauna) Assessment, Avalon Road, Avalon (Paul Kelly & Associates Ecological Services [PKA] 2020a);
    - Preliminary Ecological (Flora & Fauna) Assessment 80 Pousties Road, Avalon (PKA 2020b);
    - Ecological (Flora & Fauna) Assessment 5 Beach Road, Avalon (PKA 2020c);
    - Preliminary Ecological (Flora & Fauna) Assessment 65 Beach Road & 130 Pousties Road, Avalon (PKA 2019); and,
    - Avalon Airport Rail Link: Flora, Fauna and Net Gain Assessment (BLA 2013).

### 2.2.1 Review of previous ecological assessments

Several ecological assessments have previously been undertaken within the GA(E)P locality that describe the ecological values present, or that are considered likely to occur. The following summarises the key ecological implications and scope of the assessments outlined in their previous assessments (Table 2):

**Table 2.** Previous assessments completed within the locality of the GA(E)P

| Report Title | Scope | Summary of findings |
|---|---|---|
| **75-95 Avalon Road: Biodiversity Assessment (Biosis 2023)** | The assessment focussed on approximately 780 hectares of private land at 75-95 Avalon Road, Avalon (Figure 2). A detailed desktop review, detailed vegetation surveys (including habitat hectare surveys) and targeted flora and fauna surveys (Golden Sun Moth *Synemon plana*, Striped Legless Lizard *Delma impar*, Orange-bellied Parrot *Neophema chrysogaster* and Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*) were undertaken. | Key ecological values identified within the study area were:<br>• 152.314 ha of native vegetation<br>• The native vegetation present belongs to a threatened ecological vegetation class (EVC)<br>• Three threatened ecological communities are present including Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP) and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWFTLP)<br>• The study area provides habitat for a range of migratory birds<br>• The study area is adjacent to a Ramsar site (Port Phillip Bay (western shoreline) and Bellarine Peninsula)<br>Targeted surveys were conducted for Golden Sun Moth, Striped Legless Lizard, Orange-bellied Parrot and Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* to determine presence/absence of these species and distribution within the properties, with four nationally significant fauna species (Golden Sun Moth, Growling Grass Frog *Litoria raniformis major*, Blue-winged Parrot *Neophema chrysotoma* and Curlew Sandpiper *Caladris ferruginea*) and three State-significant fauna species (Common Greenshank *Tringa nebularia,* Tussock Skink *Pseudemoia pagenstecheri* and Fat-tailed Dunnart *Sminthopsis crassicaudata*) recorded within the properties.<br>Additionally, an application was made to DEECA to revise the boundary of Mapped Wetland 54715, which was approved (Appendix 3). |
| **Arboricultural Assessment and Report: Greater Avalon Employment Precinct PSP (Treelogic 2023)** | An arboricultural assessment was undertaken to inform the GA(E)P. The purpose of the arboricultural assessment was to provide a preliminary arboricultural assessment and report to inform potential future development, including information on the species, origin, dimensions, health and structure of the trees and their appropriateness for retention. Recommendations were also made regarding the management of the trees, including any tree protection measures for retained trees. | An arboricultural survey was conducted across approximately 1579 hectares, located north-east (GA(E)N) and south-west (GA[E]W) of Avalon Airport. A total of 242 trees and 181 tree groups (comprising approximately 7000 trees) were assessed within the study area, the majority of which were Australian natives (including eucalypts, wattles, paperbarks and sheoaks) that had been planted along roadsides, as windrows or habitat belts around the perimeters of the properties. While the majority of the plantings were Australian natives, only River Red-gum *Eucalyptus camaldulensis* was considered indigenous to the study area. As there was no proposed development plan at the time of writing, recommendations for consideration during the precinct design process were made with reference to arboricultural rating (high, moderate, low, very low) and useful life expectancy (ULE). |

| Report Title | Scope | Summary of findings |
|---|---|---|
| **Avalon Corridor Strategy: Existing Conditions Report, Flora and Fauna (Ecology and Heritage Partners 2021)** | This assessment presents a preliminary summary of ecological values associated with the study area adopted for the Avalon Corridor Strategy, which encompasses approximately 34,800 hectares of land within the Little River, Cocoroc, Lara, Corio and Wyndham Vale localities. The initial desktop review was undertaken in 2016/17 and subsequently updated in 2021 to ensure that any changes to the extent and type of native vegetation present and records of flora and fauna species and/or ecological communities within the study area were amended and reflected in the final Avalon Corridor Strategy. Detailed site assessments were not undertaken, rather the inspections focussed on ground-truthing the findings of the desktop review and were limited to areas visited during the study area tour and publicly accessible land (conservation reserves, waterways and road reserves). The inspections did not involve detailed vegetation mapping or flora and fauna surveys. | A total of 4,378.4 hectares, comprised of 18 EVCs, was modelled to occur within the study area based on the DEECA 2005 extant modelling. In addition to remnant patches and scattered trees, 74 'Current Wetland' were identified, covering a total area of 3,531 hectares (11.9% of land within the study area). Significant waterbodies were identified within the study area, including the WTP sewerage treatment ponds, Avalon Saltworks, Werribee River, Little River, Lollypop Creek, Cherry Tree Creek, Hovells Creek, Ryan's Swamp Wetland, Paul and Belfrages Swamp, Edgars Road Swamp and Cherry Swamp.<br>The assessment identified the known and potential presence of EPBC Act-listed threatened ecological communities and species, based on desktop resources and previous ecological features mapping projects. |
| **Vopak Victoria Energy Terminal: Terrestrial Flora and Fauna Assessment (Aurecon 2022)** | Terrestrial flora and fauna assessments for the Project area of the proposed Vopak Victoria Energy Terminal. The purpose of this assessment was to provide an assessment of the biodiversity values for the terrestrial components of the project which included approximately 8.5 km extent of buried onshore gas pipeline, a Gas Receiving Station and associated buildings, 66kV or 132kV electricity cable (either underground (preferred) or overhead), substation and a new 132kV onshore powerline. The onshore powerline project area was not subject to detailed ecological assessment. | A portion of the onshore powerline component of the project overlaps with the north-east boundary of GA(E)P. The study area was deemed to contain a mix of land-uses, including areas of modelled native vegetation and areas that have been highly modified by agricultural practices. The assessment identified the potential for EPBC Act threatened ecological communities and species, notably Natural Temperate Grassland of the Victorian Volcanic Plain, Spiny Rice-flower and Golden Sun Moth. |
| **Ecological (Flora & Fauna) Assessment, Avalon Road, Avalon (PKA 2020a)** | Ecological assessment to determine the potential for significant flora and fauna species and ecological constraints within the study area of approximately 140 hectares. A desktop review and site assessment were undertaken. | No native vegetation (as defined in the Guidelines) or suitable habitat for significant flora and fauna species were identified within the properties due to the highly modified nature of the site. |

| Report Title | Scope | Summary of findings |
|---|---|---|
| **Preliminary Ecological (Flora & Fauna) Assessment 80 Pousties Road, Avalon (PKA 2020b)** | Ecological assessment to determine the potential for significant flora and fauna species and ecological constraints within the study area of approximately 70.3 hectares. A desktop review and site assessment were undertaken. | No native vegetation (as defined in the Guidelines) was identified within the property, however, it was noted that the site assessment was undertaken during late summer, with spring/early-summer being the ideal assessment period. While considered unlikely to occur, potential habitat for Striped Legless Lizard and Fat-tailed Dunnart was identified within the north of the property within areas containing embedded rock, rock piles and/or cracking soils. Due to the low coverage of suitable habitat grasses (eg. Wallaby-grass and Chilean Needle-grass), Golden Sun Moth was considered unlikely to occur within the property. |
| **Ecological (Fora & Fauna) Assessment 5 Beach Road, Avalon (PKA 2020c)** | Ecological assessment to determine the potential for significant flora and fauna species and ecological constraints within the study area of approximately 2.63 hectares. A desktop review and site assessment were undertaken. | No native vegetation (as defined in the Guidelines) or suitable habitat for significant flora and fauna species were identified within the properties due to the highly modified nature of the site. |
| **Preliminary Ecological (Flora & Fauna) Assessment 65 Beach Road & 130 Pousties Road, Avalon (PKA 2019)** | Preliminary ecological assessment to determine the potential for significant flora and fauna species and ecological constraints, and to provide recommendations for further targeted ecological assessments within the study area of approximately 120 hectares. A desktop review and brief site assessment were undertaken. | No native vegetation (as defined in the Guidelines) or suitable habitat for significant flora species were identified within the properties due to the highly modified nature of the site; however, it was noted that a detailed site assessment should be undertaken prior to and development of the site. While considered unlikely to occur, potential habitat for Fat-tailed Dunnart was identified within areas not previously cropped and/or de-rocked. |
| **Avalon Airport Rail Link: Flora, Fauna and Net Gain Assessment (BLA 2013)** | Detailed flora and fauna assessment and targeted flora and fauna surveys of approximately 1000 hectares of land near the Avalon Airport. | The south-east of the site overlaps with the GA(E)P. Several patches of Plains Grassland EVC and one patch of Stony Knoll Shrubland EVC were recorded within 65 Beach Road. Patches of Plains Grassland were also identified as the nationally significant ecological community NTGVVP and State-significant Western (Basalt) Plains Grassland ecological community. No threatened flora species were recorded within 65 Beach Road, however the State-significant Rye Beetle-grass *Tripogonella loliiformis* was recorded immediately south of 65 Beach Road, within the Avalon Airport grounds. |

## 2.3 Field Assessments

A preliminary field assessment was undertaken over four days (14 June 2023; 11, 13 and 18 July 2023) to broadly view the existing conditions within the study area, determine the presence and extent of potential habitat for significant flora and fauna, and ground-truth the quality and extent of ecological values as previously mapped by past assessments (BLA 2013; PKA 2019; PKA 2020a; PKA 2020b; PKA 2020c; Aurecon 2022; Biosis 2023, Treelogic 2023), including the presence of potential habitat for State and nationally significant flora, fauna and ecological values.

The detailed ecological field assessment program was undertaken over 45 days between July 2023 and June 2024. The field assessments sought primarily to assess the extent and condition of native vegetation communities, potential flora and fauna habitat and species presence, with particular consideration given to

significant species and ecological communities. The survey program was designed to optimise the survey timing, methods and frequency to maximise the detection of flora and fauna species that occur seasonally.

All fieldwork was carried out under the appropriate licences, including a Wildlife Research Permit (#10010929) issued by DEECA under the *Wildlife Act 1975*, and a Protected Flora Research Permit (#10010917) issued by DEECA under the FFG Act. Ethics Committee Approval to conduct research using live animals has been granted by the Wildlife and Small Institutions Animal Ethics Committee (05.17).

### 2.3.1 Ecological Assessment (including Habitat Hectare Assessment)

Detailed ecological assessments were undertaken by ecologists accredited by DEECA in the habitat hectare methodology (DSE 2004a) over eight days from December 2023 to June 2024 to quantify the quality and extent of native vegetation values within the GA(E)P, identify flora and fauna habitat values within the GA(E)P, and to determine conditions with reference to findings of the desk-based assessment and preliminary field assessment.

The study areas were walked and/or driven, with all observed vascular flora and fauna species recorded, any significant records mapped and the overall condition of vegetation and habitats noted. Native vegetation in the local area was also investigated to assist in determining the pre-European vegetation within the GA(E)P. Ecological Vegetation Classes were determined with reference to DEECA pre-1750 and extant EVC mapping (DEECA 2024a) and their published descriptions (DEECA 2024c).

The surveys sought primarily to assess the extent and condition of native vegetation communities and potential flora and fauna habitat, with consideration given to significant ecological communities and species of conservation concern, such as threatened and migratory species.

The study area was visually assessed and active searching under and around ground debris for reptiles, frogs and small mammals was undertaken. Binoculars were also used to scan the area for birds, and observers listened for calls and searched for other signs of fauna such as nests, remains of dead animals, droppings and footprints. Potential habitat for fauna was assessed.

Assessments were undertaken on foot by walking into the areas considered likely to support the highest-quality and representative habitat (judgement based on the outcomes of the desktop assessment, aerial imagery and prior field experience). Zoologists remained adaptable in the field, and opportunistically included other nearby areas in the investigation if those areas were thought to provide higher quality habitat or help provide information on fauna species that might use habitat within the GA(E)P. Photographs were taken at locations as a record of the habitats encountered. Observations of threatened species were recorded at locations if seen/heard.

As outlined above, where native vegetation was identified, a habitat hectare assessment was undertaken following the methods described in the Vegetation Quality Assessment Manual (DSE 2004a), with the results provided in Appendix 2.3.

Native vegetation was classified in accordance with the definitions provided in Table 4, as defined in the '*Guidelines for the removal, destruction or lopping of native vegetation*' (the Guidelines) (DELWP 2017b).

In summary, the following tasks were undertaken as part of the field assessments within the GA(E)P:

- The identification of flora and fauna habitat values;

- An assessment of all watercourses, wetlands and springs;
- An assessment of all potential native fauna habitat, including habitat corridors, food and water sources, nesting and foraging sites;
- The identification of all native vegetation, including:
    - EVCs;
    - Scattered trees, with Diameter and Breast Height (DBH) quantified, and trees identified as Large Trees or Small Trees;
- Identify the potential presence of any Matters of National Environmental Significance (NES) listed under the EPBC Act;
- A habitat hectares assessment of the native vegetation within the study area, in accordance with the Vegetation Quality Assessment Manual (DSE 2004a);
- The documentation of site and vegetation information, including the address of the property; and,
- Photographs of the native vegetation within the study area;

#### *2.3.1.1 Removal, Destruction or Lopping of Native Vegetation (the Guidelines)*

Under the *Planning and Environment Act 1987*, Clause 52.17 of the City of Greater Geelong Planning Scheme requires a planning permit from the relevant local Council to remove, destroy or lop native vegetation. The assessment process for the clearing of vegetation follow the '*Guidelines for the removal, destruction or lopping of native vegetation*' (the Guidelines) (DELWP 2017b)

**Vegetation Assessment**

Native vegetation as defined in the Guidelines (DELWP 2017b) (Table 3) is assessed using two key parameters: extent (in hectares) and condition. For the purposes of this assessment, both condition and extent were determined as part of the field assessments.

In addition, the type and general condition of all vegetation was assessed and a determination made as to whether it qualifies for further consideration under local, State or national legislation and policy.

**Table 3.** Determination of native vegetation (DELWP 2017b).

| Category | Definition | Extent | Condition |
|---|---|---|---|
| **Patch of native vegetation** | An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native;<br>OR<br>An area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy;<br>OR<br>Any mapped wetland included in the *Current Wetlands map*, available in DELWP systems and tools. | Measured in hectares.<br>Based on hectare area of the patch. | Vegetation Quality Assessment Manual (DSE 2004a).<br>Modelled condition for *Current Wetlands*. |

| Category | Definition | Extent | Condition |
|---|---|---|---|
| **Scattered tree** | A native canopy tree that does not form part of a remnant patch. | Measured in hectares.<br>Each Large scattered tree is assigned an extent of 0.071 hectares (15m radius).<br>Each Small scattered tree is assigned a default extent of 0.031 hectares (10 metre radius) | Scattered trees are assigned a default condition score of 0.2 (outside a patch). |

**Notes:** Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'.

### Assessment Pathway

The Guidelines manage the impacts on biodiversity from native vegetation removal using an assessment-based approach. Two factors – extent and location – are used to determine the assessment pathway associated with an application for a permit to remove native vegetation. The location category (1, 2 or 3) has been determined for all areas in Victoria and is available on DEECA's NatureKit Map (DEECA 2024a). Determination of the assessment pathway is summarised in Table 4.

**Table 4.** Assessment pathways for applications to remove native vegetation (DELWP 2017b)

| Extent | | Location | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| **Native Vegetation** | < 0.5 hectares, and not including any large trees | Basic | Intermediate | Detailed |
| | Less than 0.5 hectares, and including one or more large trees | Intermediate | Intermediate | Detailed |
| | 0.5 hectares or more | Detailed | Detailed | Detailed |

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

### Current Wetlands (DEECA)

Wetlands can be difficult to map and assess accurately as they respond quite quickly to changes in environmental condition, especially rainfall. After a period of no or low rainfall they can disappear or appear very degraded. However, wetlands are known to rapidly recover when inundated after rainfalls. As a result, all DEECA mapped wetlands (based on 'Current Wetlands' layer in the DEECA NatureKit Map [DEECA 2024a]) that are to be impacted must be included as native vegetation, with the modelled condition score assigned to them (DELWP 2017b). Mapped wetlands within the study area are shown on Figure 2.

Current Wetlands do not apply if they are covered by a hardened, man-made surface, for example, a roadway. If covered by any vegetation including crops, bare soil, a mapped wetland should be treated as a remnant patch. The mapped extent of Current Wetlands may be refined if supported by the outcome of a hydrological assessment and approved by DEECA.

An application to have a portion of Mapped Wetland 54715 excluded has been approved by DEECA (Appendix 3).

**Large Tree and Habitat Assessment**

Large tree and habitat assessments were undertaken concurrently with the habitat hectare assessments to quantify the number of scattered trees and Large Trees within native vegetation, as well as to collate data pertaining to the presence of hollows and/or nests and significant 'habitat trees' that may provide habitat for fauna. Where present, hollows, nests or other relevant features were noted during the assessments.

Large Tree benchmarks relating to the potential EVCs present within the GA(E)P are summarised below (Table 5).

**Table 5.** Benchmark sizes for large trees within the GA(E)P.

| EVC | Species | Large Tree (DBH) | Small Tree (DBH) |
|---|---|---|---|
| Plains Grassy Woodland (EVC 55_61) | *Eucalyptus* spp. | ≥ 80 cm | < 80 cm |

**Note.** DBH = Diameter at Breast Height (i.e. - 1.3 metres above ground level).

### 2.3.2 Targeted Flora Surveys

Based on the findings of the desktop assessment (Section 2.1), preliminary field assessment (Section 2.2), recommendations outlined by the suite of past assessments of the study area (BLA 2013; PKA 2019; PKA 2020a; PKA 2020b; PKA 2020c; Aurecon 2022; Biosis 2023) and the draft feedback received November 2023 and March 2024 from DEECA, VPA and the City of Greater Geelong, targeted surveys for significant flora species were undertaken within the GA(E)P between July 2023 and June 2024 (Table 6). Targeted flora surveys were undertaken during the optimal survey timing to maximise the likelihood of detection, and State-significant flora species were also concurrently surveyed for during other survey events (Table 6).

**Survey Method**

Targeted surveys were completed by suitably qualified botanists experienced in the detection the target species, to coincide with the known flowering period of the species (Table 6). Where practicable, local reference sites known to support a population of the species were used to examine the diagnostic features of the target species prior to undertaking surveys within the study area, and to confirm active flowering. Targeted flora surveys were undertaken in accordance with the Biodiversity Precinct Planning Kit (DSE 2010):

- Targeted surveys were conducted by people familiar with recognising the species;
- The survey effort was directed to all potential habitat areas (i.e. grassland and the degraded woodland and grassland areas);
- Transects were walked at five-metre linear intervals through all potential habitat; and,
- Where found, locations of any plants were recorded by GPS (accuracy of +/- 3 metres) and the number of plants per land parcel was totalled.

**Table 6.** Flora species considered to have at least a moderate likelihood of occurrence within the study area.

| Common name | Species Name | EPBC Act | FFG Act | Recommended Survey Timing * | Survey Timing |
|---|---|---|---|---|---|
| **NATIONALLY SIGNIFICANT** | | | | | |
| **Large-headed Fireweed** | *Senecio macrocarpus* | VU | CR | September-November | • 10/10/2023<br>• 16/10/2023<br>• 18/10/2023 |
| **Matted Flax-lily** | *Dianella amoena* | EN | CR | November – January | • 14/12/2023<br>• 15/12/2023<br>• 20/12/2023 |
| **River Swamp Wallaby Grass** | *Amphibromus fluitans* | VU | - | January - March | • 30/01/2024 |
| **Button Wrinklewort** | *Rutidosis leptorhynchoides* | EN | EN | November – January | • 14/12/2023<br>• 15/12/2023<br>• 20/12/2023 |
| **Spiny Rice-flower** | *Pimelea spinescens* subsp. *spinescens* | CR | - | April – August | • 11/07/2023<br>• 13/07/2023<br>• 18/07/2023<br>• 20/06/2024<br>• 21/06/2024 |
| **STATE SIGNIFICANT** | | | | | |
| **Salt Lawrencia** | *Lawrencia spicata* | - | EN | January - April | • 06/12/2023<br>• 07/12/2023<br>• 08/12/2023<br>• 14/12/2023<br>• 20/12/2023<br>• 30/01/2024 |
| **Creeping Rush** | *Juncus revolutus* | - | EN | December - April | |
| **Marsh Saltbush** | *Atriplex paludosa* subsp. *paludosa* | - | EN | Year round | |
| **Coastal Saltwort** | *Salsola tragus* subsp. *pontica* | - | EN | Year round (flowers March-April). | |
| **Prickly Arrowgrass** | *Triglochin mucronata* | - | EN | September – November (Fruits); October – December (Flowering) | • 06/12/2023<br>• 07/12/2023<br>• 08/12/2023<br>• 14/12/2023<br>• 20/12/2023<br>• 30/01/2024 |
| **Rye Beetle-grass** | *Tripogonella loliiformis* | - | EN | October-March | • 10/10/2023<br>• 16/10/2023<br>• 18/10/2023<br>• 14/12/2023<br>• 15/12/2023<br>• 20/12/2023 |
| **Small Milkwort** | *Comesperma polygaloides* | - | CR | November – January | |
| **Fragrant Saltbush** | *Rhagodia parabolica* | - | VU | September – January | |
| **Arching Flax-lily** | *Dianella longifolia* var. *grandis* | - | CR | November – December | |
| **Small Scurf-pea** | *Cullen parvum* | - | EN | October – January | |
| **Tough Scurf-pea** | *Cullen tenax* | - | EN | Year round | |

| Common name | Species Name | EPBC Act | FFG Act | Recommended Survey Timing * | Survey Timing |
|---|---|---|---|---|---|
| **Brittle Greenhood** | *Pterostylis truncata* | - | CR | February – July | • 20/06/2024<br>• 21/06/2024 |

Note: * Optimal timing based on flowering season (VicFlora 2024) and relevant species conservation advice, or when the species can be reliably identified using other morphological features. CR = Critically Endangered, EN = Endangered, VU = Vulnerable.

#### *2.3.2.1 Large-headed Fireweed*

*EPBC Act Conservation Status: Vulnerable*

*FFG Act Conservation Status: Critically Endangered*

Large-headed Fireweed is an erect or sprawling subshrub listed as Vulnerable under the EPBC Act, listed under the Victorian FFG Act. The species is largely confined to Kangaroo Grass *Themeda triandra* grasslands on loamy clay soils derived from basalt (DCCEEW 2024b).

**Plate 1.** Large-headed Fireweed (Ecology and Heritage Partners Pty Ltd)

The species is a daisy that grows either as an erect long-lived herb or a small shrub (Plate 1). Each plant has 6–8 large yellowish flower-heads that are about 20 mm long and contain 50–100 individual flowers typically flowering between September – November (DCCEEW 2024b). The species has the potential to occur within areas of relatively undisturbed Plains Grassland with Kangaroo Grass present (DCCEEW 2024b).

While patches of native Plains Grassland vegetation within the GA(E)P chiefly displayed a high level of disturbance, general absence of Kangaroo Grass and were often defined by the minimum 25% native perennial cover of Wallaby Grass, which is not considered likely habitat for the species in combination with a lack of historical records, targeted surveys were undertaken within areas of suitable habitat within the GA(E)P (PG2).

In the absence of specific Commonwealth targeted survey guidelines for the species, these surveys were conducted along five metre transects within areas of suitable habitat as per the recommended survey guidelines detailed in the Biodiversity Precinct Planning Structure Kit (DSE 2010) as these are considered best-practice survey guidelines for significant flora.

A reference site known to support a population of the species located at Williams Landing was used to confirm that the species was flowering, as well as to examine the diagnostic features of the species. Large-headed Fireweed observed at the reference site were flowering at this time, and as such these specimens were easily detectable. Given that the specimens at the reference site were flowering, this provides evidence that the current surveys were conducted at a suitable time to maximise the likelihood of detection for the species within the GA(E)P.

#### 2.3.2.2 *Matted Flax-lily*

*EPBC Act Conservation Status: Endangered*

*FFG Act Status: Critically Endangered*

**Plate 2.** Matted Flax-lily (Ecology and Heritage Partners).

Matted Flax-lily is a perennial, tufted, mat-forming lily which can form patches of up to five metres wide. The plant can grow vegetatively, through sending underground rhizomatous roots, which rise above the ground with a tiller of several leaves, spread over a distance from the parent plant (Plate 2).

The leaves of Matted Flax-lily are generally glaucous, blue in colour but may be red at the base and usually but not always having small hooks (teeth) along the margins and midrib. The leaves taper to approximately 45 centimetres long depending on site and climatic conditions and are born on tillers with the leaves arranged alternatively, with several leaves per tiller.

Matted Flax-lily generally occurs in grassland and grassy woodland habitats, on well drained to seasonally wet fertile sandy loams to heavy cracking clay soils derived from Silurian or Tertiary sediments, or from volcanic geology (Carter 2010). Intense active and historical grazing, weed invasion, and vegetation clearing was evident throughout the GA(E)P, however targeted surveys for the species were undertaken in all areas of suitable habitat (patches of Plains Grassland and Plains Grassy Woodland [excluding patches within former salt works evaporation pans]) in accordance with the Biodiversity Precinct Planning Kit (DSE 2010).

In the absence of specific Commonwealth targeted survey guidelines for the species, these surveys were conducted along five metre transects within areas of suitable habitat as per the recommended survey guidelines detailed in the Biodiversity Precinct Planning Structure Kit (DSE 2010) as these are considered best-practice survey guidelines for significant flora.

A reference site known to support a population of the species located within Old Melbourne Road, Lara was used to confirm that the species was flowering, as well as to examine the diagnostic features of the species. Spiny Rice-flower observed at the reference site were flowering at this time, and as such these specimens were easily detectable. The reference site is located in relatively close proximity to the GA(E)P and given that the specimens at the reference site were flowering, this provides evidence that the current surveys were conducted at a suitable time to maximise the likelihood of detection for the species within the GA(E)P.

#### *2.3.2.3 River Swamp Wallaby Grass*

*EPBC Act Conservation Status: Vulnerable*

River Swamp Wallaby-grass is a slender aquatic or semi-aquatic, perennial grass up to 80 centimeters tall, that spreads by both underground and above-ground stems. It has arching (sometimes sprawling), flowering stems up to one meter tall, with an erect flowering portion, up to 35 millimetres long (Plate 3). The individual florets have a slender, curved bristle and are aggregated into 5-12 flowered spikelets (Walsh and Entwistle 1994). Flowering and fruiting generally occurs between November and March (Walsh and Entwistle 1994), with flower heads often only just above water level (DEWHA 2008).

**Plate 3.** River Swamp Wallaby-grass (Neville Walsh).

River Swamp Wallaby-grass has a scattered distribution across Victoria, predominantly in the north-central area along the Murray River between Wodonga and Echuca (DCCEEW 2024d), with a small number of specimens recorded within the Geelong locality. The species is known to inhabit areas of naturally occurring waterways/water-bodies, drainage lines and even constructed waterbodies such as farm dams and channels which are subject to varying water heights.

River Swamp Wallaby Grass has the potential to occur within the freshwater wetland (Plains Grassy Wetland) recorded within the west of the GA(E)P (Figure 2g). Despite such areas supporting suitable habitat, the impact of historical land management practices including active grazing and water treatment (MAB) throughout the study area have likely reduced the quality and extent of potential habitat within the GA(E)P. While the species is recognised to have some resistance to saline conditions (James *et al.* 2009), any specimens which may have previously existed in wet depressions within the MAB area (i.e. TM, PSW) are unlikely to have survived due to the additional pressure of intense grazing. Therefore, the likelihood of occurrence was considered low. Nevertheless, targeted surveys for the species were undertaken within the patch of Plains Grassy Wetland south of Dandos Road.

No accessible reference sites within the locality were able to be visited prior to the targeted surveys. However, surveys were conducted by qualified ecologists who were familiar with the target species.

#### 2.3.2.4 Button Wrinklewort

*EPBC Act Conservation Status: Endangered*

*FFG Act Status: Critically Endangered*

Button Wrinklewort is a tufted, simple or few-branched erect herb which occurs in the Southern Tablelands of NSW and ACT, the Gippsland Plains in eastern Victoria, and the Volcanic Plains of western Victoria (DCCEEW 2024e). The species is a perennial wildflower that grows in grassland and woodland communities within the Victorian Volcanic Plain Bioregion (Plate 4) (DCCEEW 2024e). It is primarily associated with Kangaroo Grass with an open distribution between tussocks (Morgan 1995).

**Plate 4.** Button Wrinklewort (Ecology and Heritage Partners Pty Ltd)

The dominant grassland species was Wallaby-grass often defined by the minimum 25% native perennial cover, which is not considered likely habitat for the species. Nevertheless, targeted surveys for the species was undertaken where Kangaroo Grass was observed, and within areas of higher quality grassland (PG2, NTGVVP) (Figure 2).

Targeted surveys were completed by suitably qualified botanists experienced in the detection the target species, to coincide with the known flowering period of the species (Table 6). A local reference site known to support a population of the species (Truganina Cemetery) was used to examine the diagnostic features of the species prior to undertaking surveys within the study area, and to confirm active flowering. In the absence of specific Commonwealth targeted survey guidelines for the species, these surveys were conducted along five metre transects within areas of suitable habitat as per the recommended survey guidelines detailed in the Biodiversity Precinct Planning Structure Kit (DSE 2010) as these are considered best-practice survey guidelines for significant flora.

#### 2.3.2.5 Spiny Rice-flower

*EPBC Act Conservation Status: Critically Endangered*

*FFG Act Status: Critically Endangered*

Spiny Rice-flower is a perennial sub-shrub endemic to Victoria and is found between the south-west and north-central parts of the State. It occurs in grassy EVC such as Plains Grassland (EVC 132), Plains Grassy Woodland (EVC 55), Plains Woodland (EVC 803) and Plains Grassland/Grassy Woodland Mosaic (EVC 897) (DEWHA 2009a). Spiny Rice-flower is typically found in small populations (<500 individuals) (DEWHA 2009a).

**Plate 5.** Spiny Rice-flower (Ecology and Heritage Partners Pty Ltd).

The species is slow-growing and reaches up to 30 centimetres in height (Plate 5) Plants are mostly dioecious (male and female flowers on separate plants) but

some plants are monoecious (male and female flower on same plant). It bears small yellow flowers between April and August (DEWHA 2009a).

The majority of historical records within the broader locality have been recorded between Lara and Little River (DEECA 2024d). However, there are numerous historical records located to the east of the GA(E)P within the Western Treatment Plant (Figure 3) and combined with the presence of potential habitat as identified during the field assessments, targeted surveys were undertaken within the following areas of private and public (i.e. roadsides) land identified as potential habitat:

- Patches of native vegetation; and,
- Areas of embedded rock not subject to historical ground disturbance (i.e. ploughing).

The flowering season for Spiny Rice-flower generally occurs between April and August, therefore this is the recommended optimal time to conduct targeted survey (DEWHA 2009a).

Targeted surveys were undertaken on 11 July 2023, 18 July 2023, 20 June 2024 and 21 June 2024. Potential habitat (i.e. patches of Plains Grassland (PG) EVC [excluding PG within the saltpans]) was systematically traversed at approximately five-metre linear intervals in accordance with the survey guidelines for Spiny Rice-flower outlined in the Biodiversity Precinct Structure Planning Kit (DSE 2010) and the Significant Impact Guidelines for the species (DEWHA 2009a), with any significant records mapped and the overall condition of vegetation noted.

A reference site known to support a population of the species located within Old Melbourne Road, Lara was used to confirm that the species was flowering, as well as to examine the diagnostic features of the species. Spiny Rice-flower observed at the reference site were flowering at this time, and as such these specimens were easily detectable. The reference site is located in relatively close proximity to the GA(E)P and given that the specimens at the reference site were flowering, this provides evidence that the current surveys were conducted at a suitable time to maximise the likelihood of detection for the species within the GA(E)P.

Potential habitat was identified within the south of the study area (MAB land) by Biosis for Spiny Rice-flower, located within the within the south-east corner of the northern lot of 75-95 Avalon Road (area bound by the saltpans to the north and west, Gillets Road reserve to the east and Dandos Road to the south), however, targeted surveys did not detect the species (Biosis 2023). Surveys were conducted in pairs, with a maximum spacing of 10 metres between transects, with a reference site (Gillets Road reserve) checked to confirm flowering prior to undertaking the surveys (Biosis 2023). Based on the described methodology (Biosis 2023), the targeted survey results for Spiny Rice-flower are considered accurate and will be relied upon (i.e. additional surveys for this species were not undertaken within the MAB Land).

#### *2.3.2.6 State Significant Flora*

Several State significant considered to have a moderate likelihood of occurrence (Table 6) were surveyed for in areas of potential habitat concurrently with the habitat hectare assessments and targeted surveys for other significant flora species undertaken per the recommended survey guidelines detailed in the Biodiversity Precinct Planning Structure Kit (DSE 2010).

The habitat hectare assessments and targeted flora surveys for nationally significant flora species conducted between July 2023 and June 2024. Handheld GPS units were used to record the location of any significant species encountered.

### 2.3.3 Nationally Significant Fauna Surveys

Based on the findings of the desktop assessment (Section 2.1), Preliminary Field Assessment (Section 2.2), recommendations outlined by the suite of past assessments of the GA(E)P (BLA 2013; PKA 2019; PKA 2020a; PKA 2020b; PKA 2020c; Aurecon 2022; Biosis 2023) and the draft feedback received from DEECA, VPA and the City of Greater Geelong, targeted surveys for significant fauna species were undertaken for nationally significant fauna species in the GA(E)P between August 2023 and February 2024 with eight species considered to have the highest likelihood of occurrence (Table 7; Table 12). Surveys were undertaken at this time to maximise the likelihood of detection of significant fauna species.

Survey methods along with survey timing and effort is summarised below.

**Table 7.** Optimal Fauna survey timing, techniques and total survey effort.

| Survey technique | Significant species or groups targeted | Ideal survey season* | # Sites | Survey effort |
|---|---|---|---|---|
| **Transect surveys** | Golden Sun Moth *Synemon plana* | Generally October - December | Suitable habitat within the study area traversed on four occasions | Golden Sun Moth surveys were undertaken on:<br>• 24/11/2023<br>• 04/12/2023<br>• 18/12/2023<br>• 23/12/2023<br>• 06/01/2024<br>• 11/01/2024 |
| **Nocturnal call-playback, spotlighting and active searching** | Growling Grass Frog Litoria *raniformis* | October - December | Five waterbodies within the study area, and five sites outside the study area (call-playback only from publicly accessible locations) | Growling Grass Frog surveys were undertaken on:<br>• 08/11/2023<br>• 23/11/2023<br>• 11/12/2023<br>Growling Grass Frog habitat assessment was undertaken on:<br>• 06/12/2023 |
| **Wetland point counts and roaming surveys** | Orange-bellied Parrot *Neophema chrysogaster,* Blue-winged Parrot *Neophema chrysostoma,* Migratory and Wetland Birds/ Diurnal Raptors | May - September | Suitable habitat within the study area | Surveys were undertaken on:<br>• 11/08/2023<br>• 14/08/2023<br>• 18/08/2023<br>• 21/08/2023<br>• 25/08/2023<br>• 29/08/2023<br>• 01/09/2023<br>• 06/09/2023<br>• 13/09/2023<br>• 14/09/2023 |

| Survey technique | Significant species or groups targeted | Ideal survey season* | # Sites | Survey effort |
|---|---|---|---|---|
| | Latham's Snipe *Gallinago hardwickii*, Curlew Sandpiper *Calidris ferruginea*, Common Greenshank *Tringa nebularia* and other Migratory and Wetland Birds | August – March | | Surveys were undertaken on:<br>• 11/08/2023<br>• 14/08/2023<br>• 18/08/2023<br>• 21/08/2023<br>• 25/08/2023<br>• 29/08/2023<br>• 01/09/2023<br>• 06/09/2023<br>• 13/09/2023<br>• 14/09/2023<br>• 29/01/2024<br>• 04/02/2024<br>• 08/02/2024 |
| **Tile Grids** | Striped Legless Lizard *Delma impar* | September – December | Tile Deployment in areas of suitable habitat | In total, 19 tile grids containing 50 tiles were deployed within the study area on 9 August 2023.<br>The tile grids were checked on eight occasions:<br>• 28/09/2023<br>• 06/10/2023<br>• 13/10/2023<br>• 18/10/2023 & 20/10/2023<br>• 28/10/2023<br>• 03/11/2023<br>• 10/11/2023<br>• 06/12/2023 & 13/12/2023 |

Note: * Optimal timing based on recommended survey guidelines.

### 2.3.3.1 *Orange-bellied Parrot*

*EPBC Act Conservation Status: Critically Endangered*

*FFG Act Conservation Status: Critically Endangered*

**Plate 6.** Orange-bellied Parrot (www.environment.vic.gov.au).

**Ecology**

Orange-bellied Parrot is a small (approx. 45 grams), migratory ground feeding bird (DELWP 2016). The darkest of the *Neophema* parrots, with grass-green plumage above and bright yellow below. The yellow sides extend to the upperparts of the tail, with the distinctive orange patch on the centre of the belly. They have a blue frontal band and a blue leading edge on their wing when folded (Plate 6). Both sexes are similar, though males are slightly brighter in colouration. No variation in plumage through the breeding season (Higgins 1999).

**Habitat**

Orange-bellied Parrot breeding grounds are confined to Tasmania, in the south-west, generally within 30 kilometres of the coast (Brown 1980; Brown and Wilson 1984), within hollows of large Eucalypts. Pairs will frequently return to the same nest site in successive years (Brown and Wilson 1984). Predominantly found in the south-west coast of Tasmania and several frequently located on King Island during migration north (Brown 1984), with some remaining there in non-breeding season (Starks 1994). The young will leave Tasmania between January and mid-February, with adults tending to leave from late February to early March (Starks 1997). After spending the over wintering period on mainland Australia, the species typically returns to Tasmania around October (Birdlife Australia 2023).

**Distribution**

Orange-bellied Parrots distribution within mainland Australia is generally limited to along the coast of South Australia and Victoria, with well-supported records between Goolwa, South Australia and Corner Inlet, Victoria (Birdlife Australia 2023). Most records are from Port Phillip Bay and Bellarine Peninsula; from Williamstown, south to Mud Island and the most important sites including the Western Treatment Plant, Swan Bay and Lake Connewarre. In Victoria, they generally occur in coastal habitats, such as bays, lagoons and estuaries; in low herbland and occasionally on golf courses or agricultural land (Loyn *et. al* 1994).

**Suitable habitat within GA(E)P**

The Coastal Saltmarsh encompasses both natural and artificial areas, offering potential habitat for migratory wading birds and species like the Orange-bellied Parrot. In hypersaline zones, characterized by open water, salt crusts, or bare ground, vegetation is scarce, limiting habitat for fauna.

**Survey Methodology**

Surveys were undertaken when the species was known to be present on mainland Australia. In total, ten surveys for the species were undertaken between 11 August and 14 September 2023 (Table 7).

Surveys included roaming area searches in locations identified as potentially suitable habitat (Figure 5). Suitably qualified and experienced zoologists traversed the area on foot and actively searched for birds. Each survey lasted for a minimum two-hour period and all waterbirds and raptors were also recorded during the surveys.

Biosis (2023) completed 11 targeted surveys in areas most likely to support the species and did not record them. Ecology and Heritage Partners completed ten targeted surveys for the species within the same habitat areas (Figure 5).

#### *2.3.3.2 Blue-winged Parrot*

*EPBC Act Conservation Status: Vulnerable*

**Plate 7.** Blue-winged Parrot (DCCEEW 2023).

**Ecology**

Blue-winged Parrot is a small (approx. 50 grams), partial migrant, ground feeding bird (DELWP 2023). A slender parrot, with olive-green plumage on the head and upper body. Underparts are yellow, with some individuals showing orange on the belly. A distinctive, narrow, dark blue band runs from eye-to-eye across the forehead, however the species takes its name from the large, dark blue patches on the wing (Higgins 1999; DCCEEW 2023a) (Plate 7).

**Habitat**

Blue-winged Parrot inhabit a variety of habitats ranging from coastal and sub-coastal areas to inland and semi-arid zones. They prefer grasslands, grassy woodlands, and wetlands near the coast and in semi-arid regions, and are adaptable to altered environments such as paddock and golf courses (Higgins 1999). Foraging primarily near or on the ground, they feed on seeds of native and introduced grasses, herbs, and shrubs (Higgins 1999). Breeding occurs in Tasmania, coastal south-eastern South Australia, and southern Victoria, with birds occupying eucalypt forests and woodlands during spring and summer (Higgins 1999).

On the mainland, the species feed in coastal Victoria's saltmarshes and rough pasture, occasionally moving over 100 kilometres inland during winter to semi-arid chenopod shrubland and sparse grassland (DCCEEW 2023a).

**Distribution**

Blue-winged parrots breed in mainland Australia south of the Great Dividing Range, primarily in southern Victoria from Port Albert in Gippsland west to Nelson, and occasionally in the far south-east of South Australia, as well as the north-western, central, and eastern parts of Tasmania. They are partial migrants, with variable numbers migrating across Bass Strait in winter, often making non-stop flights based on scarce records from Bass Strait islands. During the non-breeding period, from autumn to early spring, they are observed in northern Victoria, eastern South Australia, south-western Queensland, and western New South Wales, with some venturing into south-eastern New South Wales and eastern Victoria, particularly during southern migration. (Emison *et al.* 1987; Higgins 1999).

**Suitable habitat within GA(E)P**

The Coastal Saltmarsh encompasses both natural and artificial areas, offering potential habitat for coastal foraging birds, such as Blue-winged Parrot. Biosis (2023) completed 11 targeted surveys in areas most likely to support the species, with Blue-winged Parrot recorded within the study area (GA[E]W).

**Survey Methodology**

Surveys were undertaken when the species was known to be present on mainland Australia. In total, ten surveys for the species were undertaken between 11 August and 14 September 2023 (Table 7; Figure 5).

Surveys included roaming area searches in locations identified as potentially suitable habitat (Figure 5). Suitably qualified and experienced zoologists traversed the area on foot and actively searched for birds. Each survey lasted for a minimum two-hour period and all waterbirds and raptors were also recorded during the surveys.

### *2.3.3.3 Latham's Snipe*

*EPBC Act Conservation Status: Vulnerable*

**Ecology**

Latham's Snipe is the largest snipe in Australia, weighing up to 230 grams with a wingspan of 50-54 centimetres. They are well camouflaged with mainly brown plumage, their upper body boldly patterned with black, brown and white (Menkhorst *et al.* 2017) (Plate 8).

Latham's Snipe is also listed as a migratory and marine species under the EPBC Act .

**Plate 8.** Latham's Snipe (DCCEEW 2024).

**Habitat**

Latham's Snipe occur in a wide variety of permanent and ephemeral wetlands, preferring open freshwater wetlands with nearby cover, but have also been recorded on the edges of creeks, rivers and floodplains (Higgins and Davies 1996). Structure and composition do not appear to be a determining factor in the selection of habitat for the species, which have been found to occur in coastal heathlands, tussock grasslands, and wetlands dominated by either rushes, reeds and sedges (Naarding 1983). In addition, they have previously been recorded in disturbed sites, or areas located close to human activity (Naarding 1983).

**Distribution**

Latham's Snipe breeds in the northern hemisphere, around Japan, during the winter period of Australia (i.e. May – August), then migrates south to the east coast of Australia over spring and summer (Higgins and Davies 1996). Current estimates for the population are 30,000 individuals (Hansen *et al.* 2016).

**Suitable habitat within GA(E)P**

Suitable habitat for Latham's Snipe aligns with that described for Orange-bellied Parrot. Latham's Snipe may also utilise shallow wetland vegetation associated with the former saltworks within GA(E)W.

**Survey Methodology**

Surveys were undertaken when the species was known to be present on mainland Australia. In total, three targeted surveys for the species were undertaken on 29 January, 4 and 8 February 2024. However, there was also some potential to capture the species during early southward migration during the ten Orange-bellied Parrot surveys.

Surveys included roaming area searches in locations identified as potentially suitable habitat (Figure 5). Suitably qualified and experienced zoologists traversed the area on foot and actively searched for birds. Each survey lasted for a minimum three-hour period and all waterbirds and raptors were also recorded during the surveys.

### *2.3.3.4 Curlew Sandpiper*

*EPBC Act Conservation Status: Critically Endangered*

*FFG Act Conservation Status: Critically Endangered*

**Plate 9.** Breeding Curlew Sandpiper adult (https://ebird.org/species/cursan).

**Ecology**

Curlew Sandpiper is a small, migratory shorebird, weighing up to 57 grams with a wingspan of 38-41 centimetres. They support a long, black, decurved bill with a fine tip (DCCEEW 2024g). The species shows seasonal variation (Plate 9), though the darker, breeding plumage is unlikely to be observed in Australia.

Curlew Sandpiper is also listed as a migratory species under the EPBC Act.

**Habitat**

Curlew Sandpiper typically feed in mixed flocks alongside other shorebird species, pecking at invertebrates on mud surfaces or probing shallowly below (DCCEEW 2024g). Their foraging typically occurs within mudflats and nearby shallow waters. In non-tidal wetlands, they generally wade in water ranging from 15 to 30 millimetres, but may wade in water up to 60 millimetres deep. During high tides, they may forage among emergent vegetation like saltmarsh.

For roosting, the species mainly occurs around intertidal mudflats in sheltered coastal areas (i.e. estuaries, bays, inlets, lagoons), and around non-tidal swamps lakes, lagoons and coasts. Curlew Sandpiper exhibit gregarious behaviour, forming large flocks in both freshwater and brackish waters, and often mingle with other small shorebirds while feeding and roosting.

**Distribution**

Curlew Sandpiper breed across Arctic Siberia in during the winter period of Australia (i.e. June – July), then migrate south with males departing before the females and juveniles. The southern migration route is poorly understood, but the species is likely to follow an initial overland route, before reaching the south-east coasts of Australia over spring and summer (Minton *et al.* 2006). Adults arrive on Australian shores from late August

and begin the northward migration in March. Current estimates for the population are 40,100 (range 8,100 to 125,300) mature individuals with a continuing declining trend (Clemens *et al.* 2021).

**Suitable habitat within GA(E)P**

Suitable habitat for Curlew Sandpiper aligns with that described for Latham's Snipe; however, Curlew Sandpiper is more likely to utilise potential habitat south of GA(E)W, within the Avalon Coastal Reserve.

**Survey Methodology**

Surveys were undertaken when the species was known to be present on mainland Australia. In total, three targeted surveys for the species were undertaken on 29 January, 4 and 8 February 2024. However, there was also some potential to capture the species during early southward migration during the ten Orange-bellied Parrot surveys.

Surveys included roaming area searches in locations identified as potentially suitable habitat (Figure 6). Suitably qualified and experienced zoologists traversed the area on foot and actively searched for birds. Each survey lasted for a minimum three-hour period and all waterbirds and raptors were also recorded during the surveys.

### *2.3.3.5 Common Greenshank*

*EPBC Act Conservation Status: Endangered*

*FFG Act Conservation Status: Endangered*

**Ecology**

Common Greenshank is a large and built wader, weighing up to 170 grams with a wingspan of 55-65 centimetres. They support a long, slightly upturned bill. The species shows seasonal variation (Plate 10), with the paler head and neck of non-breeding adults likely to be observed in Australia.

**Plate 10.** Non-breeding Common Greenshank adult (https://ebird.org/species/comgre?siteLanguage=en_AU).

The species typically arrives in Australia from August, reaching as far south as south-east Tasmania, before a northward migration occurring from March (Higgins and Davies 1996; DCCEEW 2024h).

Common Greenshank is also listed as a migratory species under the EPBC Act.

**Habitat**

Common Greenshank typically forages along the periphery of wetlands, in the soft mud of mudflats, in water channels, or within shallow areas near the edges of bodies of water. These habitats are often found adjacent to mangroves or other sparse emergent vegetation like sedges or saltmarsh.

Primarily carnivorous, the species' diet primarily comprises insects and their larvae, particularly beetles, along with crustaceans, annelids, molluscs, and occasionally amphibians and fish (DCCEEW 2024h). Active both during the day and night, Common Greenshank employs various feeding techniques including picking from the

surface, probing, sweeping, and lunging at the edges of mudflats or shallows. They are also known to walk along shorelines and pursue small fish in shallow waters.

**Distribution**

Common Greenshank has extensive breeding grounds globally, and is widespread in non-breeding coastal regions, including one of widest distributions of any shorebird in Australia (Higgins and Davies 1996). The Common Greenshank is widely distributed in coastal areas of Victoria, particularly between the Gippsland Lakes and Port Phillip Bay. Inland, it is primarily observed in the western regions and the Murray River Valley (Higgins and Davies 1996).

**Suitable habitat within GA(E)P**

Suitable habitat for Common Greenshank aligns with that described for Latham's Snipe, and Curlew Sandpiper.

**Survey Methodology**

Surveys were undertaken when the species was known to be present on mainland Australia. In total, three targeted surveys for the species were undertaken on 29 January, 4 and 8 February 2024. However, there was also some potential to capture the species during early southward migration during the ten Orange-bellied Parrot surveys.

Surveys included roaming area searches in locations identified as potentially suitable habitat (Figure 6). Suitably qualified and experienced zoologists traversed the area on foot and actively searched for birds. Each survey lasted for a minimum three-hour period and all waterbirds and raptors were also recorded during the surveys.

### *2.3.3.6 Striped Legless Lizard*

*EPBC Act Conservation Status: Vulnerable*

*FFG Act Conservation Status: Endangered*

**Plate 11.** Striped Legless Lizard (Ecology and Heritage Partners Pty Ltd).

**Ecology**

Striped Legless Lizard are an oviparous (egg-laying), diurnal lizard that can be distinguished by its characteristic longitudinal stripes. The species are light brown to pale-grey in colour, with darker brown stripes that run vertically along the body, becoming diagonal bands on the tail (Cogger 1992). Adult Striped Legless Lizard can be up to 30 centimeters long, with a maximum snout-to-vent length of 12 centimeters (DCCEEW 2023) (Plate 11).

**Habitat**

Striped Legless Lizard typically occupy areas of native and introduced grassland, particularly where a high percentage of the native Kangaroo Grass is found. They are typically restricted to lowland tussock grassland habitat (Coulson 1990) in temperate south-eastern Australia, where the species has a limited and patchy distribution. A small percentage of the original habitat for Striped Legless Lizard now exists. As a result, this

species is likely to occur in small, isolated populations due to the limited and severely fragmented nature of remaining habitat (Webster *et al.* 2003).

**Distribution**

In Victorian populations, the species frequents habitats with exposed basalt rocks in grassland and areas of cracking clay soils, where the species can seek refuge under rocks and in earth cracks (Dorrough *et al*. 1995). Although Striped Legless Lizards have been reported from areas of relatively undisturbed native grasslands, with a dense cover of perennial tussock grasses (Kukolic 1991; Kukolic and Osborne 1993), they are also known to inhabit areas of non-native grassland (Smith and Robertson 1999). This has been shown at several sites throughout the Basalt Plains in western Victoria, which are currently grazed at various stock densities (Rohr and Peterson 2003).

**Suitable habitat within GA(E)P**

Striped Legless Lizard surveys were previously undertaken (Biosis 2023) across two locations in the GA(E)W. No Striped Legless Lizard were recorded (Biosis 2023).

Striped Legless Lizard surveys were undertaken at four additional locations that supported suitable habitat characteristics for the species (Figure 5). These locations are:

- 75-95 Avalon Road; approximately 1.2 kilometres north-west from nearest previous grid (Biosis 2023);
- 55 Beach Road;
- 65 Beach Road; and,
- 40 Pousties Road.

**Survey Methodology**

Potential habitat for Striped Legless Lizard was recorded during initial vegetation and habitat assessments. Subsequently, targeted Striped Legless Lizard surveys were completed within the study area in late 2023. Rectangular grids of roof tiles were deployed across the study area (Figure 5) on 9 August 2023, with each tile grid checked eight times between 28 September 2023 and 13 December 2023.

A total of nineteen grids were deployed and checked, aligning with the recommended survey guidelines for the species, whereby; 'As a minimum, two tile grids should be used for sites less than 2 hectares in size, one grid per 3 hectares for sites up to 30 hectares, and 10 grids for sites greater than 30 hectares in size.' (DSEWPaC 2011a). These can be broken down into:

- 75-95 Avalon Road: Approximately 24 hectares of continuous potential habitat; eight grids.
- 55 and 65 Beach Road, and 40 Pousties Road: Approximately 24 hectares of fragmented potential habitat; 11 grids.

The intention of establishing a grid of roof tiles is that Striped Legless Lizard will be drawn to use the artificial habitat for shelter and thermoregulation. The species can then be easily located when the tile is lifted. This adopted methodology is widely accepted as the primary survey technique for this species, particularly in areas supporting surface rock cover (DSEWPaC 2011a, 2011b). Targeted Striped Legless Lizard Surveys were undertaken in accordance with the *EPBC Act Referral Guidelines for the Vulnerable Striped Legless Lizard,*

*Delma impar* (DSEWPaC 2011a) and the Biodiversity Precinct Structure Planning Kit, Guidelines for surveying Striped Legless Lizard *Delma impar*, as follows:

- Tile grids were installed within areas of contiguous habitat as per the densities prescribed in the survey guidelines;
- Tile grids were laid in grids consisting of 50 tiles, at five metre spacing between tiles, arranged in grids of ten tiles by five tiles, positioned in vegetated areas with a northerly aspect;
- All corners of each grid were marked with a wooden or steel stake and clearly marked;
- Any damaged tiles were replaced accordingly;
- Tile checks involved systematically lifting each tile in the grid and observing and recording the species utilising the artificial habitat;
- Each tile grid was checked eight times during the survey period; and,
- Optimal time for checking is when weather is fine but preferably with >50% cloud cover. Air temperature should be in low – mid 20s and ground temperature high 20s to low 30s (C°).

The following details were recorded:

- Location and number of each tile grid;
- Date and weather conditions for each survey, including air and ground temperature;
- Location and number of any Striped Legless Lizard recorded; and
- Any non-target species identified (the tile-grid method is likely to identify other reptiles and small marsupials on site, such as Tussock Skink and Fat-tailed Dunnart (Nelson and Jemison 2012).

Although the time between the establishment of tile grids and the commencement of tile checks was slightly less than the three month period recommended by the *Survey Guidelines for Australia's Threatened Reptiles* (DSEWPaC 2011a), the timing was considered to be appropriate in this instance, with a greater importance placed on ensuring the surveys could fit within the peak period of detectability for the species (late September – late November) (Scroggie *et. al.* 2019). Further details are provided in Section 2.4.4.

Surveys previously undertaken by Biosis (2023) within GA(E)W at 75-95 Avalon Road. Surveys were undertaken in accordance with *EPBC Act Referral Guidelines for the Vulnerable Striped Legless Lizard, Delma impar* (DSEWPaC 2011a), with twenty tile grids (five by 10 layout) established throughout the study area. The tiles checked on 11 occasions between September and December 2018.

### 2.3.3.7 *Growling Grass Frog*

*EPBC Act Conservation Status: Vulnerable*

*FFG Act Conservation Status: Vulnerable*

**Plate 12.** Growling Grass Frog (Ecology and Heritage Partners Pty Ltd.)

**Ecology**

One of the largest frog species in Australia, Growling Grass Frog can reach 104 millimetres in length, with females usually larger (60–104 millimetres) than males (55–65 millimetres) (Barker *et al*. 1995). The species varies in colour and pattern, but is generally olive to bright emerald green, with irregular gold, brown, black or bronze spotting (Plate 7). Vörös *et al.* (2023) identified two lineages for *Litoria raniformis, L. r. raniformis* for the northern lineage and *L. r. major* for the southern lineage.

**Habitat**

Growling Grass Frog (Plate 2) are largely associated with permanent or semi-permanent still or slow flowing waterbodies (i.e. streams, lagoons, farm dams and old quarry sites) (Hero *et al.* 1991; Barker *et al*. 1995; Heard *et al.* 2010). The species can also utilise temporarily inundated waterbodies during breeding season, to facilitate reproduction (Organ 2005). The presence of key habitat attributes, primarily an extensive cover of emergent, submerged and floating vegetation (Robertson *et al*. 2002, Organ 2005), and the spatial orientation of waterbodies (Robertson *et al*. 2002; Heard *et al*. 2004; Hamer and Organ 2008) are strong determinants of the species' presence. Terrestrial vegetation (e.g. grasses, sedges), rocks and other ground debris around wetland perimeters also provide important foraging, dispersal and over-wintering sites. Dispersal is thought to occur primarily along drainage lines or other low-lying areas between waterbodies, and unhindered movement between and within waterbodies is considered important for population viability.

**Distribution**

Although formerly widely distributed across southern eastern Australia, including Tasmania (Littlejohn 1963; Hero *et al*. 1991), the Growling Grass Frog has declined markedly over the past two decades and in many areas, particularly in south and central Victoria where some populations have experienced local extinction.

**Suitable habitat within GA(E)P**

The Western Treatment Plant, which is located approximately 4.5 kilometres east of the study area, is a known to support a large Growling Grass Frog population. In addition, the species was previously heard adjacent to the study area (Avalon Airport land) (VBA 2001; Biosis 2023). However, Biosis (2023) stated that 75-95 Avalon Road (Figure 6) lacked suitable aquatic habitat for the species.

Five waterbodies were identified within the study area, and despite the relative absence of preferred habitat characteristics (i.e. emergent, submerged and floating vegetation), nocturnal surveys were undertaken three times at each site. Further, five locations outside the study area that supported potentially suitable habitat characteristics through the desktop assessment or during roaming surveys from roadside and/or publicly accessible areas were surveyed (call-playback only from publicly accessible locations).

**Survey Methodology**

Nocturnal Growling Grass Frog surveys were undertaken at five sites within the study area, and at five locations adjacent to the study area (call-playback only) during a time when the species was known to be active in the region. Growling Grass Frog Surveys were undertaken in accordance with the methods outlined in *Survey Guidelines for Australia's Threatened Frogs* (DEWHA 2010).

Habitat assessments were undertaken on 6 December 2023. The targeted surveys were completed on 8, 15, and 23 November. Sites included wetlands, watercourses and dams that provide potentially suitable habitat for Growling Grass Frog (Figure 5). A local reference site known to support a population of the species (Western Treatment Plant) was used to confirm that the species was actively calling prior to undertaking the targeted surveys.

Survey methods are outlined below:

- Nocturnal surveys (spotlighting, active searching, call play-back) were undertaken by two qualified zoologists who visited each site on three occasions in an effort to detect the species;
- Sites were not visited on consecutive nights. Surveys were undertaken during weather conditions considered suitable for Growling Grass Frog activity (warm, relatively still and clear);
- Zoologists searched fringing, emergent and floating vegetation within and adjacent to the watercourse/waterbody with used "Olight" LED hand-held spotlights (up to 1020 lumens/8.4 volts) and used call-playback to initiate a response from any males that may have been present; and,
- All frog species heard or seen were recorded and several site-specific habitat variables were documented including a visual assessment of water quality, flow and depth, and records of fringing, emergent, floating and submerged vegetation cover. The presence of fish (specifically Plague Minnow *Gambusia holbrooki*) was also recorded.

### *2.3.3.8 Golden Sun Moth*

*EPBC Act Conservation Status: Vulnerable*

*FFG Act Conservation Status: Vulnerable*

**Plate 13.** Golden Sun Moth (Ecology and Heritage Partners Pty Ltd).

**Ecology**

The Golden Sun Moth is a medium-sized, diurnal moth with green eyes, no functional mouthpart, and distinct clubbed antennae (DAWE 2021). Females have a wingspan of up to 31mm and are poor flyers due to a reduced hindwing and therefore rarely observed during field surveys. The hindwing of females is bright orange with black submarginal spots and the upper forewing is dark grey, patterned with pale grey (DAWE 2021). Males have a wingspan of up to 34mm and flight is typically low, no more than a metre above the ground, fast and can be prolonged, but they are generally not recorded flying more than 100-200 metres from suitable habitat (Clarke and O'Dwyer 1999). The hindwing of males is a dark bronze-brown with dark brown patches and the upper forewing is dark brown, patterned with pale grey (DAWE 2021) (Plate 13).

**Habitat**

Golden Sun Moth typically occur in native grassland and grassy woodland, typically dominated by greater than 40% cover (but can be found in habitat with as little as 10% cover) of wallaby-grass, in particular *Rytidosperma* spp. (DSE 2004b), but may also inhabit areas dominated by Kangaroo Grass *Themeda triandra* (Endersby and Koehler 2006) and introduced grassland dominated by Chilean Needle-grass *Nassella neesiana* and other introduced species (A. Organ pers. obs.). Male flight is typically low, to about a metre above the ground, fast and can be prolonged, but they are generally not recorded flying more than 100 metres from suitable habitat (Clarke and O'Dwyer 1999). The male of this species generally flies between 11am and 3pm on calm, warm (over 20°C), sunny days.

**Distribution**

Prior to European settlement, the Golden Sun Moth was widespread and relatively continuous throughout its range, inhabiting grassy open woodlands and grassland, although it now mainly inhabits small, isolated sites (DSE 2004b). The species is threatened by habitat loss, disturbance and fragmentation due to agricultural expansion and urbanisation. Many populations are isolated and fragmented, impeding the ability of the relatively immobile females to recolonise areas, thereby reducing the likelihood of genetic exchange (DSE 2004b). Such populations are therefore vulnerable as there is little likelihood of recolonisation in the event of a local extinction.

**Suitable habitat within GA(E)P**

High numbers of Golden Sun Moth were previously recorded across two locations in the southern portion of the study area (Biosis 2023) (Figure 8). These areas of confirmed habitat were not reassessed by Ecology and Heritage Partners.

Golden Sun Moth surveys were undertaken at four additional locations that supported suitable habitat characteristics for the species. These locations are:

- 75-95 Avalon Road; approximately 1.2 kilometres north-west of the nearest previous record (Biosis 2023);
- 55 Beach Road;
- 65 Beach Road; and,
- 40 Pousties Road.

**Survey Methodology**

Survey procedures followed those outlined in the *Significant Impact Guidelines for the Critically Endangered Golden Sun Moth* (DEWHA 2009). The following methods were followed:

- Surveys were conducted by ecologists experienced in the detection and identification of Golden Sun Moth;
- Each area of potential habitat was surveyed on four separate occasions, during the species' confirmed flight season;
- Surveys were undertaken during weather conditions suitable for detecting the species.

- Male moths generally fly between 10am and 3pm on warm (over 20˚C by 10am) days with minimal cloud cover and still conditions. However, if males are observed flying on site after 3pm or during moderately windy conditions surveys can continue until males are no longer observed flying;
- Surveys 1 and 2 were conducted using parallel transects at 50 metres and 25 metres apart respectively with observers walking or, if terrain permits, driving in a car at < 10 km / hour (flying male moths can be readily seen from a vehicle) until moths are observed.;
- In accordance with the *Biodiversity Planning Kit* (DSE 2010), Surveys 3 and 4 were undertaken along transects at 10 metres apart; and,

- A broad habitat assessment was completed detailing information on habitat quality, biomass levels, presence of weeds and floristic diversity.

Local reference sites known to support a population of the species (Bannockburn, Werribee, Epping and/or Avalon) was used to confirm that the species was active prior to undertaking the targeted surveys.

Surveys previously undertaken by Biosis (2023) within GA(E)W at 75-95 Avalon Road were undertaken in accordance *Significant Impact Guidelines for the Critically Endangered Golden Sun Moth* (DEWHA 2009), with four surveys conducted over five days during November and December 2018. Transects were walked in pairs spaced 20-30 metres apart (Biosis 2023).

### 2.3.4 State Significant Fauna Surveys

Based on the findings of the desktop assessment and presence of potential habitat as determined through the field assessments, surveys for the State significant Tussock Skink and Fat-tailed Dunnart were undertaken concurrently with Striped Legless Lizard surveys. Surveys for State-listed migratory shorebirds, diurnal raptors and Brolga were also undertaken concurrently with surveys for nationally significant avifauna.

#### *2.3.4.1 Fat-tailed Dunnart*

*FFG Act Conservation Status: Vulnerable*

**Ecology**

Fat-tailed Dunnart are small (10 - 20 gram), carnivorous marsupial. The species consumes a diversity of ground-dwelling invertebrate, and occasional vertebrate (i.e. frogs and reptiles). Fat is stored in the tail, causing the tail to become swollen at the base, and hence giving the species its name (Plate 14).

**Plate 14.** Fat-tailed Dunnart (Ecology and Heritage Partners Pty Ltd).

**Habitat**

Typically occurring in lowland temperate grassland ecosystems of western Victoria, the species persists in basalt grassland ecosystems and degraded landscapes, nesting beneath rocks, logs, or in deep soil cracks with cup-shaped nests (7 to 10 centimetres) constructed from dry grass. Breeding typically occurs between July and April.

**Distribution**

Although it is widely assumed that Fat-tailed Dunnart populations are stable due to a lack of legislative listings, the Victorian populations are highly fragmented, and a lack of targeted surveys means there are no accurate population estimates (Scicluna *et al.* 2021).

**Suitable habitat within GA(E)P**

Suitable habitat for Fat-tailed Dunnart within the GA(E)P aligns with that described for Striped Legless Lizard.

**Survey Methodology**

Survey Methodology for Fat-tailed Dunnart aligns with that described for Striped Legless Lizard surveys.

### *2.3.4.2 Tussock Skink*

*FFG Act Conservation Status: Endangered*

**Plate 15.** Tussock Skink (Ecology and Heritage Partners Pty Ltd).

**Ecology**

Tussock Skink are a medium sized skink, grey-brown or olive above with two dark lines on each side of a pronounced vertebral stripe. A pale stripe a scale wide runs from behind the ear to the tail on scale row 4. It has a snout vent length of up to 62 millimetres (Plate 15).

**Habitat**

Tussock Skink typically occupy areas of native and introduced treeless tussock grassland with a relatively open, grassy ground-layer, often where native Kangaroo Grass is found, and frequent burning events occur (Turner 2012; Wilson and Swan 2013). These skinks are active throughout the year when conditions are favourable and they primarily utilise surface stones, grass tussocks and soil cracks as both refugia and basking sites (Turner 2012). Though primarily ground-dwelling, this species is sometimes observed perching on Kangaroo Grass tussock blades (Turner 2012).

**Distribution**

Tussock Skink is confined to the south-eastern corner of mainland Australia and Tasmania, where it has a disjunct distribution across five different areas from the highlands of New South Wales, to New England Tablelands and lowland basalt plains of southern Victoria, eastern South Australia and central Tasmania (Hutchinson and Donnellan 1992). This species is relatively widespread across Victoria, where it is found from the Grampians in the west through the basalt plains west of Melbourne to north-east Victoria (Wilson and Swan 2013). The two main populations in Victoria are located within the warm temperate zone of the western volcanic plains and in the alpine cold temperate zone of the Victorian high country. Tussock Skink distribution has declined since European settlement, where only a small percentage of the original habitat for Tussock Skink now exists. Within Victoria, an estimated 95% of native lowland grasslands have been substantially altered since European settlement.

**Suitable habitat within GA(E)P**

Suitable habitat for Tussock Skink within the GA(E)P aligns with that described for Striped Legless Lizard.

**Survey Methodology**

Survey Methodology for Tussock Skink aligns with that described for Striped Legless Lizard surveys.

## 2.4 Assessment Qualifications and Limitations

Data and information held within the ecological databases and mapping programs reviewed in the desktop assessment (i.e. VBA, PMST, Nature Kit Maps etc.) are unlikely to represent all flora and fauna observations within, and surrounding the GA(E)P. It is therefore important to acknowledge that a lack of documented records does not necessarily indicate that a species or community is absent. Furthermore, a documented record may indicate a species' presence in an area at a given point in time, but it generally does not offer information about how a species is making use of an area (e.g. foraging, nesting, dispersing). This can be important information when determining the potential impact of a proposed action on a threatened species.

The 'snap-shot' nature of a biodiversity assessment, meant that migratory, transitory or uncommon fauna species may have been absent from typically occupied habitats at the time of the field assessment. In addition, annual or cryptic flora species such as those that persist via underground tubers may also be absent. Nevertheless, the terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources is considered adequate to provide an accurate assessment of the ecological values present within the Assessment Area.

Ecological values identified were recorded using a hand-held GPS or tablet with an accuracy of +/-3 metres. This level of accuracy is considered adequate to provide an accurate assessment of the ecological values present within the Assessment Area; however, this data should not be used for detailed surveying purposes.

Generally, the level of risk posed by the limitations described below is low due to the level of effort and resources used to conduct multiple ecological surveys conducted to date throughout the GA(E)P. Additional information has been obtained from previous assessments (Biosis 2022, ERM 2022a, ERM 2022b, Nature Advisory 2022). Limitations and assumptions relating to the survey effort for ecological values are detailed below.

### 2.4.1 Vegetation Surveys

This report has been written based on the quality and extent of the ecological values and habitat considered to be present or absent at the time of the desktop and/or field assessments being undertaken. The terrestrial flora and fauna data collected during the field assessments and information obtained from relevant desktop sources is considered to adequately inform an accurate assessment of the ecological values present within the whole study area.

### 2.4.2 Access

Several properties were unable to be accessed as consent/permission could not be obtained (Table 1; Figure 2).

Where access to parcels/properties was not permitted, a visual assessment was conducted from areas of public access such as reserves, roadsides and adjacent properties where possible. As this is not an acceptable method of determining the extent and quality of native vegetation, nor the presence of suitable habitat for rare or threatened species, where access was not permitted, the extant (2005) DEECA modelled extent of native vegetation (DEECA 2024a) has been used to give an indication of the potential values present within unassessed land. Even where parcels were confirmed to support native vegetation, given they could not be accurately mapped, the extent of native vegetation or habitat for rare or threatened species in parcels where access was not granted is not included in the totals detailed in this report. Further on-ground assessments will be required to confirm the quality and extent of native vegetation within these parcels, as well as the presence of habitats for significant flora or fauna.

#### *2.4.2.1 Qualifications relating to ecological values within parcels not assessed*

For the purposes of this report, the 'study area' refers to areas within the GA(E)P that were subject to the on-ground assessments. As such, the results of the field assessments, including data related to the presence or absence of significant flora, fauna and ecological communities and associated implications detailed in this report relate only to the areas that were subject to the on-ground assessments (unless specifically indicated otherwise).

It is acknowledged that several unassessed properties within the GA(E)N are likely to support ecological values that have not been observed or recorded as part of this suite of ecological investigations. Based on the quality and extent of known habitats within the GA(E)P, it is highly likely that the extent of suitable habitat as shown on Figure 8 extends beyond areas adequately surveyed during the 2023/24 survey season. In addition, based on visual assessments from roadsides indicating the presence of native vegetation (Figure 2), as well as the presence of modelled extant (2005) native vegetation and Landcover data (DEECA 2024a; Table 9), it is highly likely that additional patches of native vegetation are present within these areas (Figure 2).

High level implications and recommendations associated with unassessed parcels within the GA(E)P are provided in Section 7.1.

### 2.4.3 Golden Sun Moth

Targeted Golden Sun Moth surveys were undertaken by experienced personnel during the known flight period of the species and during appropriate conditions by following suitable survey guidelines. The 2023/24 Golden Sun Moth season presented some unforeseen challenges, and Ecology and Heritage Partners closely monitored the emergence, distribution and abundance of the species at reference sites across Victoria.

The suboptimal conditions of high winds, rain, and cool weather over the 2023/2024 flight season meant that it was not always possible to achieve at least a one week period between surveys at a given parcel. Given the suboptimal survey conditions and extensive area of known and potentially suitable habitat across the GA(E)N and GA(E)W, targeted surveys had to be undertaken opportunistically when conditions were optimal, and/or the species was confirmed to be flying. As such, the surveys may not have captured the additional emergence of larvae, making it difficult to capture the size of the full population of the species. However, it is noted that where the species was recorded in areas of suitable habitat, the entire contiguous extent of suitable habitat has been noted as confirmed habitat for the species.

Typically, Golden Sun Moth emergence declines in the lead up to and in early January. In temperate regions, insect larvae often face a decision between development into their adult stage, or ongoing growth for emergence in the subsequent season (DAWE 2021). We therefore experienced a truncated emergence period for the species once conditions became suitable.

Golden Sun Moth was known to be flying at other sites in the broader locality (i.e. properties north of Geelong) on the days of the survey. Given the species presence in the region and the experience of surveyors, the results of this assessment are considered suitable for the purposes of assessing the works against the objectives of the project.

### 2.4.4 Striped Legless Lizard Surveys

Although the time between the establishment of 2023 season tile grids and the commencement of tile checks was less than the three month period recommended by the Survey Guidelines for Australia's Threatened Reptiles (DSEWPaC 2011a), a three week period has been previously considered by DEECA (Garry Peterson pers. comm.) to be appropriate, with a greater importance placed on commencing the surveys in late September to maximise the likelihood of detection during the peak period of detectability for the species (late September – late November), consistent with the findings of Scroggie *et. al.,* (2019).

In this instance, to compensate for the shorter period prior to the first tile check, all tile grids were checked on eight occasions, over a 10-week period, which exceeds the number of checks recommended (i.e. six checked recommended) in the guidelines (DSEWPaC 2011a).

Based on the results of previous Striped Legless Lizard surveys undertaken west of Melbourne, it has regularly been observed that Striped Legless Lizard (and other reptiles) will generally commence using artificial shelter sites (i.e. tiles) 1-3 weeks after the tiles are deployed. Several reptile species, including the Eastern Blue-tongued Lizard *Tiliqua scincoides scincoides* were detected under tiles during the first tile check on 30 September 2020. Further, nearby sites that were subject to similar constraints regarding the timing of tile deployment recorded several instances of Tussock Skink and Marbled Gecko *Christinus marmoratus* after the first tile check, and Striped Legless Lizard recorded after the second tile check (Ecology and Heritage Partners Pty ltd 2021). This provides substantive evidence that reptiles can regularly and opportunistically acclimatise to using artificial shelter tiles for thermoregulation and cover within short timeframes.

The peak detection of Striped Legless Lizard typically occurs between late September – late November (DSEWPaC 2011a; Scroggie *et. al.,* 2019). As such, it is considered that the survey timing was appropriate (high detection probability) to detect the species should a resident population of the species occur within the study area.

### 2.4.5 General Limitations

General ecological limitations associated with the ecological investigations include:

- The desktop assessment was limited to relevant ecological reports completed within the study area (excluding the Avalon Airport land);
- Surveys for listed flora and fauna species were undertaken during the optimal flowering/breeding period for all targeted species to maximise the probability of detecting each species. Given that accessible areas of suitable habitat for significant flora and fauna species were extensively surveyed, it is considered that sufficient effort has been employed to determine the likely presence or otherwise

of targeted species within accessible areas. However, areas that could not be accessed to adequately conduct surveys have been identified as requiring additional surveys;

- The assessment of likelihood of occurrence is based on survey effort and results, background information and previous records compiled;
- Non-vascular flora (i.e. mosses, liverworts) were not recorded, although their presence is noted as part of the cover of native species in the definition of a patch of native vegetation;
- Ecological features identified during field assessments were recorded using a hand-held tablet or GPS with an accuracy of between +/- 3 metres. This level of accuracy is considered adequate to provide an accurate assessment of the ecological features present within the Project Site; however, this data should not be used for detailed surveying purposes; and,
- For cryptic and less abundant species that are known to, or that have the potential to use habitat resources within the Assessment Area as a resident or a visitor on a regular or infrequent basis, the precautionary principle (i.e. the absence of a species during targeted surveys is not used as a reason for assuming the species is not present, or may utilise habitats within the Assessment Area, particularly where the species was/is known to occur within the locality, and the Assessment Area supports suitable habitats) has been applied when determining the likelihood of occurrence.

# 3 EXISTING ECOLOGICAL CONDITIONS

The following description of the existing environment is based on the landscape, vegetation, fauna habitats and species identified from the desktop assessment and within the study area during the ecological surveys.

It should be noted that access was not permitted in several parcels within the GA(E)N, equating to 40% of the total GA(E)N being unable to be assessed on-ground (Figure 2).

Ecological values of the GA(E)P, as determined through field assessments and targeted surveys undertaken within the accessible property parcels, are summarised below.

## 3.1 Overview

Most of the GA(E)P is highly modified due to past and current agricultural and farming practices and is dominated by pasture supporting non-indigenous grasses and weeds. Much of the indigenous vegetation and terrestrial fauna habitat remaining within the GA(E)P is either confined to the 'MAB land' area within the GA(E)W or within the GA(E)N as relatively small, scattered patches which have likely been subject less grazing pressure and no cropping activity where embedded rock remains. While some moderate quality native vegetation patches do occur within the GA(E)N (i.e. PG2) (Figure 2a), the highest quality native vegetation generally occurs along an unnamed waterway parallel to Gillets Road (undeveloped road easement) within the GA(E)W area (Figure 2f; Figure 2g). The unnamed waterway begins in the GA(E)W's north-east (Figure 2e) and runs south, crossing under Dandos Road and leaving the GA(E)W in the southernmost corner (Figure 2g).

A total of 179.40 hectares of native vegetation was recorded within the study area, with two hectares recorded within GA(E)N and 177.40 recorded within GA(E)W (Table 9).

A total of 449.84 hectares of 'Current Wetlands' are modelled by DEECA to occur within the study area (Figure 2). Biosis (2023) submitted a review request to the Department of Energy, the Environment and Climate Action (DEECA) to evaluate the current wetland mapped within the 'MAB' area. As a result of this review, DEECA agreed to revise the boundary of Mapped Wetland 54715 by contracting its boundary of this wetland to the DEECA pre-1750 boundary for EVC 302 (Coastal Saltmarsh / Mangrove Shrubland Mosaic) (Appendix 3), reducing the extent of the Mapped Wetland 54715 by 390.84 hectares; however, the online 'current wetland' layer is yet to be updated. Based on the revised boundary of Mapped Wetland 54715, a total of 59 hectares of 'Current Wetlands' are modelled to occur within the study area.

Native vegetation in the GA(E)N is representative of two EVCs: *Low Rainfall* Plains Grassland (EVC 132_63) and Plains Grassy Woodland (EVC 55_61). Native vegetation in the GA(E)W is representative eight EVC's: *Low Rainfall* Plains Grassland (EVC 132_63), Brackish Wetland (EVC 656), Coastal Saltmarsh (EVC 9), Brackish Grassland (EVC 934), Plains Grassy Woodland (EVC 55_61), Plains Grassy Wetland (EVC 125), Tall Marsh (EVC 821) and Plains Sedgy Wetland (EVC 647). The presence of these EVCs is generally consistent with the modelled pre-1750s native vegetation mapping except Brackish Grassland and Brackish Wetland (DEECA 2024c).

Brackish Grassland and Brackish Wetland were considered to be present within the study area as the aforementioned EVC descriptions best fit the vegetation present. These EVCs, and other saline EVCs (including Coastal Saltmarsh), within the GA(E)W were identified within and adjacent to the saltpans of former saltworks. The former saltworks have resulted in landscape-wide changes in salinity levels, with the increased salination

beyond the control of the land manager. Similarly, Tall Marsh was mapped within the former saltworks due to the highly modified landscape. As such, vegetation was assessed against the closest EVC equivalent.

Specific details relating to observed EVCs are provided below, with a summary of the extent of each vegetation type provided in Table 8. The results of the habitat hectare assessment are provided in Appendix 1.2.

**Table 8.** Extent of mapped vegetation type (EVC).

| EVC | Bioregional Conservation Significance | GA(E)N Extent (hectares)^ | GA(E)W Extent (hectares)^ |
|---|---|---|---|
| *Low Rainfall* Plains Grassland (EVC 132_63) | Endangered | 1.83 | 29.95 |
| Brackish Wetland (EVC 656) | Endangered | - | 4.95 |
| Coastal Saltmarsh (EVC 9) | Vulnerable | - | 130.57 |
| Brackish Grassland (EVC 934) | Endangered | - | 2.13 |
| Plains Grassy Woodland (EVC 55_61) | Endangered | 0.17 | 0.78 |
| Plains Grassy Wetland (EVC 125) | Endangered | | 4.44 |
| Tall Marsh (EVC 821) | Least Concern | - | 0.11 |
| Plains Sedgy Wetland (EVC 647) | Endangered | - | 4.47 |
| **Total** | | **2.00** | **177.40** |

**Note:** ^ Area in hectares (rounded off to two decimal places).

**Table 9.** Extent of modelled vegetation type (EVC) modelled to occur within the unassessed areas of the GA(E)N (Figure 2) (DEECA 2024b).

| Modelled Ecological Vegetation Class | Bioregional Conservation Significance | Area (hectares) GA(E)N |
|---|---|---|
| Plains Grassland (EVC 132) | Endangered | 36.92 |
| Plains Grassy Wetland (EVC 125) | Endangered | 4.87 |
| Current Wetland (modelled) | N/A | 8.87 |
| **Total** | | **50.66** |

### 3.1.1 Flora

A total of 90 flora species were recorded, comprising 42 native and 48 non-native species. A list of all flora species recorded during the field assessment are provided in Appendix 1.1.

Patches of Plains Grassland within the GA(E)P have been classified as the State significant *Western (Basalt) Plains Grassland* vegetation community (PG1 and PG2 on Figure 2) with higher quality patches also meeting the description and condition thresholds that define the nationally significant *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP) ecological community (TSSC 2008) (Figure 2).

Commonly observed species recorded in grassland habitats included Common Wallaby-grass *Rytidosperma caespitosum,* Bristly Wallaby-grass *Rytidosperma setaceum* and Lobed Wallaby-grass *Rytidosperma auriculatum*. While less prevalent, Kneed Spear-grass *Austrostipa bigeniculata* and Kangaroo Grass *Themeda triandra* were also observed, with Kangaroo Grass only present in higher quality areas within the north (Figure 2a). No scattered trees or trees within patches (small or large) were identified within the GA(E)P, however

several non-indigenous planted eucalypts (e.g. Sugar Gum *Eucalyptus cladocalyx*) and other non-natives (e.g. Pine *Pinus radiata*) occur throughout the GA(E)P, particularly around dwellings and/or farm sheds/maintenance areas.

#### *3.1.1.1 Noxious Weeds*

Six species recorded in the study area are declared noxious weeds listed under the Victorian *Catchment and Land Protection Act 1994* (CaLP Act) (Table 10). Chilean Needle-grass *Nassella neesiana*, Serrated Tussock *Nassella trichotoma*, African Box-thorn *Lycium ferocissimum* are also Weeds of National Significance (WoNS).

**Table 10.** Noxious weeds recorded within the GA(E)P.

| Species Name | Common Name | CaLP Act Category | WoNS |
|---|---|---|---|
| *Nassella neesiana* | Chilean Needle-grass | **Restricted Weed** | Yes |
| *Lycium ferocissimum* | African Box-thorn | **Regionally Controlled** | Yes |
| *Cirsium vulgare* | Spear Thistle | | No |
| *Cynara cardunculus* | Artichoke Thistle | | No |
| *Echium plantagineum* | Patterson's Curse | | No |
| *Nassella trichotoma* | Serrated Tussock | | Yes |

### 3.1.2 Fauna

A total of 48 fauna species were recorded within the study area. Of these, there were 34 birds; six reptiles, three amphibians, four mammals and one invertebrate. Of these, European Rabbit *Oryctolagus cuniculus,* European Hare *Lepus europaeus* and Red Fox *Vulpes vulpes* are declared pest fauna species under the CaLP Act.

Despite the modified condition of native vegetation and habitat, the study area supports confirmed habitat for the nationally significant Golden Sun Moth, Growling Grass Frog (Biosis 2023), Curlew Sandpiper (Biosis 2023), Blue-winged Parrot, and the State-significant Tussock Skink, Fat-tailed Dunnart (Biosis 2023) and Little Eagle (Figure 8).

## 3.2 Patches of Native Vegetation

### 3.2.1 Low Rainfall Plains Grassland

*Low rainfall* Plains Grassland is typically in the form of treeless vegetation mostly less than one metre tall dominated by largely graminoid and herb life forms. The EVC occupies fertile cracking basalt soils prone to seasonal waterlogging (DEECA 2024c).

Plains Grassland was classified into two habitat zones of differing quality (PG1 and PG2) across the GA(E)N and GA(E)W (Figure 2). All patches of Plains Grassland were relatively species poor, with differences in quality predominantly due to the cover of weeds and patch size.

Plains Grassland within the study area was typically low in native species diversity and coverage with the most commonly identified habitat zone (PG1) chiefly supporting a low cover of Windmill-grass *Chloris truncata,* Common Wallaby-grass *Rytidosperma caespitosum* and/or Tall Spear-grass *Austrostipa bigeniculata* in the

ground layer (Plate 17). While the species composition and weed cover varied marginally between the various patches of PG1, the patch characteristics did not vary significantly, with numerous patches generating the same habitat score.

Many patches of Plains Grassland within GA(E)W also contained scattered halophytic species in low abundance (e.g. Rounded Noon-flower *Disphyma crassifolium*) within the ground layer (Plate 1), likely present due to the surrounding native Coastal Saltmarsh vegetation and highly modified nature of the study area. The encroachment of Saltmarsh flora is likely due to the elevated soil salinity within the artificial 'saltpan' areas providing soil conditions conducive to halophytic species. While many of these native vegetation 'patches' contained flora species characteristic of Saltmarsh EVCs, where flora characteristic of Plains Grassland dominated the ground layer (i.e. Wallaby Grass, Windmill Grass) the 'patch' was determined to 'best fit' the Plains Grassland classification.

Higher quality Plains Grassland patches (PG2) were distinguishable due to a lower cover of perennial exotic species and an improved native species diversity, comprising a mixture of native grasses including Lobed Wallaby-grass, Bristly Wallaby-grass and Kangaroo Grass in a low to moderate cover. Herbs including Australian Bindweed *Convolvulus angustissimus,* Berry Saltbush *Atriplex semibaccata*, and Sheep's Burr *Acaena echinata* were also occasionally identified throughout higher quality areas. Patches of Plains Grassland which contained a dominant cover (>50%) of Wallaby, Kangaroo and/or Spear Grass qualified as the EPBC Act Listed Ecological Community *Natural Temperate Grasslands of the Victorian Volcanic Plains* (NTGVVP) (Plate 20) where the remaining Condition Thresholds were also met (TSSC 2008). See Section 3.6.3.1 for further detail.

All mapped patches of Plains Grassland designated as habitat zone PG1 and PG2 within the GA(E)N and GA(E)W were also considered to meet the description for the State significant *Western (Basalt) Plains Grassland* vegetation community (DELWP 2019).

**Plate 16.** A patch of poor-quality Plains Grassland (PG1) within the study areas southeast containing a mixture of grassland species (i.e. Wallaby Grass and Windmill Grass) (Figure 2) (Ecology and Heritage Partners Pty Ltd 07/12/2023).

**Plate 17.** A moderate quality patch of Plains Grassland (PG2), which also qualifies as NTGVVP, containing a dominant cover of Wallaby Grass within the study area's southwest (Figure 2) (Ecology and Heritage Partners Pty Ltd 07/12/2023).

**Plate 18.** An actively managed moderate quality patch of Plains Grassland (PG2), which also qualifies as NTGVVP, containing a dominant cover of Kangaroo Grass within the council road easement within the south-east of WGAEP (Figure 2) (Ecology and Heritage Partners Pty Ltd 21/06/2024).

**Plate 19.** A moderate quality patch of Plains Grassland (PG2), which also qualifies as NTGVVP, containing a dominant cover of Kangaroo Grass within the council road easement within the south-east of WGAEP (Figure 2) (Ecology and Heritage Partners Pty Ltd 21/06/2024).

### 3.2.2 Brackish Wetland

Typically a treeless EVC, dominated by salt tolerant sedges and herbs, Brackish Wetlands contain true halophytic species such as samphires. Characteristic vegetation occurs in estuaries and along poorly defined drainage lines and is associated with shorelines of brackish lakes (DEECA 2024c).

Brackish Wetland vegetation was restricted to GA(E)W and occurred along an unnamed waterbody parallel to Gillets Road, in the study areas southwest (Figure 2e) and was of moderate to high quality. Common Blown-

grass *Lachnagrostis filiformis* and Streaked Arrowgrass *Triglochin striata* were relatively common alongside characteristic species including Sea Rush *Juncus kraussii* subsp. *australiensis* and Salt Club-sedge *Bolboschoenus caldwellii*. Although less prevalent, herbs identified included Austral Seablite *Suaeda australis*, Creeping Brookweed *Samolus repens* and Beaded Glasswort *Sarcocornia quinqueflora* (Plate 20).

### 3.2.3 Coastal Saltmarsh

Coastal Saltmarsh occurs on and immediately above marine and estuarine tidal flats and contains distinct floristic communities as bands or zones in the same location, depending on the positioning of the various floristic communities in relation to the saline environment. A range of life forms are present in the higher quality representations including succulent herbs, low succulent shrubs, rushes and sedges (DEECA 2024c).

Where native vegetation was present, species characteristic of saltmarsh assemblages dominated much of the ground layer throughout the GA(E)W. Subsequently many of the native vegetation patches within the GA(E)W were assessed as Coastal Saltmarsh. Coastal Saltmarsh within the study area was generally of low to moderate quality with most habitat zones comprising low cover and moderate diversity of native flora within the understorey. Shrubby Glasswort *Tecticornia arbuscula* dominated the drier areas, including many of the artificial 'saltpan' beds and the rises between them. Beaded Glasswort, Rounded Noon-flower *Disphyma crassifolium*, Austral Seablite and Creeping Brookweed *Samolus repens* dominated the ground layer in the wetter areas, further east of the saltpan area, adjacent to the native Brackish Wetland vegetation and related assemblages (Plate 21). Environmental weeds including Toowoomba Canary-grass and noxious weeds such as African Boxthorn *Lycium ferocissimum* were also commonly observed through the understorey of most Coastal Saltmarsh patches throughout the study area (CS1, CS4, and CS5).

**Plate 20.** A patch of Brackish Wetland within GA(E)W (Ecology and Heritage Partners 07/12/2023).

**Plate 21.** A patch of moderate quality Coastal Saltmarsh (CS2) Ecology and Heritage Partners 30/01/2024).

### 3.2.4 Brackish Grassland

Often associated with Brackish Wetlands, Brackish Grassland (sometimes sedgeland) occurs on silts in low-lying areas within brackish floodplains (DEECA 2024c).

Patches of native vegetation characteristic of Brackish Grassland were restricted to GA(E)W and were typically of moderate quality, predominantly comprising a mixture of Chaffy Saw-sedge *Gahnia filum*, Common Bog-

sedge *Shoenus apogon*, Australian Salt-grass *Distichlis distichophylla,* Coastal Tussock Grass *Poa poiformis* and Common Tussock Grass *Poa labillardierei* in the ground layer (Plate 22). Halophytic species typical of the surrounding native Coastal Saltmarsh vegetation were present in low abundance along the patch fringes, increasing in coverage as areas transitioned into Saltmarsh dominated vegetation (Plate 23).

**Plate 22.** A patch of Brackish Grassland within GA(E)W (Ecology and Heritage Partners 07/12/2023).

**Plate 23.** A patch of Brackish Grassland containing saltmarsh flora species within GA(E)W (Ecology and Heritage Partners 07/12/2023).

### 3.2.5 Plains Grassy Woodland

Plains Grassy Woodland occupies a range of geologies primarily persisting on the fertile soils of flat or undulating plains at low elevations. It is characterised as an open eucalypt woodland to 15 metres tall with a sparse shrub layer and a diverse ground layer of grasses and herbs (DEECA 2024c).

Occurrences of Plains Grassy Woodland (PGW) within the study area were of low-moderate quality. PGW1 was highly modified and contained no canopy layer, instead only comprising a sparse shrub layer over the occasional scattered native grass (i.e. Wallaby Grass) (Plate 24). The middle shrub layer lacked native flora species diversity, containing Golden Wattle *Acacia pycnantha* and Hedge Wattle *Acacia paradoxa*. PGW2 was recorded in the east of GA(E)W within the Gillets Road reserve (undeveloped road easement), with River Red-gum *Eucalyptus camaldulensis* present in the canopy layer and Hedge Wattle within the mid-layer (Plate 25). Native grasses such as Wallaby grass and Spear grass were the only native ground layer species observed within Plains Grassy Woodland patches as the ground layer was commonly dominated by grassy and herbaceous weeds including Toowoomba Canary-grass *Phalaris aquatica*, Cocksfoot *Dactylis glomerata* and Galenia *Aizoon pubescens*.

PGW2 was also considered to meet the description for the State significant *Western Basalt Plains (River Red Gum) Grassy Woodland* vegetation community (DELWP 2019) due to the characteristic River Red-gum canopy layer.

**Plate 24.** A patch of low-quality Plains Grassy Woodland comprised of Golden Wattle within the GA(E)W (PGW1; Figure 2f; Ecology and Heritage Partners Pty Ltd 30/01/2024).

**Plate 25.** A patch of moderate-quality Plains Grassy Woodland within the GA(E)W (PGW2 on Figure 2f; Ecology and Heritage Partners Pty Ltd 21/06/2024).

### 3.2.6 Plains Grassy Wetland

Plains Grassy Wetland is a typically treeless EVC. The characteristic ground cover is dominated by grasses and small sedges and herbs, typically species-rich on the outer verges but is usually species-poor in the wetter central areas (DEECA 2024c).

Plains Grassy Wetland was recorded within GA(E)W, south of Dandos Road. This EVC was highly modified, with a high cover of exotic weeds (over 70%), including Cane Needles-grass *Nassella hyalina,* Chilean Needle-grass and Artichoke Thistle (Plate 26). Common Tussock Grass was the most common native species observed, with Joyweed *Althernanthera* sp. also present.

### 3.2.7 Plains Sedgy Wetland

Plains Sedgy Wetland occurs in seasonally wet depressions on volcanic and sedimentary plains, typically associated with fertile, silty, peaty or heavy clay paludal soils. This EVC is primarily comprised of sedgy-herbaceous vegetation, sometimes with scattered or fringing eucalypts or tea-tree/paperbark shrubs in higher rainfall areas. A range of aquatic herbs can be present, and species-richness is mostly relatively low to moderate, but higher towards drier margins (DEECA 2024c).

Scattered occurrences of Plains Sedgy Wetland were recorded within the GA(E)W within the evaporation pans of the former saltworks. Patches of Plains Sedgy Wetland were predominantly dominated by Common Spike-sedge *Eleocharis acuta*, with other native grasses and herbs sporadically observed (Plate 27).

**Plate 26.** A patch of Plains Grassy Wetland (PGWe1) dominated by Cane Needle-grass, with Common Tussock Grass scattered throughout within GA(E)W (Ecology and Heritage Partners Pty Ltd 11/07/2023).

**Plate 27.** A patch of Plains Sedgy Wetland dominated by Common Spike-sedge within GA(E)W (Ecology and Heritage Partners Pty Ltd 30/01/2024).

### 3.2.8 Tall Marsh

Tall Marsh is characterised as a closed to open grassland/sedgeland to 3 m tall, dominated by Common Reed and Cumbungi. The EVC contains a mixture of small aquatic and semi-aquatic species amongst the reeds. Occurring on Quaternary sedimentary geology of mainly estuarine sands, soils are peaty, silty clays, and average annual rainfall is approximately 600 mm. Characteristic vegetation requires shallow water (to 1 metre deep) and can only tolerate very low levels of salinity (DEECA 2024c).

Occurrences of Tall Marsh were limited throughout the GA(E)W, with the characteristic vegetation Cumbungi *Typha domingensis* observed in all instances alongside a low coverage of one or two other native species. Patches of Tall Marsh were poor quality, most commonly comprising a low cover of Cumbungi and Pacific Bent Grass *Lachnagrostis filiformis* or Common Spike-sedge *Elecharis acuta* (Plate 28 and Plate 29).

**Plate 28.** A patch of Tall Marsh within the study areas south (Ecology and Heritage Partners Pty Ltd 30/01/2024).

**Plate 29.** A patch of poor-quality Tall Marsh containing Cumbungi within the study area's south (TM1; Figure 2; Ecology and Heritage Partners Pty Ltd 30/01/2024).

## 3.3 Current Wetlands

A total of 449.84 hectares of 'Current Wetlands' are modelled by DEECA to occur within the study area (Figure 2). Biosis (2023) submitted a review request to the Department of Energy, the Environment and Climate Action (DEECA) to evaluate the current wetland mapped within the 'MAB' area. As a result of this review, DEECA agreed to revise the boundary of Mapped Wetland 54715 by contracting its boundary of this wetland to the DEECA pre-1750 boundary for EVC 302 (Coastal Saltmarsh / Mangrove Shrubland Mosaic) (Appendix 3), reducing the extent of the Mapped Wetland 54715 by 390.84 hectares; however, the online 'current wetland' layer is yet to be updated. Based on the revised boundary of Mapped Wetland 54715, a total of 59 hectares of 'Current Wetlands' are modelled to occur within the study area.

It is noted that a DEECA mapped 'current wetland' is currently shown within GA(E)N within 40-80 Pousties Road (Figure 2a); however, this is considered a mapping error as the area mapped as a 'current wetland' is a stony rise and is a high point in the landscape.

A summary of the requirements of the application method to have a 'current wetland' reviewed by DEECA is provided in Section 7.3 (Table 31).

## 3.4 Introduced and Planted Vegetation

The majority of the GA(E)P does not support native vegetation and was dominated by introduced flora species, predominantly as a direct result of historical and current farming practices. These practices have resulted in the removal and stockpiling of embedded rock, ploughing for crops, and seeding for pasture. Additionally, some areas dominated by exotic weeds and pasture contained embedded rock. Exotic and non-indigenous native trees and shrubs have been planted as windrows and amenity plantings (Plate 30 and Plate 31).

Non-native areas were dominated by pasture grasses and environmental weeds. Noxious weeds were dominant in several locations, with Chilean Needle-grass and Serrated Tussock being particularly prevalent throughout.

**Plate 30.** Exotic pasture dominated by Chilean Needle Grass (Ecology and Heritage Partners Pty Ltd 11/07/2023).

**Plate 31.** Cereal crop within the study area (Ecology and Heritage Partners Pty Ltd 06/12/2023).

## 3.5 Fauna Habitat

#### *3.5.1.1 Exotic and Native Grasslands*

Much of the study area consists of paddocks which contain improved exotic pastures, likely to be used as a foraging resource by common generalist bird species which are tolerant of modified open areas. Fauna observed using this habitat included Australian Magpie *Cracticus tibicen*, Little Raven *Corvus mellori*, Welcome Swallow *Hirundo neoxena*, Magpie-lark *Grallina cyanoleuca*, Willie Wagtail *Rhipidura leucophrys*, Masked Lapwing *Vanellus miles*, Australian White Ibis *Threskiornis moluccus,* Straw-necked Ibis *Threskiornis spinicollis*, Whistling kite *Haliastur sphenurus,* Wedge-tailed eagle *Aquila audax*, Eastern Grey Kangaroo *Macropus giganteus*, Eastern Blue-tongue Lizard *Tiliqua scincoides,* European Hare *Lepus europaeus* and European Rabbit *Oryctolagus cuniculus.*

Several nocturnal fauna species were observed during nocturnal surveys, including Red Fox *Vulpes vulpes*, Common Eastern Froglet *Crinia signifera* and Eastern Banjo Frog *Limnodynastes dumerilii*.

These areas also provide habitat for the nationally significant Golden Sun Moth and the State-significant Tussock Skink and Fat-tailed Dunnart.

#### *3.5.1.2 Woodlands and Scattered Trees*

Although the majority of the GA(E)P is typically treeless, planted vegetation provides low to moderate quality habitat for native fauna, and an important source of roosting, nesting and sheltering habitat for birds, mammals and reptiles in an otherwise modified landscape.

#### *3.5.1.3 Aquatic Habitat*

Several artificial waterbodies (i.e. farm dams) were observed within the study area. These may provide a water resource to a range of common fauna species such as Eastern Grey Kangaroo, as well as suitable foraging for numerous common aquatic birds. These dams appeared to be highly impacted by agricultural grazing and contained little to no fringing vegetation.

The Coastal Saltmarsh encompasses both natural and artificial areas, offering potential habitat for migratory wading birds and species like the Blue-winged Parrot, Orange-bellied Parrot and migratory and marine shorebirds. In hypersaline zones, characterized by open water, salt crusts, or bare ground, vegetation is scarce, limiting habitat for fauna.

## 3.6 Nationally Significant Values

Matters of National Environmental Significance (NES) are listed and protected under the EPBC Act. Matters of NES relating to biodiversity are discussed below in relation to the GA(E)P based on the results of the PMST (DCCEEW 2024a), desktop review of literature, and the results of ecological surveys.

### 3.6.1 Flora

The VBA contains records of 11 nationally significant flora species previously recorded within 10 kilometres of the GA(E)P (DEECA 2024a) (Figure 3; Appendix 1.3).

The PMST nominated an additional 12 nationally significant flora species which have not been recorded in the locality but have the potential to occur (DCCEEW 2024a; Appendix 1.3).

Of the 25 nationally significant flora species that are known, or are predicted, to occur within the locality (Appendix 2.2), five were considered to have a moderate likelihood of occurrence within the GA(E)P (Table 11).

The nationally significant Spiny Rice-flower was recorded within the GA(E)W, with eight specimens recorded along the eastern boundary within Gillets Road (undeveloped road easement) (Figure 2g). Based on the results of the desktop assessment and field assessments, it is considered unlikely that any additional nationally significant flora species occur within the accessible areas of the study area due to highly modified condition of the understorey and ongoing land use of the site resulting in the absence of suitable habitats likely to support nationally significant flora. The likelihood of occurrence of nationally threatened species within the study area is outlined in Appendix 1.3.

**Table 11.** Nationally significant flora with the highest likelihood of occurrence within the study area.

| Species | Suitable habitat within the GA(E)P | Closest known records |
|---|---|---|
| **Spiny Rice-flower (critically endangered)** | Habitat for the EPBC Act-listed Spiny Rice-flower was identified within areas of Plains Grassland, and areas of embedded rock. | Eight specimens recorded within the council road easement adjacent to the south-eastern boundary of GA(E)W (Figure 2g). |
| **Large-headed Fireweed (vulnerable)** | Likely habitat for the species is identified within areas of moderate to high quality plains grassland. Areas of embedded rock not supporting native vegetation have a moderate to low likelihood of occurrence | Approximately 2.8 kilometres north of GA(E)P, adjacent to the Geelong-Melbourne rail line. |
| **Matted Flax-lily (endangered)** | Likely habitat for the species is identified within areas of moderate to high quality plains grassland. Areas of embedded rock not supporting native vegetation have a moderate to low likelihood of occurrence. | Approx. 1 kilometre north of GA(E)P adjacent to Old Melbourne Road. |
| **Button Wrinklewort (endangered)** | Likely habitat for the species is identified within areas of moderate to high quality plains grassland. Areas of embedded rock not supporting native vegetation have a moderate to low likelihood of occurrence. | Approximately 2.8 kilometres north of GA(E)P, adjacent to the Geelong-Melbourne rail line. |
| **River Swamp Wallaby Grass (vulnerable)** | Likely habitat for the species is identified within the current wetland immediately south of Dandos Road. | Approximately 4.2 kilometres north-east of GA(E)P, adjacent to Ryans Swamp Wetland. |

#### *3.6.1.1 Large-headed Fireweed*

Large-headed Fireweed has the potential to occur within areas of relatively undisturbed Plains Grassland with Kangaroo Grass present (DCCEEW 2024b). Few areas of relatively undisturbed Plains Grassland supporting Kangaroo Grass was observed within the GA(E)P.

Despite targeted surveys being undertaken at an appropriate time of year when the species is generally known to be flowering, no specimens of Large-headed Fireweed were recorded within the study area.

The dominant grassland species was Wallaby-grass often defined by the minimum 25% native perennial cover, which is not considered likely habitat for the species, and the existing condition of habitat was predominantly cleared or showed signs of historical clearing and high weed invasion. As such, habitat for the species is considered marginal and given the results of the targeted surveys the species is considered highly unlikely to occur within the assessed areas of the GA(E)P.

#### *3.6.1.2 Matted Flax-lily*

The species has the potential to persist within areas of Plains Grassland habitats recorded within the GA(E)P (Figure 2). Areas of higher quality grassland (PG2, NTGVVP) and areas combining native vegetation and embedded rock were considered likely habitat for the species (Figure 2).

Surveys were conducted at five metre intervals within areas of moderate to high quality habitat (DSE 2010).

Despite targeted surveys being undertaken at an appropriate time of year when the species is generally known to be flowering, no specimens of Matted Flax-lily were recorded within the GA(E)P.

As such, habitat for the species is considered marginal and given the results of the targeted surveys the species is considered unlikely to occur within the assessed areas of the GA(E)P.

#### *3.6.1.3 River Swamp Wallaby-grass*

River Swamp Wallaby-grass has the potential to occur within the freshwater wetland south of Dandos Road (modelled current wetland), which was surveyed at approximately five metre intervals (DoE 2013b). Despite such areas supporting potential habitat, exotic flora species were dominant and the impact of historical and active grazing throughout the study area was evident from both native and introduced herbivores and sheep, which was noted during the surveys. However, biomass was still relatively high. As such, the presence of grazing was not considered to limit the findings of the survey.

Despite targeted surveys being undertaken at an appropriate time of year when the species is generally known to be flowering, no specimens of River Swamp Wallaby-grass were recorded.

Given the results of the targeted surveys and the ongoing threats to the species observed within the GA(E)P, habitat for the species is considered marginal and the species is considered highly unlikely to occur within the assessed areas of the GA(E)P.

#### *3.6.1.4 Button Wrinklewort*

The species grows in grassland and woodland communities primarily associated with Kangaroo Grass with an open distribution between tussocks (Morgan 1995).

Despite targeted surveys being undertaken at an appropriate time of year when the species is generally known to be flowering, no specimens of Button Wrinklewort were recorded within the GA(E)P.

In consideration of the identified threats to Button Wrinklewort within the GA(E)P (i.e. agricultural activities, physical disturbance of sites, weeds, competition from native grasses), habitat for the species is considered marginal and given the results of the targeted surveys the species is considered highly unlikely to occur within the assessed areas of the GA(E)P.

#### *3.6.1.5 Spiny Rice-flower*

The species was considered to have the potential to occur within patches of native vegetation (i.e. Plains Grassland EVC) and areas supporting embedded rock (Figure 2).

Potential habitat was identified within the south of the study area (MAB land) by Biosis for Spiny Rice-flower, however, targeted surveys did not detect the species (Biosis 2023). Based on the described methodology (Biosis 2023), the targeted survey results for Spiny Rice-flower are considered accurate and will be relied upon (i.e. additional surveys for this species were not undertaken within the MAB Land).

Targeted surveys for Spiny Rice-flower were conducted within areas of potential habitat at a time when the species was known to be flowering. Eight specimens were recorded within Gillets Road (undeveloped road easement), adjacent to the south-eastern boundary of GA(E)W (Figure 2g). Habitat within this portion of the road easement was high in quality with a dense cover of Kangaroo Grass and native herbs. The remainder of habitat present in the study area showed signs of historical clearing and fragmentation, with a high cover of weeds such as exotic pasture grass.

Based on the results of the targeted survey, site condition and proximity and distribution of previous records, there is considered to be a low likelihood that the remaining assessed areas of the GA(E)P supports a population of Spiny Rice-flower.

#### *3.6.1.6 Other Nationally Significant Flora and Unassessed Areas*

It is acknowledged that 256.92 hectares, equating to approximately 40% of the GA(E)N, were not subject to on-ground assessments (see Section 2.4.2) and, as such, the absence of nationally significant flora species from these areas cannot be accurately determined. Based on the landscape context, highly modified, agricultural nature of the study area and extent of previous vegetation removal, the likelihood of any additional nationally significant flora species occurring within the assessed areas of the GA(E)N and GA(E)W is considered low due to the absence of suitable habitat and lack of records in close proximity (Appendix 1.3).

However, it is recommended that VPA further investigate the possibility to gain access to parcels that have not been surveyed to determine the presence or not of potential habitat for any nationally significant flora species. If potential habitat for significant flora species is observed, then targeted surveys should be undertaken in accordance with the relevant survey guidelines.

### 3.6.2 Fauna

The VBA contains records of 47 nationally significant fauna species previously recorded within 10 kilometres of the study area (DEECA 2024) (Appendix 2.3) (Figure 4). The PMST nominated an additional 29 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DCCEEW 2024a) (Appendix 2.3).

Of the 76 nationally significant fauna species that are known to, or are predicted to occur within the locality, 14 were considered to have a moderate or higher likelihood of occurrence within the GA(E)P (Appendix 2.3), with eight species considered to have the highest likelihood of occurrence (Table 12).

**Table 12.** Nationally significant fauna with the highest likelihood of occurrence within the GA(E)P

| Species | Suitable habitat within the GA(E)P | Closet known records |
|---|---|---|
| | | |
| **Golden Sun Moth (vulnerable)** | Areas supporting a moderate cover (i.e. 20-40%) of Wallaby-grass, Spear-grass and other native perennial species; also areas supporting moderate cover of Chilean Needle-grass | Recorded by Biosis (2023) within south-west of GA(E)W |
| **Growling Grass Frog (vulnerable)** | Still or water flowing waterbodies with emergent vegetation | In close proximity to the east boundary of GA(E)P. Known population within Western Treatment Plant |
| **Common Greenshank (endangered)** | Saltmarsh and associated vegetation within the old saltworks provides foraging habitat. | Recorded by Biosis (2023) within the GA(E)W. |
| **Orange-bellied Parrot (critically endangered)** | Saltmarsh in the south of the study area provides potential foraging habitat | Within Western Treatment Plant and immediately south of the study area within Ramsar wetland |
| **Blue-winged Parrot (vulnerable)** | Saltmarsh and associated vegetation within the old saltworks provides foraging habitat. | Species recorded both north and south of Dandos Road (Biosis 2023) |
| **Latham's Snipe (vulnerable)** | Saltmarsh and associated vegetation within the old saltworks provides foraging habitat. | Within Western Treatment Plant and immediately south of the study area within Ramsar wetland |
| **Curlew Sandpiper (critically endangered)** | Saltmarsh and associated vegetation within the old saltworks provides foraging habitat. | Species recorded south of Dandos Road (Biosis 2023) |
| **Red Knot (endangered)** | Saltmarsh in the south of the study area provides potential foraging habitat | Within Western Treatment Plant and immediately south of the study area within Ramsar wetland |
| **Great Knot (critically endangered)** | Saltmarsh in the south of the study area provides potential foraging habitat | Within Western Treatment Plant and immediately south of the study area within Ramsar wetland |
| **Greater Sand Plover (vulnerable)** | Saltmarsh in the south of the study area provides potential foraging habitat | Within Western Treatment Plant |
| **Lesser Sand Plover (endangered)** | Saltmarsh in the south of the study area provides potential foraging habitat | Within Western Treatment Plant and immediately south of the study area within Ramsar wetland |
| **Terek Sandpiper (endangered)** | Saltmarsh and associated vegetation within the old saltworks provides foraging habitat. | Within Western Treatment Plant and immediately south of the study area within Ramsar wetland. |
| **Grey Plover (vulnerable)** | Saltmarsh and associated vegetation within the old saltworks provides foraging habitat. | Within Western Treatment Plant and immediately south of the study area within Ramsar wetland. |
| **Striped Legless Lizard (vulnerable)** | Areas of suitable tussock structure, cracking soils and embedded rock without major disturbance from ploughing. | Approximately 4 kilometres north-east of GA(E)P, adjacent to Ryans Swamp Wetland. |

#### *3.6.2.1 Victorian Grassland Earless Dragon*

The study area supports general habitat features consistent with those preferred by the Victorian Grassland Earless Dragon (VGED) *Tympanocryptis pinguicolla* (i.e. basaltic plains grassland). The VBA contains 'incidental' historical records (1990) of the species located approximately 7.6 kilometres north of the GA(E)P near the You Yangs (DEECA 2024d).

The VGED is reported to primarily occur on the basalt stony plains of the Victorian Volcanic Plain bioregion (DCCEEW 2023b), are known to prefer grasslands that contain rocks/boulders, and will use invertebrate burrows for shelter, mating and breeding (DCCEEW 2023b). The current conservation advice suggests that grassland habitats that are considered to have the greatest likelihood of harbouring a remnant VGED population are most likely to contain:

- Native vegetation cover with open patches of bare earth and/or naturally short open swards due to low level disturbance (e.g. managed fire/grazing);
- Invertebrate burrow and/or rock cover and/or cracking vertisol soils;
- Adequate invertebrate prey;
- Minimal weed cover; and,
- Not been de-rocked, ploughed or fertilised to improve pasture quality.

Based on the current conservation advice regarding high-quality suitable habitat (DCCEEW 2023b), the study area is not considered to support any high-quality habitat as:

- majority of the study area has been de-rocked, ploughed or fertilised to improve pasture quality; and,
- areas that have not been de-rocked contain high levels of biomass and/or weed cover.

However, areas that support modified/low quality habitat are present and, although unlikely, there is the potential that the species may occur in these areas. However, due to a lack of intensive survey effort across the entire region of the species preferred habitat, there is still potential for survival in habitat areas that have not yet been surveyed and in low-quality habitat (Robertson and Evans 2009; Banks *et al.* 2017). As such, a conservative approach to the identification of potential habitat must be taken, whereby areas that have not been de-rocked, ploughed or fertilised to improve pasture quality are considered potential habitat for the species.

The VGED Habitat Distribution Model (HDM) (DEECA 2024f; Figure 9) shows modelled habitat within both the GA(E)N and GA(E)W. VGED HDM modelling within the GA(E)N and GA(E)W generally applies to open grassy areas that have not been subject to recent ground disturbance (eg. cropping). Within GA(E)N, VGED HDM modelling shows moderate sized areas of modelled habitat within the north-east and the central-west portions of GA(E)N, with several smaller areas shown as supporting modelled habitat throughout GA(E)N. The VGED HDM modelling covering the central-west portion of GA(E)N is broadly consistent with a stony rise which contained several patches of native grassland vegetation (Figure 2a) and large areas dominated by a high biomass of exotic grasses (predominantly Chilean Needle-grass). No patches of native vegetation were recorded within the area covered VGED HDM modelling in the north-east of GA(E)N, with this area dominated by exotic pasture grasses, with only scattered occurrences of native grasses.

Within the GA(E)W, HDM modelling indicates a moderate-to-large sized area of modelled habitat within the south-east of the GA(E)W, with several smaller areas shown as supporting modelled habitat throughout the GA(E)W. The are covered by VGED HDM modelling in the south-east portion of GA(E)W was generally dominated by a high biomass of exotic grasses (predominantly Chilean Needle-grass and Cane Needle-grass), with only scattered occurrences of native grasses.

A previous iteration of this report recommended that targeted surveys be undertaken within areas of potential VGED habitat within the GA(E)N and GA(E)W (Figure 8). Targeted surveys were recommended to be undertaken in accordance with the *Survey guidelines for four Grassland Earless Dragons (Tympanocryptis* spp.*) of Southeast Australia* (DCCEEW 2024i). Any new information, guidelines and/or advice should be reviewed as released.

In a recent report, Biosis (2025) provides the methodology and results for VGED targeted surveys during the 2024-25 survey season. Aligning with the results contained within this report, Biosis (2025) identified approximately 310 hectares of potential VGED habitat within the GA(E)W. They completed a multi-method approach to the targeted surveys, including artificial arthropod burrows, artificial shelters (roof tiles), mini-pitfall traps, and active searches of natural burrows and soil cracks (Biosis 2025). Despite extensive survey effort, no VGED were recorded (Biosis 2025). Further, there are no known nearby populations that may disperse and colonise the site. A significant impact assessment was conducted in accordance with the Significant Impact Guidelines (DoE 2013), concluding that it is unlikely that this proposed development within the GA(E)W would have a significant impact of VGED, nor interfere significantly with its recovery (Biosis 2025).However, it was noted that due to the cryptic nature of VGED their presence cannot be entirely ruled out and that pre-clearance surveys may be required by regulators prior to clearing of potential habitat (Biosis 2025). Targeted surveys are still recommended for suitable VGED habitats within the GA(E)N.

#### *3.6.2.2 Plains Wanderer*

The cropped paddock and native and non-native grasslands within the study area contain potential habitat (albeit suboptimal) for the nationally significant Plains Wanderer *Pedionomus torquatus*, particularly post-harvest when these areas structurally resemble sparse, open native grasslands. However, much of the GA(E)P supports swards of dense grass (i.e. Chilean Needle-grass) comprising high biomass, with the species known to avoid such habitat types (DoE 2016). In addition, the Geelong region is not a strong-hold or supports core habitat for Plains Wanderer, with the Riverina region of southern NSW and north-central Victoria the two main areas of primary and secondary habitat for the species (DoE 2016). As such, the use of habitat within the GA(E)P by Plains Wanderer is highly unlikely.

Based on the results of the desktop assessment and field assessments, there are eight species known to, or are considered to have a high likelihood of occurrence within the Precinct. It is considered highly unlikely that any additional nationally significant fauna occur within the assessed area of the GA(E)P due to highly modified condition of the understorey and ongoing land use of the site resulting in the absence of suitable habitats likely to support nationally significant species. The likelihood of occurrence of nationally threatened species within the GA(E)P is outlined in Appendix 2.3.

### *3.6.2.3 Blue-winged Parrot and Orange-bellied Parrot*

The VBA contains 146 records of Blue-winged Parrot within a 10-kilometre buffer of the study area, most recently from 2016 (DEECA 2024d) (Figure 4). However, the species was previously recorded within the study area in 2018 (Biosis 2023).

The VBA contains 856 records of Orange-bellied Parrot within a 10-kilometre buffer of the study area, most recently from 2021 (DEECA 2024d). The species was previously recorded within the study area in 1993 (DEECA 2024d) (Figure 4).

Blue-winged Parrot and Orange-bellied Parrot surveys were undertaken between 11 August and 14 September 2023. The nationally significant Blue-wing Parrot was observed on multiple occasions, with up to 40 observations over the duration of the surveys (Table 13; Table 14). No Orange-bellied Parrot were observed during the surveys. Surveys were undertaken during timing and conditions suitable to maximise the likelihood of detecting the species (Table 13; Table 14).

**Table 13.** Summary of results of targeted Blue-winged Parrot and Orange-bellied Parrot surveys

| Date | Survey Time | Location | Zone | Observation Type | No. Blue-winged Parrot | No. Orange-bellied Parrot |
|---|---|---|---|---|---|---|
| 11/08/2023 | 8:20 | 255-275 Avalon Road | C | Seen | 4 | 0 |
| 14/08/2023 | 8:45 | 255-275 Avalon Road | C | Seen/Heard | 14 | 0 |
| 21/08/2023 | 8:45 | 255-275 Avalon Road | C | Seen | 2 | 0 |
| 25/08/2023 | 8:30 & 9:12 | 255-275 Avalon Road | C | Seen | 2 & 3 | 0 |
| 1/09/2023 | 9:01 | 255-275 Avalon Road | C | Seen | 2 | 0 |
| 6/09/2023 | 8:51 | 255-275 Avalon Road | C | Seen | 1 | 0 |
| 14/09/2023 | 8:48 & 8:56 | 255-275 Avalon Road | B | Seen | 10 & 2 | 0 |

**Table 14.** Results of targeted Blue-winged Parrot and Orange-bellied Parrot assessments.

| Date | Survey Time | Survey Temp (C°) | Wind speed (km/hr) | Wind direction | Cloud Cover (%) | No. Blue-winged Parrot | No. Orange-bellied Parrot |
|---|---|---|---|---|---|---|---|
| 11/08/2023 | 8:05-10:35 | 9.1 | 14.8 | NW | 5 | 4 | 0 |
| 14/08/2023 | 8:30-10:45 | 4.4 | 7.4 | WNW | 40 | 14 | 0 |
| 18/08/2023 | 9:00-11:00 | 9.3 | 29.6 | W | 95 | 0 | 0 |
| 21/08/2023 | 8:45-10:45 | 11.8 | 9.3 | NNE | 40 | 2 | 0 |
| 25/08/2023 | 8:30-10:30 | 10.6 | 9.3 | NW | 0 | 5 | 0 |
| 29/08/2023 | 8:25-10:25 | 11.2 | 14.8 | NE | 95 | 0 | 0 |
| 1/09/2023 | 8:40-10:40 | 12.1 | 15.0 | S | 95 | 2 | 0 |
| 6/09/2023 | 8:40-10:50 | 10.9 | 22.0 | N | 40 | 1 | 0 |
| 13/09/2023 | 8:40-10:50 | 11.8 | 7.4 | NE | 0 | 0 | 0 |
| 14/09/2023 | 8:40-10:48 | 13.0 | 0 | - | 20 | 12 | 0 |

The Coastal Saltmarsh and Brackish Wetland areas (Figure 2f-g) included natural and artificial areas, which may provide habitat for migratory species such as Blue-winged Parrot and Orange-bellied Parrot. For Orange-bellied Parrot, non-breeding habitats (i.e. on mainland Australia) is required at several locations to support local movement of the species, and to capture fluctuating resources (DELWP 2016). Mainland habitats are considered unlikely to have declined significantly in a structural or composition sense, with the species' decline more likely attributable to genetics, inbreeding, survivorship, disease, and low reproduction rates (White *et al.* 2016). However, the National Recovery Plan (DELWP 2016) states that all non-breeding mainland habitat occupied since the year 2000 should be considered essential for the survival of the species.

Of the records from the desktop assessment, there is one record of the species within the study area in 1993 (DEECA 2024d). There are a further 10 records of the species within two kilometres, with eight dated between 1969 and 1998, and two from 2019 south-east of the study area. The remaining records are dated with 1949 and 2021, located more than two kilometres from the study area. As such, there is no habitat that should be categorised as essential for the survival of the species within the study area, but this habitat is present within the broader landscape.

#### *3.6.2.4 Waterbirds, Migratory Birds and Raptors*

Wetland bird surveys between 11 August and 14 September 2023 also recorded all waterbirds, migratory birds, and raptors present within the study area.

A total of 21 species (approximately 284 individuals) categorised at waterbirds, migratory birds, and/or raptors were recorded within the study area (Table 15), including the nationally significant Blue-wing Parrot (Table 14; Table 15), and the State significant Little Eagle *Hieraaetus morphnoides* (Table 15). However, no raptor-sized nest was recorded within the study area, suggesting that raptors used the study area for foraging only. No Brolga were recorded during any of the assessments.

**Table 15.** Results of August/September avifauna assessments.

| Scientific Name | Common Name | EPBC | FFG | Total Observations | Observation type |
|---|---|---|---|---|---|
| *Phalacrocorax varius* | Australian Pied Cormorant | - | - | 1 | Seen |
| *Threskiornis moluccus* | Australian White Ibis | - | - | 1 | Seen |
| *Elanus axillaris* | Black-shouldered Kite | - | - | 18 | Seen |
| *Neophema chrysostoma* | Blue-winged Parrot | Vulnerable | - | 40 | Seen/Heard |
| *Falco berigora* | Brown Falcon | - | - | 9 | Seen |
| *Accipiter fasciatus* | Brown Goshawk | - | - | 1 | Seen |
| *Anas castanea* | Chestnut Teal | - | - | 6 | Seen |
| *Charadrius bicinctus* | Double-banded Plover | - | - | 20-25 | Seen |
| *Hieraaetus morphnoides* | Little Eagle | - | Vulnerable | 1 | Seen |
| *Microcarbo melanoleucos* | Little Pied Cormorant | - | - | 6 | Seen |
| *Vanellus miles* | Masked Lapwing | - | - | 36 | Seen |
| *Falco cenchroides* | Nankeen Kestrel | - | - | 15 | Seen |

| Scientific Name | Common Name | EPBC | FFG | Total Observations | Observation type |
|---|---|---|---|---|---|
| *Anas superciliosa* | Pacific Black Duck | - | - | 12 | Seen |
| *Charadrius ruficapillus* | Red-capped Plover | - | - | 42 | Seen |
| *Psephotus haematonotus* | Red-rumped Parrot | - | - | 7 | Seen |
| *Circus assimilis* | Spotted Harrier | - | - | 3 | Seen |
| *Threskiornis spinicollis* | Straw-necked Ibis | - | - | 8 | Seen |
| *Aquila audax* | Wedge-tailed Eagle | - | - | 2 | Seen/Heard |
| *Egretta novaehollandiae* | White-face Heron | - | - | 10 | Seen |
| *Epthianura albifrons* | White-fronted Chat | - | - | 40 | Seen |
| *Platalea flavipes* | Yellow-billed Spoonbill | - | - | 1 | Seen |

#### *3.6.2.5 Latham's Snipe and Curlew Sandpiper*

The VBA contains 248 records of Latham's Snipe within a 10-kilometre buffer of the study area, most recently from 2019 (DEECA 2024d). The species has been primarily recorded at Lara Lake Reserve, approximately 4.4 kilometres west of the study area (Figure 4).

The VBA contains 2741 records of Curlew Sandpiper within a 10-kilometre buffer of the study area, most recently from 2021 (DEECA 2024d). The species was previously recorded within the study area in 2000 and 2017 (DEECA 2024d) (Figure 4).

Targeted surveys for Latham's Snipe and Curlew Sandpiper did not record the species within the study area. Surveys were undertaken during timing and conditions suitable to maximise the likelihood of detecting the species (Table 16).

**Table 16.** Results of targeted Latham's Snipe and Curlew Sandpiper assessments.

| Date | Survey Time | Survey Temp (C°) | Wind speed (km/hr) | Wind direction | Cloud Cover (%) | No. Latham's Snipe | No. Curlew Sandpiper |
|---|---|---|---|---|---|---|---|
| 29/01/2024 | 9:45-12:45 | 21.5 | 10.0 | NNW | 5 | 0 | 0 |
| 04/02/2024 | 13:15-16:15 | 19.3 | 26.0 | SSW | 100 | 0 | 0 |
| 08/02/2024 | 11:55-14:55 | 20.7 | 18.5 | SSW | 15 | 0 | 0 |

Targeted surveys between 29 January and 8 February 2024 also recorded all waterbirds, migratory birds, and raptors present within the study area. A total of six species (three observed in previous assessment) were recorded within the study area. Of the species recorded during these assessments, no species are listed under the EPBC or FFG Acts (Table 17). No Brolga were recorded during any of the assessments.

**Table 17.** Results of January/February avifauna assessments.

| Scientific Name | Common Name | EPBC | FFG | Total Observations | Observation type |
|---|---|---|---|---|---|
| *Anas gracilis* | Grey Teal | - | - | 10 | Seen |
| *Cygnus atratus* | Black Swan | - | - | 8 | Seen |

| Scientific Name | Common Name | EPBC | FFG | Total Observations | Observation type |
|---|---|---|---|---|---|
| *Vanellus miles* | Masked Lapwing | - | - | 2 | Seen |
| *Charadrius ruficapillus* | Red-capped Plover | - | - | 8 | Seen |
| *Calidris ruficollis* | Red-necked Stint | - | - | 22 | Seen |
| *Egretta novaehollandiae* | White-face Heron | - | - | 1 | Seen |

### *3.6.2.6 Striped Legless Lizard*

The VBA contains four records of Striped Legless Lizard within a 10-kilometre buffer of the study area, most recently from 1992 (DEECA 2024a). The nearest VBA record of the species is approximately 4.5 kilometres to the north-east in 1987 (DEECA 2024a) (Figure 4); however, Striped Legless Lizard was recorded in 2021 within the proposed Northern Geelong Growth Area, approximately nine kilometres west of the study (Ecology and Heritage Partners Pty Ltd 2021).

**Tile Grids**

No Striped Legless Lizard were detected within the study area despite undertaking systematic targeted surveys at a suitable time of year. The State significant Tussock Skink was recorded on three occasions; twice at Grid 2 (Plate 32 and Plate 33) and once at Grid 6, which are both located at 40-80 Pousties Road, Avalon (Figure 5; Figure 8).

The surveys also detected several non-target species, including Eastern Three-lined Skink *Acritoscincus duperreyi*, Blue-tongue Lizard *Tiliqua* sp., and Tiger Snake *Notechis scutatus*, indicating that the tiles were being used for thermoregulation by local reptiles.

**Plate 32.** Tussock Skink at Grid 2 (Ecology and Heritage Partners 28/09/2023)

**Plate 33.** Tussock Skink at Grid 2 (Ecology and Heritage Partners 06/12/2023).

While grassland habitats within the study area supported some habitat characteristics that were suitable for Striped Legless Lizard, given the absence of the species during the targeted surveys a resident population is not unlikely to exist within the study area. Targeted surveys undertaken concurrently by Ecology and Heritage Partners for the species elsewhere in the Melbourne region (e.g. Truganina, Caroline Springs, Bamganie) at

the same time that the GA(E)P surveys were undertaken recorded several individuals of Striped Legless Lizard, indicating that the surveys were undertaken at a time that is optimal for the detection of the species (if present).

The study area is not considered to contain extensive optimal habitat for Striped Legless Lizard. Removal of native vegetation and cultivation within the study area and broader landscape has contributed to the decline of suitable habitat for the species. Based on the results of the targeted surveys and location of existing records, it is considered highly unlikely that a population of Striped Legless Lizard is present.

#### *3.6.2.7 Growling Grass Frog*

The VBA contains 1146 records of Growling Grass Frog within a 10-kilometre buffer of the study area, most recently from 2020 (DEECA 2024a). The species was previously heard calling within the GA(E)P, located outside of the investigation area (i.e. within the Avalon Airport land) (VBA 2001; Biosis 2023) (Figure 4).

**Habitat and Water Quality Assessment**

The majority of the study area is highly modified as a result of current land use, being dominated by exotic grassland and cultivated land (i.e. crop). The surrounding area is also highly fragmented (i.e. roads, highway, infrastructure). As such, areas of terrestrial habitat for foraging and dispersal (i.e. corridors between known and potential habitats) was limited.

Water sources, including creeks, small-medium dams, and farm dams in agricultural paddocks, were generally poor in Growling Grass Frog habitat quality. The habitat and water quality survey were undertaken on 6 December 2023, with three sites suitable for the survey (Table 18 and Table 19) (Plates 34 - 37).

**Table 18.** Results of habitat assessments.

| Site | Description | Water Quality | Flow | Water depth (% filled) | Fringing vegetation (%) | Bare ground (%) | Open water (%) | Emergent vegetation (%) | Floating vegetation (%) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Dam | Poor | Still | 100 | 20 | 80 | 100 | 0 | 0 |
| 2 | Dam | Poor | Still | 80 | 0 | 100 | 100 | 0 | 0 |
| 3 | Dam | Poor | Mostly dry | 0 | 0 | 100 | 0 | 0 | 0 |
| 4 | Dry | - | - | - | - | - | - | - | - |

**Table 19.** Results of water quality assessments.

| Site | Description | Temperature (°C) | pH | mS/cm | mg/L DO | ORP |
|---|---|---|---|---|---|---|
| 1 | Dam | 26.23 | 10.24 | 0.580 | 14.39 | 15 |
| 2 | Dam | 26.21 | 8.65 | 90.0 | 17.57 | 105 |
| 3 | Dam too dry | - | - | - | - | - |
| 4 | Dry | - | - | - | - | - |

**Plate 34.** Site 1 – farm dam within the north of GA(E)N (GGF1 on Figure 5) (Ecology and Heritage Partners 6/12/2023)

**Plate 35.** Site 2- farm dam within the central portion of GA(E)W (GGF2 on Figure 5) (Ecology and Heritage Partners 6/12/2023)

**Plate 36.** Site 3 – dry farm dam within the southern half of GA(E)W (GGF3 on Figure 5) (Ecology and Heritage Partners 6/12/2023)

**Plate 37.** Site 4 – dry farm dam within the southern half of GA(E)W (GGF4 on Figure 5) (Ecology and Heritage Partners 6/12/2023)

**Targeted Surveys**

Surveys were undertaken over three nights at each site. Three common frog species – Eastern Common Froglet *Crinia signifera*, Spotted Marsh Frog *Limnodynastes tasmaniensis* and Striped Marsh Frog *Limnodynastes peronii* were recorded during the site assessments.

No Growling Grass Frogs were detected during the targeted surveys despite suitable weather conditions. Frog activity was relatively high during the survey events, and Growling Grass Frog were confirmed to be active at local (i.e. within six kilometres) sites on 8 and 23 November 2023.

Based on the findings of targeted surveys (Table 20), and previous targeted surveys within the GA(E)W (Biosis 2023), a resident population of Growling Grass Frog is not currently present; however, Growling Grass Frog may utilise drainage lines (and other wetland areas) for dispersal and foraging under optimal conditions. Due to the modified nature of the GA(E)N and GA(E)W (due to agricultural activities), Growling Grass Frog are considered unlikely to utilise habitat within the GA(E)N and GA(E)W on a regular basis, and are considered more likely to utilise drainage lines and wetlands located within the Avalon Airport land (i.e. outside of the study area) for dispersal and foraging. However, as a precautionary approach, the GA(E)W is considered to contain current or future potential aquatic and terrestrial habitat for the species.

**Table 20.** Results of targeted Growing Grass Frog surveys.

| Date | Conditions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Survey Time | Survey Temp (C°) | Wind speed (km/hr) | Wind direction | Cloud Cover (%) | Humidity | Rain (mm) | Rain (mm past 24 hours) | No. GGF |
| 08/11/2023 | 20:28-23:01 | 13.8-14.7 | 7.4-11.1 | ESE/S | 50-70 | 84-87 | 0 | 1.2 | 0 |
| 23/11/2023 | 20:10-22:50 | 18.5-19.8 | 11.1-18.5 | SSE | 60-75 | 65-80 | 0 | 0 | 0 |
| 11/12/2023 | 20:23-22:44 | 17.2-17.5 | 5.5-14.8 | SW/SSW | 100 | 94-96 | 0 | 4.2 | 0 |

**Table 21.** Non-target species recorded during Growing Grass Frog targeted surveys.

| Date | Survey Time | Other species recorded | Site* | No. |
|---|---|---|---|---|
| 08/11/2023 | 20:28-23:01 | Eastern Common Froglet | AU1, AU2 | 20 |
| | | Spotted Marsh Frog | AU6, 4 | 6 |
| | | Spotted Marsh Frog | AU1, AU2 | 200+ |
| | | Eastern Common Froglet | 1 | 1 |
| 23/11/2023 | 20:10-22:50 | Spotted Marsh Frog | AU1 | 10+ |
| 11/12/2023 | 20:23-22:44 | Eastern Common Froglet | 1,4 | 41 |
| | | Eastern Common Froglet | AU1, AU2, AU3 | 80 |
| | | Spotted Marsh Frog | 1, AU6 | 60 |
| | | Spotted Marsh Frog | AU1, AU2, AU3 | 170+ |
| | | Striped Marsh Frog | AU2 | 10 |

*AU (auditory only) sites are located outside of the study area or where access was not permitted.

### *3.6.2.8 Golden Sun Moth*

The VBA contains 680 records of Golden Sun Moth within a 10-kilometre buffer of the study area, most recently from 2019 (DEECA 2024a). The species was previously recorded within the southern portion of the study area in 2018 and 2019 (Biosis 2023) (Figure 4).

Targeted surveys for Golden Sun Moth were undertaken across November and December 2023 and January 2024 in accordance with the *Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana*) (DEWHA 2009). Golden Sun Moth were confirmed to be flying at reference sites on the same day as Golden Sun Moth surveys in the study area. Reference sites included Bulban Road, Werribee, Bamganie, and Broadmeadows.

Targeted surveys comprised 10 to 50-metre-wide parallel transects, traversed by zoologists, across all areas of suitable habitat within the study area during suitable weather conditions (Table 22) (Figure 6). While grassland habitats within the study area support habitat characteristics that are suitable for the species, no Golden Sun Moths were detected during three of the four targeted surveys.

On the second survey, dated 4 December 2023, one male Golden Sun Moth was recorded along the southern border of 65 Beach Road, and two male Golden Sun Moth were recorded within 75-95 Avalon Road, approximately 1.4 kilometres north-west from nearest Golden Sun Moth recorded by Biosis (2020).

**Table 22.** Golden Sun Moth survey results.

| # | Date | Site | Survey time | Temperature (°C) | Wind (km/hr) | Wind Direction | Cloud cover (%) | No. of days since rain | No. GSM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 24/11/2023 | MAB | 11:20-12:00 | 21.9 | 25.9 | E | 80 | 14 | 0 |
| | | Beach Road | 12:07-12:38 | 24.2 | 31.5 | ESE | 75 | | 0 |
| | | Pousties Road | 12:55-13:52 | 25.5 | 27.8 | ESE | 70 | | 0 |
| 2 | 04/12/2023 | Pousties Road | 10:46-12:10 | 24.8 | 20.4 | N | 45 | 1 | 0 |
| | | Beach Road | 12:35-13:35 | 26.8 | 20.4 | ESE | 35 | | **1** |
| | | MAB | 13:55-15:00 | 31.5 | 22.2 | N | 60 | | **2** |
| 3 | 18/12/2023 | MAB | 11:08-13:03 | 21.3 | 13.0 | NNE | 100 | 4 | 0 |
| | | Beach Road | 13:40-14:43 | 25.7 | 9.3 | N | 100 | | 0 |
| | 23/12/2023 | Pousties Road | 14:03-16:05 | 20.0 | 17.0 | ESE | 45 | 4 | 0 |
| 4 | 06/01/2024 | Pousties Road | 10:01-14:32 | 22.6 | 14.8 | SE | 80 | 2 | 0 |
| | 11/01/2024 | Beach Road | 11:05-14:24 | 21.1 | 14.8 | SE | 80 | 6 | 0 |
| | | MAB | 14:44-16:23 | 22.0 | 16.7 | SE | 60 | | 0 |

Based on the targeted surveys, and previous GSM targeted surveys completed within the GA(E)W (Biosis 2023), a total of 228 hectares of confirmed Golden Sun Moth habitat was recorded within the GA(E)P. Where

Golden Sun Moth was recorded, confirmed habitat was mapped where all areas of contiguous habitat supporting the species preferred food plants (i.e. moderate or higher cover of Wallaby-grass and/or Chilean Needle-grass) were present.

#### *3.6.2.9 Other Nationally Significant Fauna and Unassessed Areas*

It is acknowledged that 256.92 hectares, equating to approximately 40% of the GA(E)N were not subject to on-ground assessments (see Section 2.4.2), and as such, the absence of nationally significant fauna species from these areas cannot be accurately determined. Based on the landscape context, highly modified, agricultural nature of the study area and extent of previous vegetation removal, the likelihood of any additional nationally significant fauna species (excluding VGED) occurring within the assessed areas of the GA(E)N and GA(E)W is considered low due to the absence of suitable habitat and lack of records in close proximity (Appendix 2.3).

However, it is recommended that VPA further investigate the possibility to gain access to parcels that have not been surveyed to determine the presence or not of potential habitat for any nationally significant flora species. If potential habitat for significant flora species is observed, then targeted surveys should be undertaken in accordance with the relevant survey guidelines.

### 3.6.3 Ecological Communities

Six nationally listed ecological communities are predicted to occur within 10 kilometres of the GA(E)P (DCCEEW 2024a):

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain;
- Natural Damp Grassland of the Victorian Coastal Plains;
- Natural Temperate Grassland of the Victorian Volcanic Plain;
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains;
- Subtropical and Temperate Coastal Saltmarsh; and,
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Vegetation within the study area was consistent with the condition thresholds for the nationally significant *Natural Temperate Grassland of the Victorian Volcanic Plain* ecological community.

*Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* (SHWTLP) was previously recorded within GA(E)W south of Dandos Road (Biosis 2023); however, based on the site conditions observed during the site investigations, SHWTLP was not present within the study area. This was due to exotic flora species including Cane Needle-grass, Chilean Needle-grass and Artichoke Thistle accounting for greater than 60% of the total cover of plants within the ground layer, with only scattered occurrences of native grasses and herbs evident within the wetland.

*Subtropical and Temperate Coastal Saltmarsh* (STCS) was previously recorded as present within GA(E)W (Biosis 2023). While native vegetation consistent with the threatened ecological community was recorded within GA(E)W (Coastal Saltmarsh EVC on Figure 2f-g), STCS was considered absent due to the sea wall associated with the former saltworks protecting the area from tidal connectivity (Alluvium Consulting Australia Pty Ltd 2024). As per the exclusions listed in the Conservation Advice for STCS (DSEWPaC 2013), '*patches of saltmarsh*

*(possibly senescent) within the coastal margin that are disconnected (either naturally or artificially) from a tidal regime but were once connected'* (DSEWPaC 2013) are excluded from the STCS community. Should tidal connectivity be re-established in future, Coastal Saltmarsh vegetation should be reassessed against condition thresholds listed in the Conservation Advice for STCS (DSEWPaC 2013).

No additional nationally significant ecological communities were observed to be present due to the absence of key indicator species, the low diversity of native flora and high cover of exotic vegetation.

#### *3.6.3.1 Natural Temperate Grassland of the Victorian Volcanic Plain*

NTGVVP community was recorded at multiple locations within the GA(E)P, comprising a total of 4.75 hectares (Figure 2).

The Commonwealth condition thresholds for the NTGVVP community (DSEWPaC 2011) were applied to determine the community's presence. Zone PG2 qualified as the threatened ecological community due to meeting or exceeding the following critical criteria:

- Larger than 500 m2;
- Dominated by native grasses; and,
- The dominant native species represent at least 50% of the native species and perennial tussock cover.

Although areas of PG2 recorded on site qualified as the nationally listed community, the relative diversity and structure of the patches only met the minimum conditions of cover and were relatively low in species diversity typically being defined by a combination of Kangaroo Grass, Wallaby-grass and Spear-grass and lacking a herb component.

Zones PG1 did not qualify as the listed ecological community as it was dominated by exotic perennial species forming greater than 50% cover, and therefore failed to meet the criteria above.

Based on visual assessments from the roadside, there is potential for additional areas of the NTGVVP community occur in unassessed areas within the GA(E)N (Table 1; Figure 2). It is recommended that VPA further investigate the possibility to gain access to parcels that have not been surveyed to determine the presence of the NTGVVP ecological community.

### 3.6.4 Migratory Species

Migratory species listed under the EPBC Act are those protected under international agreements to which Australia is a signatory. These include the Japan Australia Migratory Bird Agreement (JAMBA), the China Australia Migratory Bird Agreement (CAMBA), the Republic of Korea Migratory Bird Agreement (ROKAMBA), and the Bonn Convention on the Conservation of Migratory Species of Wild Animals. Migratory species are considered matters of NES under the EPBC Act. For Latham's Snipe, if the habitat regularly supports 18 or more individuals, then it should be considered important habitat (DoEE 2017).

The desktop assessment identified 69 species listed on one or more of the migratory species lists. Of these, 24 species were already listed on EPBC Act, and 11 species on the FFG Act (Appendix 2.3). The remaining 34 species, not listed on the EPBC or FFG Act, are presented in Appendix 2.4.

Two bird species recognised under the migratory provisions of the EPBC Act were recorded during the ecological surveys, being Red-necked Stint and Double-banded Plover. Three additional migratory species,

namely Common Greenshank, Sharp-tailed Sandpiper, and White-winged Black Tern, had been previously recorded in the study area (Biosis 2023), but was not observed during the ecological surveys.

Internationally, saltpans are an important alternate habitat for migratory shorebirds, particularly for small-bodied shorebirds (Lei *et al.* 2021; Huang *et al.* 2025). This century, many saltpans across the world have gradually ceased production, along with management of these habitats (Huang *et al.* 2025). Generally, the diversity and abundance of bird species are lower in abandoned saltpans compared to active saltpans (Huang *et al.* 2025).

The fauna habitat mapping classifies the retired saltpans area as potential habitat for migratory bird species (Figure 8). However, this classification currently encompasses both seasonally suitable and unsuitable areas, and does not define discrete suitable habitats such as mud flats, around waterbodies, saltmarsh, or shallow marsh habitat. This limitation is partially due to the variability between the saltpans, particularly due to the expected loss of salinity over time. Due to natural processes such as rainfall, leaching, runoff, and vegetation encroachment, older saltpans typically have reduced salinity and are therefore less likely to provide habitat for shorebirds and waders, except temporarily, following substantial rain. As such, while there may be areas of seasonally suitable habitat and seasonally unsuitable habitat within the retired saltpans area, this broad area is considered to be potential habitat for migratory bird species.

While migratory bird species may occasionally inhabit the broader locality, the GA(E)P is not considered to be classed as an 'important habitat' as defined under the *EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines* (DoE 2013a), in that it does not contain:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species;
- Habitat utilised by a migratory species which is at the limit of the species range; or,
- Habitat within an area where the species is declining.

However, 'important habitat' may be present immediately south and south-east of the GA(E)P, within the Port Phillip (Western Shoreline) and Bellarine Peninsula Ramsar site.

Based on the significant impact guidelines for migratory shorebirds (DoEE 2017), an action is likely to have a significant impact to important habitat for a migratory species if there is a real chance or possibility that it will result in:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or,
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

### 3.6.5 Ramsar Sites

The nearest Ramsar wetland is the Port Phillip (Western Shoreline) and Bellarine Peninsula, which covers the Avalon Airport area within the GA(E)P, and also adjoins the southern boundary of the study area (Figure 2).

The Port Phillip (Western Shoreline) and Bellarine Peninsula Ramsar site covers 22,650 hectares and comprises six distinct areas that include Point Cook/Cheetham, Werribee/Avalon, Point Wilson/Limeburners Bay, Swan Bay, Mud Islands, and the Lake Connewarre complex.

The main potential threat to the Ramsar site from future development of the GA(E)P is likely due to potential changes in hydrology (timing, quality and quantity of existing flows) due to changes in surface runoff and stormwater discharge.

Further investigation is required to determine whether the GA(E)W development will result in a significant impact to the Ramsar site, with a summary of recommended further works included in Section 7.2.

### 3.6.6 Other Matters of NES

The study area does not support any other features corresponding with matters of NES protected under the EPBC Act (i.e. World or National Heritage Areas).

## 3.7 State Significant Values

Biodiversity matters present within the GA(E)P that are considered of significance to the State of Victoria are outlined below.

### 3.7.1 Flora

The VBA contains records of 46 State-significant flora species within 10 kilometres of the study area (DEECA 2024d) (Appendix 1.3). Most of these species are located outside of the study area in relatively high quality, undisturbed road and rail reserves.

The timing of surveys for State significant species is summarised in Table 6.

The species considered to have the highest likelihood of occurrence within the study area are summarised in Table 23.

**Table 23.** State significant flora with the highest likelihood of occurrence.

| Species | Suitable habitat within the study area | Closet known records |
|---|---|---|
| **Salt Lawrencia (endangered)** | Saltmarsh and associated vegetation within the old saltworks | Approx. 1.6 kilometres east of GA(E)P within Western Treatment Plant. |
| **Creeping Rush (endangered)** | Saltmarsh and associated vegetation within the old saltworks | Approx. 7.4 kilometres south of GA(E)P, south of Point Henry. |
| **Marsh Saltbush (endangered)** | Saltmarsh and associated vegetation within the old saltworks | Previous records from 1994 within the south of the study area. |
| **Coastal Saltwort (endangered)** | Saltmarsh and associated vegetation within the old saltworks | Approx. 1.2 kilometres south of GA(E)P, within Port Phillip Bay Coastal Reserve. |
| **Rye Beetle-grass (endangered)** | Likely habitat for the species is identified within areas of moderate to high quality plains grassland. Areas of embedded rock not supporting native vegetation have a moderate to low likelihood of occurrence. | Adjacent to the study area within Avalon Airport land. |

| Species | Suitable habitat within the study area | Closet known records |
|---|---|---|
| **Small Milkwort (critically endangered)** | Likely habitat for the species is identified within areas of moderate to high quality plains grassland. Areas of embedded rock not supporting native vegetation have a moderate to low likelihood of occurrence. | Approx. 1.9 kilometres east of GA(E)P within Western Treatment Plant. |
| **Fragrant Saltbush (vulnerable)** | Widespread, potential to occur within areas not subject to cropping disturbance. | Adjacent to the study area within Avalon Airport land. |
| **Brittle Greenhood (critically endangered)** | Likely habitat for the species is identified within areas of moderate to high quality plains grassland. Areas of embedded rock not supporting native vegetation have a moderate to low likelihood of occurrence. | Approx. 2.3 kilometres north-west of GA(E)P within private property; however majority of records from within and adjacent to the You Yangs approx. 5.8 kilometres north-west of GA(E)P |
| **Arching Flax-lily (critically endangered)** | Likely habitat for the species is identified within areas of moderate to high quality plains grassland. Areas of embedded rock not supporting native vegetation have a moderate to low likelihood of occurrence. | Approx. 1 kilometre north of GA(E)P adjacent to Old Melbourne Road. |
| **Small Scurf-pea (endangered)** | Likely habitat for the species is identified within areas of moderate to high quality plains grassland. Areas of embedded rock not supporting native vegetation have a moderate to low likelihood of occurrence. | Approx. 2.3 kilometres north of GA(E)P within private property. |
| **Tough Scurf-pea (endangered)** | Likely habitat for the species is identified within areas of moderate to high quality plains grassland. Areas of embedded rock not supporting native vegetation have a moderate to low likelihood of occurrence. | Approximately 4.6 kilometres north-east of GA(E)P, within Western Treatment Plant. |

Given State significant species were not detected through ecological surveys within accessible areas, any populations within the assessed areas of the study area that may occur are expected to be very small in numbers and possibly represented by only a few individuals.

#### *3.7.1.1 Other State Significant Flora and Unassessed Areas*

It is acknowledged that 256.92 hectares, equating to approximately 40% of the GA(E)N, were not subject to on-ground assessments and, as such, the absence of State significant flora from these areas cannot be accurately determined. However, it is considered that the likelihood of any remaining State significant species occurring within the assessed areas of the study area is considered low due to the absence of suitable habitats, and/or lack of documented records of these species within close proximity (Appendix 2.3).

It is recommended that VPA further investigate the possibility to gain access to parcels that have not been surveyed to ascertain the presence/absence of any State significant flora species.

### 3.7.2 Fauna

The VBA contains records of 49 State-significant fauna species within 10 kilometres of the GA(E)P (DEECA 2024) (Appendix 2.2) (Figure 4).

The majority of historical records of state listed fauna species have been observed outside or adjacent to the GA(E)P, most notably within the Western Treatment Plant to the east of the study area.

The species with the highest likelihood of occurrence are detailed below (Table 24).

**Table 24.** State significant fauna with highest likelihood of occurrence

| Species | Suitable habitat within the GA(E)P | Closet known records |
|---|---|---|
| **Marsh Sandpiper (endangered)** | Saltmarsh and associated vegetation within the old saltworks provides foraging habitat. | Within Western Treatment Plant and immediately south of the study area within Ramsar wetland |
| **Grey-tailed Tattler (critically endangered)** | Saltmarsh and associated vegetation within the old saltworks provides foraging habitat. | Within Western Treatment Plant and immediately south of the study area within Ramsar wetland |
| **Brolga (endangered)** | Shallow freshwater and brackish wetlands, crops, grassland and pasture | The local records are primarily within the Port Phillip Bay (western shoreline) and Western Treatment Plant |
| **Fat-tailed Dunnart (vulnerable)** | Grassland habitats | Recorded by Biosis (2023) within the south of GA(E)W. |
| **Tussock Skink (endangered)** | Grassland habitats | Recorded within GA(E)N (Figure 7) and within the south of GA(E)W (Biosis 2023). |

Two State-significant fauna species (Tussock Skink *Pseudemoia pagenstecheri* and Fat-tailed Dunnart *Sminthopsis crassicaudata*) have been previously recorded within the GA(E)W (Biosis 2023). It is likely that the avian fauna species would utilise the GA(E)P to opportunistically forage, or use as a stepping stone throughout the broader landscape.

Despite 1,614 records of Brolga within 10-kilometres of the study area (DEECA 2024a), there is very limited suitable habitat for the species with GA(E)P. The local records are primarily within the Port Phillip Bay (western shoreline) and Western Treatment Plant, where suitable wetland habitats are abundant. However, the species may opportunistically fly over the study area.

Based on the results of the ecological surveys, habitat assessments and landscape context, the remaining State significant fauna species previously recorded, or considered as having potential habitat within the project locality have been assessed as having a low likelihood of occurrence within the GA(E)P (Appendix 2.2). This determination is based on the modification of potential habitats and the findings of the on-ground assessments.

#### *3.7.2.1 Tussock Skink and Fat-tailed Dunnart*

The VBA contains six records of Tussock Skink and 123 records of Fat-tailed Dunnart within a 10-kilometre buffer of the study area, most recently from 2016 and 1986 respectively (DEECA 2024d). Both species were previously recorded within the south of the study area (Biosis 2023) (Figure 4). The State significant Tussock Skink was recorded on three occasions; twice at Grid 2 (Plate 32 and Plate 33) and once at Grid 6, which are

both located at 40-80 Pousties Road, Avalon (Figure 5; Figure 8). Fat-tailed Dunnart was not recorded during the 2023 survey effort.

### 3.7.3 Vegetation Communities

Field assessments confirmed the presence of two vegetation communities listed as threatened under the FFG Act, being Western (Basalt) Plains Grassland and Western Basalt Plains (River Red Gum Grassy Woodland).

#### *3.7.3.1 Western (Basalt) Plains Grassland*

All areas of Plains Grassland EVC mapped within the study area (Figure 2) meet the description of the FFG Act-listed vegetation community *Western (Basalt) Plains Grassland*.

This community was deemed present in such areas in a 'degraded' state. Although there are no specific condition thresholds that defines the community, a conservative approach was taken with its presence based on two main factors of species diversity and overall cover of native species within any particular area, and/or the presence of embedded rock and at least 25% cover of native species.

The GA(E)P supports a total of 31.77 hectares of the *Western (Basalt) Plains Grassland* FFG Act listed community (Figure 2).

#### *3.7.3.2 Western Basalt Plains (River Red Gum) Grassy Woodland*

One patch of Plains Grassy Woodland (PGW2 on Figure 2f) meets the description of the FFG Act-listed vegetation community *Western Basalt Plains (River Red Gum) Grassy Woodland.*

This community was deemed to be present as PGW2 due to the presence of the characteristic River Red-gum canopy, over an understorey of Hedge Wattle and scattered native grasses.

# 4 LEGISLATIVE AND POLICY IMPLICATIONS

## 4.1 *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

The EPBC Act is administered by the Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW) and provides a national framework for the protection of heritage and the environment, and the conservation of biodiversity. The Act establishes a Commonwealth process for the assessment of proposed actions that are likely to have a significant impact on matters of National Environmental Significance (MNES), or on Commonwealth land. An action (i.e. project, development, undertaking, activity, or series of activities), requires approval from the Commonwealth Environment Minister if it is likely to have a significant impact on any MNES, described in Table 25.

**Table 25.** Potential impacts to matters of National Environmental Significance (NES)

| Matter of NES | Potential Impacts |
|---|---|
| **World Heritage properties** | The proposed action will not impact any properties listed for World Heritage. |
| **National heritage places** | The proposed action will not impact any places listed for national heritage. |
| **Ramsar wetlands of international significance** | The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site covers the Avalon Airport land adjacent to the GA(E)N and GA(E)W, extending east to the Western Treatment Plant. The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site also adjoins the southern boundary of the GA(E)W.<br>Further investigations to understand the current volume and timing of existing flows into the Ramsar site from the GA(E)N and GA(E)W must be undertaken to allow the consideration of the potential ecological changes to the character of the Ramsar site that could potentially result from alterations to pre-development flows, and further determine how these changes can be appropriately minimised. |
| **Threatened species and ecological communities** | Confirmed presence of one nationally significant flora species:<br>- Spiny Rice-flower (critically endangered)<br>Confirmed presence of five nationally significant fauna species:<br>- Golden Sun Moth (vulnerable)<br>- Blue-winged Parrot (vulnerable)<br>- Growling Grass Frog (vulnerable) (Biosis 2023)<br>- Sharp-tailed Sandpiper (vulnerable) (Biosis 2023)<br>- Common Greenshank (endangered) (Biosis 2023)<br>- Curlew Sandpiper (critically endangered) (Biosis 2023)<br>Confirmed presence of one listed ecological communities:<br>- NTGVVP (4.75 hectares; critically endangered) |
| **Migratory and marine species*** | While a number of species may occasionally forage or fly over habitat within the GA(E)W, it would not be classed as an 'important habitat' as defined under the EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines (DoE 2013). However, important habitat is present immediately south of the study area (including the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site) and potential off-site impacts should be considered. |

| Matter of NES | Potential Impacts |
|---|---|
| **Commonwealth marine area** | The proposed action will not impact any Commonwealth marine areas. |
| **Nuclear actions (including uranium mining)** | The proposed action is not a nuclear action. |
| **Great Barrier Reef Marine Park** | The proposed action will not impact the Great Barrier Reef Marine Park. |
| **Water resources impacted by coal seam gas or mining development** | The proposed action is not a coal seam gas or mining development. |

### 4.1.1 Implications for Confirmed Matters of National Environmental Significance

The EPBC Act offers two pathways to achieve approval for actions that are likely to have a significant impact on matters of NES. The first of those is the referral (Part 7), assessment (Part 8) and approval process (Part 9 of the EPBC Act). The second is the strategic assessment process (under Part 10 of the EPBC Act).

- As part of a Part 9 referral, individual landowners/developers would be required to submit a referral for their proposed development where the proposed development impacts on a matter of NES within the GA(E)N or GA(E)W.
- As part of a Part 10 strategic assessment, the whole GA(E)N and GA(E)W could be submitted by the VPA (or other responsible authority) for strategic assessment of impacts to matters of NES.

Details of these assessment pathways are provided in Section 4.1.2.

The rezoning of land within the GA(E)P would not constitute a significant impact to any matter of NES identified within the study area. Any proposal to develop land that has a potential to result in a significant impact to MNES should be referred by the proponent to the Commonwealth for further assessment.

#### *4.1.1.1 Natural Temperate Grassland of the Victorian Volcanic Plain*

A total of 4.75 hectares of the nationally significant ecological community Natural Temperate Grassland of the Victorian Volcanic Plain was recorded within the GA(E)P.

Potential impacts to the NTGVVP community as a result of future development and an assessment against the significant impact thresholds for the community detailed in DoE (2013) are provided below (Table 26).

**Table 26.** Significant Impact Guidelines 1.1 – Significant Impact Criteria for Endangered or Critically Endangered Ecological Communities (NTGVVP).

| Significant Impact Guidelines 1.1 – Significant Impact Criteria for Endangered or Critically Endangered Ecological Communities (NTGVVP) | |
|---|---|
| **Significant impact Criteria** | **Comment** |
| 1. Reduce the extent of an ecological community. | Any impact to NTGVVP should be referred under the EPBC Act. |
| 2. Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines. | Future development of the GA(E)P has the potential to fragment the ecological community |
| 3. Adversely affect habitat critical to the survival of an ecological community. | Future development of the GA(E)P has the potential to adversely affect the ecological community |

| Significant Impact Guidelines 1.1 – Significant Impact Criteria for Endangered or Critically Endangered Ecological Communities (NTGVVP) | |
|---|---|
| 4. Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns. | Future development of the GA(E)P has the potential to alter surface water drainage patterns |
| 5. Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting. | Disturbance associated with proposed future development may cause a substantial change in the composition of the ecological community |
| 6. Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: | Future development of the GA(E)P has the potential reduce the quality of the ecological community |
| a. assisting invasive species, that are harmful to the listed ecological community, to become established or; | |
| b. causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community. | |
| 7. Interfere with the recovery of an ecological community. | Future development of the GA(E)P may interfere with the recovery of the ecological community |

Based on the above significant impact thresholds, any impact to the NTGVVP ecological community may be assessed as a significant impact, and the action should be further assessed under the EPBC Act.

#### *4.1.1.2 Blue-winged Parrot*

Targeted surveys identified the species' presence within the GA(E)P following surveys of areas of suitable habitat within the south of the study area (Figure 7). Forty (40) Blue-winged Parrot were recorded within GA(E)W (Section 3.6.2.1).

Potential impacts to Blue-winged Parrot as a result of future development and an assessment against the significant impact thresholds for the species detailed in DoE (2013) are provided below (Table 27).

**Table 27.** Significant Impact Guidelines 1.1 – Significant Impact Criteria for Vulnerable Species (Blue-winged Parrot)

| Significant Impact Guidelines 1.1 – Significant Impact Criteria for Vulnerable Species (Blue-winged Parrot) | |
|---|---|
| **Significant impact Criteria** | **Comment** |
| 1. Lead to a long-term decrease in the size of an important population of a species | The study area is not considered to support an 'important population'* as it is not a key source for breeding or dispersal, is not necessary for maintaining genetic diversity and is not at the limit of these species known range.<br>Future development of the GA(E)W may result in a minor long-term decrease of the population of the species due to a reduction in foraging habitat. |
| 2. Reduce the area of occupancy of an important population | Future development of the GA(E)W has the potential to reduce the area of occupancy of the species |

| Significant Impact Guidelines 1.1 – Significant Impact Criteria for Vulnerable Species (Blue-winged Parrot) | |
|---|---|
| 3. Fragment an existing important population into two or more populations | Future development of the GA(E)W is unlikely to fragment the population as the species is highly mobile |
| 4. Adversely affect habitat critical to the survival of a species | No critical habitat for these species is listed under the EPBC Act; however, future development of the GA(E)W has the potential to result in a minor long-term decrease of habitat critical to the survival of the species, being foraging and staging habitats (DCCEEW 2023a) |
| 5. Disrupt the breeding cycle of an important population | Not applicable. Any individuals occurring in the project footprint would not be classified as an important population. |
| 6. Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | Future development of the GA(E)W has the potential to reduce the extent of foraging and staging habitat for the species. However, this would only result in a small decrease in the quality and/or availability of habitat for the species as the species range includes much of south-eastern Australia. |
| 7. Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat | Future development of the GA(E)P is unlikely to result in the establishment of invasive species, beyond those that are already present. |
| 8. Introduce disease that may cause the species to decline | Future development of the GA(E)W is unlikely to result in the introduction of disease that is not already present |
| 9. Interfere with the recovery of the species. | Future development of the GA(E)W is likely to result in a small decrease in the quality and/or availability of foraging and staging habitat for the species; however, as the species range includes much of south-eastern Australia, this unlikely to interfere with the recovery of the species |

Note: *An important population is a population that is necessary for a species' long-term survival and recovery. This may include species identified in recovery plans and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or;
- Populations that are near the limit of the species range.

Based on the above significant impact guidelines for the species, the project is unlikely to constitute a significant impact to Blue-winged Parrot.

#### *4.1.1.3 Golden Sun Moth*

A total of approximately 226 hectares of confirmed Golden Sun Moth habitat is present within the GA(E)W, with a total of 0.38 hectares of confirmed habitat present within GA(E)N (Figure 8).

An assessment of the potential impacts against the significant impact guidelines for the Golden Sun Moth (DoE 2013) is provided in below (Table 28).

**Table 28.** Assessment against the Significant Impact Guidelines for Vulnerable Species (Golden Sun Moth).

| Significant Impact Guidelines 1.1 – Significant Impact Criteria for Vulnerable Species (Golden Sun Moth) | |
|---|---|
| **Significant impact Criteria** | **Comment** |
| 1. Lead to a long-term decrease in the size of an important population of a species | Future development of the GA(E)W may result in a long-term decrease of the population of the species if confirmed habitat is impacted |

| Significant Impact Guidelines 1.1 – Significant Impact Criteria for Vulnerable Species (Golden Sun Moth) | |
|---|---|
| 2. Reduce the area of occupancy of an important population | Future development of the GA(E)W will reduce the area of occupancy of the species should suitable habitat be impacted |
| 3. Fragment an existing important population into two or more populations | Any impacts associated with the future development of the GA(E)W would result in a loss of the species from the affected area. |
| 4. Adversely affect habitat critical to the survival of a species | Future development of the GA(E)W has the potential to result a loss of habitat critical to the survival of the species. |
| 5. Disrupt the breeding cycle of an important population | Future development of the GA(E)W has the potential to result a loss of habitat critical to the survival of the species. The loss of this habitat would result in a disruption to the breeding cycle for the species in the affected area |
| 6. Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | Future development of the GA(E)W has the potential to reduce and/or substantially modify habitat for the species within the GA(E)W. However, this would only result in a small decrease in the quality and/or availability of habitat for the species. |
| 7. Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat | Future development of the GA(E)W is unlikely to result in the establishment of invasive species, beyond those that are already present. |
| 8. Introduce disease that may cause the species to decline | Future development of the GA(E)W is unlikely to result in the introduction of disease that is not already present |
| 9. Interfere with the recovery of the species. | Future development of the GA(E)W may interfere with the recovery of the species due to a reduction in confirmed habitat |

Based on the above significant impact guidelines for the species, depending on the extent of confirmed habitat proposed to be removed, the project has the potential to constitute a significant impact to Golden Sun Moth.

### 4.1.2 EPBC Act Assessment Process

The EPBC Act offers two pathways to achieve approval for actions that are likely to have a significant impact on matters of NES. The first of those is the referral (Part 7), assessment (Part 8) and approval process (Part 9 of the EPBC Act). The second is the strategic assessment process (under Part 10 of the EPBC Act). Both processes have their benefits and are appropriate for different situations. A summary of the requirements under each approval pathway is provided below.

#### *4.1.2.1 Part 7, Part 8 and Part 9 Assessment under the EPBC Act (Project by Project Assessment)*

Individual actions (often called a 'proposal' or 'project') that are likely to have a significant impact on matters of national environmental significance must be referred to the government for assessment and approval under Part 7 (referral), Part 8 (assessment) and Part 9 (approval) of the EPBC Act. In this instance, a referral via this pathway would be appropriate for an individual landowner within the GA(E)P located in an area that is not covered by the potential Part 10 process.

The referral (Part 7) will be the principal basis for the Minister's decision as to whether approval is necessary and, if so, the type of assessment that is required to be undertaken.

In order to determine whether a referral is required, a proponent should start with the following questions:

- Is the proposed action likely to have a significant impact on a matter of NES? The proponent should undertake a self-assessment against the relevant significant impact thresholds to determine whether a significant impact is likely for a particular matter of NES (See Section 0);
- Is the proposed action likely to have a significant impact on the environment in general (for actions by Commonwealth agencies or actions on Commonwealth land) or the environment on Commonwealth land (for actions outside Commonwealth land)?

If the answer to either question is no, approval from the Minister is not required. If the answer to either question is yes, the proponent must submit a referral to the Minster.

In instances where the action is not considered to result in a significant impact to matter of NES, a referral may still be submitted to the Minister to ensure legislative certainty with regards to approvals and legislative implications under the EPBC Act.

Following receipt of a referral, the Minister has 20 business days to decide if the proposed action triggers the matters protected by the EPBC Act and requires further assessment and approval. As part of the 20 business days, the EPBC Act provides a public comment period of 10 business days to provide an opportunity for relevant stakeholders to comment on the proposed action.

During the decision process (including comments from the public) the Minister can make one of three decisions:

1. Not Controlled Action: If the proposed action is not likely to be significant, approval is not required if the action is taken in accordance with the referral. Consequently, the action can proceed (subject to any state, territory or local government requirements);
2. Not Controlled Action - 'Particular Manner': If the proposed action is not likely to be significant if undertaken in a particular manner, approval is not required; and,
3. Controlled Action: If the proposed action is likely to be significant, it is called a 'controlled action'. The matters which the proposed action may have a significant impact on are known as the controlling provisions. Consequently, the proposed action will require approval and is subject to further assessment and approval processes. In most cases, the type of assessment is decided at the same time (decision assessment approach).

Actions can be assessed using one of the following assessment approach:

- Accredited assessment (e.g. Bilateral agreements);
- Assessment on referral information (assessment undertaken solely on the information provided in the referral form);
- Assessment on preliminary documentation (referral form and any other relevant material identified by the minister as being necessary to adequately assess a proposed action). This assessment process is the most commonly used;
- Assessment by environmental impact statement (EIS) or public environment report (PER); or,

- Assessment by public inquiry.

Following the assessment of your proposed action, the Minister will decide whether to:

- Approve the action;
- Approve the action subject to constraints (i.e. conditions will be placed on the action); or,
- Not approve the action.

The Minister will provide a decision to approve with conditions or not to approve the future development of the study area.

#### *4.1.2.2 Part 10 Assessment under the EPBC Act – Strategic Assessment*

Strategic assessments (Part 10 of the EPBC Act) offer the opportunity to look at, and potentially approve, a series of new proposals or developments (actions) over a landscape/regional scale and timeframe (even if the developer is currently not known).

Strategic assessments are undertaken by the organisation responsible for implementing the Program (for example, state or territory government, local council, industry group or organisation) in partnership with the Australian Government.

The Part 10 strategic assessment process is intended to be a collaborative process that delivers positive outcomes for all relevant parties as it offers the potential to deal with cumulative impacts on matters of NES and look for both conservation and planning outcomes at a much larger scale than can be achieved through project-by-project assessments (as described in Section 4.1.2.1).

The key steps in the strategic assessment process are:

- Preparation of a Strategic Assessment Agreement and terms of reference describing the requirements of the strategic assessment, the geographic coverage of the strategic assessment (where relevant) and the 'classes of actions' to be assessed;
- Public exhibition of the strategic assessment documents;
- Endorsement of the final strategic assessment under Part 10 of the EPBC Act (this means that classes of actions addressed in the strategic assessment will have acceptable impacts on matters of national environmental significance if undertaken in accordance with the endorsed final strategic assessment); and,
- Approval of classes of actions under Part 10 (projects covered by the approval do not need individual referral, assessment or approval under the EPBC Act provided they are undertaken in accordance with the endorsed final strategic assessment).

## 4.2 Commonwealth Offset Implications

As outlined in the Australian Government's EPBC Act Environmental Offsets Policy (DSEWPaC 2012), a project should be designed to take into consideration the three-step approach, which is:

- Avoid environmental impacts;
- Minimise impacts;

- Where impacts cannot be avoided or minimised, compensate for the residual impacts using other mitigation measures such as offsets; and,
- Ongoing adaptive management:

The EPBC Act Environmental Offsets Policy (DSEWPaC 2012) outlines a framework for the use of environmental offsets under the EPBC Act including when they can be required, how they are determined and the framework under which they operate. Clear guidelines on what constitutes a suitable offset are provided and should be considered as part of any proposed offset strategy. Suitable offsets must include the following:

1. It delivers an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed development.
2. It is built around direct offsets but may include compensatory measures.
3. It is in proportion to the level of statutory protection that applies to the protected manner.
4. It is of a size and scale proportionate to the residual impacts on the protected manner.
5. It is additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs.
6. It effectively accounts for and manages the risks of the offset not succeeding.
7. It is efficient, effective, timely, transparent, scientifically robust and reasonable.
8. It has transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

It should be noted that the actual quantum of offsets generated by an action is highly dependent on the quality of habitats, the proposed management actions and the security mechanism proposed at both the impact site and the proposed offset site.

## 4.3 *Environment Effects Act 1978* (Victoria)

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

### 4.3.1 Implications

Actions undertaken in accordance with a prescribed DPO are exempt from the requirements of the EE Act. Provided a DPO is prepared guiding future development within the GA(E)P, then a referral under the EE Act is not required.

## 4.4 *Planning and Environment Act 1987*

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation

provisions at Clause 52.17 which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation, unless an exemption applies.

Clause 12. 01 requires planning authorities to consider Protecting Victoria's Environment – Biodiversity 2037 (DELWP 2017c) and the Flora and Fauna Guarantee Strategy under section 17 of the FFG Act when preparing a DPO and associated Native Vegetation Precinct Plan (NVPP).

### 4.4.1 Native Vegetation Precinct Plan

An NVPP provides for the strategic management of native vegetation for a defined area or precinct. It is established via a planning scheme amendment to incorporate the NVPP and list it in the schedule to Clause 52.16.

An NVPP identifies the native vegetation that can be removed and the vegetation to be protected, based on the conservation significance and land protection role of the vegetation, the identified values of vegetation within the planning scheme such as amenity and landscape, and the broader strategic planning objectives for the precinct (DELWP 2017a). An NVPP must consider the values of native vegetation described in the Guidelines (DELWP 2017b):

- Biodiversity value of native vegetation;
- Extent of native vegetation;
- Large trees;
- Native vegetation condition;
- Ecological Vegetation Class;
- Sensitive wetlands and coastal areas;
- Strategic biodiversity value;
- Habitat for rare or threatened species;
- Other values of native vegetation;
- Land and water protection;
- Identified landscape values; and,
- Native vegetation protected under the *Aboriginal Heritage Act 2006*.

### 4.4.2 The Guidelines

The State Planning Policy Framework and the decision guidelines at Clause 12.01 Biodiversity and Clause 52.17 Native Vegetation require Planning and Responsible Authorities to have regard for the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a).

In the event no NVPP is prepared, the removal of vegetation will trigger a permit under Clause 52.17 (Native Vegetation), and the requirement to source offsets in accordance with the Guidelines (DELWP 2017a). In the event an NVPP is prepared, and native vegetation removal is in accordance with the NVPP, no permit will be triggered, however offsets as per the NVPP will be required. If native vegetation removal contrary to the NVPP

is proposed, a permit under 52.16 (Native Vegetation Precinct Plan) will be triggered, and offsets in accordance with the Guidelines (DELWP 2017a) will be required.

## 4.5 *Flora and Fauna Guarantee Act 1988 (Victoria)*

The FFG Act is the primary legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria. Proponents are required to apply for an FFG Act Permit to 'take' listed and/or protected flora species, listed vegetation communities and listed fish species in areas of public land (i.e. within road reserves, drainage lines and public reserves). An FFG Act permit is generally not required for removal of species or communities on private land, or for the removal of habitat for a listed terrestrial fauna species.

## 4.6 *Flora and Fauna Guarantee Act Amendment Act 2019* (Victoria)

The *Flora and Fauna Guarantee Amendment Act 2019* (the Amendment Act) came into effect on June 1, 2020. The Amendment Act strengthens the framework for the protection of Victoria's biodiversity, with one of the main amendments now obligating all public authorities to have consideration of biodiversity to ensure decisions and policies are made with proper consideration of the potential impacts on biodiversity.

Further, species will now be considered for listing as threatened under the FFG Act in accordance with the intergovernmental Common Assessment Method (CAM). This may result in the listing status of several species being revised.

However, it should be noted that this report has been prepared based on the current requirements of the FFG Act, and these may change prior to the approval or preparation of any future DPO /NVPPs.

### 4.6.1 Implications

The VPA and CoGG are a public authority under the FFG Act. Public authorities have a duty under the FFG Act to consider potential biodiversity impacts when exercising their functions. The FFG Act-listed Spiny Rice-flower, Blue-winged Parrot, Curlew Sandpiper (Biosis 2023), Common Greenshank (Biosis 2023), Tussock Skink, Fat-tailed Dunnart (Biosis 2023), Growling Grass Frog (Biosis 2023), Golden Sun Moth, *Western (Basalt) Plains Grassland* community and *Western Basalt Plains (River Red Gum) Grassy Woodland* was recorded within the GA(E)P. A permit under the FFG Act will be required where impacts to listed FFG Act matters occur on public land.

## 4.7 *Catchment and Land Protection Act 1994 (Victoria)*

The *Catchment and Land Protection Act 1994* (CaLP Act) contains provisions relating to catchment planning, land management, noxious weeds and pest animals. Landowners are responsible for the control of any infestation of noxious weeds and pest fauna species to minimise their spread and impact on ecological values.

Weeds listed as noxious under the CaLP Act were recorded during the assessment (Chilean Needle-grass, African Box-thorn, Spear Thistle, Artichoke Thistle, Patterson's Curse, Serrated Tussock). Similarly, there is evidence that the GA(E)P is currently occupied by several pest fauna species listed under the CaLP Act (Red Fox, European Rabbit and European Hare). Weed management and pest fauna management actions are likely

to be required to be incorporated into any future Construction Environmental Management Plan (CEMP) as part of any future development of the GA(E)P.

## 4.8 Wildlife Act 1975 and Wildlife Regulations 2013 (Victoria)

The *Wildlife Act 1975* (and associated Wildlife Regulations 2013) is the primary legislation in Victoria providing for protection and management of wildlife. Authorisation for habitat removal may be obtained under the *Wildlife Act 1975* through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*.

The purposes of the Wildlife Act are to establish procedures in order to promote:

- The protection and conservation of wildlife;
- The prevention of taxa of wildlife from becoming extinct; and,
- The sustainable use of and access to wildlife.

With the exception of pest animals declared under the CaLP Act or wildlife declared to be unprotected wildlife, the Wildlife Act makes it an offence to hunt, take or destroy protected or threatened wildlife without authorisation.

Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*, issued by DEECA.

# 5 MITIGATION MEASURES

As outlined in both State and Commonwealth policy, the GA(E)N and GA(E)W should be designed to take into consideration the three-step approach, which is:

- Avoid environmental impacts;
- Minimise impacts; and,
- Where impacts cannot be avoided or minimised, compensate for the residual impacts using other mitigation measures such as offsets.

## 5.1 Precinct Design Principles

At a broad scale, the following measures should be considered as part of the strategic planning and future development process for the GA(E)N and GA(E)W:

- Retain areas of high conservation value. High value conservation areas are defined as:
    - Areas supporting confirmed/suitable habitat for matters of NES and associated buffer areas;
    - Patches of native vegetation; and,
    - Large trees and scattered trees.
- Large areas of native vegetation should be protected in habitat nodes;
- Provide a variety of flora and fauna habitats to promote and retain biodiversity;
- Undertake habitat creation (i.e. waterways, drainage lines and designated revegetation areas);
- Provide linear corridors of vegetation along walking/cycling tracks;
- Create linear habitat corridors along waterways/drainage lines/tributaries whilst implementing Water Sensitive Urban Design whilst ensuring no off-site impacts;
- Incorporating drainage lines into habitat corridors and open public spaces;
- Interpret/educate residents about values of grasslands through signage;
- Undertake feral pest animal and plant control;
- Retain native trees in urban active and passive open space areas;
- Feature waterways/landscaping combination of a series of smaller connected basins rather than one large isolated basin.
- Investigate methods to interconnect spaces through Open Space Links to create more complete habitat;
- Rehabilitate and protect significant native vegetation;
- Ensure stormwater treatment is designed to provide habitat(s) for significant flora and fauna species;

- Investigate options to achieve additional canopy coverage on public (open space areas) and private land (industrial/commercial lots, nature strips) to achieve urban greening; and,
- Connect biodiversity sites with parks/open spaces so they are separated from development.

## 5.2 Best Practice Mitigation Measures

Recommended measures to mitigate impacts upon terrestrial and aquatic values present within the GA(E)N and GA(E)W include:

- Control of noxious weeds within the study area should be an immediate priority to reduce further degrading impacts to the existing remnant ecological values present within the study area and surrounds;
- Consideration of Water Sensitive Urban Design techniques such as stormwater treatment wetlands, bio-retention systems, porous paving or swales;
- Minimise impacts to native vegetation and habitats through construction and micro-siting techniques, including fencing retained areas of native vegetation. If indeed necessary, trees should be lopped or trimmed rather than removed. Similarly, soil disturbance and sedimentation within wetlands should be avoided or kept to a minimum, to avoid, or minimise impacts to fauna habitats;
- Tree Retention Zones (TRZs) should be implemented to prevent indirect losses of native vegetation during construction activities (DSE 2011). A TRZ applies to a tree and is a specific area above and below the ground, with a radius 12 x the DBH. At a minimum standard a TRZ should consider the following:
    - A TRZ of trees should be a radius no less than two metres or greater than 15 metres;
    - Construction, related activities and encroachment (i.e. earthworks such as trenching that disturb the root zone) should be excluded from the TRZ;
    - Where encroachment exceeds 10% of the total area of the TRZ, the tree should be considered as lost and offset accordingly;
    - Directional drilling may be used for works within the TRZ without being considered encroachment. The directional bore should be at least 600 millimetres deep;
    - The above guidelines may be varied if a qualified arborist confirms the works will not significantly damage the tree (including stags / dead trees). In this case the tree would be retained, and no offset would be required; and,
    - Where the minimum standard for a TRZ has not been met an offset may be required.
- Ensure that best practice sedimentation and pollution control measures are undertaken at all times, in accordance with Environment Protection Agency guidelines (EPA 2020a; EPA 2020b; Victorian Stormwater Committee 1999) to prevent offsite impacts to waterways and wetlands; and,
- As indigenous flora provides valuable habitat for indigenous fauna, it is recommended that any landscape plantings that are undertaken as part of the proposed works are conducted using indigenous species sourced from a local provenance, rather than exotic deciduous trees and shrubs.

In addition to these measures, the following documents should be prepared and implemented prior to any construction activities:

- Construction Environmental Management Plan (CEMP). The CEMP should include specific species/vegetation conservation strategies, daily monitoring, sedimentation management, site specific rehabilitation plans, weed and pathogen management measures, etc.;
- A Kangaroo Management Plan (KMP). The KMP provides a long-term, adaptable strategy for the management of Eastern Grey Kangaroos, and may be required to be prepared to the satisfaction of DEECA;
- Conservation Management Plan (CMP). One or more CMP's are likely to be required to detail how areas of retained high value biodiversity are protected, managed and enhanced as part of the DPO process. The CMP should specify management actions and timeframes associated with the protection and enhancement of the retained values. Where more than one matter of NES is present within a conservation area, the management actions proposed must be complementary to all relevant matters.

## 5.3 Specific Mitigation Measures

### 5.3.1 Protection of Retained Ecological Values

Retained ecological values should be enhanced and managed to assist in creating a more diverse, connected and resilient natural environment through improving ecosystem health, and develop a more ecologically connected urban landscape. It is important that the enhancement of ecological values within the GA(E)P are not undermined through unrestricted and uncontrolled public access throughout retained areas.

Public access should be restricted to clearly defined shared community facilities (i.e. BBQ areas, play equipment etc) that are accessible via a connected network of shared paths (walking and cycling shared paths). Access to all other areas of retained high value native vegetation, revegetated areas and/or wetlands should be discouraged, and demarcated with informal signage and/or fencing where practical.

A summary of practically achievable ecological enhancement opportunities available within areas of retained vegetation and fauna habitat is provided below. It should be noted that the below is not intended to be a detailed plan of the works that should be undertaken, but rather a discussion on the key principles and management activities that would guide the future restoration of flora and fauna values that the VPA could consider as part of preparing the GA(E)N and GA(E)W.

### 5.3.2 Creation of Conservation Reserves and Biolinks

Four matters of NES are confirmed to occur within the GA(E)P investigation area, with NTGVVP ecological community, Spiny Rice-flower, Golden Sun Moth and Blue-winged Parrot confirmed within the study area (Figure 2; Figure 8).

The population of Golden Sun Moth is significant in size, with large numbers of the species recorded in the parcels located north and south of Dandos Road (Biosis 2023). Any Conservation Reserve established within the GA(E)P should aim to conserve large areas of confirmed Golden Sun Moth habitat and recorded Spiny Rice-flower specimens in areas supporting NTGVVP. The nationally significant Blue-winged Parrot was recorded along the eastern edge of the former salt works evaporation pans south of Dandos Road, and any proposed

conservation reserves and/or drainage scheme should consider suitable habitat and/or foraging plants utilised by Blue-winged Parrot as part of the planting list and overall design. These areas may also be utilised by additional fauna species, such as Curlew Sandpiper and Common Greenshank.

Any conservation reserve established should be as large as possible.

A summary of general principles that should be incorporated into the design and location of any conservation reserves are:

- Large reserves are generally preferred over small reserves: Large reserves typically capture and preserve a greater diversity and quality of habitats. In a fragmented landscape, a large reserve can act as core habitat for species and ecosystems. However, the retention of smaller, high quality remnants should not be discounted;
- Connected reserves are better than separated reserves: Connected reserves (via biolinks/habitat corridors) provide flora and fauna populations access to a larger, total area of habitat, maintain genetic diversity and reduce barriers to movement;
- Several reserves are better than one reserve: Populations generally rely on more than one reserve for breeding and/or foraging. The risk of decline of a population due to habitat degradation, improper management or natural causes is greater when there are fewer reserves present within the landscape. The presence of multiple reserve mitigates this risk;
- Exclusion of domestic pets or stock within conservation reserves;
- Implementation of a cat-curfew for residential dwellings adjacent to conservation reserves; and,
- Implementation of non-development buffers around reserves to mitigate against edge effects.

A network of biolinks should be established to link conservation reserves with the aim of supporting biodiversity through:

- Increasing connectivity between areas of ecological value that have previously been isolated/fragmented; and,
- Providing habitat for wildlife that can utilise habitat in narrow corridors for dispersal, foraging, breeding or sheltering;
- Enabling species to disperse to, or recolonise areas where the species was not formerly present.

The width of any biolinks will be dependent on the overall objective of the linkage (i.e. increasing connectivity; providing habitat, bike paths, active open space).

Further investigation into the location and width of potential biolinks should be undertaken as part of the DPO/NVPP process.

A Management Plan must be prepared to ensure the ecological values present within each reserve/biolink are appropriately managed, monitored and enhanced. The management of conservation reserves and biolinks must consider the inclusion of active management activities that result in the desired ecological outcome (i.e. ecological burning), even if this conflicts with the potential use of adjacent land for residential/commercial development. In these instances, the requirement to achieve the conservation management objectives should be prioritised, and not be superseded by adjacent land use preferences.

It is noted that potential land use changes, in addition to development, on adjoining land have the potential to indirectly reduce on-site values, particularly Golden Sun Moth habitat quality. Potential indirect impacts to Golden Sun Moth habitat should be considered by the Responsible Authorities.

The design and ongoing management of grassland conservation reserves should have regard to *´Start with the Grasslands: Design guidelines to support native grasslands in urban areas´* (Marshall 2013), which provides best-practice guidance for the design and management of native grasslands to maximise environmental and social outcomes.

### 5.3.3 Revegetation and Enhancement

Through strategic revegetation and enhancement activities, there is an opportunity to increase the floristic diversity and structural complexity of the vegetation within GA(E)P, and increase the carrying capacity of these existing ecological values so that over time, they may encourage and support more fauna (including significant species) to reoccupy the Precinct; in particular avian, arboreal and aquatic species.

In order to ensure any revegetation activities most closely represent the relevant EVC within the study area, it is recommended that preferred species lists are developed/refined for use by Council and developers during the development of the Precinct, that encourage the use of species of local provenance that would typically occur within the relevant EVC. Any revegetation should consider the proposed use of the relevant area (e.g. open active space; passive space etc), and factor in the requirement for bushfire hazard protection; a bushfire consultant should be engaged to inform the development of revegetated biolinks and conservation areas.

Several patches of Plains Grassland are present throughout the GA(E)P. Many of these patches exhibit a low diversity of native flora, and are homogenous throughout in terms of habitat features and species dominance. In areas of Plains Grassland proposed to be retained, there is an opportunity to enhance these grasslands through the reintroduction a wide variety of (formerly) common grasses and herbs, which in turn, will increase the diversity and structure of the grasslands, and result in an increase in habitat suitability for native fauna. In addition, an opportunity exists to increase the extent of the Plains Grassland by focussing revegetation activities on non-native areas located in between existing, fragmented patches of Plains Grassland. By increasing the extent of Plains Grassland, particularly in potential conservation reserves and/or the buffers created around conservation reserves/biolinks, it is likely that the extent of suitable habitat for a range of native fauna will also increase accordingly.

In order to ensure any revegetation activities most closely represents the indigenous Plains Grasslands, it is recommended that the following species list are reviewed (Table 29).

**Table 29.** Species associated with the Plains Grassland EVC suitable for revegetation.

| Life Form | Species Name | Common Name |
|---|---|---|
| **SS** | *Pimelea curviflora* | Curved Rice-flower |
| **PS** | *Atriplex semibaccata* | Berry Saltbush |
| **MH** | *Maireana enchylaenoides* | Wingless Bluebush |
| **MH** | *Calocephalus citroides* | Lemon Beauty-heads |
| **MH** | *Acaena echinata* | Sheep's Burr |
| **SH** | *Goodenia pinnatifida* | Cut-leaf Goodenia |

| Life Form | Species Name | Common Name |
|---|---|---|
| **LTG** | *Austrostipa bigeniculata* | Kneed Spear-grass |
| **MTG** | *Austrostipa scabra* | Rough Spear-grass |
| **MTG** | *Rytidosperma caespitosa* | Common Wallaby-grass |
| **MTG** | *Themeda triandra* | Kangaroo-grass |

**Note.** SS = Small Shrub; PS = Prostrate Shrub; MH = Medium Herb; SH = Small Herb; LTG = Large Tufted Graminoid; MTG = Medium Tufted Graminoid.

As part of any best practice revegetation and enhancement strategy, there should also be a focus on planting native grasses, shrubs and/or herbs in areas of public open space.

### 5.3.4 Habitat Creation

Many species of wildlife rely on natural tree hollows for nesting, breeding and shelter. Hollows provide a safe home away from the weather and predators. In eucalypt trees, small hollows may take over 70 years to develop and large hollows many decades longer. The range of hollow sizes and types is matched by the range of wildlife able to use them.

Nest boxes are an important aspect to wildlife conservation in that they provide additional habitat for hollow-dependant fauna in areas where hollows are in short supply, and in addition, support the persistence or reintroduction of a species in any areas where natural nesting hollows are not available.

The installation of nest boxes of varying types and size will create habitat for arboreal fauna (i.e. possums, some birds and microbats).

# 6 SUMMARY OF ECOLOGICAL FEATURES

Ecological values of the GA(E)N and GA(E)W, as determined through field assessments and targeted surveys undertaken within the accessible property parcels, are summarised in Table 30.

It is acknowledged that approximately 40% of GA(E)N has not been subject to on-ground assessments, and unassessed properties are likely to support ecological values that have not been observed or recorded as part of this suite of ecological investigations.

**Table 30.** Summary of the ecological values that occur within the assessed areas of the GA(E)P.

| | |
|---|---|
| **Species diversity** | Moderate assemblage of plants and animals, with 83 flora species and 46 fauna species recorded during the ecological surveys. |
| **Native vegetation** | GA(E)N<br>• 2 hectares of native vegetation represented by two EVCs:<br>o 1.83 hectares of Plains Grassland (EVC 132)<br>o 0.17 hectares of Plains Grassy Woodland (EVC 55)<br>GA(E)W<br>• 177.40 hectares of native vegetation represented by eight EVCs:<br>o 29.95 hectares of Plains Grassland (EVC 132)<br>o 0.78 hectares of Plains Grassy Woodland (EVC 55)<br>o 130.57 hectares of Coastal Saltmarsh (EVC 9)<br>o 4.47 hectares of Plains Sedgy Wetland (EVC 647)<br>o 4.44 hectares of Plains Grassy Wetland (EVC 125)<br>o 4.95 hectares of Brackish Wetland (EVC 656)<br>o 2.13 hectares of Brackish Grassland (EVC 934)<br>o 0.11 hectares of Tall Marsh (EVC 821) |
| **Wetlands** | • The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site falls outside the GA(E)P (within the Avalon Airport land) and immediately to the south of the study area. |
| **Significant ecological communities** | • A total of 4.75 hectares of the nationally significant ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP) is present in the study area (Figure 2):<br>o 0.84 hectares within the GA(E)N<br>o 3.91 within the GA(E)W<br>• A total of 31.77 hectares of the *Western (Basalt) Plains Grassland Community* is present in the study area (PG1 and PG2 on Figure 2)<br>• A total of 0.13 hectares of the State-significant *Western Basalt Plains (River Red Gum) Grassy Woodland* (Figure 2f) within GA(E)W |
| **Significant flora species** | • Known presence of one nationally significant flora: |

| | |
|---|---|
| | o A total of eight specimens of Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* were recorded within the council road easement adjacent to the eastern boundary of the GA(E)W (Figure 2g)<br>• No State-significant flora were recorded within the study area. |
| **Significant fauna species** | • Known presence of five nationally significant fauna:<br>o Blue-winged Parrot *Neophema chrysotoma*<br>o Curlew Sandpiper *Caladris ferruginea* (Biosis 2023)<br>o Common Greenshank *Tringa nebularia* (Biosis 2023)<br>o Sharp-tailed Sandpiper *Calidris acuminata* (Biosis 2023)<br>o Growling Grass Frog *Litoria raniformis major* (Biosis 2023)<br>o Golden Sun Moth *Synemon plana*<br>• Known presence of three State-significant fauna:<br>o Tussock Skink *Pseudemoia pagenstecheri*<br>o Fat-tailed Dunnart *Sminthopsis crassicaudata* (Biosis 2023)<br>o Little Eagle *Hieraaetus morphnoides* |

# 7 RECOMMENDATIONS

## 7.1 Unassessed Areas

Access was not permitted in several parcels within the GA(E)N, with approximately 40% (256.92 hectares) of the overall GA(E)N land unable to be assessed on-ground (Figure 2).

It is recommended that the VPA further investigate the possibility to gain access to parcels that have not been surveyed to enable the quality and extent of native vegetation to be confirmed, determine the presence of any significant ecological communities, as well as to identify the presence of potential habitats for significant flora and fauna species, including Spiny Rice-flower, Matted Flax-lily, Striped Legless Lizard, VGED and Golden Sun Moth (Figure 8).

If potential habitat for significant flora or fauna is observed, then targeted surveys should be undertaken in accordance with the relevant survey guidelines.

## 7.2 Port Phillip (Western Shoreline) and Bellarine Peninsula Ramsar Site

With only the current ecological information for the GA(E)P, it is not possible to determine whether the proposed action will result in a significant impact to the Ramsar site. It is understood that the VPA are currently investigating potential stormwater impacts to Port Phillip Coastal Reserve and the associated downstream flows into the Ramsar site. The saline environment creates foraging habitat for significant migratory and marine avian fauna, which is at risk of being compromised if the ecological character of the Ramsar site is altered.

An integrated Water Management (IWM) approach should be considered, and provides an opportunity to manage all components of the water cycle including:

- Waterways and bays;
- Wastewater management;
- Alternative and potable water supply;
- Stormwater management; and,
- Water treatment.

Further investigations to understand the current volume and timing of existing flows into the Ramsar site from the GA(E)P must be undertaken to allow the consideration of the potential ecological changes to the character of the Ramsar site that could potentially result from alterations to pre-development flows, and further determine how these changes can be appropriately minimised.

In addition, the investigation should also include an assessment of potential changes to water quality from flows into the Ramsar site, including changes potentially affected by:

- Sedimentation from construction activities; and,
- Fuel, oil and other toxicants – both during construction and ongoing.

Impacts to water quality can be partially mitigated by ensuring management practices and construction techniques are consistent with *Civil construction, building and demolition guide* (EPA 2020a) and *Erosion, sediment and dust: Treatment train* (EPA 2020b).

The drainage and stormwater strategy prepared for the GA(E)P must have regard to the known values and potential impacts relevant to the Ramsar site and be developed in a manner that seeks to minimise and mitigate potential adverse effects to the ecological values present.

## 7.3 Current Wetlands

Current Wetlands are classified as native vegetation in accordance with Victoria's native vegetation policy 'The Guidelines' (DELWP 2017a), and as such, the extent of Current Wetlands within the GA(E)N and GA(E)W must be included within overall extent of native vegetation impacts if impacted via development.

It is noted that at DEECA mapped 'current wetland' is currently shown within GA(E)N within 40-80 Pousties Road (Figure 2a); however, this is considered a mapping error as the area mapped as a 'current wetland' is a stony rise and is a high point in the landscape.

However, it is possible to submit an application to DEECA to amend, exclude or modify a mapped wetland from assessment. The Native Vegetation Regulation (NVR) Team at DEECA published an updated method to exclude/modify a mapped wetland in their October 2021 newsletter (DELWP 2021). This method focuses on wetlands associated native vegetation, rather than the full range of wetland values, and replaces the method described in Appendix 4, Section D2 of the '*Assessors Handbook: Applications to remove, destroy or lop native vegetation*' (DELWP 2018).

A summary of the requirements of this method is provided in Table 31.

**Table 31.** Method to exclude a mapped wetland shown in the Current wetlands map from the assessment process

| Mapped wetland (or part thereof) may be excluded from the assessment process if: | Evidence required from the applicant | Approval Authority |
|---|---|---|
| **Hardened, artificial surface**<br>The Mapped Wetland area is covered by a hardened, artificial surface, for example, a roadway. | Aerial photography and on-ground photographs | Responsible authority, with supporting evidence included in the permit application |
| **Mapped wetland is geospatially misaligned**<br>Due to orthorectification issues, the Mapped Wetland is misaligned with its on-ground location.<br>In some instances, a geospatially misaligned Mapped Wetland polygon may encompass part of the on-ground wetland it was intended to identify. In such circumstances, the entire area bound by the high-water mark of the on-ground wetland should be considered a remnant patch, unless one of the other exclusion scenarios applies. | Aerial photography.<br>It must be obvious that the Mapped Wetland is spatially misaligned, as opposed to the mapped area supporting a dry, indiscernible wetland. | Written agreement from the Secretary to DEECA |

| Mapped wetland (or part thereof) may be excluded from the assessment process if: | Evidence required from the applicant | Approval Authority |
|---|---|---|
| **Artificial waterbodies or permanently inundated wetlands**<br>The Mapped Wetland is an artificial waterbody or is permanently inundated.<br>Artificial waterbodies may include, but are not limited to, aquaculture ponds, sewerage treatment ponds and constructed dams. Artificial waterbodies do not include natural wetlands modified through human intervention, where natural wetland values may persist.<br>Only areas of permanent inundation not subject to periodic wet-dry cycles may be removed from consideration. This exemption does not apply to areas subject to periodic wet-dry cycles e.g. ephemeral areas fringing permanent waterbodies. | Aerial photography, on-ground photographs and any other evidence to support classifying a Mapped Wetland area as being artificial or permanently inundated.<br>It must be obvious that the Mapped Wetland area is artificial or permanently inundated (i.e. not subject to periodic wet-dry cycles). Where the potential inundation or waterlogging period is debatable, applicants are required to commission a supporting hydrological assessment, undertaken by a suitably qualified person. | Written agreement from the Secretary to DEECA |
| **Mapped Wetland area cannot support wetland-associated native vegetation**<br>The Mapped Wetland area is physically incapable of retaining surface water or being waterlogged for more than one month. This may include areas:<br>• Where a Mapped Wetland is sited on a slope or other inconsistent topography.<br>• That have been effectively drained or had their natural water source removed through legal actions.<br>Past and existing cropping or grazing activity does not remove the capacity for a Mapped Wetland area to support wetland-associated native vegetation.<br>Other factors resulting in a Mapped Wetland area being incapable of supporting wetland-associated native vegetation will be assessed on a case-by-case basis. | Aerial photography, on-ground photographs and any other evidence to support the determination.<br>Where the potential inundation or waterlogging period is debatable, applicants are required to commission a supporting hydrological assessment, undertaken by a suitably qualified person. | Written agreement from the Secretary to DEECA |

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## Legend

- Study Area
- Greater Avalon (Employment) North
- Greater Avalon (Employment) West
- Railway
- Freeway
- Highway
- Arterial road
- Collector road
- Local or minor road
- Minor Watercourse
- Permanent Waterbody
- Land Subject To Inundation
- Wetland/Swamp
- Ramsar wetland
- Parks and Reserves
- Commonwealth Land
- Crown Land
- Localities

# Figure 1

**Location of the study area**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

0 1 2
Kilometers

Map Scale: 1:75,000 @ A4
Coordinate System: GDA 1994 MGA Zone 55

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Base data source: Victoria State Government. Disclaimer: the State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

16884_Fig01_StudyArea 5/02/2025 melsley

# Figure 2 Overview

## Ecological features

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

**Legend**

- Study Area
- Greater Avalon (Employment) North
- Greater Avalon (Employment) West
- No access
- Ramsar wetland
- DEECA Modelled 'Current Wetlands'

**Ecological Vegetation Classes**

- Brackish Grassland (EVC 934)
- Brackish Wetland (EVC 656)
- Coastal Saltmarsh (EVC 9)
- Plains Grassland (EVC 132)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Woodland (EVC 55)
- Plains Sedgy Wetland (EVC 647)
- Tall Marsh (EVC 821)

N

0 250 500
Metres

Map Scale: 1:43,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

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16884_Fig02_EcoFeat_PMB 5/02/2025 melsley

Aerial source: Nearmap 2024

# Figure 2a

## Ecological features

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

**Legend**

- Study Area
- Greater Avalon (Employment) North
- No access
- DEECA Modelled 'Current Wetlands'

**Ecological Vegetation Classes**

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

N

0 20 40
Metres

Map Scale: 1:4,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

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Aerial source: Nearmap 2024

# Figure 2b

## Ecological features

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

**Legend**

- Study Area
- Greater Avalon (Employment) North
- No access
- Ramsar wetland
- DEECA Modelled 'Current Wetlands'

**Ecological Vegetation Classes**

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

N

0 20 40
Metres

Map Scale: 1:3,500 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

16884_Fig02_EcoFeat_PMB 5/02/2025 melsley

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Aerial source: Nearmap 2024

# Figure 2c

## Ecological features

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

**Legend**

- Study Area
- Greater Avalon (Employment) North
- Ramsar wetland
- DEECA Modelled 'Current Wetlands'

**Ecological Vegetation Classes**

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

**EPBC Act Listed Community**

- Natural Temperate Grassland of the Victorian Volcanic Plain

N

0 30 60

Metres

Map Scale: 1:5,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

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16884_Fig02_EcoFeat_PMB 5/02/2025 melsley

Aerial source: Nearmap 2024

# Figure 2d

**Ecological features**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

**Legend**

- Study Area
- Greater Avalon (Employment) West
- Ramsar wetland
- DEECA Modelled 'Current Wetlands'

**Ecological Vegetation Classes**

- Plains Grassland (EVC 132)
- Plains Grassy Woodland (EVC 55)
- Plains Sedgy Wetland (EVC 647)

N

0 20 40
Metres

Map Scale: 1:3,500 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

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16884_Fig02_EcoFeat_PMB 5/02/2025 melsley

Aerial source: Nearmap 2024

# Figure 2e

**Ecological features**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

**Legend**

- Study Area
- Greater Avalon (Employment) West
- DEECA Modelled 'Current Wetlands'

**Ecological Vegetation Classes**

- Coastal Saltmarsh (EVC 9)
- Plains Grassland (EVC 132)
- Plains Sedgy Wetland (EVC 647)

N

0 20 40

Metres

Map Scale: 1:3,500 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

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16884_Fig02_EcoFeat_PMB 5/02/2025 melsley

Aerial source: Nearmap 2024

# Figure 2f

## Ecological features

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

ecology & heritage partners

## Legend

- Study Area
- Greater Avalon (Employment) West
- Ramsar wetland
- DEECA Modelled 'Current Wetlands'

**EPBC Act Listed Flora**

- Spiny Rice-flower

**Ecological Vegetation Classes**

- Brackish Wetland (EVC 656)
- Coastal Saltmarsh (EVC 9)
- Plains Grassland (EVC 132)
- Plains Grassy Woodland (EVC 55)
- Plains Sedgy Wetland (EVC 647)

**EPBC Act Listed Community**

- Natural Temperate Grassland of the Victorian Volcanic Plain

N

0 55 110

Metres

Map Scale: 1:10,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

16884_Fig02_EcoFeat_PMB 5/02/2025 melsley

Aerial source: Nearmap 2024

# Figure 2g

## Ecological features

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

### Legend

- Study Area
- Greater Avalon (Employment) West
- Ramsar wetland
- DEECA Modelled 'Current Wetlands'

**EPBC Act Listed Flora**

- Spiny Rice-flower

**Ecological Vegetation Classes**

- Brackish Grassland (EVC 934)
- Coastal Saltmarsh (EVC 9)
- Plains Grassland (EVC 132)
- Plains Grassy Wetland (EVC 125)
- Tall Marsh (EVC 821)

**EPBC Act Listed Community**

- Natural Temperate Grassland of the Victorian Volcanic Plain

N

0 55 110
Metres

Map Scale: 1:10,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

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16884_Fig02_EcoFeat_PMB 5/02/2025 melsley

Aerial source: Nearmap 2024

## Legend

- Study Area
- Greater Avalon (Employment) North
- Greater Avalon (Employment) West

**Significant flora**

- Arching Flax-lily
- Australian Grass-wrack
- Basalt Podolepis
- Basalt Sun-orchid
- Brittle Greenhood
- Buloke
- Button Wrinklewort
- Coast Bush-pea
- Coast Saltwort
- Creeping Rush
- Eelgrass
- Fragrant Saltbush
- Giant Honey-myrtle
- Glistening Dock
- Grey Mangrove
- Hairy Shepherd's Purse
- Large-headed Fireweed
- Marsh Saltbush
- Matted Flax-lily
- Melbourne Yellow-gum
- Prickly Arrowgrass
- Purple Blown-grass
- River Swamp Wallaby-grass
- Rye Beetle-grass
- Salt Blown-grass
- Salt Lawrencia
- Sea Water-mat
- Small Milkwort
- Small Scurf-pea
- Snowy River Wattle
- Spiny Rice-flower
- Swamp Diuris
- Tiny Arrowgrass
- Tough Scurf-pea

# Figure 3

**Previously documented significant flora within 5km of the study area**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

0 2 4
Kilometres

Map Scale: 1:72,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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Victorian Biodiversity Atlas (VBA). Sourced from: 'VBA_FLORA25', 'VBA_FLORA100', 'VBA_FAUNA25' and 'VBA_FAUNA100', Updated June 2024 © The State of Victoria, Department of Energy, Environment and Climate Action. Records prior to 1949 not shown. //
Base data source: Victoria State Government. Disclaimer: the State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

16884_Fig03_SigFlora 5/02/2025 melsley

## Legend

- Study Area
- Greater Avalon (Employment) North
- Greater Avalon (Employment) West

**Significant fauna**

- Asian Dowitcher
- Australasian Bittern
- Australian Painted-snipe
- Bar-tailed Godwit
- Black-tailed Godwit
- Blue-winged Parrot
- Brown Treecreeper
- Common Greenshank
- Curlew Sandpiper
- Diamond Firetail
- Eastern Barred Bandicoot
- Eastern Curlew
- Fairy Tern
- Gang-gang Cockatoo
- Golden Sun Moth
- Grassland Earless Dragon
- Great Knot
- Greater Sand Plover
- Grey Plover
- Grey-headed Flying-fox
- Growling Grass Frog
- Hooded Plover
- Hooded Robin
- Indian Yellow-nosed Albatross
- Latham's Snipe
- Leathery Turtle
- Lesser Sand Plover
- Orange-bellied Parrot
- Pink Cockatoo
- Red Knot
- Regent Honeyeater
- Ruddy Turnstone
- Sharp-tailed Sandpiper
- Southern Giant-Petrel
- Southern Right Whale
- Southern Whiteface
- Striped Legless Lizard
- Superb Parrot
- Swift Parrot
- Terek Sandpiper
- White-throated Needletail

**Ecology and Heritage Partners 2024**

- Blue-winged Parrot
- Golden Sun Moth
- Tussock Skink

# Figure 4

## Previously documented significant fauna within 5km of the study area

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

N

0 2 4

Kilometres

Map Scale: 1:72,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

ecology & heritage partners

Victorian Biodiversity Atlas (VBA). Sourced from: 'VBA_FLORA25', 'VBA_FLORA100', 'VBA_FAUNA25' and 'VBA_FAUNA100', Updated June 2024 © The State of Victoria, Department of Energy, Environment and Climate Action. Records prior to 1949 not shown. //
Base data source: Victoria State Government. Disclaimer: the State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

# Figure 5

**Targeted fauna survey locations**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

## Legend

- Study Area
- Greater Avalon (Employment) North
- Greater Avalon (Employment) West
- Property boundary
- No access / permission
- Growling Grass Frog survey locations
- Growling Grass Frog survey locations - auditory survey only
- Striped Legless Lizard tile grid location
- Striped Legless Lizard tile grid location (Tussock Skink recorded)
- Avifauna survey areas

N

0 300 600

Metres

Map Scale: 1:43,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

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16884_Fig05_TFaunaSurvLoc_P 5/02/2025 melsley

Aerial source: Nearmap 2024

# Figure 6 Overview

**Golden Sun Moth survey**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

## Legend

- Study Area
- Greater Avalon (Employment) North
- Greater Avalon (Employment) West
- Property boundary
- No access / permission

**Golden Sun Moth records**

- Survey date: 04/12/2023

**Survey tracks**

- Survey date: 11/01/2024
- Survey date: 06/01/2024
- Survey date: 23/12/2023
- Survey date: 18/12/2023
- Survey date: 04/12/2023
- Survey date: 24/11/2023

N

0 300 600

Metres

Map Scale: 1:43,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

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16884_Fig06_GSM_SurveyPMB 5/02/2025 melsley

Aerial source: Nearmap 2024

# Figure 6a

**Golden Sun Moth survey**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

## Legend

- Study Area
- Greater Avalon (Employment) North
- Property boundary
- No access / permission

**Golden Sun Moth records**

- Survey date: 04/12/2023

**Survey tracks**

- Survey date: 11/01/2024
- Survey date: 06/01/2024
- Survey date: 23/12/2023
- Survey date: 18/12/2023
- Survey date: 04/12/2023
- Survey date: 24/11/2023

N

0 90 180

Metres

Map Scale: 1:13,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

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16884_Fig06_GSM_SurveyPMB 5/02/2025 melsley

Aerial source: Nearmap 2024

**Figure 6b**

**Golden Sun Moth survey**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

**Legend**

- Study Area
- Greater Avalon (Employment) West
- Property boundary

**Golden Sun Moth records**

- Survey date: 04/12/2023

**Survey tracks**

- Survey date: 11/01/2024
- Survey date: 18/12/2023
- Survey date: 04/12/2023
- Survey date: 24/11/2023

N

0 70 140

Metres

Map Scale: 1:10,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

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16884_Fig06_GSM_SurveyPMB 5/02/2025 melsley

Aerial source: Nearmap 2024

# Figure 7

**Targeted fauna survey results**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

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## Legend

- Study Area
- Greater Avalon (Employment) North
- Greater Avalon (Employment) West
- Property boundary
- No access / permission

**Species observed**

- Blue-winged Parrot
- Tussock Skink

N

0 300 600

Metres

Map Scale: 1:43,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

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16884_Fig07_TFaunaResultsP 5/02/2025 melsley

Aerial source: Nearmap 2024

# Figure 8

**Confirmed and potential fauna habitat**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

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## Legend

- Study Area
- Greater Avalon (Employment) North
- Greater Avalon (Employment) West
- Property boundary
- No access / permission
- Confirmed Tussock Skink habitat
- Potential Tussock Skink habitat
- Confirmed Golden Sun Moth habitat
- Potential Golden Sun Moth habitat
- Confirmed Fat-tailed Dunnart
- Potential Fat-tailed Dunnart
- Potential Victorian Grassland Earless Dragon habitat
- Potential Striped Legless Lizard habitat
- Significant Avifauna potential habitat

N

0 300 600
Metres

Map Scale: 1:43,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 55

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

16884_Fig08_FaunaHabP 5/02/2025 melsley

Aerial source: Nearmap 2024

## Legend

- Study Area
- Greater Avalon (Employment) North
- Greater Avalon (Employment) West
- Habitat Distribution Modelling for Victorian Grassland Earless Dragon (DEECA 2024)

# Figure 9

**Habitat Distribution Modelling for Victorian Grassland Earless Dragon (DEECA 2024)**

*Biodiversity Assessment and Targeted Flora and Fauna Surveys for the Greater Avalon (Employment) Precinct*

N

0 500 1,000
Metres

Map Scale: 1:50,000 @ A4
Coordinate System: GDA 1994 MGA Zone 55

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# APPENDIX 1 FLORA

## Appendix 1.1 Flora Results

Legend:

**CR** Critically Endangered under the EPBC Act
**^** Naturally growing (i.e. non-planted) indigenous species to the study area
**+** Naturally growing indigenous species that also occurs as planted indigenous vegetation to the study area
**#** Planted Victorian (non-indigenous) and Australian species
***** Listed as a noxious weed under the CaLP Act
**W** Weed of National Significance

**Table A1.1.** Flora within the Project Site.

| Scientific Name | Common Name | Notes |
|---|---|---|
| **INDIGENOUS SPECIES** | | |
| *Acacia paradoxa* | Hedge Wattle | ^ |
| *Acacia pycnantha* | Golden Wattle | ^ |
| *Asperula conferta* | Common Woodruff | ^ |
| *Atriplex semibaccata* | Berry Saltbush | ^ |
| *Austrostipa bigeniculata* | Kneed Spear-grass | ^ |
| *Bolboschoenus caldwellii* | Salt Club-sedge | ^ |
| *Bolboschoenus medianus* | Marsh Club-sedge | ^ |
| *Carex appressa* | Tall Sedge | ^ |
| *Carpobrotus rossii* | Karkalla | ^ |
| *Chloris truncata* | Windmill Grass | ^ |
| *Convolvulus erubescens* | Pink Bindweed | ^ |
| *Dichondra repens* | Kidney-weed | ^ |
| *Distichlis distichophylla* | Australian Salt-grass | ^ |
| *Distichlis distichophylla* | Australian Salt-grass | ^ |
| *Eleocharis acuta* | Common Spike-sedge | ^ |
| *Enchylaena tomentosa var. tomentosa* | Ruby Saltbush | ^ |
| *Eucalyptus camaldulensis* | River Red-gum | + |
| *Frankenia pauciflora* var. *gunnii* | Southern Sea-heath | ^ |
| *Gahnia filum* | Chaffy Saw-sedge | ^ |
| *Isolepis cernua* | Nodding Club-sedge | ^ |
| *Juncus kraussii subsp. australiensis* | Sea Rush | ^ |
| *Juncus spp.* | Rush | ^ |
| *Lachnagrostis filiformis* | Common Blown-grass | ^ |

| Scientific Name | Common Name | Notes |
|---|---|---|
| *Lythrum hyssopifolia* | Small Loosestrife | ^ |
| *Pimelea spinescens* subsp. *spinescens* | Spiny Rice-flower | CR |
| *Poa labillardierei* | Common Tussock-grass | ^ |
| *Poa poiformis* | Coast Tussock-grass | ^ |
| *Rytidosperma auriculatum* | Lobed Wallaby-grass | ^ |
| *Rytidosperma caespitosum* | Common Wallaby-grass | ^ |
| *Rytidosperma setaceum* | Bristly Wallaby-grass | ^ |
| *Salicornia quinqueflora* | Beaded Glasswort | ^ |
| *Samolus repens* | Creeping Brookweed | ^ |
| *Schoenus apogon* | Common Bog-sedge | ^ |
| *Schoenus nitens* | Shiny Bog-sedge | ^ |
| *Suaeda australis* | Austral Seablite | ^ |
| *Tecticornia arbuscula* | Shrubby Glasswort | ^ |
| *Tecticornia pergranulata* | Blackseed Glasswort | ^ |
| *Themeda triandra* | Kangaroo Grass | ^ |
| *Triglochin striata* | Streaked Arrowgrass | ^ |
| *Typha domingensis* | Narrow-leaf Cumbungi | ^ |
| *Wilsonia rotundifolia* | Round-leaf Wilsonia | ^ |
| **NON-INDIGENOUS OR INTRODUCED SPECIES** | | |
| *Aira cupaniana* | Quicksilver Grass | - |
| *Aizoon pubescens* | Galenia | - |
| *Arctotheca calendula* | Cape Weed | - |
| *Asphodelus fistulosus* | Onion Weed | - |
| *Avena fatua* | Wild Oat | - |
| *Berkheya rigida* | African Thistle | - |
| *Brassica* spp. | Turnip | - |
| *Briza maxima* | Large Quaking-grass | - |
| *Bromus catharticus* | Prairie Grass | - |
| *Bromus hordeaceus* | Soft Brome | - |
| *Callistemon* spp. | Bottlebrush | |
| *Casuarina cunninghamiana* subsp. *cunninghamiana* | River Oak | # |
| *Cenchrus clandestinus* | Kikuyu | - |
| *Cirsium vulgare* | Spear Thistle | * |
| *Corymbia maculata* | Spotted Gum | # |
| *Cynara cardunculus* subsp. *flavescens* | Artichoke Thistle | * |
| *Cynodon dactylon* | Couch | - |

| Scientific Name | Common Name | Notes |
|---|---|---|
| *Cyperus eragrostis* | Drain Flat-sedge | - |
| *Dactylis glomerata* | Cocksfoot | - |
| *Echium plantagineum* | Paterson's Curse | * |
| *Eucalyptus cladocalyx* | Sugar Gum | # |
| *Eucalyptus spathulata* subsp. *spathulata* | Swamp Mallet | # |
| *Gazania linearis* | Gazania | - |
| *Helminthotheca echioides* | Ox-tongue | - |
| *Hordeum* spp. | Barley | - |
| *Lolium perenne* | Perennial Rye-grass | - |
| *Lycium ferocissimum* | African Box-thorn | *W |
| *Lysimachia arvensis* var. *arvensis* | Scarlet Pimpernel | - |
| *Malva* sp. | Mallow | - |
| *Melaleuca armillaris* subsp. *armillaris* | Giant Honey-myrtle | # |
| *Melaleuca linariifolia* | Flax-leaf Paperbark | # |
| *Nassella hyalina* | Cane Needle-grass | - |
| *Nassella neesiana* | Chilean Needle-grass | *W |
| *Nassella trichotoma* | Serrated Tussock | *W |
| *Paspalum* spp. | Paspalum | - |
| *Phalaris aquatica* | Toowoomba Canary-grass | - |
| *Pinus radiata* | Radiata Pine | # |
| *Plantago coronopus* | Buck's-horn Plantain | - |
| *Plantago lanceolata* | Ribwort | - |
| *Romulea rosea* | Onion Grass | - |
| *Salvia verbenaca* var. *verbenaca* | Wild Sage | - |
| *Solanum nigrum* | Black Nightshade | - |
| *Sonchus asper* | Rough Sow-thistle | - |
| *Sonchus oleraceus* | Common Sow-thistle | - |
| *Sporobolus africanus* | Rat-tail Grass | - |
| *Trifolium angustifolium var. angustifolium* | Narrow-leaf Clover | - |
| *Vicia sativa* | Common Vetch | - |
| *Vulpia* spp. | Fescue | - |

# Appendix 1.2 Habitat Hectare Assessment

**Table A1.2.** Condition Scores recorded during the field assessment.

| Vegetation Zone | | PG1 | PG2 | PG3 | BW1 | BG1 | PGW1 | PGW2 | TM1 | PSW1 | PSW2 | PGWe1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bioregion | | VVP | VVP | VVP | VVP | VVP | VVP | VVP | VVP | VVP | VVP | VVP |
| EVC | | PG(LR) | PG(LR) | PG(LR) | BW | BG | PGW | PGW | TM | PSWe | PSWe | PGWe |
| EVC Number | | 132_63 | 132_63 | 132_63 | 656 | 934 | 55_61 | 55_61 | 821 | 647 | 647 | 125 |
| EVC Conservation Status | | En | En | En | En | En | En | En | LC | En | En | En |
| Site Condition /75 | Large Trees /10 | N/A | N/A | N/A | N/A | N/A | 0 | 6 | N/A | N/A | N/A | N/A |
| | Tree Canopy Cover /5 | N/A | N/A | N/A | N/A | N/A | 0 | 5 | N/A | N/A | N/A | N/A |
| | Lack of Weeds /15 | 2 | 9 | 13 | 20 | 9 | 0 | 4 | 0 | 2 | 9 | 0 |
| | Understorey /25 | 5 | 5 | 5 | 9 | 15 | 5 | 5 | 5 | 5 | 15 | 5 |
| | Recruitment /10 | 3 | 3 | 3 | 6 | 3 | 0 | 5 | 0 | 0 | 0 | 3 |
| | Organic Matter /5 | 0 | 3 | 3 | 3 | 5 | 0 | 3 | 2 | 3 | 3 | 2 |
| | Logs /5 | N/A | N/A | N/A | N/A | N/A | 0 | 0 | N/A | N/A | N/A | NA |
| | Treeless EVC Multiplier | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 | 1.00 | 1.00 | 1.36 | 1.36 | 1.36 | 1.36 |
| | Subtotal = | 13.60 | 27.20 | 32.64 | 51.68 | 43.52 | 5.00 | 28.00 | 9.52 | 13.60 | 36.72 | 13.60 |
| Landscape Context /25 | Patch Size /10 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| | Neighbourhood /10 | 1 | 2 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 1 |
| | Distance to Core Area /5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Subtotal = | 3 | 4 | 3 | 4 | 5 | 3 | 3 | 3 | 4 | 4 | 4 |
| Habitat Points /100 | | 17 | 31 | 36 | 56 | 49 | 8 | 31 | 13 | 18 | 41 | 18 |
| Habitat Score | | 0.17 | 0.31 | 0.36 | 0.56 | 0.49 | 0.08 | 0.31 | 0.13 | 0.18 | 0.41 | 0.18 |

**Notes:** VVP = Victorian Volcanic Plain bioregion; En = Endangered; LC = Least Concern; PG = Plains Grassland; BW = Brackish Wetland; BG = Brackish Grassland; PGW = Plains Grassy Woodland; PGWe = Plains Grassy Wetland; TM = Tall Marsh; PSW = Plains Sedgy Wetland.

| Vegetation Zone | | CS1 | CS2 | CS3 | CS4 | CS5 | CS6 | CS7 | CS8 |
|---|---|---|---|---|---|---|---|---|---|
| Bioregion | | VVP | VVP | VVP | VVP | VVP | VVP | VVP | VVP |
| EVC | | CS | CS | CS | CS | CS | CS | CS | CS |
| EVC Number | | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| EVC Conservation Status | | Vu | Vu | Vu | Vu | Vu | Vu | Vu | Vu |
| Site Condition /75 | Large Trees /10 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | Tree Canopy Cover /5 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | Lack of Weeds /15 | 2 | 9 | 6 | 2 | 2 | 9 | 9 | 9 |
| | Understorey /25 | 15 | 25 | 20 | 15 | 15 | 25 | 25 | 25 |
| | Recruitment /10 | 3 | 6 | 6 | 3 | 3 | 6 | 6 | 6 |
| | Organic Matter /5 | 4 | 5 | 4 | 4 | 4 | 5 | 5 | 5 |
| | Logs /5 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | Treeless EVC Multiplier | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 |
| | Subtotal = | 32.64 | 61.20 | 48.96 | 32.64 | 32.64 | 61.20 | 61.20 | 61.20 |
| Landscape Context /25 | Patch Size /10 | 1 | 6 | 8 | 2 | 4 | 4 | 2 | 1 |
| | Neighbourhood /10 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Distance to Core Area /5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Subtotal = | 5 | 10 | 12 | 6 | 8 | 8 | 6 | 5 |
| Habitat Points /100 | | 38 | 71 | 61 | 39 | 41 | 69 | 67 | 66 |
| Habitat Score | | 0.38 | 0.71 | 0.61 | 0.39 | 0.41 | 0.69 | 0.67 | 0.66 |

**Notes:** VVP = Victorian Volcanic Plain bioregion; Vu = Vulnerable; CS = Coastal Saltmarsh.

# Appendix 1.3 Significant Flora Species

Significant flora within 10 kilometres of the study area is provided in the Table A1.3.3 at the end of this section, with Tables A1.3.1 and A1.3.2 below providing the background context for the values in Table 1.3.3.

**Table A1.3.1** Conservation status of each species for each Act/policy. The values in this table correspond to Columns 5 to 7 in Table A1.3.3.

| EPBC Act (*Environment Protection and Biodiversity Conservation Act 1999*): | | FFG (*Flora and Fauna Guarantee Act 1988*): | |
|---|---|---|---|
| EX | Extinct | ex | Extinct |
| CR | Critically endangered | vu | Vulnerable |
| EN | Endangered | cr | Critically endangered |
| VU | Vulnerable | en | Endangered |
| # | Listed on the Protected Matters Search Tool | | |

**Table A1.3.2** Likelihood of occurrence rankings: Habitat characteristics assessment of significant flora species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area to determine their likelihood of occurrence. The values in this table correspond to Column 8 in Table A1.3.3.

| | | |
|---|---|---|
| 1 | Known Occurrence | • Recorded within the study area recently (i.e. within ten years). |
| 2 | High Likelihood | • Previous records of the species in the local vicinity; and/or,<br>• The study area contains areas of high-quality habitat. |
| 3 | Moderate Likelihood | • Limited previous records of the species in the local vicinity; and/or<br>• The study area contains poor or limited habitat. |
| 4 | Low Likelihood | • Poor or limited habitat for the species, however other evidence (such as lack of records or environmental factors) indicates there is a very low likelihood of presence. |
| 5 | Unlikely | • No suitable habitat and/or outside the species range. |

**Table A1.3.3** Significant flora recorded within 10 kilometres of the study area.

| Scientific name | Common name | Last documented record | Total # of documented records | EPBC | FFG | Likely occurrence in study area ^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|
| **NATIONAL SIGNIFICANCE** | | | | | | | |
| *Amphibromus fluitans* | River Swamp Wallaby-grass | 4 | 2001 | VU | - | 4 | Poor quality, highly modified habitat within the study area. Not detected despite targeted surveys. |
| *Caladenia pumila #* | Dwarf Spider-orchid | - | - | CR | cr | 5 | No suitable habitat |
| *Dianella amoena* | Matted Flax-lily | 22 | 2014 | EN | cr | 4 | Poor quality, highly modified habitat within the study area. Not detected despite targeted surveys. |
| *Diuris basaltica* | Small Golden Moths | 1 | 1998 | EN | cr | 4 | Poor quality, highly modified habitat within the study area. |
| *Diuris fragrantissima #* | Sunshine Diuris | - | - | EN | cr | 4 | Poor quality, highly modified habitat within the study area. Only known natural population in Sunshine, VIC. |
| *Dodonaea procumbens* | Trailing Hop-bush | - | - | VU | - | 5 | No suitable habitat |
| *Euphrasia collina* subsp. *muelleri* | Purple Eyebright | 2 | 1853 | EN | en | 5 | No suitable habitat |
| *Glycine latrobeana* | Clover Glycine | 1 | 1770 | VU | vu | 4 | Poor quality, highly modified habitat within the study area. No recent records |
| *Lachnagrostis adamsonii #* | Adamson's Blown-grass | - | - | EN | en | 4 | Poor quality, highly modified habitat within the study area. No previous records within 10km of the study area |

| Scientific name | Common name | Last documented record | Total # of documented records | EPBC | FFG | Likely occurrence in study area ^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|
| *Lepidium aschersonii #* | Spiny Peppercress | - | - | VU | en | 4 | Poor quality, highly modified habitat within the study area. No recent records |
| *Lepidium hyssopifolium #* | Basalt Pepper-cress | - | - | EN | en | 4 | Poor quality, highly modified habitat within the study area. No recent records |
| *Leucochrysum albicans* subsp. *tricolor* | White Sunray | 1 | 1853 | EN | en | 4 | Poor quality, highly modified habitat within the study area. No recent records |
| *Pimelea spinescens* subsp. *spinescens* | Spiny Rice-flower | 611 | 2021 | CR | cr | 1 | Recorded within the (undeveloped) Gillets Road easement within GA(E)W. |
| *Prasophyllum spicatum* | Dense Leek-orchid | 6 | 1934 | VU | cr | 5 | No suitable habitat |
| *Prasophyllum suaveolens* | Fragrant Leek-orchid | 1 | 1924 | EN | cr | 5 | No suitable habitat |
| *Pterostylis chlorogramma #* | Green-striped Greenhood | - | - | VU | en | 5 | No suitable habitat |
| *Pterostylis cucullate #* | Leafy Greenhood | - | - | VU | en | 5 | No suitable habitat |
| *Rutidosis leptorhynchoides* | Button Wrinklewort | 30 | 2011 | EN | en | 4 | Poor quality, highly modified habitat within the study area. Not detected despite targeted surveys. |
| *Senecio macrocarpus* | Large-headed Fireweed | 60 | 2011 | VU | cr | 4 | Poor quality, highly modified habitat within the study area. Not detected despite targeted surveys. |
| *Senecio psilocarpus #* | Swamp Fireweed | - | - | VU | - | 5 | No suitable habitat |
| *Thelymitra epipactoides #* | Metallic Sun-orchid | - | - | EN | en | 5 | No suitable habitat |
| *Thelymitra matthewsii #* | Spiral Sun-orchid | - | - | VU | en | 5 | No suitable habitat |

| Scientific name | Common name | Last documented record | Total # of documented records | EPBC | FFG | Likely occurrence in study area ^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|
| *Xerochrysum palustre #* | Swamp Everlasting | - | - | VU | cr | 5 | No suitable habitat |
| **STATE SIGNIFICANCE** | | | | | | | |
| *Acacia boormanii* | Snowy River Wattle | 1 | 2002 | - | en | 5 | No suitable habitat; outside species natural range |
| *Acacia cupularis* | Cup Wattle | 1 | 1983 | - | cr | 5 | No suitable habitat. |
| *Allocasuarina luehmannii* | Buloke | 3 | 2007 | - | vu | 5 | No suitable habitat |
| *Althenia marina* | Sea Water-mat | 3 | 2010 | - | cr | 5 | No suitable habitat |
| *Amyema pendula* subsp. *longifolia* | Drooping Mistletoe | 1 | 2002 | - | cr | 5 | No suitable habitat; known only from north-west Victoria |
| *Atriplex paludosa* subsp. *paludosa* | Marsh Saltbush | 13 | 1994 | - | en | 4 | Potential habitat in the south of the study area. Not detected despite survey effort and not recorded during previous assessments (Biosis 2023) |
| *Avicennia marina* subsp. *australasica* | Grey Mangrove | 5 | 2003 | - | en | 5 | No suitable habitat |
| *Calotis anthemoides* | Cut-leaf Burr-daisy | 4 | 1923 | - | cr | 4 | Poor quality, highly modified habitat within the study area. |
| *Comesperma polygaloides* | Small Milkwort | 31 | 2013 | - | cr | 4 | Poor quality, highly modified habitat within the study area. |
| *Coronidium gunnianum* | Pale Swamp Everlasting | 1 | 1904 | - | cr | 5 | No suitable habitat |
| *Corymbia maculata* | Spotted Gum | 1 | 2018 | - | vu | 5 | Outside species natural range – records likely of planted origin |
| *Cullen parvum* | Small Scurf-pea | 3 | 2010 | - | en | 4 | Poor quality, highly modified habitat within the study area. |

| Scientific name | Common name | Last documented record | Total # of documented records | EPBC | FFG | Likely occurrence in study area ^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|
| | | | | | | | Not detected despite targeted surveys. |
| *Cullen tenax* | Tough Scurf-pea | 4 | 2003 | - | en | 4 | Poor quality, highly modified habitat within the study area. Not detected despite targeted surveys. |
| *Dianella longifolia* var. *grandis* (formerly *Dianella* sp. aff. *longifolia [Benambra])* | Arching Flax-lily | 117 | 2011 | - | cr | 4 | Poor quality, highly modified habitat within the study area. Not recorded within the study area despite survey effort. |
| *Diuris palustris* | Swamp Diuris | 7 | 1971 | - | en | 5 | No suitable habitat |
| *Eragrostis trachycarpa* | Rough-grain Love-grass | 1 | 1979 | - | en | 5 | Outside species known natural range |
| *Eucalyptus leucoxylon* subsp. *connata* | Melbourne Yellow-gum | 5 | 2011 | - | en | 5 | No suitable habitat |
| *Goodenia macbarronii* | Narrow Goodenia | 2 | 2009 | - | en | 5 | Outside species known natural range |
| *Grevillea chrysophaea* | Golden Grevillea | 1 | 1770 | - | vu | 5 | No suitable habitat |
| *Grevillea rosmarinifolia* subsp. *glabella* | Smooth Grevillea | 1 | 1980 | - | en | 5 | No suitable habitat |
| *Grevillea steiglitziana* | Brisbane Range Grevillea | 1 | 1770 | - | en | 5 | No suitable habitat |
| *Heterozostera nigricaulis* | Australian Grass-wrack | 4 | 2010 | - | en | 5 | No suitable habitat |
| *Heterozostera tasmanica* | Eelgrass | 3 | 2011 | - | en | 5 | No suitable habitat |
| *Juncus revolutus* | Creeping Rush | 2 | 2022 | - | en | 4 | Potential habitat within the south of the study area. Not recorded within the study area despite survey effort and not recorded during previous assessments (Biosis 2023). |

| Scientific name | Common name | Last documented record | Total # of documented records | EPBC | FFG | Likely occurrence in study area ^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|
| *Lachnagrostis robusta* | Salt Blown-grass | 1 | 1997 | - | en | 4 | Potential habitat within the south of the study area; not recorded during previous assessments (Biosis 2023) or field assessment |
| *Lachnagrostis semibarbata* var. *semibarbata* | Purple Blown-grass | 3 | 2010 | - | en | 5 | No suitable habitat |
| *Lawrencia spicata* | Salt Lawrencia | 7 | 2010 | - | en | 4 | Potential habitat within the south of the study area; Not recorded within the study area despite survey effort., and no recorded during previous assessments (Biosis 2023) |
| *Leptorhynchos elongatus* | Lanky Buttons | 1 | 1770 | - | en | 5 | No suitable habitat |
| *Malva preissiana s.s.* (white-flowered coastal form) | Coast Hollyhock | 1 | 1993 | - | en | 4 | Poor quality, highly modified habitat within the study area. |
| *Melaleuca armillaris* subsp. *armillaris* | Giant Honey-myrtle | 5 | 2020 | - | en | 5 | Outside of species natural range – records likely of planted origin |
| *Microlepidium pilosulum* | Hairy Shepherd's Purse | 1 | 2009 | - | cr | 5 | Outside of species natural range |
| *Nicotiana suaveolens* | Austral Tobacco | 14 | 2012 | - | en | 5 | No suitable habitat |
| *Podolepis linearifolia* | Basalt Podolepis | 18 | 2012 | - | en | 4 | Poor quality, highly modified habitat within the study area. |
| *Prostanthera nivea* var. *nivea* | Snowy Mint-bush | 18 | 2015 | - | vu | 5 | No suitable habitat |
| *Pterostylis truncata* | Brittle Greenhood | 758 | 2021 | - | cr | 4 | Poor quality, highly modified habitat within the study area. |

| Scientific name | Common name | Last documented record | Total # of documented records | EPBC | FFG | Likely occurrence in study area ^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|
| | | | | | | | Not observed during targeted surveys |
| *Pultenaea canaliculata* | Coast Bush-pea | 1 | 2007 | - | en | 5 | No suitable habitat |
| *Rhagodia parabolica* | Fragrant Saltbush | 7 | 2018 | - | vu | 4 | Poor quality, highly modified habitat within the study area. Not recorded within the study area despite survey effort. |
| *Rumex crystallinus s.s.* | Glistening Dock | 1 | 1982 | - | en | 5 | Poor quality, highly modified habitat within the study area. Predominantly known from north-west Victoria |
| *Rytidosperma monticola* | Small-flower Wallaby-grass | 1 | 2008 | - | en | 5 | No suitable habitat |
| *Rytidosperma richardsonii* | Straw Wallaby-grass | 1 | 1961 | - | en | 5 | No suitable habitat. Predominantly known from north-east Victoria |
| *Salsola tragus* subsp. *pontica* | Coast Saltwort | 6 | 2010 | - | en | 4 | Potential habitat within the south of the study area. Not recorded within the study area despite survey effort. And recorded during previous assessments (Biosis 2023) |
| *Swainsona behriana* | Southern Swainson-pea | 3 | 1926 | - | en | 5 | No suitable habitat |
| *Thelymitra gregaria* | Basalt Sun-orchid | 2 | 2010 | - | cr | 5 | No suitable habitat |
| *Triglochin minutissima* | Tiny Arrowgrass | 2 | 1990 | - | en | 4 | Potential habitat within the south of the study area. Not recorded within the study area despite survey effort and not recorded during previous assessments (Biosis 2023) |

| Scientific name | Common name | Last documented record | Total # of documented records | EPBC | FFG | Likely occurrence in study area ^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|
| *Triglochin mucronata* | Prickly Arrowgrass | 3 | 2009 | - | en | 3 | Potential habitat within the south of the study area; Not recorded within the study area despite survey effort and not recorded during previous assessments (Biosis 2023). |
| *Tripogonella loliiformis* | Rye Beetle-grass | 30 | 2018 | - | en | 4 | Poor quality, highly modified habitat within the study area; multiple records within Avalon Airport (BLA 2013). Not recorded within the study area despite survey effort |

Data Sources: Victorian Biodiversity Atlas (DEECA 2024d); Protected Matters Search Tool (DCCEEW 2024a). ^ Likelihood of occurrence post-survey effort

# APPENDIX 2 FAUNA

## Appendix 2.1 Fauna List

**Table A2.1.** Fauna species recorded during the ecological survey.

| Common Name | Scientific Name | Native / Introduced |
|---|---|---|
| **Mammals** | | |
| European Hare | *Lepus europaeus* | Introduced |
| European Rabbit | *Oryctolagus cuniculus* | Introduced |
| Eastern Grey Kangaroo | *Macropus giganteus* | Native |
| Red Fox | *Vulpes vulpes* | Introduced |
| **Birds** | | |
| Australian Magpie | *Gymnorhina tibicen* | Native |
| Australian White Ibis | *Threskiornis molucca* | Native |
| Black Swan | *Cygnus atratus* | Native |
| Black-shouldered Kite | *Elanus axillaris* | Native |
| Blue-winged parrot | *Neophema chrysostoma* | Native |
| Brown Falcon | *Falco berigora* | Native |
| Chestnut Teal | *Anas castanea* | Native |
| Double-banded Plover | *Charadrius bicinctus* | Native |
| Eurasian Skylark | *Alauda arvensis* | Introduced |
| Golden-headed Cisticola | *Cisticola exilis* | Native |
| Grey Goshawk | *Accipiter novaehollandiae* | Native |
| Grey Teal | *Anas gracilis* | Native |
| Little Corella | *Cacatua sanguinea* | Native |
| Little Eagle | *Hieraaetus morphnoides* | Native |
| Little Pied Cormorant | *Microcarbo melanoleucos* | Native |
| Masked Lapwing | *Vanellus miles* | Native |
| Nankeen Kestrel | *Falco cenchroides* | Native |
| New Holland Honeyeater | *Phylidonyris novaehollandiae* | Native |
| Pacific Black Duck | *Anas superciliosa* | Native |
| Pied Cormorant | *Phalacrocorax varius* | Native |
| Red-capped Plover | *Charadrius ruficapillus* | Native |
| Red-necked Stint | *Calidris ruficollis* | Native |
| Red-rumped Parrot | *Psephotus haematonotus* | Native |
| Spotted Harrier | *Circus assimilis* | Native |
| Straw-necked Ibis | *Threskiornis spinicollis* | Native |

| Common Name | Scientific Name | Native / Introduced |
|---|---|---|
| Superb Fairy-wren | *Malurus cyaneus* | Native |
| Swamp Harrier | *Circus approximans* | Native |
| Wedge-tailed eagle | *Aquila audax* | Native |
| Welcome Swallow | *Hirundo neoxena* | Native |
| Whistling Kite | *Haliastur sphenurus* | Native |
| White-faced Heron | *Egretta novaehollandiae* | Native |
| White-fronted Chat | *Epthianura albifrons* | Native |
| Willie wagtail | *Rhipidura leucophrys* | Native |
| Yellow-billed Spoonbill | *Platalea flavipes* | Native |
| **Reptiles** | | |
| Common Blue-tongued Lizard | *Tiliqua scincoides scincoides* | Native |
| Eastern Three-lined Skink | *Acritoscincus duperreyi* | Native |
| Garden Skink | *Lampropholis guichenoti* | Native |
| Little Whip Snake | *Parasuta flagellum* | Native |
| Tiger Snake | *Notechis scutatus* | Native |
| Tussock Skink | *Pseudemoia pagenstecheri* | Native |
| **Frogs** | | |
| Common Froglet | *Crinia signifera* | Native |
| Eastern Banjo Frog | *Limnodynastes dumerilii* | Native |
| Spotted Marsh Frog | *Limnodynastes tasmaniensis* | Native |
| **Invertebrates** | | |
| Golden Sun Moth | *Synemon plana* | Native |

# Appendix 2.2 Tile Grid Data

**Table A1.1.** Results of the tile grid surveys.

| Tile Check # | Date | Time | Grid # | Temp (°C) | Wind speed (km/ph) | Wind direction | Relative Humidity (%) | Above Tile Temp C° | Under Tile Temp C° | Observations | No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 28/09/2023 | 8:55-13:40 | 1 | 16.8 | 18.5 | W | 56 | 32.6 | 22.6 | Garden Skink | 1 |
| | | | 11 | - | - | - | - | 34.4 | 24.0 | Spotted Marsh Frog | 1 |
| | | | 19 | 18.6 | 18.5 | W | 51 | 40.1 | 27.1 | Garden Skink | 1 |
| 2 | 06/10/2023 | 8:20-12:15 | 19 | 7.0 | 13.0 | W | 91 | - | - | Spotted Marsh Frog | 2 |
| | | | 18 | - | - | - | - | - | - | Spotted Marsh Frog | 3 |
| | | | 17 | - | - | - | - | - | - | Spotted Marsh Frog | 3 |
| | | | | | | | | | | Little Whip Snake | 1 |
| | | | 16 | - | - | - | - | - | - | Spotted Marsh Frog | 6 |
| | | | 14 | - | - | - | - | - | - | Spotted Marsh Frog | 3 |
| | | | 13 | - | - | - | - | - | - | Little Whip Snake | 3 |
| | | | 11 | 12.8 | 20.4 | SW | 69 | - | - | Spotted Marsh Frog | 2 |
| | | | 1 | - | - | - | - | - | - | Spotted Marsh Frog | 1 |
| | | | 6 | 13.2 | 27.8 | S | 61 | - | - | Tussock Skink | 1 |
| | | | | | | | | | | Garden Skink | 1 |
| | | | 5 | - | - | - | - | - | - | Spotted Marsh Frog | 1 |
| | | | | | | | | | | Garden Skink | 1 |
| | | | 4 | - | - | - | - | - | - | Eastern Three-lined Skink | 1 |
| 3 | 13/10/2023 | 8:00-13:30 | 2 | 12.7 | 33.3 | WNW | 79 | 15.9 | 13.3 | Eastern Three-lined Skink | 1 |

| Tile Check # | Date | Time | Grid # | Temp (°C) | Wind speed (km/ph) | Wind direction | Relative Humidity (%) | Above Tile Temp C° | Under Tile Temp C° | Observations | No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 12 | 14.1 | 27.8 | WNW | 75 | 18.1 | 18.0 | Spotted Marsh Frog | 1 |
| | | | 14 | - | - | - | - | 19.6 | 14.2 | Spotted Marsh Frog | 7 |
| | | | 13 | - | - | - | - | 22.6 | 20.4 | Spotted Marsh Frog | 1 |
| | | | 15 | - | - | - | - | 27.2 | 20.4 | Spotted Marsh Frog | 1 |
| | | | | | | | | | | Little Whip Snake | 1 |
| | | | 16 | 14.9 | 37.0 | WNW | 82 | 21.7 | 20.2 | Spotted Marsh Frog | 7 |
| | | | 18 | - | - | - | - | 20.1 | 17.1 | Spotted Marsh Frog | 11 |
| | | | 19 | 14.5 | 27.8 | W | 85 | 14.2 | 19.6 | Spotted Marsh Frog | 4 |
| | | | | | | | | | | Eastern Striped Skink | 1 |
| **4** | 18/10/2023 | 8:20-14:00 | 19 | 9.2 | 9.3 | WNW | 94 | 15.0 | 13.7 | Little Whip Snake | 1 |
| | | | 17 | - | - | - | - | 17.1 | 15.3 | Little Whip Snake | 1 |
| | | | 16 | - | - | - | - | 18.5 | 15.1 | Spotted Marsh Frog | 1 |
| | | | 14 | - | - | - | - | 20.8 | 18.4 | Spotted Marsh Frog | 4 |
| | | | 13 | - | - | - | - | 24.3 | 20.7 | Spotted Marsh Frog | 1 |
| | | | 12 | - | - | - | - | 25.8 | 16.6 | Spotted Marsh Frog | 3 |
| | | | 6 | 27.0 | 11.1 | N | 53 | 45.8 | 38.8 | Eastern Three-lined Skink | 1 |
| | | | 2 | - | - | - | - | 35.3 | 28.2 | Eastern Three-lined Skink | 1 |
| | | | | | | | | | | Garden Skink | 1 |
| | | | 1 | - | - | - | - | 38.5 | 30.8 | Garden Skink | 1 |
| **5** | 28/10/2023 | 8:10-13:47 | 3 | 11.4 | 7.0 | E | 52 | 26.7 | 18.1 | Eastern Three-lined Skink | 2 |

| Tile Check # | Date | Time | Grid # | Temp (°C) | Wind speed (km/ph) | Wind direction | Relative Humidity (%) | Above Tile Temp C° | Under Tile Temp C° | Observations | No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2 | 14.1 | 7.0 | E | 54 | 28.7 | 20.4 | Eastern Striped Skink | 1 |
| | | | | | | | | | | Spotted Marsh Frog | 1 |
| | | | 1 | 14.5 | 6.0 | SSE | 54 | 31.4 | 22.5 | Eastern Three-lined Skink | 2 |
| | | | 7 | 15.5 | 19.0 | ENE | 47 | 40.5 | 27.0 | Eastern Blue-tongued Lizard | 1 |
| | | | 13 | 15.9 | 22.0 | ESE | 48 | 39.4 | 28.2 | Little Whip Snake | 1 |
| | | | 17 | 17.0 | 19.0 | E | 51 | 35.6 | 21.5 | Tiger Snake | 1 |
| | | | 19 | 16.9 | 22.0 | E | 46 | 35.3 | 29.3 | Spotted Marsh Frog | 2 |
| 6 | 28/09/2023 | 8:26-12:30 | 13 | 12.3 | 13.0 | SSE | 64 | 14.8 | 14.1 | Little Whip Snake | 1 |
| | | | 2 | 13.6 | 14.8 | S | 63 | 21.2 | 14.6 | Tussock Skink | 1 |
| | | | | | | | | | | Spotted Marsh Frog | 1 |
| | | | 3 | - | - | - | - | 27.2 | 22.5 | Eastern Blue-tongued Lizard | 1 |
| | | | | | | | | | | Eastern Three-lined Skink | 1 |
| | | | 5 | - | - | - | - | 27.5 | 21.7 | Eastern Blue-tongued Lizard | 1 |
| | | | | | | | | | | Eastern Three-lined Skink | 2 |
| | | | 6 | - | - | - | - | 22.6 | 16.4 | Eastern Striped Skink | 1 |
| | | | | | | | | | | Eastern Three-lined Skink | 1 |
| | | | 4 | - | - | - | - | 23.4 | 17.6 | Garden Skink | 1 |

| Tile Check # | Date | Time | Grid # | Temp (°C) | Wind speed (km/ph) | Wind direction | Relative Humidity (%) | Above Tile Temp C° | Under Tile Temp C° | Observations | No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Eastern Striped Skink | 1 |
| **7** | 10/11/2023 | 8:50-13:40 | 2 | 19.2 | 11.1 | SE | 71 | 38.6 | 33.1 | Eastern Blue-Tongued Lizard | 1 |
| **8** | 06/12/2023 | 10:30-14:00 | 2 | 17.9 | 9.3 | SE | 63 | 38.5 | 27.7 | **Tussock Skink** | 1 |
| | | | | | | | | | | Garden Skink | 1 |
| | | | | | | | | | | Spotted Marsh Frog | 1 |
| | | | 5 | - | - | - | - | 47.5 | 27.7 | Eastern Three-lined Skink | 1 |
| | | | 4 | 19.7 | 18.5 | S | 51 | 49.5 | 28.3 | Garden Skink | 1 |
| | | | 6 | 21.1 | 14.8 | SSW | 53 | 43.6 | 28.5 | Spotted Marsh Frog | 4 |
| | 13/12/2023 | 10:00-14:56 | 12 | 24.5 | 33.0 | NE | 73 | 23.7 | 23.4 | Spotted Marsh Frog | 9 |
| | | | 13 | 23.2 | 15.0 | N | 75 | 24.1 | 22.8 | Spotted Marsh Frog | 1 |
| | | | 15 | 24.2 | 17.0 | N | 81 | 27.3 | 27.0 | Spotted Marsh Frog | 3 |
| | | | 16 | 26.6 | 19.0 | N | 76 | 27.8 | 24.1 | Spotted Marsh Frog | 13 |
| | | | | | | | | | | Eastern Banjo Frog | 1 |
| | | | 17 | 28.0 | 20.0 | N | 67 | 35.0 | 30.7 | Little Whip Snake | 1 |
| | | | 18 | 30.2 | 24.0 | NNE | 60 | 33.4 | 27.9 | Spotted Marsh Frog | 1 |
| | | | 19 | 31.2 | 30.0 | NNW | 46 | 29.4 | 25.8 | Spotted Marsh Frog | 2 |

# Appendix 2.3 Significant Fauna Species

Significant fauna within 10 kilometres of the study area is provided in the Table A2.3.3 at the end of this section, with Tables A2.3.1 and A2.3.2 below providing the background context for the values in Table 2.1.3.

**Table A2.3.1** Conservation status of each species for each Act/policy. The values in this table correspond to Columns 5 to 8 in Table A2.3.3.

| EPBC (*Environment Protection and Biodiversity Conservation Act 1999*): | | | | FFG (*Flora and Fauna Guarantee Act 1988*): | | | |
|---|---|---|---|---|---|---|---|
| EX | Extinct | VU | Vulnerable | ex | Extinct | vu | Vulnerable |
| CR | Critically endangered | CD | Conservation Dependent | cr | Critically endangered | cd | Conservation Dependent |
| EN | Endangered | # | Listed on the Protected Matter Search Tool | en | Endangered | | |
| Migratory Agreements | | | | | | | |
| B | Bonn Convention Agreement (BONNA2H) | | | | | | |
| R | Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) | | | | | | |
| J | Japan-Australia Migratory Bird Agreement (JAMBA) | | | | | | |
| C | China-Australia Migratory Bird Agreement (CAMBA) | | | | | | |

**Table A2.3.2** Likelihood of occurrence rankings: Habitat characteristics assessment of significant fauna species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area to determine their likelihood of occurrence. The values in this table correspond to Column 9 in Table A2.1.3.

| | | |
|---|---|---|
| 1 | Known Occurrence | • Recorded within the project area recently (i.e. within 10 years). |
| 2 | High Likelihood | • Likely resident in the study area based on site observations, database records, or expert advice; and/or,<br>• Recent records (i.e. within five years) of the species in the local area (DELWP 2018); and/or,<br>• The study area contains the species' preferred habitat. |
| 3 | Moderate Likelihood | • The species is likely to visit the study area regularly (i.e. at least seasonally); and/or,<br>• Previous records of the species in the local area (DEECA 2024d); and/or,<br>• The study area contains some characteristics of the species' preferred habitat. |
| 4 | Low Likelihood | • The species is likely to visit the study area occasionally or opportunistically whilst en route to more suitable sites; and/or,<br>• There are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or,<br>• The study area contains few or no characteristics of the species' preferred habitat. |

| | | |
|---|---|---|
| 5 | Unlikely | • No previous records of the species in the local area; and/or,<br>• The species may fly over the study area when moving between areas of more suitable habitat; and/or,<br>• Out of the species' range; and/or,<br>• No suitable habitat present. |

**Table A2.3.3.** Significant fauna within 10 kilometres of the study area.

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| **NATIONAL SIGNIFICANCE** | | | | | | | | |
| *Anthochaera phrygia* | Regent Honeyeater | 4 | 1989 | CR | cr | - | 5 | No suitable habitat. Species prefers temperate woodlands and open forests |
| *Antechinus minimus maritimus #* | Swamp Antechinus (mainland) | - | - | VU | vu | - | 5 | No suitable habitat. Species prefers wet heath, healthy woodland, sedgeland and dense tussock grasslands |
| *Aphelocephala leucopsis* | Southern Whiteface | 30 | 2014 | VU | - | - | 4 | No suitable habitat. Species prefers open woodlands with grass/shrub understorey |
| *Arenaria interpres* | Ruddy Turnstone | 303 | 2019 | VU | en | B,C,J,R | 3 | Potential habitat within the south of the study area; many previous records within 10km. |
| *Botaurus poiciloptilus* | Australasian Bittern | 110 | 2019 | EN | cr | - | 4 | Minimal suitable habitat (well vegetated wetlands) in the south of the study area. |
| *Calidris acuminata* | Sharp-tailed Sandpiper | 896 | 2018 | VU | - | B,C,J,R | 1 | Suitable habitat present, and previously recorded within the study area (Biosis 2023) |
| *Calidris canutus* | Red Knot | 534 | 2020 | EN | en | B,C,J,R | 3 | Potential habitat within the south of the study area; many previous records within 10km. |
| *Calidris ferruginea* | Curlew Sandpiper | 2741 | 2021 | CR | cr | B,C,J,R | 1 | Suitable habitat present, and previously recorded within the study area (Biosis 2023) |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| *Calidris tenuirostris* | Great Knot | 84 | 2018 | CR | cr | B,C,J,R | 3 | Potential habitat within the south of the study area; many previous records within 10km. |
| *Callocephalon fimbriatum* | Gang-gang Cockatoo | 84 | 2020 | EN | en | - | 4 | No suitable habitat. Species prefers tall mountain forests with dense shrubby understoreys. May opportunistically fly over study area en route to more suitable habitat |
| *Carcharodon carcharias #* | Great White Shark | - | - | VU | en | - | 5 | No suitable habitat |
| *Caretta caretta #* | Loggerhead Turtle | - | - | EN | - | - | 5 | No suitable habitat |
| *Charadrius leschenaultii* | Greater Sand Plover | 15 | 1996 | VU | vu | B,C,J,R | 3 | No recent records. Minimal suitable habitat in the south of the study area. |
| *Charadrius mongolus* | Lesser Sand Plover | 58 | 2008 | EN | en | B,C,J,R | 3 | No recent records. Minimal suitable habitat in the south of the study area. |
| *Chelonia mydas #* | Green Turtle | - | - | VU | - | - | 5 | No suitable habitat |
| *Climacteris picumnus* | Brown Treecreeper | 54 | 2018 | VU | - | - | 4 | Limited suitable habitat. Species occurs in drier eucalypt forests and woodlands |
| *Dasyurus maculatus maculatus* (SE mainland population) # | Spot-tailed Quoll | - | - | EN | en | - | 5 | No suitable habitat. Species prefers forests, woodlands, coastal heathlands, and rainforests |
| *Delma impar* | Striped Legless Lizard | 4 | 1992 | VU | en | - | 4 | Potential habitat, however species not recorded during targeted surveys, nor previous targeted surveys within the GA(E)W (Biosis 2023). |
| *Dermochelys coriacea* | Leathery Turtle | 2 | 2017 | EN | cr | B | 5 | No suitable habitat |
| *Diomedea antipodensis #* | Antipodean Albatross | - | - | VU | - | - | 5 | No suitable habitat |
| *Diomedea epomophora #* | Southern Royal Albatross | - | - | VU | cr | - | 5 | No suitable habitat |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| *Diomedea exulans #* | Wandering Albatross | - | - | VU | cr | - | 5 | No suitable habitat |
| *Diomedea sanfordi #* | Northern Royal Albatross | - | - | EN | - | - | 5 | No suitable habitat |
| *Eubalaena australis* | Southern Right Whale | 1 | 2006 | EN | en | B | 5 | No suitable habitat |
| *Falco hypoleucos #* | Grey Falcon | - | - | VU | vu | - | 4 | No suitable habitat (usually restricted to arid and semi-arid regions) and no previous records |
| *Galaxiella pusilla #* | Dwarf Galaxias | - | - | VU | en | - | 5 | No suitable habitat |
| *Galeorhinus galeus #* | School Shark | - | - | CD | - | - | 5 | No suitable habitat |
| *Gallinago hardwickii* | Latham's Snipe | 248 | 2019 | VU | - | B,C,J,R | 3 | Potential habitat within the south of the study area; many previous records within 10km. |
| *Grantiella picta* | Painted Honeyeater | 8 | 2015 | VU | vu | - | 4 | No suitable habitat. Species is a specialist feeder on the fruits of mistletoes from woodland eucalypts and acacias. |
| *Hirundapus caudacutus* | White-throated Needletail | 30 | 2007 | VU | vu | C,J,R | 4 | Species is migratory and mostly aerial. May roost in tree hollows, but seldom comes to ground. May opportunistically fly over the study area. |
| *Lathamus discolor* | Swift Parrot | 113 | 2019 | CR | cr | - | 4 | No suitable habitat. When in mainland Australia, the species typically occupies dry open eucalypt woodlands and forests comprised of box-ironbark communities. Species may fly over study area en route to more suitable habitat |
| *Lepidochelys olivacea* | Pacific (Olive) Ridley | 1 | 1974 | EN | - | B | 5 | No suitable habitat |
| *Limnodromus semipalmatus* | Asian Dowitcher | 2 | 1973 | VU | - | B,C,J,R | 4 | No recent records. Minimal suitable habitat in the south of the study area. |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| *Limosa lapponica* | Bar-tailed Godwit | 190 | 2019 | VU | vu | B,C,J,R | 3 | Potential habitat within the south of the study area; many previous records within 10km |
| *Limosa limosa* | Black-tailed Godwit | 498 | 2019 | EN | cr | B,C,J,R | 3 | Potential habitat within the south of the study area; many previous records within 10km |
| *Lissolepis coventryi #* | Swamp Skink | - | - | EN | en | - | 4 | Limited suitable habitat (densely vegetated swamps and watercourses) within the study area, and no previous records within 10km |
| *Litoria raniformis* | Growling Grass Frog | 1146 | 2020 | VU | vu | - | 1 | Not detected within the study area despite survey effort. Previously heard within the GA(E)W (VBA 2001; Biosis 2023). Majority of recent records from east of the study area (WTP) |
| *Lophochroa leadbeateri* | Major Mitchell's Cockatoo | 4 | 2005 | EN | cr | - | 4 | No suitable habitat. Species primarily occurs in arid and semi-arid environments |
| *Macronectes giganteus* | Southern Giant-Petrel | 3 | 1985 | EN | en | B | 5 | No suitable habitat |
| *Macronectes halli* | Northern Giant-Petrel | 1 | 1986 | VU | en | B | 5 | No suitable habitat |
| *Melanodryas cucullata* | Hooded Robin | 27 | 2016 | EN | vu | - | 4 | No suitable habitat. Species primarily occurs in woodlands dominated by eucalypts and/or acacia |
| *Mirounga leonina* | Southern Elephant Seal | 10 | 2005 | VU | - | - | 5 | No suitable habitat |
| *Nannoperca obscura #* | Yarra Pygmy Perch | - | - | VU | vu | - | 5 | No suitable habitat |
| *Neophema chrysogaster* | Orange-bellied Parrot | 856 | 2021 | CR | cr | - | 3 | Potential habitat within the GA(E)W and many previous records within 10km; however not recorded during targeted surveys. |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| *Neophema chrysostoma* | Blue-winged Parrot | 146 | 2016 | VU | - | - | 1 | Recorded within GA(E)W, and previously recorded within the study area (Biosis 2023) |
| *Numenius madagascariensis* | Eastern Curlew | 175 | 2018 | CR | cr | B,C,J,R | 3 | Potential habitat within the south of the study area; many previous records within 10km. |
| *Pachyptila turtur subantarctica #* | Fairy Prion (southern) | - | - | VU | - | - | 5 | No suitable habitat |
| *Pedionomus torquatus* | Plains-wanderer | 3 | 1989 | - | cr | - | 4 | Poor quality habitat/structure within the study area. |
| *Perameles gunnii* | Eastern Barred Bandicoot | 35 | 1980 | EN | en | - | 4 | No recent records and limited suitable habitat. Species prefers grasslands and grassy woodlands near a water supply |
| *Petaurus australis australis #* | Yellow-bellied Glider (south-eastern) | - | - | VU | - | - | 4 | No suitable habitat. Species prefers eucalypt dominated woodland and forests |
| *Phoebetria fusca #* | Sooty Albatross | - | - | VU | cr | - | 4 | No suitable habitat |
| *Pluvialis squatarola* | Grey Plover | 64 | 2017 | VU | vu | B,C,J,R | 3 | Potential habitat within the south of the study area; previous records within 10km. |
| *Polytelis swainsonii* | Superb Parrot | 1 | 1999 | VU | en | - | 4 | No recent records. No suitable habitat. Species prefers eucalypt dominated woodland and forests |
| *Prototroctes maraena #* | Australian Grayling | - | - | VU | en | - | 5 | No suitable habitat |
| *Pseudomys novaehollandiae #* | New Holland Mouse, Pookila | - | - | VU | en | - | 4 | No recent records. Limited suitable habitat. Species prefers woodland and dry sclerophyll forests |
| *Pterodroma leucoptera leucoptera #* | Gould's Petrel | - | - | EN | - | - | 5 | No suitable habitat |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| *Pteropus poliocephalus* | Grey-headed Flying-fox | 7 | 2008 | VU | vu | - | 4 | May occasionally fly over and/or forage in the study area, but no suitable habitat for permanent colonies within the study area |
| *Rostratula australis* | Australian Painted-snipe | 6 | 2012 | EN | cr | C | 4 | Several previous records within 10km, however no suitable habitat (shallow, freshwater wetlands) within the study area. |
| *Seriolella brama #* | Blue Warehou | - | - | CD | cd | - | 5 | No suitable habitat |
| *Stagonopleura guttata* | Diamond Firetail | 166 | 2016 | VU | vu | - | 4 | Limited suitable habitat. Species prefers riparian areas, and occasionally lightly wooded farmland |
| *Sternula nereis* | Fairy Tern | 1001 | 2022 | VU | cr | - | 4 | Minimal suitable habitat in the south of the study area. Most likely to occur in coastal environs. |
| *Synemon plana* | Golden Sun Moth | 680 | 2019 | VU | vu | - | 1 | Recorded within GA(E)N and GA(E)W. Previously within the north and south of the GA(E)W (Biosis 2023). |
| *Thalassarche bulleri #* | Buller's Albatross | - | - | VU | en | - | 5 | No suitable habitat |
| *Thalassarche bulleri platei #* | Pacific Albatross | - | - | VU | - | - | 5 | No suitable habitat |
| *Thalassarche carteri* | Indian Yellow-nosed Albatross | 1 | 1979 | VU | en | B | 5 | No suitable habitat |
| *Thalassarche cauta #* | Shy Albatross | - | - | EN | en | - | 5 | No suitable habitat |
| *Thalassarche chrysostoma #* | Grey-headed Albatross | - | - | EN | en | - | 5 | No suitable habitat |
| *Thalassarche impavida #* | Campbell Albatross | - | - | VU | - | - | 5 | No suitable habitat |
| *Thalassarche melanophris* | Black-browed Albatross | 1 | 1986 | VU | - | B | 5 | No suitable habitat |
| *Thalassarche salvini #* | Salvin's Albatross | - | - | VU | - | - | 5 | No suitable habitat |
| *Thalassarche steadi #* | White-capped Albatross | - | - | VU | - | - | 5 | No suitable habitat |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| *Thinornis cucullatus* | Hooded Plover | 3 | 2017 | VU | vu | - | 4 | Potential habitat south of GA(E)W within the Avalon Coastal Reserve; Not detected within the study area despite survey effort, and not recorded during previous targeted surveys (Biosis 2023). |
| *Thunnus maccoyii #* | Southern Bluefin Tuna | - | - | CD | cd | - | 5 | No suitable habitat |
| *Tringa nebularia* | Common Greenshank | 2038 | 2019 | EN | en | B,C,J,R | 1 | Suitable habitat within the south of the study area; previously recorded (Biosis 2023) |
| *Tympanocryptis pinguicolla* | Grassland Earless Dragon | 4 | 1990 | EN | cr | - | 4 | Limited suitable habitat. Species is a native grassland specialist inhabiting natural temperate grasslands with open patches of bare earth. Species unlikely to persist in areas that have been de-rocked, ploughed, or fertilised. |
| *Xenus cinereus* | Terek Sandpiper | 156 | 2017 | - | en | B,C,J,R | 2 | Potential habitat in the south of the study area |
| **STATE SIGNIFICANCE** | | | | | | | | |
| *Accipiter novaehollandiae* | Grey Goshawk | 14 | 2018 | - | en | - | 5 | No suitable habitat. Species prefers forests and tall woodlands |
| *Actitis hypoleucos* | Common Sandpiper | 49 | 2018 | - | vu | B,C,J,R | 2 | Potential foraging habitat in the south of the study area |
| *Anseranas semipalmata* | Magpie Goose | 955 | 2020 | - | vu | - | 4 | No suitable habitat. Species prefers shallow wetland with dense vegetation |
| *Antigone rubicunda* | Brolga | 1653 | 2023 | - | en | - | 2 | Limited suitable habitat within the study area. Species prefers open wetlands, grassy plains, and well-watered farmland. Species may opportunistically fly over the |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | study area en route to more suitable habitat |
| *Arctophoca forsteri* | Long-nosed Fur Seal | 1 | 2019 | - | vu | - | 5 | No suitable habitat |
| *Ardea alba modesta* | Eastern Great Egret | 1602 | 2019 | - | vu | C,J | 1 | Foraging habitat within the study area; previously recorded (Biosis 2023). |
| *Ardea intermedia plumifera* | Plumed Egret | 30 | 2022 | - | cr | - | 2 | Potential foraging habitat in the south of the study area |
| *Ardeotis australis* | Australian Bustard | 1 | 1889 | - | cr | - | 5 | No recent records. No suitable habitat |
| *Athanopsis australis* | Southern Hooded Shrimp | 1 | 1981 | - | en | - | 5 | No suitable habitat |
| *Aythya australis* | Hardhead | 9186 | 2023 | - | vu | - | 5 | No suitable habitat. Species prefers freshwater swamps and wetlands |
| *Biziura lobata* | Musk Duck | 7269 | 2023 | - | vu | - | 5 | No suitable habitat. Species prefers deep freshwater lagoons with dense reeds |
| *Burhinus grallarius* | Bush Stone-curlew | 4 | 1960 | - | cr | - | 5 | No suitable habitat. Species prefers open forests and woodlands near watercourses |
| *Calamanthus pyrrhopygius* | Chestnut-rumped Heathwren | 2 | 1999 | - | vu | - | 5 | No suitable habitat. Species prefers heaths and dense undergrowth of forest and woodland |
| *Egretta garzetta* | Little Egret | 2030 | 2023 | - | en | - | 2 | Potential foraging habitat within the south of study area |
| *Falco subniger* | Black Falcon | 430 | 2019 | - | cr | - | 3 | Potential foraging habitat. Species may opportunistically fly over the study area |
| *Gelochelidon macrotarsa* | Australian Gull-billed Tern | 12 | 2017 | - | en | - | 3 | Potential habitat within the south of the study area; however, no recent records within 10km |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| *Geopelia cuneata* | Diamond Dove | 4 | 2019 | - | vu | - | 4 | Limited suitable habitat. Species prefers lightly woodland, arid or semi-arid grasslands |
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | 694 | 2020 | - | en | C | 3 | Potential foraging habitat |
| *Hesperilla flavescens* | Yellow Sedge-skipper Butterfly | 5 | 1989 | - | en | - | 4 | Potential habitat in the south of the study area; no recent records within 10km |
| *Hieraaetus morphnoides* | Little Eagle | 406 | 2016 | - | vu | - | 1 | Observed flying above the study area |
| *Hydroprogne caspia* | Caspian Tern | 197 | 2019 | - | vu | C,J | 3 | Potential habitat in the south of the study area |
| *Ixobrychus dubius* | Australian Little Bittern | 3 | 1990 | - | en | - | 4 | No suitable habitat. Species prefers freshwater swamps with dense cover |
| *Lewinia pectoralis* | Lewin's Rail | 156 | 2019 | - | vu | - | 3 | Limited foraging habitat. Species prefers permanent wetlands with dense vegetation |
| *Lophoictinia isura* | Square-tailed Kite | 1 | 2018 | - | vu | - | 3 | Potential foraging habitat |
| *Megaptera novaeangliae australis* | Southern Humpback Whale | 6 | 2006 | - | cr | B | 5 | No suitable habitat |
| *Miniopterus orianae oceanensis* | Eastern Bent-winged Bat | 2 | 2016 | - | cr | - | 5 | Individuals are known to forage up to 30 kilometres from their roost site. Only recognised maternity cave located in Bairnsdale (approximately 300 kilometres east). Species unlikely to visit study area. |
| *Neophema elegans* | Elegant Parrot | 9 | 1993 | - | vu | - | 5 | No suitable habitat. Species prefers open forest and woodland |
| *Ninox connivens* | Barking Owl | 2 | 2006 | - | cr | - | 5 | No suitable habitat. Species prefers eucalypt dominated woodland and forest edges. Large hollows in mature trees required for nesting |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| *Ninox strenua* | Powerful Owl | 4 | 1976 | - | vu | - | 5 | No suitable habitat. Species prefers eucalypt dominated woodland and forest edges. Large hollows in mature trees required for nesting |
| *Numenius phaeopus* | Whimbrel | 10 | 2018 | - | en | B,C,J,R | 3 | Potential foraging habitat in the south of the study area |
| *Ornithorhynchus anatinus* | Platypus | 1 | 2002 | - | vu | - | 5 | No suitable habitat |
| *Oxyura australis* | Blue-billed Duck | 6124 | 2023 | - | vu | - | 4 | No suitable habitat. Species prefers deep water wetlands/swamps with dense vegetation. Species may fly over study area |
| *Pelagodroma marina* | White-faced Storm-Petrel | 9 | 2016 | - | en | - | 5 | No suitable habitat |
| *Pluvialis fulva* | Pacific Golden Plover | 288 | 2019 | - | vu | B,C,J,R | 3 | Potential habitat in the south of the study area |
| *Pomatostomus temporalis* | Grey-crowned Babbler | 3 | 1958 | - | vu | - | 5 | No recent records. No suitable habitat. Species prefers inland plains with open shrub layer |
| *Pseudemoia pagenstecheri* | Tussock Skink | 6 | 2016 | - | en | - | 1 | Recorded within the GA(E)W (Biosis 2023) and in the north of the GA(E)N (Figure 7) |
| *Pseudophryne bibronii* | Brown Toadlet | 123 | 1986 | - | en | - | 4 | No recent records. No suitable habitat. Species prefers areas likely to be inundated after rain |
| *Sminthopsis crassicaudata* | Fat-tailed Dunnart | 123 | 1986 | - | vu | - | 1 | Recorded within the south of the study area (Biosis 2023) |
| *Pyrrholaemus sagittatus* | Speckled Warbler | 73 | 2019 | - | en | - | 4 | No suitable habitat. Species prefers eucalypt dominated forest and woodland |
| *Spatula rhynchotis* | Australasian Shoveler | 8378 | 2023 | - | vu | - | 4 | No suitable habitat. Species prefers undisturbed freshwater swamps with |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory | Likely occurrence in study area^ | Rationale for likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | dense vegetation. Species may fly over study area |
| *Sternula albifrons* | Little Tern | 715 | 2019 | - | cr | B,C,J,R | 4 | No suitable habitat. Species prefer sandy substrate |
| *Stictonetta naevosa* | Freckled Duck | 1844 | 2023 | - | en | - | 4 | No suitable habitat. Species prefers freshwater swamps with dense vegetation. Species may fly over study area |
| *Thyone nigra* | Sea-cucumber species | 3 | 1960 | - | en | - | 5 | No suitable habitat |
| *Tringa brevipes* | Grey-tailed Tattler | 50 | 2019 | - | cr | B,C,J,R | 3 | Potential foraging habitat |
| *Tringa glareola* | Wood Sandpiper | 198 | 2019 | - | en | B,C,J,R | 4 | No suitable habitat. Species prefers well-vegetated, shallow, freshwater wetlands |
| *Tringa stagnatilis* | Marsh Sandpiper | 1388 | 2020 | - | en | B,C,J,R | 2 | Potential habitat in the south of the study area. Many previous recprds |
| *Turnix pyrrhothorax* | Red-chested Button-quail | 2 | 2010 | - | en | - | 4 | Limited suitable habitat within the study area. Species prefers dense grasslands and open woodlands |
| *Tursiops australis* | Burrunan Dolphin | 6 | 2008 | - | cr | - | 5 | No suitable habitat |
| *Tyto novaehollandiae* | Masked Owl | 5 | 1985 | - | cr | - | 5 | No recent records. No suitable habitat. Species prefers forested river flats |

Data Sources: Victorian Biodiversity Atlas (DEECA 2024d); Protected Matters Search Tool (DCCEEW 2024a). ^ Likelihood of occurrence post-survey effort

# Appendix 2.4 Non-significant, Migratory Fauna Species

**Table A2.4.** Non-significant, migratory fauna within 10 kilometres of the study area, Data Sources: Victorian Biodiversity Atlas (DEECA 2024d).

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory |
|---|---|---|---|---|---|---|
| *Acrocephalus australis* | Reed-Warbler | 458 | 2021 | - | - | B |
| *Apus pacificus* | Fork-tailed Swift | 25 | 2014 | - | - | C,J,R |
| *Ardea alba* | Great Egret | 2211 | 2023 | - | - | C,J |
| *Ardenna tenuirostris* | Short-tailed Shearwater | 21 | 2016 | - | - | J,R |
| *Balaenoptera edeni* | Bryde's Whale | 1 | 1968 | - | - | B |
| *Bubulcus coromandus* | Eastern Cattle Egret | 132 | 2021 | - | - | C,J |
| *Calidris alba* | Sanderling | 36 | 2019 | - | - | B,C,J,R |
| *Calidris melanotos* | Pectoral Sandpiper | 2018 | 2021 | - | - | B,J,R |
| *Calidris minuta* | Little Stint | 18 | 2010 | - | - | R |
| *Calidris pugnax* | Ruff | 51 | 2016 | - | - | B,C,J,R |
| *Calidris ruficollis* | Red-necked Stint | 1277 | 2021 | - | - | B,C,J,R |
| *Calidris subminuta* | Long-toed Stint | 40 | 2020 | - | - | B,C,J,R |
| *Charadrius bicinctus* | Double-banded Plover | 244 | 2021 | - | - | B |
| *Charadrius veredus* | Oriental Plover | 1 | 1970 | - | - | B,J,R |
| *Chlidonias leucopterus* | White-winged Black Tern | 1444 | 2023 | - | - | C,J,R |
| *Fregata ariel* | Lesser Frigatebird | 1 | 2005 | - | - | C,J,R |
| *Glareola maldivarum* | Oriental Pratincole | 11 | 2003 | - | - | C,J,R |
| *Limicola falcinellus* | Broad-billed Sandpiper | 22 | 2017 | - | - | B,C,J,R |
| *Merops ornatus* | Rainbow Bee-eater | 130 | 2017 | - | - | J |

| Scientific name | Common name | Total # of documented records | Last documented record | EPBC | FFG | Migratory |
|---|---|---|---|---|---|---|
| *Monarcha melanopsis* | Black-faced Monarch | 1 | 1950 | - | - | B |
| *Myiagra cyanoleuca* | Satin Flycatcher | 17 | 2016 | - | - | B |
| *Numenius minutus* | Little Curlew | 18 | 2010 | - | - | B,C,J,R |
| *Orcinus orca* | Killer Whale | 1 | 1984 | - | - | B |
| *Pandion cristatus* | Eastern Osprey | 8 | 2016 | - | - | B |
| *Phalaropus lobatus* | Red-necked Phalarope | 74 | 2016 | - | - | B,C,J,R |
| *Plegadis falcinellus* | Glossy Ibis | 894 | 2020 | - | - | B,C |
| *Rhipidura rufifrons* | Rufous Fantail | 43 | 2016 | - | - | B |
| *Spatula clypeata* | Northern Shoveler | 22 | 2013 | - | - | C,J,R |
| *Stercorarius longicaudus* | Long-tailed Jaeger | 1 | 1992 | - | - | J |
| *Stercorarius parasiticus* | Arctic Jaeger | 50 | 2019 | - | - | J,R |
| *Stercorarius pomarinus* | Pomarine Jaeger | 4 | 2014 | - | - | C,J |
| *Sterna Hirundo* | Common Tern | 120 | 2021 | - | - | C,J,R |
| *Sula leucogaster* | Brown Booby | 1 | 2013 | - | - | C,J,R |
| *Tryngites subruficollis* | Buff-breasted Sandpiper | 2 | 1986 | - | - | J,R |

# APPENDIX 3 MAPPED WETLAND 54715 EXCLUSION (DEECA)

Department of Energy, Environment and Climate Action

PO Box 500, East Melbourne,
Victoria 8002 Australia
deeca.vic.gov.au

[redacted]

Dear [redacted]

**REQUEST TO EXCLUDE PART OF MAPPED WETLAND 54715 FROM CONSIDERATION**

Thank you for your request to exclude part of Mapped Wetland 54715 from consideration under the Native Vegetation Regulations.

As required under the *Guidelines for the removal, destruction or lopping of native vegetation* (the Guidelines), you have provided information which demonstrates that the subject mapped wetland areas are either covered by a hardened surface, artificial waterbodies or unable to support wetland-associated native vegetation.

The Department of Energy, Environment and Climate Action (DEECA) has reviewed the information you have provided and agrees to the partial exclusion of Mapped Wetland 54715, as shown in Attachment 1.

Unless otherwise exempt, any in situ native vegetation proposed for removal from these areas must be assessed in accordance with the Guidelines and planning approval must be obtained prior to its removal.

Please contact Native Vegetation Regulation by email at [redacted] if you have any further questions.

Yours sincerely

[redacted]

Encl. (1)

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VICTORIA State Government

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# Attachment 1: Mapped Wetland 54715, Avalon

Mapped Wetland 54715

Areas to be excluded from consideration

Reserves

Map Scale 1:30,000

Metres

0 250 500

GDA

Universal Transverse Mercator Projection
Datum: Geocentric Datum of Australia 1994
GDA94

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