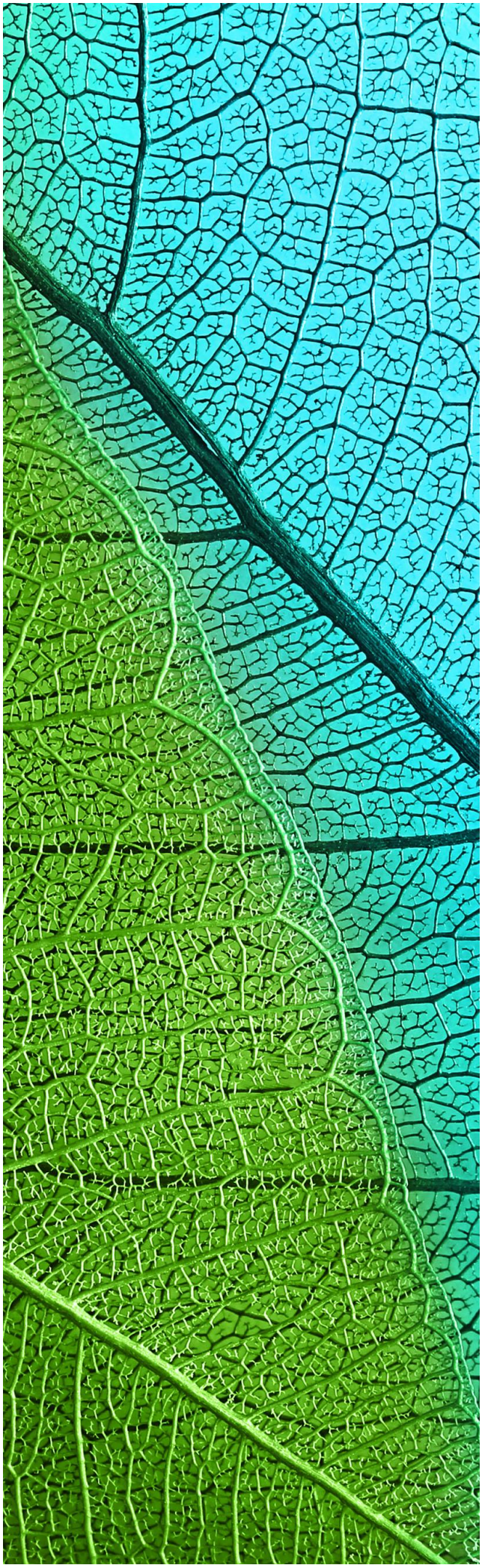

Hopetoun Park North Western Section

Flora and Fauna Assessment

Bacchus Marsh Property Group Pty Ltd

August 2023
Report No. 19217.3 (2.5)

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1. Executive summary

Bacchus Marsh Property Group Pty Ltd engaged Nature Advisory Pty Ltd to conduct a flora and fauna assessment of a 145-hectare area of land comprising nine properties in Hopetoun Park. This area was split into two sections based on the large difference in abundance and quality of native vegetation between the areas east and west of Hopetoun Park Road. The specific area investigated in this report, referred herein as the 'study area', comprised the western section of the proposed Hopetoun Park North Precinct (67.35 hectares). This area is composed of three properties located in Hopetoun Park: 124 Hopetoun Park Road (Property 1), 150 Hopetoun Park Road (Property 2) and Lot 1 Cowans Road (Property 9). This report is provided to accompany a rezoning application. Two further planning process will be undertaken in the future (Development Plan & Permit Application) which will provide a greater level of detail including subdivision design.

Previous native vegetation assessments have been undertaken by Mark Trengrove Ecological Services (2019) and a fauna overview, Golden Sun Moth surveys and an assessment of Grey Box woodland within the study area was undertaken by Nature Advisory (2019).

This report addresses the request for further information by Moorabool Shire Council and the Department of Environment, Land, Water and Planning (DELWP, now Department of Energy, Environment and Climate Action (DEECA)) regarding more detailed native vegetation assessments, including listed communities and addressing the potential for threatened species. Additional Golden Sun Moth surveys have been undertaken during the flying season in December 2022 and January 2023 within areas of suitable habitat (Nature Advisory 2023).

This investigation was commissioned to provide information on the extent and condition of native vegetation in the study area according to Victoria's *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a), herein referred to as 'the Guidelines', and any potential impacts on flora and fauna matters listed under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This report outlines any implications under relevant national, state and local legislation and policy frameworks.

The majority of the study area is occupied by wheat crops on property 1, with two residences occurring in conjunction with an area of Grey Box woodland in the east of the study area. Native vegetation in the study area comprised Grey Box woodland (2.6 hectares) in the east of properties 1 and 2 and on the adjoining Hopetoun Park Road reserve, shrubland on the rocky escarpment in the west, and small patches of native grassland and shrubland in property 9, within which ground has been tilled in preparation for crop planting.

The following native vegetation was recorded in the study area:

- Twenty-three patches of native vegetation, totalling an area of 4.787 hectares (included 16 large trees in patches); and
- Sixteen scattered trees (namely four large scattered trees and 12 small scattered trees).

The proposed rezoning and subsequent residential development have been designed to retain native vegetation, in particular higher quality grassland and woodland patches, as shown in the concept plan in Appendix 6.

EPBC Act

The following EPBC-Act listed values were recorded in the study area:

- 0.425 hectares of Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP, Critically Endangered under the EPBC Act);
- 2.565 hectares of Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP, Critically Endangered under the EPBC Act); and
- 2.565 hectares Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (GBGW, Endangered under the EPBC Act).

In addition, the following EPBC-Act listed species are considered to have potential to occur within areas of native vegetation in the study area:

- Diamond Firetail (EPBC: Vulnerable, FFG Act Vulnerable)
- Matted Flax-lily (EPBC: Endangered; FFG: Critically Endangered)

A targeted survey for the listed vulnerable species Golden Sun Moth was undertaken, and no individuals were recorded (Nature Advisory 2023).

No targeted surveys are required as all habitat for EPBC Act listed communities and species will be retained.

FFG Act

The following FFG-Act listed values were recorded in the study area:

- 0.719 hectares of Western (Basalt) Plains Grasslands Community (FFG: Listed).
- Buloke (FFG: Vulnerable)
- Fragrant Saltbush (FFG: Vulnerable).
- Melbourne Yellow Gum (FFG: Endangered)

In addition, the following ten FFG-Act listed species are considered to have potential to occur within areas of native vegetation in the study area:

- Austral Tobacco (FFG: Endangered);
- Branching Groundsel (FFG: Endangered);
- Cane Spear-grass (FFG: Endangered);
- Diamond Firetail (EPBC: Vulnerable, FFG Act Vulnerable)
- Forked Rice-flower (FFG: Endangered);
- Heath Spear-grass (FFG: Vulnerable);
- Matted Flax-lily (EPBC: Endangered; FFG: Critically Endangered);
- Rye Beetle-grass (FFG: Endangered);
- Brush-tailed Phascogale (FFG Act: Vulnerable); and
- Speckled Warbler (FFG Act: Endangered).

No targeted surveys are required as all habitat for FFG Act listed communities and species will be retained.

Implications and recommendations

The majority of the study area is currently used for wheat cropping and does not support any significant ecological values. A draft concept plan has been designed for the proposed subdivision avoiding any impacts to native vegetation (Appendix 6).

The following design recommendations are provided to avoid any consequential impacts to native vegetation, and flora and fauna habitats:

- Retain all existing Grey Box trees and Grey Box woodland areas in the east of the study area within a reserve. Site development a minimum of 15m from the trunks of any treed native vegetation to avoid consequential impacts.
- Site entrances to the proposed subdivision to avoid impacts to native vegetation recorded in the road reserve of Hopetoun Park Road.
- Retain a minimum 20m buffer adjoining the edge of the escarpment in the west of the study area as a reserve and a 5m buffer around retained grasslands to prevent impacts to remnant vegetation, namely the area of EPBC-Act listed NTGVVP in HZ 1E and FFG-Act listed Melbourne Yellow Gum and Buloke.

In addition, while the majority of the escarpment and bank of Pyrites Creek west of the study area were not included in this investigation, they were noted to support native vegetation. Any development near to the western edge of the study area will be designed to minimise erosion and potential damage to vegetation through water runoff as specified in a stormwater management plan.

A permit for the removal of native vegetation will not be required under Cl. 52.17 of the State Planning Provisions if all native vegetation is being retained.

A referral under the EPBC Act will not be required for the abovementioned values, as no habitat for EPBC Act listed values is proposed to be removed.

A Protected Flora Permit will not be required from DEECA as no FFG-Act listed community or species' habitat are proposed to be removed.

2. Introduction

Bacchus Marsh Property Ltd engaged Nature Advisory Pty Ltd to conduct a flora and fauna assessment of a 145-hectare area of land comprising nine properties in Hopetoun Park. This area was split into two sections based on the large difference in abundance and quality of native vegetation between the areas east and west of Hopetoun Park Road. The specific area investigated in this report, referred herein as the 'study area', comprised the western section of the proposed Hopetoun Park North Precinct (67.35 hectares). This area is composed of three properties located in Hopetoun Park: 124 Hopetoun Park Road (Property 1), 150 Hopetoun Park Road (Property 2) and Lot 1 Cowans Road (Property 9). This report is provided to accompany a rezoning application. Two further planning process will be undertaken in the future (Development Plan & Permit Application) which will provide a greater level of detail including subdivision design.

This investigation was commissioned to provide information on the extent and condition of native vegetation in the study area according to Victoria's *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a), herein referred to as 'the Guidelines', and any potential impacts on flora and fauna matters listed under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This report outlines any implications under relevant national, state and local legislation and policy frameworks.

Specifically, the scope of the investigation included the following:

- A review of existing information regarding the flora, fauna and native vegetation of the study area and surrounds, including the following:
  - *Victorian Biodiversity Atlas* administered by the Department of Environment, Land, Water and Planning (DELWP);
  - The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) *Protected Matters Search Tool*;
  - DELWP's *Native Vegetation Information Management system* (NVIM);
  - Mark Trengrove Ecological Services (2019), *Hopetoun Park Vegetation Assessments*, several reports prepared for prepared for Bacchus Marsh Property Group P/L; and
  - Nature Advisory 2019, *124 and 150 Hopetoun Park Road and Lot 1 Cowans Lane, Hopetoun Park North Fauna Overview Assessment, Golden Sun Moth Targeted Survey & Greybox Woodland Assessment* - Report No. 19217 (5.2), Nature Advisory Pty Ltd, Hawthorn East, consultant report prepared for Urban Land Developments P/L.
- A site survey involving the following:
  - Characterisation and mapping of native vegetation on the site, as defined in Victoria's *Guidelines for the removal, destruction or lopping of native vegetation* (the 'Guidelines');
  - Assessment of native vegetation in accordance with the Guidelines, including habitat hectare assessment and/or scattered tree assessment;
  - Compilation of a flora species list/flora and fauna species lists for the site;
  - Assessment of the nature and quality of native fauna habitat; and

- Assessment of the likelihood of occurrence of EPBC Act- and *Flora and Fauna Guarantee Act 1988* (FFG Act)-listed flora, fauna and communities on the site.

This investigation was undertaken by a team from Nature Advisory comprising Tessa Doherty (Botanist), Dean Karopoulos (Botanist), Hongxiang Zhang (Botanist), Liz Browne (Zoologist), Dr Kate Callister (Senior Ecologist & Project Manager) and Dr Inga Kulik (Director).

3. Planning and legislative considerations

This investigation and report address the application on the site of relevant legislation and planning policies that protect biodiversity. Local, state and Commonwealth controls are summarised below.

3.1. Local planning provisions

The study area is located within the Moorabool local government area and is currently zoned Farming Zone in the Moorabool Planning Scheme.

The study area is located within a Bushfire-prone Area.

Local planning provisions apply under the *Victorian Planning and Environment Act 1987*.

3.2. Overlays

The study area is subject to the following overlay in the Moorabool Planning Scheme:

- *Environmental Significance Overlay – Schedule 3 (ESO3) –and Schedule 8 (ESO8*). ESO3 identifies areas which support environmental values related to the "Melton Mallee" vegetation of the Long Forest Flora Reserve on private land, and aims to protect the environmental, scientific, habitat and landscape values of these areas by controlling development of land. A permit would be required under this overlay to remove, destroy or lop any vegetation. This overlay covers a small area in the northwest of the study area where a shared path is proposed, which can be designed to avoid any native vegetation removal when following the existing track towards Cowans Road. ESO8 relates to River Red-gums and also covers a small area of land in the north west corner of the study area. The only vegetation removal trigger in ESO8 relates to the removal of River Red-gums. Therefore, a permit will not be required pursuant to ESO8 as there are no River Red-gums in the study area.
- *Significant Landscape Overlay – Schedule 1 (SLO1)* – This overlay identifies scenic hilltop and ridgeline areas, and aims to minimise visual impacts of development to these areas. A permit is required under this overlay to remove any vegetation specified in the schedule to this overlay. As no vegetation is listed in the schedule to this overlay, no permit under this overlay is required for the removal of vegetation.

No other overlays relevant to this investigation cover the study area.

3.3. State planning provisions

State planning provisions are established under the *Victorian Planning and Environment Act 1987*.

Clause 52.17 of all Victorian Planning Schemes states the following:

A permit is required to remove, destroy or lop native vegetation, including dead native vegetation.

A permit is not required if any of the following apply:

- An exemption in Table 52.17-7 specifically states that a permit is not required.
- A native vegetation precinct plan corresponding to the land is incorporated into the planning scheme and listed in the schedule to Clause 52.16.
- The native vegetation is specified in a schedule to Clause 52.17.

3.3.1. Exemptions

Exemptions listed in Table 52.17-7 relevant to the study area include the following:

- *Site area:* Native vegetation that occurs on contiguous land in one ownership that has an area of less than 0.4 hectares is exempt and does not require a planning permit. This exemption does not apply to native vegetation on a roadside or rail reservation.
- *Planted vegetation:* Native vegetation that is to be removed, destroyed or lopped that was either planted or grown as a result of direct seeding. This exemption does not apply to native vegetation planted or managed with public funding for the purpose of land protection or enhancing biodiversity.

3.3.2. Application requirements

Any application to remove, destroy or lop native vegetation must comply with the application requirements specified in the Guidelines (DELWP 2017a). The application of the Guidelines (DELWP 2017a) is explained further in Appendix 1.

When assessing an application, Responsible Authorities are also obligated to refer to Clause 12.01-1S (Protection of biodiversity), Clause 12.01-1L and Clause 12.01-2S (Native vegetation management) in the Planning Scheme that, in addition to the Guidelines, refers to the following policy guidelines and documents:

- *Assessor's handbook – applications to remove, destroy or lop native vegetation* (Version 1.1) (DELWP 2018a).
- Statewide biodiversity information maintained by DEECA.
- Any applicable biodiversity strategies, including the relevant Regional Catchment Strategy (prepared under Part 4 of the Catchment and Land Protection Act 1994)
- *Biodiversity Conservation Strategy for Melbourne's Growth Corridors* (Department of Environment and Primary Industries 2013a)
- *Protecting Victoria's Environment – Biodiversity 2037* (Department of Environment, Land, Water and Planning 2017)
- *Victorian Waterway Management Strategy* (Department of Environment and Primary Industries 2013b)

The Responsible Authorities must also consider the relevant objectives and strategies of the three above-mentioned Clauses. The relevant objectives and strategies relating to the current proposal for each Clause are outlined below.

Clause 12.01-1S – Protection of biodiversity

To objective of this Clause is to protect and enhance Victoria's biodiversity through the following strategies:

- Use biodiversity information to identify important areas of biodiversity, including key habitat for rare or threatened species and communities, and strategically valuable biodiversity sites.
- Strategically plan for the protection and conservation of Victoria's important areas of biodiversity.
- Ensure that decision making takes into account the impacts of land use and development on Victoria's biodiversity, including consideration of:
  - Cumulative impacts.

  - Fragmentation of habitat.
  - The spread of pest plants, animals and pathogens into natural ecosystems.
- Avoid impacts of land use and development on important areas of biodiversity.
- Consider impacts of any change in land use or development that may affect the biodiversity value of national parks and conservation reserves or nationally and internationally significant sites; including wetlands and wetland wildlife habitat designated under the Convention on Wetlands of International Importance (the Ramsar Convention) and sites utilised by species listed under the Japan-Australia Migratory Birds Agreement (JAMBA), the China-Australia Migratory Birds Agreement (CAMBA), or the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).
- Assist in the identification, protection and management of important areas of biodiversity.
- Assist in the establishment, protection and re-establishment of links between important areas of biodiversity, including through a network of green spaces and large-scale native vegetation corridor projects.
- Support land use and development that contributes to protecting and enhancing habitat for indigenous plants and animals in urban areas.

Clause 12.01-1L - Biodiversity

The relevant strategies in this Clause include the following:

- Minimise the impacts of land use and development by retaining native vegetation and minimising topsoil disturbance.

Clause 12.01-2S – Native vegetation management

The objective of this Clause is to ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation through the following strategies:

- Ensure decisions that involve, or will lead to, the removal, destruction or lopping of native vegetation, apply the three-step approach in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (Department of Environment, Land, Water and Planning, 2017):
  - Avoid the removal, destruction or lopping of native vegetation.
  - Minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.
  - Provide an offset to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation.

A response of how the current application addresses the relevant strategies of Clause 12.01 is provided in Section 6.4.

3.3.3. Referral to DEECA

Clause 66.02-2 of the planning scheme determines the role of DEECA in the assessment of native vegetation removal permit applications. If an application is referred, DEECA may make certain recommendations to the responsible authority in relation to the permit application.

Any application to remove, destroy or lop native vegetation must be referred to DEECA if any of the following apply:

- The impacts to native vegetation fall within the Detailed Assessment Pathway;
- A property vegetation plan applies to the site; or
- The native vegetation is on Crown land that is occupied or managed by the responsible authority.

3.4. EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects a number of threatened species and ecological communities that are considered to be of national conservation significance. Any significant impacts to these species require the approval of the Australian Minister for the Environment.

If there is a possibility of a significant impact on nationally threatened species, communities or listed migratory species, a Referral under the EPBC Act should be considered. The Minister will decide whether the project will be a 'controlled action' under the EPBC Act after 20 business days, in which case the project can only be undertaken with the approval of the Minister. This approval depends on a further assessment and approval process (lasting between three and nine months, depending on the level of assessment).

Implications under the EPBC Act for the current proposal are discussed in Section 6.7.

3.5. FFG Act

Section 4B of the FFG Act states that a public authority will need to consider potential biodiversity impacts when exercising their functions. This relates to the granting of a Planning Permit by Moorabool Council for the current proposal.

The Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) lists threatened and protected species and ecological communities (DELWP 2017b, DELWP 2018b). Any removal of protected flora, including threatened flora species and plants that constitute threatened communities listed under the FFG Act from public land, requires a Protected Flora Licence or Permit under the Act that can be obtained from DEECA.

The FFG Act only applies to private land where a license is required to remove grass trees, tree ferns and sphagnum moss for sale or where an Interim Conservation Order has been made to protect critical habitat for a threatened species or community. As no such habitat has ever been declared, this mechanism under the FFG Act has never been implemented.

Implications under the FFG Act for the current proposal are discussed in Section 6.8.

3.6. EE Act

One or a combination of several criteria may trigger a requirement for a Referral to the Victorian Minister for Planning who will determine whether an Environmental Effects Statement (EES) will be required according to the *Ministerial Guidelines for Assessment of Environmental Effects under the* Environment Effects Act 1978 (DSE 2006).

The criteria related to flora, fauna and native vegetation that trigger a Referral are listed below.

<u>One or more</u> of the following would trigger a Referral:

- Potential clearing of 10 or more hectares of native vegetation from an area that meets the following criteria:

  - Is of an Ecological Vegetation Class identified as endangered by the Department of Sustainability and Environment (in accordance with Appendix 2 of Victoria's Native Vegetation Management Framework); or
  - Is, or is likely to be, of very high conservation significance (as defined in accordance with Appendix 3 of Victoria's Native Vegetation Management Framework); and
  - Is not authorised under an approved Forest Management Plan or Fire Protection Plan;
- Potential long-term loss of a significant proportion (e.g. 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria;
- Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia'; or
- Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long term.

Two or more of the following would also trigger a Referral:

- Potential clearing of 10 or more hectares of native vegetation, unless authorised under an approved Forest Management Plan or Fire Protection Plan;
- Matters listed under the Flora and Fauna Guarantee Act 1988, including the following:
  - Potential loss of a significant area of a listed ecological community; or
  - Potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or
  - Potential loss of critical habitat; or
  - Potentially significant effects on habitat values of a wetland supporting migratory bird species.

Implications under the *Environment Effects Act 1978* (EE Act) for the current proposal are discussed in Section 6.9.

3.7. CaLP Act

The *Catchment and Land Protection Act 1994* (CaLP Act) requires that landowners (or a third party to whom responsibilities have been legally transferred) must eradicate regionally prohibited weeds and prevent the growth and spread of regionally controlled weeds.

Weed species listed under the CaLP Act that have been recorded in the study area are discussed in Section 6.10 and listed in Appendix 4.

4. Existing information and methods

4.1. Existing information

Existing information used for this investigation is described below.

4.1.1. Existing reporting and documentation

The existing documentation below, relating to the study area, was reviewed.

- Moorabool Planning Scheme.

4.1.2. Native vegetation

Pre-1750 (pre-European settlement) vegetation mapping administered by DEECA was reviewed to determine the type of native vegetation likely to occur in the study area and surrounds. Information on Ecological Vegetation Classes (EVCs) was obtained from published EVC benchmarks. These sources included the following:

- Relevant EVC benchmarks for the Victorian Volcanic Plain bioregion[1] (DSE 2004a); and
- *NatureKit* (DELWP 2022a).

4.1.3. Listed matters

Existing flora and fauna species records and information regarding the potential occurrence of listed matters were obtained from an area termed the 'search region', defined here as an area with a radius of 5 kilometres from the approximate centre point of the study area (coordinates: latitude 37˚ 41' 30" S and longitude 144˚ 30' 08" E).

A list of the flora and fauna species recorded in the search region was obtained from the *Victorian Biodiversity Atlas* (VBA), a database administered by DEECA.

The online EPBC Act *Protected Matters Search Tool* (DCCEEW 2022a) was consulted to determine whether nationally listed species or communities potentially occurred in the search region based on habitat modelling.

4.2. Field methods

The field assessment was conducted over four days on the 28th and 30th November and the 1st and 2nd December 2022. During this assessment, the study area was initially surveyed on foot.

Sites in the study area found to support native vegetation or with potential to support listed matters were mapped through a combination of aerial photograph interpretation and ground-truthing using a hand-held GPS (accurate to approximately five metres). Species and ecological communities listed as threatened under the EPBC Act or FFG Act (where these occurred on public land) were also mapped using the same method.

[1] A bioregion is defined as "a geographic region that captures the patterns of ecological characteristics in the landscape, providing a natural framework for recognising and responding to biodiversity values". In general, bioregions reflect underlying environmental features of the landscape (DNRE 1997).

4.2.1. Native vegetation

Native vegetation is currently defined in Clause 73.01 of all Victorian planning schemes as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'. The Guidelines (DELWP 2017a) further classify native vegetation as belonging to two categories:

- Patch; or
- Scattered tree.

The definitions of these categories are provided below, along with the prescribed DELWP methods of assessment. Further details on definitions of patches and scattered trees are provided in Appendix 1.

Patch

A patch of native vegetation may be defined as one of the following:

- An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native; or
- Any area with three or more native canopy trees[2] where the drip line[3] of each tree touches the drip line of at least one other tree, forming a continuous canopy; or
- Any mapped wetland included in the *Current wetlands map*, available at *MapShareVic* (DELWP 2022b).

Patch condition is assessed using the habitat hectare method (Parkes *et al.* 2003; DSE 2004b) whereby components of the patch (e.g. tree canopy, understorey and ground cover) are assessed against an EVC benchmark. The score effectively measures the percentage to which the condition of the vegetation resembles the original condition.

The *Native Vegetation Information Management* (NVIM) system (DELWP 2022c) provides modelled condition scores for native vegetation to be used in certain circumstances.

Scattered tree

A scattered tree may be defined as the following:

- A native canopy tree[2] that does not form part of a patch.

Scattered trees are counted and mapped, the species identified and the circumference at 1.3 m above the ground is recorded.

4.2.2. Flora species and habitats

Records of flora species were made in conjunction with sampling methods used to undertake habitat hectare assessments of the native vegetation described above. Specimens requiring identification using laboratory techniques were collected.

Species protected under the FFG Act were determined by crosschecking against the FFG Act *Protected Flora List* (DELWP 2017b).

[2] A native canopy tree is a mature tree (i.e. able to flower) that is taller 3 metres and normally found in the upper layer of the relevant vegetation type.
[3] The drip line is the outermost boundary of a tree canopy (leaves and/or branches) where the water drips onto the ground.

The potential for habitats to support listed flora species was assessed based on the following criteria:

- The presence of suitable habitat for flora species such as soil type, floristic associations and landscape context; and
- The level of disturbance of suitable habitats by anthropogenic disturbances and invasions by pest plants and animals.

Wherever appropriate, a precautionary approach was adopted in determining the likelihood of occurrence or flora listed under the EPBC Act and/or FFG Act. That is, where insufficient evidence was available regarding the potential occurrence of a listed species, the assumption was made that this could be in an area of suitable habitat.

4.2.3. Fauna species and habitats

The techniques below were used to detect fauna species utilising the study area.

- Incidental searches for mammal scats, tracks and signs (e.g. diggings, signs of feeding and nests/burrows).
- Daytime bird observations.
- General searches for reptiles and frogs.

Fauna habitats are described using habitat components that include old-growth trees, fallen timber, leaf litter and surface rocks.

Habitat connectivity of the study area (i.e. degree of isolation/fragmentation), including linkages to other habitats in the region, was determined using field observations, recent aerial photography and *NatureKit* (DELWP 2022a).

Wherever appropriate, a precautionary approach was adopted in determining the likelihood of occurrence or fauna listed under the EPBC Act and FFG Act. That is, where insufficient evidence was available regarding the potential occurrence of a listed species, the assumption was made that this could be in an area of suitable habitat.

Golden Sun Moth Targeted Surveys

Surveys for Golden Sun Moth (GSM) were undertaken in Summer 2022/23 in accordance with the method set out in the EPBC Act policy statement 3.12 – *Significant impact guidelines for the critically endangered golden sun moth (Synemon plana)* (DEWHA 2009).

The aim of the surveys was to identify whether GSM were present and to gather information on population size and distribution. As per the guidelines, this is achieved by undertaking a total of four surveys in areas of suitable habitat walking 50m, 25m and twice 10m wide transects.

A total of five surveys were conducted on the following dates.

- 21st December 2022 (50m transects)
- 26th December 2022 (25m transects)
- 6th January 2023 (10m transects)
- 14th January 2023 (10m transects)

Surveys were conducted in suitable conditions, specifically including the following.

- Surveys were timed to coincide with the GSM activity season, i.e. December to January

- Surveys were undertaken during suitable weather conditions, including the following:
  - Warm to hot days (above 20°C by 10 am);
  - During the warmest part of the day;
  - Clear to mostly cloudless sky;
  - Still or relatively still wind conditions during the survey period; and
  - At least two days since rain.
- Surveys were undertaken when male moths were flying. This was determined by visiting a reference site known to support a population of the species on the day of the survey of the study area. The reference sites were located off Barry Road, Broadmeadows
- Where practicable, surveys commenced at 10am and terminated at 3pm
- Surveys were mostly one week apart.

4.2.4. Threatened ecological communities

The study area was assessed against published descriptions of relevant listed ecological communities modelled to potentially occur in the study area.

Reviewed ecological community descriptions comprised identification criteria and condition thresholds from listing advice for EPBC Act communities and FFG Act-listed community descriptions (SAC 2015).

4.3. Limitations of field assessment

The site assessment was conducted during Spring. The short duration and seasonal timing of field assessments can result in some species not being detected when these may occur at other times. Additionally, some flora species and lifeforms may be undetectable at the time of survey or unidentifiable due to a lack of flowers or fruit. Timing of the survey and condition of vegetation were otherwise considered suitable to ascertain the extent and condition of native vegetation and fauna habitats.

These limitations were not considered to compromise the validity of the current investigation that was designed to address the relevant policies and decision guidelines.

5. Assessment results

5.1. Site description

The study area for this investigation (Figure 1) constituted approximately 67.35 hectares of predominantly private land located at Hopetoun Park, seven kilometres southwest of Melton. It was bordered by the Western Freeway to the north, Hopetoun Park Road to the east, adjoining private properties to the south and a steep escarpment leading down to Pyrites Creek to the west.

The study area supported basalt derived heavy soils on a flat landscape which sloped gently downwards to the west towards a steep rocky escarpment. Two farm dams occurred in the centre and northeast of the study area.

The majority of the study area is occupied by wheat crops on property 1, with two residences occurring in conjunction with an area of Grey Box woodland in the east of the study area. The westernmost property in the study area, located at Cowans Road, had recently been tilled in preparation for crop planting.

Surrounding land predominantly supported private residential dwellings to the south, low-density residential use and horse-keeping to the east, and a mixture of pasture, cropping and reserves to the north.

Native vegetation in the study area comprised Grey Box woodland in the east of properties 1 and 2 and on the adjoining Hopetoun Park Road reserve, shrubland on the rocky escarpment in the west, and patches of native grassland which remain following the ploughing in property 9. The woodland areas supported an open canopy of Grey Box in good health containing multiple large trees over an understory dominated by a diverse assemblage of native grasses and herbs as well as several scattered shrubs, with a lower quality understory dominated by weeds and garden plants near the residences.

Grassland was dominated by Spear and Wallaby Grasses with occasional occurrences of Kangaroo Grass, Common Wheat-grass and Silky Blue-grass. These areas of grassland also supported a low cover of a diversity of herbs such as Bluebells, Wingless Bluebush, Variable Sida, Ruby Saltbush, Kidney Weed and several species of New Holland Daisy.

The escarpment shrubland was variable, containing a diversity of grasses, herbs, trees and shrubs such as Buloke, Fragrant Saltbush, Melbourne Yellow Gum, Dark Bottle-washers, Austral Stork's-bill and Rock Fern, but often being heavily degraded by the invasion of weeds such as African Box-thorn and Pepper Tree.

An area to the southwest of the main properties was included in the study area for a proposed drainage outfall as well as an area to the northwest for a proposed shared path along an existing track down to Cowans Road.

The study area lies within the Victorian Volcanic Plain bioregion and falls within the Melbourne Water catchment management area.

5.2. Native vegetation

5.2.1. Patches of native vegetation

Pre–European EVC mapping (DELWP 2022a) indicated that the study area and surrounds would have supported Creekline Grassy Woodland (EVC 68), Plains Grassland (EVC 132), Plains Woodland (EVC 803), Stream Bank Shrubland (EVC 851) and Escarpment Shrubland (EVC 895).

Prior to European settlement based on modelling of factors including rainfall, aspect, soils and remaining vegetation.

Evidence on site, including floristic composition and soil characteristics, suggested that *Low-Rainfall* Plains Grassland (EVC 132_63), Plains Woodland (EVC 803) and Escarpment Shrubland (EVC 895) were present (Figure 1). A description of these EVCs is provided in the EVC benchmarks in Appendix 5.

Twenty-three patches (referred to herein as habitat zones) comprising the abovementioned EVCs were identified in the study area (Table 1). This totalled an area of 4.787 hectares of native vegetation in patches and included 16 large trees.

Table 1: Description of habitat zones in the study area

Habitat Zone	EVC	Description
A, B, C, AF, 1I, 1K	Plains Woodland (EVC 803)	Grassy Grey Box Woodland occurring in the east of property 1 and 2 and on the adjoining roadside of Hopetoun Park Road. These habitat zones had an open canopy of Grey Box in moderate-high health, and did not include any large trees, other than HZ AF which contained 11 large trees, and HZ 1I which contained 1 large tree. Understory vegetation was dominated by Wallaby Grasses and Rough Spear-grass with scattered shrubs, and was herb-rich, including Nodding Saltbush, Berry Saltbush, Bluebells, Inland Pigface and Kidney-weed. Inter-tussock space was high, and largely occupied by bryophytes and soil crusts. Weed cover was moderate-high (20-70%), and was largely high-threat, including Galenia, Prickly Pear, African Boxthorn and Couch. These habitat zones comprise both the EPBC-Act listed Critically Endangered ecological community **Grassy Eucalypt Woodland of the Victorian Volcanic Plain** and the EBPC-Act listed Endangered community **Grey Box (*Eucalyptus 16acrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.**
D, E, AG, AH, 1J	Plains Woodland (EVC 803)	Degraded Grassy Grey Box Woodland occurring in the east of property 1 and 2 and on the adjoining roadside of Hopetoun Park Road. These habitat zones had an open canopy of Grey Box in moderate-high health, and did not include any large trees, other than HZ AG which contained 3 large trees and HZ AH which included 1 large tree. Understory vegetation was scarce, consisting of scattered Wallaby and Spear Grasses with occasional herbs such as Nodding Saltbush, Inland Pigface, Kidney Weed and Berry Saltbush. Weeds such as Chilean Needle Grass, Galenia, Couch and African Boxthorn occupied the majority of the ground cover, although much of the ground was bare.

Habitat Zone	EVC	Description
AA, AB, AE	*Low-Rainfall* Plains Grassland (EVC 132_63)	These habitat zones occurred beside an access track in the northwest of the study area, and comprised low-quality grassland dominated by Brown-back Wallaby-grass, Spear Grasses and Windmill Grass, as well as herbs such as Spreading Crassula and New Holland Daisy. Inter-tussock space was high, comprised roughly equal amounts of bare ground and leaf litter. Weed cover was very high (55%), but was composed of low-threat weeds such as Rye Grass, Brome and Wild Oat. High threat weeds include African Box-thorn, Prickly Pear, Artichoke Thistle, Serrated Tussock and Chilean Needle-grass.
1E	*Low-Rainfall* Plains Grassland (EVC 132_63)	Moderate-low quality treeless grassland occurring in the southwest of property 9. Vegetation was dominated by a number of species of Wallaby Grass and Spear grass, with occasional occurrences of Kangaroo Grass, Common Wheat-grass and Silky Blue-grass. Chenopods and other arid herbs were a common feature of the ground layer, including Ruby Saltbush, Wingless Bluebush, Nodding Saltbush Black Roly-poly, Variable Sida, and several species of New Holland Daisy. Biomass and leaf litter was generally very high throughout these habitat zones, with little space for recruitment. Bryophytes, lichens and soil crusts occupied the majority of open ground. Weed cover was high (50%), but was generally composed of low-threat weeds such as Rye Grass, Brome and Wild Oat. High threat weeds include Galenia, Serrated Tussock, Artichoke Thistle and Chilean Needle-grass. This habitat zone comprises the EPBC-Act listed Critically Endangered ecological community **Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP).**
1G	*Low-Rainfall* Plains Grassland (EVC 132_63)	Low quality treeless grassland occurring in the west of property 9. Vegetation was dominated by a number of species of Wallaby Grass and Spear grass, with occasional occurrences of Kangaroo Grass and Windmill Grass. Herbs were scattered throughout the ground layer, including Ruby Saltbush, Bluebells, Nodding Saltbush and several species of New Holland Daisy. Bare ground occupied the majority of inter-tussock space. Weed cover was high (55%), and was composed of high-threat weeds such as Galenia, Serrated Tussock, African Boxthorn, Artichoke Thistle and Chilean Needle-grass.
AC, AI, 1C, 1D, 1F, 1H, 1L	Escarpment Shrubland (EVC 895)	Small areas of shrubland located on the escarpment in the west and south of the study area of varying biodiversity and quality.

The habitat hectare assessment results for these habitat zones are provided in Table 2. More detailed habitat scoring results are presented in Appendix 2. Details of large trees in patches are provided in Appendix 3.

Table 2: Summary of habitat hectare assessment results

Habitat Zone	EVC	Area (ha)	Condition score (out of 100)	No. of large trees in HZ
A	Plains Woodland (EVC 803)	0.104	33	
B	Plains Woodland (EVC 803)	0.123	33	
C	Plains Woodland (EVC 803)	0.005	19	
D	Plains Woodland (EVC 803)	0.047	21	
E	Plains Woodland (EVC 803)	0.038	23	
AA	*Low-Rainfall* Plains Grassland (EVC 132_63)	0.072	16	
AB	*Low-Rainfall* Plains Grassland (EVC 132_63)	0.013	23	
AC	Escarpment Shrubland (EVC 895)	0.097	18	
AE	*Low-Rainfall* Plains Grassland (EVC 132_63)	0.057	16	
AF	Plains Woodland (EVC 803)	1.571	46	11
AG	Plains Woodland (EVC 803)	0.052	40	3
AH	Plains Woodland (EVC 803)	0.040	30	1
AI	Escarpment Shrubland (EVC 895)	0.155	20	
1C	Escarpment Shrubland (EVC 895)	0.147	57	
1D	Escarpment Shrubland (EVC 895)	0.392	48	
1E	*Low-Rainfall* Plains Grassland (EVC 132_63)	0.425	62	
1F	Escarpment Shrubland (EVC 895)	0.096	51	
1G	*Low-Rainfall* Plains Grassland (EVC 132_63)	0.151	46	
1H	Escarpment Shrubland (EVC 895)	0.231	56	
1I	Plains Woodland (EVC 803)	0.261	47	1
1J	Plains Woodland (EVC 803)	0.072	23	
1K	Plains Woodland (EVC 803)	0.144	40	
1L	Escarpment Shrubland (EVC 895)	0.009	51	
Total		**4.787**		**16**

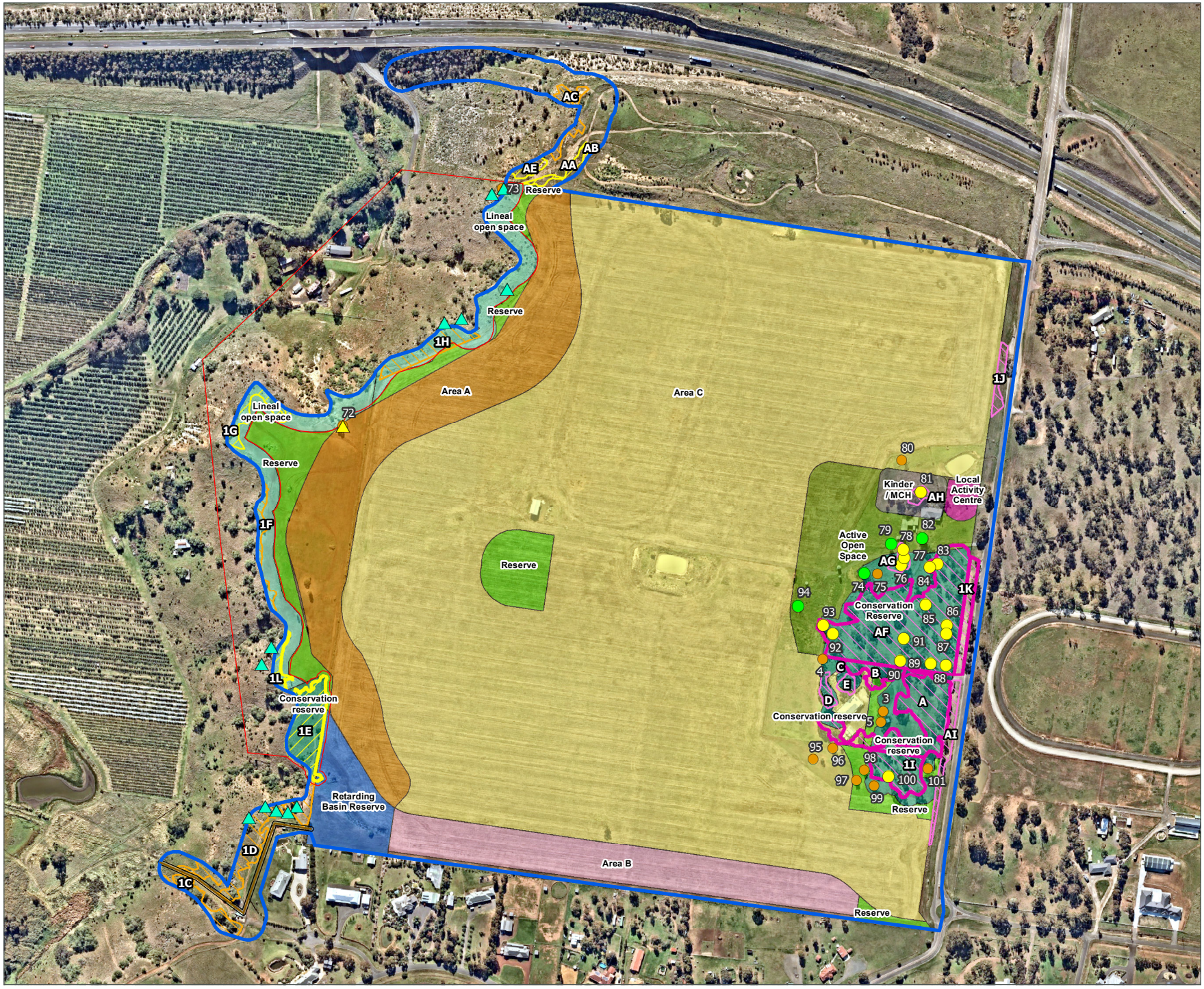

Figure 1: Study area and native vegetation

Project: Hopetoun Park North
Client: Urban Lands Developments Pty Ltd
Date: 24/08/2023

Study area

Native vegetation

- Large tree in patch
- Large scattered tree
- Small scattered tree
- Plains Grassland - Low-rainfall (EVC 132_63)
- Plains Woodland (EVC 803)
- Escarpment Shrubland (EVC

Threatened species

- Buloke
- Melbourne Yellow Gum

Listed community

- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- Natural Temperate Grassland of the Victorian Volcanic Plain
- Retention buffer

Concept Plan West Side

- Kinder / MCH
- Conservation reserve
- Lineal open space
- Development Area A
- Development Area
- Development Area
- Active Open Space
- Local Activity
- Reserve
- Retarding Basin Reserve

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Metres
0 100

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5.2.2. Scattered trees

Scattered trees recorded in the study area would once have comprised the canopy component of Plains Woodland (EVC 803).

Sixteen scattered trees occurred in the study area (Figure 1), including the following:

- Four large scattered trees (≥ 70-centimetre DBH); and
- Twelve small scattered trees (< 70-centimetre DBH).

Details of all scattered trees recorded are listed in Appendix 3.

5.3. Flora species

5.3.1. Species recorded

During the field assessment, 138 plant species were recorded, of which 80 (58%) were indigenous and (42%) were introduced or non-indigenous native in origin (Appendix 4).

5.3.2. Listed species

Records from the VBA (DELWP 2022d) and Commonwealth EPBC Protected Matters Search Tool (DCCEEW 2022a) indicated that within the search region (5km from the study area) there were records of, or potential suitable habitat occurred for, 13 species listed under the Commonwealth EPBC Act and 35 listed under the state FFG Act, including 11 listed under both Acts. No flora species listed under the EPBC Act and three flora species listed under the FFG Act were recorded during the field survey:

- Buloke (FFG: Vulnerable);
- Fragrant Saltbush (FFG: Vulnerable); and
- Melbourne Yellow Gum (FFG: Endangered).

The likelihood of occurrence of species listed under the EPBC Act and FFG Act in the study area is addressed in Table 3. Species considered 'likely to occur' have very high potential of occurring in native vegetation within the study area based on numerous records in the search region and suitable habitat in the study area. Species considered to have the 'potential to occur' are those for which suitable habitat exists, but recent records are scarce.

This analysis indicates that in addition to the species listed above, the following seven listed flora species are likely to occur or have the potential to occur within native vegetation of the study area:

- Austral Tobacco (FFG: Endangered);
- Branching Groundsel (FFG: Endangered);
- Cane Spear-grass (FFG: Endangered);
- Diamond Firetail (EPBC: Vulnerable, FFG Act Vulnerable)
- Forked Rice-flower (FFG: Endangered);
- Heath Spear-grass (FFG: Vulnerable);
- Matted Flax-lily (EPBC: Endangered; FFG: Critically Endangered);
- Rye Beetle-grass (FFG: Endangered).

Table 3: Listed flora species and their likelihood of occurrence within native vegetation in the study area

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Rough Wattle	*Acacia aspera subsp. parviceps*		Endangered	Apparently confined to northern Brisbane Ranges (Mt Wallace - Bacchus Marsh areas), with an outlying occurrence just S of Beaufort (Maslin 2001); Usually occurs on ranges in shallow stony or gravelly soil in eucalyptus open forest communities (Entwisle et al. 1996)	1	22/10/2009	Study area outside of known range. No open eucalypt forest on stony/gravelly soils occurs. Conspicuous species not spotted during detailed assessment. **Unlikely to occur.**
Bacchus Marsh Wattle	*Acacia rostriformis*		Vulnerable	Occurs in low hilly areas in Eucalyptus woodland in the Bacchus Marsh Area.	63	26/05/2015	Multiple nearby records. Habitat and multiple records occur on nearby escarpment, but no habitat occurs within study area. **Unlikely to occur** within study area, but potential to occur on adjacent escarpment.
Buloke	*Allocasuarina luehmannii*		Critically Endangered	Woodlands on non-calcareous soils. Commonly grows with Grey Box (Entwisle 1996).	11	3/03/2020	Habitat occurs on the escarpment in the west of the study area as well as in the Grey Box woodland. Recorded in multiple locations along western escarpment. **Known to occur.**
River Swamp Wallaby-grass	*Amphibromus fluitans*	Vulnerable		River Swamp Wallaby-grass grows mostly in permanent swamps and also lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground; conditions that are caused by seasonally-fluctuating water levels (DAWE 2020).	None	N/A	No areas of wetland within study area, and no species of *Amphibromus* recorded. No nearby records. **Unlikely to occur.**
Cane Spear-grass	*Austrostipa breviglumis*		Endangered	Skeletal soils in dry areas.	8	13/04/2014	Nearby records confined to Long Forest Reserve, however suitable soils occur on edge of western escarpment. **Potential to occur.**
Heath Spear-grass	*Austrostipa exilis*		Vulnerable	Apparently confined to drier woodlands near Bacchus Marsh (Walsh 1994).	7	22/10/2009	Dry woodland habitat occurs in study area. Multiple nearby recent records. **Potential to occur.**
Yellow Burr-daisy	*Calotis lappulacea*		Vulnerable	Open woodlands near Melbourne and on fertile loam or clay soils in the north and north-west of Victoria	1	22/10/2009	Dry woodland habitat occurs in study area, but is disturbed by nearby residences and cropping, limiting habitat for herbaceous species. **Unlikely to occur.**
Spotted Gum	*Corymbia maculata*		Vulnerable	Coastal Plains and hills. Endemic to the Tara range in East Gippsland (Walsh & Entwistle).	1	8/11/2010	Study area outside of native range. Nearby record likely a cultivated individual of this widely planted species. **Does not naturally occur.**
Tough Scurf-pea	*Cullen tenax*		Endangered	Grasslands and grassy woodlands, subject to irregular flooding, with relatively rich soils derived from alluvium. *An exception is the population near Shelford, which grows from rocky clay soils derived from basalt* (DSE 2005).	1	22/10/2009	Study area not subjected to flooding and does not support soils derived from alluvium. **Unlikely to occur.**
Matted Flax-lily	*Dianella amoena*	Endangered	Critically Endangered	Lowland grassland and grassy woodlands on well-drained to seasonally waterlogged fertile sandy loams to heavy cracking soils derived from sedimentary or volcanic Geology. It is widely distributed from eastern to south-western Victoria (DAWE 2020).	1	3/03/2020	Habitat occurs in study area in grassy woodland and native grassland with a nearby record, but these habitats have been disturbed by nearby residences, cropping, and clearing of grassland. However, this species is known to be resilient to disturbance, and may persist in these areas. **Potential to occur.**
Small Golden Moths	*Diuris basaltica*	Endangered	Critically Endangered	Grows in herb-rich native grasslands, dominated by Kangaroo Grass (Themeda triandra) on heavy basaltic soils, often embedded with basalt boulders. All locations that the species is known to occur form part of the 'Natural Temperate Grassland of the Victorian Volcanic Plain' (DAWE 2020).	7	3/03/2020	Grassland not herb rich, nor dominated by Kangaroo Grass. Adjoining grassland has recently been cleared, leading to further disturbance of this habitat. **Unlikely to occur.**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Sunshine Diuris	*Diuris fragrantissima*	Endangered	Critically Endangered	Native grasslands dominated by Kangaroo Grass, on heavy basalt soils, often with embedded basalt boulders; the only remaining natural population at Sunshine occurs in a small (0.1 ha) remnant of Western (Basalt) Plains Grassland (DAWE 2020).	None	N/A	Grassland not herb rich, nor dominated by Kangaroo Grass. Adjoining grassland has recently been cleared, leading to further disturbance of this habitat. No nearby records. **Unlikely to occur.**
Trailing Hop-bush	*Dodonaea procumbens*	Vulnerable		Grows in low lying, often winter wet areas in woodland, low open-forest heathland and grasslands on sands and clays. Largely confined to SW of Victoria (DAWE 2020).	None	N/A	Study area outside of known species range. No nearby records. Low lying areas in woodland unlikely to be wet during winter. **Unlikely to occur.**
Werribee Blue-box	*Eucalyptus baueriana subsp. thalassina*		Endangered	Grows on alluvial soils near waterways from Bacchus Marsh to Werribee.	311	7/07/2016	Multiple nearby records. Habitat occurs on the escarpment west of the study area, but nearby records are restricted to Long Forest reserve. Conspicuous species not recorded during detailed survey. No habitat occurs within study area. **Unlikely to occur.**
Melbourne Yellow-gum	*Eucalyptus leucoxylon subsp. connata*		Endangered	Limited to the outer areas of Melbourne and Geelong on hilly, well drained slopes of sandstone origin. Extremely common in the Brisbane Ranges and also in small pockets near Torquay and Anglesea, and in the north-east metropolitan Melbourne and Sunbury area.	33	3/03/2020	Suitable habitat occurs on escarpment in west of study area. Individual recorded during the detailed field survey. **Known to occur.**
Clover Glycine	*Glycine latrobeana*	Vulnerable	Vulnerable	Found across south-eastern Australia in native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer. In Victoria, populations occur in lowland grasslands, grassy woodlands and sometimes in grassy heath (DAWE 2020).	None	N/A	Study area supports habitat in native grassland and grassy woodland, but these habitats have been disturbed by nearby residences, cropping, and clearing of grassland. No nearby records. **Unlikely to occur.**
Western Golden-tip	*Goodia medicaginea*		Endangered	Sporadically placed, however prefers dry sites.	3	19/10/2008	Nearby records confined to Long Forest Reserve. Conspicuous species not recorded during detailed field survey. **Unlikely to occur.**
Adamson's Blown-grass	*Lachnagrostis adamsonii*	Endangered	Endangered	Confined to slow moving creeks, swamps, flats, depressions or drainage lines that are seasonally inundated or waterlogged and usually moderately to highly saline. Appear to favour sites that have some shelter from the wind (DAWE 2020).	None	N/A	Study area outside of known range. Inundated areas highly limited and seasonal, and non-saline. No nearby records. **Unlikely to occur.**
Spiny Peppercress	*Lepidium aschersonii*	Vulnerable	Endangered	The Spiny Peppercress occurs in periodically wet sites such as gilgai depressions and the margins of freshwater and saline marshes and shallow lakes, usually on heavy clay soil. Almost all sites receive some degree of soil waterlogging or seasonal flooding.	None	N/A	Study area is not seasonally inundated. No nearby records. **Unlikely to occur.**
Basalt Peppercress	*Lepidium hyssopifolium* s.s.	Endangered	Endangered	Known to establish on open, bare ground with limited competition from other plants. Previously recorded from Eucalypt woodland with a grassy ground cover, low open Casuarina woodland with a grassy ground cover and tussock grassland. Now generally found amongst exotic pasture grasses and beneath exotic trees (DAWE 2020).	None	N/A	Bare ground limited within study area. No nearby records. **Unlikely to occur.**
White Sunray	*Leucochrysum albicans subsp. tricolor*	Endangered	Endangered	Occurs in a wide variety of grassland, woodland and forest habitats, generally on relatively heavy soils. Plants can be found in natural or semi-natural vegetation and grazed or ungrazed habitat. Bare ground is required for germination. The unpalatability of this species is likely to protect it in heavily grazed areas where patches of bare ground are likely to develop, favouring recruitment (DAWE 2020).	None	N/A	Study area outside of known range of species. Bare ground limited within study area. No nearby records. **Unlikely to occur.**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Austral Tobacco	*Nicotiana suaveolens*		Endangered	Drier inland areas often in rocky places, especially escarpments (Jeanes 1996).	25	3/03/2020	Habitat occurs on rocky escarpment in west of study area. Multiple nearby records. **Potential to occur.**
Satin Daisy-bush	*Olearia minor*		Endangered	Loamy soils in mallee vegetation, and in dry forest in Brisbane Ranges and Werribee Gorge	1	22/10/2009	Study area outside of known range of species. Not known to occur on heavy clay soils. **Unlikely to occur.**
Narrow-leaf Wax-flower	*Philotheca angustifolia subsp. montana*		Vulnerable	Grows in rocky areas of the northern Grampians and ranges further west.	1	1/01/1987	Study area outside of known range of species. Not known to occur on heavy clay soils. No recent nearby records. **Unlikely to occur.**
Forked Rice-flower	*Pimelea hewardiana*		Endangered	Rocky Habitats west of Melbourne (Entwisle 1996).	12	7/08/2015	Study area supports suitable habitat along western escarpment, and multiple nearby records occur. **Potential to occur.**
Spiny Rice-flower	*Pimelea spinescens subsp. spinescens*	Critically Endangered	Critically Endangered	Occurs in grassland or open shrubland on basalt derived soils, usually comprising black or grey clays. Plants from more northerly populations occur on red clay complexes, while plants from southern populations occur on heavy grey-black clay loams. Topography is generally flat but populations may occur on slight rises or in slightly wettish depressions.	2	3/03/2020	Study area supports habitat in native grassland, with nearby recent records. However, clearing of grassland in the west of the study area has led to the disturbance of the remaining patches, which occur on the edges of the escarpment on a sloping topography with transitionary geology. **Unlikely to occur.**
Basalt Podolepis	*Podolepis linearifolia*		Endangered	Grasslands with heavy clay soils on the Basalt Plains (Jeanes 1999).	2	3/03/2020	Study area supports habitat in native grassland. with nearby recent records. However, clearing of grassland in the west of the study area has led to the disturbance of the remaining patches, which occur on the edges of the escarpment on a sloping topography with transitionary geology. **Unlikely to occur.**
Snowy Mint-bush	*Prostanthera nivea var. nivea*		Vulnerable	Shrub and woodlands confined to granite outcrops	5	27/09/2011	No granite outcrop habitat occurs in study area. Nearby records limited to Long Forest Reserve and Werribee Gorge. **Unlikely to occur.**
Green-striped Greenhood	*Pterostylis chlorogramma*	Vulnerable	Endangered	Occurs in mixed Box-Stringybark forest with a shrubby understorey, often with Pteridium esculentum as a major component on sandy or clay loam soils (Duncan et al. 2009).	None	N/A	No habitat occurs in study area. **Unlikely to occur.**
Leprechaun Greenhood	*Pterostylis conferta*		Critically Endangered	Kangaroo Grass grasslands on stony rises, with scattered Hedge Wattle and other grasses and herbs, on shallow heavy clay soils derived from basalt. Plants often grow in very shallow soils around embedded basalt boulders, often with mosses and small ferns (Duncan et al. 2010)	2	8/10/1996	Grassland and grassy woodland within study area disturbed by nearby residences, cropping and clearing of grassland. Remaining grassland and grassy woodland not dominated by Kangaroo Grass or with abundant basalt boulders. **Unlikely to occur.**
Brittle Greenhood	*Pterostylis truncata*		Critically Endangered	Open forest, basalt plains grasslands and woodlands, often in flat open areas with shallow granite outcrops or on sheltered ridges (Jones 1994).	53	22/10/2009	Grassland and grassy woodland within study area disturbed by nearby residences, cropping and clearing of grassland. Remaining grassland occurs on the edges of the escarpment on sloping topography with transitionary geology. **Unlikely to occur.**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Fragrant Saltbush	*Rhagodia parabolica*		Vulnerable	Steep rocky and broad ridges between Sunbury and Geelong, but can be locally common (Walsh 1996).	434	13/10/2020	Habitat occurs in west of study area on rocky escarpment, and was recorded during the field survey. Species is widely planted and spread by birds and may occur elsewhere. **Known to occur.**
Coast Twin-leaf	*Roepera billardierei*		Endangered	Dunes and limestone cliffs in scrubby vegetation (Jeanes 1999).	2	19/10/2008	No dunes or limestone cliffs occur in study area. Nearby records restricted to Long Forest Reserve. **Unlikely to occur.**
Button Wrinklewort	*Rutidosis leptorhynchoides*		Endangered	In Victoria restricted to open stands of plains grassland and grassy woodlands, on fertile clays to clay loams, usually in areas where the grass cover is more open, either as a result of recurrent fires or grazing by native macropods or stock. It also occurs on low rises with shallow, stony soils at less than 100 m above sea level.	None	N/A	Study area outside of known species range. No nearby records. Study area not subject to regular disturbance, and bare ground limited. **Unlikely to occur.**
Branching Groundsel	*Senecio cunninghamii var. cunninghamii*		Endangered	Heavy, sometimes winter-wet soils, dry rocky soils, common on embankments and escarpments.	3	22/10/2009	Habitat occurs on escarpment in west of study area, and recent record occurs immediately to the south of study area. **Potential to occur.**
Large-headed Fireweed	*Senecio macrocarpus*	Vulnerable	Critically Endangered	Victoria, occurs most commonly in grasslands on red-brown earth soils; may also occur in grassy woodlands and open woodlands predominantly in the Western (Basalt) Plains grassland on red brown earth soils found on recent Quaternary (basalt) deposits (DAWE 2020).	None	N/A	Study area outside of known species range, but supports habitat and suitable soils. No nearby records. **Unlikely to occur.**
Rye Beetle-grass	*Tripogonella loliiformis*		Endangered	Dry and rocky sites (Walsh 1994). Grows in shallow soils over-lying (or on the edges of) flat basalt rocks in Plains Grassland where there is an accumulation of moss and organic matter (D. Coppolino personal obs).	4	10/09/2020	Habitat occurs in native grassland throughout study area. Although disturbed, these areas of habitat are dominated by grasses with abundant surface stones. Nearby recent records. **Potential to occur.**

Notes: EPBC-T = threatened species status under EPBC Act; **FFG** = threatened species status under the FFG Act.

5.4. Fauna habitats

The study area supported the following three fauna habitat types:

- Grey Box woodland;
- Grassland habitat; and
- Escarpment shrubland.

Native Treed Vegetation: This habitat type consisted of a Grey Box woodland patch within properties 1 and 2 and a few other scattered trees. Native grasses and herbs were dominant in the understorey, with exotic grasses and exotic shrubs near to the residences. Loose bark, fallen branches, emergent stones and logs were common and may provide shelter or breeding sites for wildlife, particularly reptile species. Several hollows varying in size were recorded in the trees, which can be utilised by a variety of wildlife.

Photograph 1: Grey Box woodland

Grassland habitat: Grassland in the north and south of property 9 and consisted predominantly of large patches of native Wallaby and Spear Grasses. Kangaroo Grass, Chilean Needle Grass, Serrated Tussock, Common Wheat-grass and Windmill grass were also scattered throughout. Regardless of species composition and origin, grassland vegetation can provide foraging opportunities for various fauna species and can host reptiles due to the presence of scattered refugia such as dense tussocks. Emergent stones were present at a low density throughout, and may provide shelter or breeding sites for wildlife, particularly reptile species.

Photograph 3: Native grassland with extensive recent disturbance

Rocky Escarpment: This habitat type was dominated by a mixture of exotic and native trees and shrubs such as African Boxthorn, Pepper trees, Buloke, Lightwood, Fragrant Saltbush and Melbourne Yellow Gum. The thick clumps of African Boxthorn and Fragrant Saltbush provide habitat for a variety of small bird species, and the larger trees and native understory species provide feeding opportunities for a range of fauna. Large emergent stones and rock walls were abundant throughout this habitat, providing shelter or breeding sites for wildlife, particularly reptile species.

Photograph 4: Rocky Escarpment

5.5. Fauna species

5.5.1. Listed species

The review of existing information including VBA records (DELWP 2022d) and the results of the EPBC Protected Matters Search Tool (DCCEEW 2022a) indicated that within the search region there were records of, or potential suitable habitat occurred for, 53 fauna species listed under the Commonwealth EPBC Act and the state FFG Act. The likelihood of occurrence of these species in the study area was assessed and the results are presented in Table 4.

This analysis of potential occurrence of listed fauna species excludes the following:

- Marine fauna given that the study area is inland; and
- Migratory oceanic bird species (such as albatrosses and petrels) and migratory shorebirds given that the study area is inland.

Species considered 'likely to occur' are those with very high potential of occurring in the study area given the existence of numerous records in the search region and suitable habitat in the study area. Using the precautionary approach, species considered to have the 'potential to occur' are those for which suitable habitat exists, but recent records are scarce. This analysis indicates that 12 listed fauna species are likely to occur or have the potential to occur. These species include the following:

Birds

- Black Falcon (FFG: Critically Endangered);
- Diamond Firetail (EPBC: Vulnerable, FFG Act Vulnerable);
- Fork-Tailed Swift (EPBC: Migratory);
- Little Eagle (FFG: Vulnerable);

- Satin Flycatcher (EPBC: Migratory);
- Speckled Warbler (FFG: Endangered);
- Swift Parrot: (EPBC: Critically Endangered; FFG: Critically Endangered);
- White-bellied Sea-eagle (FFG: Endangered);
- White-throated Needletail (EPBC: Vulnerable, Migratory; FFG: Vulnerable).

Mammals

- Brush-tailed Phascogale (FFG: Vulnerable); and
- Grey-headed Flying-fox (FFG: Vulnerable).

Insects

- Golden Sun Moth (EPBC Act: Vulnerable; FFG Act: Vulnerable)

The susceptibility of these species to impacts from development is discussed in Section 5.5.2.

Table 4: Listed fauna species and their likelihood of occurrence in the study area

Common Name	Scientific name	EPBC-T	EPBC-M	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Birds								
Australasian Bittern	*Botaurus poiciloptilus*	Endangered		Critically Endangered	Terrestrial wetlands, including a range of wetland types but prefers permanent water bodies with tall dense vegetation, particularly those dominated by sedges, rush, reeds or cutting grass (Marchant & Higgins 1990).	None	N/A	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Australasian Shoveler	*Spatula rhynchotis*			Vulnerable	Large and deep permanent bodies of water and aquatic flora abundant. Also occurs on billabongs, watercourses and flood waters on alluvial plains, freshwater meadows, shallow swamps, reed swamps, wooded lakes, sewage farms and farm dams (Marchant & Higgins 1990).	5	21/02/2019	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Australian Painted-snipe	*Rostratula australis*	Endangered		Critically Endangered	Generally inhabits shallow terrestrial freshwater wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of Lignum muehlenbeckia or canegrass or sometimes tea-tree (Melaleuca). Sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber (DAWE 2020).	None	N/A	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Barking Owl	*Ninox connivens*			Critically Endangered	Eucalyptus dominated forests and woodlands, commonly near water-bodies, such as streams and rivers, and requires hollow trees for nesting and trees with dense foliage for roosting (Higgins 1999).	21	5/10/2002	Suitable foraging habitat within the study area, but absence of records from the area including within Long Forest Nature Conservation Reserve for twenty years, **unlikely to occur**.
Black Falcon	*Falco subniger*			Critically Endangered	Woodlands, open country and terrestrial wetlands; in arid and semi-arid zones; mainly over open plains and undulating land with large tracts of low vegetation. It is more commonly found in north-western Victoria and is only occasionally found in southern Victoria. It is a highly mobile species, moving in response to food availability and seasonal conditions (Marchant & Higgins 1993).	9	8/03/2019	Some suitable habitat and recent in the search region, **potential to occur.**
Blue-billed Duck	*Oxyura australis*			Vulnerable	Terrestrial wetlands and prefers deep permanent, well vegetated water bodies. V (Marchant & Higgins 1990).	5	18/03/2020	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*			Vulnerable	Dense heathland and dense understorey or ground-layer in sclerophyll forests and woodlands; also in Box-ironbark forests. Widespread but sparsely distributed (Higgins & Peter 2002; Tzaros 2005).	7	9/05/2004	Lack of suitable habitat within the study area, **unlikely to occur**.
Common Greenshank	*Tringa nebularia*		M (Bonn A2H, CAMBA, JAMBA, ROKAMBA)	Endangered	Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins & Davies 1996).	None	N/A	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Common Sandpiper	*Actitis hypoleucos*		M (Bonn A2H, CAMBA, JAMBA, ROKAMBA)	Vulnerable	Inhabits a wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands. In Victoria, mostly found Westernport and Port Phillip Bay (Higgins & Davies 1996).	None	N/A	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Crested Bellbird	*Oreoica gutturalis*			Endangered	Dry acacia shrublands or woodlands, eucalypt woodlands including mallee and spinifex; usually occur in dense vegetation near ground. In Victoria, widespread in north central and southern northern districts; often in box-ironbark woodlands with open shrubby understorey (Higgins & Peter 2002; Tzaros 2005).	16	10/01/2003	Lack of suitable habitat within the study area, **unlikely to occur**.

Common Name	Scientific name	EPBC-T	EPBC-M	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Curlew Sandpiper	*Calidris ferruginea*	Critically Endangered	M (Bonn A2H, CAMBA, JAMBA, ROKAMBA)	Critically Endangered	Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins & Davies 1996).	None	N/A	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Diamond Firetail	*Stagonopleura guttata*	Vulnerable		Vulnerable	Commonly found in box-ironbark forests and woodlands and also occurs along watercourses and in farmland areas. Widespread but scattered. Forages on a wide range of seeds, which in some cases a large portion can be derived from weed species (Read 1994). Populations had declined in Victoria since the 1950s (Emison et al. 1987; Tzaros 2005).	61	16/02/2018	Some suitable habitat within grey box woodland and numerous recent records within the search region, **likely to occur**.
Eastern Curlew	*Numenius madagascariensis*	Critically Endangered	M (Bonn A1, CAMBA, JAMBA, ROKAMBA)	Critically Endangered	Inhabits sheltered coasts, especially estuaries, embayment, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats, often with beds of sea grass (Higgins & Davies 1996).	None	N/A	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Fork-tailed Swift	*Apus pacificus*		M (CAMBA, JAMBA, ROKAMBA)		The species can occur in wet sclerophyll forest but mainly prefers open forest or plains. It is almost exclusively aerial and feeds up to hundreds on metres above the ground, but can feed among open forest canopy. The species breeds internationally and seldom roosts in trees (Higgins 1999).	4	20/02/2003	Aerial species which may fly above the study area, **potential to occur**.
Freckled Duck	*Stictonetta naevosa*			Endangered	Terrestrial wetlands; prefer fresh, densely vegetated waters, particularly floodwater swamps and creeks vegetated with lignum or cane grass. During dry seasons or droughts, move off ephemeral breeding swamps and occupy large permanent waters (Marchant & Higgins 1990).	2	28/02/2006	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Endangered			In summer generally in tall mountain forests and woodlands, particularly in heavily timbered, mature wet sclerophyll forests and woodlands. Prefer Eucalyptus dominated assemblages. Also occurs in subalpine snow gum woodlands and occasionally in temperate rainforests and regenerating forests. In winter occur at lower altitudes in drier, more open Eucalyptus woodland (Higgins 1999).	1	1/10/1986	Lack of suitable habitat within the study area, **unlikely to occur**.
Glossy Ibis	*Plegadis falcinellus*		M (Bonn A2S)		Prefer freshwater inland wetlands, in particular, permanent or ephemeral water bodies and swamps with abundant vegetation (Marchant & Higgins 1990).	1	1/10/1986	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Grey Falcon	*Falco hypoleucos*	Vulnerable		Vulnerable	Inhabits arid and semi-arid zones; mainly on sandy and stony plains of inland drainage systems, lightly timbered with acacia. Hunt far into open areas, over spinifex, tussock grasslands and low shrublands. In Victoria, few records mostly in north and northwestern regions (Marchant & Higgins 1993).	None	N/A	Lack of suitable habitat and no records within the search region, **unlikely to occur.**
Grey Goshawk	*Accipiter novaehollandiae*			Endangered	Inhabit rainforests, open forests, swamp forests, woodlands and plantations; most abundant where forest or woodland provide cover for hunting from perches. in Vic., most common in Otway ranges (Marchant & Higgins 1993).	2	10/03/2021	Lack of suitable forest habitat, and very few records, **unlikely to occur.**
Hardhead	*Aythya australis*			Vulnerable	Inhabits large, deep waters where vegetation is abundant; particularly deep swamps and lakes, pools and creeks. Also occur on freshwater meadows, seasonal swamps with abundant aquatic flora, reed swamps, wooded lakes and swamps, rice fields, and sewage ponds (Marchant & Higgins 1990).	7	29/10/2015	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**

Common Name	Scientific name	EPBC-T	EPBC-M	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Hooded Robin	*Melanodryas cucullata*	Vulnerable		Vulnerable	Occur mostly in open Grey Box, White Box, Yellow Box, Yellow Gum and Ironbark woodlands with pockets of saplings or taller shrubs, an open shrubby understorey, sparse grasses and patches of bare ground and leaf-litter, with scattered fallen timber. The population has declined throughout range, especially since the early 1980s. This species typically occurs north of the great divide in shrubland or woodland dominated by acacias (Higgins & Peter 2002; Tzaros 2005).	4	7/09/1986	Some suitable habitat within grey box woodland, but absence of recent records from the area, **unlikely to occur**.
Latham's Snipe	*Gallinago hardwickii*		M (Bonn A2H, JAMBA, ROKAMBA)		Occurs in wide variety of permanent and ephemeral wetlands; it prefers open freshwater wetlands with dense cover nearby, such as the edges of rivers and creeks, bogs, swamps, waterholes. The species is wide spread in southeast Australia and most of its population occurs in Victoria, except in the northwest of the state (Naarding 1983; Higgins & Davies 1996).	4	6/01/2008	Lack of suitable aquatic habitat within the study area, **unlikely to occur.**
Little Eagle	*Hieraaetus morphnoides*			Vulnerable	Over wooded and forested lands and open country of Aust. Range extending into arid zone. Most abundant in open forest and woodland (Marchant & Higgins 1993).	48	29/05/2021	Suitable habitat and numerous records within the study area within the search region, **likely to occur**.
Magpie Goose	*Anseranas semipalmata*			Vulnerable	Terrestrial and aquatic habitats, but activities cantered on wetlands, mainly those on floodplains of rivers (Marchant & Higgins 1990).	1	27/07/2019	Lack of suitable habitat within the study area and no records within the search region, **unlikely to occur.**
Painted Honeyeater	*Grantiella picta*	Vulnerable		Vulnerable	Inhabits box-ironbark forests and woodlands and mainly feeds on the fruits of mistletoe. Strongly associated with mistletoe around the margins of open forests and woodlands. Can also be found in farmland containing remnant treed vegetation. Occurs at few localities. Uncommon breeding migrant from further north, arriving in October and leaving in February (Higgins et al. 2001; Tzaros 2005).	None	N/A	Lack of suitable habitat within the study area and no records within the search region, **unlikely to occur.**
Pectoral Sandpiper	*Calidris melanotos*		M (Bonn A2H, JAMBA, ROKAMBA)		Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins & Davies 1996).	None	N/A	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Plains-wanderer	*Pedionomus torquatus*	Critically Endangered		Critically Endangered	This species is highly sensitive to changes in grassland cover and density. Typically inhabits treeless native grasslands with sparse cover, with a preference for grasslands composed of wallaby grass and spear grass (Marchant & Higgins 1993). Habitat becomes unsuitable when grassland becomes dense (CA 2016). Evidence suggests it avoids areas of tree cover, with no records of the species within 300m of trees (>10m high) in their strongholds in New South Wales or Victoria (CA 2016).	None	N/A	Lack of suitable habitat within the study area and no records within the search region, **unlikely to occur**.
Powerful Owl	*Ninox strenua*			Vulnerable	Found in open and tall wet sclerophyll forests with sheltered gullies and old growth forest with dense understorey. They are also found in dry forests with box and ironbark eucalypts and River Red-gum. Large old trees with hollows are required by this species for nesting. In Victoria, the Powerful Owl is widespread, having been recorded from most of the state. However, throughout its range it is uncommon and occurs in low densities (Higgins 1999). Also occurs in highly urbanised areas, such as metropolitan Melbourne, where they are heavily reliant upon various forms of movement corridors (riparian strips, roadside vegetation and recreational reserves) to both hunt within and navigate throughout the landscape (Carter et al. 2019).	3	1/06/2011	Lack of large hollow-bearing trees and habitat within the study area, **unlikely to occur**.
Red-necked Stint	*Calidris ruficollis*		M (Bonn A2H, CAMBA, JAMBA, ROKAMBA)		Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins & Davies 1996).	1	18/02/2007	Lack of suitable aquatic habitat within the study area, **unlikely to occur.**

Common Name	Scientific name	EPBC-T	EPBC-M	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered		Critically Endangered	Inhabits dry box-ironbark eucalypt forests near rivers and creeks on inland slopes of the Great Dividing Range. Can also occur in small remnant patches or in mature trees in farmland or partly cleared agricultural land (Higgins et al. 2001).	None	N/A	Lack of suitable habitat within the study area and no records within the search region, **unlikely to occur.**
Rufous Fantail	*Rhipidura rufifrons*		M (Bonn A2H)		In east and south-east Australia, mainly inhabits tall wet sclerophyll forests, often in gullies. When on passage in warmer months, they are sometimes recorded in drier sclerophyll forests and woodlands, as well as parks and gardens (Higgins et al. 2006). Virtually absent from south-eastern Australia during winter (Higgins et al. 2006).	10	6/03/2016	Lack of suitable habitat within the study area, **unlikely to occur.**
Satin Flycatcher	*Myiagra cyanoleuca*		M (Bonn A2H)		Mostly found in eucalypt forest, particularly tall wet forests and woodland within gullies (Higgins et al. 2006). Also inhabits eucalypt woodland comprising an open understorey and a grassy ground layer (Higgins et al. 2006). Generally absent from rainforest (Higgins et al. 2006).	25	2/11/2005	Suitable habitat within the woodland in the study area and multiple previous records within the search region, **Potential to occur**.
Sharp-tailed Sandpiper	*Calidris acuminata*		M (Bonn A2H, CAMBA, JAMBA, ROKAMBA)		Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins & Davies 1996).	None	N/A	Lack of suitable aquatic habitat within the study area and no records within the search region, **unlikely to occur.**
Speckled Warbler	*Pyrrholaemus sagittatus*			Endangered	Inhabits dry eucalypt forests and woodlands, especially those with box-ironbark eucalypt associations. It is also found in River Red-gum woodlands. The species is uncommon; populations have declined since the 1980s (Higgins & Peter 2002; Tzaros 2005).	128	24/07/2019	Suitable habitat within the woodland in the study area and numerous previous records within the search region, **likely to occur**.
Swift Parrot	*Lathamus discolor*	Critically Endangered		Critically Endangered	Prefers a select range of eucalypts in Victoria, including Yellow Gum, Grey Box, White Box, Red Ironbark and Yellow Box, as well as River Red-gum when this species supports abundant 'lerp' (Saunders & Tzaros 2011). The species is also known to forage within planted stands of Spotted Gum and Sugar Gum (Nature Advisory; unpublished data). Breeds in Tasmania and migrates to the mainland of Australia for the autumn, winter and early spring months. It lives mostly north of the Great Dividing Range, passing through two areas of Victoria on migration: the Port Phillip district and Gippsland (Emison et al. 1987; Higgins 1999; Kennedy & Tzaros 2005). Though it is also not uncommonly sighted in urban areas (Nature Advisory; unpublished data). Occurrence of this species on the mainland can substantially change from year to year depending on food availability, giving potential for this species to occur almost anywhere throughout its range (Emison et al. 1987).	9	30/06/2021	Suitable habitat is present within the Grey Box woodland. Recent records have been recorded nearby in similar habitat at Eynesbury Grey Box Forest, **potential to occur**.
White-bellied Sea-Eagle	*Haliaeetus leucogaster*			Endangered	Maritime habitats, terrestrial large wetlands and coastal lands of tropical and temperate Australia and offshore islands, ranging far inland only over large rivers and wetlands. The eagles usually breed on coast and offshore islands and inland beside large lakes or rivers, usually in tall trees in or near water, also in cliffs, rock pinnacles and escarpments (Marchant & Higgins 1993).	11	1/03/2021	Limited habitat within the study area but nearby records located the Werribee River and Long Forest Conservation Reserve. May fly over the study area while traversing to nearby wetlands and rivers. **Potential to occur**.
White-throated Needletail	*Hirundapus caudacutus*	Vulnerable	M (CAMBA, JAMBA, ROKAMBA)	Vulnerable	Aerial, over all habitats, but probably more over wooded areas, including open forest and rainforest. Often over heathland and less often above treeless areas such as grassland and swamps or farmland (Higgins 1999).	10	27/03/2020	Aerial species which may fly above the study area, **potential to occur.**
Yellow Wagtail	*Motacilla flava*		M (CAMBA, JAMBA, ROKAMBA)		Regular non-breeding visitor in northern Australia mainly spring-summer, vagrant to the south. Occupies a wide range of habitats, usually open areas with low vegetation such as crop, grassland and even parkland. Often recorded near water (Higgins, Peter & Cowling 1999)	None	N/A	Suitable habitat present within grassland on site but no evidence of occurrence within the search region, **unlikely to occur**.

Common Name	Scientific name	EPBC-T	EPBC-M	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Mammals								
Brush-tailed Phascogale	*Phascogale tapoatafa*			Vulnerable	Dry forest and woodland in association with box, ironbark and stringybark eucalypts (Menkhorst 1995). Closely associated with remnant vegetation, this species occupies large home ranges of woodland habitat (M=100Ha; F=20-70Ha) (Menkhorst 1995).	5	5/03/1988	Some suitable habitat and a previous record within 1km of the study area, **potential to occur.**
Common Dunnart	*Sminthopsis murina murina*			Vulnerable	in Victoria, dry forest and woodland, mallee scrub and dry heath (Menkhorst 1995).	1	1/10/1984	Lack of suitable habitat and no recent records within the search region, **unlikely to occur**.
Eastern Barred Bandicoot	*Perameles gunnii*	Endangered		Endangered	The habitat of the Eastern Barred Bandicoot (mainland) is perennial tussock grassland and eucalypt woodland with a grassy ground layer (Dufty 1994b; Seebeck 1995a, 2001). Drainage lines and areas of high vegetative cover have been identified as prime habitat. The key determining factor for persistence of this species appears to be high structural complexity and heterogeneity within the environment, reflected in its absence from agricultural areas but persistence in rubbish dumps and other variable habitats.	None	N/A	Lack of dense vegetation within the study area and no records within the search region, **unlikely to occur**.
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable		Vulnerable	Brisbane, Newcastle, Sydney and Melbourne are occupied continuously. Elsewhere, during spring, they are uncommon south of Nowra and widespread in other areas of their range. Roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation, but colonies also use highly modified vegetation in urban and suburban areas (DAWE 2020).	2	30/05/2020	Foraging habitat present in Grey Box woodland and a camp previously used by the species in the Long Forest Conservation Reserve, **potential to occur.**
Platypus	*Ornithorhynchus anatinus*			Vulnerable	Inhabits freshwater streams, ranging from alpine creeks to tropical lowland rivers; also lakes, shallow reservoirs and farm dams (Menkhorst and knight 2001).	2	15/12/2016	Lack of suitable habitat within the study area, **unlikely to occur**.
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	Endangered		Endangered	Rainforest, wet and dry forest, coastal heath and scrub and River Red-gum woodlands along inland rivers (Menkhorst 1995).	None	N/A	Lack of suitable habitat and no records within the search region, **unlikely to occur.**
Reptiles								
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	Endangered		Critically Endangered	The species is confined to native tussock grassland on basalt plains north and west of Melbourne, with no confirmed sightings in Victoria since the 1960's (Robertson & Cooper 2000).	None	N/A	Most of the study area is cropped. No suitable habitat. **Unlikely to occur.**
Pink-tailed Worm-Lizard	*Aprasia parapulchella*	Vulnerable		Endangered	Sites where the species is found generally include rocky outcrops or scattered partly buried rocks. This species is diurnal and largely fossorial, sheltering under rocks and vegetation, and in the burrow passages of small ants and termites within grassland and woodland habitats of south-eastern Australia (Robertson & Coventry 2019). It feeds primarily on the larvae and eggs of ants. In Victoria, the species is largely restricted to box-ironbark woodland in the greater Bendigo region, though it may also persist elsewhere in the state (Robertson & Coventry 2019).	None	N/A	Lack of suitable habitat and no records within the search region, **unlikely to occur.**
Striped Legless Lizard	*Delma impar*	Vulnerable		Endangered	Grassland specialist. Known to occur in some areas dominated by introduced species such as Harding Grass Phalaris aquatica, Serrated Tussock Nasella trichotoma and Flatweed Hypochaeris radicata and at sites with a history of grazing and pasture improvement. shelter in grass tussocks, thick ground cover, soil cracks, under rocks, spider burrows, and under ground debris such as timber. The majority of sites in Victoria and NSW occur on cracking clay soils with some surface rock which provide shelter for the species (DAWE 2020).	None	N/A	Most of the study area is cropped and was not considered suitable during previous surveys, due to intense use for horse grazing and lack of inter-tussock space. **Unlikely to occur.**

Common Name	Scientific name	EPBC-T	EPBC-M	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Tussock Skink	*Pseudemoia pagenstecheri*			Endangered	Tussock grasslands with few or no trees (Wilson & Swan (2003).	None	N/A	Most of the study area is cropped and was not considered suitable during previous surveys, due to intense use for horse grazing and lack of inter-tussock space. Unlikely to occur.
Fish								
Australian Grayling	*Prototroctes maraena*	Vulnerable		Endangered	Large and small coastal streams and rivers with cool, clear waters with a gravel substrate and altering pools and riffles (Cadwallader & Backhouse 1983).	None	N/A	Lack of suitable aquatic habitat and no records within the search region, **unlikely to occur**.
Dwarf Galaxias	*Galaxiella pusilla*	Vulnerable		Endangered	Ranges from the far west of the state through to the Mitchell River basin in central Gippsland. Vegetated margins of still water, ditches, swamps and backwaters of creeks, both ephemeral and permanent (Allen et al. 2002). Some wetlands where it occurs may partially or completely dry up during summer, with such wetlands reliant on seasonal flooding plus linkages to other sites where the species occurs, for habitat and population replenishment (Saddlier, Jackson & Hammer 2010). Dwarf Galaxias is also often found in association with burrowing freshwater crayfish (Engaeus spp.), with the crayfish burrows reportedly providing refuge from predators and dry conditions for the species (Saddlier, Jackson & Hammer 2010).	None	N/A	Lack of suitable aquatic habitat and no records within the search region, **unlikely to occur**.
Yarra Pygmy Perch	*Nannoperca obscura*	Vulnerable		Vulnerable	Streams and small lakes, prefers flowing water with abundant aquatic vegetation (Allen et al. 2002).	None	N/A	Lack of suitable aquatic habitat and no records within the search region, **unlikely to occur**.
Invertebrates								
Golden Sun Moth	*Synemon plana*	Vulnerable		Vulnerable	Areas that are, or have been native grasslands or grassy woodlands. It is known to inhabit degraded grasslands with introduced grasses being dominant, with a preference for the native wallaby grass being present (DEWHA 2009). Also known to be closely associated with exotic grass species, with populations found in grassland almost entirely composed of Chilean needlegrass (Richter et al. 2013).	331	7/12/2012	**Not detected during targeted surveys.**
Frogs								
Growling Grass Frog	*Litoria raniformis*	Vulnerable		Vulnerable	Permanent, still or slow flowing water with fringing and emergent vegetation in streams, swamps, lagoons and artificial wetlands such as farm dams and abandoned quarries (Clemann & Gillespie 2004).	14	10/10/2021	Dams within the study area are disconnected from any waterbodies within the search region recent records of the species, **unlikely to occur**.
Keferstein's Tree Frog	*Litoria dentata*			Critically Endangered	Often found around swamps and lagoons, favouring paperbark swamps behind coastal sand dunes. Also in rainforest, wet and dry sclerophyll forests and urban bushland (Cogger 2000).	4	4/11/2020	**Does not occur** in Victoria.

Notes: EPBC-T = threatened species status under EPBC Act; **EPBC-M =** migratory status under the EPBC Act (M = listed migratory taxa; Bonn Convention (A2H) - Convention on the Conservation of Migratory Species of Wild Animals – listed as a member of a family; Bonn Convention (A2S) - Convention on the Conservation of Migratory Species of Wild Animals - species listed explicitly; CAMBA - China- Australia Migratory Birds Agreement; JAMBA - Japan-Australia Migratory Birds Agreement; ROKAMBA - Republic of Korea Australia Migratory Birds Agreement); **FFG** = threatened species status under the FFG Act.

5.5.2. Susceptibility of listed fauna to impacts

The following analysis identifies the susceptibility of listed fauna species that may utilise the study area to development. This analysis includes consideration of the following factors:

- Mobility of the species;
- Availability and extent of other suitable habitat in the region and degree to which each species may rely on habitat in the study area; and

Birds (non-migratory)

Six listed non-migratory bird species are considered to have the potential to occur in the study area. The susceptibility of these species to possible impacts from any development in the study area is discussed below.

- **Black Flacon** (**FFG Act:** Critically Endangered)
- **Little Eagle** (**FFG Act:** Vulnerable)

These species have the potential to occasionally fly over or visit the study area due to open areas of crop and grassland habitat adjacent to woodland. Given how highly mobile the species are and the large amount of habitat available in the surrounding region, Black Falcon and Little Eagle would likely not be impacted by the proposed development.

- **Diamond Firetail** (**EPBC Act:** Vulnerable, FFG Act Vulnerable)
- **Speckled Warbler** (**FFG Act:** Endangered)

These species are likely to visit the study area due to the presence of the Grey Box woodland. A large amount of habitat is available in the surrounding region, including Long Forest Conservation Reserve, Melton Gilgai Woodland Nature Conservation Reserve, Eynesbury Grey Box Forest, and Pinkerton Forest. However, Speckled Warbler are known to form long-term core residences from which they do not readily disperse, and can also occasionally occur with Diamond Firetail. Thus, these species would be susceptible to any impacts to the Grey Box woodland if they were found to be resident there. Since the Grey Box woodland within the study area and immediate surrounds are to be retained, there will be no impact to the Diamond Firetail & Speckled Warbler.

- **Swift Parrot** (**EPBC Act:** Critically Endangered**, FFG Act:** Critically Endangered)

This species has the potential to occur within the study area due to the presence of Grey Box woodland. Occurrence may vary widely based on flowering of eucalypt trees and food availability. Swift Parrot only visit Victoria to feed, nesting and breeding in Eastern Tasmania. As a large amount of habitat is available in the surrounding region, including Long Forest Conservation Reserve, Melton Gilgai Woodland Nature Conservation Reserve, Eynesbury Grey Box Forest, and Pinkerton Forest, this species is unlikely to be significantly impacted by any development of the study area, although their feeding range will be reduced by any clearing of the Grey Box woodland. Since the Grey Box woodland is to be retained within the study area, there will be no impact to the Swift Parrot and no targeted surveys required.

- **White-bellied Sea-Eagle** (**FFG Act:** Endangered)

This species has the potential to occasionally visit or fly over the study area as it travels between wetlands and rivers in the area. As aquatic habitat within the study area is not suitable for foraging, White-bellied Sea-Eagle is considered unlikely to be impacted by development of the study area.

Migratory Birds

Two listed migratory bird species (excluding oceanic species and shorebirds) have the potential to occur in the study area. The susceptibility of these species to possible impacts from any development in the study area is discussed below.

- **Fork-tailed Swift Species** (**EPBC Act:** Migratory)
- **White-throated Needletail** (**EPBC Act:** Vulnerable & Migratory**, FFG Act:** Vulnerable)

These are aerial species that have the potential to occasionally fly over the study area. Given that these species are not known to roost in Victoria and there is more extensive quality habitat in the surrounding region, it is considered unlikely that Fork-tailed Swift and White-throated Needletail would be impacted by development in the study area.

- **Satin Flycatcher (EPBC Act:** Migratory)

This species may occasionally occur on site in areas of healthy midstorey during migration. Due to the small extent of this habitat on site it is unlikely that its removal will impact Satin Flycatcher.

Mammals

Two listed mammal species are considered to have the potential to occur in the study area. The susceptibility of these species to possible impacts from any development in the study area is discussed below.

- **Brush-tailed Phascogale** (FFG Act: Vulnerable)

This species may occur in the Grey Box Woodland. There is a previous record within 1km of the study area. If found to occur on site, the species will be impacted by any disturbance of the Grey Box woodland. Since the Grey Box woodland is to be retained within the study area, there will be no impact to Brush-tailed Phascogale and no targeted surveys required.

- **Grey-headed Flying-Fox** (FFG Act: Vulnerable)

This species may occasionally visit the site to forage within the Grey Box woodland. A large amount of habitat is available in the surrounding region, including Long Forest Conservation Reserve, Melton Gilgai Woodland Nature Conservation Reserve, Eynesbury Grey Box Forest, and Pinkerton Forest.

Reptiles

- Tussock Skink
- Striped Legless Lizard

The study area was heavily grazed by horses in the past and is being used for wheat cropping, leaving no suitable habitat for these species. While DEECA has recommended consideration of Tussock Skink and Striped Legless Lizard, no targeted surveys are recommended due to the lack of suitable habitat.

Invertebrates

One listed invertebrate species was considered to have the potential to occur in the study area.

- **Golden Sun Moth** (EPBC Act: Vulnerable; FFG Act: Vulnerable)

There are several records of Golden Sun Moth within the search region and the species has been recorded in the properties east of the study area, across Hopetoun Park Road. However, targeted

surveys did not find any record of this species in grassland habitat in the study area, and it is unlikely to colonise the study area across the cleared land of properties 1 and 9.

5.6. Listed ecological communities

The EPBC Protected Matters Search Tool (DCCEEW 2020a) indicated that five ecological communities listed under the EPBC Act had the potential to occur in the search region. Occurrence of these communities in the study area was determined based on an assessment of the native vegetation present against published descriptions and condition thresholds for these communities.

Table 5: EPBC Act-listed ecological communities and likelihood of occurrence in the study area

Ecological Community	EPBC Status	FFG Status	Occurrence in the study area
Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP)	Critically Endangered		While this ecological community is typically dominated by River Red-gum, the listing advice specifies that some sites west of Melbourne which occur in rain shadows receiving <600mm of annual rainfall may be dominated by Grey Box, which is the case for the study area. As such, the majority of the area of Grey Box woodland within the study area meets the key diagnostic characteristics and condition thresholds for listing, being >0.5ha, having an understory dominated (>50%) by *Rytidosperma* and *Austrostipa* and containing *Acaena, Arthropodium, Dianella, Dichondra* and *Geranium*, not being dominated by any contra-indicative species, and occurring on basalt-derived soils on the Victorian Volcanic Plain. **Known to occur.**
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (GBGW)	Endangered		The listing advice specifies that this ecological community is known to occur within rainshadows on basalt soils near Melton, which is the case for the study area. The majority of the area of Grey Box woodland within the study area meets the key diagnostic characteristics and condition thresholds for listing, being >0.5ha and having a canopy entirely composed of Grey Box with at least 8 trees/ha bearing hollows or having a diameter >60cm. The understory is dominated (>50%) by *Rytidosperma* and *Austrostipa* and contains *Dianella, Atriplex, Chenopodium, Einadia, Enchylaena* and *Maireana,* and has <30% cover of non-grassy weeds. **Known to occur.**
Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP)	Critically Endangered		A single patch of native grassland recorded in the study area meets the key diagnostic characteristics and condition thresholds for listing, being treeless, dominated (>50% cover) by species of *Rytidosperma* and *Austrostipa,* >0.05ha and occurring on basalt-derived soils on the Victorian Volcanic Plain. **Known to occur.**

Ecological Community	EPBC Status	FFG Status	Occurrence in the study area
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP)	Critically Endangered		Areas of grassy wetland within the study area occur within the range of this ecological community and meet condition thresholds 1. and 3.C., being consistent with the key diagnostic characteristics and meeting minimum size requirements for listing as the threatened community, but do not have >50% cover of characteristic native species, being dominated instead by a mixture of species of *Juncus, Rytidosperma* (other than *Rytidosperma duttonianum*) and *Eleocharis*. **Unlikely to occur.**
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered		No White Box, Yellow Box or Blakely's Red Gum occurs in the study area, and native grassland in the study are is likely not derived from a previously wooded state. **Does not occur.**
Western (Basalt) Plains Grasslands Community		Listed	This ecological community comprises all remnant patches of treeless native grassland on the Western Basalt Plains (Victorian Volcanic Plain). Therefore, all patches of *Low-rainfall* Plains Grassland (EVC 132_63) in the study area meet the criteria for listing as this ecological community. **Known to occur.**

The following four listed ecological communities were recorded in the study area:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain (EPBC: Critically Endangered) – Habitat Zones A, B, AF, 1I and 1K comprise part of this listed ecological community, with a total area of **2.565ha**.
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (EPBC: Endangered) – Habitat zones A, B, AF, 1I and 1K comprise part of this listed ecological community, with a total area of **2.565ha.**
- Natural Temperate Grassland of the Victorian Volcanic Plain (EPBC: Critically Endangered) – Habitat zone 1E comprises part of this listed ecological community, with an area of **0.425ha**.
- Western (Basalt) Plains Grassland Community (FFG: Listed) – Habitat Zones AA, AB, AE, 1E and 1G comprise part of this listed ecological community, with a total area of **0.719ha**.

6. Potential impacts and implications

6.1. Proposed development

This report is provided to accompany a rezoning application. Two further planning processes will be undertaken in the future (Development Plan & Planning Permit Application) which will facilitate the development of the land and provide a greater level of detail including subdivision design. The proposed rezoning and subsequent residential development have been designed to retain native vegetation, in particular higher quality grassland and woodland patches, as shown in the concept plan in Appendix 6.

The final layout should be carefully designed to avoid any consequential native vegetation removal such as:

- Native vegetation within 10 metres of all proposed building envelopes.
- Native vegetation within 2 metres on either side of all proposed lot boundaries (to address the future *Fences* exemption as (per Cl. 52.17-7).
- Native vegetation required to be removed for the creation of defendable space.
- Trees with the more than 10% of their TPZ encroached.
- Native vegetation on new lots with an area of less than 0.4 hectares (to account for future *Site area* exemption from the requirement for a permit application as per Cl. 52.17-7).

Impacts to trees

In accordance with the *Assessor's Handbook* (DELWP 2018a), a tree is deemed lost when earthworks encroach on more than 10% of the Tree Protection Zone (TPZ). A TPZ is defined as an area around the trunk of the tree that has a radius of 12 × the DBH (to a maximum of 15 metres but no less than 2 metres). Dead trees are treated in the same manner.

6.2. Proposed native vegetation removal & Offset requirements

Neither detailed development plans nor subdivisional plans are yet to be prepared for the site. These are subject to further detailed planning processes at the future Development Plan and planning permit stage. As such, the extent of native vegetation removal (if any) is unknown at this stage. Given the large conservation reserves established to protect identified native vegetation it is considered that any future removal will be minimal and that subdivision can be designed in such a way to avoid significant native vegetation identified.

6.3. Design recommendations

The majority of the study area is currently used for wheat cropping and does not support any significant ecological values. A draft concept plan has been designed for the proposed subdivision avoiding any impacts to native vegetation (Appendix 6).

The following design recommendations are provided to avoid any consequential impacts to native vegetation, and flora and fauna habitats:

- Retain all existing Grey Box trees and Grey Box woodland areas in the east of the study area in a reserve. Site adjoining development a minimum of 15m from the trunks of any treed native vegetation to avoid consequential impacts. It is recommended that a land management plan is developed for these areas as part of future planning approval processes that will be required for the development (approval of a Development Plan and the issue of a planning permit). This recommendation is supported by DEECA. The land

management plan must detail how conservation areas are to be managed to provide guidance for future land managers. The land management plan must address ways to prevent negative impacts to native regeneration caused by land management practices such as mowing.

- In addition to a land management plan, all areas identified for conservation should have the ESO7 applied, which would provide a high level of planning protection to these areas. This ESO mapping would match the conservation areas mapped by Nature Advisory as recommended by DEECA..
- Site entrances to the proposed subdivision to avoid impacts to native vegetation recorded in the road reserve of Hopetoun Park Road.
- While the majority of the escarpment and bank of Pyrites Creek west of the study area were not included in this investigation, they were noted to support native vegetation and threatened species. Any development near to the western edge of the study area will be designed to minimise erosion and potential damage to native species off-site through water runoff as specified in the Stormwater Management Plan (Afflux 2023). This stormwater management plan outlines the mitigation measures for impacts of increased flows and nutrients on the adjacent waterway and native vegetation. . It is understood that stormwater will be treated in a retarding basin and wetlands system before entering the river. This design is recommended as it will minimise off-site impacts to listed species occurring in the Werribee River, which is fed by Pyrites Creek.
- A minimum 20m buffer adjoining the edge of the escarpment in the west of the study area should be retained as a reserve. A 5m buffer should be placed around retained grasslands to prevent impacts to remnant vegetation, namely the area of EPBC-Act listed NTGVVP in HZ 1E and FFG-Act listed Melbourne Yellow Gum and Buloke.
- There is the potential to encourage wildlife movement between patches of native vegetation on the site. From the east to west, between the Djerriwarrah Creek and the high value grasslands and Pyrite Creek to the east, it is considered that wildlife movement will be supported by the provision of a 5 metres planting buffer that is proposed within the rear of the properties that will be located abutting the southern boundary of the site, between the drainage reserve proposed in the south west corner and the open space reserve in the south east corner. The use of EVC-appropriate tree planting is recommended for the planting buffer, spaced 10 metres apart, as a requirement of the Section 173 Agreement that will be put in place for each property. From north to south, existing habitat corridors along the slope of the escarpment will be maintained and further enhanced by the addition of a 20 lineal reserve along its top. EVC appropriate tree planting can be recommended in this lineal reserve. In addition, EVC appropriate tree planting can also be recommended along the east side of Hopetoun Park Road along its property abuttal providing another north south link. Both initiatives aim to enhance linkages between areas to support wildlife movement.

6.4. Clause 12.01 of the of the Planning Scheme

The objectives of Clause 12.01 – *Biodiversity* are to protect and enhance Victoria's biodiversity and to ensure that there is no let loss as a result of the removal, destruction or lopping of native vegetation. This is in general, achieved by the 'Guidelines' and the avoid, minimise and offset obligations as detailed within this report. Specific strategies of Clause 12.01-1S, Clause 12.01-1L and Clause 12.01-2S are outlined in Section 3.3.2. These clauses are relevant to the application

by considering the protection and enhancement of habitat for indigenous plants and animals in urban areas and avoiding fragmentation of habitat.

Any application must respond to these objectives by retention of areas of higher biodiversity values and the creation, enhancement and/or protection of habitat, including corridors between habitats to maintain connectivity. The proposal does identify and suggest management of important areas of biodiversity. Additionally, all areas of native vegetation are retained and protected in the current concept plan. Opportunities to create corridors between habitat, have been made in Section 6.3 . Further measures to ensure the protection and ongoing management of protected native vegetation outlined in Section 6.3.

6.5. Clause 52.17 of the Planning Scheme

A permit for the proposed removal of native vegetation is required under Cl. 52.17 of the State Planning Provisions should any native vegetation be proposed to be removed. If native vegetation is required to be removed this will form part of a future planning approval process.

6.6. Implications under the Guidelines

6.6.1. Avoid and minimise statement

In accordance with the Guidelines, all applications to remove native vegetation must provide an avoid and minimise statement that describes any efforts undertaken to avoid the removal of, and minimise the impacts to biodiversity and other values of native vegetation, and how these efforts were focused on areas of native vegetation with the highest value.

The concept plan aims to avoid any native vegetation as shown in Figure 1 and includes a 20m buffer along the top of the escarpment providing significant separation to the Pyrites Creek in the west. If native vegetation is required to be removed this will form part of a future planning approval process.

6.7. EPBC Act

A referral under the EPBC Act will not be required as no EPBC Act listed communities or habitat for EPBC Act listed species are proposed to be removed in accordance with the concept plan (Appendix 6).

6.8. FFG Act

The Victorian FFG Act lists threatened and protected species and ecological communities (DELWP 2018b, DELWP 2017b). Any removal of threatened flora species or communities (or protected flora) listed under the FFG Act from public land requires a Protected Flora Permit under the Act, obtained from DEECA.

A Protected Flora Permit will not be required from DEECA as no FFG Act listed threatened community, or listed threatened flora species or otherwise protected values from public land are proposed to be removed.

6.9. EE Act

The *Ministerial Guidelines for Assessment of Environmental Effects under the* Environment Effects Act 1978 (DSE 2006) identifies criteria that trigger a Referral to the State Minister for Planning.

Based on the relevant criteria, a Referral to the State Minister for Planning will not be required under the EE Act as the proposal will not result in the clearing of more than 10ha of native vegetation.

6.10. CaLP Act

The *Catchment and Land Protection Act 1994* (CaLP Act) requires that landowners (or a third party to whom responsibilities have been legally transferred) must eradicate regionally prohibited weeds and prevent the growth and spread of regionally controlled weeds.

Property owners who do not eradicate Regionally prohibited weeds or prevent the growth and spread of Regionally controlled weeds for which they are responsible, may be issued with a Land Management Notice or Directions Notice that requires specific control work to be undertaken.

In accordance with the *Catchment and Land Protection Act 1994*, the noxious weed species listed below, that were recorded in the study area, must be controlled.

- African Box-thorn;
- Artichoke Thistle;
- Common Prickly-pear;
- Horehound
- Paterson's Curse;
- Serrated Tussock;
- Spear Thistle;
- Sticky Ground-cherry; and
- Wild Teasel.

Precision control methods that minimise off-target kills (e.g. spot spraying) should be used in environmentally sensitive areas (e.g. within or near native vegetation, waterways, etc.).

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Appendix 1: Details of the assessment process in accordance with the Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017a)

Purpose and objective

Policies and strategies relating to the protection and management of native vegetation in Victoria are defined in the State Planning Policy Framework (SPPF). The objective of all Victorian Planning Schemes, as identified in Clause 12.01, is 'To ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

This is to be achieved through the following three-step approach, as described in the Guidelines:

1. Avoid the removal, destruction or lopping of native vegetation.
2. Minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.
3. Provide an offset to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation.

Note: While a planning permit may still be required, if native vegetation does not meet the definition of either a patch or a scattered tree, an offset under the Guidelines is not required.

Assessment pathways

The first step in determining the type of assessment required for any site in Victoria is to determine the assessment pathway for the proposed native vegetation removal. The three possible assessment pathways for applications to remove native vegetation in Victoria are the following:

- Basic;
- Intermediate; or
- Detailed.

This assessment pathway is determined by the following two factors:

- **Location Category**, as determined using the Location Map of Victoria. The location category indicates the potential risk to biodiversity from removing a small amount of native vegetation. The three location categories are defined as follows:
  - Location 1 – shown in light blue-green on the Location Map; occurring over most of Victoria.
  - Location 2 – shown in dark blue-green on the Location Map; includes areas mapped as endangered EVCs and/or sensitive wetlands and coastal areas.
  - Location 3 – shown in brown on the Location Map; includes areas where the removal of less than 0.5 hectares of native vegetation could have a significant impact on habitat for rare and threatened species.
- **Extent of native vegetation** – The extent of any patches and scattered trees proposed to be removed (and the extent of any past native vegetation removal), with consideration as to whether the proposed removal includes any large trees. Extent of native vegetation is determined as follows:
  - **Patch** – the area of the patch in hectares.
  - **Scattered Tree** – the extent of a scattered tree is dependent on whether the scattered tree is small or large. A tree is considered to be a large tree if the DBH is greater than or equal to the large tree benchmark DBH for the relevant bioregional EVC. Any scattered tree that is not a

large tree is a small scattered tree. The extent of large and small scattered trees is determined as follows:

- **Large scattered tree** – the area of a circle with a 15 metre radius, with the trunk of the tree at the centre.
- **Small scattered tree** – the area of a circle with a ten-metre radius, with the trunk of the tree at the centre.

The assessment pathway for assessing an application to remove native vegetation is subsequently determined as shown in the following matrix table:

Extent of native vegetation	Location Category		
	Location 1	Location 2	Location 3
< 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
< 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
≥ 0.5 hectares	Detailed	Detailed	Detailed

Note: If the native vegetation to be removed includes more than one location category, the higher location category is used to determine the assessment pathway.

Landscape scale information – strategic biodiversity value

The strategic biodiversity value (SBV) is a measure of a location's importance to Victoria's biodiversity, relative to other locations across the state. This is represented as a score between 0 and 1, and determined from the SBV map, available from *NVIM* (DELWP 2022c).

Landscape scale information – habitat for rare or threatened species

Habitat importance for rare or threatened species is a measure of the importance of a location in the landscape as habitat for a particular rare or threatened species, in relation to other habitat available for that species. This is represented as a score between 0 and 1 and determined from the Habitat importance maps, administered by DEECA.

This includes two groups of habitat:

- **Highly localised habitats** – Limited in area and considered to be equally important, therefore having the same habitat importance score.
- **Dispersed habitats** – Less limited in area and based on habitat distribution models.

Habitat for rare or threatened species is used to determine the type of offset required in the detailed assessment pathway.

Biodiversity value

A combination of site-based and landscape scale information is used to calculate the biodiversity value of native vegetation to be removed. Biodiversity value is represented by a general or species habitat score, as determined below.

Firstly, the extent and condition of native vegetation to be removed are combined to determine the habitat hectares as follows:

Habitat hectares = extent of native vegetation × condition score

Secondly, the habitat hectare score is combined with a landscape factor to obtain an overall measure of biodiversity value. Two landscape factors exist as follows:

- **General landscape factor** – determined using an adjusted strategic biodiversity score and relevant when no habitat importance scores are applicable;
- **Species landscape factor** – determined using an adjusted habitat importance score for each rare or threatened species habitat mapped at a site in the Habitat importance map.

These factors are subsequently used as follows to determine the biodiversity value of a site:

General habitat score = habitat hectares × general landscape factor

Species habitat score = habitat hectares × species landscape factor

Offset requirements

A native vegetation offset is required for the approved removal of native vegetation. Offsets conform to one of two types and each type incorporates a multiplier to address the risk of offset:

- A **general offset** is required when the removal of native vegetation does not have a significant impact on any habitat for rare or threatened species (i.e. the proportional impact is below the species offset threshold). In this case a multiplier of 1.5 applies to determine the general offset amount.

General offset (amount of general habitat units) = general habitat score × 1.5

- A **species offset** is required when the removal of native vegetation has a significant impact on habitat for a rare or threatened species (i.e. the proportional impact is above the species offset threshold). In this case a multiplier of 2 applies to determine the species offset amount.

Species offset (amount of species habitat units) = Species habitat score × 2

Note: If native vegetation does not meet the definition of either a patch or scattered tree, an offset is not required.

Offset attributes

Offsets must meet the following attribute requirements, as relevant:

- General offsets

- **Offset amount** – general offset = general habitat score × 1.5
- **Strategic biodiversity value (SBV)** – the offset has at least 80% of the SBV of the native vegetation removed
- **Vicinity** – the offset is in the same CMA boundary or municipal district as the native vegetation removed
- Habitat for rare and threatened species – N/A
- **Large trees** – the offset includes the protection of at least one large tree for every large tree to be removed

- Species offsets
  - **Offset amount** – species offset = species habitat score × 2
  - Strategic biodiversity value (SBV): N/A
  - Vicinity: N/A
  - **Habitat for rare and threatened species** – the offset comprises mapped habitat according to the Habitat importance map for the relevant species
  - **Large trees** – the offset includes the protection of at least one large tree for every large tree to be removed

Appendix 2: Detailed habitat hectare assessment results

Habitat Zone			A	B	C	D	E	AA	AB	AC	AE	AF	AG	AH	AI	1C	1D	1E	1F	1G	1H	1I	1J	1K	1L
Bioregion			VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP
EVC Number			803	803	803	803	803	132_63	132_63	895	132_63	803	803	803	803	895	895	132_63	895	132_63	895	803	803	803	895
Total area of Habitat Zone (ha)			0.485	0.123	0.005	0.047	0.038	0.072	0.013	0.097	0.057	1.571	0.052	0.040	0.155	0.147	0.392	0.425	0.096	0.151	0.231	0.261	0.072	0.144	0.009
Site Condition	Large Old Trees	/10	0	0	0	0	0	NA	NA	NA	NA	5	9	9	0	NA	NA	NA	NA	NA	NA	2	0	0	0
	Tree Canopy Cover	/5	3	5	0	5	5	NA	NA	0	NA	4	3	4	0	0	0	NA	2	NA	3	4	3	5	2
	Lack of Weeds	/15	2	2	4	0	4	0	2	0	0	6	0	0	2	4	0	6	4	0	6	6	6	4	4
	Understorey	/25	15	15	5	5	5	5	5	5	5	15	15	5	5	15	15	20	15	15	15	15	5	15	15
	Recruitment	/10	0	0	0	0	0	3	6	3	3	6	3	3	0	10	10	10	6	10	10	5	0	3	6
	Organic Matter	/5	5	3	3	5	3	0	0	3	0	2	3	4	5	3	4	3	5	3	5	3	3	3	5
	Logs	/5	0	0	0	0	0	NA	NA	0	NA	0	0	0	0	5	5	NA	5	NA	3	4	0	2	5
	Site condition standardising multiplier*		1.00	1.00	1.00	1.00	1.00	1.36	1.36	1.15	1.36	1.00	1.00	1.00	1.00	1.15	1.15	1.36	1.15	1.36	1.15	1.00	1.00	1.00	1.15
	Site Condition subtotal		*25*	*25*	*12*	*15*	*17*	*11*	*18*	*13*	*11*	*38*	*33*	*25*	*12*	*43*	*39*	*53*	*43*	*38*	*48*	*39*	*17*	*32*	*43*
Landscape Context	Patch Size	/10	2	2	1	1	1	1	1	1	1	2	1	1	2	8	4	4	4	4	4	2	1	2	4
	Neighbourhood	/10	3	3	3	2	2	1	1	1	1	3	3	1	3	2	2	2	1	1	1	3	2	3	1
	Distance to Core	/5	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3
Total Condition Score		**/100**	**33**	**33**	**19**	**21**	**23**	**16**	**23**	**18**	**16**	**46**	**40**	**30**	**20**	**57**	**48**	**62**	**51**	**46**	**56**	**47**	**23**	**40**	**51**

* Modified approach to habitat scoring - refer to Table 14 of DELWP's Vegetation Quality Assessment Manual (DSE, 2004).

Appendix 3: Large trees in patches and scattered trees recorded in the study area

Tree No.	Common Name	Scientific Name	DBH (cm)	Habitat Category	Radius of TPZ (m)	Notes
76	Grey Box	*Eucalyptus microcarpa*	85	Large Tree in Patch	10.2	
77	Grey Box	*Eucalyptus microcarpa*	79	Large Tree in Patch	9.48	
78	Grey Box	*Eucalyptus microcarpa*	73	Large Tree in Patch	8.76	
81	Grey Box	*Eucalyptus microcarpa*	104	Large Tree in Patch	12.48	
83	Grey Box	*Eucalyptus microcarpa*	89	Large Tree in Patch	10.68	
84	Grey Box	*Eucalyptus microcarpa*	78	Large Tree in Patch	9.36	
85	Grey Box	*Eucalyptus microcarpa*	96	Large Tree in Patch	11.52	
86	Grey Box	*Eucalyptus microcarpa*	75	Large Tree in Patch	9	
87	Grey Box	*Eucalyptus microcarpa*	89	Large Tree in Patch	10.68	
88	Grey Box	*Eucalyptus microcarpa*	100	Large Tree in Patch	12	Estimated, inaccessible
89	Grey Box	*Eucalyptus microcarpa*	71	Large Tree in Patch	8.52	
90	Grey Box	*Eucalyptus microcarpa*	77	Large Tree in Patch	9.24	
91	Grey Box	*Eucalyptus microcarpa*	95	Large Tree in Patch	11.4	Estimated, inaccessible
92	Grey Box	*Eucalyptus microcarpa*	71	Large Tree in Patch	8.52	
93	Grey Box	*Eucalyptus microcarpa*	90	Large Tree in Patch	10.8	
100	Eucalyptus	*Eucalyptus sp.*	71	Large Tree in Patch	8.52	Dead
74	Grey Box	*Eucalyptus microcarpa*	93	Large Scattered Tree	11.16	
79	Grey Box	*Eucalyptus microcarpa*	87	Large Scattered Tree	10.44	
82	Grey Box	*Eucalyptus microcarpa*	100	Large Scattered Tree	12	Inaccessible, estimated. Beehive present
94	Eucalyptus	*Eucalyptus sp.*	63	Large Scattered Tree	7.56	Dead
3	Grey Box	*Eucalyptus microcarpa*	135	Small Scattered Tree	16.2	
4	Grey Box	*Eucalyptus microcarpa*	72	Small Scattered Tree	8.64	
5	Grey Box	*Eucalyptus microcarpa*	92	Small Scattered Tree	11.04	
72	Melbourne Yellow Gum	*Eucalyptus leucoxylon subsp. connata*	43	Small Scattered Tree	5.16	
75	Grey Box	*Eucalyptus microcarpa*	20	Small Scattered Tree	2.4	
80	Grey Box	*Eucalyptus microcarpa*	25	Small Scattered Tree	3	
95	Grey Box	*Eucalyptus microcarpa*	20	Small Scattered Tree	2.4	
96	Grey Box	*Eucalyptus microcarpa*	17	Small Scattered Tree	2.04	
97	Grey Box	*Eucalyptus microcarpa*	32	Small Scattered Tree	3.84	
98	Grey Box	*Eucalyptus microcarpa*	19	Small Scattered Tree	2.28	
99	Grey Box	*Eucalyptus microcarpa*	44	Small Scattered Tree	5.28	
101	Grey Box	*Eucalyptus microcarpa*	34	Small Scattered Tree	4.08	

Notes: DBH = Diameter at breast height (130 cm from the ground); **TPZ** = Tree Protection Zone.

Appendix 4: Flora species recorded in the study area

Origin	Common name	Scientific name	EPBC	FFG-T	FFG-P	CaLP Act
	Lightwood	*Acacia implexa*				
	Black Wattle	*Acacia mearnsii*			p	
	Blackwood	*Acacia melanoxylon*				
	Golden Wattle	*Acacia pycnantha*			p	
	Sheep's Burr	*Acaena echinata*				
	Bidgee-widgee	*Acaena novae-zelandiae*				
*	Hair Grass	*Aira spp.*				
	Buloke	*Allocasuarina luehmannii*		Vulnerable	P	
	Common Wheat-grass	*Anthosachne scabra s.l.*				
*	Sweet Vernal-grass	*Anthoxanthum odoratum*				
*	Cape weed	*Arctotheca calendula*				
*	Bridal Creeper	*Asparagus asparagoides*				R
	Berry Saltbush	*Atriplex semibaccata*				
	Plump Spear-grass	*Austrostipa aristiglumis*				
	Kneed Spear-grass	*Austrostipa bigeniculata*				
	Feather Spear-grass	*Austrostipa elegantissima*				
	Supple Spear-grass	*Austrostipa mollis*				
	Rough Spear-grass	*Austrostipa scabra*				
	Spear Grass	*Austrostipa spp.*				
*	Wild Oat	*Avena fatua*				
	Club Sedge	*Bolboschoenus spp.*				
*	Twiggy Turnip	*Brassica fruticulosa*				
*	Large Quaking-grass	*Briza maxima*				
*	Lesser Quaking-grass	*Briza minor*				
*	Prairie Grass	*Bromus catharticus*				
*	Great Brome	*Bromus diandrus*				
*	Soft Brome	*Bromus hordeaceus*				
	Tall Sedge	*Carex appressa*				
	Knob Sedge	*Carex inversa*				
	Inland Pigface	*Carpobrotus modestus*				
*	Drooping Cassinia	*Cassinia sifton*				
*	Common Centaury	*Centaurium erythraea*				
*	Common Mouse-ear Chickweed	*Cerastium glomeratum s.l.*				
	Green Rock-fern	*Cheilanthes austrotenuifolia*			p	

Origin	Common name	Scientific name	EPBC	FFG-T	FFG-P	CaLP Act
	Narrow Rock-fern	*Cheilanthes sieberi subsp. sieberi*			p	
	Small-leaf Goosefoot	*Chenopodium desertorum subsp. microphyllum*				
	Windmill Grass	*Chloris truncata*				
*	Spear Thistle	*Cirsium vulgare*				C
	Small-leaved Clematis	*Clematis microphylla s.l.*				
	Blushing Bindweed	*Convolvulus angustissimus*				
	Pink Bindweed	*Convolvulus erubescens s.l.*				
	Common Cotula	*Cotula australis*			p	
	Spreading Crassula	*Crassula decumbens var. decumbens*				
	Sieber Crassula	*Crassula sieberiana s.l.*				
	Australian Stonecrop	*Crassula tetramera*				
*	Artichoke Thistle	*Cynara cardunculus subsp. flavescens*				C
*	Couch	*Cynodon dactylon var. dactylon*				
	Leafy Flat-sedge	*Cyperus lucidus*				
*	Cocksfoot	*Dactylis glomerata*				
	Silky Blue-grass	*Dichanthium sericeum subsp. sericeum*				
	Kidney-weed	*Dichondra repens*				
*	Wild Teasel	*Dipsacus fullonum*				C
	Sticky Hop-bush	*Dodonaea viscosa*				
*	Paterson's Curse	*Echium plantagineum*				C
*	Annual Veldt-grass	*Ehrharta longiflora*				
	Saloop	*Einadia hastata*				
	Nodding Saltbush	*Einadia nutans*				
	Common Spike-sedge	*Eleocharis acuta*				
	Ruby Saltbush	*Enchylaena tomentosa var. tomentosa*				
	Dark Bottle-washers	*Enneapogon nigricans*				
	Variable Willow-herb	*Epilobium billardiereanum*				
	Turkey Bush	*Eremophila deserti*			p	
*	Flaxleaf Fleabane	*Erigeron bonariense*				
	River Red-gum	*Eucalyptus camaldulensis*				
	Melbourne Yellow-gum	*Eucalyptus leucoxylon subsp. connata*		Endangered		

Origin	Common name	Scientific name	EPBC	FFG-T	FFG-P	CaLP Act
	Yellow Box	*Eucalyptus melliodora*				
	Grey Box	*Eucalyptus microcarpa*				
	Clustered/Creeping Cudweed	*Euchiton japonicus s.l.*			p	
	Flat Spurge	*Euphorbia drummondii s.l.*				
	Common Eutaxia	*Eutaxia microphylla*				
*	Tall Fescue	*Festuca arundinacea*				
*	Fennel	*Foeniculum vulgare*				R
*	Desert Ash	*Fraxinus angustifolia*				
*	Galenia	*Galenia pubescens var. pubescens*				
*	Gazania	*Gazania linearis*				
	Cut-leaf Goodenia	*Goodenia pinnatifida*				
*	Ox-tongue	*Helminthotheca echioides*				
*	Barley-grass	*Hordeum marinum*				
*	Barley	*Hordeum vulgare s.l.*				
*	Flatweed	*Hypochaeris radicata*				
	Toad Rush	*Juncus bufonius*				
	Rush	*Juncus spp.*				
*	Prickly Lettuce	*Lactuca serriola*				
	Jersey Cudweed	*Laphangium luteoalbum*			p	
*	Common Peppercress	*Lepidium africanum*				
*	Rye Grass	*Lolium spp.*				
	Wattle Mat-rush	*Lomandra filiformis*				
*	African Box-thorn	*Lycium ferocissimum*				C
*	Pimpernel	*Lysimachia arvensis*				
	Small Loosestrife	*Lythrum hyssopifolia*				
	Black Cotton-bush	*Maireana decalvans s.l.*				
	Wingless Bluebush	*Maireana enchylaenoides*				
*	Small-flower Mallow	*Malva parviflora*				
*	Horehound	*Marrubium vulgare*				C
	Common Nardoo	*Marsilea drummondii*			p	
*	Burr Medic	*Medicago polymorpha*				
*	Common Ice-plant	*Mesembryanthemum crystallinum s.l.*				
*	Small Ice-plant	*Mesembryanthemum nodiflorum*				

Origin	Common name	Scientific name	EPBC	FFG-T	FFG-P	CaLP Act
	Weeping Grass	*Microlaena stipoides var. stipoides*				
*	Chilean Needle-grass	*Nassella neesiana*				R
*	Serrated Tussock	*Nassella trichotoma*				C
*	Common Prickly-pear	*Opuntia stricta*				C
	Grassland Wood-sorrel	*Oxalis perennans*				
	Knottybutt Grass	*Paspalidium constrictum*				
*	Paspalum	*Paspalum dilatatum*				
	Austral Stork's-bill	*Pelargonium australe*				
*	Sticky Ground-cherry	*Physalis hederifolia*				C
*	Buck's-horn Plantain	*Plantago coronopus*				
*	Ribwort	*Plantago lanceolata*				
*	Four-leaved Allseed	*Polycarpon tetraphyllum*				
	Fragrant Saltbush	*Rhagodia parabolica*		Vulnerable		
	Wiry Dock	*Rumex dumosus*				
	Common Wallaby-grass	*Rytidosperma caespitosum*				
	Brown-back Wallaby-grass	*Rytidosperma duttonianum*				
	Silvertop Wallaby-grass	*Rytidosperma pallidum*				
	Slender Wallaby-grass	*Rytidosperma racemosum var. racemosum*				
	Bristly Wallaby-grass	*Rytidosperma setaceum*				
	Wallaby Grass	*Rytidosperma spp.*				
	Black Roly-poly	*Sclerolaena muricata*				
	Cotton Fireweed	*Senecio quadridentatus*			p	
	Variable Sida	*Sida corrugata*				
*	Common Sow-thistle	*Sonchus oleraceus*				
*	Chickweed	*Stellaria media*				
*	Garden Dandelion	*Taraxacum officinale spp. agg.*				
	Kangaroo Grass	*Themeda triandra*				
	Yellow Rush-lily	*Tricoryne elatior*				
*	Hare's-foot Clover	*Trifolium arvense var. arvense*				
*	White Clover	*Trifolium repens var. repens*				
*	Great Mullein	*Verbascum thapsus subsp. thapsus*				R

Origin	Common name	Scientific name	EPBC	FFG-T	FFG-P	CaLP Act
	Fuzzy New Holland Daisy	*Vittadinia cuneata*			p	
	Woolly New Holland Daisy	*Vittadinia gracilis*			p	
	Narrow-leaf New Holland Daisy	*Vittadinia muelleri*			p	
*	Squirrel-tail Fescue	*Vulpia bromoides*				
*	Rat's-tail Fescue	*Vulpia myuros*				
	Tufted Bluebell	*Wahlenbergia communis s.l.*				
	Bronze Bluebell	*Wahlenbergia luteola*				
	Bluebell	*Wahlenbergia spp.*				
*	Yucca	*Yucca spp.*				

Notes: EPBC = Threatened species status under the EPBC Act; **FFG-T** = Threatened species status under the FFG Act; **FFG-P =** Listed as protected (P) under the FFG Act; **CaLP Act**: Declared noxious weeds under the CaLP Act (S = State Prohibited Weeds – any infestations must be reported to DEECA that is responsible for control of these; P = Regionally Prohibited Weeds – landowners must eradicate these; C = Regionally Controlled Weeds – landowners must prevent the growth and spread of these; R = Restricted Weeds – trade in these weeds and propagules, either as plants, seeds or contaminants in other materials is prohibited).

* = introduced to Victoria

= Victorian native taxa occurring outside the natural range

Appendix 5: EVC benchmarks

Plains Grassy Wetland (EVC 125) – Victorian Volcanic Plain

Low-rainfall Plains Grassland (EVC 132_63) – Victorian Volcanic Plain

Plains Woodland (EVC 803) – Victorian Volcanic Plain

Escarpment Shrubland (EVC 895) – Victorian Volcanic Plain

Department of Sustainability and Environment

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Victorian Volcanic Plain bioregion

EVC 125: Plains Grassy Wetland

Description:
This EVC is usually treeless, but in some instances can include sparse River Red Gum *Eucalyptus camaldulensis* or Swamp Gum *Eucalyptus ovata*. A sparse shrub component may also be present. The characteristic ground cover is dominated by grasses and small sedges and herbs. The vegetation is typically species-rich on the outer verges but is usually species-poor in the wetter central areas.

Life Forms:

Life form	#Spp	%Cover	LF code
Large Herb	5	5%	LH
Medium Herb	6	10%	MH
Small or Prostrate Herb	3	10%	SH
Large Tufted Graminoid	3	15%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	8	30%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
LH	*Epilobium billardierianum*	Variable Willow-herb
LH	*Villarsia reniformis*	Running Marsh-flower
LH	*Epilobium billardierianum ssp. cinereum*	Grey Willow-herb
MH	*Potamogeton tricarinatus s.l.*	Floating Pondweed
MH	*Lilaeopsis polyantha*	Australian Lilaeopsis
MH	*Utricularia dichotoma s.l.*	Fairies' Aprons
SH	*Eryngium vesiculosum*	Prickfoot
SH	*Neopaxia australasica*	White Purslane
SH	*Lobelia pratioides*	Poison Lobelia
LTG	*Juncus flavidus*	Gold Rush
LTG	*Deyeuxia quadriseta*	Reed Bent-grass
LTG	*Amphibromus nervosus*	Common Swamp Wallaby-grass
LTG	*Poa labillardierei*	Common Tussock-grass
MTG	*Triglochin procerum s.l.*	Water Ribbons
MTG	*Glyceria australis*	Australian Sweet-grass
MTG	*Juncus holoschoenus*	Joint-leaf Rush
MTG	*Austrodanthonia duttoniana*	Brown-back Wallaby-grass
MNG	*Eleocharis acuta*	Common Spike-sedge
MNG	*Eleocharis pusilla*	Small Spike-sedge

Recruitment:
Episodic/Flood. Desirable period between disturbances is 5 years.

Organic Litter:
20% cover

Logs:
5 m/0.1 ha.(where trees are overhanging the wetland)

Victoria The Place To Be

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	*Cirsium vulgare*	Spear Thistle	high	high
MH	*Leontodon taraxacoides ssp. taraxacoides*	Hairy Hawkbit	high	low
MH	*Hypochoeris radicata*	Cat's Ear	high	low
LTG	*Phalaris aquatica*	Toowoomba Canary-grass	high	high
LNG	*Holcus lanatus*	Yorkshire Fog	high	high
MTG	*Briza minor*	Lesser Quaking-grass	high	low
MTG	*Romulea rosea*	Onion Grass	high	low
TTG	*Cyperus tenellus*	Tiny Flat-sedge	high	low

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Department of Sustainability and Environment

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Victorian Volcanic Plain bioregion

EVC 132_63: *Low-rainfall* Plains Grassland

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

Life forms:

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

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

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

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

Organic Litter:
10% cover

Victoria The Place To Be

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

Weediness:

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

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Department of Sustainability and Environment

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Victorian Volcanic Plain bioregion

EVC 895: Escarpment Shrubland

Description:

Occurs on rocky escarpments in steep valleys or gorges, associated with limestone or basalt. Sites have moderate to high fertility, are well-drained but subject to regular summer drought due to shallow soils. Eucalypt woodland to 15 m tall or non-eucalypt shrubland to 8 m tall, with occasional eucalypts; lichen-covered rock outcrops are common.

[+] eucalypt woodland only components (ignore when assessing shrubland areas and standardise site condition score as required)

Large trees[+]:

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

Tree Canopy Cover:

% cover	Character Species	Common Name
15%	*Acacia implexa*	Lightwood
	Allocasuarina verticillata	Drooping Sheoak
	Acacia mearnsii	Black Wattle
	Bursaria spinosa	Sweet Bursaria
	Eucalyptus viminalis ssp. viminalis	Manna Gum

Understorey:

Life form	# Spp	% Cover	LF code
Immature Canopy Tree[+]		5%	IT
Understorey Tree or Large Shrub[+]	3	10%	T
Medium Shrub	3	10%	MS
Small Shrub	2	5%	SS
Large Herb	3	5%	LH
Medium Herb	4	10%	MH
Small or Prostrate Herb	5	5%	SH
Large Tufted Graminoid	1	5%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	9	25%	MTG
Medium to Tiny Non-tufted Graminoid	3	5%	MNG
Ground Fern	1	5%	GF
Scrambler or Climber	1	5%	SC
Bryophytes/Lichens	na	10%	BL
Soil Crust	na	10%	S/C

LF Code		Species typical of at least part of EVC range	Common Name
MS	r	*Rhagodia parabolica*	Fragrant Saltbush
MS		*Hymenanthera dentata* s.l.	Tree Violet
SS		*Enchylaena tomentosa* var. *tomentosa*	Ruby Saltbush
LH		*Wahlenbergia communis* s.l.	Tufted Bluebell
MH		*Oxalis perennans*	Grassland Wood-sorrel
MH		*Maireana enchylaenoides*	Wingless Bluebush
MH		*Einadia nutans* ssp. *nutans*	Nodding Saltbush
SH		*Chamaesyce drummondii*	Flat Spurge
SH		*Dichondra repens*	Kidney-weed
LTG		*Austrostipa bigeniculata*	Kneed Spear-grass
MTG		*Austrodanthonia racemosa* var. *racemosa*	Stiped Wallaby-grass
MTG		*Austrodanthonia setacea*	Bristly Wallaby-grass
MNG		*Panicum effusum*	Hairy Panic
GF		*Cheilanthes distans*	Bristly Cloak-fern
SC		*Clematis microphylla*	Small-leaved Clematis
SC		*Convolvulus erubescens* spp. agg.	Pink Bindweed

Victoria The Place To Be

EVC 895: Escarpment Shrubland - Victorian Volcanic Plain bioregion

Recruitment:
Continuous

Organic Litter:
20 % cover

Logs:
15 m/0.1 ha+.
5 m/0.1 ha. (note: large log class does not apply)

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	*Schinus molle*	Pepper Tree	high	high
MS	*Lycium ferocissimum*	African Box-thorn	high	high
MS	*Genista monspessulana*	Montpellier Broom	high	high
SS	*Marrubium vulgare*	Horehound	high	high
LH	*Sonchus oleraceus*	Common Sow-thistle	high	low
LH	*Helminthotheca echioides*	Ox-tongue	high	high
LH	*Lactuca serriola*	Prickly Lettuce	high	low
LH	*Sisymbrium officinale*	Hedge Mustard	high	high
LH	*Sonchus asper* s.l.	Rough Sow-thistle	high	low
LH	*Verbascum thapsus* ssp. *thapsus*	Great Mullein	high	high
LH	*Echium plantagineum*	Paterson's Curse	high	high
LH	*Centaurium tenuiflorum*	Slender Centaury	high	low
LH	*Foeniculum vulgare*	Fennel	high	high
MH	*Hypochoeris radicata*	Cat's Ear	high	low
MH	*Trifolium arvense* var. *arvense*	Hare's-foot Clover	high	low
MH	*Trifolium subterraneum*	Subterranean Clover	high	low
MH	*Trifolium campestre* var. *campestre*	Hop Clover	high	low
MH	*Trifolium angustifolium* var. *angustifolium*	Narrow-leaf Clover	high	low
MH	*Lotus suaveolens*	Hairy Bird's-foot Trefoil	high	low
MH	*Cerastium glomeratum* s.l.	Common Mouse-ear Chickweed	high	low
SH	*Medicago polymorpha*	Burr Medic	high	low
SH	*Trifolium glomeratum*	Cluster Clover	high	low
SH	*Modiola caroliniana*	Red-flower Mallow	high	low
SH	*Aptenia cordifolia*	Heart-leaf Ice-plant	high	high
LTG	*Phalaris aquatica*	Toowoomba Canary-grass	high	high
LNG	*Holcus lanatus*	Yorkshire Fog	high	high
LNG	*Avena fatua*	Wild Oat	high	low
MTG	*Nassella trichotoma*	Serrated Tussock	high	high
MTG	*Ehrharta longiflora*	Annual Veldt-grass	high	low
MTG	*Briza maxima*	Large Quaking-grass	high	low
MTG	*Bromus hordeaceus* ssp. *hordeaceus*	Soft Brome	high	low
MTG	*Sporobolus africanus*	Rat-tail Grass	high	high
MTG	*Vulpia bromoides*	Squirrel-tail Fescue	high	low
MTG	*Romulea rosea*	Onion Grass	high	low
MTG	*Pentaschistis airoides* ssp. *airoides*	False Hair-grass	high	low
MTG	*Lolium perenne*	Perennial Rye-grass	high	high
MTG	*Dactylis glomerata*	Cocksfoot	high	high
MTG	*Vulpia myuros*	Rat's-tail Fescue	high	low
MTG	*Bromus rubens*	Red Brome	high	low
MTG	*Avena barbata*	Bearded Oat	high	low
MTG	*Aira caryophyllea*	Silvery Hair-grass	high	low
SC	*Vicia sativa* ssp. *sativa*	Common Vetch	high	low

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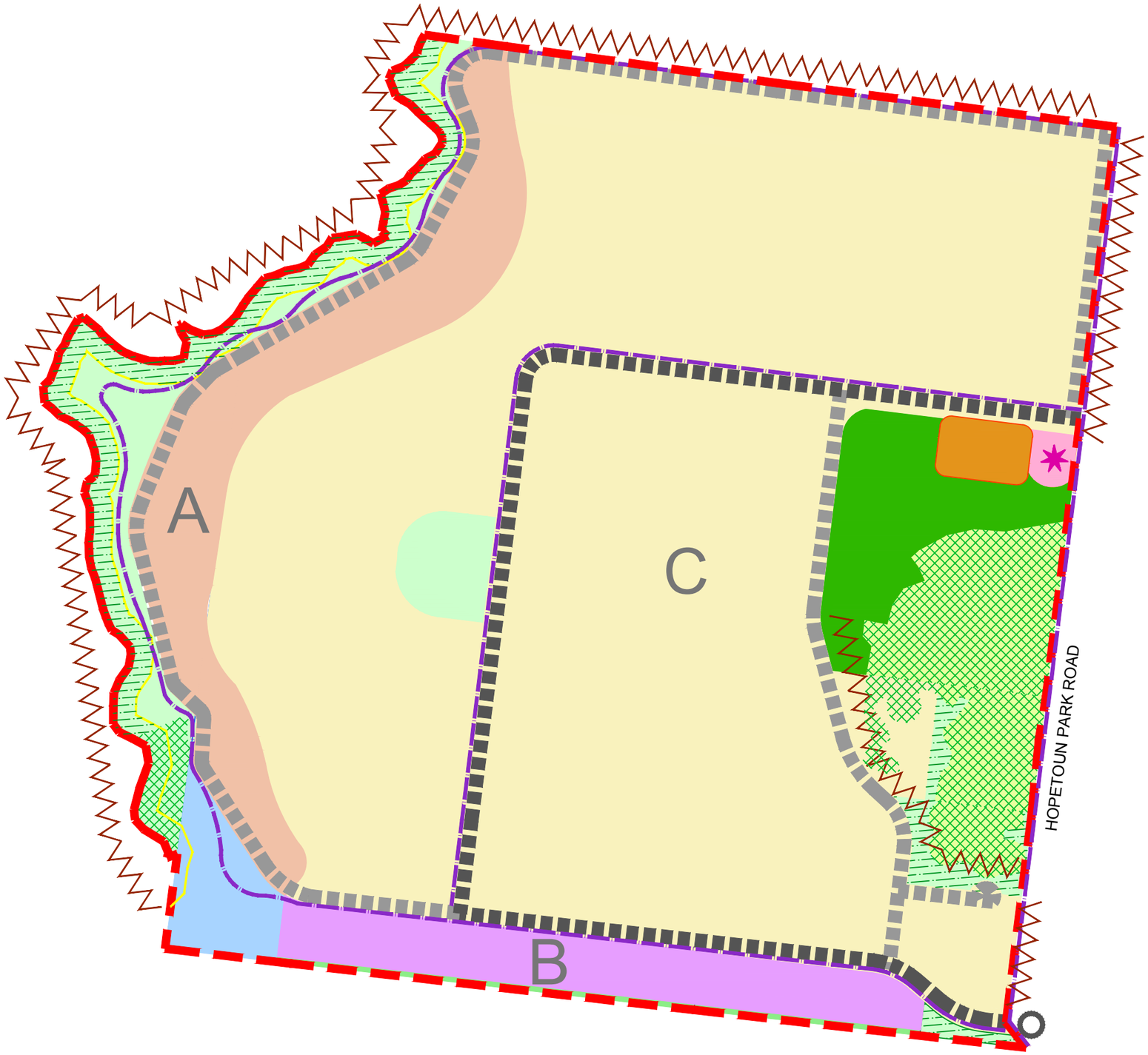
Appendix 6: Concept Plan



- Potential Conservation Reserve
- Indicative Stormwater Treatment Reserve
- Indicative Passive Open Space Reserve
- Indicative Active Open Space Reserve
- Indicative Encumbered Open Space Reserve
- Indicative Connector Road
- Indicative Perimeter Road
- Indicative location of shared path
- Indicative Location of Local Convenience Centre
- Indicative Kindergarten & Maternal Child Health & Community Room
- Area A - minimum 1500m² lots
- Area B - minimum 1500m² lots
- Area C - minimum 800m² lots
- Rezoning Area
- 20m Setback from Top of Escarpment
- Bushfire Mitigation Interface

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FOR DISCUSSION

North

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DPO - CONCEPT PLAN

Hopetoun Park North

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Moorabool Shire Council

21702 M9
VERSION 2
SHEET 1 OF 1