



PART 2 RESPONDING TO THE SCOPING REQUIREMENTS

8 Effects on Biodiversity

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8.1 Overview

8.1.1 Introduction

This chapter discusses the potential environmental effects on biodiversity during the design, construction, operation and maintenance phases of the Project. These effects would be managed through an Environmental Management Framework, as required by the Environment Effects Statement (EES) Scoping Requirements and relevant Evaluation Objectives.

This chapter has been informed by the following specialist technical reports:

- Technical Report B1 *Biodiversity Existing Conditions Assessment (WSP 2020)*
- Technical Report B2 *Biodiversity Impact Assessment (SMEC 2020)*
- Technical Report C *Arboriculture Assessment (C&R Ryder Consulting 2020)*.

This EES recognises that the Project would have impacts on key biodiversity values as a result of the proposed removal of trees, vegetation and habitat. Tree removal in particular has been identified as a significant biodiversity impact.

What is biodiversity?

For the purpose of this EES, biodiversity is defined as native flora, fauna and their habitat, including ecological communities.

A number of refinements have been made to the project design to avoid and minimise impacts on biodiversity values, including designing the Project to have as narrow a footprint as possible, retaining the two Doreen River Red Gums at the Bridge Inn Road / Yan Yean Road / Doctors Gully Road intersection, establishing no-go zones to avoid impacts on native vegetation and scattered trees, and providing for a wide median between Bannons Lane and Jorgensen Avenue to allow additional landscaping opportunities and potentially avoid impacts on existing biodiversity values such as two Matted Flax-lily plants and large trees. Impacts on native vegetation and trees are expected to be reduced further as the Project's design and construction methods continue to be refined.

To understand the potential impacts of the Project on biodiversity values, the EES technical specialists first identified and characterised existing conditions in the project area and its vicinity. This was followed by a risk assessment, which identified significant or high risks in relation to the potential removal of native vegetation, the potential impacts on threatened species and wildlife, and loss of or damage to trees.

The technical specialists identified and assessed these impacts and recommended measures to avoid, manage or minimise them. Implementing these measures would result in the Project having no significant impacts to listed species (including Swift Parrot and Grey-headed Flying-fox) or to common fauna species at a population level.

The potential for impacts to Swift Parrot has been carefully considered, as this was a key trigger for the requirement for an EES. While Swift Parrot have not been recorded in the project area and there is a low likelihood that Swift Parrot uses habitat in the project area or traverses through it regularly, measures would be taken to minimise any potential impacts on the species.

8.1.2 EES Scoping Requirements

On 14 October 2018, the Minister for Planning determined an Environment Effects Statement would be required under the *Environment Effects Act 1978* to assess the potential environmental effects of the Project.

The Scoping Requirements, including draft Evaluation Objectives for the EES, were issued by the Minister for Planning in June 2019.

The Minister determined an EES was required for the Project due mainly to the potential significant effects on biodiversity and social and cultural values as a result of the proposed clearance of a very large number of trees and habitat, including potential cumulative effects on the habitat of the Swift Parrot.

Appendix A to the Scoping Requirements sets out procedures and requirements applicable to the preparation of the EES in accordance with Section 8B(5) of the *Environment Effects Act 1978*, including the following key issues to be assessed by the EES:

- Projected traffic growth volumes and related uncertainties for Yan Yean Road and related roads in the network
- Design alternatives and refinements and their associated impacts, particularly how they avoid and minimise native tree loss with proposed locations of tree and vegetation removal, no go zones and offset requirements and a demonstration that avoid and minimise principles have been applied
- Consideration of carriageways, medians, shared pathways, footpaths, intersections and other treatments to minimise the loss of preferred foraging trees for the critically endangered Swift Parrot (*Lathamus discolor*) and avoidance of high retention value trees of ecological and cultural value.

The EES Scoping Requirements set out the following draft evaluation objective and key issues in relation to biodiversity.

Effects on biodiversity

Evaluation Objective – To avoid or, at least, minimise adverse effects on native vegetation (including remnant, planted, regenerated and large old trees), listed migratory and protected species/ecological communities and then to address offset requirements consistent with relevant state and commonwealth policies.

Key issues:

- Potential for significant effects on biodiversity values including effects associated with threatening processes listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or *Flora and Fauna Guarantee Act 1988* (FFG Act) including, but not limited to, Swift Parrot, Matted Flax-lily, Studley Park Gum and large old trees
- Potential for direct or indirect impact on vegetation and other landscape elements used by fauna listed under the EPBC Act, FFG Act and/or DELWP Advisory Lists
- Potential loss or degradation of habitat (and/or habitat connectivity) including tree hollows, existing canopy and woody debris, due to removal of trees
- Potential impacts to Matters of National Environmental Significance (MNES) through erosion, sedimentation and contamination of watercourses and groundwater near and downstream from the project area resulting from construction and operation.

8.1.3 EPBC Act assessment requirements

The Project was also referred to the Australian Government under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which provides the legal framework to protect and manage matters of national environmental significance (MNES). On 2 April 2019, the Commonwealth Minister for Environment determined that the Project was a 'controlled action'. This means the Project requires approval under the EPBC Act.

The Commonwealth Minister for the Environment decided the Project was likely to have a significant impact on the following listed threatened species:

Swift Parrot

Listed as critically endangered. The proposed action is likely to result in a loss of Swift Parrot habitat containing key and secondary foraging trees, is nearby to a known movement corridor for the species and has the potential for indirect impacts including increasing the risk of vehicle strike, noise and dust.

Matted Flax-lily

Listed as endangered. The proposed action is likely to remove two Matted Flax-lily plants, consisting of over 100 and over 75 ramets respectively, within the proposed action area.

This EES is an accredited assessment by Victoria under a bilateral agreement with the Commonwealth made under Section 45 of the EPBC Act. This agreement avoids duplicating assessment processes by allowing Victoria to assess proposals that the Commonwealth has determined are controlled actions. The Project's impacts on EPBC Act-listed MNES have been assessed through the EES process and forwarded to the Commonwealth Minister for Environment following the Victorian Minister for Planning's assessment of the EES. The information in the EES will enable the Commonwealth to make an approval decision under the EPBC Act.



8.2 Methodology

Native vegetation and trees were the priority for consideration in the EES impact assessment, given the potential significance of this habitat to threatened flora and fauna, and the importance of native vegetation to the local community. Technical Report B1 *Biodiversity Existing Conditions Report* and Technical Report B2 *Biodiversity Impact Assessment* provide detail on the methodology used to assess the presence of ecological values and ecological impacts relevant to the Project.

The project area used for each technical report is described in Chapter 5 *Project Description* and shown in Figure 5.1.

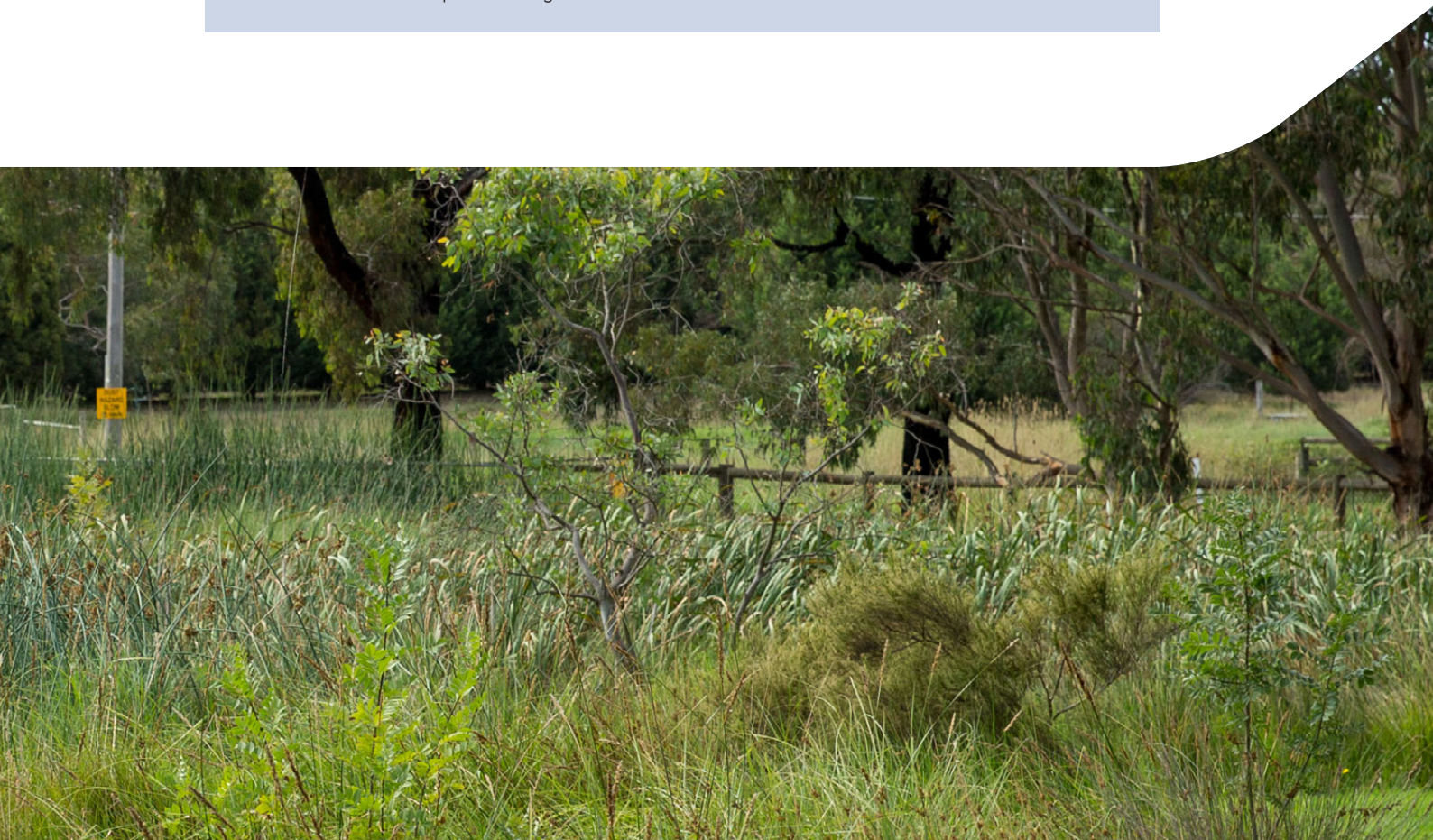
8.2.1 Existing conditions assessment

To understand the potential for the Project to impact listed threatened fauna and flora, vegetation and trees, the following existing aspects of the project area were investigated as part of the biodiversity assessment:

- The quality, type and extent of native vegetation
- The number, size and useful life expectancy of trees
- The canopy area (ha) of native trees present
- The likelihood of the habitat to support threatened flora and fauna
- The dependence of ecosystems on groundwater
- The likelihood of the Project to exacerbate key threatening processes listed under the Commonwealth EPBC Act and the Victorian FFG Act..

What are targeted surveys?

Targeted surveys entail searches for particular species, which are undertaken at the time of year the species is most likely to be detected. Some threatened flora and fauna have accepted scientific methodologies for targeted survey that have been developed into state and Commonwealth-published guidelines.



The existing conditions assessment involved the following key tasks:

- **Desktop review** of flora and fauna databases and relevant documents
- **Field assessment** of the project area to characterise the existing environment through numerous surveys undertaken between 2017 and 2020. Surveys were undertaken on roadsides and in some private properties and are detailed in Technical Report B1 *Biodiversity Existing Conditions Report*. This included:
 - Assessment and mapping of native vegetation (see example shown in Plate 1)
 - Targeted flora surveys for the following rare and threatened species:
 - › Matted Flax-lily (*Dianella amoena*)
 - › Clover Glycine (*Glycine latrobeana*)
 - › Flax-lily (*Dianella longifolia* var. *grandis*)
 - › Charming Spider-orchid (*Caladenia amoena*)
 - › Little Pink Spider-orchid (*Caladenia rosella*)
 - › Wine-lipped Spider-orchid (*Caladenia oenochila*)
 - › Veined Spear-grass (*Austrostipa rudis* subsp. *australis*)
 - › Rye Beetle-grass (*Tripogonella loliiformis*)
 - › Bamboo Spear-grass (*Austrostipa verticillata*)
 - › Bear's Ear (*Cymbonotus lawsonianus*)
 - › Pale-flower Crane's-bill (*Geranium* sp. 3)
 - › Valley Crane's-bill (*Geranium* sp. aff. *Retrorsum*) (Nillumbik)
 - › Rosemary Grevillea (*Grevillea rosmarinifolia* subsp. *rosmarinifolia*)
 - › Slender Tick Trefoil (*Desmodium varians*)
 - › Velvet Apple-berry (*Billardiera scandens*)
 - › Yarra Gum (*Eucalyptus yarraensis*)
 - › Slender Bindweed (*Convolvulus angustissimus* subsp. *omnigracilis*)
 - Fauna habitat assessments and targeted surveys for the following species:
 - › Swift Parrot (*Lathamus discolor*)
 - › Southern Toadlet (*Pseudophryne semimarmorata*)
 - › Brown Toadlet (*Pseudophryne bibronii*)
 - › Brush-tailed Phascogale (*Phascogale tapoatata*)
 - › Eltham Copper Butterfly (*Paralucia pyrodiscus lucida*)
 - › Growling Grass Frog (*Litoria raniformis*)
 - › Masked Owl (*Tyto novaehollandiae*)
 - › Powerful Owl (*Ninox strenua*)
 - › Sooty Owl (*Tyto tenebricosa*)
 - Arborist assessment of all relevant trees
- **Assessment of the potential for threatened flora and fauna to occur.** The threatened species and communities assessed were those listed under the Commonwealth EPBC Act, the Victorian FFG Act or the Victorian Rare or Threatened Species Advisory Lists (Advisory Lists) administered by the State Department of Environment, Land, Water and Planning (DELWP).

8.2.2 Risk assessment

As required by the EES Scoping Requirements, a risk-based approach was adopted to understand the Project's key risks and those impact pathways with the potential to lead to significant impacts on biodiversity values. Risk assessment and identification of key risks was ongoing as the design of the Project progressed. This included reassessing identified impact pathways and investigating additional design options to minimise impacts.

Chapter 4 *Environment Effects Statement Assessment Framework* and Attachment III *Environmental Risk Report* provide more details about the risk assessment methodology.

8.2.3 Impact assessment

An impact assessment was completed to determine the potential impacts on biodiversity values during the construction, operational and maintenance phases of the Project. This assessment involved the following:

- Detailed assessment of impacts upon ecological values in accordance with relevant legislation and policy (the Commonwealth, State and local legislation and policy relevant to this chapter are provided in Section 2.4 of Chapter 2 *Project Rationale* and in Attachment III *Legislation and Policy*)
- Calculation of impacts on Swift Parrot habitat within the project area
- Assessment of cumulative impacts on Swift Parrot
- Assessment of the likelihood of the Project to exacerbate key threatening processes listed under the EPBC Act and FFG Act
- Development of an impact avoidance, minimisation and mitigation strategy for the Project, and identification of mitigation for threatened and common species
- Determination of offset requirements for the Project in accordance with relevant guidelines, specifically the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) (the Guidelines).

Methods relevant to assessing potential impacts on biodiversity through effects of the Project on groundwater and surface water are detailed in Chapter 11 *Effects on Physical Environment*.

What are cumulative impacts?

For the purposes of this EES, cumulative impacts are defined as impacts on Swift Parrot habitat in the project area combined with other sources of cumulative stressors across its range, past and present. This EES addresses the Project in the context of other stressors and the likelihood of the Project to have a significant cumulative effect on Swift Parrot at the population level.

Plate 1 Typical fragmented vegetation and habitat within the project area

8.3 Existing conditions

The following sections summarise the existing native flora and fauna and ecological communities in the project area and surrounding landscape. Despite the project area comprising a highly modified environment, several hectares of native vegetation and threatened flora and fauna were recorded during the biodiversity existing conditions assessment and the following locations were noted to support higher quality values:

- Doreen River Red Gums at the Yan Yean Road / Bridge Inn Road / Doctors Gully Road intersection
- Native vegetation within and adjacent to Werther Park
- Studley Park Gum and Matted Flax-lily plants adjacent to Yarrambat Park
- Native vegetation between Ashley Road to Vista Court and between Laurie Street and Bannons Lane.

In addition, substantial sections of the project area support native and non-native vegetation planted for amenity purposes along public roads and within recreation reserves, which may provide foraging habitat for threatened fauna.

The project area contains minimal wetland and aquatic habitat, including constructed dams/wetlands that contain common wetland vegetation types. Several small unnamed drainage lines intersect the project area, one of which supports native vegetation. Groundwater under the project area has been recorded as deep (>60 m in the southern half).

8.3.1 Native vegetation

Approximately 20 percent of the project area supports patches of native vegetation. In some areas, larger contiguous patches of vegetation exist on adjoining larger rural blocks surrounding the project area or on public land such as the Yarrambat Park Golf Course, which supports patches of trees and dams (Plate 2). Seven Ecological Vegetation Classes (EVCs) were recorded and vegetation was generally in poor to moderate condition (refer to Table 8.1 and Figure 8.1). Four of these EVCs were identified as having potential to be groundwater-dependent, including:

- Grassy Dry Forest (EVC 22)
- Plains Grassy Woodland (EVC 55)
- Swampy Woodland (EVC 937)
- Valley Grassy Forest (EVC 47).

What are Ecological Vegetation Classes?

EVCs are a classification for Victoria's native vegetation types. They are described and categorised through floristics, lifeforms of plants and other ecological characteristics. Each EVC pertains to and has **conservation significance** within a specific **bioregion**, which are geographic areas classified using attributes such as soil, geology, climate, geomorphology and vegetation.

Plate 2 Grassy Dry Forest EVC in the project area



What are groundwater-dependent ecosystems?

Groundwater-dependent ecosystems are those that depend on groundwater for survival. They include ecosystems relevant to the project area such as wetlands and vegetation and may be either entirely dependent on groundwater for survival or use groundwater as a supplementary water source.

If the water table is lowered due to drawdown, and vegetation is deprived of groundwater, the condition of vegetation is likely to decline during times of low rainfall or periods of drought.

Table 8.1 Native vegetation within project area

No.	EVC	Bioregion	Bioregional Conservation Status	project area extent (ha)
22	Grassy Dry Forest	Highlands Southern fall	Least Concern	14.301
47	Valley Grassy Forest	Highlands Southern fall	Vulnerable	1.595
55	Plains Grassy Woodland	Highlands Southern fall	Endangered	0.295
136	Plains Sedgy Wetland	Victorian Volcanic Plain	Endangered	0.049
653	Aquatic Herbland	Highlands Southern fall	Endangered	0.172
821	Tall Marsh	Highlands Southern fall; Victorian Volcanic Plain	Not listed	0.395
Total area of native vegetation				17.31

Trees – remnant, planted, regenerated and large trees

A total of 7,030 trees and shrubs (> 3m) were recorded in the project area and adjacent 20 metre buffer zone, comprising 3,482 remnant trees and shrubs, 2,113 planted native or indigenous trees, and 1,435 exotic trees.

Remnant trees were generally typical of the EVCs within the local area. Of the remnant trees occurring within the project area and 20 metre buffer zone, 187 were large trees in patches of native vegetation, 58 were large scattered trees and 212 were small scattered trees as defined by EVC benchmarks. Two large remnant scattered trees known as the Doreen River Red Gums are of significance to the local community and are protected by local planning controls in the Nillumbik and Whittlesea planning schemes.

Trees and shrubs planted for amenity purposes, which are exempt from requiring a planning permit under clause 52.17 of the Victoria Planning Provisions in the Whittlesea and Nillumbik planning schemes, were common in the project area.

Planted trees and shrubs predominantly comprised of Australian native trees, with a smaller number of exotic trees such as pines and cypress also present. The planted trees and shrubs provide foraging habitat for wildlife, including threatened species such as Swift Parrot and Grey-headed Flying-fox, and also facilitate dispersal of fauna in the landscape by providing connectivity to adjacent areas of habitat.

What are Native trees?

Native trees are defined as those species occurring naturally in Australia, including locally indigenous remnant trees, and planted and regenerated trees that are either indigenous or Australian Native species. Remnant trees are those that have naturally established in the project area. Exotic trees are those that are introduced, and were either planted, introduced weeds or garden escapees.



Figure 8.1 Native vegetation and threatened flora - project area, Cookes Road to Orchard Road

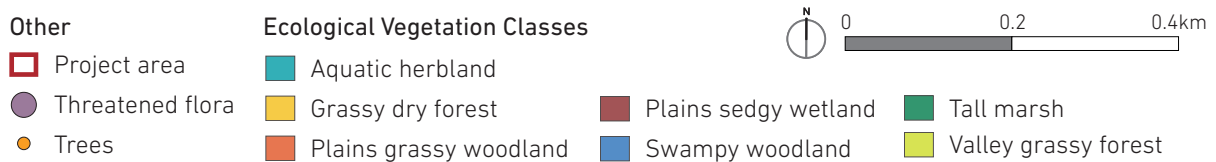


Figure 8.2 Native vegetation and threatened flora - project area, Orchard Road to Laurie Street

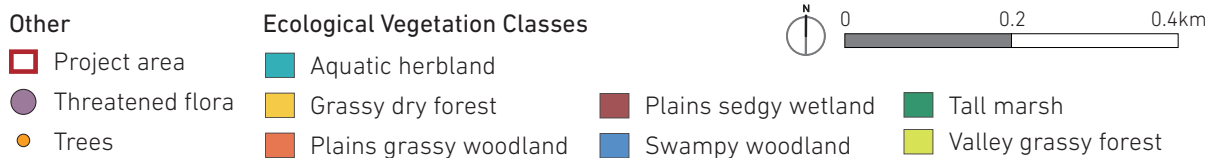
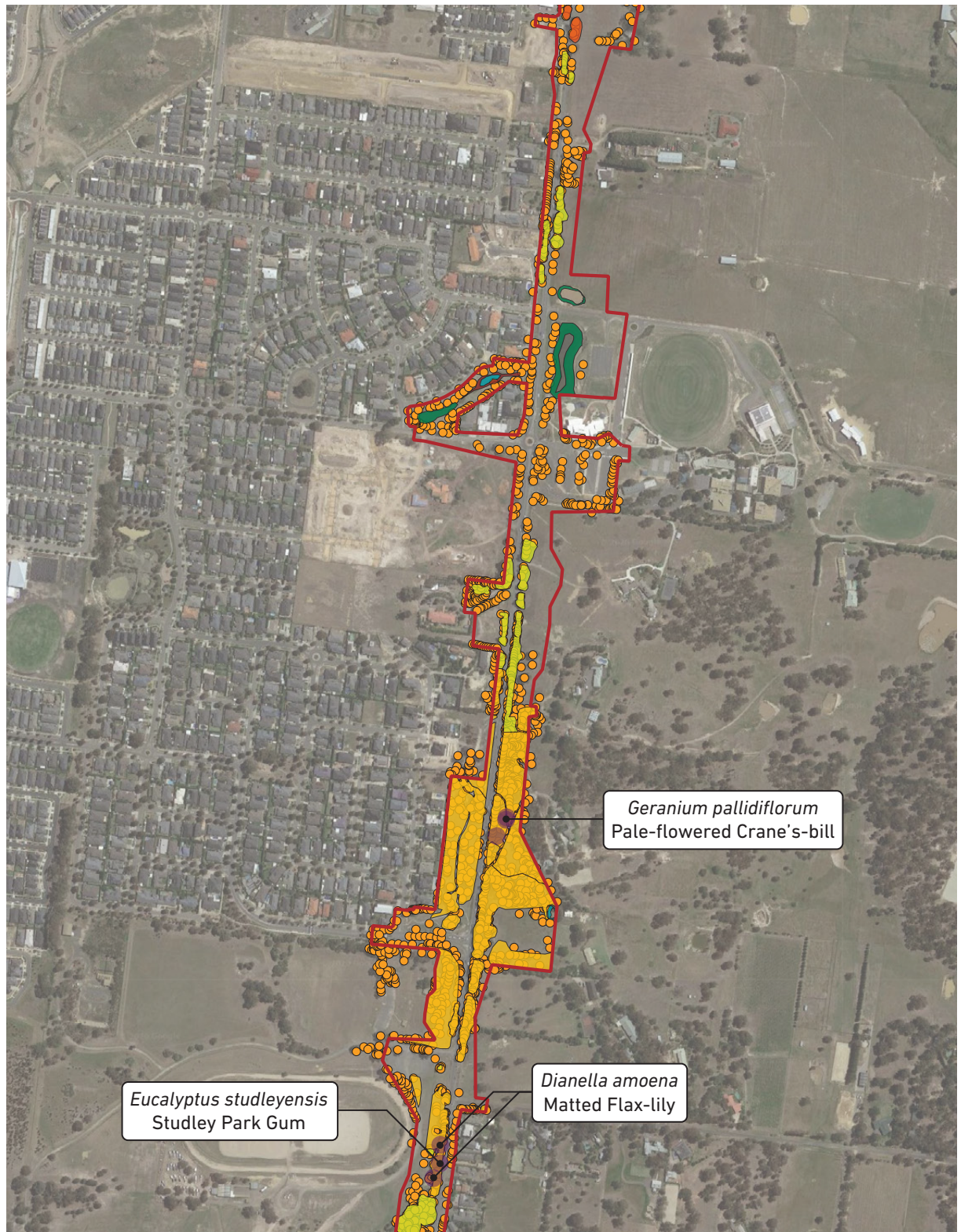
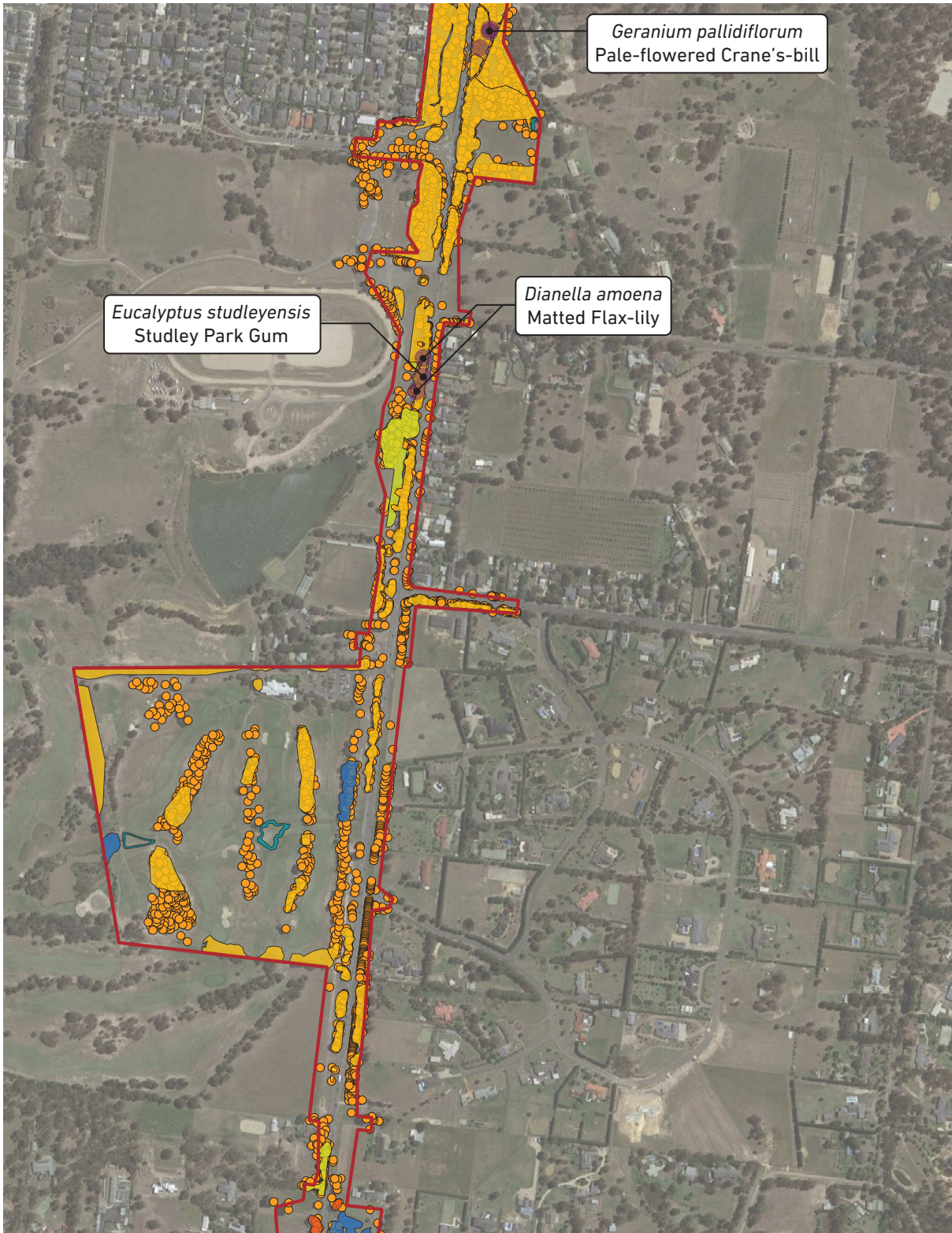


Figure 8.3 Native vegetation and threatened flora - project area, Laurie Street to Ashley Road



Other

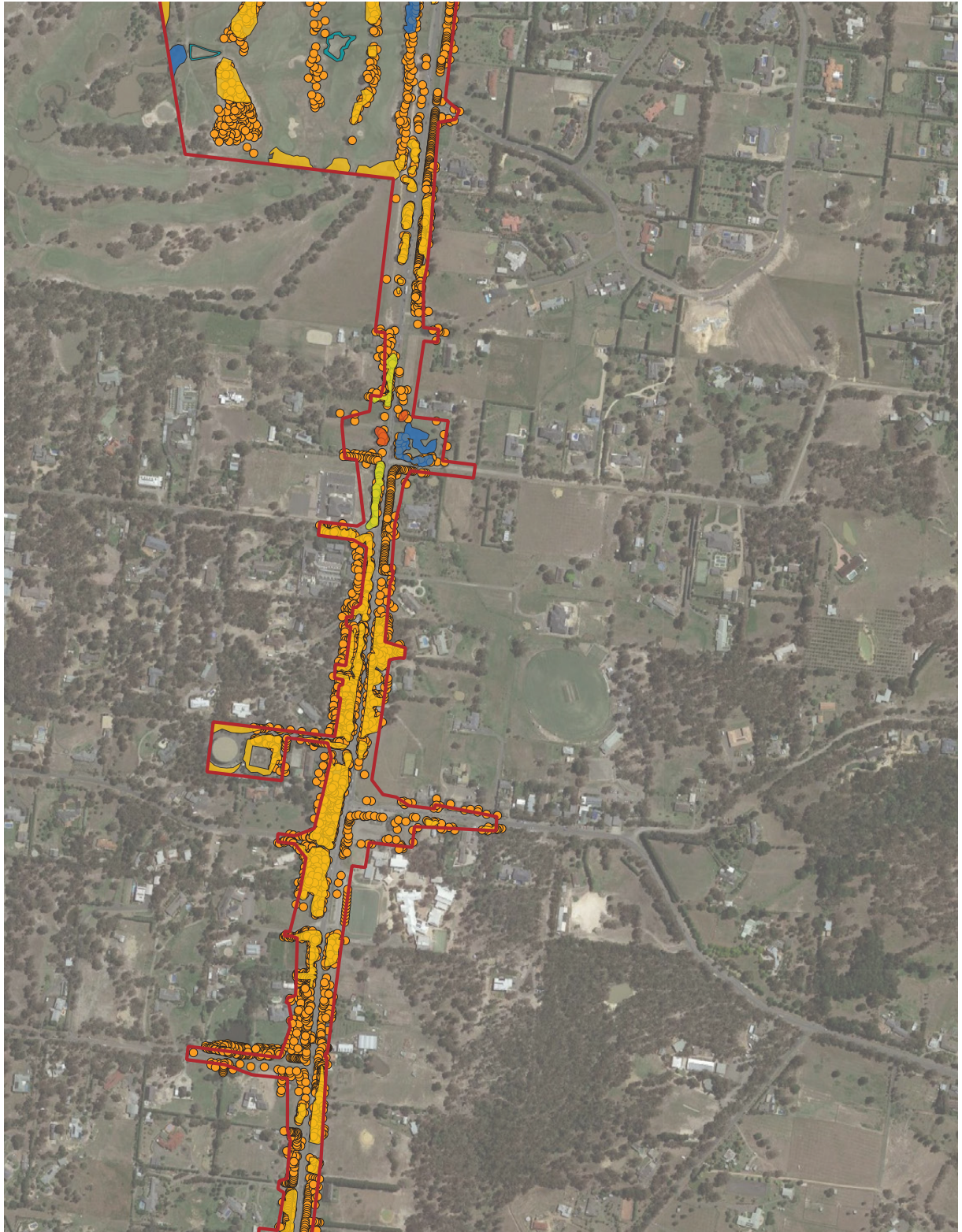
- Project area
- Threatened flora
- Trees

Ecological Vegetation Classes

- | | | |
|--|--|--|
| Aquatic herbland | Plains sedgy wetland | Tall marsh |
| Grassy dry forest | Swampy woodland | Valley grassy forest |
| Plains grassy woodland | | |



Figure 8.4 Native vegetation and threatened flora - project area, Ashley Road to North Outlands Road



Other

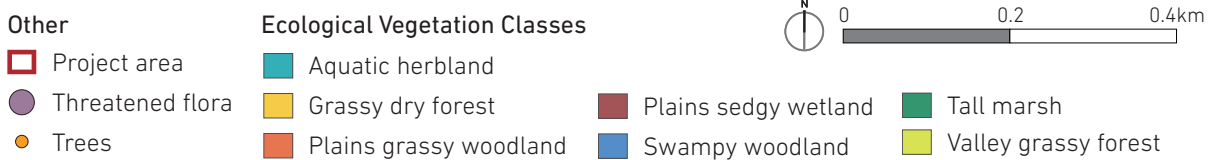
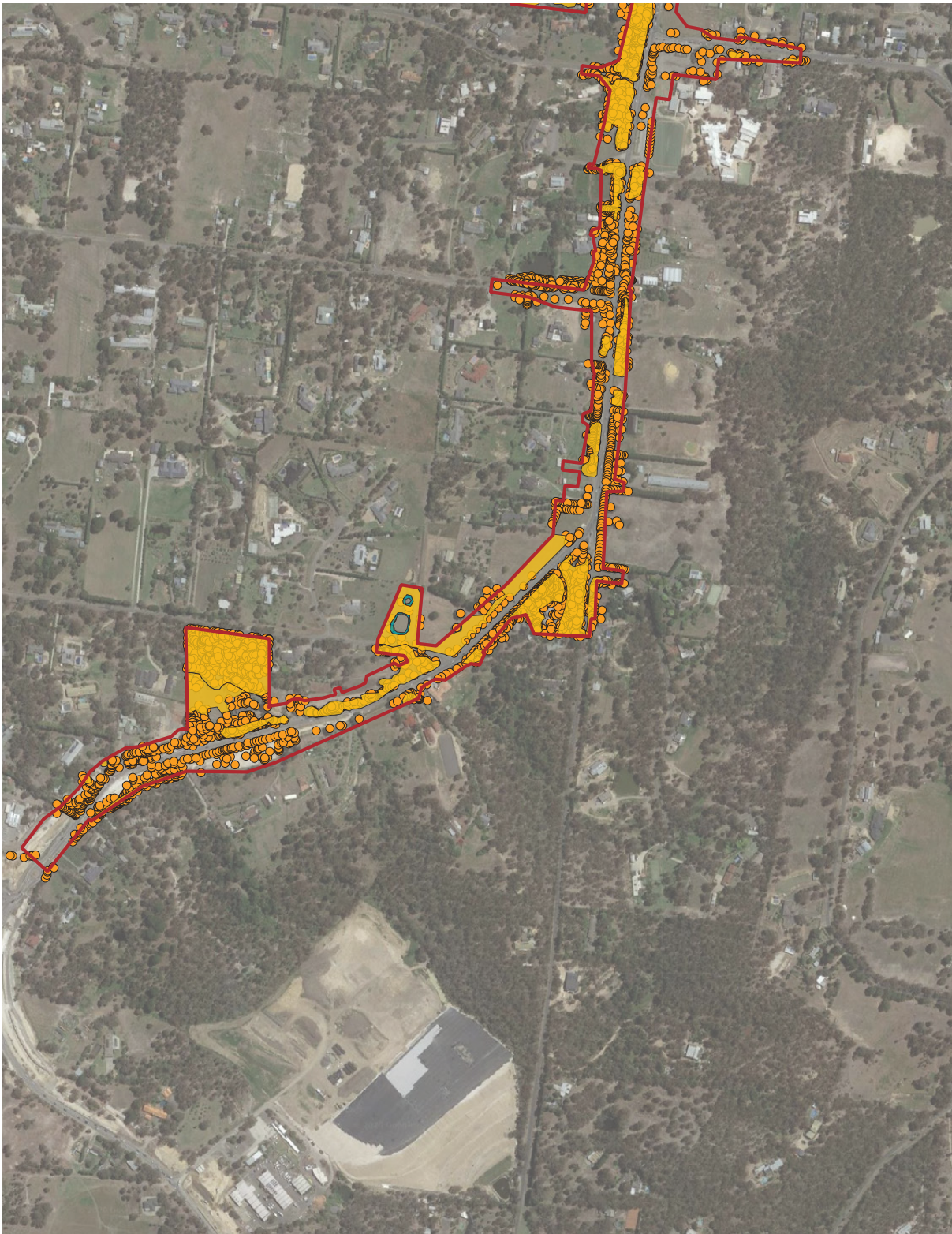
- Project area
- Threatened flora
- Trees

Ecological Vegetation Classes

- | | | |
|--|---|--|
| Aquatic herbland | Plains sedgy wetland | Tall marsh |
| Grassy dry forest | Swampy woodland | Valley grassy forest |
| Plains grassy woodland | | |



Figure 8.5 Native vegetation and threatened flora - project area, North Oatlands Road to Kurrak Road



8.3.2 Listed species and communities and their habitat

Species and ecological communities may be listed as rare or threatened under the Commonwealth EPBC Act, the Victorian FFG Act) and/or the Advisory Lists.

The EPBC Act is Australia's key legislation for protection of threatened species and ecological communities. The EPBC Act aims to conserve Australia's environment through assessing MNES. The following MNES are relevant to the project:

- Wetlands of international importance (listed as 'declared Ramsar wetlands')
- Listed threatened species and ecological communities
- Migratory species listed under international agreements.

The FFG Act is Victoria's key legislation for the conservation of Victoria's native species. The FFG Act establishes a threatened species list, a protected species list and a list of threatened 'communities of flora and fauna', to identify those species and communities that require management to conserve. Species that are 'listed' under the FFG Act are considered threatened for the purpose of this assessment. Species that are 'protected' are not considered threatened but require a permit for removal. The listed items relevant to the Project are:

- Threatened flora, fauna and communities
- Threatening processes.

The Advisory Lists are maintained by DELWP and include species listed under the FFG and EPBC Acts, and other species determined as rare or threatened by a range of experts and available data. Advisory-listed species are considered through planning assessments and the native vegetation offset process; however, they have no legal status.

Threatened communities

One threatened ecological community listed under the FFG Act was recorded: Western (Basalt) Plains Grassy Woodland. The community is synonymous with 0.233 ha of native vegetation mapped as Plains Grassy Woodland (EVC 55), which occurs as several small, fragmented patches in the northern half of the project area. These small patches were of poor quality and comprised low cover of native species in the understorey.

There were no EPBC Act-listed threatened ecological communities recorded in the project area and no declared Ramsar wetlands present within or in proximity to the project area.

Rare and threatened flora

Matted Flax-lily

The Matted Flax-lily is a small, perennial, tufted lily, with a distribution ranging from the south-west to the east of Victoria, occurring in grassland and grassy woodland habitats. This species is listed as Endangered under Commonwealth and State legislation. Much of the habitat for Matted Flax-lily has been cleared, and remaining populations of Matted Flax-lily are mostly small and highly fragmented. Current threats include ongoing clearing of habitat and weed invasion. Several known populations of Matted Flax-lily are present in the land surrounding the project area (refer to Figures 8.2 and 8.3), typically occurring within patches of native vegetation.

Two Matted Flax-lily plants were recorded within the project area, on the west side of Yan Yean Road south of Laurie Street. Matted Flax-lily plants in the project area occurred in the understorey of Grassy Dry Forest (EVC 22) vegetation, in an area where weeds dominated the groundlayer. They were considered to be in moderate condition and not dependent on sub-surface groundwater or nearby watercourses for survival.

Studley Park Gum

Studley Park Gum is a hybrid between River Red Gum (*Eucalyptus camaldulensis* subsp. *camaldulensis*) and Swamp Gum (*Eucalyptus ovata* subsp. *ovata*) which naturally occurs in suburbs in the north-eastern suburbs of Melbourne, including those within Nillumbik Shire. This species is Advisory-listed as Endangered in Victoria although is not listed under Commonwealth or State legislation. A single, large Studley Park Gum in good condition is present within the project area on the west side of Yan Yean Road south of Laurie Street, near the Matted Flax-lily plants.

Pale-flowered Crane's-bill

Pale-flowered Crane's-bill is small perennial herb and is an Advisory-listed Rare species. It is not listed under Commonwealth or State legislation. The species occupies open, grassy areas of dry forest and woodland and is known from several localities including Yan Yean. Three Pale-flowered Crane's-bill were detected on private land during targeted surveys in the vicinity of Werther Park.

Protected flora

Eight species listed as protected flora under Section 4.6 of the FFG Act were recorded in the project area. It is likely that individuals of all these species would be impacted by the Project.

Rare and threatened fauna**Swift Parrot**

Swift Parrot is a showy parrot with very fast flight speeds of up to 88 kilometres per hour. The species breeds in the eastern and south eastern parts of Tasmania during spring and summer. The breeding range closely mirrors the distribution of Southern Blue-gum (*Eucalyptus globulus*) in Tasmania and is generally scarce and fragmented. The species migrates in the autumn and winter months to south-eastern mainland Australia ranging from Victoria and the eastern parts of South Australia to south-east Queensland (shown in Figure 8.6). These are referred to as 'overwintering habitat areas'.

Swift Parrots are listed as critically endangered under the EPBC Act and listed as threatened under the FFG Act.

Each year a large proportion of the Swift Parrot population spends winter in central Victoria. Pending adequate foraging resources, the species has a preference of box-ironbark forests and they feed preferentially in the largest trees available. Swift Parrots are also often seen in town parks and occur sporadically and unpredictably across their range in dry forests, dry woodlands and wooded farmlands, and may roost in ornamental trees and shrubs.

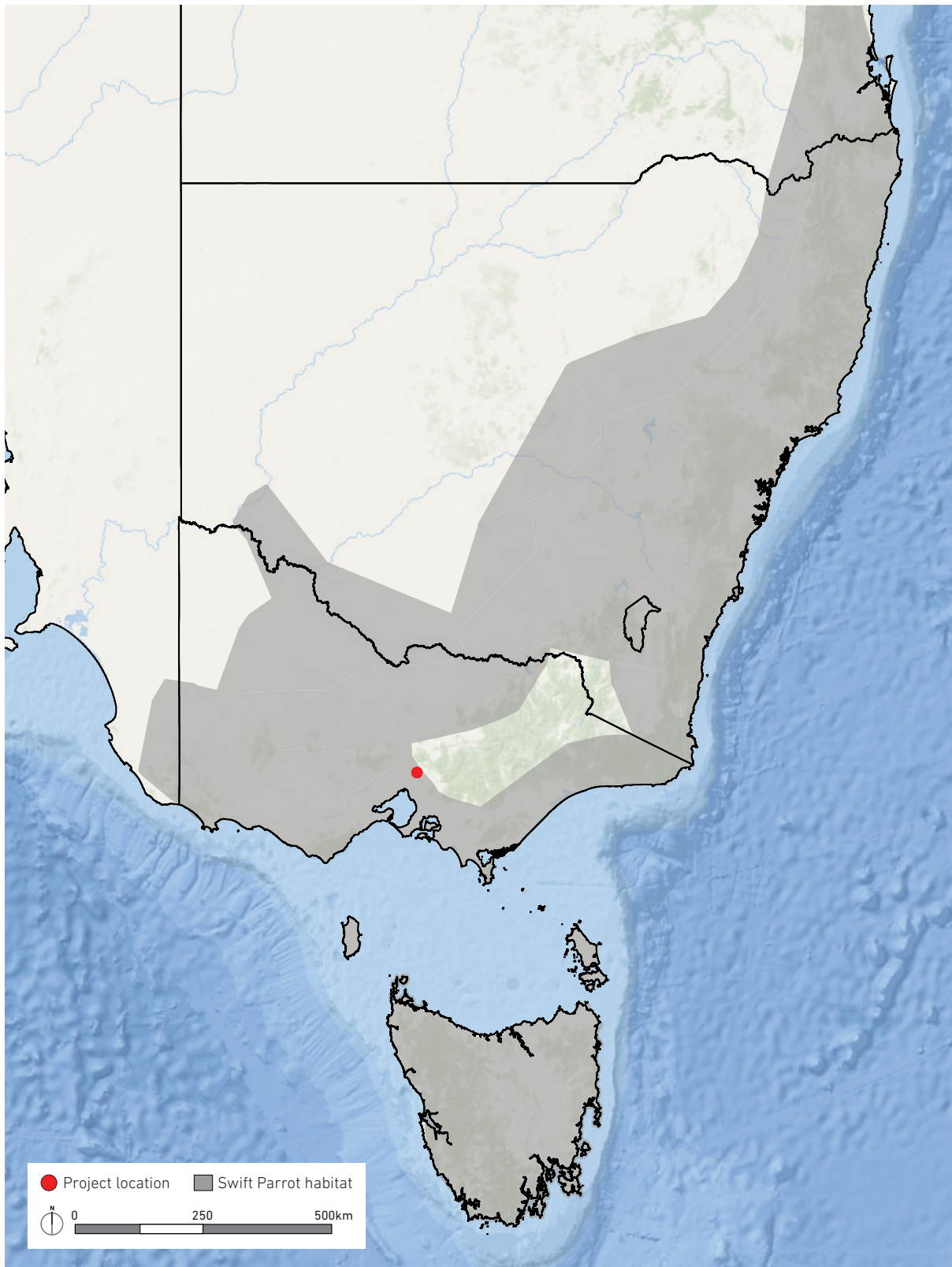
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- Swift Parrots mainly feed on nectar from flowering eucalypt species, as well as psyllids and their lerp (modified bug excrement containing sugars), other insects, flowering native shrubs such as Acacia and Banksia, seeds and fruits. In urban areas, birds feed mainly in winter-flowering eucalypts, especially Yellow Gum (*Eucalyptus leucoxylon*) and Red Ironbark (*Eucalyptus tricarpa*).
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Plate 3 **Swift Parrot foraging in a planted eucalypt in suburban Melbourne**



Photo credit: Andrew Silcocks Birdlife Australia.

Figure 8.6 Swift Parrot national distribution and annual migration direction – illustrative only, subject to change



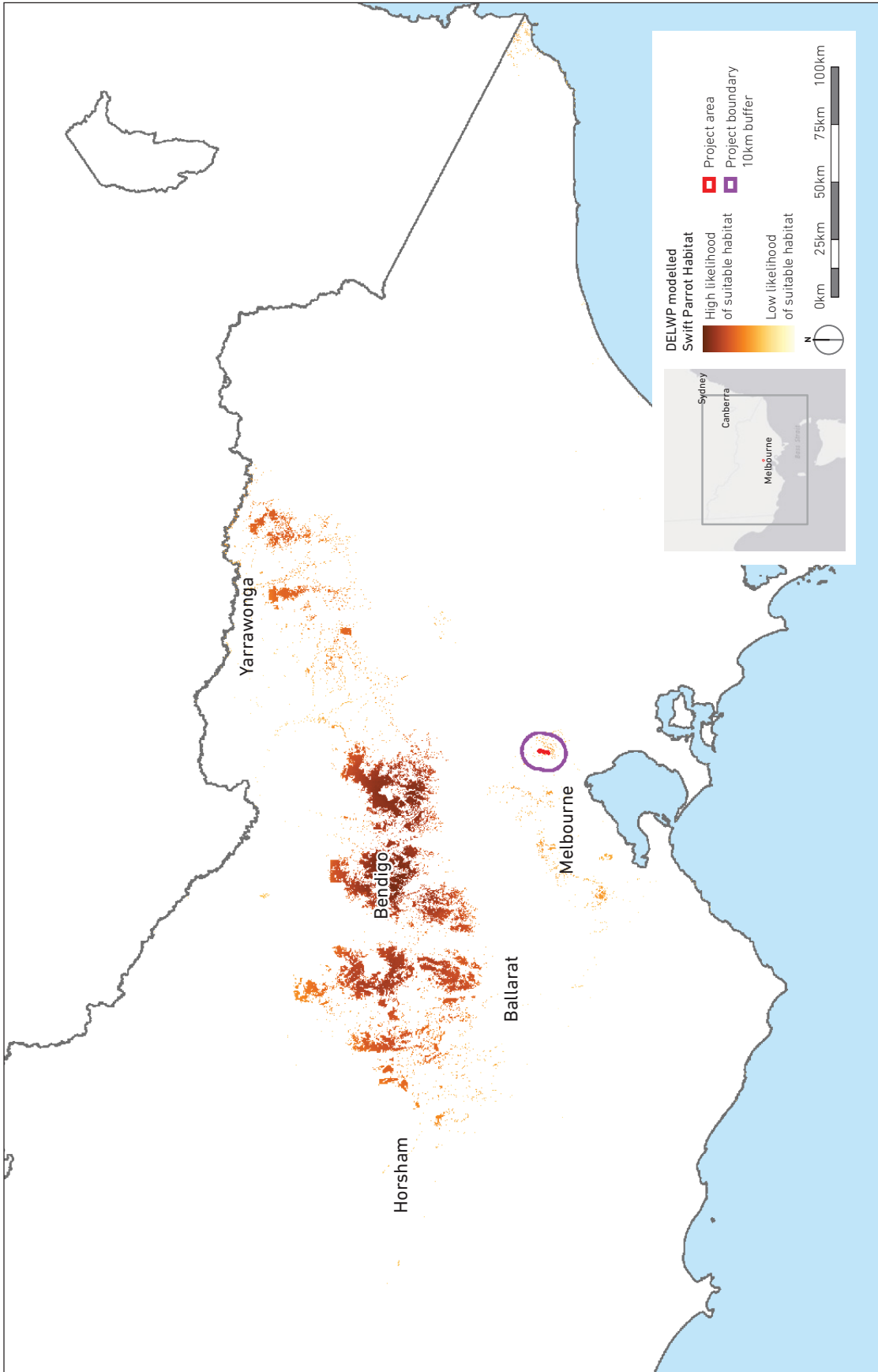
The project area (plus 20 metre buffer) supports 656 trees which are considered 'key' foraging trees for Swift Parrot. Most of these key trees are small and are dispersed throughout the study area, and foraging habitat in the study area is considered to be of low to moderate value.

While Swift Parrots may occasionally forage in trees within or near the project area, there is no evidence to suggest that trees or habitat patches within the project area are visited regularly by this species.

Swift Parrots have not previously been recorded within the project area. However, Swift Parrots are known to forage in the broader locality, specifically in the nearby Plenty Gorge parklands and the Plenty River corridor, which acts as stepping stone' habitat for the species as it migrates north to preferred box-ironbark forest habitat in central Victoria (shown in Figure 8.7) and beyond into New South Wales and Queensland.



Figure 8.7 Swift Parrot distribution model (Victoria)



Grey-headed Flying-fox

The Grey-headed Flying-fox is listed as threatened under the EPBC Act and FFG Act and have been recorded across a large distribution from central Queensland to South Australia. Numbers of Grey-headed Flying-fox across Melbourne have been increasing in recent times, likely due to loss of habitat in New South Wales and Queensland and increased tree plantings across Melbourne.

This species is highly mobile, was recorded in the project area during ecological surveys and is likely to regularly fly over and feed in the project area, although the project area is not located near a known flying fox camp. The nearest flying fox camp to the project area is located at Yarra Bend Park, where numbers of Grey-headed Flying-fox are estimated to be 30,000 during summer. This species forages on a wide range of flowering and fruiting trees and provides ecosystem services across the landscape such as seed dispersal and flower pollination. Due to its highly mobile nature this species can utilise a range of habitats across its distribution.

Brush-tailed Phascogale

This FFG Act listed threatened species is a small, nocturnal, tree-dwelling mammal. The species occupies a fragmented distribution in Victoria, including the foothills to the north east of Melbourne. This species has been recorded to the east and south-east of the project area; however, there are no records within or close to the project area and no individuals were recorded during targeted surveys. While a resident population is unlikely, the species may periodically move through the study area.

Tussock Skink

Tussock Skink prefers medium to tall grass tussocks in open grasslands where trees are absent or sparse. This species is Advisory-listed as vulnerable in Victoria but is not listed under state or Commonwealth legislation. There are two previous records for Tussock Skink south and west of the project area along the Plenty River corridor.

The small ephemeral tributaries of Plenty River that intersect the project area were assumed to possibly support Tussock Skink despite the extensive habitat fragmentation resulting in narrow, disconnected areas of remaining habitat. A small amount of poorly-connected potential habitat for Tussock Skink occurs within Grassy Dry Forest vegetation north-east of the Jorgensen Avenue intersection and areas of Plains Grassy Woodland vegetation within the project area. It is unlikely to be of substantial value to the species, if present.

8.3.3 Wildlife

In general, habitat quality in the study area is low due to fragmentation, weeds, noise and light, and suited to common fauna species tolerant of modified environments. These include the Eastern Grey Kangaroos, Eastern Long-necked Turtle, Echidna, common frog species, Swamp Wallaby, Wombat, possums, microbats and Sugar Gliders. Many common birds are also known to use the project area.

There are three broad habitat types in the project area: woodland, grassland and wetland. Woodland habitat is present as remnant native woodland and planted trees and gardens, some areas of which contain hollow-bearing trees. Grassland habitat is exotic, comprising cleared, regularly maintained areas such as public open space and reserves, and wetland habitat consists of eight dams, which contain common wetland vegetation types.

The existing Yan Yean Road currently presents a partial or complete barrier to movement for many of the smaller and less mobile fauna species in the area, including arboreal mammals. For larger mammals, particularly the Eastern Grey Kangaroo, the section of Yan Yean Road proposed to be upgraded is a roadkill hotspot.

8.4 Risk assessment

Effective environmental risk management is a continuous, collaborative and forward-looking process that anticipates potential impacts so that project related activities can be planned to avoid, minimise, manage and, where applicable, mitigate adverse impacts. Environmental risk is a function of the likelihood of an adverse event occurring and the consequence of the event.

The environmental risk assessment process was undertaken in accordance with the MRPV Environmental Risk Management Guideline (2020). Risk assessment methodology is further detailed in Chapter 4 *Environment Effects Statement Assessment Framework* and Attachment III *Environmental Risk Report*.

Mitigation measures to inform Environmental Performance Requirements (EPRs) were identified to ensure that there is a clear, unambiguous and transparent set of controls in place to guide project delivery. An Environmental Management Framework would manage environmental risk to achieve acceptable environmental outcomes in accordance with the EPRs. The consolidated list of EPRs for the Project is provided in Section 12.8 of Chapter 12 *Environmental Management Framework*.

All risk numbers, aspects, potential impact pathways and risk ratings identified for the Project have been compiled into a register, which is provided in Attachment III *Environmental Risk Report*. Key risks are defined as having an initial rating of 'significant' and above and are shown in the table below.

Table 8.2 Key risks

Risk #	Aspect	Impact pathway	Project Phase	Initial rating	EPR #	Residual rating
6, 26, 46	Ecology - Native vegetation	Potential removal, destruction or lopping of native vegetation (including patches and scattered trees)	Site establishment, earthworks, civils and structures	High	EPR E1, EPR E3	High
7, 27, 47	Ecology - Threatened species and communities, or their habitat	Potential impact on Commonwealth and/or Victorian listed threatened species and communities, or their habitat (including freshwater ecology)	Site establishment, earthworks, civils and structures	High	EPR E2, EPR E3, EPR E4, EPR E5	Significant
8, 88	Ecology - Wildlife	Potential impact on wildlife or their habitat	Site establishment, operation	High	EPR E2, EPR E3, EPR E8	Significant
28, 48			Earthworks, civils and structures	Significant	EPR E2, EPR E3	Medium
3, 23, 43	Arboriculture	Loss of or damage to remnant, planted or regenerated trees, reducing canopy cover which can affect air temperature, climate, landscape, biodiversity, aesthetic, and recreational values	Site establishment, earthworks, civils and structures	High	EPR AR1, EPR AR2, EPR AR3	Significant

8.4.1 Key listed threatening processes

The project risks identified above have been considered in the context of key threatening processes listed under the EPBC Act and FFG Act. The threatening processes considered relevant to the Project and with potential to be exacerbated by the Project are presented in the table below.

Table 8.3 Key threatening processes with potential to be exacerbated by the Project

Key threatening process	Listing
Aggressive exclusion of birds from potential woodland and forest habitat by over-abundant noisy miners (<i>Manorina melanocephala</i>)	EPBC Act, FFG Act
Competition and land degradation by rabbits	EPBC Act, FFG Act
Dieback caused by the root-rot fungus (<i>Phytophthora cinnamomi</i>)	EPBC Act
Habitat fragmentation as a threatening process for fauna in Victoria	FFG Act
Increase in sediment input into Victorian rivers and streams due to human activities	FFG Act
Infection of amphibians with chytrid fungus resulting in chytridiomycosis	EPBC Act, FFG Act
Invasion of native vegetation by Blackberry <i>Rubus fruticosus</i> L. agg.	FFG Act
Invasion of native vegetation by 'environmental weeds'	FFG Act
Land clearance	EPBC Act
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	EPBC Act
Loss of biodiversity as a result of the spread of Coast Wattle (<i>Acacia longifolia</i> subsp. <i>sophorae</i>) and Sallow Wattle (<i>Acacia longifolia</i> subsp. <i>longifolia</i>) into areas outside its natural range	FFG Act
Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases	EPBC Act, FFG Act
Loss of coarse woody debris from Victorian native forests and woodlands	FFG Act
Loss of hollow-bearing trees from Victorian native forests.	FFG Act
Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species	EPBC Act
Spread of <i>Pittosporum undulatum</i> in areas outside its natural distribution.	FFG Act
Use of <i>Phytophthora</i> -infected gravel in construction of roads, bridges and reservoirs.	FFG Act
Wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing.	FFG Act

8.5 Impact assessment

Impacts identified for the Project have been categorised according to existing biodiversity values:

- Native vegetation and trees
- Listed species and their habitat
- Wildlife.

'Avoid and minimise' was the guiding principle used when designing the Project to reduce impacts on the environment, as required under Appendix A to the Scoping Requirements.

The risk of impacts to biodiversity was assessed for both construction and operation phases of the Project. The risk ratings, following the implementation of EPRs, are provided in Table 8.2 above.

8.5.1 Native vegetation

Impacts on native vegetation have been assessed in accordance with the EES Scoping Requirements with consideration to:

- Removal or destruction of native vegetation
- Introduction and/or spread of declared weeds or pathogens.

Removal or destruction of native vegetation

The Project would impact 11.888 ha of native vegetation and 204 scattered trees. Native vegetation to be removed includes 134 large trees in patches and 40 large scattered trees. The listed key threatening process of Land Clearance is considered present in the project area.

The Project proposes to remove 0.186 ha of FFG Act-listed threatened community Western (Basalt) Plains Grassy Woodland.

Avoid

While complete avoidance of native vegetation is unachievable, avoidance of impacts on biodiversity values has been achieved in several instances, which has resulted in the proposed Project causing the least impact possible while achieving road safety and transport objectives.

The project area has been designed to be as narrow as possible while accommodating the road alignment and areas required for construction activities, while avoiding impacts on native vegetation as much as practicable (refer to EPR E1).

Five intersection design options (Options A-E) were developed in response to the project objectives and existing conditions at the Bridge Inn Road / Yan Yean Road / Doctors Gully Road intersection, including effects on biodiversity such as the Doreen River Red Gums. Refer to Section 3.3.1 (Key design developments) of Chapter 3 *Project Development* for further detail on the design development process. Following community consultation and in response to additional arboriculture advice on the Doreen River Red Gums, the Project has been designed to retain these two trees.

A total of 144 no-go zones have been developed in collaboration with design engineers during the Project's design phase to avoid impacts on native vegetation and scattered trees. No-go zones of note include:

- Twenty no-go zones at Yarrambat Park Public Golf Course, comprising patches of Swift Parrot habitat containing key habitat trees
- Three no-go zones within the Yarra Valley Water pump station area north of Vista Court, which would protect the majority of Grassy Dry Forest (EVC 22) within this land which also contains secondary habitat trees for Swift Parrot
- The parcel of land owned by Department of Transport, containing Grassy Dry Forest (EVC 22) vegetation, and foraging trees for Swift Parrot
- The northern half of Werther Park, containing Grassy Dry Forest (EVC 22) vegetation and key and secondary habitat trees for Swift Parrot
- Private land opposite Werther Park at 790A Yan Yean Road. The majority of native vegetation within this property would be protected
- Wetland vegetation within Orchard Park at Orchard Road, containing habitat for common fauna species
- Secondary Swift Parrot habitat trees on private property south east of the intersection of Yan Yean and Doctors Gully Roads.

Minimise

Prior to the EES, extensive work was undertaken to minimise the width of the project area and reduce impacts to biodiversity values. For example, the design includes a 2.2 metre centre median (instead of the standard 6 metres), a shared walking and cycling path only on the western side of the road, and use of 2:1 batters instead of the standard 4:1 to reduce the overall project footprint.

Total loss of native vegetation is considered to be a conservative estimate (an upper limit) given that impacts may be reduced during the ongoing design process (including possible refinements to the entire road design and the selection of site compounds and material laydown areas) and through the choice of construction methods.

The Project has put considerable additional effort into minimising biodiversity impacts. EES Chapter 3 *Project Development* details the design options and alterations that were examined, including those specifically considered to reduce the Project's impacts on native vegetation and trees, most notably Swift Parrot habitat and/or threatened flora. For example, incorporating retaining walls has reduced the requirement to clear high-quality native vegetation and habitat, resulting in a reduction in width of the clearing footprint.

The Project's later design and construction phases would establish additional no-go zones to minimise the impact on native vegetation and trees during construction (refer to EPR E1 and EPR E3). The Project would also further reduce its impact on native vegetation during the construction phase through the implementation of a Construction Environmental Management Plan (CEMP).

Native vegetation that would be retained in the project area and areas adjacent to the new road would be enhanced by supplementary planting as part of the Project's landscape works. Landscape plantings would use plants belonging to EVCs naturally occurring in the local area and favour species used by native fauna, including threatened species.

Offset

Native vegetation unable to be retained during the design and construction phases would be offset according to the Guidelines (refer to EPR E1). The amount of native vegetation required to be offset for the Project is presented in Table 8.4 and discussed in detail in Technical Report B2 *Biodiversity Impact Assessment*.

Table 8.4 Project offset requirements**Native vegetation offsets required for the Project**

General offset amount	4.478 general units
Vicinity	Port Phillip and Westernport CMA or Nillumbik Shire, Whittlesea City Council
Minimum strategic biodiversity score	0.423
Large trees to be offset	127
Species offset amount	1.861 species units of habitat for Little Pink Spider-orchid (<i>Caladenia rosella</i>)
Large trees	47 trees
Total number of large trees that the offset must protect	174

Trees – remnant, planted, regenerated and large

The construction of the new section of Yan Yean Road would impact a total of 4,777 trees, including 3,680 native trees (including remnant, planted and regenerated trees) and 1,097 exotic trees. A total of 174 large trees would be impacted (40 scattered large trees and 134 large trees in patches).

The Project prioritised retention of indigenous trees due to their ecological importance and significance to the local community. These were retained through design refinements wherever possible.

Several design options were considered to avoid impacts to trees:

- The current design for the Yan Yean/Bridge Inn/Doctors Gully roads intersection, which avoids impacting the two Doreen River Red Gums
- The addition of a retaining wall at four locations: Ironbark Road, Jorgensen Avenue, Service Road A (between Vista Court and Ashley Road) and north of North Oatlands Road.
- The establishment of 144 no-go zones, which would be protected during construction of the Project by appropriate fencing.

Following construction, trees retained in the project area and resultant canopy cover would be supplemented through landscape planting.

Introduction and/or spread of introduced weeds or pathogens

Project construction works create the potential to spread weeds and pathogens, which could negatively impact the quality of remnant vegetation. During construction, activities such as clearing native vegetation, stockpiling materials and exposing bare ground create disturbed, fragmented areas that are more susceptible to invasion by weeds and pathogens. Weeds and pathogens may be lodged and transported in construction plant and equipment and then driven through the project area. Plant and equipment used within the project area also have the opportunity to spread weeds and pathogens to other areas causing potential infestations further afield.

Construction works would be subject to management requirements for weeds and pathogens such as vehicle hygiene protocols and a spoil management plan, which would be incorporated into the Project CEMP. The potential impact of introduction or spread of weeds and pathogens and potential for the Project to exacerbate key associated EPBC Act and FFG Act-listed threatening processes is considered low, provided the relevant EPRs are implemented (refer to EPRs EMF2, E3, E7 and E8).

8.5.2 Listed threatened species and their habitat

The Project proposes to remove native vegetation that provides potential habitat for threatened species. No listed threatened species that forages or disperses in the project area is expected to frequently use habitat with water courses, such as unnamed drainage lines, or be groundwater-dependent.

Threatened species that are likely to use the project area for foraging sporadically are unlikely to be adversely impacted by habitat removal; however, the loss of dispersal, foraging and nesting opportunities caused by the Project may affect some threatened species populations where alternative habitats are unavailable. As there is no known breeding or roosting habitat for threatened fauna species in the project area, and therefore no habitat in the project area is expected to be critical for the survival and persistence of threatened fauna.

It is considered unlikely that groundwater would be intersected during construction or that dewatering would be required. The potential for regional groundwater to be impacted by fuel or chemical spills is considered unlikely given groundwater is deep within the project area. Standard construction activity controls are expected to be sufficient to control potential contamination and, as such, impacts to potential habitat for listed threatened species and MNES due to groundwater contamination is considered low (refer to EPR GW1).

The unnamed drainage lines that intersect the project area are unlikely to provide habitat for listed threatened species. Potential degradation of these drainage lines due to construction activities resulting in erosion, sedimentation and contamination is unlikely to impact threatened species or other MNES.

Impacts on listed threatened species and their habitat have been considered according to each listed species and the following themes in the EES Scoping Requirements:

- Removal or destruction of habitat
- Disturbance or alteration of habitat conditions
- Initiating or exacerbating potentially threatening processes listed under the EPBC and FFG Acts
- Introduction and/or spread of declared weeds or pathogens.
- Impacts caused by water quality changes within and downstream of project area.

Swift Parrot

The potential for impacts to the Swift Parrot as a result of tree loss was a key trigger for the requirement for an EES. The Project would cause the removal of 354 key and 1,239 secondary Swift Parrot foraging trees, including 88 large trees. Trees of the relevant species that were dead or in poor or very poor health as rated by the arborist assessment for the Project (refer to Technical Report C *Arboriculture Assessment*) were not included as key or secondary Swift Parrot foraging trees.

The removal of this habitat may reduce foraging opportunities for the species; however, annual observed habitat use by Swift Parrot over the last 10 years occurs outside the project area in higher quality habitat areas. The Project would not remove or impact any critical foraging or breeding habitat for the species. In the local area, Swift Parrot largely use the Plenty River corridor for foraging when migrating to core habitat areas in central and north eastern Victoria. The species breeds exclusively in Tasmania.

Construction works would create temporary noise, dust, light and vibration within the project area that may further reduce the value of extant habitat. The project area is not known to support Swift Parrot on a regular basis, and the use of habitat within the project area by Swift Parrot would likely be of a short duration if used at all. The potential drift of light, noise and dust into areas of known preferred habitat at Plenty Gorge Parklands is not likely if works are conducted in accordance with a CEMP (refer to EPR EMF2, E2 and E4).

Construction works resulting in temporary additional noise, light and vibration are considered unlikely to affect the recovery of Swift Parrot. Increased light and noise during the operation of the Project are unlikely to be a deterrent to Swift Parrot in using available habitat within the project area, as they have been recorded foraging in eucalypts in busy suburban carparks in Melbourne (Glen Waverly 2011, Macleod 2015, Bundoora 2017), and typically use habitat in the Melbourne area for a short time before moving further north into central Victoria.

Due to their rapid flight behaviour, Swift Parrot mortality due to collisions with vehicles and man-made structures is a key threat for the species. Collision mortality is most deleterious where populations are concentrated during the species' breeding season in Tasmania. Yan Yean Road traffic volumes are expected to increase moderately once the upgraded road is in operation; however, as Swift Parrot is an infrequent visitor to the project area and wider study area, the rate of vehicle strike due to the Project is not expected to increase proportionately. Traffic volumes during operation are unlikely to have a significant impact on the species or interfere with its recovery.

Swift Parrot are also susceptible to collision with vehicles and other infrastructure, such as the proposed 30-36 metre high and 360 metre long fence at Yarrambat Park Golf Course to prevent golf ball collisions with motor vehicles. The projected increase in vehicular traffic along Yan Yean Road may lead to an increase in bird mortality through collisions, while the high fence poses a risk to foraging birds that may potentially use foraging habitat in proximity to the fence.

Despite the low likelihood that Swift Parrot utilises habitat in the project area or traverses through the project area regularly, there is potential for Swift Parrot to collide with vehicles and the proposed golf course fence. To reduce potential impacts on Swift Parrot due to collision resulting in trauma and death, the proposed fence would not be constructed using chain mesh or barbed wire (refer to EPR E2).

The fence would be constructed using materials that are elastic. Woven polymer fabrics containing Kevlar have been used to construct fences at Ringwood Public Golf Course and Centenary Park Golf Course (refer to EPR E4 and Technical Report B2 *Biodiversity Impact Assessment*).

Habitat fragmentation is a threatening process for Swift Parrot as well as being a listed threatening process generally, and the Project would exacerbate this at a local level. Habitat fragmentation resulting from tree loss as part of the Project is very small compared to the total Swift Parrot habitat distribution area across Victoria (refer to Technical Report B2 *Biodiversity Impact Assessment*) and the threat of reduced connectivity is likely to be low for Swift Parrot given its high mobility and the continued presence of higher quality habitat in the local area.

Swift Parrot is not reliant on canopy cover to move across the landscape; however, it is reliant on the presence of winter-flowering trees in the Melbourne area to provide food resources after arriving on the Australian mainland. The Project would reduce a very small amount of preferred Swift Parrot foraging habitat (EPR E1).

The potential impact on Swift Parrot habitat due to the key threatening processes of introduction or spread of weeds and pathogens and is also considered low, provided the EPRs and measures in Attachment V *Swift Parrot Management Plan* are implemented (refer to EPR E7). Seed collection from Swift Parrot-preferred foraging species in the project area would be undertaken prior to construction. Landscape plantings undertaken following construction would supplement removed foraging trees with Swift Parrot-preferred species, noting that these would take several years to reach maturity and become foraging resources (refer to EPR E6).

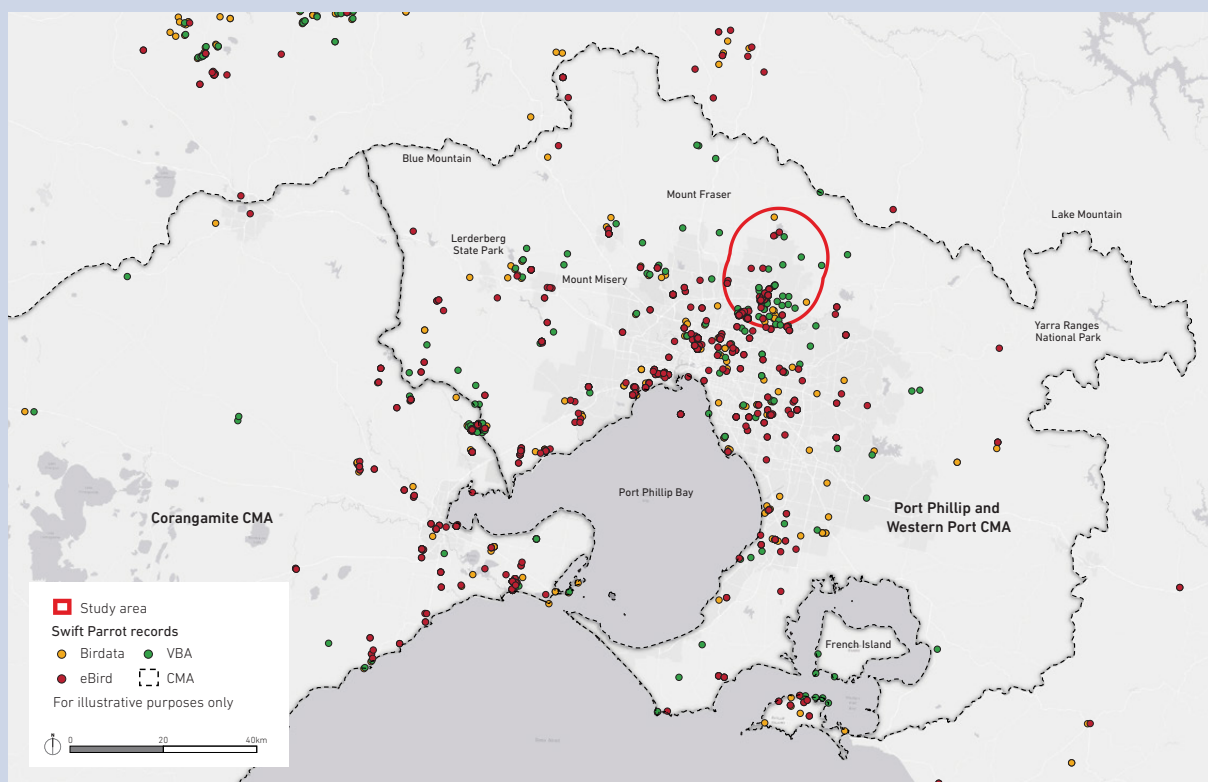
The introduction of weeds and pathogens during construction has the potential to prevent these plantings from growing to maturity and flowering. This risk is considered to be low if works are conducted in accordance with the EPRs. The Project is not expected to have a significant impact on Swift Parrot when assessed against the EPBC Act Significant Impact Guidelines (Refer to Appendix C of Technical Report B2 *Biodiversity Impact Assessment* [SMEC 2020]).

Swift Parrot: assessment of cumulative impacts

The entire Swift Parrot population migrates each year from its breeding grounds in Tasmania to overwintering areas of mainland Australia (refer to Figure 8.6). Availability of intact key habitat across its entire range is necessary to sustain the population. While Swift Parrots spend the majority of their overwintering time in central Victoria, habitat in the Melbourne area is important in providing sustenance to birds as they arrive on the mainland from their flight across Bass Strait. This habitat is briefly occupied and considered a 'stepping stone' to core habitat areas of box-ironbark forest in central and north-eastern Victoria, and western slope and coastal forests in New South Wales.

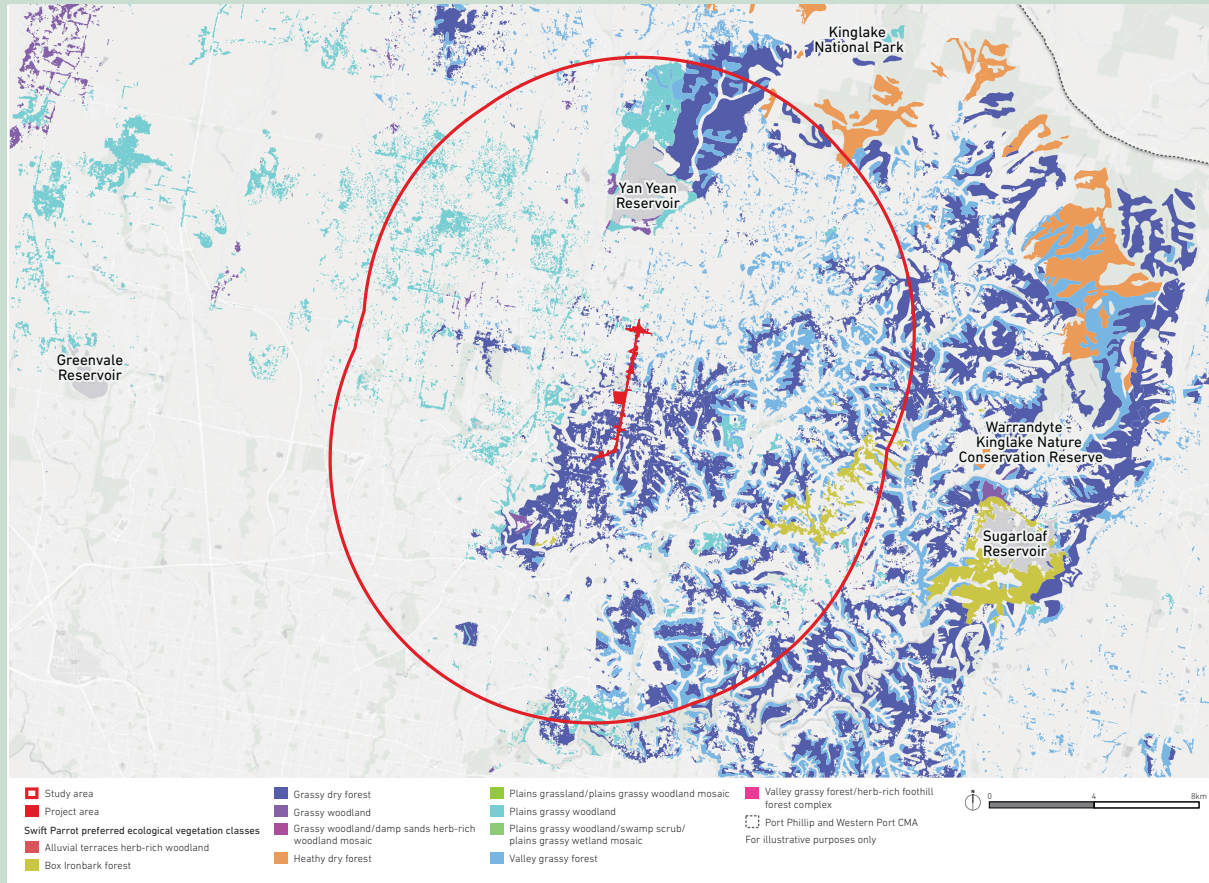
The potential for the Project to have a cumulative impact on Swift Parrot was considered in terms of the importance of habitat in the project area in the context of the wider region, and the likelihood and frequency of Swift Parrot to use habitat in the project area. Swift Parrot has not been recorded within the project area and this habitat is not considered critical to the species in the context of the EPBC Act Significant Impact Guidelines. The species is consistently recorded in higher quality protected habitat within the Plenty River corridor to the west of the project area, and dry forests and woodland along the Yarra River and Diamond Creek (as shown below).

Figure 8.8 Swift Parrot records within the Melbourne region – illustrative only, subject to change



Several infrastructure projects designed in the past five years have removed or proposed removal of Swift Parrot habitat within a 10 kilometre radius of the project area. These projects, in conjunction with the Project, are considered unlikely to have a significant cumulative effect on Swift Parrot due to the value of habitat within these project areas being lower than the preferred and regularly used habitat areas by the species (the river corridors referred to above).

Several factors affecting the Swift Parrot population were considered in conjunction with those causing reductions in potential habitat area within and surrounding the project area. Loss of Tasmanian Blue Gum in Tasmania due to forestry and bushfire has caused ongoing loss of breeding habitat and significantly reduced the area of occupancy for Swift Parrot. Historic clearing of box-ironbark forests in Victoria and New South Wales has greatly reduced the area of key foraging habitat across the species' mainland range. Areas of key habitat in these dry forests that are not protected in parks or reserves are at risk of future clearing, meaning Swift Parrot may be required to travel further to find suitable resources during their overwintering period on the mainland, potentially reducing the fitness of the population.

*Swift Parrot: assessment of cumulative impacts – continued***Figure 8.9** Swift Parrot habitat in the local Yan Yean area – illustrative only, subject to change

Swift Parrot breeding success has been severely impacted by predation of Swift Parrot young by Sugar Gliders. This Australian native mammal is an introduced species in Tasmania and eats Swift Parrot eggs, chicks and even adult birds. An estimated 85 percent of the Swift Parrot population is at risk of being killed by Sugar Gliders annually, which drastically increases adult mortality and significantly decreases the reproductive success of the species. The impact of Sugar Gliders was identified by the Commonwealth's Threatened Species Scientific Committee as a key threat to the Swift Parrot in reviewing its listing under the EPBC Act in 2016.

Cinnamon Fungus (*Phytophthora cinnamomi*) causes dieback of native flora and is known to occur within key 'stepping stone' habitats for Swift Parrot such as Plenty Gorge and the Brisbane Ranges in central western Victoria. Dieback results in reduction in the area of key habitat and an increase in the distance Swift Parrots are required to travel for foraging resources. Another likely contributor to future reduction or changes in distribution and physiology of habitat is climate change. Having to travel an additional distance for food resources would place greater strain on Swift Parrot population health.

Habitat fragmentation caused by the Project and other preferred habitat clearing within the species' range provides additional opportunity for colonisation by aggressive nectivorous birds such as the Noisy Miner, which can reduce overall habitat value through exclusion. Widening and duplication of roads and development of peri-urban and rural areas has the potential to increase Swift Parrot collisions with vehicles, buildings, netting and windows, which is known to kill 2 percent of the Swift Parrot population each year. Psittacine Beak and Feather Disease (Pbfd) is a widespread, lethal parrot disease (Department of Environment and Heritage 2005) that is known to occur in Swift Parrots and has been recorded in nestlings in the Tasmanian breeding areas.

Conclusion

The available habitat for Swift Parrot within the project area is considered to be of low to moderate value, and the majority of the trees proposed to be lost are secondary foraging species that flower during spring and summer when Swift Parrot are largely in Tasmania.

Taking into account local landscape variation in preferred tree species cover as a result of previous and proposed developments, the removal of trees in the project area was considered insignificant in the context of:

- Extensive areas of higher quality and protected habitat in the local area and greater Melbourne region
- Significant, pervasive impacts continuing to occur in the species breeding range
- Climate change related changes in habitat suitability and foraging resource availability
- Continued decline and fragmentation in preferred overwintering habitat in central and north eastern Victoria, the western slopes, central coast and coastal regions in New South Wales and south east Queensland.

Vegetation and preferred foraging tree species losses resulting from the Project are unlikely to contribute to a cumulative impact on the Swift Parrot population. Further detailed analysis is presented in Technical Report B2 *Biodiversity Impact Assessment*.

Grey-headed Flying-fox

Removal of native vegetation and trees during construction is expected to remove foraging habitat occasionally used by Grey-headed Flying-fox. Clearing and resultant habitat fragmentation would not impact breeding habitat for the species, as their nearest breeding camp is located 20 kilometres south-west of the project area. Grey-headed Flying-fox is expected to be able to use any flowering eucalypt tree in the project area and, as such, has the potential to use up to 3,978 trees for foraging.

The Project proposes to remove 2,521 of these trees. As there is adequate suitable foraging habitat outside the project area, the removal of these trees would not significantly impact Grey-headed Flying-fox. Landscape plantings undertaken following construction would include trees likely to be used by Grey-headed Flying-fox (refer to EPR E6).

The noise, light and vibration disturbance caused during construction would not significantly impact Grey-headed Flying-fox, due to its breeding camp being located 20 kilometres south-west of the project area, its use of habitat in the project area being sporadic and the extensive areas of alternative habitat being available to the species outside the project area. Additional noise from vehicles and lighting during operation of the upgraded Yan Yean Road is not expected to significantly impact Grey-headed Flying-fox as the species is an infrequent visitor to the project area.

Grey-headed Flying-fox are also susceptible to collision with fences, such as the proposed 30-36 metre high fence at Yarrambat Park Golf Course. Despite the species being an infrequent visitor to the area, the high fence poses a risk to Grey-headed Flying-fox that may potentially use foraging habitat in proximity to the fence. To reduce potential impacts on Grey-headed Flying-fox, the proposed fence would be constructed using materials that are elastic rather than using chain mesh or barbed wire (refer to EPR E2).

Grey-headed Flying-fox has the potential to be impacted by the introduction of pathogens such as Cinnamon Fungus and Myrtle Rust, which is a listed key threatening process. With the implementation of appropriate vehicle hygiene protocols, spoil management and minimising soil movement on site, impacts to Grey-headed Flying-fox would be avoided (refer to EPR E3 and E8).

Habitat to be retained during the Project's operation phase must be managed and protected to limit further impacts to foraging habitat for Grey-headed Flying-fox. Landscape plantings would comprise native species to reduce long-term impacts on available foraging habitat. The Project is not expected to have a significant impact on Grey-headed Flying-fox when assessed against the EPBC Act Significant Impact Guidelines (Refer to Appendix C of Technical Report B2 *Biodiversity Impact Assessment*).

Brush-tailed Phascogale

Removal of habitat during construction has the potential to reduce dispersal opportunities for Brush-tailed Phascogale, predominantly where Yan Yean Road intersects with Jorgensen Avenue. The Project would not impact known breeding habitat or areas of high quality, critical habitat for the species.

Temporary disturbance caused by additional light, noise and vibration during construction would result in negligible impacts on Brush-tailed Phascogale given its likely infrequent use of the project area. The species does not rely on habitat in the project area for breeding or regular use and, as such, ongoing alteration of habitat conditions during operation phase from noise, light and vibration are likely to be minor.

Potentially threatening processes caused by construction such as habitat fragmentation would occur in an already highly fragmented landscape; however, these processes may impact the way that Brush-tailed Phascogale interacts with the project area and its ability to disperse to other areas of foraging habitat. The Project would result in the removal of hollow-bearing trees, which is a potentially threatening process for animals that use hollows for breeding such as Brush-tailed Phascogale; however, as Brush-tailed Phascogale is not known to breed in the project area the potential impact is negligible.

The construction phase has the potential to exacerbate habitat fragmentation if weeds and pathogens are introduced to the project area and establish during operation phase. This may result in the decline in remaining habitat within the project area. If mitigation controls such as vehicle hygiene protocols, spoil management and minimising soil movement on site, impacts to Brush-tailed Phascogale would be avoided (refer to EPR E3).

Tussock Skink

Vegetation removal during construction is expected to remove one small, isolated fragment of high-quality habitat and several areas of low-quality habitat for Tussock Skink. Given that Tussock Skink is extremely unlikely to use any habitat within the project area due to its lack of connectivity to the Plenty River corridor, the Project is unlikely to impact Tussock Skink.

Matted Flax-lily

Two Matted Flax-lily were recorded in the project area and these would potentially be impacted by construction works, however there is potential opportunity to retain these plants through the design of the wide median at later stages of the Project (refer to EPR E1). If removed, the two Matted Flax-lilies would be translocated to a site containing suitable habitat in accordance with a salvage and translocation plan. The plan would be prepared in consultation with DELWP and to the satisfaction of DAWE if plants are confirmed impacted and include monitoring over time to assess the success of translocation (refer to EPR E5). The Project is not expected to have a significant impact on Matted Flax-lily when assessed against the EPBC Act Significant Impact Guidelines (Refer to Appendix C of Technical Report B2 *Biodiversity Impact Assessment*).

Studley Park Gum

The Project is likely to remove the Studley Park Gum. Impacts would be minimised as much as possible during design, and the tree would be offset in accordance with the Guidelines. Mitigation measures for impacts to Studley Park Gum include collecting seed from the tree to be removed if fruiting capsules are present prior to construction, to propagate and use during landscaping works post construction.

Pale-flowered Crane's-bill

The Project would cause removal of the three Pale-flowered Crane's-bill occurring within the project area. However, this is not expected to have a significant impact on the species. This removal would be offset according to the Guidelines (refer to EPR E1).

8.5.3 Wildlife

The Project is likely to impact common fauna, which are likely to reside within, or regularly use, habitats contained within the project area, with the key impact being habitat loss. In addition to direct removal of habitat, retained habitat may become degraded during the construction phase of the Project due to erosion and sedimentation, weed incursion and dust. Increased noise, light and vibration may also deter fauna from using habitats directly adjacent to the project area during construction. Standard mitigations measures included in the Project's Construction Environmental Management Plan (refer to EPR EMF2) would protect areas of retained vegetation throughout construction.

Following completion of construction of the Project, current impacts to wildlife are likely to be exacerbated due to the widening of the road (a movement barrier) in addition to increases in traffic movement and street lighting. These impacts include injury and direct mortality from collision with vehicles, increased disturbance from noise and light, further fragmentation of habitat and barriers to movement, increased predation and habitat degradation through weed incursion and litter, and displacement from established territories.

Common bird and bat species may also be impacted by the proposed 30-36 metre high and 360 metre long fence to be built at Yarrambat Park Golf Course. The fence poses a potential barrier to movement for aerial species moving in an easterly or westerly direction, and for those foraging in the general area. Golf course netting is usually constructed of a woven polymer fibre and black in colour which reduces its visibility at night and is therefore a potential issue for species which are nocturnal. While there is a general lack of collision or entanglement data relating to ongoing impacts of large-scale netting, evidence suggests that the majority of common fauna species become conditioned to the presence of the structure once installed, and some species even using them for perching and playful intraspecies interactions.

Mobile ground-dwelling fauna such as kangaroos, wallabies, echidnas and wombats would be particularly susceptible to the increased barrier of the road and road infrastructure by either being deterred to cross entirely, becoming trapped within the road corridor or vehicle strike. Revegetation works will avoid planting kangaroo foraging habitat near the road corridor to avoid exacerbating risk of vehicle strike (Refer to Section 6.6.11 of Technical Report G *Landscape Strategy*). The increased width of the road corridor would also reduce potential movement of arboreal fauna through the canopy between patches of retained habitat either side of Yan Yean Road. These species include possums, gliders and potentially Brush-tailed Phascogale. Smaller mammals, reptiles and amphibians are less likely to be impacted by the loss in connectivity as the existing road is likely to already act as a significant movement barrier to these species.

The existing fragmentation and past disturbance of land surrounding the project area is likely to have already disrupted gene flow of fauna populations. Despite this, the Project has the potential to create an additional barrier to gene flow for fauna, affecting long-term population viability. Mitigation measures to manage impacts on common fauna would include the installation of fauna bridges for arboreal mammals, fauna sensitive lighting and targeted signage to alert motorists to crossing fauna (refer to EPR E2).

Fauna crossings would be placed in areas connected to wildlife habitat corridors, as identified in Figure 5.5 in Technical Report B1 *Biodiversity Existing Conditions Assessment* (refer to EPR E8). Other measures would be investigated during the Project's design phase (and potentially trialled) to minimise collision risk (refer to EPR E2).

The introduction or spread of weeds and pathogens such as Cinnamon Fungus (*Phytophthora cinnamomi*) has the potential to cause decline of habitat for wildlife and, in the case of Amphibian Chytrid Fungus and Psittacine Circoviral (beak and feather) Disease, cause physical decline of wildlife. While the Project has potential to exacerbate these key threatening processes, the risk is considered low provided the EPRs are implemented.

8.5.4 MNES Assessment

An assessment of potential impacts of the Project on MNES listed as threatened under the EPBC Act has been undertaken against criteria for critically endangered, endangered and vulnerable matters presented within the Matters of National Environmental Significance Significant impact guidelines 1.1 (DoE 2013). The results are presented below, and a detailed presentation of this assessment is provided in Appendix C of Technical Report B2 *Biodiversity Impact Assessment* (SMEC 2020).

Swift Parrot – listed as Critically Endangered

The Project is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- **Lead to a long-term decrease in the size of a population – low likelihood.** There are no confirmed records of Swift Parrot from the project area, and the project area is not considered to comprise important habitat for the species. The potential loss of preferred foraging trees will not lead to a long-term decrease in the size of the Swift Parrot population. Any potential impacts to the Swift Parrot population resulting from the loss of preferred foraging trees would be minimal in the context of continued availability of higher quality habitat availability in the greater Melbourne area.
- **Reduce the area of occupancy of the species – low likelihood.** There are no confirmed records of Swift Parrot from the project area, and the project area is not considered to comprise important habitat for the species. The species does not currently occupy or depend on potential habitat within the project area, nor depend on habitat within the project area for routine movement between Tasmania and core habitat areas further into mainland Australia. Therefore, the potential loss of preferred foraging trees will not reduce the area of occupancy of the Swift Parrot.
- **Fragment an existing population into two or more populations – low likelihood.** Swift Parrots are highly mobile and cover large distances and occupy a variety of core habitat areas when in mainland Australia. The population of Swift Parrot can migrate across mainland Australia in smaller cohorts in various suitable habitat types and locations. The proposed Yan Yean Road Stage 2 upgrade will not result in fragmentation of the Swift Parrot population.
- **Adversely affect habitat critical to the survival of a species – low likelihood.** Preferred foraging trees within the project area are not currently utilised by the species. Despite consistent observations of Swift Parrot in the wider study area over the past six years, the species has not been observed using preferred foraging trees within the project area. Potential habitat provided by these tree species is not critical to the survival of the Swift Parrot. Potential habitat provided by preferred foraging trees does not comprise breeding habitat, core overwintering habitat or priority habitat as listed in the species recovery plan.
- **Disrupt the breeding cycle of a population – low likelihood.** Swift Parrot breed in Tasmania, and as such the proposed Yan Yean Road stage two upgrades will not disrupt the breeding cycle or breeding activity of the species.
- **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline – low likelihood.** Potential habitat provided by preferred foraging trees within the project area does not constitute important habitat for Swift Parrot. Potential habitat provided by these tree species is not critical to the survival of the Swift Parrot. Potential habitat available for Swift Parrot within the project area is considered to be of low - moderate value. Low-moderate value habitat are defined as: 'Areas of lower quality habitat which may have some potential use for opportunistic foraging and movements on an irregular basis'; Moderate value habitat, potentially useful for opportunistic foraging and roosting in some years (14 large preferred foraging trees); Low value habitat, limited potential for opportunistic foraging and movements on an irregular basis (74 large secondary foraging trees, 340 small preferred foraging trees and 1,165 small secondary foraging trees). Proposed removal of preferred and secondary foraging trees within the project area will not result in a decline of Swift Parrot.
- **Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat – low likelihood.** The project area is situated in a highly modified, urbanised landscape. An abundance of common aggressive nectarivorous birds are already present in the area. European Honeybees are also already present in high numbers in the area. Given the prevalence of residential development and existing residential land parcels along Yan Yean Road, free ranging domestic and feral cats are expected to be prevalent. Relevant listed threatening processes are the introduction and spread of the Large Earth Bumblebee, competition from feral honeybees and predation by cats. The Project is unlikely to result in an increase in numbers of invasive or pest species that are not already present.

- **Introduce disease that may cause the species to decline – low likelihood.** Psittacine Beak and Feather Disease is a known threat to the Swift Parrot and a listed Commonwealth threatening process. The Project is unlikely to introduce or exacerbate this disease.
- **Interfere with the recovery of the species – low likelihood.** Based on available information, there is no evidence of Swift Parrot using or being dependent on preferred foraging trees within the project area. The Project will result in the removal of potential foraging habitat for Swift Parrot within the project area and a small net loss of potential habitat in the greater Melbourne region. Preferred foraging species within the project area have been assessed to be of moderate quality and, other than remnant Yellow Box Eucalyptus melliodora, preferred foraging trees for the species are identified as having been planted, albeit many of them being locally indigenous. Based on the local context, preferred foraging trees within the project area are considered to be areas of low to moderate value habitat that are potentially useful for opportunistic foraging and roosting in some years. Habitat present does not constitute 'habitat critical to the survival of a species or ecological community'. Extensive areas of known and potential Swift Parrot habitat remain within the region and the potential loss of preferred foraging trees in the project area is not significant relative to the area of surrounding habitat within protected reserves and public land. The Project will not interfere with the recovery of Swift Parrot.

Based on the above assessment, the Project is not expected to have a significant impact on Swift Parrot.

Matted Flax-lily – listed as Endangered

The Project is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- **Lead to a long-term decrease in the size of a population – low likelihood.** Two Matted Flax-lily plants were recorded in modified, fragmented Grassy Dry Forest vegetation subject to historical and ongoing road maintenance activities. This is likely to be a small, isolated population. The project area is not listed as a known significant site for the species or considered to provide important habitat for the species.
- **Reduce the area of occupancy of the species – low likelihood.** The Project will reduce the area of occupancy for the species within the project area boundary (two plants) but is not considered to reduce the area of occupancy of Matted Flax-lily such that the species would decline.
- **Fragment an existing population into two or more populations – low likelihood.** The Project will remove two Matted Flax-lily plants, which are believed to be the only population of Matted Flax-lily in the project area. No fragmentation of a larger, important population will occur.
- **Adversely affect habitat critical to the survival of a species – low likelihood.** The project area contains disturbed, fragmented areas of native vegetation and is not listed as an important known site in the National Recovery Plan for Matted Flax-lily (Carter 2010) or considered critical habitat.
- **Disrupt the breeding cycle of a population - low likelihood.** The Project will not disrupt the breeding cycle of Matted Flax-lily.
- **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline - low likelihood.** The Project may remove habitat containing the two Matted Flax-lily plants, and similar habitat within the project area boundary. There are no other known Matted Flax-lily plants within the project area, and therefore the removal of this habitat would not be considered to be detrimental such that the species would decline.
- **Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat – low likelihood.** The Project may result in the invasion of weeds including declared and environmental weeds. The habitat for Matted Flax-lily within the project area is already highly modified and contains weeds.
- **Introduce disease that may cause the species to decline – low likelihood.** The Project has potential to introduce and spread *Phytophthora cinnamomi* in the project area. Given that the population in the project area is small and isolated, decline of the plants in the project area (if retained) would not result in decline of the species.
- **Interfere with the recovery of the species – moderate likelihood.** Removal of habitat is a key threat to Matted Flax-lily (Carter 2010), and the Project may not be able to retain Matted Flax-lily in situ. Given that the population in the project area contains two plants in a small, isolated population, removal of these plants would interfere with recovery of the species to a small extent only, and not within a known important population for the species.

Based on the above assessment, the Project is not expected to have a significant impact on Matted Flax-lily.

Grey-headed Flying-fox – listed as Vulnerable

The Project is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- **Lead to a long-term decrease in the size of an important population of a species – low likelihood.** There are no roosting sites in the vicinity of the project area. Individuals would fly over the project area on a routine basis in their nightly search for foraging resources. The loss of 2,521 large trees represents a reduction in available nectar producing trees in the local area but will not lead to a decline in an important population of Grey-headed Flying-fox. The Project will not lead to any decrease in the size of an important population of Grey-headed Flying-fox.
- **Reduce the area of occupancy of an important population – low likelihood.** The project area is not recognised as important habitat for Grey-headed Flying-fox. The Project would not reduce area of occupancy for an important population of this species.
- **Fragment an existing important population into two or more populations – low likelihood.** Grey-headed Flying-fox are highly mobile and widely distributed in south eastern and eastern Australia. Proposed works within the project area would not fragment any known important populations.
- **Adversely affect habitat critical to the survival of a species – low likelihood.** Grey-headed Flying-fox are highly mobile and widely distributed in south eastern and eastern Australia. Individuals travel long distances from breeding colony locations each night in search of foraging resources. As such, Project will not adversely affect habitat critical to the survival of Grey-headed Flying-fox.
- **Disrupt the breeding cycle of an important population – low likelihood.** There are no known breeding colonies of Grey-headed Flying-fox in the local area. The Project will not result in the disruption of an important population of the species.
- **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline – low likelihood.** Grey-headed Flying-fox are well known to be opportunistic foragers and will forage in a range of flowering eucalypt species regardless of their provenance, as well as a variety of planted fruit trees around the greater Melbourne region. While the Project will result in removal of eucalypts of various species in the local area, given the relatively low number of individuals likely to utilise these trees on a routine basis, their removal is highly unlikely to result in the decline of the species.
- **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat – low likelihood.** The project area is situated in a highly modified, urbanised landscape. Given the prevalence of residential development and existing residential land parcels along Yan Yean Road, free ranging domestic and feral cats are expected to be prevalent. Further, predation by domestic or feral animals is not recognised as a key threatening process for Grey-headed Flying-fox. It is highly unlikely that the Project would result in any invasive species becoming established in the local area.
- **Introduce disease that may cause the species to decline – low likelihood.** Disease is not listed as a threatening process for Grey-headed Flying-fox. Given the relatively low number of individuals likely to utilise habitat within the project area it is highly unlikely that the Project will result in the introduction of disease that would cause species decline.
- **Interfere substantially with the recovery of the species – low likelihood.** The Project will not interfere with the recovery of Grey-headed Flying-fox.

Based on the above assessment, the Project is not expected to have a significant impact on Grey-headed Flying-fox.

8.6 Environmental Performance Requirements

This EES includes an Environmental Management Framework (refer to Chapter 12 *Environmental Management Framework*) which provides a transparent and integrated framework for managing environmental risk for the Project. It contains Environmental Performance Requirements, which set the environmental outcomes that must be achieved to minimise impacts during design, construction and operation.

Initial EPRs were prepared for the Project to inform the environmental risk assessment. This performance-based approach defines the legislative requirements, standards, limits and processes that the Project must meet, while still providing flexibility to accommodate minor modifications during the design process – provided the outcomes specified in the EPRs are achieved. These initial EPRs were based on standard requirements and measures that are typically incorporated into construction contracts for road projects.

In developing the EPRs, the following hierarchy of control was used to identify potential mitigation and management measures:

- Avoidance through design refinements
- Minimisation through timing of the activities
- Mitigation or management through physical/engineering controls
- Mitigation or management through operational controls
- Induction, training and awareness
- Monitoring and measurement
- Adaptive management and contingency protocols.

EPRs relevant to biodiversity have been grouped by Evaluation Objective and are shown in Table 8.4.

Table 8.5 Environmental Performance Requirements

Performance objective	Applicable legislation, policy and guideline	EPR Code	Environmental Performance Requirement	Project phase
Effects on biodiversity – To avoid or, at least, minimise adverse effects on native vegetation (including remnant, planted, regenerated and large old trees), listed migratory and protected species/ecological communities and then to address offset requirements consistent with relevant state and commonwealth policies.				
<p>Ecology</p> <p>To avoid where possible, and otherwise minimise adverse impacts on native vegetation and listed migratory and protected species / ecological communities, and their habitat</p> <p>To address relevant offset requirements consistent with state and commonwealth policies</p>	<p><i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) (EPBC Act)</p> <p><i>Planning and Environment Act 1987</i></p> <p>Guidelines for the removal, destruction or lopping of native vegetation (DELWP, 2017)</p> <p><i>Flora and Fauna Guarantee Act 1988</i></p> <p>Australian Standard 4970-2009 Protection of Trees on Development Site</p>	E1	<p>Native vegetation</p> <p>Develop and implement measures to avoid where possible, and otherwise minimise impacts on native vegetation through detailed design and construction, including:</p> <ul style="list-style-type: none"> Minimising footprint and disturbance of temporary and permanent works, such as through detailed design of: <ul style="list-style-type: none"> The wide median between Bannons Lane and Laurie Street The Bridge Inn Road intersection The Jorgensen Avenue intersection The Youngs Road roundabout The Yarra Valley Water pump station relocation The walking and cycling path in Werther Park The walking and cycling path built within Tree Protection Zones At the Bridge Inn Road intersection, the Doreen River Red Gums will be retained. A Tree Protection Management Plan is required to protect trees during construction (see also EPR AR3) Further minimisation of native tree loss during detailed design, prioritising retention of large and hollow-bearing trees Trees for which the Project will impact <10% of the Tree Protection Zone (TPZ) are likely to be able to be retained. For these specific trees, once construction methods are better known, a detailed arborist assessment must be conducted Implement the no-go zones identified in EES Attachment VI <i>Map Book</i>. <p>Native vegetation removal must be offset in accordance with DELWP's Guidelines for the removal, destruction or lopping of native vegetation 2017 (DELWP 2017c).</p>	Design and construction

Performance objective	Applicable legislation, policy and guideline	EPR Code	Environmental Performance Requirement	Project phase
Continued: Ecology	<p><i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) (EPBC Act)</p> <p><i>Planning and Environment Act 1987</i></p> <p><i>Flora and Fauna Guarantee Act 1988</i></p> <p><i>Wildlife Act 1975</i></p> <p>MRPV Fauna Sensitive Road Design Guideline (2020)</p>	E2	<p>Flora and fauna - design</p> <p>Design the Project to avoid and otherwise minimise impacts, to the extent practicable, on listed species and ecological communities, the Studley Park Gum, wildlife and their habitat, including:</p> <ul style="list-style-type: none"> Utilising the MRPV Fauna Sensitive Road Design Guideline (2020) to incorporate fauna sensitive design, including: <ul style="list-style-type: none"> Use of fauna-friendly fencing where fencing is required where possible (avoidance of chain-mesh fencing and barbed wire). If non-metal mesh fencing is required, it must be designed to minimise collision risk Use of fauna-sensitive lighting where lighting is required Avoidance of transparent materials in the construction of bus shelters, barriers, fencing, and signage to minimise the potential for birds or other fauna to collide with them Targeted signage to minimise roadkill and investigation of other measures during detailed design which may be trialled to minimise collision risk, particularly for Eastern Grey Kangaroos Providing rope bridges in key connectivity areas for arboreal mammals, to be installed as early as practicable during construction. 	Design and construction
Continued: Ecology	<p>Australian Standard 4970-2009 Protection of Trees on Development Sites</p> <p>MRPV Fauna Sensitive Road Design Guideline (2020)</p> <p><i>Catchment and Land Protection Act 1994</i></p>	E3	<p>Flora and fauna – construction</p> <p>The CEMP must include requirements and methods in accordance with the MRPV Fauna Sensitive Road Design Guideline (2020) for avoiding, or where avoidance is not feasible, minimising impacts on flora and fauna, including:</p> <ul style="list-style-type: none"> Contingency and reporting procedures for the event that a listed threatened species is identified in order to mitigate any potential for significant impacts on the listed threatened species. Protection of all vegetation inside and adjacent to the project area (where the Tree Protection Zone intersects the project area) that is not required to be removed, provided that such measures should be limited to activities undertaken inside the project area 	Design and construction

Performance objective	Applicable legislation, policy and guideline	EPR Code	Environmental Performance Requirement	Project phase
Continued: Ecology	Continued: As above	Cont. As above	<ul style="list-style-type: none"> Fencing no-go zones (refer to Attachment VI <i>Map Book</i>) to prevent access during construction Vegetation clearing controls and protection measures, including protocols such as pre-clearing surveys, two-stage clearing, minimised clearing during spring where practicable, and phased removal wherever practicable (see also EPR V1) Pruning of trees to be retained must not exceed one third of total canopy area. Pruning and removal of trees must only be conducted following pre-clearance surveys, in the presence of an ecologist Measures during clearing and construction including weed and disease hygiene, pathogen mitigation, management, monitoring and reporting measures to reduce weed introduction and spread Fire risk management measures Development and implementation of a Tree Protection Management Plan for protection of retained trees (see also EPRs AR2 and AR3) Development and implementation of protocols around the handling of fauna during construction Retention of dead, declining, or impacted trees for habitat where appropriate and practicable Minimise impacts of construction lighting through consideration of siting, direction and fixtures Egress points for fauna (particularly kangaroos) in construction fencing. Construction personnel to report fauna entrapment and traffic control to slow or stop vehicles when wildlife is sighted to minimise collision risk Trench management, including avoiding open trenches overnight where practicable. Where trenches cannot be closed, check trenches for fauna early in the morning. 	Continued: As above

Performance objective	Applicable legislation, policy and guideline	EPR Code	Environmental Performance Requirement	Project phase
Continued: Ecology		E4	<p>Swift Parrot Management Plan</p> <p>Implementing the mitigation measures specified in the Swift Parrot Management Plan, including:</p> <ul style="list-style-type: none"> Using existing stacksites and existing road formation for material lay down areas for storage, plant and vehicle storage and site compounds Establish and maintain no-go zones (refer to Attachment VI <i>Map Book</i>) to reduce impacts on Swift Parrot Design, where possible, to avoid incorporating chain-mesh or barbed wire fences as well as clear glass for any structures (bus shelters, barriers). If chain mesh fencing is required at Yarrambat Golf Course, it must be designed to minimise collision risk for Swift Parrot Inducting construction workers to communicate permit conditions, environmental requirements regarding fauna management and no-go zones Controlling noise and dust during works in accordance with relevant standards (see also EPRs NV1 and AQ1). 	Design and construction
Continued: Ecology		E5	<p>Matted Flax-lily</p> <p>Where direct impacts on Matted Flax-lily occur, a salvage and translocation plan must be developed and implemented to the satisfaction of the Department of Environment, Land, Water and Planning and the Commonwealth Department of Agriculture, Water and the Environment, prior to the commencement of relevant works.</p>	Design and construction
Continued: Ecology	<i>Planning and Environment Act 1987</i>	E6	<p>Strategic revegetation</p> <p>Strategic revegetation in accordance with the Project's Landscape Strategy (see also EPRs AR4 and LV2) to minimise long term fragmentation impacts by:</p> <ul style="list-style-type: none"> Using indigenous species as appropriate from relevant ecological vegetation classes to maximise fauna habitat value and connectivity, including trees likely to be used by Swift Parrot and Grey-headed Flying-fox Incorporating indigenous mid-storey and ground layer plants as appropriate to complement retained habitat. 	Design and construction

Performance objective	Applicable legislation, policy and guideline	EPR Code	Environmental Performance Requirement	Project phase
Continued: Ecology	<i>Catchment and Land Protection Act 1994</i>	E7	Avoid introduction or spread of weeds and pathogens The CEMP must include measures to avoid the spread or introduction of weeds and pathogens during construction, including vehicle and equipment hygiene.	Design and construction
Continued: Ecology	<i>Catchment and Land Protection Act 1994</i>	E8	Operational maintenance During operation, maintain all fences, signage and fauna crossings, and soil hygiene controls for areas of retained native vegetation in accordance with Department of Transport processes and standards for declared roads in Victoria.	Operation and maintenance
Arboriculture To avoid where possible, and otherwise minimise adverse impacts on remnant, planted, regenerated, or large old trees	Australian Standard 4970-2009 Protection of Trees on Development Sites	AR1	Avoid and minimise tree removal During detailed design and construction, review potential tree impacts (particularly large/higher value trees and high value vegetation as identified within the Landscape Strategy's 'Cultural Value of Vegetation Assessment'), and provide for maximum tree retention where possible. This may be achieved through: <ul style="list-style-type: none"> • Design permanent and temporary works to avoid where possible, and otherwise minimise, adverse effects on trees (see also EPRs E1, AR2 and AR3) • The location and width of walking and cycling paths and footpaths is to be varied further to minimise Tree Protection Zone encroachment where possible • Apply suitable construction techniques to minimise impact on Tree Protection Zones, including limiting excavation depth or building above grade. Include additional retaining walls in the design for high priority trees where appropriate • Optimise design of Safety Barriers to retain trees, such as avoiding trenching • Prepare a Tree Impact Assessment which includes consideration of necessary cut and fill and grading requirements (3D design) which can be undertaken in stages • Establishment of no-go zones identified in Attachment VI <i>Map Book</i> to exclude and protect the trees within the project area, with fencing to be as per the Australian Standard 4970-2009 Protection of Trees on Development Sites. 	Design and construction

Performance objective	Applicable legislation, policy and guideline	EPR Code	Environmental Performance Requirement	Project phase
<p>Continued: Arboriculture</p>	<p>Continued: As above</p>	AR2	<p>Tree Protection Management Plan</p> <p>Prior to construction commencing, develop and implement a Tree Protection Management Plan (see also EPRs E3 and AR3) based on the recommendations of Australian Standard 4970-2009 Protection of Trees on Development Sites. This will be in consultation with the City of Whittlesea and Shire of Nillumbik and informed by a project arborist (with a minimum qualification of Diploma in Arboriculture (AQF level 5 or equivalent)), which covers:</p> <ul style="list-style-type: none"> • Trees to be removed or retained which will be informed by Tree Impact Assessment • Condition or significance of trees to be removed • Options for relocation and reinstatement of trees if feasible • All tree protection zones and structural root zones • All tree protection fenced off areas and areas where ground protection systems will be used • All services to be located within the tree protection zone. All services will either be located outside of the tree protection zone or bored under the tree protection zone • Location of tree protection measures and ground protection • To reduce tree removal and retain trees for as long as possible, tree removal will be undertaken as late as possible during construction works. 	Design and construction
<p>Continued: Arboriculture</p>	<p>Continued: As above</p>	AR3	<p>Doreen River Red Gums</p> <p>At the Bridge Inn Road intersection, the two Doreen River Red Gums will be retained. Prior to any works, a detailed Tree Protection Plan will be prepared by a suitably qualified arborist and must be signed off by MRPV.</p> <p>This will include tree protection measures relevant to proposed works such as a calculated no-go zone and Tree Protection Zones and specific controls for works (including excavation, utility installation, lighting) within the calculated Tree Protection Zones of the Doreen River Red Gums as follows:</p> <ul style="list-style-type: none"> • Works must not occur within the no-go zone determined in the Tree Protection Plan • The maximum depth of excavation must not exceed 800 millimetres below the existing ground surface within the Tree Protection Zones identified in the Tree Protection Plan 	Design and construction

Performance objective	Applicable legislation, policy and guideline	EPR Code	Environmental Performance Requirement	Project phase
<p>Continued:</p> <p>Arboriculture</p>	<p>Continued:</p> <p>As above</p>	<p>Cont.</p> <p>As above</p>	<ul style="list-style-type: none"> • There must be no damage to the tree canopy of the Doreen River Red Gums • Fence/crash barrier, signage footings and road furniture can be installed within the identified Tree Protection Zones identified in the Tree Protection Plan but are not to be more than one metre below the existing ground surface level and must not be strip footings or similar if they exceed 800 millimetres below the existing ground surface level • Any utilities or services such as conduits or pipes to be installed within the Tree Protection Zones identified in the Tree Protection Plan, but outside of the no-go zone identified in the Tree Protection Plan, are to be bored with a minimum of one metre cover to the existing ground surface and are to be no greater than 500 millimetres in diameter • Arrangements for appropriate long-term access to water are to be provided to the Doreen River Red Gums • The finished level of any surface adjacent to the no-go zone must be +/- 200 millimetres of the existing road and no additional fill can be placed within the undisturbed areas of the Tree Protection Zones identified in the Tree Protection Plan • Reinstatement – the area that is available, must be converted to mulched garden bed with complementary indigenous plantings such as acacias. Reinstatement of existing pavement areas within the Tree Protection Zones identified in the Tree Protection Plan shall be to a minimum depth of 500 millimetres. 	<p>Continued:</p> <p>As above</p>
		AR4	<p>Reinstatement</p> <p>Reinstatement of soft and hard landscaping is to be in accordance with the Project’s Landscape Strategy (see also EPRs E6 and LV2) and include:</p> <ul style="list-style-type: none"> • Protecting retained trees • Ensuring new tree planting does not adversely impact existing vegetation. 	Design and construction
<p>Environmental Management Framework</p> <p>To provide a transparent framework with clear accountabilities for managing and monitoring the environmental effects associated with the Project</p>	Legislation and policies as identified in all EPRs	EMF2	<p>Environmental Management Plans</p> <p>Prepare and implement a Construction Environmental Management Plan (CEMP) and other relevant plans as required by the EPRs and in accordance with this Environmental Management Framework (EMF). The development of the CEMP and sub-plans must include consultation with relevant stakeholders as listed in this EMF and as required under any statutory approvals. The CEMP and all sub-plans shall be approved by MRPV before construction commences (excluding preparatory buildings and works permitted under the Incorporated Document).</p>	Design and construction

8.7 Conclusion

This chapter has identified and assessed existing conditions, risks and associated impacts to biodiversity from the Project. The Project results in some impacts to native vegetation and trees, threatened flora, wildlife, and removal of fauna habitat which could potentially be used by threatened fauna. The establishment of no-go zones and the application of the Project EPRs would minimise impacts to biodiversity from the Project.

Native vegetation and trees

Relevant EPRs include E1, E3, E5 and E7.

- Up to 11.888 ha of native vegetation, including 134 large trees in patches, 40 large scattered trees and 164 small scattered trees would be impacted
- Up to 4777 trees would be impacted, including exotic and planted trees
- A total of 0.186 ha of threatened ecological community Western (Basalt) Plains Grassland would be removed
- Offsets required include 4.478 general units, 174 large trees and 1.861 species units of habitat for Little Pink Spider-orchid.

Native vegetation and tree removal would primarily consist of low-quality patches of Grassy Dry Forest (EVC 22), which has a bioregional conservation status of least concern and is widespread within the Highlands Southern Fall bioregion.

Listed species

- Relevant EPRs include E1-E8. Two Matted Flax-lily plants, consisting of approximately 100 ramets and 75 ramets respectively occurring along Yan Yean Road between Laurie Street and Bannons Lane, are proposed for removal. These plants would be salvaged and translocated in accordance with translocation plan approved by DELWP and DAWE
- A single Studley Park Gum occurring along Yan Yean Road between Laurie Street and Bannons Lane is likely to be removed
- Three Pale-flowered Crane's-bill would be removed
- Individuals of eight flora species listed as Protected under the FFG Act would be removed
- Potential Swift Parrot habitat would be removed, including 354 key habitat trees and 1,239 secondary habitat trees
- Up to 2,521 trees that represent potential foraging habitat for Grey-headed Flying-fox would be removed.

When assessed in accordance with the EPBC Significant Impact Guidelines (refer to Appendix C of Technical Report B2 *Biodiversity Impact Assessment*), impacts from the Project are not expected to result in significant impacts to, or interfere in the recovery of, listed species.

Wildlife

Relevant EPRs include E1-E3, E6-E7.

- Fragmentation of potential dispersal habitat (from native vegetation removal)
- Disturbance or alteration of habitat conditions from increased noise, light and vehicle movement
- Additional barriers to movement
- Increased predation
- Habitat degradation from weed incursion, dust, erosion and sedimentation.

Impacts on wildlife from the Project are not expected to result in impacts to common fauna species at a population level.

MNES

The Project is not expected to have a significant impact on any MNES, when assessed against the EPBC Act Significant Impact Guidelines.

In accordance with the EES Scoping Requirements, the effects of the Project on biodiversity have been assessed and EPRs have been identified to avoid, manage and mitigate the potential impacts.

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