

Stage 1 Strategic Biodiversity Assessment for Plan Harcourt (Amendment C94malx)

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Plan Harcourt (Amendment C94malx)
6 June 2023



Stage 1 Strategic Biodiversity Assessment for Plan Harcourt (Amendment C94malx)

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Executive summary

Introduction

Jacobs has been engaged by the Department of Transport and Planning (DTP) to undertake the first stage of a Strategic Biodiversity Assessment for Plan Harcourt (PS Amendment C94malx). *Plan Harcourt* (Mount Alexander Shire Council 2020), a guide to the future planning and development of the township, was prepared and adopted by Mount Alexander Shire Council (the council) in July 2020 in response to anticipated population growth and demand for housing. The council submitted documentation to the Department of Environment, Land, Water and Planning (DELWP) seeking authorisation to commence a planning scheme amendment (known as Mount Alexander Planning Scheme Amendment C94malx) to implement key land use planning recommendations of Plan Harcourt into the Mount Alexander Planning Scheme. Following public exhibition of the amendment a subsequent panel hearing concluded that the Amendment did not take into account the full range of elements required to assess, understand and protect biodiversity values. It recommended that the amendment should not proceed until further work is undertaken to strategically plan for the protection and conservation of areas of biodiversity.

Objectives

The objective of this report is to undertake the first stage of a strategic biodiversity assessment for the Harcourt township to inform Council and allow the consideration of how to proceed with further work on Amendment C94malx in accordance with the recommendations of the Panel. Jacobs has been engaged by the DTP to:

- Review documentation associated with Amendment C94malx, including background reports, proposed policy and planning panel report
- Undertake a desktop review of biodiversity assets at the landscape scale to:
 - identify any high value biodiversity assets (ecosystems and species) that would warrant planning scheme protection
 - identify if there is a need to establish any strategic habitat and wildlife connections
 - identify any significant native trees
- Undertake targeted consultation with knowledge groups specifically Harcourt Valley Landcare (HVL), and Djaara to inform the above assessments
- Inspect study area from publicly accessible areas to inform desktop findings
- Provide a report that details findings of the above and recommendations on whether Stage 2 of the strategic biodiversity assessment is needed.

Study area

The study area is 563 ha of land centred around Harcourt (Figure 1-1, page 3). The boundaries are Calder Freeway/Midland Highway in the west, Blackjack Road in the south, Elys Lane in the north and Douglas Lane/Thompsons Road in the east.

Methods

Desktop review of databases and previous reports relevant to the study area and amendment was undertaken. Field survey from accessible areas was undertaken over two days to assess the findings of the desktop assessment.

Results

Table 1 provides a summary of higher value biodiversity areas as defined in Planning for Biodiversity (DELWP 2017b) identified in the study area based on desktop assessment and field assessment from accessible areas.

Table 1. Summary of higher value biodiversity areas

Higher biodiversity value	Examples within study area
Larger, well connected areas of native vegetation	Woodland and forest areas in the south of the study area Market Street-Bagshaw Street woodland
Areas with higher strategic biodiversity value scores	<ul style="list-style-type: none"> ▪ The northern portions of Barkers Creek ▪ Vegetated areas in the central south ▪ Along the railway line and west to the Calder Freeway ▪ Some areas of the north-east.
Areas that are highly localised habitat for rare or threatened species, particularly if they are areas of highly localised habitat for multiple rare or threatened species	<ul style="list-style-type: none"> ▪ Areas that support or potentially support threatened flora including: <ul style="list-style-type: none"> - along the railway line - areas of intact groundstorey in the south, e.g. where Castlemaine Spider-orchid known to occur - Market Street-Bagshaw Street woodland - road reserves and other areas in the north-east supporting threatened Flax-lilies. ▪ Habitat for Golden Sun Moth, potentially including areas of native grassy groundstorey: <ul style="list-style-type: none"> - along the railway line - nearby the railway line (potentially including some portions of Growth Area D) - areas in the north-east (potentially including some parts of Growth Area c) ▪ Habitat for Brown Toadlet: drainage lines and depressions across the study area
Important areas of habitat within dispersed habitats for rare or threatened species or areas of habitat for many dispersed rare or threatened species	<ul style="list-style-type: none"> ▪ Potential nesting sites for Barking Owl and Powerful Owl such as large old trees along watercourses ▪ Potential nesting sites for woodland birds such as tree hollows for Brown Treecreeper ▪ Potential denning sites (hollows in large old trees) for Brush-tailed Phascogale
Native vegetation in good condition (i.e. with higher condition scores)	<ul style="list-style-type: none"> ▪ Areas in south of the study area (e.g. Harcourt Recreation Reserve Bushland and nearby) ▪ Areas along the railway line ▪ Potentially Market Street-Bagshaw Street woodland
Waterways and sensitive wetlands and coastal areas	<ul style="list-style-type: none"> ▪ Barkers Creek ▪ Picnic Gully Creek ▪ Unnamed watercourses: <ul style="list-style-type: none"> - along Blackjack Road - between Calder Freeway and Symes Road - Mills Road/Harmony Way to Barkers Creek ▪ Drainage lines and depressions through north-east of the study area
Significant roadsides and wildlife corridors.	<ul style="list-style-type: none"> ▪ Waterways ▪ Numerous roadsides including: <ul style="list-style-type: none"> - Symes Road/railway line - Harmony Way - Eagles Road - Elys Lane - Leafy Lane - Douglas Lane - Craigie Street - Mills Road

Conclusion

The Panel outlined two major objectives in undertaking a strategic biodiversity assessment in relation to the proposed amendment, these being, to help determine if:

- the proposed planning controls will be effective in managing the identified biodiversity values
- development is being directed away from higher value areas.

The Panel also noted a strategic biodiversity assessment would assist with reviewing current planning controls and identifying suitable planning measures for potential incorporation into the amendment to protect and manage identified biodiversity values (i.e. planning measures that focus on biodiversity protection and are not necessarily associated with enabling or directing development).

The desktop review and field survey undertaken to date have focussed on identifying areas of higher value biodiversity within the study area. This information has informed a review of the amendment. Resultingly some key considerations and directions for future work in relation to the amendment and fulfilling the objectives of the strategic biodiversity assessment identified by the Panel are:

- Proposed amendments to the **town centre** and existing residential areas are unlikely to result in increased risk to ecological values however additional provisions should be considered to manage biodiversity values that may be at risk from new development.
- Rezoning of proposed **new residential areas (Growth Areas A and B)** is consistent with directing development away from higher value areas, some revision of proposed ordinance is suggested, including consideration of additional planning provisions.
- **Future town expansion** areas 27 Craigie Street, 1 Poplar Drive and most of Area D could likely be developed with little impact to ecological values.
- **Growth Area D** has substantial areas without native vegetation and lower ecological values, however further assessment is necessary to:
 - determine the extent of scattered trees
 - identify if potential habitat for the EPBC Act listed Golden Sun Moth is present.
- In **Growth Area C** there is a considerable amount of native vegetation that could be impacted and fragmented by future residential development and there is likely a significant amount of higher value biodiversity areas that development should be directed away from, including:
 - remnants of Grassy Woodland are potentially consistent with the EPBC Act threatened ecological community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland; further field assessment is required to determine if these remnants meet condition thresholds to qualify for protection under the EPBC Act
 - remnants of endangered Ecological Vegetation Classes (EVCs) (Creekline Grassy Woodland and Red Gum Swamp) which are also likely groundwater dependent ecosystems
 - potential habitat for a range of threatened woodland birds and Brush-tailed Phascogales
 - further field assessment is required to identify if potential habitat for the EPBC Act listed Golden Sun Moth is present.
- With regard to the proposed **town boundary** the values detailed in relation to Growth Area C are pertinent to the determination of its location in the north-east portion of the town.

It is concluded that while the proposed amendment attempts to protect higher value biodiversity in certain ways, such as rezoning areas for development with limited biodiversity values, Stage 2 should proceed with further work to confirm higher biodiversity areas where possible (e.g. access dependent). Fieldwork need not necessarily focus on presence/absence of threatened taxa but initially determine native vegetation and habitat extent and quality. For species with highly localised habitat that may be placed at risk due to the amendment such as threatened flora, Golden Sun Moth and Brown Toadlet, targeted field survey may be beneficial in determining higher biodiversity areas related to these taxa. For broader ranging taxa with dispersed habitat, identification of important potential habitat is more likely to be sufficient.

Fieldwork should be targeted towards enabling assessment of whether the amendment directs development away from higher value areas and if the proposed planning controls will be effective in managing the identified biodiversity values. Targeting Stage 2 fieldwork in this way is important given that the potential threat level to biodiversity values is contingent upon the planning controls proposed by the amendment. The approach should also enable reviewing current planning controls and identifying suitable planning to protect and manage identified values.

As specified by the Panel, the proposed amendment establishes the guidance for growth of the town for the foreseeable future, as such Stage 2 of the strategic biodiversity assessment should identify opportunities to maximise biodiversity benefits in the context of relevant legislative, policy and regulatory requirements, including:

- establish biodiversity objectives
- identify high value biodiversity assets (ecosystems and species) for priority protection
- identify and make recommendations to establish strategic habitat connections
- identify and make recommendations to manage threats
- recommend appropriate planning controls commensurate with the value of the asset and its contribution to ecosystem health.

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1. Introduction

1.1 Project introduction

Jacobs has been engaged by the Department of Transport and Planning (DTP) to undertake the first stage of a strategic biodiversity assessment for Plan Harcourt (PS Amendment C94Malx).

Harcourt, located approximately 123 kilometres northwest of Melbourne and approximately 33 kilometres south of Bendigo, is a small town in Central Victoria identified as suitable to accommodate planned growth in the region. *Plan Harcourt* (Mount Alexander Shire Council 2020), a guide to the future planning and development of the township, was prepared and adopted by Mount Alexander Shire Council (the council) in July 2020 in response to anticipated population growth and demand for housing. It seeks to ensure the development and expansion of Harcourt is carefully managed to promote local character, recognise and protect productive agricultural land and operations, ensure adequate land supply, and protect the natural and cultural features of the town.

The council submitted documentation to the Department of Environment, Land, Water and Planning (DELWP) seeking authorisation to commence a planning scheme amendment (known as Mount Alexander Planning Scheme Amendment C94malx) to implement key land use planning recommendations of Plan Harcourt into the Mount Alexander Planning Scheme. Following public exhibition of the amendment a subsequent panel hearing concluded that the Amendment did not take into account the full range of elements required to assess, understand and protect biodiversity values. The Panel concluded that habitat and wildlife corridors have not been adequately identified or protected. As Harcourt has been identified as an area with significant biodiversity values, it was recommended that the amendment should not proceed until further work was undertaken to strategically plan for the protection and conservation of areas of biodiversity.

Therefore, to progress the amendment, a strategic biodiversity assessment is required across the whole study area. As recommended by the planning panel, the assessment will identify significant biodiversity values and recommend appropriate planning provisions to adequately protect them. It will:

- establish biodiversity objectives
- identify high value biodiversity assets (ecosystems and species) for priority protection
- identify and make recommendations to establish strategic habitat connections
- identify and make recommendations to manage threats
- recommend appropriate planning controls commensurate with the value of the asset and its contribution to ecosystem health.

1.2 Study objectives

The objective of this study is to undertake the first stage of a strategic biodiversity assessment for the Harcourt township in accordance with the recommendations of the Panel for Amendment C94malx to the Mount Alexander Planning Scheme.

Jacobs has been engaged by the DTP to:

- Review documentation associated with Amendment C94malx, including background reports, proposed policy and planning panel report
- Undertake a desktop review of biodiversity assets at the landscape scale to:
 - identify any high value biodiversity assets (ecosystems and species) that would warrant planning scheme protection
 - identify if there is a need to establish any strategic habitat and wildlife connections
 - identify any significant native trees
- Undertake targeted consultation with knowledge groups specifically Harcourt Valley Landcare (HVL) and Djaara to inform the above assessments

- Inspect study area from publicly accessible areas to inform desktop findings
- Provide a report that details findings of the above and recommendations on whether Stage 2 (detailed field assessment) of the strategic biodiversity assessment is needed.

Out of scope

Stage 2 is not included as part of this study, but may comprise the following tasks:

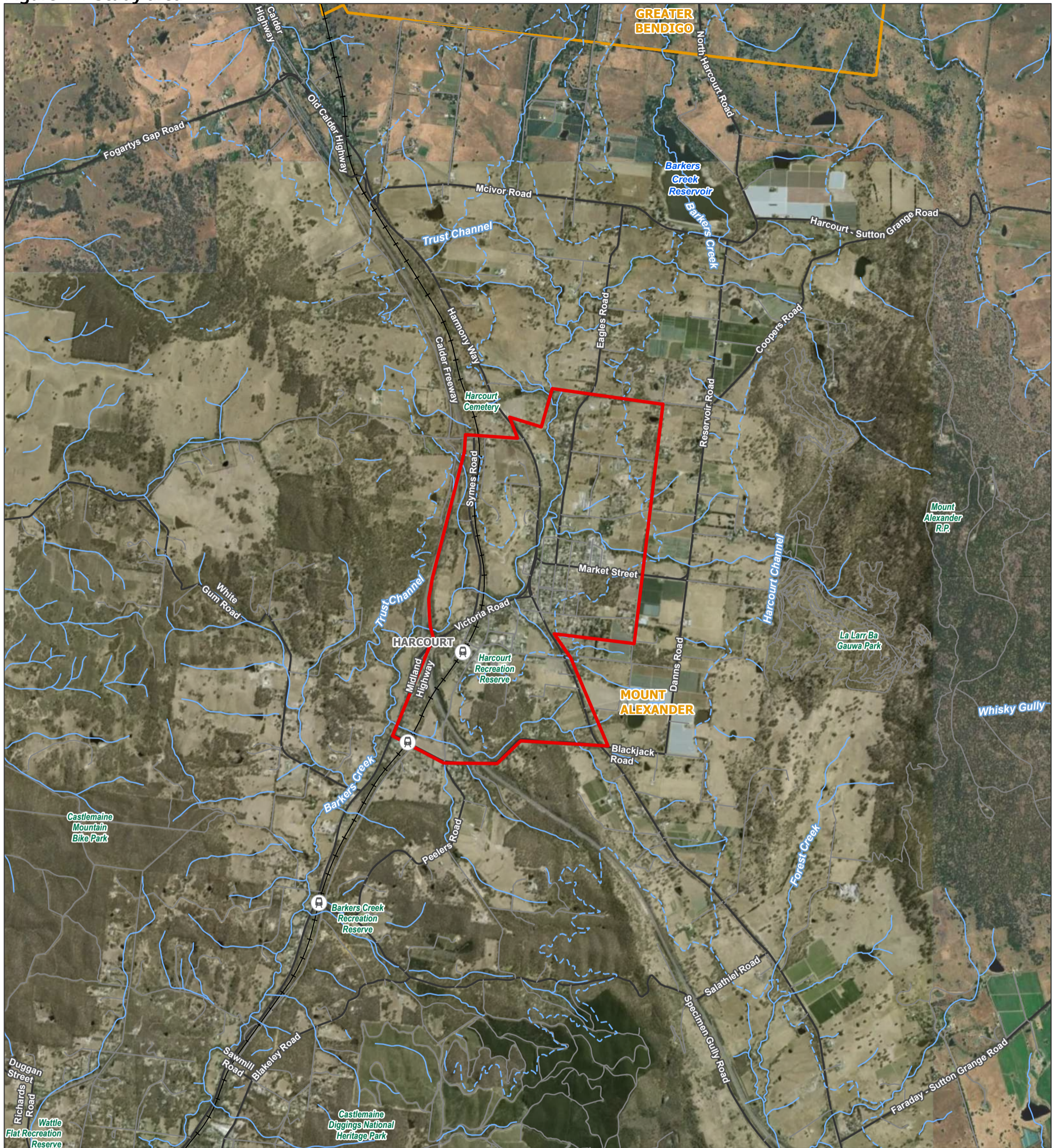
- Undertake a Detailed Field Assessment with the following scope of works:
 - Establish biodiversity objectives.
 - Undertake detailed field assessments to:
 - confirm high value biodiversity assets (ecosystems and species) for priority protection
 - confirm and make recommendations to establish strategic habitat connections
 - confirm and make recommendations to manage threats.
- Undertake wider community consultation on findings.
- Prepare a final strategic biodiversity assessment report that recommends appropriate planning controls, including consideration of local policy objectives, strategies and other tools, commensurate with the value of the asset and its contribution to ecosystem health. Recommendations would take into account contemporary relevant planning policy and guidance. The recommended controls would have regard to the implementation of Amendment C94malx.

1.3 Study area

The study area is 563 ha of land centred around Harcourt (Figure 1-1). The boundaries are Calder Freeway/Midland Highway in the west, Blackjack Road in the south, Elys Lane in the north and Douglas Lane/Thompsons Road in the east.

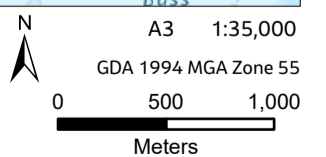
The study area falls within the Goldfields bioregion and the North Central Catchment Management Authority (CMA). The study area is traditionally owned by the Dja Dja Wurrung.

Figure 1.1 Study area



LEGEND

- Study Area
- Rail Station
- Railway
- Major road
- Minor road
- Watercourse channel/drain
- Watercourse stream/river
- LGA Boundary



Jacobs

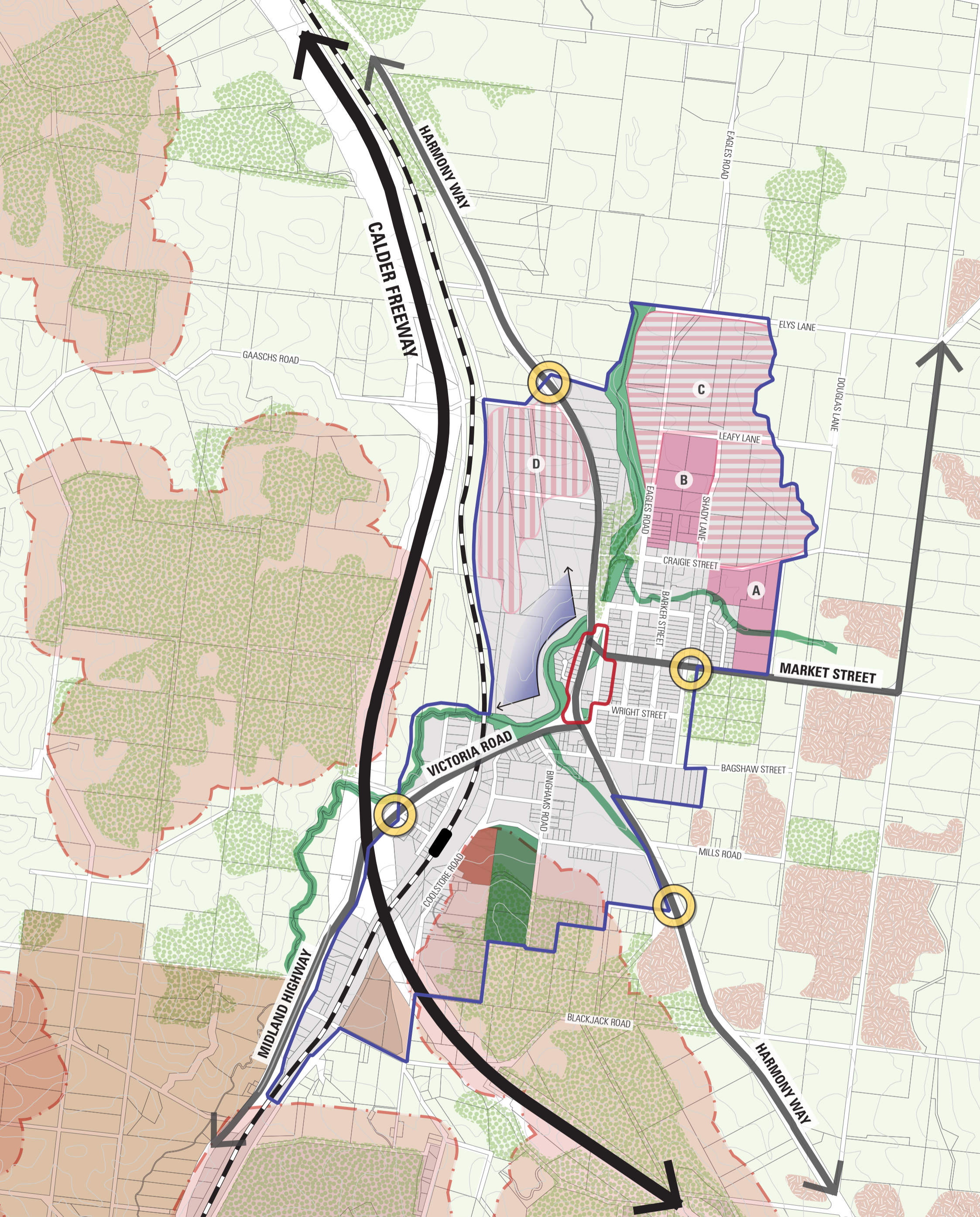
1.4 Amendment C94malx

The proposed Mount Alexander Planning Scheme Amendment C94malx intends to implement the key land-use planning directions of *Plan Harcourt* (Mount Alexander Shire Council 2020), adopted by Council on 21 July 2020, to guide future land use and development within Harcourt.

Specifically, the Amendment proposes to:

- Insert a new local policy Clause 11.01-1L-04 (Harcourt) including an updated Harcourt Land Use Framework Plan (Figure 1-2)
- Rezone the majority of land in the Township Zone and General Residential Zone to the Neighbourhood Residential Zone Schedule 1
- Rezone land in the designated town centre from Township Zone to Commercial 1 Zone and apply design requirements through the Design and Development Overlay Schedule 16
- Rezone land in Growth Areas A and B from Farming Zone to Neighbourhood Residential Zone Schedule 1 and apply design requirements through the Development Plan Overlay Schedule 12
- Identify land for future town expansion (Area C and Area D) as per the updated Harcourt Land Use Framework Plan
- Include Plan Harcourt as a Background Document
- Make other minor and consequential changes to the Mount Alexander Planning Scheme.

Since the Panel, Council officers have revised the proposed ordinance associated with these changes. For the purposes of this report, the latest version (February 2023) has been used to review the amendment.



- Legend**
- Township Boundary
 - Town Centre
 - Freeway
 - Main Roads
 - Train Station
 - Rail Corridor

- Township Entrance
- Retain hillslope and landscape background to Town Centre
- Rural Living Zone (RLZ)
- Industrial Land
- Public Open Space
- Bushfire Management Overlay

- Future Town Expansion Areas A and B
- Future Town Expansion Area C
- Future Town Expansion Area D
- Existing Canopy Vegetation
- Existing Horticultural Land



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Figure 1.2 Harcourt Land Use Framework Plan

2. Methods

2.1 Desktop assessment

The following sources were utilised to undertake a review of existing information relating to the ecology and biodiversity values of the study area:

- Protected Matters Search Tool (PMST) (DCCEE 2023a) - This database search was initially undertaken on 10 March 2023 and then redone on 13 April 2023 to include recently listed taxa. It was undertaken for a 10 km buffer of the study area. The PMST highlights Matters of National Environmental Significance (MNES) relevant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that potentially occur in the search area.
- Victorian Biodiversity Atlas (VBA)(DEECA 2023) – GIS datasets relating to the VBA as available on 3 March 2023 for a 10 km buffer of the study area. The VBA comprises spatial data records of flora and fauna species from across the State. Records are added opportunistically, as flora and fauna surveys are conducted within Victoria for a variety of purposes. The mapping of flora and fauna distribution and determination of species' habitat preferences is an ongoing process.
- A selection of publicly available GIS layers as referenced throughout report
- Available aerial imagery
- Documentation associated with Amendment C94malx, including background reports, proposed policy and planning panel report provided by DTP and Mount Alexander Shire Council
- Previous reports and documents relating to the study area as referenced in Section 3.

2.2 Consultation

Consultation with the following groups was undertaken to inform this report:

- Harcourt Valley Landcare: Bonnie Humphreys (HVL President); Robyn Miller (HVL Secretary) George Milford (HVL Treasurer), Bron Willis (HVL member)
- Paul Foreman, Blue Devil Consulting
- Jess Lawton, PhD candidate, Latrobe University
- Djaara (Dja Dja Wurrung Clans Aboriginal Corporation): Shana Nerenberg.

2.3 Field assessment

The assessment involved the interpretation of aerial imagery proofed with on-ground visual inspection. Field assessment was undertaken by Jacobs' ecologists over two days in March 2023. The assessment was undertaken from publicly accessible areas (e.g. road sides and public land) as well as some private land where access was granted from land owners. A general visual inspection was undertaken to consider:

- General extent and condition of native vegetation
- Potential habitat for threatened flora and fauna
- Potential for presence of threatened communities in accordance with the listing advice for those communities.

As the assessment involved interpretation of aerial photography and visual inspection from accessible locations only it should not be considered exhaustive but rather a general indicative assessment and any mapping of native vegetation extent approximate.

2.3.1 Native vegetation mapping

Native vegetation was mapped in selected portions of the study area, with particular focus on Growth Areas proposed in the Amendment C94malx. Where native vegetation was mapped, it was mapped as either a patch or a scattered tree. This was informed by categorisation used in the Guidelines (DELWP 2017b)

Patch:

- An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native
- any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy; or
- any mapped wetland included in the current wetlands map, available in DELWP systems and tools.

Scattered Tree:

- A native canopy tree that does not form part of a remnant patch.

Mapping involved interpretation of aerial photography and visual inspection from accessible locations and as such it should be considered indicative.

2.4 Likelihood of occurrence assessment

An assessment of the likelihood of threatened and migratory taxa occurring within the study area was undertaken for taxa recorded or modelled to occur within 10km of the study area in the VBA and PMST. This assessment was based on the known preferred habitats in comparison to the habitat available in the study area; the frequency, date, and location of previous recordings; and consideration of how cryptic the taxon is (i.e. is it likely to be present but undetected). The criteria used for assessing likelihood of occurrence of threatened species are described in Appendix B.

2.5 Policy and legislation

The following legislation and policy inform this assessment, which are further detailed in Appendix A:

- Commonwealth
 - *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- Victoria
 - *Environment Effects Act 1978* (EE Act)
 - *Flora and Fauna Guarantee Act 1988* (FFG Act)
 - Protecting Victoria's Environment – Biodiversity 2037 (DELWP 2017c)
 - *Planning and Environment Act 1987* (P&E Act)
 - Mount Alexander Planning Scheme
 - Planning for biodiversity: guidance (DELWP 2017d)
 - Guidelines for the removal, destruction or lopping of native vegetation ('the Guidelines'; DELWP 2017b).

Planning for biodiversity: guidance

This document offers assistance in identifying the role of the planning system in protecting and conserving biodiversity, outlines the frameworks that guide planning in Victoria and offers direction on the process of planning for biodiversity protection and conservation. It includes a planning toolkit and summary of biodiversity information tools available to inform planning for biodiversity. It will guide recommendation of planning provisions to be provided in Stage 2 of the strategic biodiversity assessment.

2.6 Assumptions and limitations

This report is intended only for the purposes specified in this document. The following assumptions and limitations should be considered:

- The sole purpose of this report and the associated services performed by Jacobs is to undertake an ecological assessment in accordance with the scope of services set out in the contract between Jacobs and DTP.
- In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by DTP/Mount Alexander Shire Council and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that the observations and conclusions as expressed in this report may change.
- Jacobs derived the data in this report from information sourced from the DTP/Mount Alexander Shire Council and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.
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- Information presented in this report is based on conditions at the time of the assessment. Changes to the ecological conditions occur over time through natural and human influences and may alter the conclusions of this report.
- This report is based on the study area as shown in Section 1.3. Should the study area change this report will require review.
- Information from available desktop data has not been confirmed unless explicitly detailed in this report. The sources include some modelled data (e.g. DEECA EVC mapping and EPBC Act PMST results) and hence this should be considered indicative only.
- With regards to the Victorian Biodiversity Atlas the data is highly variable depending on the number of surveys previously undertaken, i.e. an area where many surveys have been undertaken in the past, will, most likely, have a more extensive list of species than areas where very little survey work has been undertaken. The spatial accuracy of past surveys is also variable and point locations can be out by several kilometres. In addition to the number of previous surveys undertaken, there are other reasons why species may not have been recorded. For example, some plant species may not have been flowering or present above the ground, overlooked or not identified within the area surveyed. In particular, wetlands display a high degree of temporal variation: plant species and EVCs observed during wet periods may be quite different to plant species and EVCs observed during drier periods. In the case of fauna, species move around the landscape and can be in hidden or cryptic locations, so while they potentially utilise or reside within a site, they may often not be observed during surveys.
- The field survey was undertaken during March which is generally not a good time for observing flora, as many taxa may not have been visible or easily identified. Detailed flora or fauna survey was not undertaken. Field survey was undertaken to assess vegetation and habitat quality, and conditions were sufficient to undertake this for the purposes of this report.

- Legislative change is ongoing including the listing of taxa under the EPBC Act and FFG Act. The listings of taxa within this report are consistent with the data used to inform this assessment. Future change to listings may affect the findings of this report.

3. Consultation and review of previous studies

3.1 Previous studies

Table 3-1 provides a summary of previous studies provided by Mount Alexander Shire Council and Harcourt Valley Landcare reviewed to inform this assessment.

Table 3-1. Summary of previous studies

Document Title	Author	Date	Location	Summary of Ecological Values
Preliminary Flora and Fauna Assessment: Calder Highway, Harcourt Planning Study	VicRoads	November 1997	Partially within study area; Harcourt township and immediately surrounding area.	<p>Identified four native vegetation communities across Harcourt township and immediate surroundings: Grey Box Woodland, Red Gum Woodland, Red Stringybark Forest and Wetland.</p> <p>Native vegetation was generally of poor condition due to high weed levels and reduced diversity associated with land use history. Stands of remnant eucalypts were common but with understories dominated by introduced species and regeneration limited by livestock.</p> <p>Intact vegetation was generally localised to narrow remnant areas along creeks and drainage lines with larger sections present within Harcourt Recreation Reserve and Barkers Creek Reservoir.</p> <p>Roads and minor creeklines represent valuable wildlife corridors for significant species but habitats linking larger areas of native vegetation were not present.</p>
Calder Highway – Faraday to Ravenswood Detailed Flora and Fauna Investigation of Route Options	Ecology Australia	February 1999	Partially within study area; corridor extending north of Ellerys Road, Faraday, 5km north of Ravenswood, 2km east of Coopers Road, Harcourt and 2.5km west of the Midland Highway, Harcourt.	<p>Assessment of flora and fauna values associated with six route alignment options for the Calder Highway upgrade between Faraday and Ravenswood.</p> <p>Identified three indigenous vegetation communities of varying significance: Heathy Dry Forest, Grassy Open Forest and Riparian Complex.</p> <p>Documented 43 remnant vegetation sites ranging from local to regional significance for floral values and up to state significance for faunal values; remnant patches of native vegetation support high conservation value for the FFG Act listed Brush-tailed Phascogale (<i>Phascogale tapoatafa</i>).</p>
Calder Highway, Faraday to Ravenswood Supplementary Environment Effects	Brett Lane & Associated PTY LTD	October 2003	Partially within study area; corridor extending north of Ellerys Road, Faraday, 5km north of Ravenswood, 2km east of	<p>Assessment of floral and faunal impacts of a proposed alignment option for the Calder Highway upgrade between Specimen Gully Road and Fogartys Gap Road.</p> <p>Identified five definable EVCs within the study area and 151 plant species.</p>

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Document Title	Author	Date	Location	Summary of Ecological Values
Statement; Flora and Fauna Stage 2 Report – Evaluation of Options			Coopers Road, Harcourt and 2.5km west of the Midland Highway, Harcourt.	Eight mammal species were identified during the assessment including Brush-tailed Phascogale. Forty-six bird species were recorded of which none were of state significance. Habitat suitable for the nationally endangered Swift Parrot (<i>Lathamus discolor</i>) was identified. Habitat suitable for reptile and frog species was also identified.
Wildlife Survey Mount Alexander Summit	Scott Corbett & Terri Williams	November 2004	Adjacent; Southern Cross Transmission Tower, Mount Alexander Regional Park (approx. 2.7km east of study area)	Faunal assessment of summit of Mount Alexander (Leanganook) surrounding transmission tower. Identified a number of threatened species in close proximity to Harcourt including Barking Owl (<i>Ninox connivens</i>).
Roadside Conservation Management Plan 2012-2017	Mount Alexander Shire Council	September 2012	Applies to study area	A plan designed primarily for use by Council staff to provide them with the opportunity to make clear and consistent decisions in their roles relating to the management of roadsides within the Mount Alexander Shire. Utilises a 2008 ecological assessment of the Shire's roadsides.
Mount Alexander Shire Council – Roadside Ecological Assessment and Modelling	Ecology Australia	December 2014	Adjacent; All roads within Mount Alexander Shire Council previously mapped by the North Central Catchment Management Authorities (NCCMA)	Assessment of roadside vegetation quality within the Mt. Alexander municipality; roadsides within the study area were assessed using modelling only and not directly surveyed. Models roadside vegetation within the area into percentage, high, moderate and low category in comparison to the Conservation Value model utilised in the 2008 roadside assessment. Reduces percentage of high and moderate quality vegetation within the Shire.
Mount Alexander Shire Roadside Vegetation Conservation Quality Map	Holocene Environmental Science	September 2017	Within study area; Assessment of all roads within the project boundary	Provides mapping of roadside vegetation quality within the Shire; assigns all roads to one of 6 vegetation value categories; High, Moderate, Low, Low (scattered trees), Low (degraded treeless vegetation/scattered trees), Degraded Treeless Vegetation. All roads within the proposed township boundary for Plan Harcourt were categorised as either Degraded Treeless Vegetation, Low (degraded treeless vegetation/scattered trees), or Low with the exception of a small number of areas east and west of Bingham Road and adjacent to Blackjack Road which received Moderate to High classification.
Harcourt Mountain Bike Park Construction Environmental	DEWLP	July 2017	Adjacent; Harcourt Mountain Bike Park west of the study area	Delineates areas of high and low value vegetation and cites the presence of the EPBC listed Matted Flax-lily (<i>Dianella amoena</i>).

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Document Title	Author	Date	Location	Summary of Ecological Values
Management Plan (CEMP)				
Woodland Bird Monitoring Program; Summary of results from 2010 to 2017	Connecting Country	August 2017	Adjacent; Fifty-one undisclosed sites across Mount Alexander Region	<p>Monitoring of Victorian temperate woodland bird species across 51 undisclosed sites in the Mount Alexander region as a focal species for landscape restoration. A full site list was not provided and therefore site locations cannot be confirmed.</p> <p>Identified 164 bird species of which 34 are of conservation interest including the nationally endangered Hooded Robin (<i>Melanodryas cucullata</i>), Brown Treecreeper (<i>Climacteris picumnus victoriae</i>), Diamond Firetail (<i>Stagonopleura guttata</i>), Swift Parrot (<i>Lathamus discolor</i>) and Painted Honeyeater (<i>Grantiella picta</i>).</p>
Witness Statement – Planning Scheme Amendment C94malx: Plan Harcourt	Paul Warrick Foreman	September 2022	Within study area; Assessment for Plan Harcourt (PS Amendment C94malx)	<p>Review of ecological values within Amendment C94malx. Note this is a slightly different area to the study area in this report. Among other things key findings included:</p> <ul style="list-style-type: none"> - Five vulnerable or endangered EVCs coincide with the study area. - Identification of spring/soaks likely associated with groundwater dependent ecosystems similar to other threatened communities listed under the FFG Act - Numerous large old eucalypt tress (LOTs) are present along road reserves and riparian zones. - Potential presence of threatened ecological communities listed under the EPBC Act: <ul style="list-style-type: none"> ▪ Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia ▪ White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland - Potential presence of thirty-three species of threatened plants, birds, mammals, amphibians, reptiles and invertebrates were identified during desktop analysis. - Strategic ecology connections between Mount Alexander and the greater Castlemaine region

3.2 EPBC Act Referrals

Table 3-2 provides a summary of EPBC Act referrals within the study area as identified in the EPBC Act Protected Matters Report (Appendix C).

Table 3-2. Summary of previous EPBC Act referrals within the study area

Project / Reference No.	EPBC Act decision	Proposed action	Location	Summary of Ecological Values
Harcourt Modernisation Project 2011/6050	Completed; Not Controlled Action (NCA)	Construction of a water pipeline between Barkers Creek reservoir and the Coliban Main Channel with reticulated feeds into the Harcourt rural area. Works include upgraded irrigation channels, two pump stations (Barkers Creek Pump Station situated approximately 1.6 km north of the study area with fluvial connections and Faraday Pump Station approximately 7.6 km south-east) and a balanced storage facility.	Encompasses study area commencing at Johansens Road, North Harcourt then east along Mclvor Road before connecting with a pump station at Barkers Creek Reservoir. It then heads south along Reservoir Road, crosses through private property and follows the Old Calder Highway for several kilometres before heading west at Finnings Road to connect with the Poverty Gully Channel on the western side of the Coliban Main Channel. The reticulated feeds generally follow the existing irrigation system located in and around the township of Harcourt. Accompanying flora and fauna assessment report (Biosis 2011) includes additional areas to the north of Johansens Road connecting Barkers Creek Reservoir to Sandhurst Reservoir.	<p>Assessment identified presence of threatened species and ecological communities, those of relevance are summarised below. The proposed action was decided as 'not a controlled action' and is unlikely to have significant impact on protected matters. Impacts were mitigated during pre-construction, construction, and post-construction, including the avoidance of threatened communities, habitat for significant species, vegetation of Very High Conservation Significance, and numerous large trees.</p> <p>Targeted surveys undertaken and taxa not detected: River Swamp Wallaby-grass (<i>Amphibromus fluitans</i>), Growling Grass Frog (<i>Litoria raniformis</i>): Brown Toadlet (<i>Pseudophryne bibronii</i>): surveys undertaken outside Plan Harcourt area and these taxa not detected</p> <p>EPBC Act threatened species detected:</p> <ul style="list-style-type: none"> Golden Sun Moth (<i>Synemon plana</i>) – Recorded at four locations to north of study area, closest is within 2 km north of study area. Surveys within study area (cnr Eagles Road and Elys Lane) did not detect species. Brown Treecreeper (<i>Climacteris picumnus victoriarum</i>): woodland patches and road reserves. Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>) - observed adjacent to Harcourt Modernisation Study area. <p>EPBC Act threatened ecological communities detected: White Gum-Yellow Box-Blakeley's Red Gum Grassy Woodland and Derived Native Grassland Community, located north-west of Midland Highway and Blackjack Road intersection (outside of Plan Harcourt study area)..</p> <p>FFG Act threatened species detected: Arching Flax-lily (<i>Dianella</i> sp. aff. <i>longifolia</i> (Benambra)), Late-flower Flax-lily (<i>Dianella tarda</i>), Bearded Dragon (<i>Pogona barbata</i>)</p> <p>Ecological Vegetation Classes detected: 22 Grassy Dry Forest, 61 Box Ironbark Forest, 68 Creepline Grassy Woodland, 175_62 Granitic Grassy Woodland, 292 Red Gum Swamp.</p>

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Project / Reference No.	EPBC Act decision	Proposed action	Location	Summary of Ecological Values
Regional Fibre Optic Project (RFOP) 2003/978	Post-Approval; Not Controlled Action (NCA)	Installation of fibre optic cable along rail corridors to regional destinations for rail communications purposes.	Existing rail corridor between Spencer Street Station, Melbourne and Bendigo including sections through Harcourt and immediate surrounding area.	<p>Identified biosites nearby but outside of study area:</p> <ul style="list-style-type: none"> DSE Biosite No.4369 – Harcourt Cemetery Rail Reserve (to north of study area), located on the east (up) side of the line immediately west of Harcourt Cemetery (135.50-135.70 km). Site is of regional significance containing “Granitic Hills Herb-rich Woodland”. DSE Biosite No. (unclassified) – Harcourt Cemetery Rail Reserve 2, located on the west (down) side of the line immediately west of Harcourt Cemetery (135.50 -135.70 km). Site is of regional significance not yet classified by DSE.
Upgrade of Calder Highway 2003/1281	Completed, Not Controlled Action (NCA)	Road upgrade of approximately 21 km of a new, four-lane highway (Calder Highway).	Within Study area; Ellery’s Road, Faraday to Calder Alternative Highway, Ravenswood with a section intersecting the west of the Plan Harcourt study area.	<p>Targeted surveys undertaken: Pink-tailed Worm-lizard (<i>Aprasia parapulchella</i>), not detected.</p> <p>EPBC threatened species detected: Swift Parrot (<i>Lathamus discolor</i>), Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>).</p> <p>EPBC threatened species with moderate likelihood of occurrence: Trout Cod (<i>Maccullochella macquariensis</i>), Macquarie Perch (<i>Macquaria australasica</i>), Murray Cod (<i>Maccullochella peelii</i>).</p>
Regional Rail Link - drainage, trenching and cable laying works 2003/1132	Post-Approval; Not Controlled Action (NCA)	Undertake drainage, trenching and cable laying works as part of the Regional Fast Rail Project – Bendigo Country Works Package.	Works required between New Sydenham Station and Bendigo Station within existing rail corridor including sections through Harcourt and immediately surrounding area. The rail corridor also intersects Barkers Creek, Harcourt.	<p>Biosites identified:</p> <ul style="list-style-type: none"> DSE Biosite Old 4368 – Harcourt, located on the down (west) side of the line (134.20-134.50 km). Site is of state significance with Late-flower Flax-lily (<i>Dianella tarda</i>) present. DSE Biosite No. (unclassified) – NEW, located on the down (west) side of the line (135.09-135.11 km). Site is of state significance with Late-flower Flax-lily present. DSE Biosite No. (unclassified) – Area S, located on the down (west) side of the line (135.40-135.60 km). Site is of state significance with Late-flower Flax-lily present.
Regional Fast Rail Project - Bendigo Country Works Package 2002/675	Completed; Not Controlled Action (NCA)	Upgrade existing railway infrastructure between New Sydenham and Bendigo to enable diesel operated passenger trains to travel at higher speeds.	Works required between New Sydenham Station and Bendigo Station within existing rail corridor including sections through Harcourt and immediately surrounding area.	<p>Biosites identified:</p> <ul style="list-style-type: none"> DSE (previously DNRE) Biosite No.4369 – Harcourt Cemetery Rail Reserve, located on the east (up) side of the line immediately west of Harcourt Cemetery (135.30-135.60 km). Site is of regional significance containing “Granitic Hills Herb-rich Woodland”.

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Project / Reference No.	EPBC Act decision	Proposed action	Location	Summary of Ecological Values
				<ul style="list-style-type: none">▪ DSE Biosite No. (unclassified) – Harcourt Cemetery Rail Reserve 2, located on the west (down) side of the line immediately west of Harcourt Cemetery (135.50 -135.70 km). Site is of regional significance.

3.3 Consultation

Table 3-3 provides a summary of the formal consultation undertaken to inform this study. In addition to those in the table numerous conversations were had with landowners in association with field survey.

Table 3-3. Summary of formal consultation undertaken

Person/s	Topics addressed	Outcomes
Bron Willis Harcourt Valley Landcare Member	Overview of ecological values in Harcourt and intent for not just protection but goal is to improve biodiversity outcomes. Liaison with landowners for provision of access and advice on sites of high biodiversity values	Informed approach to field survey and identification of biodiversity values.
Paul Foreman Blue Devil Consulting	Provided overview of expert witness report made to planning panel	Informed review of background material, field survey and identification of biodiversity values
Jess Lawton PhD Candidate, La Trobe University	Presented findings of PhD studies showing extent of detection of Brush-tailed Phascogale in the landscape and habitat attributes correlated with abundance	Identified the importance of the study area to Brush-tailed Phascogale and consideration of supporting habitat
Bonnie Humphreys Harcourt Valley Landcare President George Milford Harcourt Valley Landcare Treasurer	Discussion on local species and some key area of importance including Barkers Creek, Picnic Gully Creek, unnamed waterways and Harcourt Recreation Reserve Bushland	Informed approach to field survey and identification of biodiversity values.
Shana Nerenberg Biodiversity Lead, Dja Dja Wurrung Clans Aboriginal Corporation	Need for a land use planning approach that facilitates goals of healing country. <i>Overview of Dhelkunya Dja - Dja Dja Wurrung Country Plan 2014-2034 and Galk-galk Dhelkunya Forest Gardening Strategy 2022-2034</i>	Appreciation of Dja Dja Wurrung aspirations and initiatives to facilitate reconciliation. Potential need for further engagement regarding more specific Harcourt knowledge.

4. Results

4.1 Study area description and native vegetation extent

The study area is 563 ha of land centred around Harcourt (Figure 1-1). The boundaries are Calder Freeway/Midland Highway in the west, Blackjack Road in the south, Elys Lane in the north and Douglas Lane/Thompsons Road in the east. It's centred around the Harcourt town centre and connecting residential areas. Beyond the residential areas surrounding the town centre are larger allotments that provide a rural living environment with hobby farms and grazing areas. Some orchards occur in the south-east.

Native vegetation is widespread across the study area (Figure 4-1). Field assessment determined that the 2017 native vegetation extent layer (DELWP 2017a) provides a relatively accurate representation of the current cover of native vegetation. Larger remnants generally occur in the south although native vegetation is spread throughout. Native vegetation remnants are often interspersed with residential development and land cleared for agriculture. There are a few key areas where native vegetation cover is underestimated in the 2017 extent layer (e.g. Figure 4-2):

- In the north-east of the study area (e.g. north-east of Craigie Street and Edgars Road) are areas of regeneration including regenerating eucalypts and areas of sedges and rushes along drainage lines and depressions. As such the 2017 extent layer slightly underestimates the extent of native vegetation in this area.
- Scattered trees are not necessarily reflected in the 2017 extent vegetation layer. For example, in the north-west of the study area (e.g. between Twyford Road, Barkers Creek and the railway line) scattered trees appear to not be well represented. Note, there was limited access/visibility to this area and consequently some difficulty in determining remnant eucalypts visible from aerial imagery from planted eucalypts.
- Vegetation bordering the Calder Freeway, including areas of revegetation and remnant native vegetation.

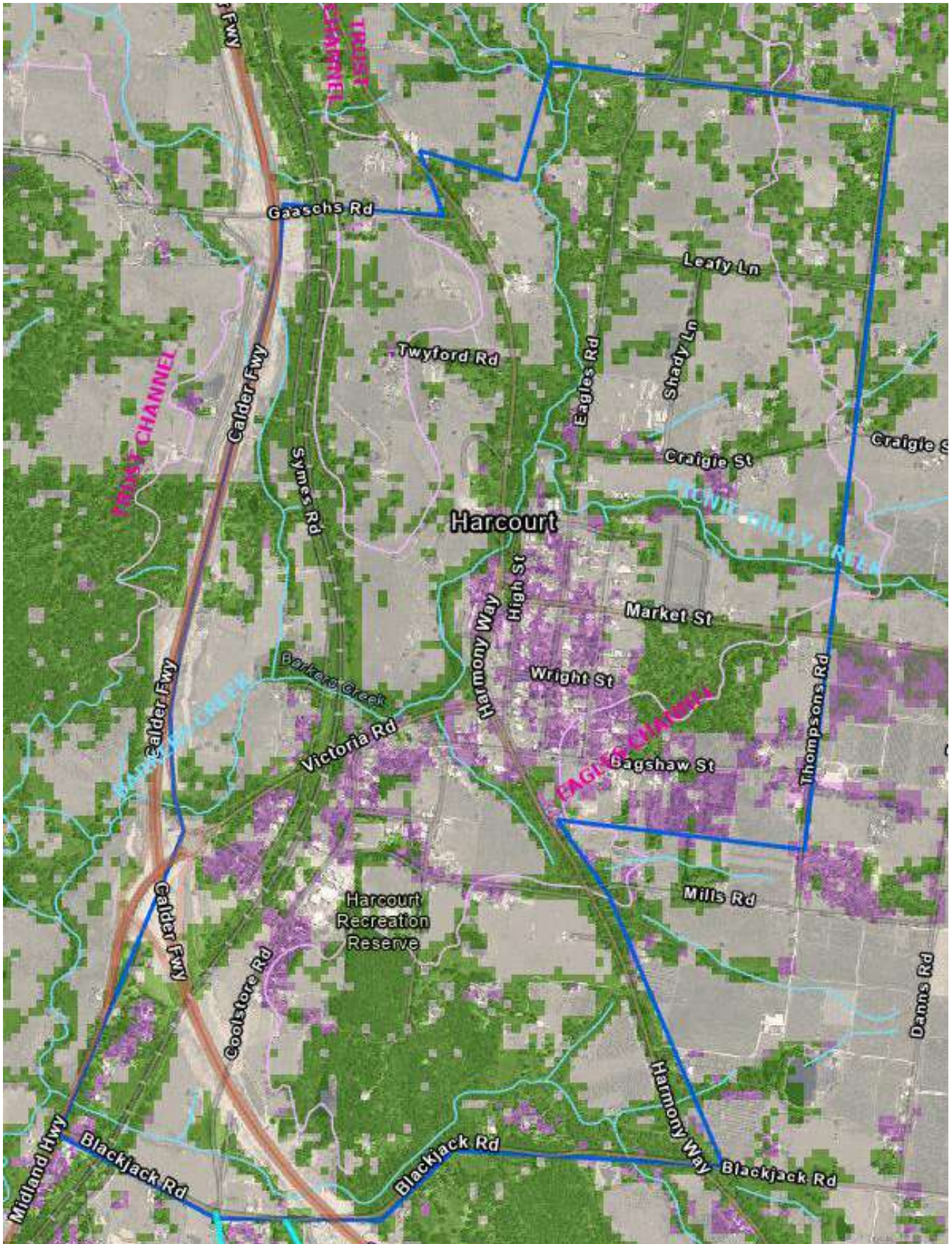


Figure 4-1. Native vegetation extent (green: native vegetation, purple: mixed vegetation (native and non-native)) (DELWP 2017a)

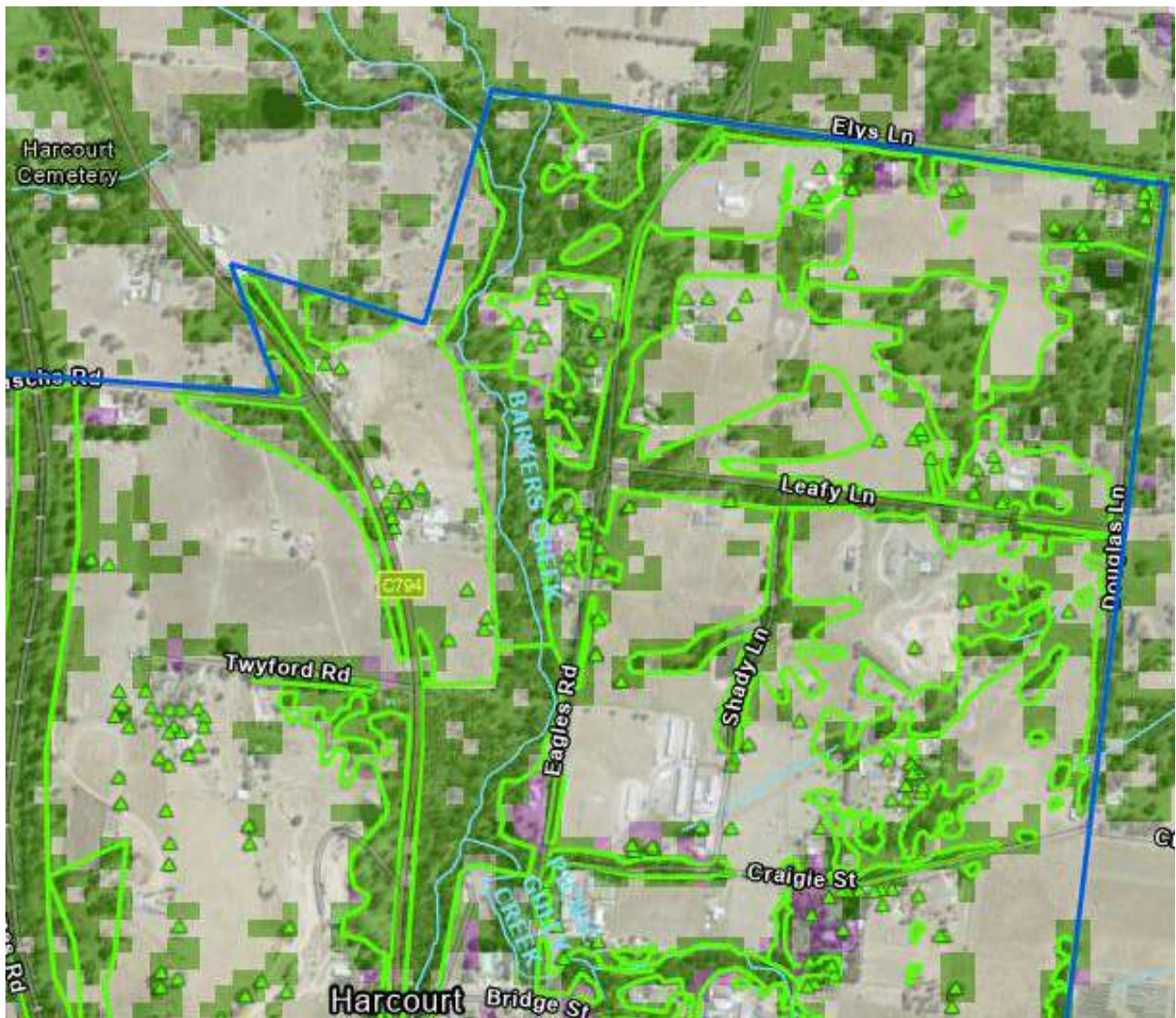


Figure 4-2. Comparison of 2017 native vegetation extent layer (DELWP 2017a) with mapping of native vegetation from aerial imagery and targeted ground truthing (light green polygons showing patches and triangles for scattered trees) from accessible areas in the north of the study area.

4.2 Geomorphology and Ecological Vegetation Classes

Geomorphologically the study area can be divided in two by geology derived from Silurian marine sediments in the south-west and the Devonian granites in the north-east as shown in Figure 4-3. The marine sediments give rise to hilly areas with shallow low-nutrient soils that support EVC 61 Box-Ironbark Forest, EVC 20 Heathy Dry Forest and EVC 22 Grassy Dry Forest (Figure 4-4). Given the low productivity of these areas they are less attractive for agriculture and often retain a high cover of native vegetation in better condition (e.g. diverse native understorey) than other areas.

The igneous areas contain more fertile soils that tend to be subject to more intense land use and higher levels of disturbance. As such they tend to contain less native vegetation and remnants are in poorer condition (e.g. suffer weed invasion and loss of native groundstorey). These areas mostly support EVC 175_62 Granitic Grassy Woodland. As shown in Figure 4-3 these can be further divided into the higher sloping areas containing granodiorite (G290) and the lower flatter areas of granitic colluvium. The areas of colluvium tend to support Grassy Woodland with a canopy of Yellow-box (*Eucalyptus melliodora*) and Long-leafed box (*Eucalyptus goniocalyx*) compared with the River Red-gum (*Eucalyptus camaldulensis*) dominated Grassy Woodland that tends to occur on the granodiorite slopes. As shown in Figure 4-3 the areas of granitic colluvium are rarer in the landscape than the hills of granodiorite and as the gentler topography makes it more attractive to agriculture and development such that the native vegetation is often more severely

impacted. This geology and associated vegetation dominate the north-eastern portion of the study area. These areas of Grassy Woodland contain remnants of the EPBC Act listed community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

The 1750 EVC modelling (Figure 4-4) indicates a large area of EVC 292 Red Gum Swamp occurs in the north-east of the study area. Field survey did not support this with this area mostly supporting Grassy Forest, although some Red Gum Swamp pockets may be present. The geology map (Figure 4-3) is produced at a higher resolution than the EVC modelling and shows the drainage lines in the landscape as areas of alluvium. Where these areas intersect the granitic colluvium a different EVC occurs. These areas tend to have a River-red Gum canopy with a sedgy understorey and are probably best attributed to the less mesic EVC 68 Creekline Grassy Woodland rather than Red Gum Swamp. The geology mapping does not fully reflect the occurrence of drainage lines and this vegetation type across this area. More detailed field assessment is required to do so. As identified by Foreman (2022) these ephemerally wet areas may be groundwater dependent ecosystems and represent unique vegetation assemblages.

The intersection of the granitic colluvium and the granodiorite hills provides the course of Barkers Creek through the northern half of the study area. The 1750 EVC modelling suggests Barkers Creek to consist of a mosaic of EVC 67 Alluvial Terraces Herb-rich Woodland and EVC 68 Creekline Grassy Woodland. Past disturbance of the creekline makes it difficult to confidently attribute these EVCs to specific areas of Barkers Creek within the study area. However, it seems the latter is more likely the dominant EVC although some areas are on the threshold of EVC 641 Riparian Woodland which is associated with permanent streams. This is likely confounded by the increased water flows associated with agricultural run-off that has historically occurred in the catchment.

North of Barkers Creek a drainage line occurs at the intersection of Silurian sediments and granodiorite (i.e. between the Calder Freeway and Symes Road). Due to the scale of the modelling this drainage line is not reflected on the 1750 EVC layer. Field inspection and access was limited in this area however it is likely the native vegetation along this drainage line is attributable to Creekline Grassy Woodland. A number of other watercourses (shown in Figure 4-4) are not reflected on the 1750 EVC modelling that likely support Creekline Grassy Woodland. These include an unnamed watercourse that crosses Harmony Way near its intersection with Mills Road and continues in a north-westerly direction adjoining Barkers Creek near Bingham's Road; and an unnamed watercourse and associated tributaries that runs roughly parallel with Blackjack Road.

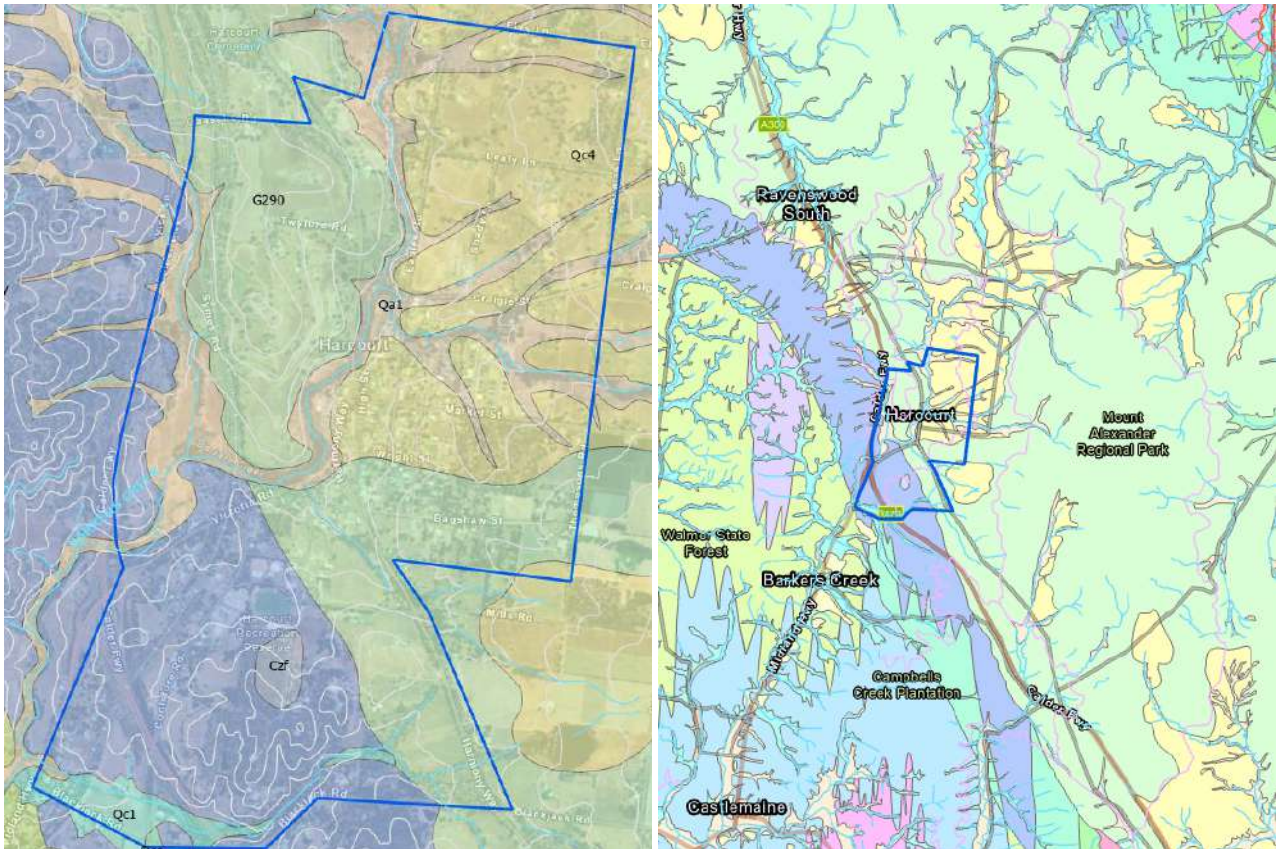


Figure 4-3. Geology across study area (DJPR 2006)

Czf: duricrust; G290 Harcourt Granodiorite; Ocy Castlemaine Group hornfels; Qa1: alluvium; Qc1: CoQc4: Granite-derived colluvium;

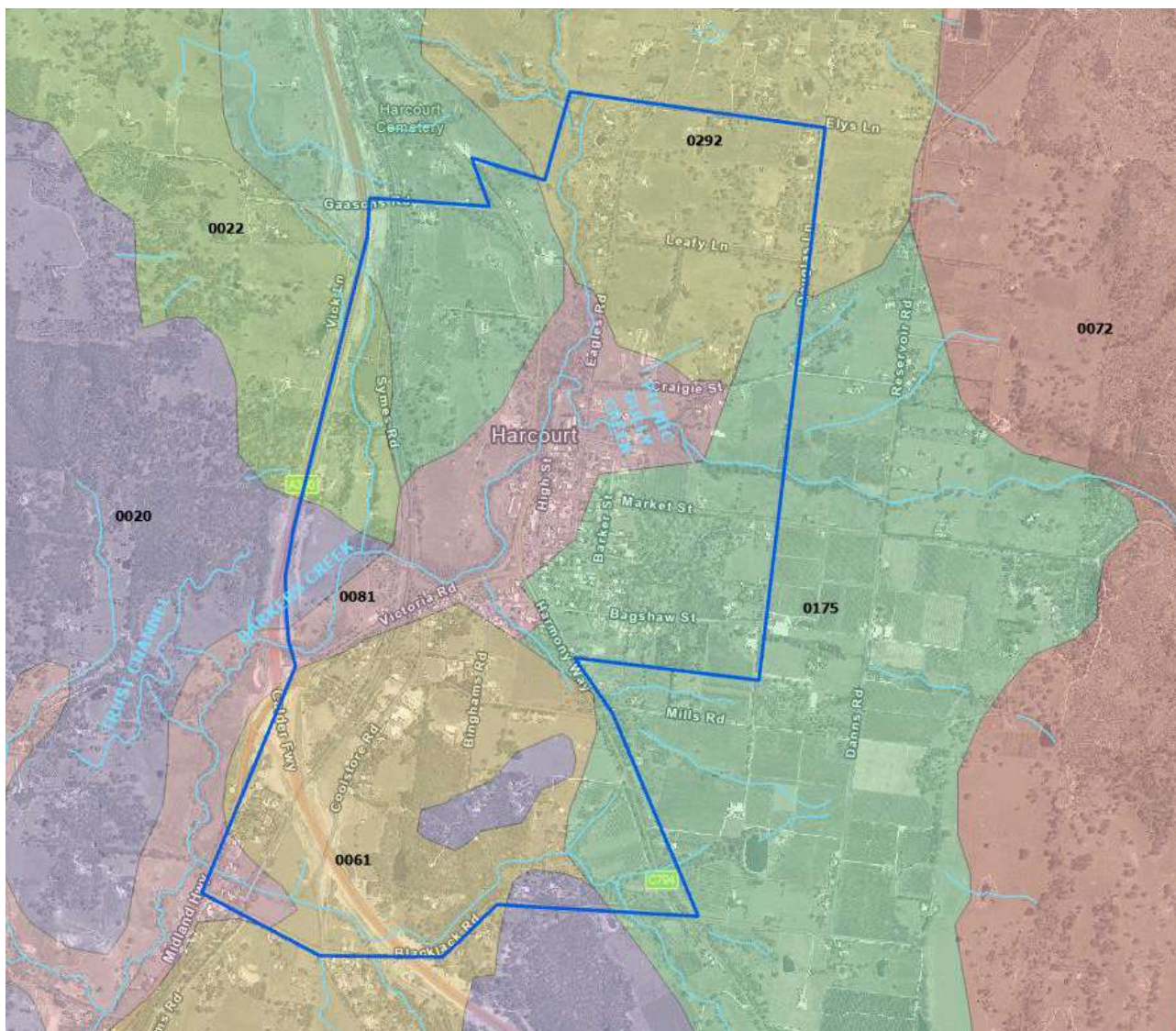


Figure 4-4. 1750 Ecological Vegetation Classes (DSE 2007a)

EVC 20 Heathy Dry Forest; EVC 22 Grassy Dry Forest; EVC 61 Box-ironbark Forest; EVC 72 Granitic Hills Woodland; EVC 81 Mosaic comprising EVCs 67 Alluvial Terraces Herb-rich Woodland and 68 Creekline Grassy Woodland; EVC 175 Grassy Woodland; EVC 292 Red Gum Swamp.

Table 3.1 EVCs relevant to the study area

EVC #: Name	Description	1750 EVC Layer	2005 EVC Layer	Bioregional Conservation Status
EVC 20: Heathy Dry Forest	Grows on shallow, rocky skeletal soils on a variety of geologies and on a range of landforms from gently undulating hills to exposed aspects on ridge tops and steep slopes at a range of elevations. The overstorey is a low, open eucalypt forest, poor in form to 20 m tall with an open crown cover. The understorey is dominated by a low, sparse to dense layer of ericoid-leaved shrubs including heaths and peas. Graminoids and grasses are frequently present in the ground layer, but do not provide much cover.	✓	✓	Least Concern
EVC 22: Grassy Dry Forest	Occurs on a variety of gradients and altitudes and on a range of geologies. The overstorey is dominated by a low to medium height forest of eucalypts to 20 m tall, sometimes	✓	✓	Depleted

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EVC #: Name	Description	1750 EVC Layer	2005 EVC Layer	Bioregional Conservation Status
	resembling an open woodland with a secondary, smaller tree layer including a number of Acacia species. The understorey usually consists of a sparse shrub layer of medium height. Grassy Dry Forest is characterised by a ground layer dominated by a high diversity of drought-tolerant grasses and herbs, often including a suite of fern species.			
EVC 61: Box Ironbark Forest	Occurs in low rainfall areas on gently undulating rises, low hills and penneplains on infertile, often stony soils derived from a range of geologies. The open overstorey to 20 m tall consists of a variety of eucalypts, often including one of the Ironbark species. The mid storey often forms a dense to open small tree or shrub layer over an open ground layer ranging from a sparse to well-developed suite of herbs and grasses.	✓	✓	Depleted
EVC 67: Alluvial Terraces Herb-rich Woodland	Open woodland to 15 m tall on broad alluvial plains and along ephemeral drainage lines. Soils are generally poorly drained duplex soils with sandy loam overlying a heavier clay subsoil. Understorey consists of few, if any shrubs with the striking feature of this EVC being the high species-richness of the ground-layer and the low biomass of this cover, particularly in summer.	✓	✓	Endangered
EVC 68: Creepline Grassy Woodland	Eucalypt-dominated woodland to 15 m tall with occasional scattered shrub layer over a mostly grassy/sedgy to herbaceous ground-layer. Occurs on low-gradient ephemeral to intermittent drainage lines, typically on fertile colluvial/alluvial soils, on a wide range of suitably fertile geological substrates. These minor drainage lines can include a range of graminoid and herbaceous species tolerant of waterlogged soils, and are presumed to have sometimes resembled a linear wetland or system of interconnected small ponds	✓	✓	Endangered
EVC 175_62 Granitic: Grassy Woodland	A variable eucalypt woodland or open forest to 15 m tall over a distinct large and medium shrub layer and diverse ground layer of grasses and herbs. It occurs on sites with moderate fertility on plains or weathered undulating granitic hills in areas with moderately high rainfall (>600 mm per annum).	✓	✓	Vulnerable
EVC 292: Red Gum Swamp	Open woodland to 15 m tall with a diverse understorey dominated by sedgy or grassy-herbaceous aquatics and species tolerant of intermittent to seasonal inundation. Occurs on alluvial plains in the seasonally wet depressions of shallow drainage lines or prior stream meanders, typically associated with heavy paludal soils, sometimes with gilgai development. The annual rainfall across its distribution is generally below 700 mm, and the period of inundation may range from 2 to 6 months	✓	✓	Endangered
EVC 641: Riparian Woodland	Occurs beside permanent streams, typically on narrow alluvial deposits. Woodland to 15 m tall generally dominated by <i>Eucalyptus camaldulensis</i> over a tussock grass-dominated understorey. Tall shrubs may be present and amphibious herbs may occur in occasional ponds and beside creeks. While flooding may be common, sites are rarely inundated for lengthy periods.			Endangered

4.3 Modelled wetlands

The statewide current wetlands mapping (DELWP 2021a) includes one wetland (44318) within the study area. This is mapped to occur in the far north-east of the study area at 109 Eagles Road Harcourt. The wetland is spatially misaligned and occurs on a ridge top and escarpment down to Barkers Creek. It is likely the wetland is intended to be mapped some 120 m to the north-east (outside of study area) where there is an alluvial plain beside Barkers Creek. Wetlands mapped on the statewide current wetlands layer are considered areas of native vegetation under the Guidelines (DELWP 2017b).



Figure 4-5. One wetland (44318) is mapped within the study area on the statewide current wetlands layer. It is geospatially misaligned and located on a ridge top and escarpment.

4.4 Wetlands of international importance (Ramsar wetlands)

No wetlands of international importance occur within or in close proximity to the study area.

4.5 Habitat connectivity

Harcourt is situated between the vegetated hills of Mount Alexander Regional Park to the east and box-iron forests on sedimentary hills to the west and south (Figure 4-6). Key areas of connectivity (i.e. movement of species and flow of genetic material) for biodiversity within the study area include watercourses and adjacent vegetation (e.g. Barkers Creek, Picnic Gully Creek and other unnamed watercourses along Blackjack Road, between Calder Freeway and Symes Road and from Mills Road/Harmony Way to Barkers Creek). Eagles Channel, a disused constructed channel, also provides a patchy vegetation corridor in the north-east of the study area. Transport corridors including the railway and road reserves also provide some connective habitat, in particular the southern portion of Harmony Way, Elys Lane, Leafy Lane and to a lesser extent Craigie Street. The large areas of native vegetation in the south of the study area are connective with native vegetation to the south.

Scattered vegetation provides a matrix throughout the study area that improves connectivity across the landscape for many taxa including woodland birds and Brush-tailed Phascogale. This matrix of vegetation does not necessarily provide distinctive corridors for movement, it rather provides multiple options for movement about the landscape. Some areas, such as woodland areas in the north-east may provide future opportunity for establishing defined corridors from larger remnants such as from Leanganook to Barkers Creek; however, such corridors would need to be defined at a scale beyond this study area.

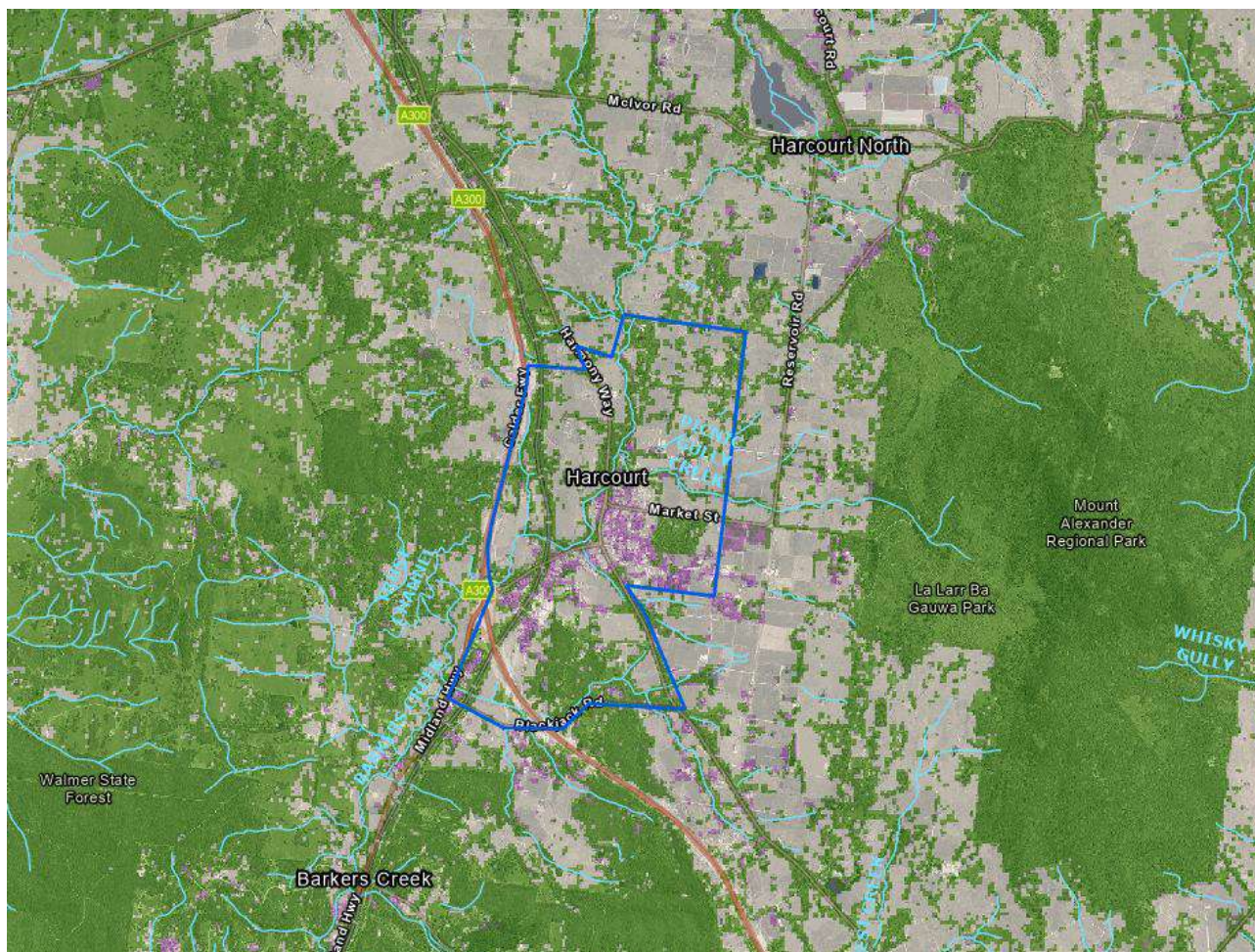


Figure 4-6. Native vegetation extent across the surrounding landscape (green: native vegetation, purple: mixed vegetation (native and non-native)) (DELWP 2017a)

4.6 Strategic biodiversity value

The strategic biodiversity value (SBV) layer (DELWP 2017e) combines information on important areas for threatened flora and fauna, levels of depletion, connectivity, vegetation types and condition to provide a view of relative biodiversity importance of all parts of the Victorian landscape. This analysis results in the areas with little biodiversity value being ranked lower, the most degraded and poorly located examples of the most common habitat or vegetation in the middle of the ranking, and the best and most well-connected examples of species' habitats across the state ranked highest (DELWP 2017f). This means that some locations with low condition vegetation can be more highly ranked because they provide links for habitats, or are the only remaining habitat for certain species (DELWP 2017f).

Figure 4-6 shows the SBV for the study area and surrounding landscape. The forested areas to the east and west of Harcourt are ranked highly. Within the study area the northern portions of Barkers Creek are ranked highly. Other areas of higher or moderate ranking within the study area include the vegetated areas in the central south, along the railway line and west to the Calder Freeway, and the north-east.

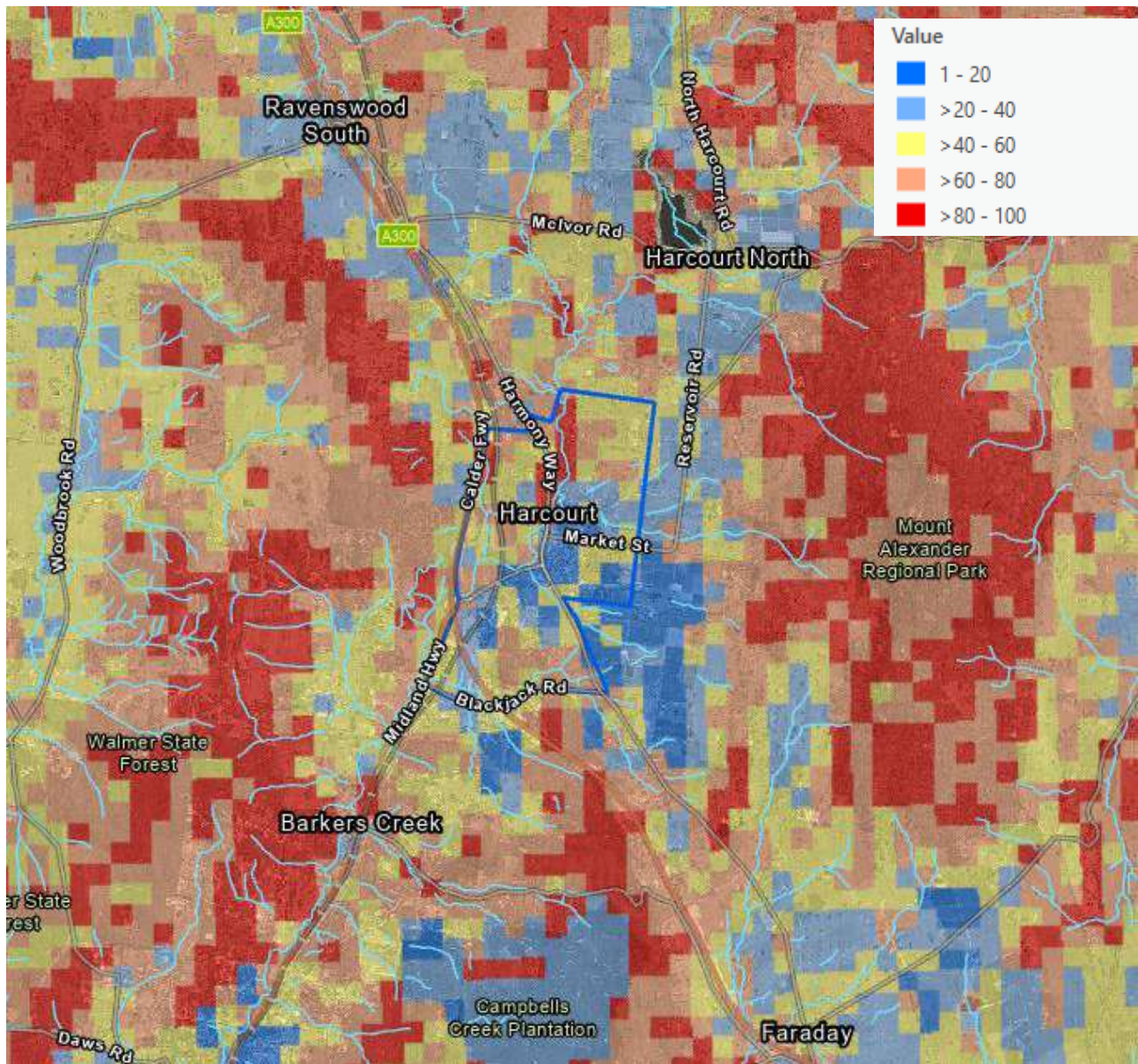


Figure 4-7. Strategic biodiversity value across the surrounding landscape (DELWP 2017e)

4.7 Threatened Ecological Communities

4.7.1 EPBC Act threatened ecological communities

Table 4-1 presents EPBC Act threatened ecological communities modelled to potentially occur within a 10 km buffer of the study area and an assessment of their potential to occur in the study area.

Table 4-1. EPBC Act listed ecological communities predicted to occur

Threatened Ecological Community	Threatened Status	PMST Modelled Likelihood of Occurrence	Jacobs Determination
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Likely to occur within area	This community is consistent with areas of Grassy Woodland with a predominantly Yellow Box canopy that occur in the study area. This is most evident on the granitic alluvium in the north-east of the study area. Most areas however contain a disturbed groundstorey and considerable levels of

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Threatened Ecological Community	Threatened Status	PMST Modelled Likelihood of Occurrence	Jacobs Determination
			fragmentation or are interspersed with areas dominated by other eucalypt species (e.g. River Red-gum, Long-leaved Box). More detailed assessment is needed to determine if any locations meet the condition thresholds for protection under the EPBC Act. Land north-east of the intersection of Leafy Lane and Douglas Lane (Figure 4-8) and woodland remnant between Market Street and Bagshaw Street are the most likely areas.
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Likely to occur within area	There are limited areas that contain a Grey Box canopy with the study area. Areas of Grey Box canopy such as along Harmony Road on the southern entrance to town are generally too small or degraded to qualify for protection under the EPBC Act. None-the-less there is some small potential for this community to occur.



Figure 4-8. Yellow Box Grassy Woodland north-east of the intersection of Leafy Lane and Douglas Lane



Figure 4-9. Yellow Box Grassy Woodland with a native groundstorey at 31 Elys Lane just outside the northern boundary of the study area.

4.7.2 FFG Act threatened ecological communities

Creekline Grassy Woodland (Goldfields)

One FFG Act listed vegetation community is modelled to potentially occur in the study area (DSE 2007b): Creekline Grassy Woodland (Goldfields). This coincides with the modelled distribution of EVC 81 Alluvial Terraces Herb-rich Woodland/Creekline Grassy Woodland Mosaic as shown in Figure 4-4. The description of this community (DELWP 2019) states it occurs as small remnants within the box-ironbark ecosystems of Victoria and that it “occurs as a woodland interface between the undulating sedimentary rises and the geologically younger alluvial plains. It fringes shallow or ephemeral drainage lines on the lower slopes of box-ironbark forests, but is distinct from the riparian vegetation found along permanently flowing streams on the alluvial plains.” Given this, the community is most likely to occur along the ephemeral drainage lines adjacent the sedimentary rises in the south of the study area, such as between the Calder Freeway and Symes Road and along Blackjack Road. The community definition would not appear to include drainage lines throughout granitic areas. Although as pointed out by Foreman (2022) these areas share similarities with the FFG Act listed Granite Foothills Spring Wetland Community listed for north-east Victoria and North Western Goldfields Intermittent Soak Community.

Victorian Temperate Woodland Bird Community

The Victorian Temperate Woodland Bird Community has been defined as a suite of bird species, mainly associated with drier woodlands on the slopes and plains north of the Great Dividing Range, that seem to have declined markedly in numbers since records began. Twenty-four bird species are listed in the group, a number of which are likely to occur and utilise habit throughout the study area including Painted Button-quail

(*Turnix varia*), Swift Parrot (*Lathamus discolor*), Barking Owl (*Ninox connivens*), Brown Treecreeper (*Climacteris picumnus victoriae*), Speckled Warbler (*Pyrrholaemus sagittatus*), Yellow-tufted Honeyeater (*Lichenostomus melanops meltoni*), Fuscous Honeyeater (*Lichenostomus fuscus*), Black-chinned Honeyeater (*Melithreptus gularis*), Brown-headed Honeyeater (*Melithreptus brevirostris*), Jacky Winter (*Microeca fascinans*), Red-capped Robin (*Petroica goodenovii*), Grey-crowned Babbler (*Pomatostomus temporalis*) and potentially Diamond Firetail (*Stagonopleura guttata*).

4.8 Threatened flora

A total of 58 threatened floral taxa have previously been recorded or are modelled to occur within the 10 km search based on the VBA database and PMST search. Following the field assessment, the likelihood of these taxa occurring within the study area was assessed and this is provided in Appendix B.

Of these taxa, ten were considered to have a moderate or higher likelihood of occurrence within the study area, including three considered present as shown in Table 4-2. None of these are EPBC Act listed but all are listed under the FFG Act. A further 21 were listed as low-moderate, which reflects the many species with a few localised records in the 10 km search area. The low-moderate ranking accounts for it being possible for these taxa to be present, although the probability is quite low.

Table 4-2. Summary of threatened flora with a moderate or higher likelihood of occurring with the study area

EPBC	FFG	Scientific name	Common Name	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
	cr	<i>Caladenia clavescens</i>	Castlemaine Spider-orchid	2018	92	Present	Known to occur in box-ironbark areas in south of the study area.
	cr	<i>Dianella longifolia</i> var. <i>grandis</i> s.l.	Glaucous Flax-lily	2009	29	Present	Recorded along railway and in north-east of study area; although potentially some confusion with <i>D. tarda</i> . <i>D. longifolia/tarda</i> complex was observed during fieldwork across study area including along railway line, Harmony Way south of township and regularly along roadsides in north-east of study area.
	cr	<i>Dianella tarda</i>	Late-flower Flax-lily	2020	296	Present	283 of these records from 2005, where recorded along railway line. See comments under <i>D. longifolia</i> .
	en	<i>Diuris behrii</i>	Golden Cowslips	2007	9	Moderate	Nearby records around Barkers Creek Reservoir suggests it may occur in more intact areas of Grassy Woodland such as north-east of study area or along railway.
	en	<i>Eriocaulon scariosum</i>	Common Pipewort	1997	2	Moderate	Two previous records from 1990s occur about 5km north-east of study area. Short-lived taxon that can re-appear under suitable conditions. Potential habitat in wet areas of north-east of study area.
	en	<i>Grevillea dryophylla</i>	Goldfields Grevillea	2018	19	Moderate	Records generally from Walmer area, may occur in box-ironbark areas in south of study area.
	en	<i>Grevillea rosmarinifolia</i> subsp. <i>glabella</i>	Smooth Grevillea	2008	5	High-moderate	Records from Harcourt Valley Primary School (potentially planted?) and about 1km further west. Potential habitat on sediments in south of study area.
	en	<i>Leptorhynchos elongatus</i>	Lanky Buttons	2019	5	Moderate	Potential habitat in box-ironbark areas in south of study area.
	cr	<i>Pterostylis agrestis</i>	Sutton Grange Greenhood	2017	8	Moderate	Records from Sutton Grange and Sedgewick on both granitic and sedimentary soils. Potential to occur in areas of the study area with intact groundstorey (e.g. railway line, southern portions).

EPBC	FFG	Scientific name	Common Name	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
	en	<i>Pterostylis smaragdina</i>	Emerald-lip Greenhood	2016	6	Moderate	Potential habitat in south of study area, limited but nearby records.

4.9 Threatened fauna

A total of 58 threatened faunal taxa have previously been recorded or are modelled to occur within the 10 km search based on the VBA database and PMST search. Following the field assessment, the likelihood of these taxa occurring within the study area was assessed and this is provided in Appendix B.

Of these taxa, 15 were considered to have a moderate or higher likelihood of occurrence within the study area, these are presented in Table 4-3. Six of these are EPBC Act listed and fourteen FFG Act listed. A further 15 were listed as low-moderate, which reflects the many species with a few records in the 10 km search area. The low-moderate ranking accounts for it being possible for these taxa to be present, although the probability is quite low.

Table 4-3. Summary of threatened fauna with a moderate or higher likelihood of occurring with the study area

EPBC	FFG	Taxon	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
VU	vu	Golden Sun Moth (<i>Synemon plana</i>)	PMST	2012	31	Moderate	28 of the records are from 1932 or prior and have with limited spatial accuracy. One record from 2012 near corner of Leversha Road and Fogarty's Gap Road and two from 2010 near Coopers Road and Harcourt-Sutton Grange Road intersection. The 2010 records relate to surveys undertaken for the Harcourt Modernisation Project where four properties in North Harcourt were found to support the species (Biosis 2011). Surveys undertaken for that project within Plan Harcourt study area did not detect the species. Potential for it to occur in areas of grassland/grassy woodland that have not been subject to cultivation.
	en	Brown Toadlet (<i>Pseudophryne bibronii</i>)		2019	20	Moderate	17 of the records are from Kalimna Park in 2019. The previous records date back to 1980 and 1964, where recorded at Golden Point and the southern end of Mount Alexander. Surveys undertaken for Harcourt Modernisation Project to the north (e.g. Ravenswood South) of Plan Harcourt study area did not detect taxon (Biosis 2011). However, gap in records from 1980 to 2019 suggests it may be poorly detected across landscape. Habitat occurs in damp seasonally inundated areas across the study area.
	vu	Bearded Dragon (<i>Pogona barbata</i>)		2009	2	Moderate	Cryptic species with relatively recent nearby record. Habitat present broadly across study area.
	cr	Barking Owl (<i>Ninox connivens</i>)		2020	10	Moderate	Records scattered broadly across local area, may utilise study area for foraging. Some but limited nesting habitat available.
	vu	Hardhead (<i>Aythya australis</i>)		2019	57	Moderate	May utilise farm dams.
	vu	Powerful Owl (<i>Ninox strenua</i>)		2020	44	High	Known to nest at Castlemaine Botanic Gardens. Potential foraging across study area and some, but limited, potential nesting habitat along Barkers Creek.

EPBC	FFG	Taxon	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
	vu	Square-tailed Kite (<i>Lophoictinia isura</i>)		2019	13	Moderate	All 13 records are from 2017-2019 spread broadly across surrounding landscape suggesting taxon likely to utilise study area.
CR	cr	Swift Parrot (<i>Lathamus discolor</i>)	PMST	2018	476	High	Many local records, likely to forage in eucalypts across study area.
VU		Brown Treecreeper (<i>Climacteris picumnus victoriae</i>)	PMST	2021	139	High	Many recent records and habitat across the study area.
VU	vu	Diamond Firetail (<i>Stagonopleura guttata</i>)	PMST	2006	17	Moderate	Records scattered across landscape but becoming increasingly rare, appears not be resident but may utilise study area.
EN	vu	Hooded Robin (<i>Melanodryas cucullata</i>)	PMST	2006	7	Moderate	May utilise study area, although limited records suggest infrequently.
	en	Speckled Warbler (<i>Pyrrholaemus sagittatus</i>)		2019	49	High	Records scattered broadly in the landscape, including in south of study area and potential habitat across study area.
	cr	Eastern Bent-winged Bat (<i>Miniopterus orianae oceanensis</i>)		2011	6	Moderate	Records scattered broadly in the landscape of this cryptic species, that is likely to have had limited survey.
VU	vu	Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	PMST	2020	8	Moderate	Likely occasional visitor from camp in Bendigo.
	vu	Brush-tailed Phascogale (<i>Phascogale tapoatafa</i>)		2022	95	High	Many local records and suitable habitat across study area, including larger trees for denning.

4.10 Migratory fauna

Migratory fauna are those animals that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations. Many of these taxa breed outside of Australia, and spend a critical part of their lifecycle in Australia. These taxa are protected under the EPBC Act and listed under a number of international agreements and conventions.

All listed migratory taxa are matters of national environmental significance under the EPBC Act. An action will require approval if the action has, will have, or is likely to have, a significant impact on a listed migratory taxon. The thresholds for a significant impact to migratory taxa are generally much greater than those for threatened taxa. Note, that some migratory taxa are also listed as threatened taxa.

The PMST searches identified 11 migratory faunal taxa to potentially utilise the 10km search area, including one migratory marine bird, four migratory terrestrial birds and six migratory wetland birds. A likelihood of occurrence assessment for these taxa is presented in Appendix B. Given the limited wetland habitat, the wetland birds are all considered a low likelihood. Four of the other five are considered to have a low-moderate likelihood, indicating they may occasionally utilise the area, these being: Fork-tailed Swift (*Apus pacificus*), Rufous Fantail (*Rhipidura rufifrons*), Satin Flycatcher (*Myiagra cyanoleuca*) and White-throated Needletail (*Hirundapus caudacutus*). This usage would not be significant enough for potential impacts within the study area to result in a significant impact.

5. Summary of higher value biodiversity areas

Planning for Biodiversity (DELWP 2017d) provides guidance for identifying areas of higher and lower biodiversity values in Victoria:

Areas with higher biodiversity values include:

- larger, well-connected areas of native vegetation
- areas with higher strategic biodiversity value scores
- areas that are highly localised habitat for rare or threatened species, particularly if they are areas of highly localised habitat for multiple rare or threatened species
- important areas of habitat within dispersed habitats for rare or threatened species or areas of habitat for many dispersed rare or threatened species
- native vegetation in good condition (i.e. with higher condition scores)
- areas with large trees, including consideration of their age and size
- areas of native vegetation that are an endangered Ecological Vegetation Class (EVC)
- waterways and sensitive wetlands and coastal areas
- National parks and conservation reserves
- significant roadsides and wildlife corridors.

Areas with lower biodiversity values include:

- areas with no native vegetation
- areas with lower strategic biodiversity value scores
- native vegetation in poor condition (i.e. with lower condition scores)
- native vegetation that is small in area and isolated from other native vegetation, unless it provides highly localised habitat for rare or threatened species.

Areas with higher value biodiversity as defined by *Planning for Biodiversity* (DELWP 2017d) are summarised in Table 5-1

Table 5-1. Higher value biodiversity areas

Higher biodiversity value	Examples within study area
Larger, well-connected areas of native vegetation	Woodland and forest areas in the south of the study area Market Street-Bagshaw Street woodland
Areas with higher strategic biodiversity value scores	<ul style="list-style-type: none"> ▪ The northern portions of Barkers Creek ▪ Vegetated areas in the central south ▪ Along the railway line and west to the Calder Freeway ▪ Some areas of the north-east.
Areas that are highly localised habitat for rare or threatened species, particularly if they are areas of highly localised habitat for multiple rare or threatened species	<ul style="list-style-type: none"> ▪ Areas that support or potentially support threatened flora including: <ul style="list-style-type: none"> - along the railway line - areas of intact groundstorey in the south, e.g. where Castlemaine Spider-Orchid known to occur - Market Street-Bagshaw Street woodland - road reserves and other areas in the north-east supporting threatened Flax-lilies. ▪ Habitat for Golden Sun Moth, potentially including areas of native grassy groundstorey: <ul style="list-style-type: none"> - along the railway line - nearby the railway line (potentially including some portions of Growth Area D)

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Higher biodiversity value	Examples within study area
	<ul style="list-style-type: none"> - areas in the north-east (potentially including some parts of Growth Area c) ▪ Habitat for Brown Toadlet: drainage lines and depressions across the study area
Important areas of habitat within dispersed habitats for rare or threatened species or areas of habitat for many dispersed rare or threatened species	<ul style="list-style-type: none"> ▪ Potential nesting sites for Barking Owl and Powerful Owl such as large old trees along watercourses ▪ Potential nesting sites for woodland birds such as tree hollows for Brown Treecreeper ▪ Potential denning sites (hollows in large old trees) for Brush-tailed Phascogale
Native vegetation in good condition (i.e. with higher condition scores)	<ul style="list-style-type: none"> ▪ Areas in south of the study area (e.g. Harcourt Recreation Reserve Bushland and nearby) ▪ Areas along the railway line ▪ Potentially Market Street-Bagshaw Street woodland
Waterways and sensitive wetlands and coastal areas	<ul style="list-style-type: none"> ▪ Barkers Creek ▪ Picnic Gully Creek ▪ Unnamed watercourses: <ul style="list-style-type: none"> - along Blackjack Road - between Calder Freeway and Symes Road - Mills Road/Harmony Way to Barkers Creek ▪ Drainage lines and depressions through north-east of the study area
Significant roadsides and wildlife corridors.	<ul style="list-style-type: none"> ▪ Waterways ▪ Numerous roadsides including: <ul style="list-style-type: none"> - Symes Road/railway line - Harmony Way - Eagles Road - Elys Lane - Leafy Lane - Douglas Lane - Craigie Street - Mills Road

6. Review of Amendment c94malx in context of biodiversity values

6.1 Introduction

Mount Alexander Shire Council prepared and adopted Plan Harcourt to guide future planning and development of the township of Harcourt. It comprises the Harcourt Framework Plan and Shine Harcourt Leanganook. It seeks to respond to the anticipated population growth in Harcourt and ensure that future development is appropriately managed. It integrates land use planning and local economic development objectives and proposes new local planning policy, and zone and overlay controls and recommends future town centre activation projects to improve the structure and function of the town. It seeks to ensure growth and development of Harcourt is carefully managed to promote local character, recognise and protect productive agricultural land and operations, ensure adequate land supply and infrastructure and protect natural and cultural features of the town.

Mount Alexander Planning Scheme Amendment C94malx seeks to implement the key land use planning recommendations of Plan Harcourt into the Mount Alexander Planning Scheme. The Planning Panel that assessed the amendment was broadly supportive of the amendment given its "importance to establish contemporary growth and development directions for Harcourt". However, that Panel found it premature to proceed with the amendment in the absence of a strategic biodiversity assessment and that the amendment be updated to reflect this further work. The Panel stated this should include the whole study area to:

- identify significant biodiversity values
- recommend appropriate planning provisions which adequately protect biodiversity values.

In fulfilling this recommendation, the intent of this Stage 1 of the strategic biodiversity assessment is to identify potential and significant biodiversity values. Stage 2 of the strategic biodiversity assessment is to undertake further detailed field investigations if required to confirm Stage 1 initial findings and provide recommendations on proposed planning provisions to protect ecological values.

The Panel outlined two broad questions a strategic biodiversity assessment will help assess, these being, whether:

- development is being directed away from higher biodiversity value areas
- the proposed planning controls will be effective in managing the identified biodiversity values.

The following section provides review of the proposed amendment to help inform what ecological values may be at risk and potentially require further investigation to inform an assessment of the amendment and identification of appropriate planning provisions. This will be an iterative process, bearing in mind not to circumvent the process outlined by the Panel of ensuring the strategic biodiversity assessment informs the final development and assessment of the amendment.

The biodiversity related measures within the amendment are associated with provisions targeting the strategic growth of Harcourt rather than planning provisions specifically aimed at protecting and managing biodiversity values across the study area. Recommendations for planning provisions focussed on protecting and managing biodiversity values in specific areas in the context of the strategic growth objectives, will be provided in Stage 2 of the strategic biodiversity assessment. As such the review provided in this section specifically focuses on what is proposed in the amendment.

Since the Panel, Council officers have drafted revisions to the proposed ordinance in response to the panel findings. For the purposes of this report, the latest version (February 2023) has been used to review the amendment.

6.2 Town centre

6.2.1 What is proposed?

The amendment proposes to define a clear town centre for Harcourt by:

- Introducing a new town centre boundary in the proposed Harcourt Land Use Framework Plan (Figure 1-2)
- Introducing local policy relating to Harcourt town centre
- Rezoning approximately 3.16 hectares of land in Harcourt's town centre from TZ to C1Z
- Applying DDO16 to all proposed C1Z land
- Rezoning land at Stanley Park North from Road Zone 1 to Public Park and Recreation Zone to reflect existing use.

6.2.2 Ecological values

Given the already high level of existing development within the town centre, potential ecological values are limited. Most of the 3.16 hectares proposed for rezoning are already developed and any remaining areas, such as 99 Harmony Way, are cleared of native vegetation and contain low ecological value. The key ecological feature in this area is the scattered large River Red-gums. These occur on both private land and public land such as roadsides. These provide potential habitat and increase landscape connectivity for threatened woodland birds and Brush-tailed Phascogales.

6.2.3 Potential impacts of proposal and considerations to support biodiversity

The key focus for the protection of ecological values in this area is the protection of large remnant trees. Increased development may place these trees at risk. Trees that occur on land parcels less than 0.4 ha are not protected under the planning scheme, trees on larger parcels and roadsides are protected under Clause 52.17 of the planning scheme. The amendment does not include any additional provisions to protect remnant trees in the town centre. Consideration of provisions to protect remnant trees across the town centre (and adjoining land) should be included in Stage 2 of the strategic biodiversity assessment.

6.3 Rezoning of existing residential areas to NRZ

6.3.1 What is proposed?

The Amendment proposes to rezone 135 hectares of land within the Harcourt settlement boundary that is currently zoned Township Zone and General Residential Zone to Neighbourhood Residential Zone Schedule 1, and give effect to Harcourt's preferred neighbourhood character through specific objectives and standards in NRZ1 including the following:

- Encouraging planting of native and/or indigenous shrubs and trees in front setbacks to strengthen town character
- Encouraging provision of canopy trees in setbacks, and retention of trees where possible
- Application of overlay controls to protect landscapes of cultural value such as view lines to Leanganook.

6.3.2 Ecological values

Patches of remnant vegetation and large old trees are frequent throughout the existing residential areas of Harcourt particularly in close proximity to key landscape features such as watercourses and adjacent to roads and lanes. Key ecological values in this area include:

- Vegetation and habitat along Picnic Gully Creek
- An unnamed watercourse/gully and adjacent vegetation that crosses Harmony Way near its intersection with Mills Road and continues in a north-westerly direction adjoining Barkers Creek near Bingham's Road (referred to as Mills Road watercourse)
- Woodland (approximately 13 ha) along a road easement and continuing into 38 Barker Street and 33 Bagshaw Street (i.e. land between Market Street and Bagshaw Lane; only the eastern 65 m width of this land is included in the proposed rezoning)
- Woodland between Poplar Drive and Bingham's Road (i.e. 22 Polar Drive and 68 Bingham's Road)
- Woodland areas at property north-east of Coolstore Road and Calder Freeway cross over (connective with Harcourt Recreation Reserve)

- Remnant trees along Craigie Street
- Clusters of remnant trees along Mills Road, Bingham's Road and Eagles Channel in this area
- Clusters of remnant trees at 4 Wilkinson Street (i.e. between Coolstore Road, Wilkinson Street and Bingham's Road)
- Remnant trees along drainage line at 13 Coolstore Road
- Scattered large remnant trees throughout.

6.3.3 Potential impacts of proposal and considerations to support biodiversity

Given the area subject to change is already zoned either TZ or GRZ rezoning to NRZ is unlikely to significantly increase the risk to ecological values. The amendment provides opportunity to support the existing biodiversity and help direct development away from higher value areas. The proposed NRZ has increased ability to do so given the proposed Schedule 1 to the NRZ specifies neighbourhood character objectives, including some relating to biodiversity values, as compared with the current Schedules to the TZ and GRZ in the planning scheme which do not specify any neighbourhood character objectives.

The proposed NRZ Schedule 1 objectives support the planting of native and/or indigenous shrubs and trees and retention of existing trees where possible. However, there is no specific mention of the intent to support biodiversity. Revision of the schedule is recommended to incorporate this. In addition, the intent to support biodiversity through new plantings could be strengthened by reference to a planting list of suitable indigenous species and a weeds list to ensure weedy natives are avoided.

The schedule also includes provisions to encourage development to provide new canopy trees and retain existing trees where possible. Canopy trees are defined in planning scheme through the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017b) as trees that form the canopy of the relevant EVC, in this instance this would include around half a dozen eucalypt species. It is unclear if this specific definition is the intent of the schedule, further detail within the schedule would help clarify this. These significantly sized trees may not be appropriate to plant on some of the smaller lots.

The amendment also provides an opportunity to support values listed in Section 6.3.2 above such as specific protection for:

- Existing remnant trees given the substantial presence of remnant trees without planning scheme protection across the area (e.g. land parcels less than 0.4 ha)
- Watercourses (Picnic Gully Creek and unnamed watercourse in south-east e.g. near Mills Road)
- Areas densely covered in woodland (e.g. 38 Barker Street, 33 Bagshaw Street, 22 Polar Drive and 68 Bingham's Road). These properties may not be best suited to residential zoning, particularly 38 Barker Street and 33 Bagshaw Street which are to be partially rezoned (i.e. not the whole parcel).

6.4 Rezoning of new residential areas (Growth Area A & B)

6.4.1 What is proposed?

The amendment proposes to rezone 22 hectares of land along Eagles Road, Harcourt and Market Street, Harcourt (i.e. Growth Areas A and B) from Farming Zone to Neighbourhood Residential Zone Schedule 1 and apply specific design requirements by way of DPO12.

6.4.2 Ecological values

Growth Area A

Growth Area A is approximately 10 ha of land bound by Craigie Street, Market Street, an unnamed road reserve in the east and adjoins residential zoning to the west. Figure 6-1 shows native vegetation and other landscape features of Growth Area A. Picnic Gully Creek runs east to west through the southern portion. The creek contains remnant canopy trees over a mostly disturbed understorey of dense exotic shrubs. In the north-west of Growth Area A are vegetated tributaries that connect with Picnic Gully Creek. These tributaries largely occur on the grounds of Ely House (17 Craigie Street) and contain a number of large River Red-gums.

The southern of these two tributaries continues through the properties to the east where it lacks native vegetation and becomes an excavated drain.

Ely House is subject to a Heritage Overlay, which focusses on the built features and does not provide protection to vegetation. Along with remnant trees the grounds contain extensive gardens of non-native vegetation and include a large pond. Scattered remnant trees occur along Craigie Street and on the properties in the north-east of Growth Area A – the majority of which are small to medium sized. These properties also contain areas of planted trees; these are generally non-indigenous. A row of mature remnant trees occurs along Market Street.



Figure 6-1. Indicative extent of native vegetation in Growth Area A (blue line)

Growth Area B

Growth Area B is approximately 12 ha bound by Eagles Road, Leafy Lane, Shady Lane and residentially zoned land adjacent Craigie Street. Figure 6-2 shows native vegetation and other features of Growth Area B. It is predominantly free of native vegetation (approximately 10 of the 12 ha). Both Leafy Lane and Shady Lane contain Grassy Woodland remnants. A drainage line crosses midway along Shady Lane and runs through the central portion of Growth Area B before reaching Barkers Creek. The portion of it through Growth Area B is treed most of the way with remnants of what is likely best attributed to Creekline Grassy Woodland. There is a dam constructed on this drainage line near Shady Lane. In between Growth Area B and Craigie Street is undeveloped land zoned residential, which would essentially be developed in conjunction with Growth Area B. The south-east portion of this contains scattered trees along a drainage line. Craigie Street contains a strip of trees and some other scattered and clusters of trees occur along and nearby Eagles Road.



Figure 6-2. Indicative extent of native vegetation in Growth Area B (blue line)

6.4.3 Potential impacts of proposal and considerations to support biodiversity

Native vegetation occurs throughout the Plan Harcourt study area and there are few large areas devoid of native vegetation and associated ecological values. Growth Areas A and B have merit for rezoning given they are comparatively free of native vegetation and adjoin areas of existing residential development. Directing development into these locations is generally consistent with directing development away from higher value areas.

There are some discrete areas of Growth Areas A & B that contain higher biodiversity values (e.g. Picnic Gully Creek in Area A, vegetated drainage line through Area B, roadside vegetation). The proposed NRZ1 is discussed in Section 6.3.3 and provides opportunity for supporting biodiversity values. However, rezoning of Growth Area A and B for residential development will potentially facilitate the removal of native vegetation and fauna habitat. The amendment seeks to address this through the proposed Development Plan Overlay Schedule 12, which includes:

- The requirement for a biodiversity assessment that includes:
 - a "flora and fauna report and a net gain assessment prepared by a suitably qualified person showing the habitat values and the location of existing vegetation and how these have been considered and addressed in the design and layout of the development plan"
 - "Vegetation considered significant and/or of high habitat value must be protected and retained in the public realm, and where possible retained and protected in the private realm."
- A planning assessment and site analysis that demonstrates how the "development plan responds to the location of existing vegetation within private and public land, including mature remnant native trees within existing road reserves."
- Requirement for a landscape and open space concept plan where public open space is to be provided along the waterway (i.e. Picnic Gully Creek) and any vegetation to be retained where possible. This is to include a regeneration plan for Picnic Gully Creek.
- Trees proposed for retention and removal on an indicative subdivision layout.

Development Plan Overlay Schedule 12 provides an opportunity to strategically protect ecological values while facilitating development. However, it is suggested that DPO12 is revised to strengthen biodiversity protection including:

- Explicitly stating the protection of biodiversity as an objective
- Include all native vegetation proposed for removal or retention in the indicative subdivision layout
- Remove reference to a "net gain assessment" given this is no longer language used in the planning scheme and replace with application requirements as specified in the current *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017b).

Other measures, such as specific protection for Picnic Gully Creek and the vegetated drainage line in Area B would help support biodiversity.

6.5 Land for future town expansion (Growth Area C & D)

6.5.1 What is proposed?

The proposed updated Harcourt Land Use Framework Plan identifies two areas for town expansion (Growth Area C and Area D) to support future residential growth. The Panel also concluded that additional land at 1 Poplar Drive and 27 Craigie Street be identified as land for future residential growth.

6.5.2 Ecological values

Growth Area C

Growth Area C contains a significant extent of native vegetation and potential for higher biodiversity areas including:

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- Remnants of Grassy Woodland are consistent with the EPBC Act threatened ecological community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland; further field assessment is required to determine if these remnants meet condition thresholds to qualify for protection under the EPBC Act
- Remnants of endangered EVCs (Creekline Grassy Woodland and Red Gum Swamp) which are also likely groundwater dependent ecosystems
- Native vegetation connective with Barkers Creek (i.e. east of Eagles Road)
- Potential habitat for a range of threatened woodland birds and Brush-tailed Phascogale
- Further field assessment is required to identify if potential habitat for the EPBC Act listed Golden Sun Moth is present.



Figure 6-3. Indicative extent of native vegetation in Growth Area C (blue line)

Growth Area D

Growth Area D has substantial areas without native vegetation, however further assessment is necessary to:

- Determine the extent of scattered trees
- Identify if potential habitat for the EPBC Act listed Golden Sun Moth is present.



Figure 6-4. Indicative extent of native vegetation in Growth Area D (blue line). (Note portion north-east of Gaaschs Rd and Harmony Way intersection is outside of study area)

27 Craigie Street

27 Craigie Street is mostly exotic grassland (Figure 6-5). It contains Picnic Gully Creek and trees on its eastern boundary along the unconstructed easement of Douglas Lane/ Thompsons Road. Trees occur along Market Street and near Eagles Channel in the south.



Figure 6-5. Indicative extent of native vegetation at 27 Craigie Street

1 Poplar Drive

1 Poplar Drive contains an old orchard and some scattered remnant trees (Figure 6-6).



Figure 6-6. Indicative extent of native vegetation at 1 Poplar Drive

6.5.3 Potential impacts of proposal and considerations to support biodiversity

Given these areas are proposed as future growth areas there are no proposed changes to zoning or overlays and little detail on what shape development may take. However, it is clear some areas are more suited to development than others. For instance, 27 Craigie Street, 1 Poplar Drive and most of Area D could likely be developed with little impact to ecological values. In Area C there is a considerable amount of native vegetation that could be impacted and fragmented by future residential development. While further investigation is required to confirm some of these values, there is likely a significant amount of higher value biodiversity areas (e.g. as listed in Section 6.5.2 above) that development should be directed away from.

6.6 Township boundary

The amendment proposes to update the existing Harcourt Framework Plan by defining a clear town boundary. The Panel found that principles used to inform the township boundary alignment are appropriate, apart from using Eagles Channel as a hard edge with the use of property boundaries preferred for the township boundary in the north-eastern part of town. This portion of the study area has considerable biodiversity values and the indicative extent of native vegetation is presented in Figure 6-3. Further work is required to confirm the extent of high value biodiversity areas. Specific planning provisions to protect these values should be considered in Stage 2 of this strategic biodiversity assessment, particularly if they are included within the township boundary.

7. Conclusion

The scope for this Stage 1 strategic biodiversity assessment was to review and identify biodiversity assets for the Plan Harcourt (Mount Alexander Planning Scheme Amendment C94malx) study area and provide recommendations on whether Stage 2 of the strategic biodiversity assessment is necessary, with the intent to inform Council on how to proceed with further work on Amendment C94malx in accordance with the recommendations of the Panel.

The Panel outlined two major objectives in undertaking a strategic biodiversity assessment in relation to the proposed amendment, these being, to help determine if:

- the proposed planning controls will be effective in managing the identified biodiversity values
- development is being directed away from higher biodiversity value areas.

The panel also noted a strategic biodiversity assessment would assist with reviewing current planning controls and identifying suitable planning measures for potential incorporation into the amendment to protect and manage identified biodiversity values (i.e. planning measures that focus on biodiversity protection and are not necessarily associated with enabling or directing development).

The desktop review and field survey undertaken to date have focussed on identifying areas of higher value biodiversity within the study area. This information has informed a review of the amendment. Resultingly some key considerations and directions for future work in relation to the amendment and fulfilling the objectives of the strategic biodiversity assessment identified by the Panel are:

- Proposed amendments to the **town centre** and existing residential areas are unlikely to result in increased risk to ecological values however additional provisions should be considered to manage biodiversity values that may be at risk from new development
- Rezoning of proposed **new residential areas (Growth Areas A and B)** is consistent with directing development away from higher value areas, some revision of proposed ordinance is suggested, including consideration of additional planning provisions
- **Future town expansion** areas 27 Craigie Street, 1 Poplar Drive and most of Area D could likely be developed with little impact to ecological values.
- **Growth Area D** has substantial areas without native vegetation and lower ecological values, however further assessment is necessary to:
 - determine the extent of scattered trees
 - identify if potential habitat for the EPBC Act listed Golden Sun Moth is present.
- In **Growth Area C** there is a considerable amount of native vegetation that could be impacted and fragmented by future residential development and there is likely a significant amount of higher value biodiversity areas that development should be directed away from, including:
 - remnants of Grassy Woodland are potentially consistent with the EPBC Act threatened ecological community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland; further field assessment is required to determine if these remnants meet condition thresholds to qualify for protection under the EPBC Act
 - remnants of endangered EVCs (Creekline Grassy Woodland and Red Gum Swamp) which are also likely groundwater dependent ecosystems
 - potential habitat for a range of threatened woodland birds and Brush-tailed Phascogales
 - further field assessment is required to identify if potential habitat for the EPBC Act listed Golden Sun Moth is present
- With regard to the proposed **town boundary** the values detailed in relation to Growth Area C are pertinent to the determination of its location in the north-east portion of the town.

It is concluded that while the proposed amendment attempts to protect higher value biodiversity in certain ways, such as rezoning areas for development with limited biodiversity values, Stage 2 should proceed with further work to confirm higher biodiversity areas where possible (e.g. access dependent). Fieldwork need not necessarily focus on determination of presence/absence of threatened taxa but initially determine native

vegetation and habitat extent and quality. For species with highly localised habitat that may be placed at risk due to the amendment such as threatened flora, Golden Sun Moth and Brown Toadlet, targeted field survey may be beneficial in determining higher biodiversity areas related to these taxa. For broader ranging taxa with dispersed habitat, identification of important potential habitat is more likely to be sufficient.

Fieldwork should be targeted towards enabling assessment of whether the amendment directs development away from higher value areas and if the proposed planning controls will be effective in managing the identified biodiversity values. Targeting Stage 2 fieldwork in this way is important given that the potential threat level to biodiversity values is contingent upon the planning controls proposed by the amendment. The approach should also enable reviewing current planning controls and identifying suitable planning to protect and manage identified biodiversity values.

As specified by the planning panel, the proposed amendment establishes the guidance for growth of the town for the foreseeable future, as such Stage 2 of the strategic biodiversity assessment should identify opportunities to maximise biodiversity benefits in the context of relevant legislative, policy and regulatory requirements, including:

- establish biodiversity objectives
- identify high value biodiversity assets (ecosystems and species) for priority protection
- identify and make recommendations to establish strategic habitat connections
- identify and make recommendations to manage threats
- recommend appropriate planning controls commensurate with the value of the asset and its contribution to ecosystem health.

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Appendix A. Summary of key legislation

Legislation/policy	Description
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	<p>The EPBC Act provides for the listing of nationally threatened species, threatened ecological communities and key threatening processes; and provides the legal framework to protect and manage nine matters of national environmental significance (MNES): world heritage properties; national heritage places; wetlands of international importance (Ramsar); listed threatened species and communities; listed migratory species; Commonwealth marine areas; the Great Barrier Reef Marine Park; nuclear actions; and water resources, in relation to coal seam gas and large coal mining development.</p> <p>Any project, not covered by an approved strategic assessment, that is likely to have a significant impact on MNES, is required to be referred to the Commonwealth Minister for the Environment via the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for a decision on whether the project is a 'controlled action' requiring assessment and approval under the EPBC Act.</p>
<i>Environment Effects Act 1978</i> (EE Act)	<p>The EE Act provides for the assessment of actions that are capable of having a significant effect on the environment. A project is required to be referred to the Victorian Minister for Planning for a decision on whether an Environment Effects Statement (EES) is required, if the project triggers one individual or at least two combination referral criteria specified in the 'Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978' (DSE, 2006) (Ministerial Guidelines). Biodiversity referral criteria include potential clearing of 10 ha or more of native vegetation (particularly endangered EVCs), potentially significant impacts on species or ecological communities threatened in Victoria, and potentially significant impacts on the ecological character of internationally or nationally important wetlands.</p> <p>The EE Act also allows an applicant to write to the Secretary to the Department of Transport and Planning (DTP) to confirm no EES is required. The assessment process under this Act is not an approval process itself, rather it enables statutory decision-makers to make decisions about whether a project with potentially significant environmental effects should proceed. If an EES is required, statutory approval decisions (e.g. planning permit, FFG Act permit) are put on hold until the EES process is complete.</p>
<i>Flora and Fauna Guarantee Act 1988</i> (FFG Act)	<p>The FFG Act provides a framework for biodiversity conservation in Victoria, including providing for the listing of threatened species and communities of flora and fauna, as well as threatening processes. A number of non-threatened flora species are also listed as protected under the FFG Act. A permit to take is required to remove protected flora, including listed threatened and non-threatened flora, from public land.</p> <p>The FFG Act specifies two categories of protected flora: 'restricted use protected flora' and 'generally protected flora'. Restricted use protected flora are exclusively threatened by take for commercial/personal use, and the taking of these species incidental to clearing for development works, will not require a permit to take. Generally protected flora are threatened by take for reasons other than or additional to commercial/personal use (e.g. development clearing) and will require a permit to take for any purpose. The protected flora list is currently being reviewed, but for now, all protected flora are classified as generally protected flora.</p> <p>Under the FFG Act, public authorities have a duty of care to consider potential biodiversity impacts when exercising their functions, including giving proper attention to the objectives of the FFG Act.</p>
Protecting Victoria's Environment – Biodiversity 2037	<p>Biodiversity 2037 is a twenty-year plan to prevent the decline of Victoria's biodiversity and achieve biodiversity improvement via two over-arching goals:</p> <ul style="list-style-type: none"> • Victorians value nature: targets human connection with the environment. • Victoria's natural environment is healthy: targets the prevention of species reaching endangered status, options for long-term conservation management and net gain of habitats. <p>It identifies that successful implementation of the Plan requires a whole-of-government approach and that the land use planning framework, provides a good opportunity to ensure that biodiversity is integrated early in decision-making processes. It acknowledges the important linkages between legislation, such as the Planning and Environment Act 1987, the Flora and Fauna Guarantee Act 1988 and the Climate Change Act 2017.</p>
<i>Planning and Environment Act 1987</i> (P&E Act) and Mount Alexander Planning Scheme	<p>The P&E Act regulates the use and development (including vegetation removal) of land in Victoria, and provides the framework and procedures for preparing and amending planning schemes, obtaining planning permits and enforcing compliance with planning schemes.</p> <p>The Mount Alexander Planning Scheme includes Clause 12 which states: Planning should help to protect the health of ecological systems and the biodiversity they support (including ecosystems, habitats, species and genetic diversity) and conserve areas with identified</p>

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Legislation/policy	Description
	environmental and landscape values. It further details strategies to protect and enhance Victoria's biodiversity. Including during the strategic planning process.
Guidelines for the removal, destruction or lopping of native vegetation (the Guidelines)	The purpose of the Guidelines is to set out, and describe the application of Victoria's statewide policy in relation to assessing and compensating for the removal of native vegetation. The primary objective of the Guidelines is to achieve no net loss of native vegetation, through a three-step approach of avoid and minimise impacts, and offset unavoidable losses through the protection and ongoing management of an area proportional to their importance in Victoria's biodiversity. The Guidelines identify that the strategic planning process is the most effective planning mechanism to protect and manage native vegetation and to achieve the objectives of the Clause 12 of all Victoria Planning Schemes. It goes on to state that the methods and approaches outlined in the Guidelines should be used to inform strategic planning processes and the application of appropriate planning controls to ensure Victoria's native vegetation is well managed and protected.
Planning for biodiversity: guidance	This document offers assistance in identifying the role of the planning system in protecting and conserving biodiversity, outlines the frameworks that guide planning in Victoria and offers direction on the process of planning for biodiversity protection and conservation. It includes a the planning toolkit and summary of biodiversity information tools available to inform planning for biodiversity.

Appendix B. Potentially occurring threatened or migratory taxa

An assessment of the likelihood of threatened and migratory taxa occurring within the study area was undertaken for taxa recorded or modelled to occur within 10km of the study area in the VBA and PMST. This assessment was based on the known preferred habitats in comparison to the habitat available in the study area; the frequency, date, and location of previous recordings; and consideration of how cryptic the taxon is (i.e. is it likely to be present but undetected).

The criteria used for assessing likelihood of occurrence are described in Table B-1.

Table B-1. Criteria for determining the likelihood of threatened or migratory taxa occurring in the survey area

Criteria for determining taxon likelihood of occurrence	
Present	High likelihood (likely)
<ul style="list-style-type: none"> Taxon recorded within the study area by the present study or known to occur with supporting evidence 	<ul style="list-style-type: none"> Recent records of the taxon in the vicinity, and/or The study area contains high quality habitat for the taxon.
Moderate likelihood (possible)	Low likelihood (improbable)
<ul style="list-style-type: none"> Limited records of the taxon in the vicinity, and/or The study area contains habitat. 	<ul style="list-style-type: none"> The taxon is only likely to rarely occur (irregularly and infrequently) in the study area and/or No previous or only historic records of the taxon in the vicinity, and/or The study area contains limited or no suitable habitat for the taxon, and/or The taxon was not observed during surveys and would likely have been observed if present, and/or The study area lies outside the known geographic range of the taxon.
Negligible (Neg)	N/A
<ul style="list-style-type: none"> Conditions within the study area are incongruous with requirements of the taxon (e.g. marine pelagic taxon could not occur in a terrestrial study area; or a highly degraded environment lacking habitat features required for taxon), and/or The taxon has been deemed absent after sufficient survey effort (criterion generally reserved for particularly conspicuous taxa). 	<ul style="list-style-type: none"> Legislation protecting taxon does not apply within the study area, as: <ul style="list-style-type: none"> The study area is outside the natural geographic range of the taxon, and/or The taxon is present for non-conservation purposes (e.g., planted for amenity, or has become naturalised in the area).

Conservation status key:

EPBC Act 1999 and FFG Act 1988 (lowercase)

EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable, CD: Conservation dependent, TH: Threatened.

International Treaty:

B: Bonn Convention; C: CAMBA; J: JAMBA; R: ROKAMBA.

Table B-2. Likelihood of occurrence for threatened flora identified in database searches

EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
	cr	Buloke (Allocasuarina luehmannii)	Usually growing in woodland with Eucalyptus microcarpa, on non-calcareous soils. Mainly distributed north of Great Dividing Range throughout north-central and north-western Victoria, with a few sites on the western outskirts of Melbourne (Walsh and Entwisle 1996).		2010	13	Low	Not observed and generally not suitable soils.
VU		River Swamp Wallaby-grass (Amphibromus fluitans)	Largely confined to permanent swamps, principally along the Murray River between Wodonga and Echuca, uncommon to rare in the south (e.g. Casterton, Moe, Yarram), probably due to historic drainage of wetlands (RBGV 2016). Largely restricted in greater Melbourne to seasonal wetlands and mudflats of River Red Gum swamps of the Lower Yarra and Plenty/Merri volcanic plains north of Melbourne (Cam Beardsell pers. comm.).	PMST			Low	No previous records, not typical habitat.
	en	Tall Vanilla-lily (Arthropodium sp. 1 (robust glaucous))	Apparently endemic to Victoria. Currently known only from the upper Macalister, Tambo and Snowy River areas where occurring in rocky situations (often in clefts and on ledges of low cliffs) within rather dry woodland. (Walsh and Entwisle 1994)		2005	1	Low	2005 record from rail reserve near Gaashes Road and Symes Road intersection. However taxon is apparently only known from eastern Victoria, suggesting this is an erroneous record.
EN	cr	Southern Shepherd's Purse (Ballantinia antipoda)	Known previously from dry stony areas of west-central Victoria but presumed extinct until rediscovered in 1983 growing in shallow soil moss mats on outcropping granite at high elevation on Mount Alexander near Harcourt (RBGV 2019).	PMST	2014	348	Low	Unlikely to be suitable habitat within study area.
EN	cr	Mclvor Spider-orchid (Caladenia audasii)	Dry box-ironbark forest from Bendigo to Stawell - known from 3 sites and <10 plants. Flowers August to October (Jeanes and Backhouse 2006).	PMST			Low	Potential habitat but very rare species with no records in the vicinity.
	cr	Castlemaine Spider-orchid (Caladenia clavescens)	Endemic to central Victoria where now known only from the Castlemaine region in box-ironbark forest on skeletal or stony brown loam.(RBGV 2018)		2018	92	Present	Known to occur in box-ironbark areas in south of the study area.
VU	en	Crimson Spider-orchid (Caladenia concolor)	Sporadic and uncommon in dry open-forests, mostly of north-eastern Victoria, on ridges and slopes in well-drained shallow stony or skeletal soils (Walsh and Entwisle 1994).	PMST	2010	2	Low-moderate	Potential habitat in box-ironbark areas in south of project.
VU	cr	Elegant Spider-orchid (Caladenia formosa)	Apparently restricted to south-west Victoria near Dergholm (type locality), where occurring in open woodland in sandy soil.(Walsh and Entwisle 1994)	PMST			Low	No previous records, not typical habitat.
VU	en	Ornate Pink-fingers (Caladenia ornata)	In Victoria known only from the south-west in heathy forest on seasonally moist sandy loam. Flowers Oct.-Dec (RBGV 2018).	PMST			Low	No previous records, not typical habitat.
	en	Veined Spider-orchid (Caladenia reticulata s.s.)	In Victoria, known only from scattered localities in the Stawell, Ararat, Horsham and Dunolly areas. Usually in open Eucalyptus leucoxylon woodland on poorly structured clay loams (RBGV 2015).		1997	1	Low-moderate	Potential habitat in box-ironbark areas although previous record not consistent with known distribution of taxon.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
EN		Rigid Spider-orchid (<i>Caladenia tensa</i>)	In Victoria found mainly in the Little Desert area (also with an isolated record for near Wood Wood) in Eucalyptus/Callitris woodland on well-drained sandy soil (RBGV 2015).	PMST			Low	No previous records, not typical habitat.
VU	en	Candy Spider-orchid (<i>Caladenia versicolor</i>)	Confined to a limited area near Stawell in western Victoria where it grows in herb-rich Yellow Box woodland on seasonally wet soils. Flowers Sep to Nov (Jeanes and Backhouse 2006).	PMST			Low	No previous records, limited potential habitat and not known to occur in vicinity.
	cr	Naked Beard-orchid (<i>Calochilus imberbis</i>)	Mainly in dryish open woodlands and heaths. Flowers Sep.-Dec. Coextensive with <i>Calochilus robertsonii</i> (Walsh and Entwisle 1994).		1997	1	Low-moderate	Recorded in Heathy Dry Forest near Walmer, potential habitat in south of study area where <i>C. robertsonii</i> known to occur, however only that one local record.
	en	Forest Bitter-cress (<i>Cardamine papillata</i>)	Grows in hilly forest areas across Victoria, often in damp areas. Flowers late winter-spring (Walsh and Entwisle 1996).		2011	1	Low-moderate	Limited potential habitat along waterways and other damp areas and only one previous record from Mount Alexander.
	en	Cottony Cassinia (<i>Cassinia ozothamnoides</i>)	An uncommon pioneer species of disturbed sites in dry open-forests on poor shaly or stony soils of the north-east. Distribution previously extended to south-central Victoria around Daylesford. Occurs from 170-400 m altitude. (Walsh and Entwisle 1999)		1997	5	Low-moderate	4 of the 5 records are >150years old. 1997 record from Mount Alexander. While potential habitat is present, scarcity of local records suggest it is unlikely.
	en	Tough Scurf-pea (<i>Cullen tenax</i>)	Widespread in Victoria but now much depleted from its former range and seldom collected. Generally grows in drier parts of the state in grassland and grassy woodland on heavy soils but range is widespread including grasslands around Melbourne through to north-west, south-west and north-east Victoria (RBGV 2019)		1770	1	Low	Historic record only; lack of typical habitat.
	en	Goldfield Boronia (<i>Cyanothamnus anemonifolius</i> subsp. <i>aurifodinus</i>)	Apparently endemic in mallee communities between Bolangum (north of Stawell) and Rushworth. Flowers spring (RBGV 2018).		1975	1	Low	Potential habitat in box-ironbark areas however scarcity of local records suggest it is unlikely.
EN	cr	Matted Flax-lily (<i>Dianella amoena</i>)	Largely confined to drier grassy woodland and grassland communities south of the Dividing Range and now much depleted through its range (RBGV 2017).	PMST	2005	1	Low-moderate	Apparently recorded in 2005 along railway near Gaashs Road and Symes Road intersection, however given no other local records there is some uncertainty about this record and its presence within the study area.
	en	Swamp Flax-lily (<i>Dianella callicarpa</i>)	Occurs in grassland, woodland and swamp-scrub, mostly on clay soils derived from basalt, but also on sandier soils. Recorded from e.g. Grampians, Hamilton and Portland areas (RBGV 2017).		2005	2	Low	Recorded on the railway line along Symes Road in 2005 - however only known to occur in Western Victoria, suggesting these to be erroneous records.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
	cr	Glaucous Flax-lily (<i>Dianella longifolia</i> var. <i>grandis</i> s.l.)	Occurs in lowland plains grassland and grassy woodlands (e.g. Volcanic Plain and Riverina) as well as around rocky outcrops at higher altitudes than the var. <i>longifolia</i> . Flowers Nov.–Dec (RBGV 2018).		2009	29	Present	Recorded along railway and in north-east of study area; although potentially some confusion with <i>D.tarda</i> . <i>D.longifolia/tarda</i> complex was observed during fieldwork across study area including along railway line, Harmony Way south of township and regularly along roadsides in north-east of study area.
	cr	Late-flower Flax-lily (<i>Dianella tarda</i>)	Open, often grassy forests of foothills and plains of north-eastern and north-central Victoria (e.g. Mansfield, Euroa, Chiltern, Nagambie, Nathalia areas). Often on lower slopes or near gullies and watercourses, usually on clay or clay-loam soils (RBGV 2017).		2020	296	Present	283 of these records are from 2005, where recorded along railway line. See comments under <i>D.longifolia</i> .
	en	Golden Cowslips (<i>Diuris behrii</i>)	Locally common in grassland and open woodland mostly in western Victoria; Flowers Sep.–Nov. (RBGV 2018).		2007	9	Moderate	Nearby records around Barkers Creek Reservoir suggest it may occur in more intact areas of Grassy Woodland such as north-east of study area or along railway.
	en	Swamp Diuris (<i>Diuris palustris</i>)	Scattered throughout western Victoria, frequently in swampy depressions within grassland or open woodland communities, probably now extinct in all former sites near Melbourne (RBGV 2015).		1997	2	Low-moderate	Two records from Mount Alexander one dated 1770 and the other 1997. Potential habitat is likely too disturbed and limited previous records suggest unlikely to occur.
	en	Purple Diuris (<i>Diuris punctata</i> var. <i>punctata</i>)	Formerly widespread and common in Victoria, occurring in the open forests, woodlands and grasslands of the fertile lowlands, now much reduced through clearing for agriculture and restricted to relatively few, isolated sites, but sometimes locally abundant (RBGV 2018)..		1997	3	Low-moderate	Records from Mount Alexander and further east dated 1770, 1984 and 1997. Potential habitat is likely too disturbed and limited previous records suggests unlikely to occur.
VU		Trailing Hop-bush (<i>Dodonaea procumbens</i>)	Largely confined in Victoria to the south-west (Penola-Dergholm area, Grampians, Lake Fyans) with outlying occurrences near Castlemaine, Avoca, Skipton, Camperdown and extraordinary disjunctions near Sale where very rare and in perhaps also in the upper Murray River area (represented by a single, 1883 specimen of uncertain provenance). Grows in low-lying, often winter-wet areas in woodland, low open-forest and grasslands on sands and clays (RBGV 2014).	PMST	2005	4	Low-moderate	Two records form 1939 and the others dated 2003, and 2005 from South Muckleford. Some potential habitat however limited previous records suggests unlikely to occur.
	en	Common Pipewort (<i>Eriocaulon scariosum</i>)	Occurs in Bog communities and drainage areas, often in running water. Flowers Jan-Jun (Walsh and Entwisle 1994).		1997	2	Moderate	Two previous records from 1990s occur about 5km north-east of study area. Short-lived taxon that can re-appear under suitable conditions. Potential habitat in wet areas of north-east of study area.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
	en	Long Eryngium (<i>Eryngium paludosum</i>)	Rare in Victoria, confined to heavy soils of lake margins and river floodplains in the north and north-west. Flowers Oct.-Jan. (Walsh and Entwisle 1999).		1997	1	Low	Record from Mount Alexander outside of species known range/typical habitat, habitat in study area likely too degraded.
EN	en	Purple Eyebright (<i>Euphrasia collina</i> subsp. <i>muelleri</i>)	Historically, the Purple Eyebright was widespread in south-eastern Australia extending from south-central South Australia (SA) through Victoria to northern New South Wales (NSW). It is now known only from Victoria including the Mornington Peninsula, Jamieson, Little River, Benambra, Deep Lead and Maryborough, although some of these populations may have become extinct in recent years. It grows in heathland and heathy woodland on sand and in open forest. Associated communities include: <i>Xanthorrhoea australis</i> dominated sandy heath on the Mornington Peninsula; <i>Eucalyptus cephalocarpa</i> - <i>Eucalyptus obliqua</i> open forest at Merricks North; <i>Eucalyptus pauciflora</i> grassy woodland near Benambra; <i>Eucalyptus radiata</i> - <i>Eucalyptus rubida</i> grassy open forest near Jamieson; and <i>Eucalyptus macrorhyncha</i> heathy woodland at Deep Lead (TSSC 2016a). It is now potentially extinct on the Peninsula as has not emerged at known sites since 2012 (Gidja Walker pers. comm.)		1770	3	Low	Historic records only
	en	Rough Eyebright (<i>Euphrasia scabra</i>)	Formerly widespread, but not common, in lowland and montane regions throughout Victoria, this species is now threatened with extinction and confined to a few sites in the eastern ranges (e.g. Mt Koonika, Nunniong Plateau, Bendock areas). Observed in damp grassy situations, amongst shrubs, in sclerophyll forest, clearings or subalpine woodland (Walsh and Entwisle 1999).		1852	2	Low	Historic records only
	en	Austral Crane's-bill (<i>Geranium solanderi</i> var. <i>solanderi</i> s.s.)	An uncommon species occurring in damp to dryish, sheltered sites of grassy woodlands, often along drainage lines or seepage areas (Walsh and Entwisle 1999).		2004	5	Low-moderate	All records are form 2004 around Barkers Creek Reservoir. While potential habitat occurs in the study area the limited records suggest it is unlikely.
	en	Pale-flower Crane's-bill (<i>Geranium</i> sp. 3)	In Victoria, currently known only from Stawell, Yan Yean, Eltham, and Bonegilla areas. Incomplete specimens from near Goroke and Hamilton areas may be of this species. Found in open, grassy areas of dry woodland to forest; Flowers Sep.-Jan. (RBGV 2020).		2004	5	Low-moderate	All records are form 2004 around Barkers Creek Reservoir. While potential habitat occurs in the study area the limited records suggest it is unlikely.
VU	vu	Clover Glycine (<i>Glycine latrobeana</i>)	Widespread but of sporadic occurrence and rarely encountered. Grows mainly in grasslands and grassy woodlands (Walsh and Entwisle 1996).	PMST	2014	3	Low-moderate	Records from Mount Alexander and further east. Potential habitat in higher quality Grassy Woodland areas (e.g. railway line), however limited records suggests unlikely.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
	en	Cobberas Grevillea (<i>Grevillea brevifolia</i>)	Found in subalpine and alpine woodlands between 1000 to 1500 m asl in eastern Vicotria, typically on rocky sites, slopes, ridges and outcrops (DELWP 2021b).		2002	1	Low	Record from near Fogartys Gap Road and Calder Freeway intersection is outside of species known range and habitat.
	en	Goldfields Grevillea (<i>Grevillea dryophylla</i>)	Scrambling semi-erect shrub to about 1m; reasonably common in Western Goldfields in Bendigo-St Arnaud-Maryborough-Castlemaine area. Grows in box-ironbark-stringybark associations on poor stony or gravelly soil; flowers Aug-Nov (Walsh and Entwisle 1996).		2018	19	Moderate	Records generally from Walmer area, may occur in box-ironbark areas in south of study area.
	en	Fryerstown Grevillea (<i>Grevillea obtecta</i>)	Restricted to an area bounded approximately by Castlemaine, Guildford, Glenlyon and Taradale. Grows usually in well-drained situations in dry sclerophyll forest, sometimes in shallow gullies on ridge slopes.(RBGV 2016)		2000	1	Low-moderate	Potential habitat in box-ironbark areas in south of study area, however taxon not known to occur north of Castlemaine.
	en	Smooth Grevillea (<i>Grevillea rosmarinifolia</i> subsp. <i>glabella</i>)	In Victoria, it occurs mainly in the Little Desert area, north central region, Brisbane Ranges, and Warrandyte State Park. Grows in mallee, open woodland and shrub associations, usually on sandy soils. Flowers Aug.-Nov (RBGV 2016).		2008	5	High-moderate	Records from Harcourt Valley Primary School (potentially planted?) and about 1km further west. Potential habitat on sediments in south of study area.
EN	en	Adamson's Blown-grass (<i>Lachnagrostis adamsonii</i>)	Occurs in and around saline depressions on the Volcanic Plain where recorded from Portarlington west almost to the South Australian border (RBGV 2015).	PMST			Low	Not typical habitat and no local records.
VU	en	Spiny Peppercross (<i>Lepidium aschersonii</i>)	Sprouts annually from perennial, relatively short-lived underground rootstock at periodically wet sites such as gilgai depressions and the margins of freshwater and saline marshes and shallow lakes, usually on heavy clay soils. Its population numbers can fluctuate greatly from year to year (and may be absent for several seasons following flooding), presumably due to the amount of bare soil available for seed germination. Flowering occurs from spring to autumn (Carter 2010). In Victoria, mostly occurs on the volcanic plain, but with outlying populations from near Lake Omeo and the Barwon River floodplain in Geelong and pre-1900 records from the Grampians, Port Fairy and Williamstown (AVH 2020).	PMST			Low	Not typical habitat and no local records.
	cr	Prince-of-Wales Feather-moss (<i>Leptodon smithii</i>)	Recorded in Victoria from two sites: Jones Creek in far East Gippsland where in warm temperate rainforest and from a boulder on Mount Alexander near Bendigo. (RBGV 2021)		1969	1	Low-moderate	Potential habitat but historic record only.
	en	Lanky Buttons (<i>Leptorhynchos elongatus</i>)	Largely confined in Victoria to eastern uplands (Benambra, Omeo, Wulgulmerang, Coryong areas) where occasional in grassy Eucalyptus pauciflora woodlands. Rare further west (e.g. near Castlemaine) in dry open-forest, formerly known from southern mallee areas (e.g. Jeparit, Nhill), but now possibly extinct there (Walsh and Entwisle 1999).		2019	5	Moderate	Potential habitat in box-ironbark areas in south of study area.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
EN	en	White Sunray (<i>Leucochrysum albicans</i> subsp. <i>tricolor</i>)	Very rare in Victoria, the only recent collections from volcanic grassland remnants in the Wickliffe, Willaura, Streatham, Inverleigh and Creswick districts. All other Victorian collections were made last century, from e.g. Mt Cole, the Grampians and the Port Fairy district. Collections from the Victorian alps have been attributed to this subspecies, but they may be the result of hybridisation between <i>Leucochrysum alpinum</i> and <i>Leucochrysum albicans</i> subsp. <i>albicans</i> . Flowers Nov.-Dec (RBGV 2017).	PMST			Low	Not typical habitat and no local records.
	en	Striped Water-milfoil (<i>Myriophyllum striatum</i>)	The taxon is rare and occurs in northern Victoria in the Wedderburn, Terrick Terrick, and Nathalia areas as well as Mt Alexander near Castlemaine. It also occurs in Queensland and New South Wales. At Mt Alexander, Mt Terrick Terrick, Mt Korong and near Mt Hope, the taxon is recorded in shallow, typically ephemeral, rock pools (gnammas) on granite outcrops in association with a suite of aquatic and amphibious plants. Elsewhere it occurs in freshwater marshes, shallow ephemeral swamps, depressions in old creek channels and damp mud in gilgais in native grassland (DELWP 2021b).		2003	4	Low-moderate	Potential habitat although these areas often highly disturbed and only known to occur in a localised area on Mount Alexander.
CR	cr	Spiny Rice-flower (<i>Pimelea spinescens</i> subsp. <i>spinescens</i>)	Grows in grassland, open shrubland and occasionally woodland, often on basalt-derived soils. Mostly west of Melbourne (to near Horsham), but extending as far north as Echuca (RBGV 2017).	PMST			Low	Not typical habitat and no local records.
EN	en	Maroon Leek-orchid (<i>Prasophyllum frenchii</i>)	Widespread across southern Victoria, but rare. Occurs in grassland, heathland and open forest on well-drained or water-retentive sand or clay loams; flowers Oct-Nov (RBGV 2018).	PMST	1990	1	Low-moderate	Potential habitat but only one record from south of Castlemaine.
	en	Woodland Leek-orchid (<i>Prasophyllum</i> sp. aff. <i>validum</i>)	Apparently endemic to Victoria where scattered across northern, north-eastern (Chiltern area) and western open forest and woodland communities on stony and sandy soils.. Flowers Oct.-Dec. The distribution of this species is poorly known due to confusion with other members of the <i>P. pyriforme</i> complex (RBGV 2020).		2010	3	Low-moderate	Potential habitat in south of study area but only a few records from Walmer State Forest.
	cr	Sutton Grange Greenhood (<i>Pterostylis agrestis</i>)	Endemic to central Victoria, between Bendigo and Kyneton. Grows in grassland and grassy woodland on clay loam soils (Backhouse et al. 2016).		2017	8	Moderate	Records from Sutton Grange and Sedgewick on both granitic and sedimentary soils. Potential to occur in areas of the study area with intact groundstorey (e.g. railway line, southern portions).
VU	en	Green-striped Greenhood (<i>Pterostylis chlorogramma</i>)	Apparently localized in Victoria, but exact range uncertain due to confusion with closely allied species. Grows in moist areas of heathy and shrubby forest, on well-drained soils (RBGV 2018).	PMST			Low	Not typical habitat and no local records.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
	en	Inland Red-tip Greenhood (<i>Pterostylis rubescens</i>)	Widespread across northern Victoria on slopes and ridges in drier open forests and woodlands on well-drained soils. Flowers Jan.–May (RBGV 2018).		2006	4	Low-moderate	Potential habitat in south of study area but only a few local records.
	en	Emerald-lip Greenhood (<i>Pterostylis smaragdina</i>)	he taxon is patchily distributed from north-eastern to western Victoria, between Wangaratta and Stawell, and south to near Melbourne and Anakie. The taxon also occurs in SA and NSW. Grows in drier open forests and woodlands on well-drained, shallow clay loam, sometimes gravelly soils across an altitudinal range of 95-450 metres asl. Flowers May-Sept. (DELWP 2021b).		2016	6	Moderate	Potential habitat in south of study area, limited but nearby records.
CR	en	Robust Greenhood (<i>Pterostylis valida</i>)	Known from a few grassy woodland sites between Charlton and Bendigo, on shallow soil among emergent granite or sedimentary rocks. Flowers Oct.–Nov (RBGV 2018).	PMST			Low	Potential habitat but no local records and only known to currently occur further north.
EN	cr	Stiff Groundsel (<i>Senecio behrianus</i>)	Exceedingly rare in Victoria, and thought to be extinct until 1991 when rediscovered between Rochester and Stanhope, and Miners Rest near Ballarat in 2004. Apparently confined to heavy, winter-wet, clayey soils. Formerly known from Casterton, Swan Hill, Barham areas, with specimens from the 'Wimmera', and You Yangs near Lara of uncertain affinity, but closest to <i>Senecio behrianus</i> (RBGV 2018).	PMST			Low	Limited habitat and not known to occur in vicinity.
VU	cr	Large-headed Fireweed (<i>Senecio macrocarpus</i>)	In Victoria largely confined to remnant Themeda grasslands on loamy clay soils derived from basalt from near Melbourne west to Skipton area. Also known from auriferous ground near Stawell. Formerly recorded from near Horsham and Casterton, but apparently long extinct from these areas (Walsh and Entwisle 1999).	PMST			Low	Lacking typical habitat, not known to occur in vicinity.
VU		Swamp Fireweed (<i>Senecio psilocarpus</i>)	Rare, restricted in Victoria to a few herb-rich winter-wet swamps throughout the south of the state, west from Sale, growing on volcanic clays or peaty soils (RBGV 2017).	PMST			Low	Lacking typical habitat, not known to occur in vicinity.
	en	Southern Swainson-pea (<i>Swainsona behriana</i>)	Widespread but sporadic in Victoria, mostly in lowlands west of Melbourne, but extending to montane areas in the east (e.g. Omeo, Cobungra, Gelantipy). Usually found in grassland and grassy woodland on relatively fertile soils. Flowers Aug.–Jan. (RBGV 2019).		2007	3	Low-moderate	Recorded from Sutton Grange, and sedimentary hills north of Castlemaine. Potential habitat most likely in areas with intact groundstorey (e.g. railway line, south of study area).
VU	en	Spiral Sun-orchid (<i>Thelymitra matthewsii</i>)	Widespread but sporadically distributed across southern Victoria, mostly near the coast, extending inland to the Grampians in the west. About 20 known populations. Grows in heath and heathy woodland, on sandy loam to heavy gravelly clay loams. Readily identified by coiled leaf. Flowers Aug–Sep. Pioneer species that persists in low biomass sites (Backhouse et al. 2016).	PMST			Low	Lacking typical habitat, not known to occur in vicinity.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
	vu	Crimson Sun-orchid (<i>Thelymitra X macmillanii</i>)	Occurs sporadically in grassland, woodland and open forests, and generally occurs where parent species (<i>T. antennifera</i> & <i>T. carnea</i>) are found (RBGV 2018).		1997	1	Low-moderate	Potential habitat in south of study area but only a few local records.
	en	Glandular Early Nancy (<i>Wurmbea biglandulosa</i> subsp. <i>biglandulosa</i>)	The taxon is widespread in north-east Victoria, with a few collections in East Gippsland and one in the Castlemaine area, and a few in the Melbourne region. Occurs in open forest and woodland at moderate elevations to almost 800 m above sea level on a variety of well-drained but often seasonally moist soils. Many records are from shallow-soil moss beds over granitic geology (DELWP 2021b).		1999	1	Low-moderate	Potential habitat however only one local record (Walmer State Forest).
VU	cr	Swamp Everlasting (<i>Xerochrysum palustre</i>)	Occurs in lowland swamps, usually on black cracking clay soils, scattered from near the South Australian border north-west of Portland to Bairnsdale district, but rare due to habitat depletion (RBGV 2018).	PMST			Low	Lacking typical habitat, not known to occur in vicinity.

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Table B-3. Likelihood of occurrence for threatened fauna identified in database searches

EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
Invertebrates								
	ex	Cryptic Sun Moth (<i>Synemon theresa</i>)	Not been recorded in Victoria for approximately 100 years. It occurred at Castlemaine, Ararat and Beechworth in likely eucalypt-dominated grassy woodland on well-drained and possibly stony soils, with ground flora dominated by Wallaby-grasses and Spear-grasses (DSE 2003).		1907	8	Low	Historic records only, taxon considered extinct in Victoria.
EN	cr	Eltham Copper Butterfly (<i>Paralucia pyrodiscus lucida</i>)	The Eltham Copper Butterfly prefers woodland habitat with an understorey containing the shrub Sweet Bursaria and a ground layer of native grasses, mosses and leaf litter.	PMST	2021	146	Low-moderate	Records relate to Kalimna Park and Botanic Gardens, with a few in Walmer State Forest. Potential habitat occurs in south of study area.
VU	vu	Golden Sun Moth (<i>Synemon plana</i>)	Native temperate grassland and open grassy woodlands, may also be found in degraded grasslands dominated by exotic Chilean Needlegrass (DAWE 2020).	PMST	2012	31	Moderate	28 of the records are from 1932 or prior, with limited spatial accuracy. One record from 2012 near cnr of Leversha Road and Fogarty's Gap Road and two from 2010 near Coopers Road and Harcourt-Sutton Grange Road intersection. The 2010 records relate to surveys undertaken for the Harcourt Modernisation Project where four properties in North Harcourt were found to support the species (Biosis 2011). Surveys undertaken within Plan Harcourt study area did not detect the species. Potential for it to occur in areas of grassland/grassy woodland that have not been subject to cultivation.
	en	Yellow Ochre Butterfly (<i>Trapezites luteus luteus</i>)	Eucalypt woodland, cypress-pine open-woodland and grassland on the drier inland slopes and tablelands of the Great Dividing Range, preferring very open grassy areas where the larval food plants, Mat-rush (<i>Lomandra</i> spp.) grow (Braby 2016).		1988	8	Low-moderate	All records relate to same day in 1988, and appear to be the same location but spatial accuracy of the records are poor. Potential habitat present.
Fishes								
CR	vu	Flat-headed Galaxias (<i>Galaxias rostratus</i>)	Only known from the southern half of the Murray-Darling Basin system. The species once occurred in the middle reaches, usually below 150 m in altitude, of the Lachlan, Murrumbidgee and Murray river catchments in New South Wales, and the Mitta Mitta, Kiewa, Ovens, Loddon, Goulburn and Murray river catchments in Victoria. Shoals in mid-water. Usually below 150 m altitude in Murray system in still or gently	PMST			Low	No local records, typically occurs further north.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
			flowing waters, lakes, billabongs and backwaters. Depth 1 m, substrate of coarse sand and mud, and debris (Allen et al. 2002, TSSC 2016b).					
EN	en	Macquarie Perch (<i>Macquaria australasica</i>)	The Macquarie Perch was once widespread through the cooler upper reaches of the southern tributaries of the Murray-Darling river system in Victoria and New South Wales. Although it was considered rare downstream in the Murray River, in Victoria the Macquarie Perch occurred in the Barmah Lakes area and tributaries such as Broken Creek. In New South Wales, the species occurred in the upper reaches of the Macquarie River system. However, currently in Victoria only small discrete populations remain in the upper reaches of the Mitta Mitta, Ovens, Broken, Campaspe and Goulburn Rivers in northern Victoria. A larger, apparently self-sustaining translocated population exists in the Yarra River, around Warrandyte and is potentially the most secure in the country. It is also known to persist in Lake Eildon in the Goulburn River catchment (DAWE 2020).	PMST			Low	Not known to occur in catchment, watercourses likely too ephemeral.
VU	en	Murray Cod (<i>Maccullochella peelii</i>)	The Murray Cod is endemic to the Murray-Darling River system in south-eastern Australia. The species occurred throughout almost the entire system, with the exception of some of the upper reaches of tributaries, and it still occurs throughout almost all of its historic range, although with some localised extinctions in several upper tributaries. It has also been hatchery-bred and widely translocated and stocked within and outside its natural range. In Victoria, introduced populations occur in the Yarra River, Wimmera River and several isolated lakes and swamps in the Wimmera district, and have also been stocked into numerous waters on private property such as lakes and farm dams, where local populations may have established. It occurs in a range of flowing and standing waters, from small, clear, rocky streams on the inland slopes and uplands of the Great Diving Range, to the large, turbid, meandering slow-flowing rivers, creeks, anabranches, and lakes and larger billabongs, of the inland plains of the Murray Darling Basin. The species frequents the main river channel and larger tributaries and anabranches, which are important habitats, and is considered a 'main channel specialist' (National Murray Cod Recovery Team 2010).	PMST	1970	1	Low	Not known to occur in catchment, watercourses likely too ephemeral.
VU	vu	Southern Pygmy Perch (Murray-Darling lineage) (<i>Nannoperca australis</i> (Murray-Darling lineage))	The natural distribution of Southern Pygmy Perch-MDB once extended across the southern Murray-Darling Basin, from the lowland to the upland zones (0–580 m a.s.l.) of New South Wales and Victorian catchments. In Victoria, the species is now known from the Mitta Mitta, Kiewa, Ovens, Goulburn-Broken, Campaspe, Avoca and Wimmera river catchments. It prefers habitats in low-gradient waterways and floodplains with slow-flowing or still water, and aquatic macrophyte cover or wood at shallow depths, with little or no flow in summer (TSSC 2021).	PMST			Low	Not known to occur in catchment, watercourses likely too ephemeral.
Amphibians								

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
	en	Brown Toadlet (<i>Pseudophryne bibronii</i>)	In Victoria, distributed from the north-east through to central and western Victoria with scattered records in Gippsland. To the north of Melbourne there are records from Diggers Rest across to Craigieburn and Warrandyte. In Victoria's south-west most records are grouped on the Volcanic Plains bioregion north of Werribee, the Greater Grampians bioregion and the Lowan Mallee bioregion in the Little Desert. The species is declining across the state e.g. a recent survey of the Greater Melbourne district failed to find the species at any of the 40 sites where it had previously been found. The Brown Toadlet utilises a wide variety of habitats, including dry forests, woodland, shrubland, grassland, coastal swamps, heathland, and sub-alpine areas. They live in areas that are likely to be inundated after rain and shelter in damp areas under leaf litter, logs, or other forms of cover (SWIFFT 2020).		2019	20	Moderate	17 of the records are from Kalimna Park in 2019. The previous records date back to 1980 and 1964 where recorded at Golden Point and the southern end of Mount Alexander. Surveys undertaken for Harcourt Modernisation Project to the north (e.g. Ravenswood South) of Plan Harcourt study area did not detect taxon (Biosis 2011). However, gap in records from 1980 to 2019 suggests it may be poorly detected across landscape. Habitat occurs in damp seasonally inundated areas across the study area.
VU	vu	Growling Grass Frog (<i>Litoria raniformis</i>)	Was previously widespread across much of Victoria (excluding high country, Big Desert, Murray-Sunset), declined dramatically from about 1990, and now found in scattered populations around greater Melbourne, across areas of south western Victoria and along the Murray River. It needs still or slow moving water with emergent vegetation around the edges and mats of floating and submerged plants. They can live in artificial waterbodies, such as farm dams, irrigation channels and disused quarries. Favourable habitat features include abundant aquatic vegetation, minimal tree canopy cover, waterbodies with salinity less than 7.0 mS/cm or (7000 EC) which hold water for at least six months of the year. A major factor appears to be a combination of vegetation types: tall emergent, floating attached, submerged and emergent vegetation, as well as feathery and non-feathery. Grass and shrub cover on the banks is also important for the emerging froglets to gain protection from predators and to acquire insect prey as a food source. Will readily migrate from a drying site to a stable site with suitable habitat. During winter are largely inactive and shelter on the land under rocks, logs, thick vegetation, or in ground crevices, often a long way from waterbodies and sometimes communally (SWIFFT 2020).	PMST			Low	Not known to occur in vicinity. Surveys undertaken for Harcourt Modernisation Project in the surrounding landscape (e.g. Ravenswood South, Faraday) of Plan Harcourt study area did not detect taxon (Biosis 2011).
Reptiles								
	vu	Bearded Dragon (<i>Pogona barbata</i>)	Predominantly a species of the warm temperate zone in northern and western Victoria, is widely distributed in treed habitats within the dry sclerophyll forest and box-ironbark ecosystems including granitic shrublands, mallee and treed farmland), sometimes occurring marginally in the Heathland, Red Gum and Black-Box woodland ecosystems although largely replaced by the Central Bearded Dragon in the latter (Tzaros 2005, Robertson and Coventry 2019).		2009	2	Moderate	Cryptic species with recent nearby record. Habitat present broadly across study area.
	en	Lace Monitor (<i>Varanus varius</i>)	Coast, ranges, slopes and adjacent plains of eastern and south-eastern Australia, where it occurs in occur in well-timbered areas from dry woodlands to cool		2006	1	Low-moderate	Record from Pilchers Bridge NCR. Habitat in north likely too fragmented for this species.

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			temperate forests. It feeds on insects, reptiles and small mammals, but is a major predator of nestling birds. Often forages on the ground, and in trees (Cogger 2014).					Possible but scarcity of records suggest unlikely in box-ironbark in the south.
	cr	Murray River Turtle (<i>Emydura macquarii</i>)	In Victoria, known from the Murray Basin where restricted to larger rivers and associated large waterholes on the floodplains (Cogger 2014). Various records occur in southern Victoria due to translocation.		2020	1	Low-moderate	Recent record from Castlemaine Botanic Gardens and other records in landscape >10km such as Coliban River, Lake Eppalock and Bendigo suggests it may be occur along Barkers Creek and other waterbodies.
VU	en	Pink-tailed Worm-Lizard (<i>Aprasia parapulchella</i>)	The Pink-tailed Worm-lizard occurs in New South Wales (NSW), Victoria and the Australian Capital Territory (ACT) where it is widely but patchily distributed along the foothills of the western slopes of the Great Dividing Range between Bendigo in Victoria and Gunnedah in NSW. In Victoria its distribution is not fully known, but it is centred around Bendigo and thought to encompass Big Hill Range to the south, Marong to the west and Sugarloaf Range to the east. The Pink-tailed Worm-lizard's habitat includes primary and secondary grassland, grassy woodland and woodland communities, and the species usually inhabits sloping sites that contain rocky outcrops or scattered, partially buried rocks. These rocky habitats tend to be well-drained mid-slope or ridge-top sites with loosely embedded rocks on soil substrate with ant galleries present. Individuals are most commonly found sheltering under these rocks and spend considerable time in ant burrows below these rocks, which are considered important foraging and shelter sites (TSSC 2015a).	PMST			Low-moderate	Potential habitat exists, in steeper areas with surface rock, although given nearest records are Bendigo it appears unlikely.
VU	en	Striped Legless Lizard (<i>Delma impar</i>)	In Victoria, mostly occurs across central (including north-central) and western plains. A grassland specialist, potential habitat for the Striped Legless Lizard includes all areas which have, or once had, native grasslands or grassy woodlands (including derived grasslands) across the historical range of the species, provided that area retains suitable tussock structure, the soil is of appropriate type and structure, and the site has not had major disturbance such as ploughing. Until recently, this species was thought to inhabit only native grasslands, however, the species does occur in some areas dominated by introduced species and at sites with a history of grazing and pasture improvement. It is not known if grassland dominated by introduced species can support Striped Legless Lizard populations in the long term. The majority of sites in Victoria occur on cracking clay soils with some surface rock which provide shelter for the species, tussock structure may vary from widely spaced tussocks of open grassland to a dense sward of closed grassland, areas of bare ground are avoided (DAWE 2020).	PMST	2013	1	Low-moderate	Nearby recent record from Sutton Grange and apparently recorded during works for the Calder Freeway near Elphinstone suggests potential for this species to occur in areas of grassy woodland. There are limited areas of suitable habitat that have escaped past soil disturbance; perhaps most potential is along railway line.
EN	en	Swamp Skink (<i>Lissolepis coventryi</i>)	Mainly found within the southern half of Victoria with the population at the Grampians being the most northern. Densely vegetated swamps and associated	PMST			Low	Not known to occur in vicinity.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
			watercourses where it inhabits adjacent wet heaths (Melaleuca or Leptospermum thickets), sedgelands and saltmarshes. It is a secretive species that quickly retreats into shelter when disturbed, usually dense vegetation or burrows of its own construction, although it uses the burrows of freshwater crayfish, as well as rocks, logs, tussocks and sedges. It has a home range of about 10 metres from its burrow, and juveniles disperse up to 200 metres. Is generally active between early-September to early-May (Cogger 2014, SWIFFT 2020).					
Waders								
	vu	Caspian Tern (Hydroprogne caspia)	Coastal, offshore waters, beaches, mudflats, estuaries, larger rivers, reservoirs and lakes (Pizzey and Knight 2012).		2018	3	Low	Records relate to Barkers Creek Reservoir, lack of suitable habitat in study area.
CR	cr	Curlew Sandpiper (Calidris ferruginea)	Tidal mudflats; saltmarsh, saltfields; fresh, brackish or saline wetlands; sewage ponds (Pizzey and Knight 2012).	PMST			Low	Lack of suitable habitat, no local records.
CR	cr	Eastern Curlew (Numenius madagascariensis)	Estuaries, tidal mudflats, sandspits, saltmarshes, mangroves; occasionally fresh or brackish lakes; bare grasslands near water (Pizzey and Knight 2012).	PMST			Low	Lack of suitable habitat, no local records.
Other Non-passerine birds								
EN	cr	Australasian Bittern (Botaurus poiciloptilus)	Narrow habitat preferences, preferring shallow, vegetated freshwater or brackish swamps (Pizzey and Knight 2012).	PMST			Low	Lack of suitable habitat, no local records.
	vu	Australasian Shoveler (Spatula rhynchotis)	Larger waters, fresh and saline lakes, well-vegetated freshwater wetlands, coastal inlets, sewage ponds, floodwaters (Pizzey and Knight 2012).		2009	9	Low	Limited suitable habitat, limited recent records.
EN	cr	Australian Painted-snipe (Rostratula australis)	Well-vegetated shallows and margins of wetlands, dams, sewage ponds; wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, open timber (Pizzey and Knight 2012)..	PMST			Low	Lack of suitable habitat, no local records.
	cr	Barking Owl (Ninox connivens)	Within Victoria the Barking Owl occurs in open woodlands and open forests, including box-ironbark and riparian River Red-gum habitats, as well as some foothill habitats on granitic slopes. The taxon has been recorded more frequently in edge habitats such as the interface between woodlands and wooded farmland, than in forest interiors perhaps due to abundance of prey (rabbit) and larger hollow-bearing trees. Hydrological features such as rivers and swamps are often a conspicuous component of Barking Owl habitat. Favour nesting in live hollow-bearing trees over dead ones (DELWP 2021b).		2020	10	Moderate	Records scattered broadly across local area, may utilise study area. Some but limited nesting habitat available.
	cr	Black Falcon (Falco subniger)	Mostly found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas. Will utilise plains, grasslands, foothills, timbered watercourses, wetland environs; crops; occasionally over towns and cities. Nests		2012	3	Low-moderate	May occasionally forage across study area.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
			along tree-lined creeks and rivers of inland drainage systems. Highly mobile and may travel hundreds of kms (Pizzey and Knight 2012, BirdLife Australia 2021).					
	vu	Blue-billed Duck (<i>Oxyura australis</i>)	Found on temperate, fresh to saline, terrestrial wetlands including sewerage ponds, rivers, salt lakes and saltpans. Preferring deep, permanent open water within or near dense vegetation (Pizzey and Knight 2012).		2004	10	Low	Limited suitable habitat, recorded from Barkers Creek Reservoir.
VU		Blue-winged Parrot (<i>Neophema chrysostoma</i>)	Breed on on mainland Australia south of the Great Dividing Range in southern Victoria from Port Albert in Gippsland west to Nelson, and sometimes in the far south-east of South Australia, and the north-western, central and eastern parts of Tasmania. During the non-breeding period, from autumn to early spring, birds are recorded from northern Victoria, eastern South Australia, south-western Queensland and western New South Wales, with some birds reaching south-eastern New South Wales and eastern Victoria, particularly on the southern migration. The Blue-winged Parrot inhabits a range of habitats from coastal, sub-coastal and inland areas, right through to semi-arid zones. Throughout their range they favour grasslands and grassy woodlands but may include semi-arid chenopod shrubland with native and introduced grasses, herbs and shrubs and coastal saltmarshes. They are often found near wetlands both near the coast and in semi-arid zones. Blue-winged Parrots can also be seen in altered environments such as airfields, golf-courses and paddocks. Nest in hollows and in Victoria, birds are known to breed mainly in heathy forests and woodlands and in wetter forests soon after fire or logging (DCCEEW 2023d).	PMST	2018	2	Low-moderate	Potential habitat although limited records suggests rare visitor.
	cr	Bush Stone-curlew (<i>Burhinus grallarius</i>)	Open woodland, dry watercourses with fallen branches, leaf-litter, sparse grass; sandplains with spinifex and mallee; coastal scrub, mangrove fringes, golf-courses, rail reserves; timber remnants on roadsides; orchards, plantations; suburbs, towns (Pizzey and Knight 2012).		2006	1	Low	Some potential habitat, however only one 2006 record from near Pilchers Bridge NCR and not known to occur more locally.
	vu	Eastern Great Egret (<i>Ardea alba modesta</i>)	Widespread in Australia in a broad range of wetland habitats (e.g. inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial). These include swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs. It usually frequents shallow waters (DAWE 2020).		2018	4	Low	Limited suitable habitat, recorded from Barkers Creek Reservoir.
	en	Freckled Duck (<i>Stictonetta naevosa</i>)	Large, well vegetated swamps; in dry periods moves to open lakes (Pizzey and Knight 2012).		2019	2	Low	Limited suitable habitat, recorded from Barkers Creek Reservoir.
EN		Gang-gang Cockatoo (<i>Callocephalon fimbriatum</i>)	Endemic to south-eastern Australia, rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee. In Victoria, the Gang-gang Cockatoo is widespread through northeast	PMST	1998	3	Low	Potential infrequent visitor but edge of geographic range of species.

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			and southern regions. During summer months, Gang-gang Cockatoos primarily inhabit mature, wet sclerophyll forests, but also may occur across a broad range of forests and woodlands. During winter months, Gang-gang Cockatoos tend to range beyond montane forests to inhabit open eucalypt assemblages at lower, drier altitudes, including suburban areas of cities. They may also utilise coastal heathlands and thickets. Overlapping of winter and summer ranges is common, with some individuals choosing to winter at higher altitudes, and others remaining at lower altitudes during summer. Habitat critical to the survival of the Gang-gang Cockatoo includes all foraging habitat during both the breeding and non-breeding season, this generally does not include exotic feeding grounds such as ornamental trees, shrubs, and hedges within urban and suburban areas. Breeding requires stands of suitable hollow-bearing trees (DAWE 2022).					
VU	vu	Grey Falcon (<i>Falco hypoleucos</i>)	Lightly treed inland plains, gibber deserts, sandridges, pastoral lands, timber watercourses; seldom in driest deserts (Pizzey and Knight 2012). Essentially confined to the arid and semi-arid zones of Australia and absent south of the Great Dividing Range in Victoria (TSSC 2020).	PMST			Low	No local records, southern extremity of species distribution.
	en	Grey Goshawk (<i>Accipiter novaehollandiae</i>)	In Australia, its range extends from Tasmania, through south-eastern Australia, along the east coast and across the north of Australia to the Kimberley area in the north-west. Generally favours tall, wet forests, particularly in gullies, for roosting and hunting. They are also seen in woodlands, dry forests, wooded farmlands and suburban parks below altitudes of 500 m. In Victoria, breeding appears to be confined to dense, wet old-growth forests at low to medium altitudes and nest sites are almost always associated with watercourses (SWIFFT 2020). Young may utilise open country in Autumn dispersal (Pizzey and Knight 2012).		1928	1	Low	Historic record only, atypical habitat, may visit infrequently.
	vu	Hardhead (<i>Aythya australis</i>)	Deep, permanent wetlands, large open waters, brackish coastal swamps, farm dams, ornamental lakes, sewage ponds (Pizzey and Knight 2012).		2019	57	Moderate	May utilise farm dams.
	vu	Lewin's Rail (<i>Lewinia pectoralis</i>)	Swamp woodlands, rushes, reeds, rank grass in swamps, creeks, paddocks; wet heaths (Pizzey and Knight 2012).		1994	1	Low	Limited suitable habitat and records.
	vu	Little Eagle (<i>Hieraaetus morphnoides</i>)	Plains, foothills, open forests, woodlands and scrublands; river red gums on watercourses and lakes (Pizzey and Knight 2012). Nest in mature living trees in open woodland or tree-lined watercourses. They rarely nest in isolated trees (BirdLife Australia 2021).		2014	61	Low-moderate	Potential habitat but only two records in last ten years suggests only an infrequent visitor.
	en	Little Egret (<i>Egretta garzetta</i>)	Tidal mudflats, saltmarshes, mangroves, freshwater wetlands, sewage ponds (Pizzey and Knight 2012).		2017	1	Low	Limited suitable habitat and records.
	vu	Musk Duck (<i>Biziura lobata</i>)	Well-vegetated swamps, wetlands, both brackish and fresh, lakes, reservoirs, shallow bays, inlets; occasionally at sea (Pizzey and Knight 2012).		2019	80	Low	Likely confined to larger waterbodies in landscape.

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EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
CR	cr	Plains-wanderer (<i>Pedionomus torquatus</i>)	In Victoria the main Victorian population stronghold is now in the Campaspe area of north-central Victoria, particularly areas which surround Terrick Terrick National Park, Bael Bael Nature Conservation Reserve and Trust for Nature's Wanderers Plain. Other areas for consideration of Plains-wanderer are the Victorian Volcanic Plain immediately west of Melbourne, although many of these sites have suffered habitat loss and no longer support the Plains-wanderer. Preferred habitat of the Plains-wanderer consists of hard, red-brown soils with sparse native vegetation: a mosaic of grasses and herbs (40%), leaf litter (10%) and bare ground (50%). Grasses rarely exceeds 30cm in height, with the majority (94%) reaching less than 10cm, allowing for easy movement and foraging for seeds and ground-dwelling insects. However, some taller growth is essential for concealment from predators. Low crops and cereal stubble occasionally offer temporary shelter. The Plains-wanderer also prefers areas where there are no trees or clusters of trees within 300m (SWIFFT 2020).		2021	1	Low	Not typical habitat and only one record from Campbells Creek, not know to have a permanent presence in landscape.
	cr	Plumed Egret (<i>Ardea intermedia plumifera</i>)	Freshwater wetlands, pastures and croplands, tidal mudflats, floodplains (Pizzey and Knight 2012).		2014	4	Low	Limited suitable habitat, recorded from Barkers Creek Reservoir.
	vu	Powerful Owl (<i>Ninox strenua</i>)	Pairs occupy a large, probably permanent, home range in mountain forests, gullies and forest margins, sparser hilly woodlands, coastal forests, woodlands, scrubs, exotic pine plantations, large trees in private/public gardens, some in cities (Pizzey and Knight 2012).		2020	44	High	Known to nest at Castlemaine Botanic Gardens. Potential foraging across study area and some, but limited, potential nesting habitat along Barkers Creek.
	vu	Square-tailed Kite (<i>Lophoictinia isura</i>)	Has been recorded throughout Victoria, although with few records in the higher elevation areas along the Great Dividing Range in eastern Victoria. The majority of records (88%) from Victoria are from spring (breeding season) and summer. In winter, the Square-tailed Kite may migrate northwards to the tropics. Birds are usually seen over forests, woodlands, timbered watercourses and foothill gullies in Victoria with a preference for eucalypt open forest and woodland associations in southern Australia. Stick nests are made and usually located near water in a horizontal branch in mature live eucalypts between 12 and 26m above the ground. There are records of the taxon breeding in small areas of suitable habitat close to humans (DELWP 2021b).		2019	13	Moderate	All 13 records are form 2017-2019 spread broadly across surrounding landscape suggesting taxon likely to utilise study area.
VU	en	Superb Parrot (<i>Polytelis swainsonii</i>)	Endemic to south-eastern Australia. It is found in the Riverina area of New South Wales and Victoria, and, in winter, in northern New South Wales. Found along timbered waterways and nearby well-watered woodlands, especially in River Red Gums along the Murray and Murrumbidgee Rivers. They are usually seen in family parties or small flocks. They roost communally in trees (BirdLife Australia 2020).	PMST	1982	1	Low	Marginal habitat, lack of local records.

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CR	cr	Swift Parrot (<i>Lathamus discolor</i>)	Swift Parrots spend most of the year in Tasmania and have been recorded there from August to April, the main breeding season being from October – December, during this time the birds utilise Tasmanian Blue Gum <i>Eucalyptus globulus</i> in the north, east and southern areas of Tasmania. Migration across Bass Strait can commence anytime from late February onwards. By May the Swift Parrot is distributed mainly in Victoria and to a lesser extent New South Wales and sometimes southern Queensland where they remain until mid August to September. Whilst on the mainland the Swift Parrot disperses widely to forage on flowers and psyllid lerps in <i>Eucalyptus</i> species. In Victoria, the over-wintering habitat is prodimantly the box ironbark woodlands of central Victoria, but may also occur in urban areas. There are a few records each year from the Melbourne and Geelong districts and they are occasionally recorded south of the divide in the Gippsland region. Areas used by Swift Parrots can change differently from one year to the next. Thirty one locations have been identified in Victoria as being important feeding habitat for the Swift Parrot, these are mainly in the Box Ironbark forests through central Victoria (TSSC 2016c, SWIFFT 2020).	PMST	2018	476	High	Many local records, likely to forage in eucalypts across study area.
VU	vu	White-throated Needletail (<i>Hirundapus caudacutus</i>)	White-throated Needletails occur in Australia only between late spring and early autumn, but mostly in summer, when they sometimes form large flocks, appearing as a swirling cloud of birds. These feeding flocks may be associated with thunderstorms, the uplift of which may assist with their flight and carry insects high into the air. In Australia, they are mostly aerial, from heights of less than 1 m up to more than 1000 m above the ground, but also roost in trees. They utilise airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns and feeding companies may patrol back and forward along favoured hilltops and timbered ranges (Pizzey and Knight 2012, BirdLife Australia 2021). After breeding in eastern Siberia, north-eastern China and Japan, they leave the breeding grounds and mainly enter Australia via the Torres Strait, usually during September and October, often arriving in Victoria in November and leaving Australia by April (DoE 2009).	PMST	2020	15	Low-moderate	Predominantly aerial species that may occasionally utilise study area.
Passerine birds								
VU		Brown Treecreeper (<i>Climacteris picumnus victoriae</i>)	Endemic to south-eastern Australia from the Grampians in western Victoria, through central New South Wales to the Bunya Mountains in Queensland and from the coast to the inland slopes of Great Dividing Range, where can intergrade with arid zone subspecies of Brown Treecreeper (<i>C. p.picumnus</i>). Within this area population is fragmented as it is sedentary and its failure to cross habitat gaps means it has been lost from many habitat fragments. Occupy dry open eucalypt forests and woodlands and mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey,	PMST	2021	139	High	Many recent records and habitat across the study area.

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			sometimes with one or more shrub species. They also occur in mallee, forests and River Red-gum woodlands along the Murray River. They are not usually found in woodlands with a dense shrub layer, and absent from heavily degraded woodlands and steep rocky hills. Roosts and nests in hollows (DCCEEW 2023c).					
	vu	Chestnut-rumped Heathwren (<i>Calamanthus pyrrhopygius</i>)	Endemic to south-eastern mainland Australia, where mostly occurs on the seaward and inland slopes of the Great Divide (in Vic inland to c. Rutherglen-Inglewood-Grampians) in heathy woodlands/shrublands and Box/Ironbark forests (Pizzey and Knight 2012).		2018	10	Low-moderate	Two records from Pilchers Bridge NCR in 2018 and the other records 1981 or earlier. May utilise study area.
	en	Crested Bellbird (<i>Oreoica gutturalis</i>)	In Victoria inhabit Slender Cypress Pine-Belah woodlands and Dumosa Mallee scrubs (particularly in the Sunset Country) in the north-west of state and Red Ironbark and Grey Box forests in the northern Goldfields (Bendigo and Maryborough regions). There may be small outlying populations elsewhere (DELWP 2021b).		2018	14	Low-moderate	Records from Pilchers Bridge NCR in 2018 and Muckleford State Forest in 2017. The other records 1981 or earlier. May utilise study area, particularly in south.
VU	vu	Diamond Firetail (<i>Stagonopleura guttata</i>)	In Victoria, occur in the lowlands and foothills where rainfall is between 300-700mm. Occupy eucalypt woodlands, forests and mallee where there is a native grassy understorey. They mainly inhabit native grassy woodlands or wooded farmlands containing River Red Gums, Yellow Gum, Murray Pine or Buloke near permanent water. The taxon is generally sedentary, but some populations move north in winter after breeding. Although their diet may include exotic grasses, a diversity of native grasses with differing phenology and maturation patterns appears essential for their persistence in an area (DELWP 2021b).	PMST	2006	17	Moderate	Records scattered across landscape but becoming increasingly rare, appears not be resident but may utilise study area.
	vu	Grey-crowned Babbler (<i>Pomatostomus temporalis</i>)	Widespread throughout north-western, northern, central and eastern Australia. In Victoria generally found north of the Great Dividing Range in open forests and woodlands, favouring plains with an open shrub layer, little ground cover and plenty of fallen timber and leaf litter. May be seen along roadsides and around farms. In south-east Melbourne, small populations survive on golf courses (BirdLife Australia 2020).		2000	15	Low-moderate	May utilise study area, although limited records suggests infrequently.
EN	vu	Hooded Robin (<i>Melanodryas cucullata</i>)	In Victoria they occur in the lowlands and foothills where rainfall is less than 700mm. They are considered a vagrant or occasional visitor to Gippsland. Recorded from drier eucalypt forests, woodlands and scrub, grasses and low shrubs, as well as cleared paddocks with regrowth or stumps adjacent to woodland and avoid dense forests and urban areas. In southern Victoria the taxon occurs in lightly timbered habitats containing tall shrubs such as Yellow Box woodlands, coastal heaths and heathy woodlands. Tend to be found in large, intact woodlands, with a complex understorey and dead or fallen timber. The bird is shy and retiring and tends to be found away from human activity (DELWP 2021b).	PMST	2006	7	Moderate	May utilise study area, although limited records suggests infrequently.

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VU	vu	Painted Honeyeater (<i>Grantiella picta</i>)	Sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. The greatest concentrations and almost all records of breeding come from the inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland. Exhibit seasonal north-south movements governed principally by the fruiting of mistletoe in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens (TSSC 2015b).	PMST	2006	5	Low-moderate	One record from near Pilchers Bridge NCR in 2006, otherwise previous records from 1980 or prior. May utilise study area, although limited records suggests rarely.
CR	cr	Regent Honeyeater (<i>Anthochaera phrygia</i>)	Formerly common and widespread throughout the box-ironbark country of southeastern Australia, from about 100km north of Brisbane through sub-coastal and central New South Wales, Victoria inland of the ranges, and as far west as the Adelaide Hills. Now in Vic occurs as a rare vagrant to the country around Bendigo and Gippsland; with 80% of sightings from Chiltern, the Killawarra, and the Reef Hills. Across Australia there are only about 800 to 1500 Regent Honeyeaters in the wild, with about 100 of these remaining in Victoria with significant breeding populations remaining only in New South Wales. Regent Honeyeaters show a consistent preference for just four eucalypt species: Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>Eucalyptus albens</i>), Yellow Box (<i>Eucalyptus melliodora</i>) and Yellow Gum (<i>Eucalyptus leucoxyton</i>). All four species flower profusely and have especially rich nectar flows. Remnant vegetation on private land can contain valuable feeding and/or breeding resources for the Regent Honeyeater with specific migrations being made when there are seasonal flowering events (SWIFFT 2020).	PMST	1981	2	Low	Historic records only, only likely to occur very rarely.
VU		Southern Whiteface (<i>Aphelocephala leucopsis</i>)	Includes two subspecies that occur across most of mainland Australia south of the tropics, from the north-eastern edge of the Western Australian wheatbelt, east to the Great Dividing Range. <i>A. l. leucopsis</i> (south-east southern whiteface), the nominate found throughout south-eastern and central Australia; and <i>A. l. castaneiventris</i> (south-west southern whiteface) found in central and southern WA. Live in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains. Forage almost exclusively on the ground, favouring habitat with low tree densities and an herbaceous understorey and litter cover. Generally sedentary but may move to wetter areas during drought years. Nest in hollows, crevices and sometimes bushes (DCCEEW 2023b)	PMST	2020	13	Low-moderate	Only three records in last 20 years. May occasionally utilise habitat within study area.
	en	Speckled Warbler (<i>Pyrholaemus sagittatus</i>)	Endemic to coastal eastern Australia, where mainly inhabits the 600-800mm annual rainfall belt of the northern foothills of the Great Divide. Rare in Gippsland where it has been reported from Buchan and Suggan Buggan areas. The current		2019	49	High	Records scattered broadly in the landscape, including in south of study area and potential habitat across study area.

Stage 1 Strategic Biodiversity Assessment for Plan Harcourt (Amendment C94malx)

EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
			'main range' in Victoria is the Central District (mainly box-ironbark), where it exists as scattered but widespread populations. They are sedentary, living in pairs or trios and nesting on the ground in grass tussocks, dense litter or fallen branches. Recorded from box-ironbark and Broad-leaved Peppermint forests, dry woodlands and wooded farmlands (particularly those containing Yellow Box), where there is a scattered shrub cover of acacias or low eucalypt regrowth. Rarely reported from the coast in drier habitats associated with rocky ridges or gullies. Preferred foraging habitat has a combination of open grassy patches, leaf litter and shrub cover (DELWP 2021b).					
Bats								
	cr	Eastern Bent-winged Bat (<i>Miniopterus orianae oceanensis</i>)	This subspecies of the Bent-wing Bat occurs along the east coast of Australia from Cape York to southern Victoria. Roost during the day in caves such as coastal cliffs, old mines, stormwater channels and comparable structures including occasionally buildings. Typically found in well timbered valleys where it forages, above the tree canopy (Van Dyck and Strahan 2008). Only known maternity cave (where females travel to birth) in Victoria occurs in East Gippsland near Bairnsdale (SWIFFT 2020).		2011	6	Moderate	Records scattered broadly in the landscape of this cryptic species, that is likely to have had limited survey.
VU	vu	Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	Camps of this species are found in gullies, typically not far from water and usually in vegetation with a dense canopy (Van Dyck and Strahan 2008).	PMST	2020	8	Moderate	Likely occasional visitor from camp in Bendigo.
Other mammals								
	vu	Brush-tailed Phascogale (<i>Phascogale tapoatafa</i>)	In Victoria, the Brush-tailed Phascogale now has a fragmented distribution, to the east and north-east of Melbourne, central Victoria around Ballarat, Heathcote and Bendigo; north-eastern Victoria from Broadford to Wodonga; the Brisbane Ranges north-east of Geelong; and far western Victoria from Mt Eccles to Apsley. Inhabits open dry foothill forest with little ground cover, typically associated with box, ironbark and stringybark eucalyptus. Hollows in dead or live trees provide preferred den sites, although nests constructed under flaking bark, in tree stumps are sometimes used (SWIFFT 2020).		2022	95	High	Many local records and suitable habitat across study area, including larger trees for denning.
EN	en	Spot-tailed Quoll (<i>Dasyurus maculatus maculatus</i>)	Has a preference for mature wet forest habitat, especially in areas with rainfall 600 mm/year. Recorded from a wide range of habitats, including: temperate and subtropical rainforests in mountain areas, wet sclerophyll forest, lowland forests, open and closed eucalypt woodlands, inland riparian and River Red Gum (<i>Eucalyptus camaldulensis</i>) forests, dry 'rainshadow' woodland, sub-alpine woodlands, coastal heathlands and occasional sightings from open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites such as hollow logs, tree hollows, rock outcrops or caves. In Victoria, mainly confined to public land, mostly in parks, reserves and state	PMST			Low	Not known to occur in landscape.

Stage 1 Strategic Biodiversity Assessment for Plan Harcourt (Amendment C94malx)

EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
			forests. Locations include: Mount Eccles NP and the Otway Ranges in south-west Victoria, Macedon Ranges north-west of Melbourne, north and east of Melbourne in the eastern highlands, sites adjacent to NSW populations, East Gippsland, particularly the upper Snowy River Valley and the Rodger River-Errinundra Plateau area, Strezlecki Range in South Gippsland, Wilson's Promontory NP, the subspecies current status at this location is unknown and Grampians NP (DAWE 2020).					

Stage 1 Strategic Biodiversity Assessment for Plan Harcourt (Amendment C94malx)

Table B-4. Likelihood of occurrence for migratory fauna identified in PMST searches

TREATY	EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
C,R,J			Fork-tailed Swift (<i>Apus pacificus</i>)	Non-breeding summer visitor to all parts of Australia from breeding grounds in Siberia. There are widespread but sparsely scattered records across Victoria. In Australia it is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. They mostly occur in flocks over open country, from semi deserts to coasts, islands, sometimes over forests or cities (Pizzey and Knight 2012).	PMST	2020	4	Low-moderate	May occasionally use airspace across study area.
B			Rufous Fantail (<i>Rhipidura rufifrons</i>)	Occurs in coastal and near coastal districts of northern and eastern Australia. Two subspecies in Australia: <i>R. r. rufifrons</i> and <i>R. r. intermedia</i> . <i>R. r. rufifrons</i> has breeding populations occurring from about the South Australia-Victoria border, through south and central Victoria. <i>R. r. intermedia</i> occurs further north. Both species overwinter during the non-breeding period in northern Australia and Papua New Guinea. In east and south-east Australia mainly inhabits wet sclerophyll forests, often in gullies with a dense shrubby understorey and often including ferns. They are recorded in a variety of other habitats while on passage (DAWE 2020).	PMST	2019	5	Low-moderate	May occasionally use area during migration.
B			Satin Flycatcher (<i>Myiagra cyanoleuca</i>)	Satin Flycatchers are migratory, moving north in autumn to spend winter in northern Australia and New Guinea. They return south in spring to spend summer in south-eastern Australia. In Victoria, the species is widespread in the south and east, in the area south of a line joining Numurkah, Maldon, the northern Grampians, Balmoral and Nelson. They are sparsely scattered on the western plains and very occasionally further north. Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests (DAWE 2020).	PMST	2020	4	Low-moderate	May occasionally utilise area during migration.
C,R,J	VU	vu	White-throated Needletail (<i>Hirundapus caudacutus</i>)	White-throated Needletails occur in Australia only between late spring and early autumn, but mostly in summer, when they sometimes form large flocks, appearing as a swirling cloud of birds. These feeding flocks may be associated with thunderstorms, the uplift of which may assist with their flight and carry insects high into the air. In Australia, they are mostly aerial, from heights of less than 1 m up to more than 1000 m above the ground, but also roost in trees. They utilise airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns and feeding companies may patrol back and forward along favoured hilltops and timbered ranges (Pizzey and Knight 2012, BirdLife Australia 2021). After breeding in eastern Siberia, north-eastern China and Japan, they leave the breeding grounds and mainly enter Australia via the Torres Strait, usually during September	PMST	2020	15	Low-moderate	Predominantly aerial species that may occasionally utilise study area.

Stage 1 Strategic Biodiversity Assessment for Plan Harcourt (Amendment C94malx)

TREATY	EPBC	FFG	Taxon	Habitat/distribution	PMST	Last rec.	No. recs	Likelihood occurrence	Likelihood reasoning
				and October, often arriving in Victoria in November and leaving Australia by April (DoE 2009).					
C,R,J			Eastern Yellow Wagtail (Motacilla tschutschensis)	A migratory bird that is a regular wet season visitor to northern Australia, also regularly visits the Hunter River region in NSW but considered a vagrant to coastal Victoria, S.A. and southern W.A. Occurs in highly variable habitat but typically utilises grassy flats near water including grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves. It breeds across broad areas in the northern hemisphere (DoE 2015).	PMST			Low	Lack of records in vicinity.
B,R,J,C		vu	Common Sandpiper (Actitis hypoleucos)	Shallow, pebbly, muddy or sandy edges of rivers and streams, coastal to far inland; dams, lakes, sewage ponds; margins of tidal rivers; waterways in mangroves or saltmarsh; mudflats; rocky or sandy beaches; causeways, riverside lawns, drains, street gutters (Pizzey and Knight 2012).	PMST			Low	Limited habitat and lack of records.
B,R,J,C	CR	cr	Curlew Sandpiper (Calidris ferruginea)	Tidal mudflats; saltmarsh, saltfields; fresh, brackish or saline wetlands; sewage ponds (Pizzey and Knight 2012).	PMST			Low	Limited habitat and lack of records.
B,R,J,C	CR	cr	Eastern Curlew (Numenius madagascariensis)	Estuaries, tidal mudflats, sandspits, saltmarshes, mangroves; occasionally fresh or brackish lakes; bare grasslands near water (Pizzey and Knight 2012).	PMST			Low	Limited habitat and lack of records.
B,R,J,C			Latham's Snipe (Gallinago hardwickii)	Freshwater or brackish wetlands, preferring to be close to protective vegetation cover (Pizzey and Knight 2012).	PMST	1991	10	Low	Limited habitat and lack of recent records.
B,R,J			Pectoral Sandpiper (Calidris melanotos)	Prefers shallow fresh waters, often with low grass or other herbage; swamp margins, flooded pastures, sewerage ponds; occasionally tidal areas, saltmarshes (Pizzey and Knight 2012).	PMST			Low	Limited habitat and lack of records.
B,R,J,C			Sharp-tailed Sandpiper (Calidris acuminata)	Tidal mudflats, saltmarshes, mangroves; shallow fresh, brackish or saline inland wetlands; floodwaters, irrigated pasture and crops; sewage ponds and saltfields (Pizzey and Knight 2012).	PMST	1980	1	Low	Limited habitat and lack of recent records.

Appendix C. EPBC Act Protected Matters Report



Australian Government

Department of Climate Change, Energy,
the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 13-Apr-2023

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar)	7
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	52
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <https://www.dcceew.gov.au/parks-heritage/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	1
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	22
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	16
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [\[Resource Information \]](#)

Name	State	Legal Status	Buffer Status
Historic			
Castlemaine Diggings National Heritage Park	VIC	Listed place	In buffer area only

Wetlands of International Importance (Ramsar Wetlands) [\[Resource Information \]](#)

Ramsar Site Name	Proximity	Buffer Status
Banrock station wetland complex	400 - 500km upstream from Ramsar site	In feature area
Gunbower forest	100 - 150km upstream from Ramsar site	In buffer area only
Hattah-kulkyne lakes	200 - 300km upstream from Ramsar site	In feature area
Kerang wetlands	100 - 150km upstream from Ramsar site	In feature area
Nsw central murray state forests	100 - 150km upstream from Ramsar site	In buffer area only
Riverland	400 - 500km upstream from Ramsar site	In feature area
The coorong, and lakes alexandrina and albert wetland	300 - 400km upstream from Ramsar site	In feature area

Listed Threatened Ecological Communities [\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area	In feature area

Community Name	Threatened Category	Presence Text	Buffer Status
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species

[[Resource Information](#)]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat likely to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat known to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat known to occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area	In feature area
FISH			
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Macquaria australasica Macquarie Perch [66632]	Endangered	Translocated population known to occur within area	In buffer area only
Nannoperca australis Murray-Darling Basin lineage Southern Pygmy Perch (Murray-Darling Basin lineage) [91711]	Vulnerable	Species or species habitat may occur within area	In feature area

FROG

Scientific Name	Threatened Category	Presence Text	Buffer Status
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area	In feature area
INSECT			
Paralucia pyrodiscus lucida Eltham Copper Butterfly [66766]	Endangered	Species or species habitat known to occur within area	In feature area
Synemon plana Golden Sun Moth [25234]	Vulnerable	Species or species habitat known to occur within area	In feature area
MAMMAL			
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area	In feature area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
PLANT			
Amphibromus fluitans River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat may occur within area	In feature area
Ballantinia antipoda Southern Shepherd's Purse [16173]	Endangered	Species or species habitat known to occur within area	In buffer area only
Caladenia audasii McIvor Spider-orchid, Audas' Spider-orchid [11727]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Caladenia concolor Crimson Spider-orchid, Maroon Spider-orchid [5505]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Caladenia formosa Elegant Spider-orchid, Blood-red Spider-orchid [24370]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Caladenia ornata Ornate Pink Fingers [76213]	Vulnerable	Species or species habitat may occur within area	In feature area
Caladenia tensa Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat may occur within area	In buffer area only
Caladenia versicolor Candy Spider-orchid [24392]	Vulnerable	Species or species habitat may occur within area	In feature area
Dianella amoena Matted Flax-lily [64886]	Endangered	Species or species habitat known to occur within area	In feature area
Dodonaea procumbens Trailing Hop-bush [12149]	Vulnerable	Species or species habitat known to occur within area	In feature area
Glycine latrobeana Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lachnagrostis adamsonii Adamson's Blown-grass, Adamson's Blowngrass [76211]	Endangered	Species or species habitat may occur within area	In buffer area only
Lepidium aschersonii Spiny Peppercross [10976]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Leucochrysum albicans subsp. tricolor Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat may occur within area	In feature area
Pimelea spinescens subsp. spinescens Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Prasophyllum frenchii Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Prasophyllum validum Sturdy Leek-orchid, Mount Remarkable Leek-orchid [10268]	Vulnerable	Species or species habitat may occur within area	In feature area
Pterostylis chlorogramma Green-striped Greenhood [56510]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pterostylis valida Robust Greenhood [64598]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Senecio behrianus Stiff Groundsel, Behr's Groundsel [14030]	Endangered	Species or species habitat may occur within area	In feature area
Senecio macrocarpus Large-fruit Fireweed, Large-fruit Groundsel [16333]	Vulnerable	Species or species habitat may occur within area	In feature area
Senecio psilocarpus Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thelymitra matthewsii Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area	In feature area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
REPTILE			
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Delma impar Striped Legless Lizard, Striped Snake- lizard [1649]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lissolepis coventryi Swamp Skink, Eastern Mourning Skink [84053]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Heritage Places			[Resource Information]
Name	State	Status	Buffer Status
Historic			
Castlemaine Post Office	VIC	Listed place	In buffer area only

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Castlemaine H80 B.R.	Natural Features Reserve	VIC	In buffer area only
Castlemaine H84 B.R.	Natural Features Reserve	VIC	In buffer area only
Castlemaine H85 B.R.	Natural Features Reserve	VIC	In buffer area only
Chewton B.R.	Natural Features Reserve	VIC	In buffer area only
Chewton H86 B.R.	Natural Features Reserve	VIC	In buffer area only
Chewton H8A B.R.	Natural Features Reserve	VIC	In buffer area only
Clinkers Hill B.R.	Natural Features Reserve	VIC	In buffer area only
Diamond Gully H8A B.R.	Natural Features Reserve	VIC	In buffer area only
Greater Bendigo	National Park	VIC	In buffer area only
Harcourt B.R.	Natural Features Reserve	VIC	In feature area
Kaweka N.C.R.	Natural Features Reserve	VIC	In buffer area only
Muckleford I135 B.R.	Natural Features Reserve	VIC	In buffer area only
Muckleford I136 B.R.	Natural Features Reserve	VIC	In buffer area only
Pilchers Bridge N.C.R.	Natural Features Reserve	VIC	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Ravenswood B.R.	Natural Features Reserve	VIC	In buffer area only
Ravenswood South B.R.	Natural Features Reserve	VIC	In buffer area only
Sandhurst	Reference Area	VIC	In buffer area only
Walmer H82 B.R.	Natural Features Reserve	VIC	In buffer area only
Walmer I138 B.R.	Natural Features Reserve	VIC	In buffer area only
Walmer I139 B.R.	Natural Features Reserve	VIC	In buffer area only
Walmer N.C.R.	Natural Features Reserve	VIC	In buffer area only
Walmer South N.C.R.	Natural Features Reserve	VIC	In buffer area only

EPBC Act Referrals [[Resource Information](#)]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Castlemaine Link Project	2011/6044	Controlled Action	Completed	In buffer area only
Castlemaine Link raw water transfer system project, Vic	2017/7877	Controlled Action	Assessment Approach	In buffer area only
The Modified Operation of the Goulburn Murray Irrigation District	2009/5123	Controlled Action	Post-Approval	In feature area
Not controlled action				
Barker Creek Reservoir Upgrade	2002/560	Not Controlled Action	Completed	In buffer area only
Extension of telecommunications facility	2004/1847	Not Controlled Action	Completed	In buffer area only
Harcourt Modernisation Project	2011/6050	Not Controlled Action	Completed	In feature area
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Regional Fast Rail Project - Bendigo Country Works Package	2002/675	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Upgrade of Calder Highway	2003/1281	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
Calder Highway upgrade	2003/1248	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
drainage, trenching and cable laying works	2003/1132	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Regional Fibre Optic Project (RFOP)	2003/978	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Referral decision				
All actions taken in response to the current severe bushfires in Victoria.	2009/4787	Referral Decision	Completed	In buffer area only
Castlemaine Link and Harcourt Modernisation Project, VIC	2011/5931	Referral Decision	Completed	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact us](#) page.

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