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Technical Report B2 - Biodiversity Impact Assessment

Yan Yean Road Upgrade – Stage 2: Kurrak Road to Bridge Inn Road

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LIMITATIONS

It was beyond the scope of this assessment to undertake field ecological assessments of the Project area. The impact assessment relies solely on the previous ecological investigations undertaken within the Project area, presented within the report provided by WSP - *Yan Yean Road Upgrade - Stage 2: Kurrak Road to Bridge Inn Road Flora and Fauna Existing Conditions Assessment* (WSP 2020).

Numbers stating amounts of native vegetation and trees to be removed are not final and are subject to change. Subsequent offset calculations are also likely to change.

Maps presented in this report displaying site information should not be relied on for the design during the construction process.

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Acronyms and Abbreviations

ACRONYMS	DESCRIPTION
Advisory List	Species listed on DELWP's *Advisory List of Rare or Threatened Plants in Victoria* or *Advisory List of Threatened Vertebrate/Invertebrate Fauna in Victoria*
CaLP Act	*Catchment and Land Protection Act 1994*
CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authority
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DBH	Diameter at Breast Height (measured at 1.3 m above ground level)
DELWP	Department of Environment, Land, Water and Planning
DEPI	Department of Environment and Primary Industries (now DELWP)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988*
Guidelines	*Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017)
GIS	Geographic Information System
ha	Hectares
km	Kilometres
m	Metres
NVR report	Native Vegetation Removal report
sp.	Species (one species)
spp.	Species (more than one species)
subsp.	Subspecies
VBA	Victorian Biodiversity Atlas (DELWP)
WoNS	Weed of National Significance

Executive Summary

Overview

Yan Yean Road Upgrade – Stage 2 project (the Project) is the proposed duplication of a 5.5 km section of Yan Yean Road between Kurrak Road and Bridge Inn Road, Doreen and the associated intersection upgrades and installation of new walking and cycling paths. Stage 1 of the Yan Yean Road upgrade (Diamond Creek Road to Kurrak Road) was completed in 2019. The Project would support increased traffic volumes resulting from urban growth to the north of the Project within the township of Doreen and improve safety and connectivity for pedestrians and cyclists.

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 for significant environmental effects of the Project.

The Scoping Requirements, including draft Evaluation Objectives, were set out 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.

The evaluation objective for effects on biodiversity in the Minister for Planning's EES Scoping Requirements is:

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.

SMEC Australia Pty Ltd (SMEC) was commissioned by Major Road Projects Victoria (MRPV) to undertake an assessment of potential impacts to biodiversity and trees for the purposes of the EES. Impacts were assessed by desktop only, using information presented in Yan Yean Road Upgrade - Stage 2: Kurrak Road to Bridge Inn Road Biodiversity Existing Conditions Assessment (WSP 2020).

Existing Conditions

The Project area occurs within the Highlands - Southern Fall Bioregion and the Victorian Volcanic Plain Bioregion. The Project area has been subjected to historical land clearing, however a proportion (approximately 20%) supports patches of native vegetation, occurring mostly within the road verge and on adjacent private and public property. Other vegetated areas comprise amenity plantings of native and exotic species, including residential gardens and roadside screening.

Native Vegetation and Trees

The Project area contained 118 native flora species and approximately 17 ha of native vegetation comprised of seven EVCs plus 234 scattered trees. The majority (14.301 ha) was identified as Grassy Dry Forest (EVC 22), which has a bioregional conservation status of Least Concern. Trees that met the definition of native vegetation in the Project area comprised 2,505 native canopy trees in patches and 270 scattered trees. Quality of native vegetation in the Project area was generally poor, however there are locations containing higher quality native vegetation and trees, including:

- Bridge Inn Road – containing two large trees, referred to herein as the Doreen River Red-gums;
- Private properties located on the east side of Yan Yean Road, northeast of the intersection of Jorgensen Avenue; and
- Private properties on which targeted surveys for orchids were conducted

There were 7,030 trees recorded in the Project area in total (including 20 m buffer zone), including remnant native, planted and exotic trees.

Threatened Flora

Three listed rare or threatened flora species were recorded in the Project area:

- Matted Flax-lily (*Dianella amoena*), listed as endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and threatened under the Flora and Fauna Guarantee Act 1988 (FFG Act);
- Studley Park-gum (*Eucalyptus X studleyensis*), listed as endangered on the Victorian Threatened Species Advisory List (Victorian Advisory List); and
- Pale-flower Crane's-bill, listed as Rare on the Victorian Advisory List.

Threatened Ecological Communities

One threatened ecological community listed under the FFG Act was recorded within the Project area, represented by patches of Plains Grassy Woodland (EVC 55) occurring within the Victorian Volcanic Plain bioregion. A total of 0.233 ha of *Western Basalt Plains (River Red Gum) Grassy Woodland* occurs within the Project area.

Threatened Fauna

One threatened fauna species was recorded during field assessments; Grey-headed Flying-fox (*Pteropus poliocephalus),* albeit outside the Project area. Suitable habitat with potential to support an additional seven listed threatened fauna species was also recorded, including hollow-bearing trees, patches of remnant native woodland, and planted trees including scattered eucalypts. Threatened fauna species with a moderate or higher likelihood to occur in the Project area include:

- Grey-headed Flying-Fox;
- Swift Parrot (*Lathamus discolor*);
- White-throated Needletail (*Hirundapus caudacutus*);
- Rufous Fantail (*Rhipidura rufifrons*);
- Brush-tailed Phascogale (*Phascogale tapoatafa*);
- Common Bent-wing Bat (*Miniopterus schreibersii*);
- Tussock Skink (*Pseudemoia pagenstecheri*).

These species, whilst considered likely to utilise habitat within the Project area on occasion, are considered unlikely to use this habitat for breeding or as primary foraging habitat.

Wildlife (common fauna)

The primary fauna habitat type present within the Project area included patches of woodland vegetation and planted trees and shrubs. Aquatic habitat present within the Project area was present in farm dams and landscaped wetlands.

A total of 88 fauna species were recorded across all surveys, 10 of which are introduced species. Common native fauna expected to utilise habitat in the Project area include Eastern Grey Kangaroo, Common Wombat, Echidna, arboreal mammals such as Common Ringtail Possum, Common Brushtail Possum, Sugar Glider, common native frogs and reptiles. Introduced species European Rabbit and Red fox were evident in high numbers during surveys.

Impact Assessment

The design for the Project has avoided and minimised impacts on native vegetation and fauna habitat in the Project area where practicable, and further minimisation may be achieved during the design phase. All native vegetation within the Project area, i.e. not within a no-go zone, is assumed lost for the purposes of the EES.

Native vegetation and Trees

The Project proposes to remove 11.888 ha of patches native vegetation plus 204 scattered trees (equivalent to approximately 17 ha). Within this total to be impacted includes 134 large trees in patches, 40 large scattered trees and 164 small scattered trees. Native vegetation to be removed would be offset in accordance with the Victorian *Guidelines for the removal, destruction or lopping of native vegetation* (the Guidelines, DELWP 2017). To prevent impacts to native vegetation to be retained, no-go zones would be established and managed in accordance with Environmental Protection Requirements (EPRs) for the Project. An offset strategy has been developed for the Project, involving the purchase of offsets from third-party offset credit suppliers, which will protect areas of native vegetation in perpetuity.

Threatened Flora

The design for the Project impacts on the following threatened flora:

- Two Matted Flax-lily plants, occurring in the western road reserve of Yan Yean Road between Bannons Lane and Laurie Street;
- One Studley Park-gum, occurring in the western road reserve of Yan Yean Road between Bannons Lane and Laurie Street; and
- Three Pale-flowered Crane's-bill, occurring in private property east of Yan Yean Road.

To minimise impacts on Matted Flax-lily, a salvage and translocation plan is proposed, which would relocate plants to a suitable receptor site and protected. This plan would be subject to regulatory approval. Seeds from Studley Park-gum will be collected where possible and utilised during landscaping works for the Project.

Threatened Fauna

The design for the Project impacts on potential habitat for the following threatened fauna:

- Potential foraging habitat for Swift Parrot, including the loss of up to 1,593 preferred and secondary potential foraging trees (88 large trees, 1,505 small trees);
- Potential foraging habitat for Grey-headed Flying-fox, including loss of up to 2,521 eucalypts (174 large trees, 2,347 small trees);
- Potential dispersal habitat (approximately 2 ha) for Brush-tailed Phascogale will be fragmented; and
- Potential habitat (approximately 1.5 ha) for Tussock Skink will be removed.

To minimise potential impacts on Swift Parrot, Grey-headed Flying-fox and Tussock Skink, vegetation and habitat removal would be further avoided during the design phase. Landscape plantings will be managed in accordance with a Landscape Strategy and Plan, and fauna rope bridges will be installed to facilitate potential crossing of the upgraded Yan Yean Road by arboreal fauna, including Brush-tailed Phascogale.

To assist Swift Parrot and other bird species to recognise the 30-36 m high fence at the Golf Course as a visible barrier to their movement, the proposed fence will incorporate ultra-violet reflective elements to increase its visibility to reduce risk of collision resulting in trauma and death.

Swift Parrot Cumulative Impact Assessment

An assessment was undertaken of the potential for cumulative impacts on Swift Parrot based on the Project proposing to remove preferred and secondary potential foraging trees. Swift Parrots have not been recorded using potential habitat – preferred foraging trees – in the Project area. Of the preferred foraging trees present in the Project area, 15 are large trees (i.e. over 60 cm DBH). Of the 15 large preferred foraging trees, 14 are expected to provide potential foraging resources for Swift Parrots based on their size, health and condition.

Given the life-cycle of Swift Parrot includes annual migration to mainland Australia from breeding habitat in Tasmania, the removal of trees in the Project area was considered in the context of habitat in the local area, Melbourne metropolitan area and at a regional and national scale. Removal of trees in the Project area was considered insignificant in the context of the larger area of available habitat in the wider region. In addition, the removal of a large number of trees in the Project area was not considered to contribute to a cumulative impact on Swift Parrot due to;

- No records of Swift Parrot utilising potential foraging habitat in the immediate vicinity of the Project area;
- the relatively low number of key or ‘preferred’ foraging trees providing viable potential foraging habitat likely to be impacted by the Project;
- the apparent site fidelity of Swift Parrot indicated by previous records at known sites in the greater Melbourne region;
- the species’ ability to utilise a variety of eucalypts for foraging; and
- the ongoing prevalence of significant impacts occurring outside of and unrelated to the Project area across the species’ range.

Wildlife

The project is likely to impact on common fauna during both construction and operation phases. 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 utilising habitats directly adjacent the Project area during the construction phase. Standard mitigations measures are required to protect areas of retained vegetation throughout construction. Following construction, potential impacts on wildlife include 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. Mobile ground-dwelling fauna such as kangaroos, wallabies, echidnas and wombats will 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. The increased width of the road corridor will 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. Mitigation measures proposed include fauna bridges for arboreal mammals, fenced fauna crossings, fauna sensitive lighting and adequate signage.

1 Introduction

1.1 Background

SMEC Australia Pty Ltd (SMEC) was commissioned by Major Road Projects Victoria (MRPV) to undertake an assessment of the potential impacts to biodiversity associated with the Yan Yean Road Upgrade – Stage 2 project (the Project). The proposed Project involves the duplication of a 5.5 km section of Yan Yean Road between Kurrak Road and Bridge Inn Road, Doreen, including associated intersection upgrades and installation of new walking and cycling paths. The Project includes two new roundabouts (at Heard Avenue, and Youngs Road), five new signalised intersections (Bannons Lane, Jorgensen Avenue, North Oatlands Road, Orchard Road and Bridge Inn Roads), upgrades to one existing signalised intersection, including an additional right-hand turning lane, slip lane, and traffic island (Ironbark Road), as well as new street lighting at all intersections, road signage and landscaping. A new 3-metre-wide walking and cycling shared use path on the western side and 1.2-metre-wide footpath on the eastern side of Yan Yean Road is also proposed. The proposed upgrades will support increased traffic volumes resulting from urban growth to the north of the Project within the township of Doreen and improve safety and connectivity for pedestrians and cyclists. A 30-36 m high and up to 360 m long golf course impact mitigation net may be constructed along the Yarrambat Park Golf Course, Yan Yean Road interface to prevent golf balls from potentially colliding with vehicles using the road.

The Project is to be assessed under a bilateral agreement between the Commonwealth of Australia and the state of Victoria. An Environment Effects Statement (EES) was required to be prepared under the *Environment Effects Act 1978* to assess the potential for significant environmental effects of the Project. The Project was also deemed a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) by the Commonwealth Department of Agriculture, Water and the Environment (DAWE) for potential for significant impacts to two nationally listed threatened species; Swift Parrot (*Lathamus discolor*) and Matted Flax-lily (*Dianella amoena*).

This impact assessment aims to summarise the key impacts and risks to the ecological values of the Project area resulting from the construction and operational phases of the Project. This report will also provide an overview of the ecological values of the Project area and summarise the key mitigation measures and Environmental Performance Requirements (EPRs) to address the scoping requirements of the EES.

This assessment utilises the data from previous ecological investigations undertaken within and adjacent the Project area, presented within the comprehensive flora and fauna report provided by WSP Australia Pty Ltd (WSP) – *Technical Report B1 – Biodiversity Existing Conditions Yan Yean Road Upgrade - Stage 2: Kurrak Road to Bridge Inn Road* (WSP 2020).

1.2 Scope of Works

The scope of works and objectives for the impact assessment are:

- Provide a brief overview of the biodiversity values present within the Project area (as described in WSP 2020);
- Undertake an assessment of risk to biodiversity values of the Project area;
- Undertake a Cumulative Impact Assessment for Swift Parrot;
- Identify and describe the key impacts to biodiversity arising from the construction and operational phases of the Project based on the data collected and presented in the *Yan Yean Road Upgrade - Stage 2: Kurrak Road to Bridge Inn Road Biodiversity Existing Conditions Assessment* (WSP 2020);
- Provide the key mitigation measures to be employed during the Project; and
- Detail the EPRs related to mitigating biodiversity impacts for the Project.

1.3 Project Area

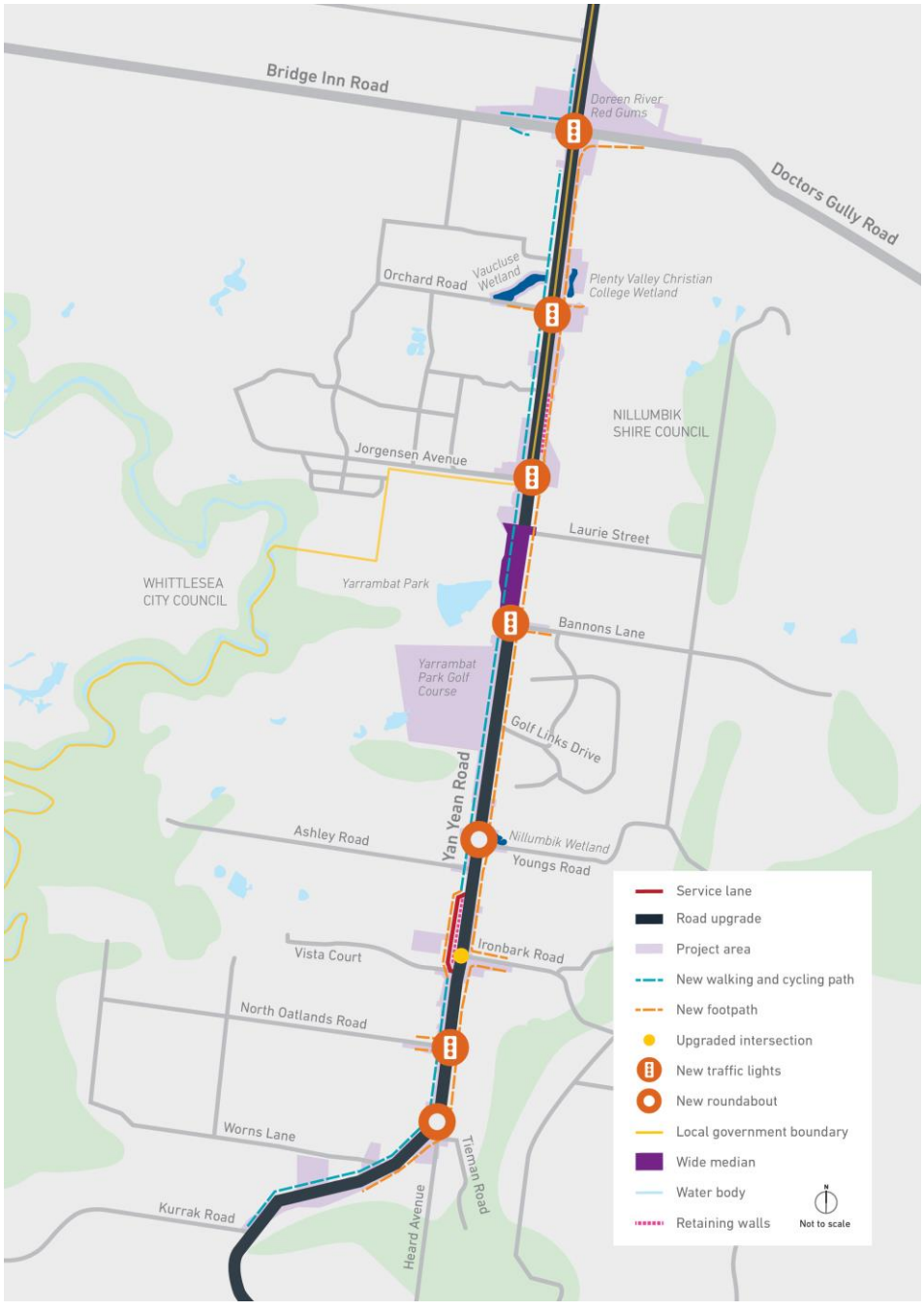
The Project area includes the existing Yan Yean Road corridor between Kurrak Road, Plenty and Bridge Inn Road, Doreen, including some adjoining private and public land, as displayed on Figure 1.

The majority of the road corridor is surrounded by the semi-rural, low-density residential area of Yarrambat, with a medium-density housing development adjacent the northern-most section of the Project area, between Bridge Inn Road and Jorgenson Avenue. Public recreational facilities occur within Yarrambat Park, located immediately west of the Project area and to the south of Jorgenson Avenue. These facilities include Yarrambat Fly Fishing Club, Yarrambat Horse and Pony Club and Yarrambat Park Public Golf Course, a portion which occurs within the Project area footprint.

The Project area has been subjected to historical land clearing, however a proportion (approximately 20%) supports patches of native vegetation, occurring mostly within the road verge and on adjacent private and public property. Other vegetated areas comprise amenity plantings of native and exotic species, including residential gardens and roadside screening. Larger tracts of remnant vegetation are present within the Plenty Gorge Parklands and Plenty River, located west of the Project area. Similarly, remnant vegetation is present along many of the small gullies and watercourses east of the Project area, which are tributaries to Diamond Creek. There are several small ephemeral drainage lines in the Project area that flow into Plenty River west of the Project area.

All direct impacts are proposed to occur within the Project area, however indirect impacts on biodiversity may occur outside the Project area, and potential cumulative impacts to Swift Parrot incorporate the Port Phillip and Westernport Catchment Management Authority area, and broadly consider a state and national context (refer Section 5.7). Additionally, trees immediately adjacent to the Project area boundary (i.e. within 15 m) have been assessed to account for potential impacts to Tree Protection Zones (TPZs) (refer Section 5.3).

Figure 1: Project area and main project elements



2 Methods

2.1 Definitions

2.1.1 Threatened Species, Migratory Species and Ecological Communities

Threatened flora and fauna species and communities assessed were those listed as:

- Matters of National Environmental Significance (MNES), i.e. threatened under the Commonwealth EPBC Act[1];
- Threatened under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act); or
- Vulnerable, endangered or critically endangered under the Victorian Rare or Threatened Species Advisory Lists administered by the State Department of Environment, Land, Water and Planning (DELWP)[2].

2.1.2 FFG Act Protected Flora

Protected flora are plants:

- Declared protected under section 46 of the FFG Act;
- Listed as threatened under section 10 of the FFG Act; or
- That belong to communities that are listed as threatened under section 10 of the FFG Act.

It is an offence to take, trade in, keep, move or process protected flora without a permit, or unless authorised by Order of the Governor in Council published in the *Government Gazette* (GIC Order). The FFG Act defines "take" to mean to kill, injure, disturb or collect.

2.1.3 Native Vegetation

Native vegetation described in the report is that which meets the definition of patch or scattered tree provided on page 6 of the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017).

2.1.4 No-Go Zones

For the purposes of this EES, no-go zones are areas of native vegetation to be retained and protected during construction. They are excluded from the calculation of Project impacts on native vegetation.

2.2 Nomenclature

Common and scientific names for flora and fauna follow the VBA database (current version) are used in this report. The report first presents flora and fauna species with a nominated common name, followed by scientific name in brackets, e.g. Matted Flax-lily (*Dianella amoena*). Following first mention of species, common name will be used only.

2.3 Desktop Assessment

A review of the *Yan Yean Road Upgrade - Stage 2: Kurrak Road to Bridge Inn Road Biodiversity Existing Conditions Assessment* (WSP 2020) was undertaken to obtain data on the existing ecological condition and biodiversity values of the Project area. The WSP (2020) report summarises all ecological surveys undertaken on behalf of MRPV within the Project area and wider study area[3] from the early stages of planning through to the present (2017-2020). Ecological surveys include vegetation assessment in addition to targeted surveys for threatened flora and fauna.

The biodiversity values that form the basis of the impact assessment include:

- Native vegetation and trees;
- Flora and fauna species listed as rare or threatened under one or more of the following:
  - EPBC Act
  - FFG Act

[1] Migratory species are listed under the EPBC Act. The marine status of fauna listed under the EPBC Act was not considered as the Project does not occur within or near a Commonwealth Marine Area and has no probability of impacting such an area.

[2] Species listed as rare are listed on the DELWP Advisory Lists only. Species listed as poorly known or data deficient on DELWP Advisory Lists were not considered in detail for this impact assessment.

[3] the wider study area assessed encompassed a 5 km buffer of the Project area, designed to assess ecological values existing beyond the immediate Project area boundary.

- *Advisory List of Rare or Threatened Plants in Victoria* (Advisory List) (DEPI 2014)
- *Advisory List of Threatened Vertebrate/Invertebrate Fauna in Victoria* (Advisory List) (DSE 2013; DSE 2009)

- Wildlife (i.e. common fauna species)
- Key threatening processes listed under the EPBC Act and FFG Act.

2.3.1 Likelihood of Occurrence

The likelihood of occurrence for rare and threatened species within the Project area adopts the criteria and rating applied in the WSP (2020) existing conditions assessment.

2.3.2 Key Threatening Processes

The potential for the Project to exacerbate key threatening processes in the Project area were identified during the review of WSP (2020) and considered in terms of their likelihood of occurrence, according to the following criteria:

- Low - Threatening process was not recorded within Project area, or potential for threatening process to be exacerbated by the Project is low;
- Moderate – Threatening process could be exacerbated by the Project due to ecological values present in the Project area and proposed Project-related activities;
- High - Threatening process likely to be exacerbated by the Project due to ecological values present in the Project area and proposed Project activities; and
- Present - Threatening process recorded within the Project area or will be exacerbated as a result of Project activities.

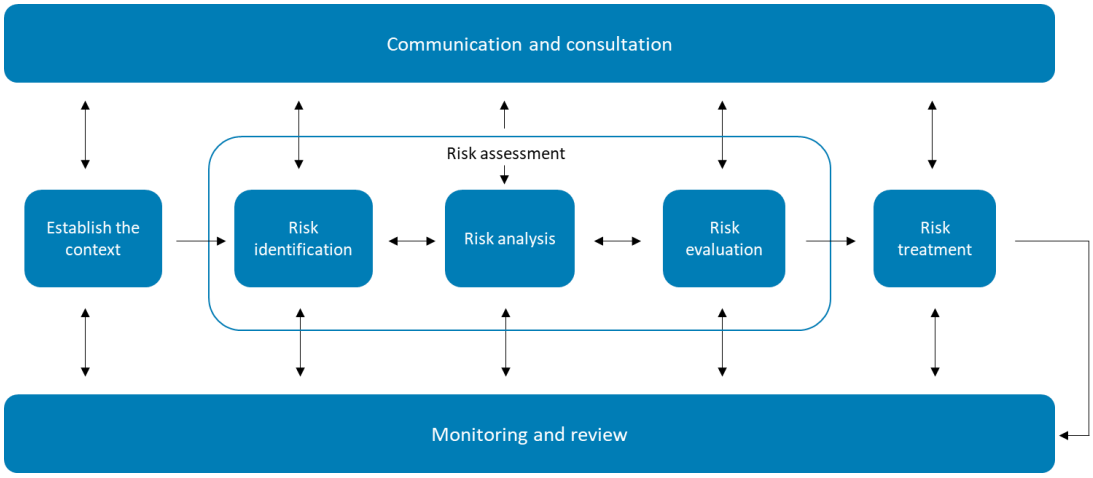
A list of key threatening processes relevant to the Project and their likelihood of occurrence is provided in Appendix B. Threatening processes were included or excluded based on the Project location, habitat and species recorded, and the proposed works associated with the Project. Those threatening processes considered irrelevant to the project have been excluded.

2.4 Risk Assessment

The environmental risk assessment process was undertaken in accordance with the MRPV Environmental Risk Management Guideline (2019) and International Standard ISO 31000:2018 *Risk management - Guidelines*. Risk assessment methodology is further detailed in Chapter 4 Environment Effects Statement Assessment Framework and Attachment III Environmental Risk Assessment Report.

ISO 31000:2018 requires a risk management process to involve the systematic application of policies, procedures and practices to the activities of communicating and consulting, establishing the context and assessing, treating, monitoring, reviewing, recording and reporting risk. This process is shown in Figure 2.

Figure 2: Risk management process



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 will manage environmental risk to achieve acceptable environmental outcomes in accordance with the EPRs. The consolidated list of EPRs for the Project is detailed in Chapter 12 Environmental Management Framework (Section 12.8).

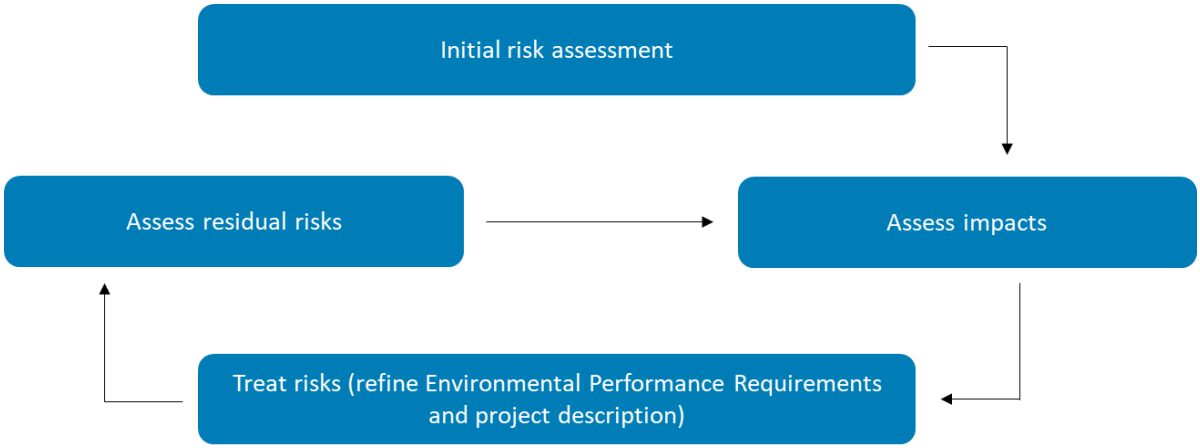
All risk numbers, aspects, potential impact pathways and risk ratings identified for the Project have been compiled into a register, which is provided in Attachment III Environmental Risk Assessment Report (Appendix III-A).

Please refer to Chapter 4 *Environment Effects Statement Assessment Framework* (Section 4.3.3 Risk assessment) and the MRPV Environmental Risk Management Guideline for detailed risk methodology.

2.4.1 Risk Analysis

The risk analysis of consequence, likelihood and level of risk is summarised in Section 4 and illustrated in Figure 3.

Figure 3: Risk analysis process



The assignment of an initial level of likelihood and consequence for each of the impact pathways took into account standard construction practices and management measures that are typical of a project of this scale and type. Specialists used their professional judgment and experience to assign the appropriate consequence levels.

Likelihood and generic consequence criteria, informed by the MRPV corporate risk matrix, are shown in Table 1 and

Table 2. Please refer to Appendix III-B of the EES for an aspect-based consequence guide.

Risk ratings were then reassessed following risk evaluation and risk treatment to generate a 'residual' risk rating. Both initial and residual risk ratings are documented in the risk register attached in Appendix III-A of the EES.

Risk levels were determined using the matrix in Table 3, which was informed by the MRPV corporate risk matrix.

Table 1: Likelihood criteria

LIKELIHOOD	DESCRIPTION
Almost certain	76-99% Has occurred before and is expected to occur again Is expected to occur each year or more frequently All of the controls associated with the risk are extremely weak/non-existent. Without control improvement there is almost no doubt that the risk will eventuate
Likely	51-75% Has occurred before with a chance of it occurring again Has occurred several times at the Department, Group, Division, Program or Project before The majority of the controls associated with the risk are weak. Without control improvement it is more likely than not that the risk will eventuate
Possible	26-50% Has occurred before with a chance of occurring again Has occurred at the Department, Group, Division, Program or Project once before There are some controls that need improvement, however unless there is improvement the risk may eventuate

Unlikely	6-25% Has occurred elsewhere before, therefore a small chance of occurring The majority of controls are strong with no control gaps. The strength of this control environment means that is likely that the risk eventuating would be caused by external factors not known to the organisation
Rare	0-5% Has never occurred but may occur Is expected to occur 1/100 or more years All controls are strong with no control gaps. The strength of this control environment means that if this risk eventuated, it is most likely as a result of external circumstances outside of the control of the organisation

Table 2: Generic consequence criteria[4]

CONSEQUENCE	DESCRIPTION
Critical	A critical degree of impact on an environmental asset, value or use of moderate or higher significance
Major	A high degree of impact on an environmental asset, value or use of moderate or higher significance
Moderate	A moderate degree of impact on an environmental asset, value or use of moderate or higher significance
Minor	A low degree of impact on an environmental asset, value or use
Insignificant	A very low degree of impact on an environmental asset, value or use

Table 3: Risk matrix

LIKELIHOOD	CONSEQUENCE LEVEL				
	Insignificant	Minor	Moderate	Major	Critical
Almost Certain	Medium	Significant	High	High	High
Likely	Medium	Medium	Significant	High	High
Possible	Low	Medium	Medium	Significant	High
Unlikely	Low	Low	Medium	Medium	Significant
Rare	Low	Low	Low	Medium	Medium

2.5 Impact Assessment

The impact assessment utilises the findings of the previous ecological surveys within the Project area, and identifies likely impacts to biodiversity values based on the following:

- The project description;
- Establishing project context and existing conditions via desktop assessment;
- The total impacts to native vegetation and trees, including secondary impacts such as degradation from weed incursion and impacts to Tree Protection Zones (TPZs);
- The likelihood of occurrence of threatened species utilising the Project area, including quality of suitable habitat and presence of key foraging or breeding habitat;
- The frequency of potential use of habitat by threatened species;
- The key risks to wildlife resulting from habitat loss and degradation and changes to road conditions following construction;

[4] Please refer to Appendix III-B for an aspect-based consequence guide

- Significant impact criteria under the EPBC Act, in accordance with the *Matters of National Environmental Significance Significant impact guidelines 1.1* (DoE 2013) and,
- Considering mitigation and management measures required to avoid, minimise and offset impacts to biodiversity.

The extent of removal of native vegetation and trees was calculated by overlaying the Project area onto existing native vegetation mapping. If any area of a patch of native vegetation or 10% of the TPZ of any scattered tree occurred within the Project area, it was determined 'impacted'.

2.6 Swift Parrot Assessment of Cumulative Impacts

The Assessment of Cumulative Impacts (ACI) is part of the broader environmental impact assessment process and is focussed on considering the known and potential effects on environmental values resulting from multiple activities or impacts. It considers the impact of activities on a single or range of environmental values, including receptors, receivers, assets or valued resources. Known or potential impacts on environmental values may combine geographically, over time or a combination of these two variables, to cause a different outcome than would otherwise have been the case had a project been developed in isolation. There are a variety of definitions and approaches to ACI, which are described in published guidelines, scientific literature and in approval conditions. In Australia, cumulative impacts are generally assessed in a manner consistent with one of the circumstances summarised in Table 4, although it should be noted that there are no specific guidelines or methodology on the ACI process in state or federal environmental legislation frameworks.

Table 4: Summary of cumulative impact assessment approaches commonly used in Australia

Approach	Description
Single project	The cumulative impacts of a single project on the existing environmental baseline, accounting for previous activities. For example, assessment of the effects of clearing vegetation, taking into account all previous clearing that has occurred in the region.
Multiple projects, single environmental value	The cumulative impacts of multiple projects are assessed for a given environmental value or aspect of the environment. For example, development of a water quality strategy for a catchment, considering all sources of pollution.
Multiple projects, multiple environmental values	The cumulative impacts of multiple projects are assessed for all environmental values. For example, this may occur as part of a strategic assessment for a region, or assessment of a project where several 'other projects' are also being developed nearby.

In the context of Yan Yean Road - Stage 2, assessing impacts to Swift Parrot (a single environmental value) in relation to multiple projects is the most applicable approach. There are several important considerations in this context which relate mainly to the species' ecology.

Swift Parrot is a migratory species and subject to a variety of pressures across a vast geographic scale. Activities such as habitat losses (various drivers), competition with aggressive species, predation by feral or introduced animals (e.g. Sugar Gliders) are all known to impact Swift Parrot. The influence of other broader factors such as climate change, diseases such as Psittacine Beak and Feather Disease (PBFD) and illegal wildlife trafficking are also known to be impacting Swift Parrot. As a result, the situation presents a challenge for undertaking a quantitative ACI on the species. That is, identifying and considering the following:

- all relevant impacts directly related to the Project;
- impacts arising from previous infrastructure and residential developments in the local area; and,
- broader scale impacts affecting the species across its range.

In such situations, where a range of factors constrain the ability to undertake a quantitative assessment approach, only a qualitative assessment is practicable.

2.6.1 ACI Area

The spatial boundary of the ACI encompasses the area required to assess both local and broader, range-wide impacts.

The Swift Parrot is a highly mobile species with annual winter migratory movements from Tasmania to south-eastern Australia and a range which includes Tasmania up the east coast of Australia to southeast Queensland.

Various ACI areas were considered. Taking into account the highly mobile nature of the species, their inherent unpredictability in occurrence, and similarities in available habitat (i.e. modified, urbanised environs), a local, regional and range-wide assessment were considered necessary. This included an initial 10 km buffer around

the Project area, and then the greater Melbourne region. The greater Melbourne region has been defined as the Port Phillip and Westernport and Corangamite Catchment Management Authority (CMA) areas.

Significant impacts affecting the species well outside the ACI area have also been considered.

2.6.2 Temporal Extent (of impacts contributing to ACI)

Whilst not the focus of impacts within the ACI area, infrastructure projects approved within the five years prior to May 2020 have been incorporated into understanding potential impacts at the local scale. This is consistent with the consideration of past clearing under the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017c).

Range-wide (i.e. habitat distribution) impacts, or impacts occurring outside of the ACI area (e.g. wide-spread predation in Tasmania), have also been included in this assessment, and are not temporally bound.

2.6.3 Existing Species Records

A comprehensive search of confirmed Swift Parrot records was undertaken in May 2020 across the species range, but with a focus on greater Melbourne and Victoria. This included searches of the following databases:

- Victorian Biodiversity Atlas (VBA);
- Birdlife Australia Birdata database (formerly Atlas of Australian Birds);
- Cornell Lab of Ornithology eBird database; and,
- Atlas of Living Australia (ALA).

The focus for this assessment is on records within the greater Melbourne region as this encompasses potential habitat 'stepping stones' the species is frequently observed utilising when migrating to and from Tasmania.

2.6.4 Habitat Indicators

Various sources of information were accessed to inform the process of determining the extent and quality of habitat resources for the Swift Parrot across the greater Melbourne region. This included GIS databases and mapping resources (e.g. Naturekit), documents and mapping on fauna habitat and vegetation, aerial photography, and other government resources and documentation.

Below is a detailed list of resources accessed to assist in estimating the distribution of suitable Swift Parrot habitat across the greater Melbourne region:

- Ecological Vegetation Class (EVC) mapping (DELWP);
- Preferred Foraging Tree species locations (VBA, ALA search);
- Swift Parrot Victorian Habitat Suitability Model (DELWP);
- Aerial photographs; and
- Other published and unpublished reports

The species recovery plan (Saunders and Tzaros, 2011) identifies preferred or 'key' foraging tree species for Swift Parrot when they are overwintering in mainland Australia (Appendix A: Table 1). Practical Ecology (2017) identifies 'secondary' foraging tree species within the north-eastern Melbourne region based on additional information collated through available literature and anecdotal evidence.

Practical Ecology (2017) also outlines a Swift Parrot habitat quality assessment method which is useful for assessing the value of remnant vegetation patches through several condition parameters. While this approach has been developed in a local context, it can be adapted and applied more broadly. In this assessment, it has been adapted and applied for assessing the value of potential habitat provided by key and secondary foraging tree species within the Project area, relative to known and potential areas of suitable habitat within 10 km of the Project area and across the greater Melbourne region (Table 5).

Table 5: Habitat value ranking system adapted from Practical Ecology (2017)

Habitat Value	Description
Critical	Core areas of highest quality habitat providing significant foraging and roosting opportunities and likely to be important for foraging, roosting, and movements on a more regular basis (i.e. high site fidelity)
Important	Key areas of higher quality habitat and important for foraging and movements, and possibly for roosting
Moderate	Areas of moderate quality habitat potentially useful for opportunistic foraging and roosting in some years
Low	Areas of lower quality habitat which may have some potential use for opportunistic foraging and movements on an irregular basis

2.6.4.1 Ecological Vegetation Class (EVC) Mapping (DELWP)

To identify relevant EVCs likely to provide suitable habitat for migrating Swift Parrots, the following information sources were used:

- Documented associations with primary and secondary foraging species of eucalypts within Victoria (Saunders 2007; Saunders and Tzaros, 2011),
- The listing of these species as typical tree canopy cover in Victorian EVC/Bioregion benchmarks and
- An analysis of Swift Parrot record associations with certain vegetation types within the greater Melbourne region.

Modelled EVC distributions were exported from Naturekit, DELWP's biodiversity web mapping and reporting tool, to demonstrate available habitat areas within the greater Melbourne region and in proximity to the Project area.

This approach does not capture available habitat provided by planted vegetation or scattered trees and therefore requires additional assessment steps in order to identify additional areas of suitable habitat within the greater Melbourne region.

2.6.4.2 Preferred Foraging Tree Species Locations (VBA, ALA)

To identify suitable habitat trees outside of mapped EVC locations and reserve locations, the VBA and ALA were queried to map locations of primary eucalypt and secondary foraging tree species in the greater Melbourne region.

2.6.4.3 DELWP modelled Swift Parrot habitat

The Swift Parrot habitat suitability model (current as at May 2020) was used cautiously as the model is intended for use at the landscape scale to identify habitat suitability for the species across Victoria.

With reference to the Swift Parrot Habitat Suitability modelling, the website data.vic.gov.au states

"These data are a combination of site observations and models and as such are indications of the importance of habitat. They do not however take into account the current condition of the habitat for the particular species, apart from an indication of the presence and context of native vegetation - Some species are known to predominantly inhabit non-native vegetation. This modelled data component does not capture this. Models of habitat are not intended to equate with species presence. Other factors such as natural disturbances, losses due to historic catastrophes, and the impact of predators and seasonal factors influence whether a species is present in habitat at any given time. Also, these data are highly reliant on survey records that indicate the suitability of a particular environment for a species. New records may influence future spatial models of suitable habitat."

2.6.5 Consideration of Additional Unrelated Developments

Standalone development projects within 10 km of the Project area were identified for the purposes of qualitatively assessing the likelihood of cumulative impact on Swift Parrot. This approach is outlined in the Ministerial Guidelines for Assessment of Environmental Effects under the *Environment Effects Act 1978* which states;

"While cumulative effects may be a relevant consideration for the assessment of a project, a proponent may not have a practical ability to provide such an assessment, for example because of their limited access to information on the effects of other existing activities or potential projects. Similarly, the ability of a proponent to provide a regional perspective in an EES will depend on the availability – usually from government agencies – of relevant regional policies, plans, strategies, as well as regional data….

…. Because of the factors constraining quantitative assessment of cumulative effects, often only a qualitative assessment will be practicable."

Given specific quantitative information relating to such development projects is not readily available a qualitative approach was considered adequate for the purposes of the ACI.

Based on development projects within 10 km of the Project area, they can be broadly categorised into two main groups; major roads and other infrastructure and major residential or precinct developments.

2.6.5.1 Major Roads and Other Infrastructure Projects

Major road, rail, pipeline, power and other infrastructure projects were identified and included in this process. These projects were identified where information was readily available and assessed qualitatively for their potential collective impact on possible stepping stone habitat in the study area.

2.6.5.2 Major Residential or Precinct Developments

Northern and north-eastern Melbourne are one of several major growth areas within the Melbourne Urban Growth Boundary. The requirement for road and other major infrastructure projects in these areas are largely driven by increases in residential, commercial and industrial areas through the strategic implementation of the Plan Melbourne metropolitan planning strategy.

In comparison to linear infrastructure, large-scale land usage changes directly and indirectly impact expansive areas of habitat for fauna species.

2.6.5.3 Other Actions Impacting Swift Parrot

Given the migratory behaviour of Swift Parrot, and dependence on habitats across its wide range, a review of all factors impacting the species was undertaken to provide broader context when considering local impacts potentially arising from the Project.

Available literature was reviewed and is summarised in Section 5.7.

2.7 Limitations and assumptions

SMEC's impact assessment is limited by the information within the *Yan Yean Road Upgrade - Stage 2: Kurrak Road to Bridge Inn Road Flora and Fauna Existing Conditions Assessment* report (WSP 2020), and availability of WSP data. SMEC ecologists have traversed the Project area, however have not conducted formal fieldwork. SMEC's review of WSP data and reporting indicates that ecological assessments have been undertaken at appropriate times of year and in accordance with relevant survey guidelines for threatened species. To counteract the limitation of WSP ecological surveys being conducted over a short time period, SMEC also utilised previous records from database searches conducted by WSP to inform the impact assessment on flora and fauna species. These desktop searches are not exhaustive but are considered adequate to inform the impact assessment. Additional desktop information was sought in relation to Swift Parrot where existing information was insufficient to inform the cumulative impact assessment.

The likelihood of occurrence assessment and subsequent ratings for threatened flora and fauna has been adopted from WSP's report, and in instances where SMEC disagrees with the determination of likelihood, a brief discussion has been included in the body of the report as to why a species is not being considered in detail for impact assessment.

The impact assessment is limited by the current engineering design options proposed for design stage. In some cases, this has resulted in the assumption that particular flora, fauna and trees will be impacted, when there is a possibility that they will be retained following later design.

3 Ecological Values

3.1 Flora

3.1.1 Summary

The vegetation within the Project area immediately adjacent the road verge has been heavily disturbed from construction of the existing road formation and is regularly slashed/mown as part of ongoing road maintenance. Further away from the road verge, the understorey of most native vegetation patches was heavily disturbed and subject to a range of ongoing impacts including regular grazing by herbivores (both native and introduced), slashing/mowing and weed invasion. The highest quality patches were identified within private properties supporting remnant vegetation, including northeast of Jorgensen Avenue and northwest of Ironbark Road, where both the canopy and understorey remained intact.

Field surveys undertaken within the Project area and immediate surrounds identified 182 vascular plant species including 118 (65%) native, the remainder being introduced/exotic species or planted natives that are not indigenous to the area. Three flora species listed as rare or threatened were identified during the ecological surveys and are summarised in Table 6.

Table 6: Listed flora species recorded within the Project area

COMMON NAME	SCIENTIFIC NAME	LISTING[5]		
		EPBC	FFG	Vic Adv.
Matted Flax-lily	*Dianella amoena*	EN	L	en
Studley Park Gum	*Eucalyptus* x *studleyensis*	-	-	en
Pale-flowered Crane's-bill	*Geranium sp.3*	-	-	r

3.1.2 Ecological Vegetation Classes

A total of 17.31 ha of patches native vegetation (not including 20 m buffer zone around the Project area) comprising seven EVCs, plus 234 scattered trees were recorded within the Project area. The EVCs recorded are summarised in Table 7 below, with their corresponding bioregion and Bioregional Conservation Status (BCS) and total extent within the Project area. The quality of vegetation patches varied widely, with the majority scored moderate to poor quality, given the previous extent of modification and disturbance within the Project area.

Table 7: EVCs recorded within the Project area

NO.	EVC	BIOREGION	BCS	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; Victorian Volcanic Plain	Endangered	0.295
647	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	n/a	0.395
937	Swampy Woodland	Highlands Southern fall	Endangered	0.501
TOTAL				17.31

[5] EPBC Act listings: EN = Endangered; FFG Act listing: L = Listed as Threatened; Advisory List listings: en = endangered, r = rare, P = listed as Protected under the FFG Act.

3.1.3 Trees

The total number of trees recorded in the Project area and 20 m buffer including native, planted and exotic trees was 7,030. Trees recorded within a 20 m buffer of the Project area have potential to be impacted indirectly by encroachment of their TPZ. Trees recorded within the Project area and 20 m buffer, that met the definition of native canopy trees under the Guidelines (DELWP 2017) comprised:

- 2,505 trees in patches:
  - 187 large;
  - 2,318 small; and
- 270 scattered trees:
  - 58 large;
  - 212 small.

Other trees recorded in the Project area and 20 m buffer that did not meet the definition of canopy trees under the Guidelines (DELWP 2017) comprised:

- 2,113 planted native and planted indigenous trees;
- 707 indigenous trees and shrubs (understorey tree species, or canopy tree species < 3 m in height)
- 1,435 exotic trees.

3.1.4 Threatened Ecological Communities

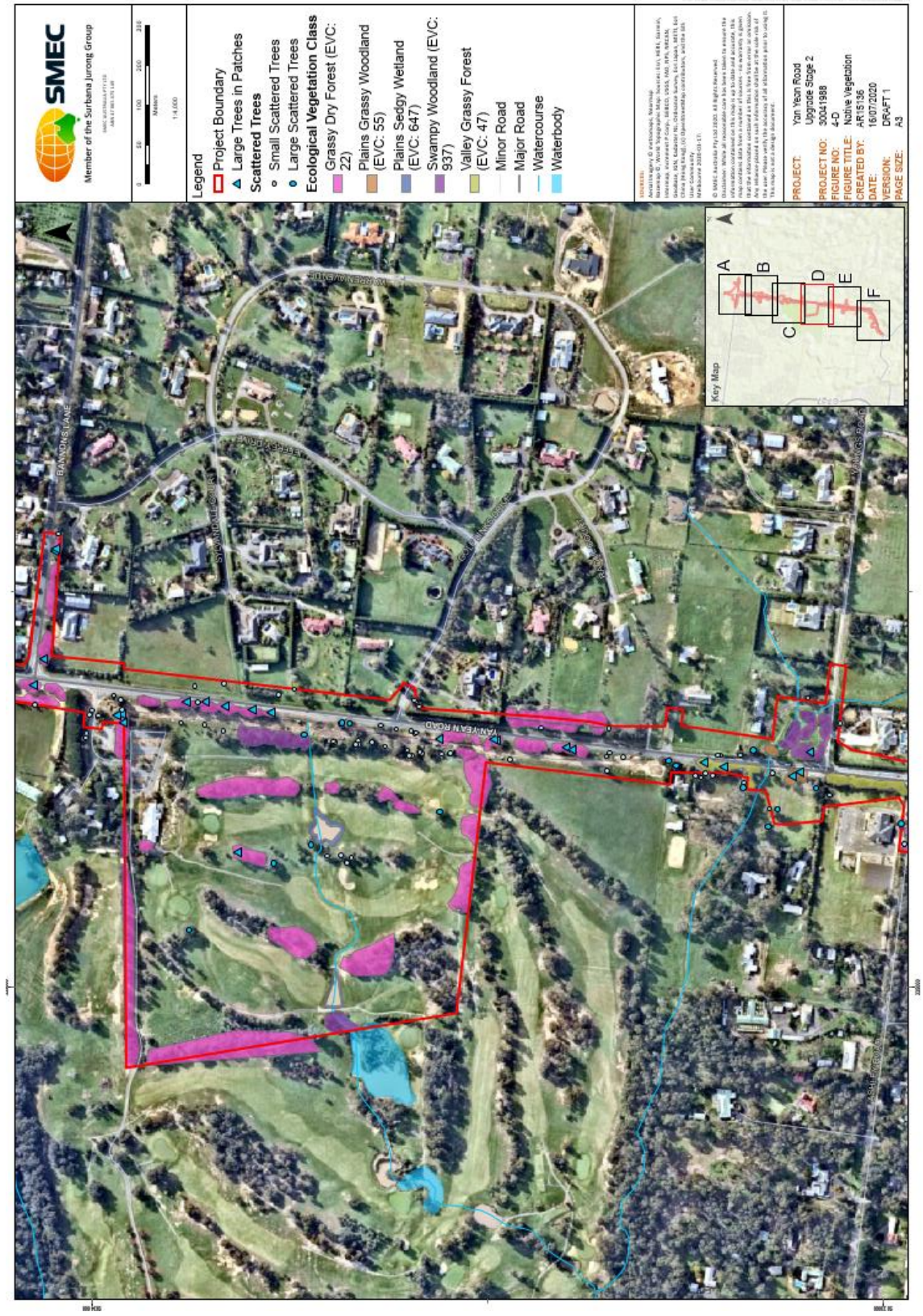
One threatened community listed under the FFG Act was found to occur within the Project area; *Western Basalt Plains (River Red Gum) Grassy Woodland*. This community is synonymous with patches of Plains Grassy Woodland (EVC 55 - Victorian Volcanic Plain bioregion) within the Project area. These patches comprised 0.233 ha and low-quality patches of vegetation with understorey dominated by introduced weeds.

While some vegetation communities present within the Project area are synonymous with EPBC Act listed communities, they did not meet the size or condition thresholds of the listed communities and were therefore not considered present.

Figure 4: Native vegetation within the Project area


SMEC
Member of the Surbana Jurong Group
Legend
Project Boundary
Large Trees in Patches
Scattered Trees
Small Scattered Trees
Large Scattered Trees
Ecological Vegetation Class
Aquatic Herbland (EVC: 653)
Grassy Dry Forest (EVC: 22)
Plains Sedgy Wetland (EVC: 647)
Tall Marsh (EVC: 821)
Valley Grassy Forest (EVC: 47)
Minor Road
Major Road
Watercourse
Waterbody
Key Map
A
B
C
D
E
F
PROJECT: Yan Yean Road Upgrade Stage 2
PROJECT NO: 30041988
FIGURE NO: 4-B
FIGURE TITLE: Native Vegetation
CREATED BY: AR15136
DATE: 16/07/2020
VERSION: DRAFT 1
PAGE SIZE: A3


SMEC
Member of the Surbana Jurong Group
Legend
Project Boundary
Large Trees in Patches
Scattered Trees
Small Scattered Trees
Large Scattered Trees
Ecological Vegetation Class
Grassy Dry Forest (EVC: 22)
Tall Marsh (EVC: 821)
Valley Grassy Forest (EVC: 47)
Minor Road
Major Road
Watercourse
Waterbody
Key Map
A
B
C
D
E
F
PROJECT: Yan Yean Road Upgrade Stage 2
PROJECT NO: 30041988
FIGURE NO: 4-C
FIGURE TITLE: Native Vegetation
CREATED BY: AR15136
DATE: 16/07/2020
VERSION: DRAFT 1
PAGE SIZE: A3
LAURIE STREET
YAN YEAN ROAD
BANNONS LANE
JEFFERIES DRIVE


SMEC
Member of the Surbana Jurong Group
Legend
Project Boundary
Large Trees in Patches
Scattered Trees
Small Scattered Trees
Large Scattered Trees
Ecological Vegetation Class
Grassy Dry Forest (EVC: 22)
Plains Grassy Woodland (EVC: 55)
Plains Sedgy Wetland (EVC: 647)
Swampy Woodland (EVC: 937)
Valley Grassy Forest (EVC: 47)
Minor Road
Major Road
Watercourse
Waterbody
Key Map
A
B
C
D
E
F
PROJECT: Yan Yean Road Upgrade Stage 2
PROJECT NO: 30041988
FIGURE NO: 4-D
FIGURE TITLE: Native Vegetation
CREATED BY: AR15136
DATE: 16/07/2020
VERSION: DR4FT 1
PAGE SIZE: A3
BANNONS LANE
YAN YEAN ROAD


SMEC
Member of the Surbana Jurong Group
Legend
Project Boundary
Large Trees in Patches
Scattered Trees
Small Scattered Trees
Large Scattered Trees
Ecological Vegetation Class
Grassy Dry Forest (EVC: 22)
Plains Grassy Woodland (EVC: 55)
Swampy Woodland (EVC: 937)
Valley Grassy Forest (EVC: 47)
Minor Road
Major Road
Watercourse
Waterbody
Key Map
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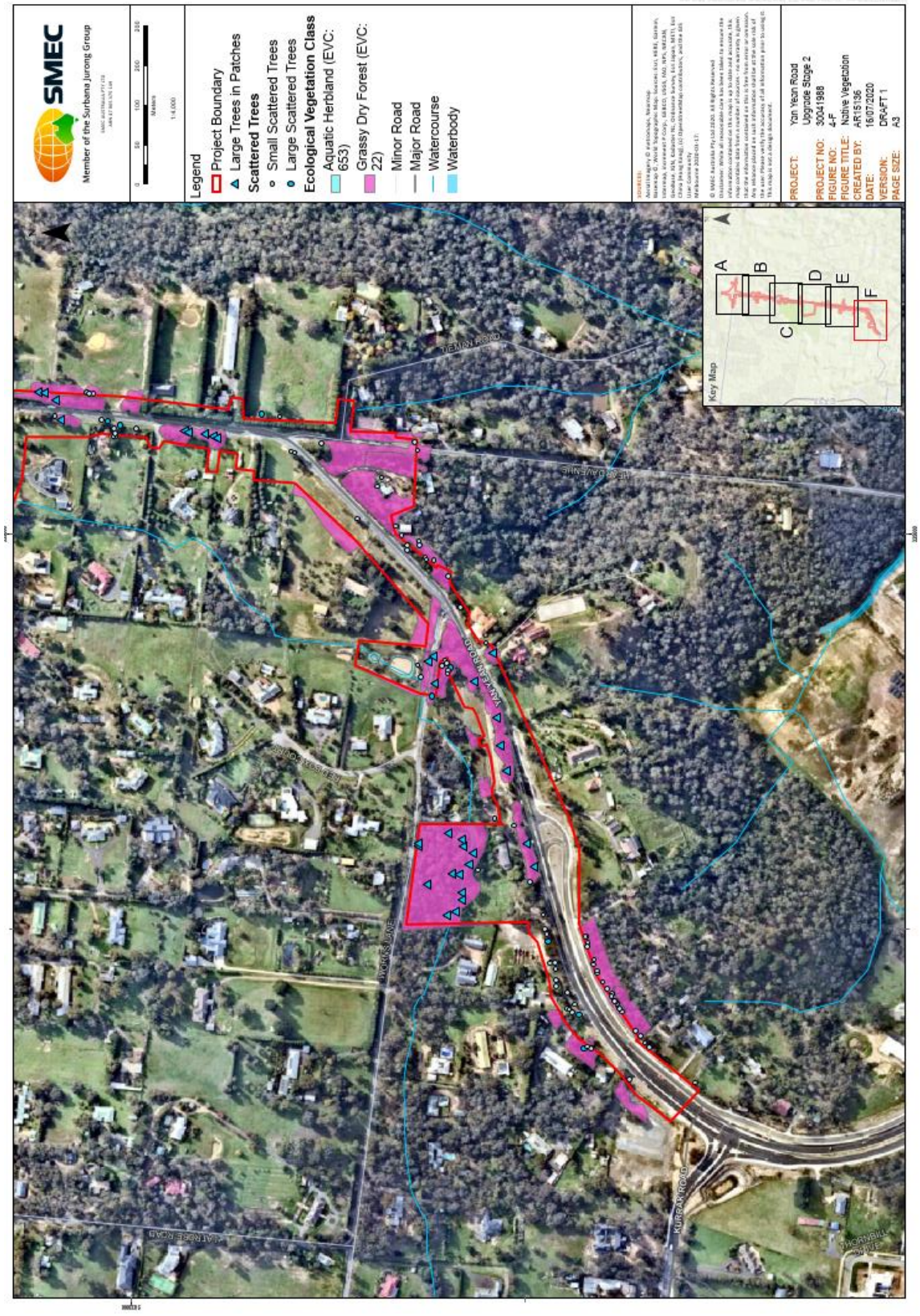
PROJECT: Yan Yean Road Upgrade Stage 2
PROJECT NO: 30041988
FIGURE NO: 4-E
FIGURE TITLE: Native Vegetation
CREATED BY: AR/15136
DATE: 16/07/2020
VERSION: DRAFT 1
PAGE SIZE: A3
IRONBARK ROAD
KURRAK ROAD
MORTONS LANE ROAD


SMEC
Member of the Surbana Jurong Group
Legend
Project Boundary
Large Trees in Patches
Scattered Trees
Small Scattered Trees
Large Scattered Trees
Ecological Vegetation Class
Aquatic Herbland (EVC: 653)
Grassy Dry Forest (EVC: 22)
Minor Road
Major Road
Watercourse
Waterbody
Key Map
A
B
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F
PROJECT: Yan Yean Road Upgrade Stage 2
PROJECT NO: 30041988
FIGURE NO: 4-F
FIGURE TITLE: Native Vegetation
CREATED BY: AR15136
DATE: 16/07/2020
VERSION: DRAFT 1
PAGE SIZE: A3
TIEMAN ROAD
HIGH STREET
KURRAK ROAD
BRIDGE INN ROAD

3.1.5 Threatened Flora

3.1.5.1 EPBC Act

One flora species listed as endangered under the EPBC Act was observed within the Project area, Matted Flax-lily. Matted Flax-lily is a tufted, perennial, mat-forming lily occurring in grassland and grassy woodland habitats (Vicflora 2020).

Two individual plants (each containing >75 ramets) were observed within the western road reserve of Yan Yean Road, just south of Laurie Street. Matted Flax-lily is also listed as endangered under the Vic Advisory List and is threatened under the FFG Act.

3.1.5.2 FFG Act

Other than Matted Flax-lily, no additional FFG Act-listed flora species were observed or considered likely to occur within the Project area due to a lack of suitable habitat, high levels of disturbance and/or absence during targeted surveys.

3.1.5.3 Victorian Advisory List

In addition to Matted Flax-lily, two flora species listed under the Victorian Advisory List were observed within the Project area; Studley Park Gum and Pale-flowered Crane's-bill.

A single Studley Park Gum was recorded within the road reserve of Yan Yean Road between the two Matted Flax-lily plants. This species is listed as endangered on the Vic Advisory List and is actually a fertile hybrid taxon of two common eucalyptus species; River Red Gum (*Eucalyptus camaldulensis*) and Swamp Gum (*Eucalyptus ovata*).

Three Pale-flowered Crane's-bill were recorded within private property at 790A Yan Yean Road and the species is listed as rare under the Advisory List. Pale-flowered Crane's-bill is a small perennial herb that occurs in open, grassy areas of dry woodland to forest and is known from the Yan Yean area (Vicflora 2020).

No additional threatened flora species listed under the Advisory List were considered likely to occur.

3.1.6 Protected Flora

Eight flora species listed as protected under the FFG Act[6] were recorded within the Project area and are listed in Table 8.

Table 8: FFG Act-listed Protected flora recorded within the Project area

SCIENTIFIC NAME	COMMON NAME
Acacia acinacea s.l.	Gold-dust Wattle
Acacia genistifolia	Spreading Wattle
Acacia mearnsii	Black Wattle
Acacia pycnantha	Golden Wattle
Acacia stricta	Hop Wattle
Brunonia australis	Blue Pincushion
Dianella amoena	Matted Flax-lily
Hardenbergia violacea	Purple Coral-pea

[6] FFG Act protected flora list: https://www.environment.vic.gov.au/__data/assets/pdf_file/0011/50420/20191114-FFG-protected-flora-list.pdf

3.1.7 Noxious Weeds

Field surveys identified nine weed species listed under the *Catchment and Land Protection Act 1994* (CaLP Act), with five also identified as Weeds of National Significance (WoNS). These species and their corresponding listings are included in Table 9.

Table 9: Noxious weeds recorded within the Project area.

SCIENTIFIC NAME	COMMON NAME	LISTING[7]
Asparagus asparagoides	Bridal Creeper	CaLP (R), WoNS
Chrysanthemoides monilifera	Boneseed	CaLP (C), WoNS
Cytisus scoparius	English Broom	CaLP (C), WoNS
Genista monspessulana	Montpellier Broom	CaLP (C), WoNS
Nassella neesiana	Chilean Needle Grass	CaLP (R), WoNS
Opuntia stricta	Prickly Pear	CaLP (C), WoNS
Oxalis pes-caprae	Soursob	CaLP (R)
Rubus polyanthemus	Blackberry	CaLP (C), WoNS
Watsonia meriana var. *bulbillifera*	Wild Watsonia	CaLP (C), WoNS

3.2 Fauna

3.2.1 Summary

The primary habitat type to support fauna species within the Project area included patches of woodland vegetation and planted trees and shrubs. Aquatic habitat present within the Project area was present in farm dams, landscaped wetlands associated with Yarrambat golf course, Orchard Park and private property, and a dam built for drainage purposes at the corner of Youngs Rd and Yan Yean Rd.

A total of 88 fauna species were recorded across all surveys, 10 of which are introduced species. One threatened fauna species was observed at two locations during nocturnal fauna surveys, Grey-headed Flying-fox (*Pteropus poliocephalus*), albeit outside of the Project area. Suitable habitat with potential to support an additional seven listed species was also recorded during field surveys, summarised in Table 10.

Table 10: Listed fauna species recorded or identified as potentially occurring within the Project area

COMMON NAME	SCIENTIFIC NAME	LISTING[8]		
		EPBC	**FFG**	**Vic Adv.**
Grey-headed Flying-Fox	*Pteropus poliocephalus*	VU	L	vu
Swift Parrot	*Lathamus discolor*	CR, Ma	L	en
White-throated Needletail	*Hirundapus caudacutus*	VU, Mi, Ma	L	vu
Rufous Fantail	*Rhipidura rufifrons*	Mi, Ma	-	-
Brush-tailed Phascogale	*Phascogale tapoatafa*	-	L	vu
Common Bent-wing Bat	*Miniopterus schreibersii*	-	L	-

[7] C = Listed as Regionally Controlled under the CaLP Act; R = Listed as Restricted Weeds under the CaLP Act, WoNS = listed as a Weed of National Significance

[8] EPBC Act listings: CR = Critically Endangered, VU = Vulnerable, Mi = Migratory, Ma = Marine; FFG Act listing: L = Listed as Threatened; Vic Advisory listings: en = endangered, vu = vulnerable, dd = data deficient.

Tussock Skink	*Pseudemoia pagenstecheri*	-	-	vu

3.2.2 Threatened Fauna

3.2.2.1 EPBC Act

One threatened fauna species listed under the EPBC Act was recorded during the field investigations, Grey-headed Flying-Fox, while a further two were considered a moderate likelihood of occurrence based on the presence of suitable habitat and previous records including Swift Parrot and White-throated Needletail.

Swift Parrot is considered to have a moderate likelihood of utilising the Project area as a foraging resource following the species' winter migration from its Tasmanian breeding grounds to mainland Australia. Swift Parrot forage within the canopy of eucalypts, feeding mainly on nectar but also lerps, seeds and flowers (Species Profile and Threats Database, SPRAT, DAWE website[9]). The core habitat for this species within Victoria includes the Box-Ironbark woodlands in northern Victoria, which contain a high proportion of winter-flowering eucalypt species, however its distribution can change year to year and is heavily dependent on food supply (SPRAT). In total, the Project area and 20 m buffer supports eight preferred foraging tree species (encompassing 639 small trees, 17 large trees) and four secondary feed tree species (including 1,824 small trees, 107 large trees). These trees occur throughout the entire Project area and are largely situated in areas of remnant native vegetation, however also occur as scattered trees and areas of planted trees.

Grey-headed Flying-fox was recorded outside of the Project area at two targeted owl survey sites located approximately 350 m and 800 m from the Project area. Grey-headed Flying-fox are widely distributed across eastern Australia feeding on nectar from a variety of eucalypt species and fruits in rainforest habitats and farmland (SPRAT). This species is highly mobile and is considered likely to periodically forage within the Project area, however it does not contain permanent breeding or roosting habitat with the nearest known camp located approximately 17 km to the south in Yarra Bend Park.

White-throated Needletail is an almost exclusively aerial species that can occur over a wide variety of habitat types. It is a summer migrant to Australia with its breeding grounds occurring in northern Asia. While the species may periodically fly over the Project area, it is not likely to utilise the habitats occurring there.

3.2.2.2 FFG Act

Two fauna species listed under the FFG Act are considered to have a moderate likelihood of occurrence within the Project area; Common bent-wing Bat and Brush-tailed Phascogale.

Brush-tailed Phascogale inhabits open dry foothill forest with little ground cover and typically associated with box, ironbark and stringybark eucalypts (SWIFFT 2020a). They are primarily arboreal and dependent on tree hollows for denning and breeding purposes and coarse woody debris such as logs for dispersing across landscapes. The species has a large home range, which may extend between 20-70 ha for females and up to 100 ha for males, with males known to disperse through less suitable habitat types (DSE 2003). Targeted surveys undertaken for the Project failed to detect Brush-tailed Phascogale, and it was considered highly unlikely to be present within the Project area or surrounding study area due to the highly fragmented habitat present and lack of woody debris at ground level. However, given previous records for Brush-tailed Phascogale exist south of the Project area, the species was considered moderately likely to use habitat within the Project area for dispersal (WSP 2020). Areas of habitat able to be used for dispersal by Brush-tailed Phascogale include patches of native vegetation with high scores for large trees (>4 out of 10) *and* logs (>2 out of 5), which represents 15 patches (approximately 4 ha) mapped in the Project area (WSP 2020, Appendix H, Native Vegetation Patches; Habitat Hectare Data).

However, considering the abundance of records to the east and south-east of the Project area within large tracts of remnant vegetation (centred around Warrandyte, Hurstbridge and Sugarloaf Reservoir, VBA 2020) and lack of recent records west of Project area (one 2005 record in the last 30 years), the Project area is likely to be utilised very infrequently by this species.

The Common Bent-wing Bat is a cave-roosting species, foraging on insects within woodland habitats in proximity to suitable roosting sites (e.g. caves, cliffs, mineshafts) (SWIFT 2020b). There are no known roosting sites within the Project area or nearby, and this species is likely to only infrequently forage or fly through/over the Project area.

[9] SPRAT database: https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

3.2.2.3 Victorian Advisory List

One species Victorian Advisory-listed species was considered to have potential habitat in the Project area; Tussock Skink. This species is listed as vulnerable under the Vic Advisory List and is considered to have a moderate to high likelihood of occurrence within the Project area.

Tussock Skink occurs in grassland and grassy woodland habitats with tussock-forming grasses as the primary ground cover. Potential habitat for this species was observed within moderate to high quality patches of Grassy Dry Forest (EVC 22) northeast of Jorgenson Avenue. Additional habitat was assumed present within low quality patches of Plains Grassy Woodland (EVC 55) with a predominantly native grassy understorey. This consisted of 18 patches of native vegetation (approximately 2 ha) with high scores for understorey (≥10) *and* low scores for canopy cover (≤3). Due to the lack of targeted surveys undertaken and presence of suitable habitat, Tussock Skink was assumed present.

3.2.3 Migratory Species

In total, two species listed as migratory under the EPBC Act were considered to potentially occur within the Project area; Rufous Fantail and White-throated Needletail, the latter also listed as a threatened species and discussed in detail above.

Rufous fantail primarily occurs in wet sclerophyll forests and rainforests however the species utilises drier sclerophyll forests and woodlands when on passage to their winter migration grounds in northern Australia and Papua New Guinea (SPRAT). It is therefore considered that Rufous Fantail may periodically utilise woodland habitat and gardens within the Project area, however is not likely to reside there on a permanent basis.

3.2.4 Habitats

Overall, the Project area was found to contain low to moderate quality habitat for fauna. Much of the previous woodland habitat has been heavily impacted by past clearing for road infrastructure and residential developments, and ongoing impacts include weed incursion, slashing/mowing and movement of traffic. Higher quality habitats included remnant vegetation located on private property to the north of the Project area (adjacent Jorgenson Avenue) and to the south between Kurrak Road and Worns Lane.

Habitat features present in the Project area included:

- Hollow bearing trees;
- Higher quality patches of native vegetation with intact understorey;
- Eucalyptus with modified midstorey for foraging birds and mammals;
- Aquatic habitat (limited) farm dams, landscaped wetlands;
- Planted gardens; and
- Grassland – native and exotic.

3.2.5 Pest Fauna

Evidence of introduced pest fauna species was present in the Project area, including Red Fox and European Rabbit.

3.3 Waterbodies, Watercourses and Groundwater Dependent Ecosystems

Aquatic habitat within the project area comprises constructed dams on private property and council wetlands built for local drainage purposes. There are no creeks or rivers within the Project area, however several ephemeral drainage lines that intersect the Project area, flowing towards Plenty River. These habitats contain common native wetland flora and support common amphibians and waterbirds such as Common Froglet (*Crinia signifera*), Spotted Marsh frog (*Limnodynastes tasmaniensis*) and Purple Swamphen (*Porphyrio porphyrio*). Aquatic habitats within the Project area are not considered to support MNES.

There are no listed Ramsar-listed or internationally significant wetlands present in or within a 5 km radius of the Project area.

Groundwater dependent ecosystems (GDEs) are communities of plants, animals or other organisms that rely on groundwater partially or entirely for their health and existence (DPJR 2020). GDEs include vegetation that can access sub-surface groundwater via their root systems, or via the surface expression of groundwater as wetlands and streams. *Technical Report J - Groundwater Impact Assessment Yan Yean Road Upgrade – Stage 2: Kurrak Road to Bridge Inn Road* (Arcadis 2020) identified several modelled GDEs within the Project area reliant on the subsurface presence of groundwater. These include four terrestrial EVCs confirmed present:

- Grassy Dry Forest (EVC 22);
- Valley Grassy Forest (EVC 47);

- Plains Grassy Woodland (EVC 55); and
- Swampy Woodland (EVV 937).

These EVCs were considered potentially reliant on groundwater due to existing canopy trees that access water via their root systems. Wetland EVCs recorded in the Project area such as Aquatic Herbland (EVC 653) and Tall Marsh (EVC 821) were not considered to be dependent on subsurface groundwater as these EVCs do not contain canopy trees and their root systems are shallow. Wetland EVCs in the Project area are expected to be dependent on surface water and surface expressions of groundwater.

Groundwater in the southern half of the Project area is assumed to be deep (>60 m) (WSP 2020) and vegetation in this area is therefore unlikely to be reliant on subsurface groundwater. Some large trees in the northern half of the Project area may be more susceptible to changes in groundwater, which is more likely to be at a depth of 8m or further below ground surface.

No EVCs in the Project area constitute a threatened community under the EPBC Act, however recorded areas of Plains Grassy Woodland (EVC 55) occurring within the Victorian Volcanic Plain bioregion are synonymous with, and are therefore considered, the FFG Act-listed Western Basalt Plains Grassy Woodland community. Threatened fauna listed under the EPBC Act such as Grey-headed Flying-fox occasionally utilise trees in the project area for foraging, and Swift Parrot has potential to utilise these trees, but are not considered dependent on this habitat. EPBC Act-listed Matted Flax-lily is unlikely to be reliant on subsurface groundwater and therefore is expected to be unaffected by potential changes to groundwater.

4 Risk Assessment

The environmental risk assessment process was undertaken in accordance with the MRPV Environmental Risk Management Guideline (2019). Risk assessment methodology is further detailed in Chapter 4 Environment Effects Statement Assessment Framework and Attachment III Environmental Risk Assessment Report of the EES.

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 will manage environmental risk to achieve acceptable environmental outcomes in accordance with the EPRs. The consolidated list of EPRs for the Project is detailed in Chapter 12 Environmental Management Framework (Section 12.8) of the EES.

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 Assessment Report (Appendix III-A) of the EES.

Key risks are defined as having an initial rating of 'significant' and above and are shown in Table 11 below.

Table 11: Summary of residual significant or above-rated biodiversity risks

RISK #	IMPACT PATHWAY	PROJECT PHASE	INITIAL RATING	EPR #	RESIDUAL RATING
6, 25, 44	Potential removal, destruction or lopping of native vegetation (including patches and scattered trees)	Site establishment, earthworks, civils and structures	High	EPR E1, EPR E3, EPR E4	High
7, 26, 45	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 E1, EPR E2, EPR E3, EPR E4, EPR E8	Significant
8, 84	Potential impact on wildlife or their habitat	Site establishment, operation	High	EPR E2, EPR E3, EPR E6	Significant
27, 46		Earthworks, civils and structures	Significant	EPR E2, EPR E3	Medium
3, 22, 41	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	Significant

5 Impact Assessment

5.1 Overall Impacts of the Project

Likely impacts identified for the project have been categorised according to existing biodiversity value:

- Native vegetation and trees;
- Listed flora and fauna species and their habitat; and
- Wildlife (common fauna).

The risk of impacts to biodiversity was assessed for both construction and operational phases of the project with impacts relevant to each matter summarised in Table 12 and discussed in detail below.

Table 12: Summary of likely impacts for the Project

BIODIVERSITY MATTER	PROPOSED IMPACTS
Native vegetation and trees	
Native vegetation (Guidelines)	• Up to 11.888 ha of native vegetation patches to be removed including: – 9.068 ha Grassy Dry Forest (EVC 22) – 1.545 ha of Valley Grassy Forest (EVC 47) – 0.347[10] ha Plains Grassy Woodland (EVC 55) – 0.049 ha Plains Sedgy Wetland (EVC 647) – 0.066 ha Aquatic Herbland (EVC 653) – 0.395 Tall Marsh (EVC 821) – 0.418 ha Swampy Woodland (EVC 937) • Up to 134 large trees within EVC patches • Up to 40 large scattered trees and 164 small scattered trees (equivalent to approximately 5 ha).
Trees (other)	• Up to 2,319 additional trees to be removed including: – 1,222 planted native trees – 1,097 exotic trees
Listed flora	
Matted Flax-lily	Two plants (>75 ramets per plant) occur within the Project area and are proposed to be removed.
Studley Park Gum	One individual occurs within the Project area and is proposed to be removed.
Pale-flowered Crane's-bill	Three individuals occur within the Project area on private land and are proposed to be removed.
Western Basalt Plains (River Red Gum) Grassy Woodland	A total of 0.186 ha of this community is proposed to be removed.
FFG Act-listed Protected flora	Eight species occur within the Project area; Matted Flax-lily, Gold-dust Wattle, Spreading Wattle, Black Wattle, Golden Wattle, Hop Wattle, Blue Pincushion and Purple Coral-pea. Individuals of all these species are likely to be removed.
Listed fauna	

[10] Area (ha) of Plains Grassy Woodland to be removed appears larger than the total amount recorded in the Project area by WSP (2020). In accordance with DELWP data compliance standards for native vegetation mapping, impact calculations have incorporated additional areas of canopy that were clipped in the vegetation mapping presented by WSP (2020).

BIODIVERSITY MATTER	PROPOSED IMPACTS
Swift Parrot	• Up to 1,593 preferred and secondary foraging trees potentially removed, consisting of: – 354 preferred foraging trees – 1,239 secondary foraging trees • Disturbance or alteration of habitat conditions from increased noise and light • Habitat degradation from weed incursion and dust • Increased risk of vehicle strike and collision with man-made structures
Grey-headed Flying Fox	• Up to 2,521 eucalypts (174 large trees, 2,347 small trees) which provide potential foraging habitat to be removed • Disturbance or alteration of habitat conditions during construction from increased noise and light • Habitat degradation from weed incursion and dust
Brush-tailed Phascogale	• 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
Tussock Skink	• Potential habitat to be removed. • Disturbance or alteration of habitat conditions from increased noise, light and vibration • Increased predation • Habitat degradation from weed incursion, dust, erosion and sedimentation
Wildlife (common fauna)	• 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

5.2 Listed Key Threatening Processes

The EPBC Act lists 21 key threatening processes that may threaten the survival, abundance or evolutionary development of a native species or ecological community. The FFG Act lists 43 threatening processes which have been identified as detrimental to Victoria's flora and fauna. Of these listed threatening processes, six were identified as having moderate or above likelihood to occur *and* as having the possibility to be exacerbated by the Project:

- Land clearance;
- Habitat fragmentation as a threatening process for fauna in Victoria;
- Invasion of native vegetation by Blackberry *Rubus fruticosus L.* agg;
- Invasion of native vegetation by Sallow Wattle;
- Loss of hollow-bearing trees from Victorian native forests; and
- Invasion of native vegetation by Sweet Pittosporum.

The likelihood of occurrence assessment for key threatening processes is presented in Appendix B Consideration of impacts on biodiversity through key threatening processes considered *likely* to be exacerbated

by the Project are incorporated in the sections below for native vegetation, listed threatened species and communities, and wildlife.

5.3 Native Vegetation

Impacts on native vegetation have been considered according to the following themes in accordance with EES scoping requirements:

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

5.3.1 Removal or Destruction of Native Vegetation

The current design for the Project requires the removal of patches of native vegetation and scattered trees. Whilst complete avoidance is unachievable, the current design has been selected to minimise the loss of native vegetation whilst still maintaining the desired safety outcomes for the road. It should also be noted the totals referred to in this report reflect a conservative estimate based on the current Project footprint, with additional retention expected to be achievable during the design stage. The removal of native vegetation is required for the following key components of the Project:

- Widening of Yan Yean Road to accommodate a dual carriageway;
- Installation a of shared user path; and
- Upgraded intersections.

Vegetation removal will primarily occur in the early phases of construction as areas are cleared by machinery prior to civil works. However, secondary removal or destruction of native vegetation may occur during the construction phase of the Project if construction activities are not properly managed, such as: sedimentation or erosion caused by run off from recently cleared areas, contamination from spills or chemicals used during construction, generation of dust and poor management of retained vegetation and no-go zones.

- Construction activities (e.g. soil excavation, vehicle storage and movement) may increase the potential for erosion and sedimentation and can impact water quality of adjacent waterways and degrade site ecological values. Fast moving water running off recently cleared areas can cause scouring of topsoil and vegetation in adjacent areas of retained vegetation. The water running off construction sites is usually heavily laden with sediment that is then deposited in receiving waterways or on areas of retained vegetation, affecting the productivity health of native ground covers.
- Construction activities may involve the use of fuels, lubricants, chemicals and construction waste materials that pose a risk to soil, waterways and groundwater contamination. The chemicals can be dispersed across large areas by wind and water, causing adverse impacts to the health of vegetation.
- Some construction activities have the potential to increase dust levels. When vegetation is stripped, and large areas of soil are exposed, construction activities such as vehicle and machinery movement can generate dust which may settle on adjacent retained vegetation, affecting the health and productivity of the plants. Dust levels may also increase with wind if exposed soils are left open for long periods of time.
- Damage to or accidental loss of vegetation may occur as a result of poor management of no-go areas, soil compaction (e.g. from movement of vehicles and machinery) and damage to TPZs of retained trees. No-go zones should be appropriately demarcated and signed and should take into account the TPZ of retained trees.

During the operational phase of the project, the risk of vegetation removal is considered to be negligible, however impacts may arise from maintenance activities such as weed control and slashing of ground covers adjacent the road corridor. If undertaken during wet or windy conditions, herbicides applied to control roadside weeds may drift into areas of retained vegetation, causing dieback. Slashing of roadside vegetation may also occur in areas of vegetation retention.

Appropriate mitigation measures will be employed throughout the construction and operational phases of the project to minimise the risk of any further loss of native vegetation other than the anticipated losses required for the construction footprint of the Project. Mitigation measures to avoid, minimise and offset the loss of native vegetation are discussed in Section 6.3.

Vegetation removal will primarily consist of low-quality patches of Grassy Dry Forest (EVC 22) (habitat scores of patches assessed ranged between 0.17 and 0.62, with an average habitat score of 0.35), and which has a bioregional conservation status of least concern. Land clearance is a key threatening process which will be exacerbated by the Project, by creating further vegetation loss and fragmentation within an already significantly fragmented local landscape.

5.3.2 Introduction and/or Spread of Introduced Weeds or Pathogens

The 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 creates disturbed environments that are more susceptible to invasion by weeds and pathogens. When native ground cover species are removed, weeds often outcompete natives to recolonize cleared areas. Weeds and pathogens may be introduced to the Project area by construction plant and equipment that is carrying weed seed material or contaminated soil. Plant and equipment used to undertake earthworks within the Project also have the opportunity to spread weeds and pathogens to other areas causing potential infestations further afield.

Construction works will be subject to management requirements for weeds and pathogens which will be incorporated into the Construction Environmental Management Plan (CEMP) for the Project. A Weed and Hygiene sub-section of the CEMP will be developed to manage for weeds, disease and spoil management (refer Section 6). This would include measures to reduce the key threatening processes of invasion of the Project area by Blackberry, Sallow Wattle and Sweet Pittosporum. The potential impact of introduction or spread of weeds and pathogens on biodiversity values is considered low provided EPRs are implemented.

5.4 Listed Threatened Species and their Habitat

The project proposes to remove native vegetation that provides potential habitat for threatened species. Threatened species that are not heavily dependent on the habitat present within the Project area (e.g. occasional foraging) are less likely to be adversely impacted by habitat removal, however the loss of dispersal and foraging opportunities caused by the Project may affect some threatened species populations where alternative habitats are unavailable. There is no known breeding or roosting habitat for threatened fauna species in the Project area.

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.

It should also be noted that It is considered unlikely that groundwater will be intersected during construction. Standard control measures stated in the CEMP for the Project are expected to manage potential contamination of groundwater levels adequately such that GDEs and associated habitat for listed threatened species and GDEs in the Project area will not be adversely impacted.

Matted Flax-lily

Based on the current project design, the removal of the two Matted Flax-lily plants (>75 ramets per plant) from the western road reserve of Yan Yean Road during construction is likely to be unavoidable.

Despite the design attempting to avoid removal at this location, the wide median design between Laurie Street and Bannon's Lane is likely to encroach directly upon the Matted Flax-lily plants. If the design cannot avoid impacts on Matted Flax-lily, plants are proposed to be translocated in accordance with a salvage and translocation plan (EPR E5). Suitable recipient sites are being investigated and will be endorsed by City of Whittlesea and/or Nillumbik Shire, as well as DELWP and DAWE prior to the removal of plants. There are no additional impacts expected to Matted Flax-lily during the operational phase of the Project.

Yan Yean Road is not listed as a known significant site for Matted Flax-lily within the National Recovery Plan for the species (Carter 2010). Removal of the two plants is considered unlikely to lead to decline of the species and is not considered to constitute a significant impact under the EPBC Act. An assessment against EPBC Act significant impact criteria (DoE 2013) for Matted Flax-lily is provided in Appendix C Translocation of plants proposed for removal is a listed objective of the National Recovery Plan (Carter 2010).

Studley Park Gum

Based on the current Project design, the removal of a single Studley Park-gum during construction is unavoidable. Despite the design attempting to avoid removal at this location, the wide median design between Laurie Street and Bannon's Lane encroaches directly upon the Studley Park-gum. The tree would be offset in

accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) (EPR E4). Proposed 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 utilise during landscaping works post construction. There are no additional impacts expected to Studley Park-gum during the operational phase of the project.

Pale-Flowered Crane's-Bill

Three Pale-flowered Crane's-bill plants were recorded within the Project area, within private property at 790A Yan Yean Road, across the road from Werther Park. The design is not able to avoid impacts on Pale-flowered Crane's-bill and construction is likely to result in their removal. Plants would be offset in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) (EPR E1).

FFG Act - Protected Flora

Eight species listed as protected under the FFG Act were recorded within the Project area. It is assumed that individuals from each of these species will be unable to be avoided by construction of the project. The project footprint should be minimised as much as possible during design to minimise impacts on these species (EPR E1). Areas of vegetation containing these species able to be retained will be protected by the establishment of no-go zones (EPR E4). A permit will be sought from DELWP for the removal of these protected species in areas that cannot be avoided, and offsets would be secured in accordance with DELWP Guidelines. Potential impacts to these species during operation phase is likely to be through weed invasion and habitat degradation in the Project area. To avoid these impacts, weed and pathogen control within the Project area will be undertaken (EPR E3).

Swift Parrot

Swift Parrot have not previously been recorded within the Project area and were not identified in targeted surveys, indicating the Project area is not used frequently during the period when the species is present on mainland Australia. However, the species is highly mobile and forages across the greater Melbourne region in response to foraging resources, therefore the species may utilise foraging habitat within the Project area if available on rare occasions, albeit only if more reliable, secure and higher quality habitat is unavailable in the local area.

The primary impact to Swift Parrot is through direct loss of preferred foraging trees, however additional impacts to the species may occur through the construction and operational phases of the project. Retained habitat adjacent to the Project area may become degraded through settling of dust on the foliage of eucalypts, in addition to introduction of weeds and pathogens, particularly *Phytophthora cinnamomi*. Noise and light from construction activities may also deter the species from foraging within retained habitat during the construction phase, however these impacts will be short term, and limited to areas in which Swift Parrot have not been recorded previously.

A total of 2,315 preferred or secondary foraging trees are located within the Project area boundary. An additional 272 preferred or secondary foraging trees are situated outside the Project area boundary. Key or 'preferred' and secondary foraging tree species definitions are as per Saunders and Tzaros (2011) and Practical Ecology (2017).

When taking into consideration the health and condition of preferred and secondary foraging trees likely to be impacted within the Project area boundary, the potential loss of foraging habitat equates to 354 preferred foraging trees and 1,239 secondary foraging trees, noting that the respective habitat value of each of these trees varies significantly. These trees are summarised in Table 13.

Generally, the larger the tree the more foraging value it has for Swift Parrots (Saunders and Tzaros, 2011). Within the eucalypt forests and woodlands on mainland Australia, Swift Parrots have been found to preferentially forage in large, mature trees (Kennedy 2000; Kennedy and Overs 2001; Kennedy and Tzaros 2005) that provide more reliable foraging resources than younger trees (Wilson and Bennett 1999; Law et al. 2000).

Phenological characteristics are important in determining potential habitat areas and the quality of those areas (Saunders and Tzaros, 2011). Tree health is also important in determining potential habitat suitability.

Preferred and secondary foraging trees listed in Table 13 do not all possess the same foraging habitat potential, that is their respective value to Swift Parrot is highly variable. Young trees do not provide the same amount of nectar or overall foraging resources that older, more established trees provide. Similarly, trees in very poor health or condition do not provide the same amount of nectar foraging resources as trees in good health or condition. Young trees are also more unreliable in their flowering patterns. As per the recovery plan, larger,

mature trees are known to be of higher importance to Swift Parrots due to them providing a more reliable foraging resource.

Ultimately, of the preferred and secondary foraging trees likely to be impacted, only a small proportion of these trees are expected to provide potentially suitable foraging habitat for Swift Parrot.

Of the preferred and secondary foraging trees likely to be impacted within the Project area;

- 89 are dead (1 preferred large old tree, 5 secondary large old trees, 7 preferred small trees, 76 secondary small trees); and,
- 11 are in very poor condition (1 preferred large tree, 2 preferred small trees, 8 secondary small trees);

Dead or trees in very poor condition are expected to provide no or extremely limited foraging habitat for Swift Parrots and are thus considered to be of low value. Of the remaining 1,593 trees;

- 14 large preferred foraging trees are predicted to provide suitable foraging habitat for Swift Parrot;
- 74 large secondary foraging trees may provide some foraging habitat for Swift Parrot, depending on flowering patterns during April through to September, and psyllid insect infestations (lerp availability), and are therefore considered to be an unreliable foraging resource;
- 340 small preferred foraging trees may provide some unpredictable and unreliable foraging habitat for Swift Parrot; and,
- 1,165 small secondary foraging trees are expected to provide limited and unreliable foraging habitat for Swift Parrot.

Following completion of the project, retained habitat may provide additional colonisation opportunities for more aggressive bird species which are adapted to urbanised environments, such as the Noisy Miner. These territorial species can fend off many other native species from foraging within their territory. An increase in such species may further reduce the suitability of potential foraging habitat for Swift Parrot in the Project area.

Swift Parrot are also susceptible to collision with vehicles and other infrastructure, such as the proposed 30-36m high and 360 m 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 of Swift Parrot utilising habitat in the Project area or travelling 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 collisions resulting in trauma and death, the proposed fence would not be chain mesh or barbed wire. The fence would be constructed using materials that are elastic. Woven polymer fabrics containing Kevlar have been used to construct impact mitigation fences at Ringwood Public Golf Course and Centenary Park Golf Course, which based on anecdotal evidence have each experienced a very low instance of bird entanglement and no recorded Swift Parrot entanglements or mortality in 20 years of operation.

Overall, this assessment has identified that the Project is not likely to significantly impact the species when considering the availability of foraging habitat in the wider region and the highly mobile nature of the species, which are known to forage over large distances within greater Melbourne as part of their migratory route between Tasmania and mainland areas to the north. The project will also include mitigation measures and EPRs (based on this assessment) which will reduce potential impacts.

Table 13: A summary of the number of preferred and secondary foraging trees for Swift Parrot in the Project area

Swift Parrot foraging trees impacted within project area boundary																
	Large Trees >60cm DBH						Large Tree Total	Small Trees <60cm DBH							Small Tree Total	Grand Total
Tree Health	**Dead**	**Very poor**	**Poor**	**Fair**	**Good**	**Very good**		**Dead**	**Very poor**	**Poor**	**Fair**	**Good**	**Very good**	**n/a**		
Preferred																
Grey Box					1		1					1			1	2
Ironbark											1				1	1
Red Ironbark								3		2	11	28			44	44
Spotted Gum									2	5	29	46	3		85	85
Swamp Mahogany										3	4				7	7
Yellow Box	1			4	8	1	14	3		8	53	63	3		130	144
Yellow Gum								1		9	52	19			81	81
Preferred Total	**1**			**4**	**9**	**1**	**15**	**7**	**2**	**27**	**150**	**157**	**6**		**349**	**364**
Secondary																
Golden Wattle								3	1	15	60	17			96	96
Red Box	3	1		18	30		52	45	4	85	485	206	2	1	828	880
Red Stringybark	2		1	1			4	26	2	38	104	15	2		187	191
River Red Gum			2	5	16	1	24	2	1	34	61	40			138	162
Secondary Total	**5**	**1**	**3**	**24**	**46**	**1**	**80**	**76**	**8**	**172**	**710**	**278**	**4**	**1**	**1249**	**1329**
Grand Total	***6***	***1***	***3***	***28***	***55***	***2***	***95***	***83***	***10***	***19 9***	***86 0***	***43 5***	***10***	***1***	***1598***	***1693***
Preferred (poor or better health)				4	9	1	14			27	150	157	6		340	
Secondary (poor or better health)			3	24	46	1	74			172	710	278	4	1	1165	
Total (poor or better health)							***88***								***1505***	***1593***

Grey-Headed Flying-Fox

The Project will result in the loss of potential foraging habitat for Grey-headed Flying-fox comprising 2,521 trees, of which 174 are large trees (over 60 cm DBH) and 2,347 are small trees. In addition to the loss of habitat from the construction footprint of the Project, there is a risk of further habitat loss or degradation to retained vegetation as a result of construction and operational activities as described in Section 5.3 and will require implementation of appropriate mitigation measures (refer Section 6).

Temporary disturbances to the foraging activities of this species may occur throughout the construction phase of the Project and during the operational phase from increased disturbance from noise and light. Noise from construction activities are expected to occur primarily during the day and are therefore not likely to impact this nocturnal species. Any construction activities undertaken at night may disrupt foraging activity in retained habitat within or immediately adjacent the Project area but will be restricted to smaller sections of the road at any given time and will be short term in nature.

Following the completion of construction, it is anticipated there will be an increase in noise and light disturbances within the Project area from increased traffic and street lighting. However, considering this species' foraging habitat is primarily within the urban environment of greater Melbourne, the levels of increased noise and light from the Project are unlikely to act as a deterrent to Grey-flying fox foraging in adjacent habitat.

Grey-headed Flying-fox may also be impacted by the proposed 30-36m high fence to be built at Yarrambat Park Golf Course. The fence poses a risk to foraging individuals that may use suitable habitat when available in proximity to the fence at night, as well as individuals travelling in an easterly or westerly direction from roost sites to foraging areas. 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 nocturnal species. Fences that have been constructed at other golf courses around the greater Melbourne area have not reported collisions or entanglements with Grey-headed Flying-fox, although it should be noted that post-construction monitoring for entanglement and collision related mortality has not been required at the golf clubs consulted, and thus evidence collected is anecdotal only. To assist Grey-headed Flying- to recognise the fence as a visible barrier to their movement, thereby reducing risk of collision resulting in entanglement and death, the proposed fence should incorporate ultra-violet reflective elements to increase its visibility.

While the Project will result in the loss of potential foraging habitat (up to 2,521 trees) for Grey-headed Flying-fox, this is not likely to significantly impact the species when considering the availability of foraging habitat in the wider region and the highly mobile nature of the species, which are known to forage over large distances within greater Melbourne from their known roost within Yarra Bend Park. The project will also include mitigation measures and EPRs (based on this assessment) which will assist in reducing any further potential impacts.

Brush-Tailed Phascogale

Habitat within the Project area is considered unlikely to support a resident population of Brush-tailed Phascogale, therefore potential impacts to the species focus on possible disruption of dispersal opportunities. The Project proposes to remove 13 patches (approximately 2 ha) of native with potential to provide dispersal habitat for Brush-tailed Phascogale.

Possible impacts to Brush-tailed Phascogale during construction include removal and degradation of dispersal habitat and disturbances from light and noise. Removal or degradation of forest habitat within the Project area pertaining to key threatening processes land clearance, habitat fragmentation and loss of hollow-bearing trees, particularly areas adjoining larger intact tracts of vegetation, may create a movement barrier for individuals dispersing between patches of higher quality habitat outside of the Project area. Potential movement corridors were identified near Jorgenson Avenue, Ironbark Road and between Kurrak Road and Worns Lane (WSP 2020). If movement barriers from widening of the road prevent movement of Brush-tailed Phascogale, this is likely to also result in a barrier to gene flow and may cause decline in genetic diversity and resilience and viability of the species over time. Noise and light from construction works may also deter the species from utilising habitats within or adjacent the Project area during construction, however these impacts will be short term. Mitigation measures are required to protect areas of retained vegetation throughout construction. Additional measures must include installation of fauna bridges to enhance connectivity between movement corridors (EPR E2).

The operational phase of the Project will amplify impacts that currently exist along Yan Yean Road including barrier effects to movement (i.e. cleared areas, roads etc.), potential mortality from collision with vehicles, noise and light from traffic and street lighting and increased predation. Increased predation may result from

further fragmentation of habitat and potential increase in pest fauna, which are more likely to utilise disturbed habitats.

Overall, this assessment has identified that impacts on Brush-tailed Phascogale are limited considering the Project area is unlikely to support a resident population of the species, and EPRs will assist in reducing potential impacts associated with movement barriers.

Tussock Skink

Tussock Skink was assumed present in patches of Grassy Dry Forest (EVC 22) northeast of Jorgenson Avenue and areas of Plains Grassy Woodland (EVC 55). As this species has limited dispersal capability between fragmented patches of habitat (i.e. across cleared areas, roads etc.), the main potential impact to this species is direct habitat loss. This habitat is required for the construction of the intersection of Yan Yean Road and Jorgenson Avenue and will largely be removed.

Additional indirect impacts resulting from the construction phase pf the Project may also enhance edge effects on areas of retained habitat, such as weed invasion, vegetation degradation (through erosion, sedimentation, dust etc.), disturbance from noise, light and vibration and increased predation. Some of these impacts are also likely to continue during the operation phase of the Project including increased weed invasion and predation from pest fauna. Tussock Skink is unlikely to experience additional barriers to gene flow from the duplicated road. Due to its limited mobility and existing habitat fragmentation in the Project area, if the species is present, barriers to gene flow and movement would already be present from the existing road. Fifteen patches (approximately 1.5 ha) of moderate to poor-quality habitat for Tussock Skink is proposed to be removed. Adequate mitigation measures will be required to protect the remaining habitat for this species.

5.5 Wildlife

The Project is likely to have the greatest impact on common fauna, which are likely to reside within, or regularly utilise, habitats contained within 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 utilising habitats directly adjacent the Project area during the construction phase. Standard mitigations measures are required to protect areas of retained vegetation throughout construction.

Following completion of the Project, current impacts and key threatening processes 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 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.

Mobile ground-dwelling fauna such as kangaroos, wallabies, echidnas and wombats will 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. The increased width of the road corridor will 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. Barrier to physical movement across the road would also result in preventing gene flow between populations and potentially result in the reduction of genetic diversity and population resilience over time. Given these species are common, barriers to gene flow are likely to be impacts at local population level only and not result in the decline of common fauna species. 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. Impacts from injury and mortality would affect individuals of common fauna species and is not expected to have a lasting effect population-level effect.

Impacts from increased traffic movements are expected to be reduced from the implementation of mitigation measures including fauna bridges for arboreal mammals, fenced fauna crossings, fauna sensitive lighting and adequate signage. The loss of habitat will also be mitigated through areas of retained vegetation in no-go zones and landscape plantings of native species to provide additional habitat resources. Mitigation measures will include fauna bridges and crossings, fauna sensitive lighting and adequate signage, as discussed in Section 6.

Common bird and bat species may also be impacted by the proposed 30-36m high and 360 m 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. In the absence of available post-construction monitoring data,

anecdotal evidence was obtained from representatives of local golf courses in the greater Melbourne region, as well as the primary supplier of Golf Course Impact Netting in Australia, Country Club International Pty Ltd. Fences of similar size that have been constructed at other golf courses around the greater Melbourne area have reported a relatively low number of entanglements with mainly waterfowl species (<5 in 15 years), which are likely to collide with the net at night when it is less visible. In these cases, the entangled bird has been removed and released the same day that it is discovered. It should be noted that post-construction monitoring for entanglement and collision related mortality has not been required at the golf clubs consulted to date, and evidence collected is anecdotal only. While there is a general lack in 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.

5.6 Threatened Ecological Communities

One threatened ecological community listed under the FFG Act was recorded within the Project area, *Western Basalt Plains (River Red Gum) Grassy Woodland*. The Project will result in the removal of 0.186 ha of this community.

The vegetation community identified within the Project area occurred as a low-quality example of this community only, with high levels of disturbance and lack of species diversity in the understorey. Considering this, in addition to the small area required for removal, overall impacts to listed communities from the Project are low.

5.7 Swift Parrot Assessment of Cumulative Impacts

5.7.1 Existing Species Records

There are no records of Swift Parrot using available habitat within the Project area (Figure 5). Usage of preferred foraging trees present within the Project area by Swift Parrots is likely to be rare.

In proximity to the Project area, the main aggregation of historical sightings occurs within Plenty Gorge Park with records of the species from earlier this year (2020). Additional clusters of sightings occur in the Eltham/Montmorency area and in the vicinity of Latrobe University and Gresswell Forest Nature Conservation Reserve (Figure 6). Observations in the greater Melbourne region peak in early April through to May, during which time birds are migrating through the area to other areas north and northeast of Melbourne. A second peak in sightings usually occurs in August through October as birds are migrating back southward to their breeding areas in Tasmania. Even when taking into account observational bias in urban areas (due to a greater number of potential observers), the greater Melbourne region appears to continue provide an initial respite after birds cross Bass Straight as well as foraging opportunities depending on eucalypt flowering patterns, nectar production and incidence of lerp-producing psyllid infestations.

An analysis of records within 10 km of the Project alignment since 1950 show Swift Parrots consistently traveling through the area with some variation between years. Improvements in reporting, creation and augmentation of existing monitoring programs, accessibility to online databases and communication of sightings via social media platforms have resulted in a significant increase in the numbers of sightings from 2014 to present. Variations in the species' appearance in known habitat areas within the greater Melbourne region is likely to be influenced by availability of foraging resources, climate driven factors, and reduction in the overall population of the species largely as a result of impacts within the species breeding range in Tasmania.

5.7.2 Habitat Areas within the Greater Melbourne Region

Preferred habitat for Swift Parrot within the greater Melbourne region includes a selection of EVCs containing known foraging tree species (Appendix A), planted or scattered trees as well as the existing urban and peri-urban park and reserve network. EVCs known to support Swift Parrots in the greater Melbourne region are shown in Figures 6 and 7.

In the vicinity of the Project alignment, EVCs likely to support Swift Parrot include;

- Box Ironbark Woodland;
- Grassy Dry Forest;
- Heathy Dry Forest;
- Grassy Woodland;
- Plains Grassy Woodland;
- Valley Grassy Forest;
- Alluvial Terraces Herb-rich Woodland; and,

- Herb-rich Foothill Forest.

The species can exhibit a high degree of site fidelity, returning to locations both in breeding and overwintering habitat areas on an irregular cyclic basis (Saunders 2008, Saunders and Tzaros, 2011). Plenty Gorge Park and the Plenty River corridor appear to support the species each year, although there is also a high variation in numbers of birds. Given the species demonstrates a high degree of site fidelity, habitat quality and unchanging land use in this area, Plenty Gorge and its immediate surrounds can be considered the most important habitat resource for Swift Parrots in the local area.

Each year a concentration of Swift Parrots records generally occurs around the Port Phillip and Westernport Region with further clusters of records in the You Yangs north of Geelong, and the Bellarine peninsula from late March onwards.

The most extensive areas of habitat in the southern extent of mainland habitat, occurs in the northern reaches of Melbourne, including areas such as the Plenty River, Yarra River and Diamond Creek corridors (Figure 7, 8). These are likely to be important temporary habitat areas used by birds travelling to higher quality habitat areas in central and north-eastern Victoria and further interstate into NSW.

Stands of preferred eucalypts species in parks and gardens around Melbourne also provide foraging and roosting habitat for Swift Parrots after traversing Bass Strait depending on food resource availability.

Figure 5: Historic Swift Parrot records within 10 km radius of Project area

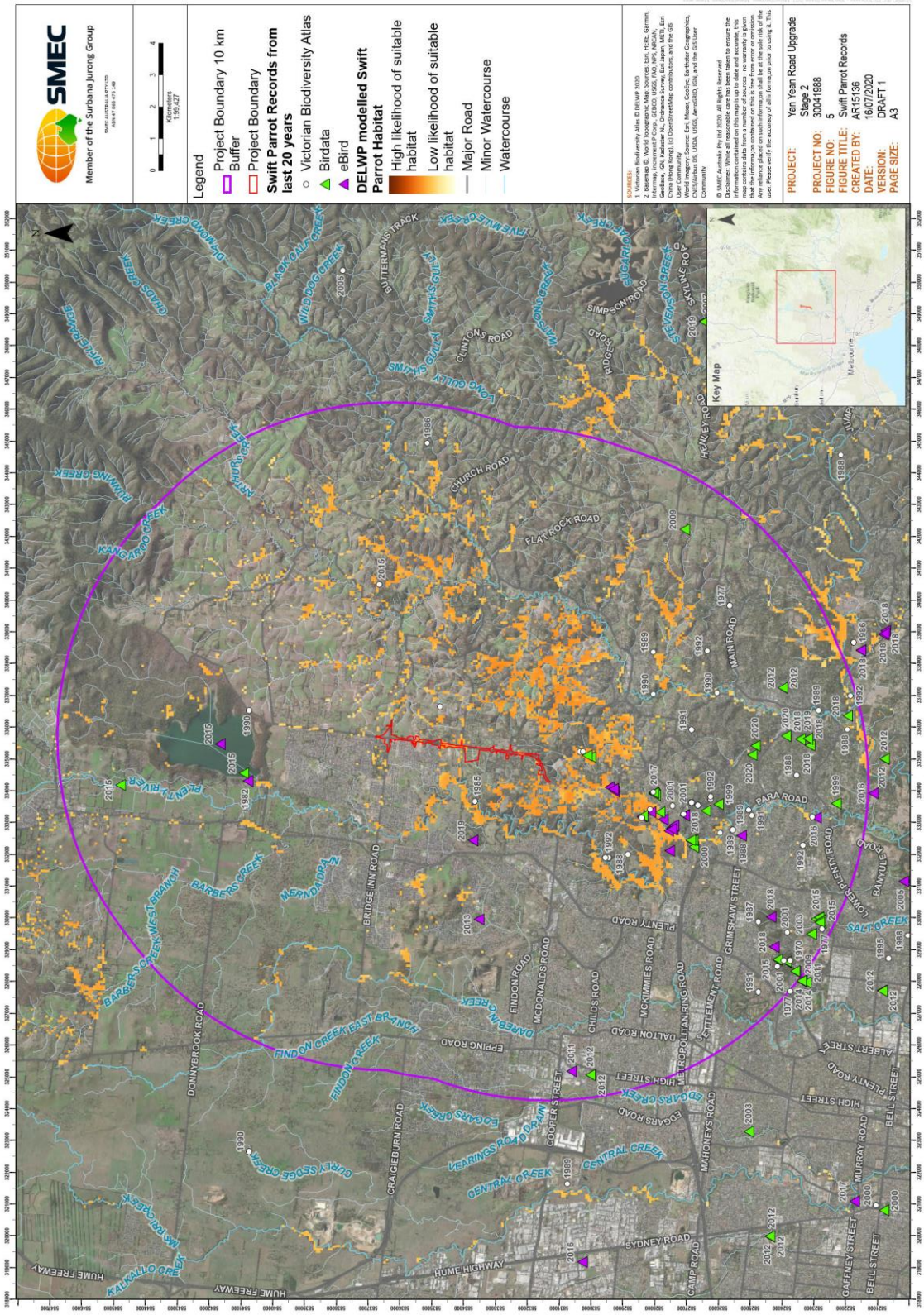


Figure 6: Swift Parrot records in greater Melbourne region

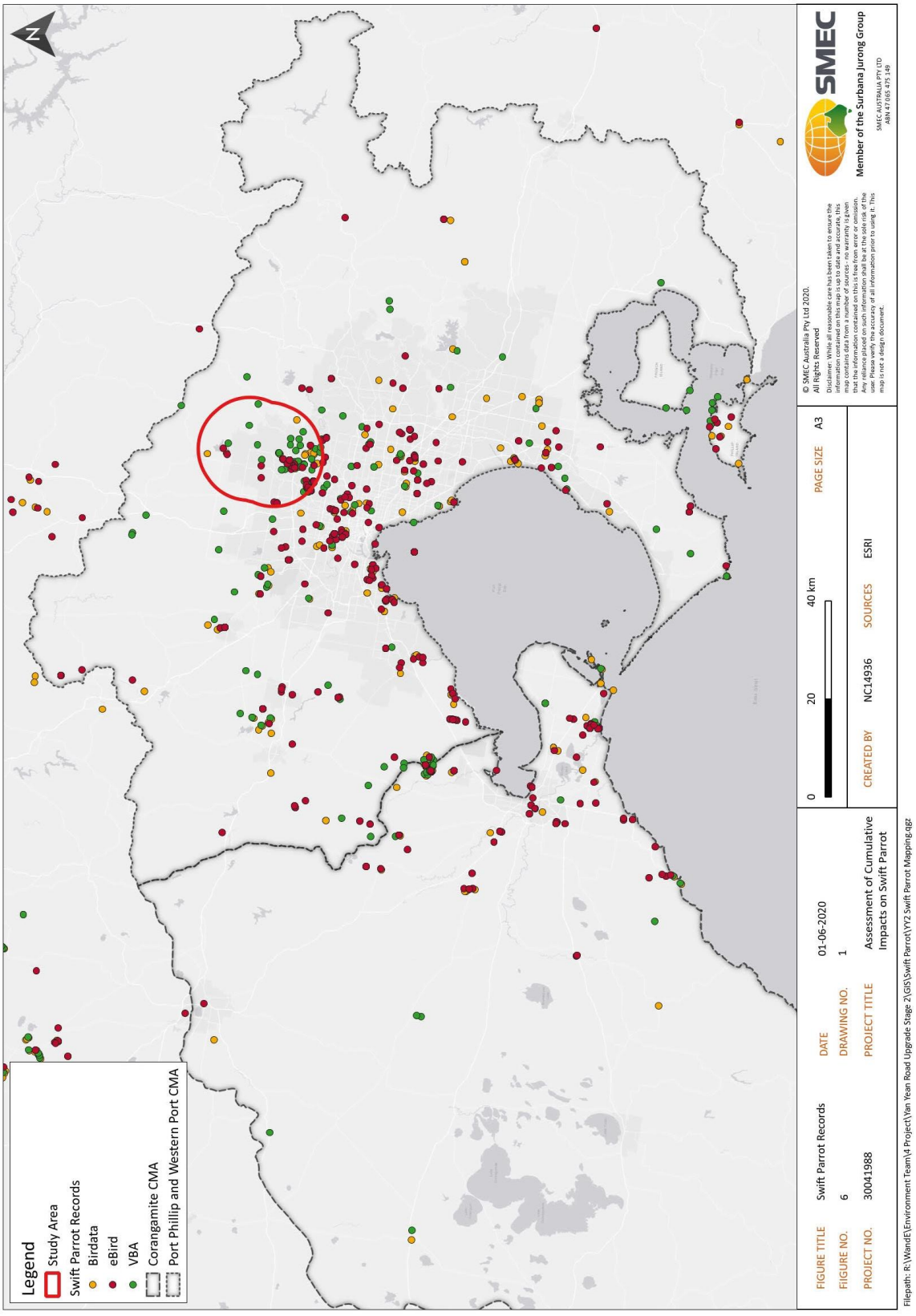


Figure 7: Swift-Parrot-preferred EVCs across Melbourne region

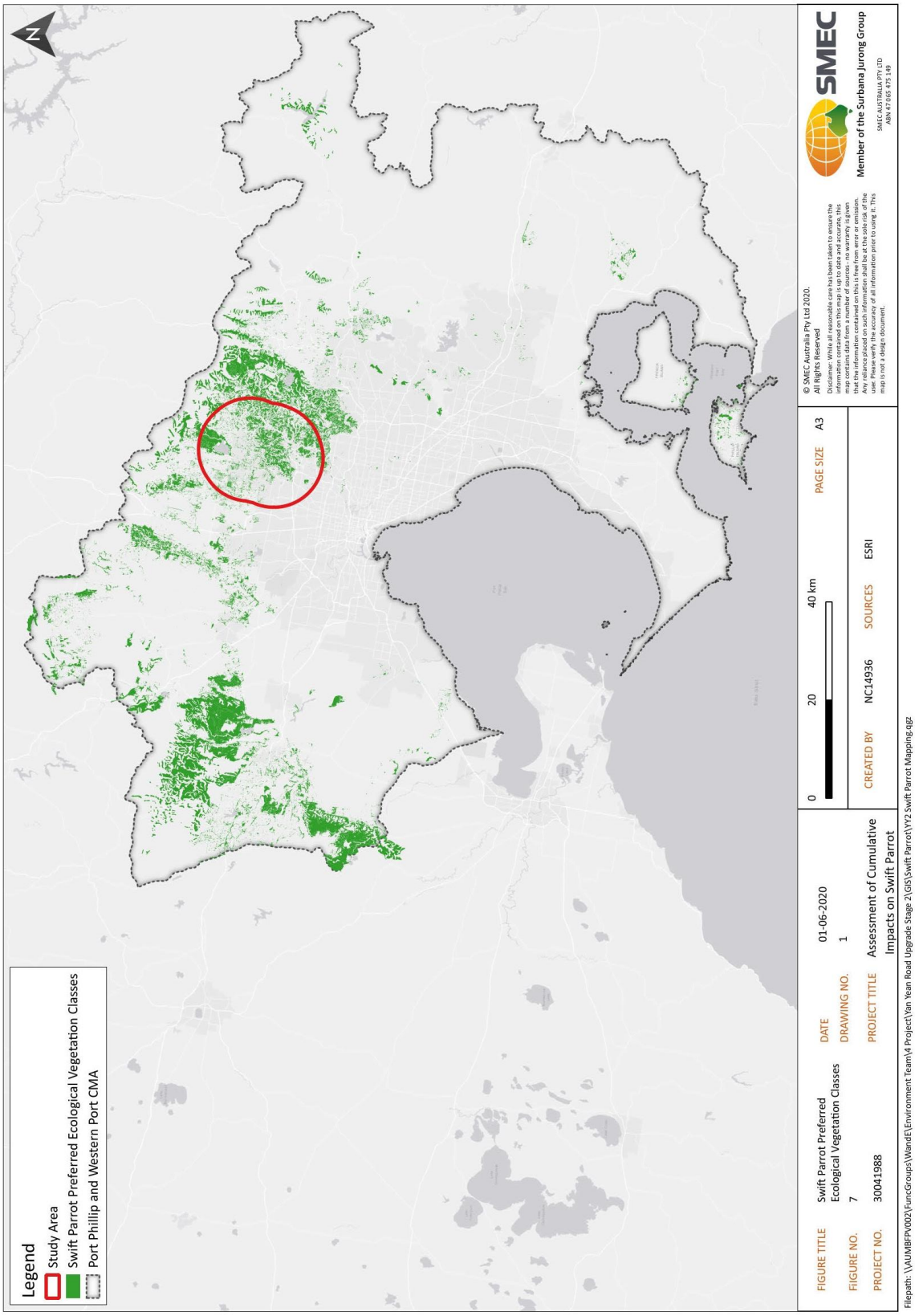
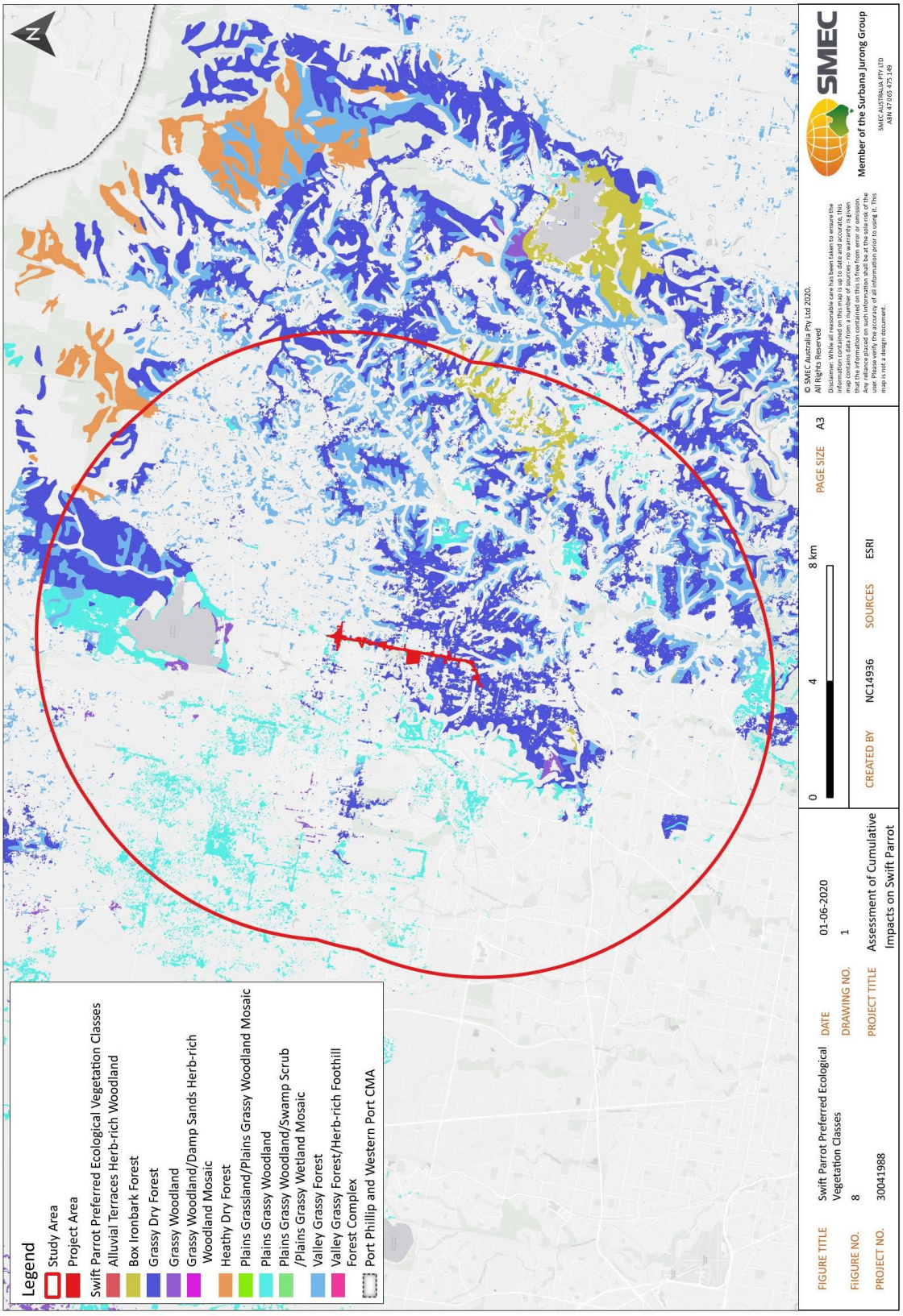


Figure 8: Swift-Parrot-preferred EVCs within 10 km of Project area and local area



5.7.3 Impacts to Swift Parrot Relevant to Project

The primary potential impact to Swift Parrot resulting from the Project is associated with the loss of preferred foraging trees. The majority of these fall under the genera *Eucalyptus* and *Corymbia*, noting Golden Wattle *Acacia pycnantha* is also utilised by Swift Parrot (Higgins and Davies, 1999). Preferred foraging trees 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 (WSP 2020), albeit many of them being locally indigenous. Based on the local context, preferred foraging trees within the Project area are considered to be of low to moderate quality habitat that are potentially useful for opportunistic foraging and roosting in some years:

- 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)

Based on the significant impact guidelines (DoE 2013), habitat present does not constitute 'habitat critical to the survival of a species or ecological community' (Appendix C). Extensive areas of known and potential Swift Parrot habitat (Figure 9) remain within the region and the potential loss of preferred foraging species in the Project area is not significant relative to the area of surrounding habitat within protected reserves and public land.

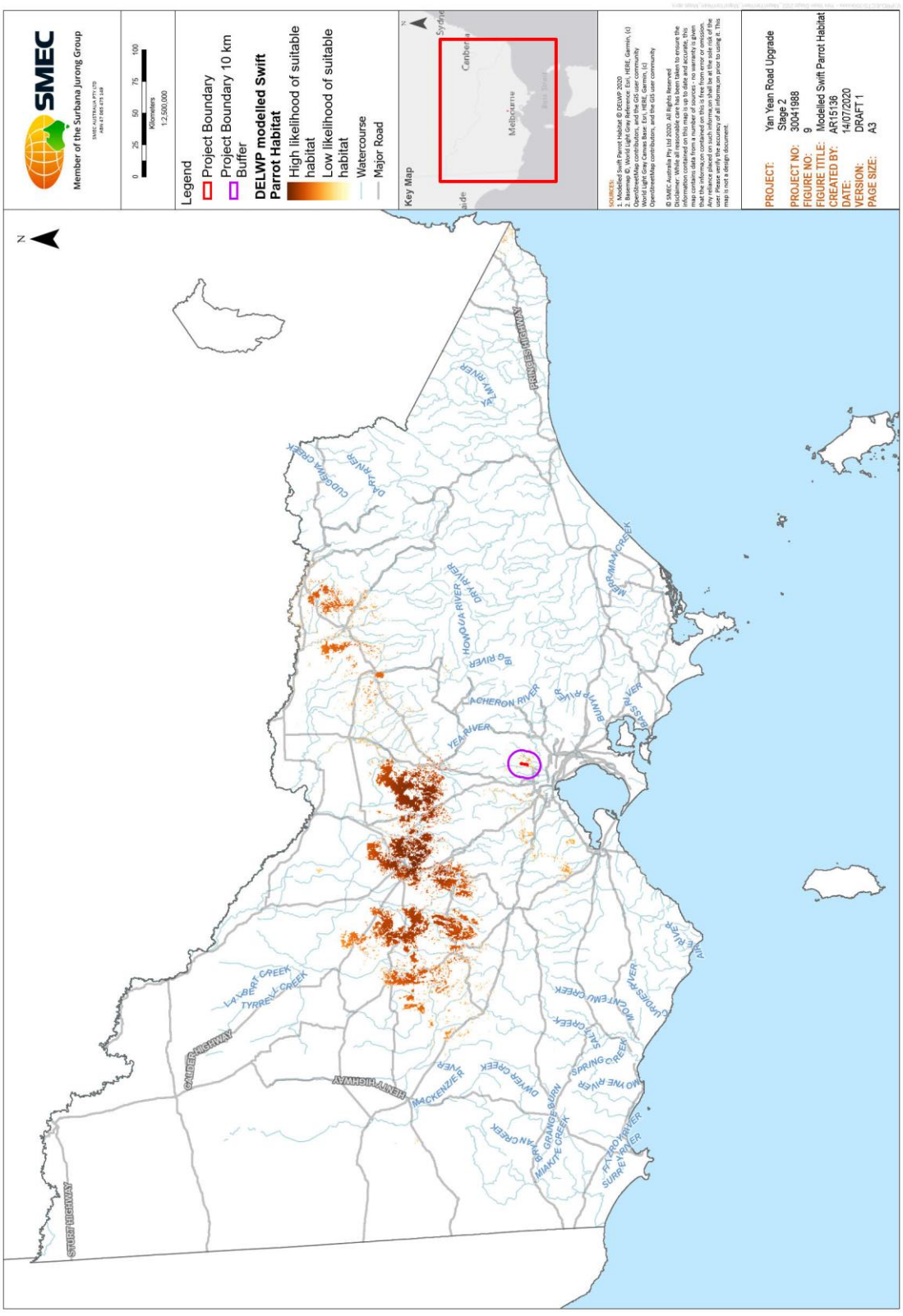
The Species recovery plan states that habitat critical to the survival of the Swift Parrot includes areas of priority habitat for which Swift Parrot demonstrates a high degree of site fidelity, as well are habitats which show phenological characteristics likely to be of importance to Swift Parrot. As per the species recovery plan (Saunders and Tzaros, 2011), priority habitat consists of areas which are used:

- for nesting;
- by large proportions of the Swift Parrot population;
- repeatedly between seasons (site fidelity); or
- for prolonged periods of time (site persistence).

Potential habitat in the form of preferred or secondary foraging trees within the Project area does not constitute priority or critical habitat for Swift Parrot. A Significant Impact Assessment for potential impacts for Swift Parrot can be found in Appendix C.

Collisions with netting, walls, windows and vehicles is also a relevant consideration due to the species' direct and rapid flight behaviour. These include chain-link fencing and large expanses of glass which is either reflective and mimics real vegetation or simply functionally invisible to the bird. Mortality of Swift Parrots has been documented as a result of collisions with such obstacles as tall mesh fencing, such as those around tennis courts and golf courses, and windows and glass bus shelters in urban environments, all of which are potentially present in the Project area or introduced as a result of the project. A protective fabric barrier netting fence is proposed for the interface of the Project alignment and the Yarrambat Golf Course.

Figure 9: Swift Parrot modelled habitat across Victoria



5.7.4 Additional Unrelated Developments

5.7.4.1 Major Roads and Other Infrastructure Projects

The following major road and infrastructure projects have been identified within 10 km of the Project area. Their respective consideration for impacts to Swift Parrot, as stated in approvals documentation are noted:

- Yan Yean Stage 1 Upgrade (Ecology and Heritage Partners 2017)
  - This project was not expected to have a significant impact on Swift Parrot
- Bridge Inn Road Duplication (WSP 2017)
  - This project is not expected to have a significant impact on Swift Parrot
- Mernda Rail Extension
  - Low likelihood of Swift Parrot occurrence, the project was not expected to have a significant impact on Swift Parrot
- Plenty Road Stage 1 Upgrade (McKimmies Road to Bush Boulevard) (Brinkerhoff 2017)
  - This project was not expected to have a significant impact on Swift Parrot
- Plenty Road Stage 2 Upgrade (Bush Boulevard to Bridge Inn Road)
  - Low likelihood of Swift Parrot occurrence, the project was not expected to have a significant impact on Swift Parrot
- North East Link (GHD 2019)
  - Moderate likelihood of Swift Parrot occurrence, the project is not expected to have a significant impact on Swift Parrot
- Doreen to Diamond Creek Sewerage Project (Jacobs 2017)
  - Low likelihood of Swift Parrot occurrence, the project was not expected to have a significant impact on Swift Parrot

5.7.4.2 PSPs / Large Scale Land Developments

Extensive residential development has occurred throughout the Yarrambat, Doreen, Mernda, South Morang and Whittlesea area, the vast majority of these large-scale developments have occurred prior to the five-year ACI timeframe (2014-2019).

5.7.4.3 Additional Unrelated Developments Summary

Based on the assessment of the collective outcomes of the projects listed above, it is considered unlikely that a cumulative significant impact on Swift Parrot would occur. Habitat value within the majority of these Project areas is insignificant relative to higher value habitat in the local area (i.e. Plenty River corridor). Usage of preferred foraging trees within the footprint of the developments identified above that fall within the ACI area would be on a rare and opportunistic basis only. Applying the Significant Impact Criteria for critically endangered species (Department of the Environment 2013), the development projects outlined above will not;

- Lead to a long term decrease in the size of the species' population
- Reduce the area of occupancy of the species
- Fragment an existing species population into two or more populations
- Adversely affect habitat critical to the survival of the species
- Disrupt the breeding cycle of the species' population
- Modify, destroy, remove or isolate or decrease the availability or quality of habitat *to the extent that the species is likely to 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
- Introduce disease that may cause the species to decline
- Interfere with the recovery of the species.

5.7.5 Relevant External Factors for Consideration

External factors refer to impacts to the Swift Parrot over its entire range, or well beyond the imposed boundaries of the ACI area. Whilst not driven by potential impacts arising from the Project, these factors need to be considered in the ACI process as part of a broader context analysis due to their significant effect on the Swift Parrot population.

5.7.5.1 Sugar Gliders (Tasmania)

As outlined in the Threatened Species Scientific Committee Conservation Advice for Swift Parrot (TSSC, 2016), Sugar Gliders, while native to mainland Australia, are thought to have been introduced to Tasmania (Gunn 1851; Rounsevell et al., 1991; Lindenmayer 2002; Hui 2006). The majority of islands off mainland Tasmania remain free of this species (TSSC, 2016). It is estimated that almost 85 per cent of the Swift Parrot population is at risk each season of being killed by Sugar Gliders, depending on the location of breeding sites (TSSC, 2016). Up to 65 per cent of breeding females in Tasmania can fall victim to Sugar Gliders each year, as Sugar Gliders eat Swift Parrot eggs, chicks and even adult birds, drastically increasing adult mortality and significantly decreasing the reproductive success of the species (TSSC, 2016).

Stojanovic et al. (2014) found that Swift Parrot nests failed at a very high rate on the Tasmanian mainland, compared to no failure on offshore islands where Sugar Gliders were shown to be absent. Most cases of glider predation resulted in the death of the adult female parrot, and always involved the death of either eggs or nestlings (TSSC, 2016). Predation by Sugar Gliders has been recorded at all locations on mainland Tasmania where Swift Parrots breed (TSSC, 2016).

On the Tasmanian mainland, predation rates interact with the extent of habitat disturbance from logging, with a positive relationship between nest survival and increasing mature forest cover at the landscape scale (Stojanovic et al., 2014).

The impact of Sugar Gliders was identified by the Commonwealth's Threatened Species Scientific Committee as a key threat to the Swift Parrot, resulting in the status of the Swift Parrot being elevated in 2016 to "critically endangered" under the Commonwealth's *Environment Protection and Biodiversity Conservation Act* 1999 (TSSC, 2016).

5.7.5.2 Land Clearing, Forestry / Timber Harvesting (Tasmania)

The distribution of nesting Swift Parrots each breeding season is largely determined by the distribution and intensity of Blue Gum flowering across the breeding range. Where there is good Blue Gum flowering in association with abundant tree hollows aggregations of up to 50 nesting pairs covering over 100 hectares have been recorded (Webb 2008). Reuse of nesting sites recorded over several different years highlights the importance of these areas to the species. Forestry activities, including firewood harvesting result in the loss and alteration of nesting and foraging habitat throughout the Swift Parrot's range. In Tasmania, in the absence of adequate management prescriptions, foraging and nesting habitat in wet forest types has been particularly prone to loss and alteration by forestry activities. Habitat loss from forestry activities occurs from either conversion to plantation or from intensive native forest silviculture (Saunders and Tzaros, 2011).

Historically, there has been a loss of Swift Parrot breeding habitat due to land clearing for agricultural expansion (Garnett et al., 2011; Saunders and Tzaros 2011). Ongoing loss of breeding habitat (i.e. both nesting and foraging habitat) is also continuing (Saunders and Tzaros 2011).

5.7.5.3 Fires

In addition to the impact of production forestry on the area of occupancy of Swift Parrots in Tasmania, other threatening processes act to further reduce the availability of habitat. For instance, wildfires degrade the quality of breeding habitat, with one recent fire at the Craigow site (Webb et al., 2012) causing the collapse of over 60 percent of known nest trees while also killing or destabilising an additional proportion of the remaining trees (Stojanovic, D. et al, 2015; TSSC, 2016). Similarly, destructive wildfires in 2007 (northeast Tasmania) and 2013 (the 'Dunalley fire' – southeast Tasmania) severely burned large tracts of Swift Parrot breeding habitat (TSSC, 2016). Given the extent and severity of forest loss across the breeding range of Swift Parrots, and the further deleterious impacts over large areas of mainland Tasmanian by Sugar Gliders, there is strong evidence to support a continued decline in the area of occupancy of Swift Parrots (TSSC, 2016).

5.7.5.4 Native Vegetation Clearing within Range (mainland)

Area of occupancy appears to have declined significantly since European settlement, as can be inferred from the extent of habitat loss. For example, 83 percent of Box-Ironbark habitat (the principal wintering habitat of the Swift Parrot on the mainland) has been cleared in Victoria, and 70 percent has been cleared in New South Wales (Environment Conservation Council 2001; Robinson & Traill 1996; Siversten 1993). White Box-Yellow Gum-Blakely's Red Gum woodland, another important habitat in New South Wales, has been reduced to less than 4 percent of its pre-European extent on the south-western slopes and southern tablelands of New South Wales (Saunders 2003, Swift Parrot Recovery Team 2001).

5.7.5.5 Habitat Fragmentation within Range (mainland)

Habitat fragmentation is a recognised threatening process to Swift Parrot (Saunders & Tzaros 2011). Fragmentation of habitat involves dividing, separating and clearing parcels of habitat into scattered and potentially isolated patches. This can have consequential effects especially for Swift Parrot where they use habitat as 'stepping stones' throughout their migration path within mainland Australia. Numerous typical foraging sites throughout Victoria, NSW and Queensland for Swift Parrot occur outside of protected conservation reserves or parks and are therefore vulnerable to habitat fragmentation (Saunders & Tzaros 2011).

Impacts resulting from fragmentation on Swift Parrot include, but not limited to, loss of foraging and roosting trees, increased competition from aggressive nectarivores (i.e. birds, bees) and edge effects (i.e. predation from invasive predators, pollution impacts) (Saunders & Tzaros 2011). The loss of 'stepping stones' also indicates that Swift Parrot may be required to travel or disperse further during their migration movements in attempts to seek suitable foraging habitat.

5.7.5.6 Phytophthora Related Dieback within Range

Dieback caused by Phytophthora cinnamomi is a serious threat to the health of many Australian flora species and is listed as a key threatening process under the EPBC Act (DAWE 2020). As such, a threat abatement plan was created to identify, research and manage the threatening disease (DoEE 2018). Since its listing, P. *cinnamomi* was originally considered a soil-borne fungus, however, has recently been identified as a species of water mould (DoEE 2018).

P. cinnamomi is considered to be an exotic pathogen most likely introduced to Australia during European settlement (DoEE 2018). Since its arrival in Australia, *P. cinnamomi* has caused significant damage and decline in Australian flora populations, by attacking susceptible vegetation through their roots and collar (DoEE 2018). Flora families typically susceptible by *P. cinnamomi* include Proteaceae (i.e. banksias), Ericaceae, Fabaceae, Xanthorrhoeacae (i.e. grass trees) and Dilleniaceae (DoEE 2018). In addition, some Eucalypt species are highly susceptible to impacts of *P. cinnamomi*, whilst others have shown varying degrees of resistance.

Within Victoria, *P. cinnamomi* has impacted large vegetation including native forests of East Gippsland, Brisbane Ranges, Plenty Gorge, Grampians and Otways. These areas constitute potential 'stepping stones' along Swift Parrot migration paths from Tasmania to the Australian mainland. Therefore, foraging trees (i.e. various eucalypt species) within these areas may be susceptible to dieback as a result of the *P. cinnamomi* threat.

Because of these factors, dieback as a result of *P. cinnamomi* is a recognised threat to Swift Parrot (Saunders & Tzaros 2011). Loss of foraging and roosting trees for Swift Parrot contributes to habitat fragmentation and overall reduction in available preferred eucalypt species across the swift parrot's range. The increase in distance between foraging habitat may threaten Swift Parrot health, as individuals are required to disperse and travel further to seek trees to forage in.

5.7.5.7 Climate Change

Loss of nesting and foraging habitat from climate change, caused by anthropogenic emissions of greenhouse gases, is likely to pose a significant threat to the Swift Parrot. The Swift Parrot has been identified by Bennett *et al.* (1991) as potentially having suitable climatic conditions within its current range reduced by 50% in Victoria as a result of increased temperatures (3 degrees Celsius) due to global warming (based on bioclimatic models only). Brereton *et al.* (1995) identified the Swift Parrot as being particularly vulnerable to changes in spatial and temporal distribution of its habitats. Climate change in Australia may affect the geographic range, migration patterns, physiology and abundance of species (such as the Swift Parrot) as well as the phenology and community composition of their habitats (Chambers *et al.* 2005).

Although management of this global issue is beyond the scope of this assessment, the cumulative effects of other threats together with climate change need to be considered for effective and adaptive long-term management of the Swift Parrot.

5.7.5.8 Collisions

Swift Parrot are susceptible to collision strikes from vehicles, wire netting or windows throughout their range (Pfennigwerth 2008). Up to 2% of the entire Swift Parrot breeding population is killed every year as a result of collisions with windows, fences (especially chain-link fences) and vehicles. Although this figure seems low, it assumes a greater significance considering the small number of birds in existence, and the increasing human encroachment into key Swift Parrot habitat (Pfennigwerth 2008). A combination of habitat fragmentation and urban expansion is likely to exacerbate the problem where collisions may occur more frequently with greater

consequences (e.g. mortality) (Saunders & Tzaros 2011). Threat of collision is further heightened in periods of drought or instances of habitat loss causing Swift Parrots to make exploratory movements into urban areas they may typically not have previously used to forage (Saunders & Tzaros 2011).

Hotspots for collisions including mortality incidents are in greater Hobart, greater Melbourne, NSW central and NSW north coast regions (Tzaros 2002).

5.7.5.9 Competition / Exclusion by Aggressive Nectarivores

As habitat fragmentation increases, so do edge effects further increasing possibilities for interactions between Swift Parrot and forager-competition species. The density of certain aggressive nectar feeding honeyeaters and parrots may also negatively affect the occurrence of Swift Parrot including such species such as Noisy Miner *Manorina melanocephala*, Fuscous Honeyeater *Lichensostomus fuscus*, White-plumed Honeyeater *Lichensostomus penicillatus*, Yellow-tufted Honeyeater *Lichensostomus melanops* and the Red Wattlebird *Anthochaera carunculata*.

Swift Parrot attempts to forage in urban landscapes may be met by direct competition and exclusion from foraging resources by the aforementioned aggressive nectarivores. As such, factors of competition and exclusion threaten Swift Parrot by way of reduction of availability of foraging trees. In addition, increases in abundance of competitive and aggressive species decreases the likelihood of Swift Parrot occurrence therefore influencing the distribution and habitat utilisation of the species (Saunders and Heinsohn 2008).

In addition, invasive insects such as European Honeybee *Apis mellifera* and Large Earth Bumblebee *Bombus terrestris* are also likely to compete with Swift Parrot for foraging resources (Saunders and Tzaros 2011). Swift Parrots compete with honeybees *Apis mellifera* and Common Starlings for tree cavities, where nesting parrots can be killed and the cavities usurped (Heinsohn et al., 2015).

5.7.5.10 Disease

Psittacine Beak and Feather Disease (PBFD) is a widespread, lethal parrot disease (Department of Environment and Heritage 2005), which is known to occur in Swift Parrots (Sarker et al., 2013) and has been recorded in swift parrot nestlings in the wild population (Stojanovic, D. Unpublished Data, TSSC 2016).

5.7.5.11 Relevant External Factors Summary

The external factors outlined above are continuing to significantly impact the Swift Parrot. The species' migratory behaviour and reliance on specific habitat types within its Tasmanian breeding range result in a pronounced susceptibility to localised threatening processes.

The relatively recent discovery of predation by Sugar Gliders, considered independently of other impacts, has alone led to population modelling identifying a 95% population decline over three generations (16 years) (Heinsohn et al. 2015, TSSC, 2016). Whilst breeding areas are in some years are located on glider-free islands, any increases in the breeding success were insufficient to counter the projected collapse of the population under modelled scenarios (Heinsohn et al. 2015, TSSC, 2016).

Historically, there has been a loss of Swift Parrot breeding habitat due to land clearing for agricultural expansion (Garnett et al., 2011; Saunders & Tzaros 2011). Ongoing loss of critical breeding habitat (i.e. both nesting and foraging habitat) is also continuing (Saunders & Tzaros 2011), despite the species being listed as critically endangered under the EPBC Act.

These two significant threatening processes overshadow the cumulative effect of collisions, disease, habitat degradation through competitor exclusion (i.e. other aggressive nectarivores) and changes in mainland habitat availability and quality as a result of climate change and vegetation clearing in core habitat regions.

5.7.6 ACI Conclusion

Swift Parrots are consistently observed using areas of suitable habitat in the north-east Melbourne region each year, including the Plenty River corridor. Considering the species demonstrates a high degree of site fidelity and is observed consistently in higher value habitat within 10 km of the Project area, the species has not been recorded using preferred eucalypt foraging species within or abutting the Project area. Potential habitat for Swift Parrot within the Project area comprises key and secondary eucalypt foraging species. The majority of the trees proposed to be lost are secondary foraging species as they flower during spring and summer when Swift Parrot are largely in Tasmania. The available habitat for Swift Parrot within the Project area is considered to be of low to moderate value;

- 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 1165 small secondary foraging trees)

Noting that habitat loss is noted as a threatening process for Swift Parrot in the species recovery plan (Saunders and Tzaros, 2011) and listing advice (TSSC, 2016), even if 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:

- The relatively low number of foraging trees providing viable potential foraging habitat;
- extensive areas of higher quality and protected habitat in both 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; and,
- continued declines and fragmentation in preferred overwintering habitat in central and north-eastern Victoria, the western slopes, central coast and coastal regions in NSW and south-eastern Queensland.

Vegetation and preferred foraging trees losses resulting from the Project are unlikely to contribute to a cumulative impact on the Swift Parrot population.

6 Avoid and minimise statement

'Avoid and minimise' was the guiding principle used when designing the project to reduce impacts on the environment. The Project has been designed to avoid impacts to the biodiversity values of the Project area where possible, whilst still maintaining the required safety outcomes for Yan Yean Road. Where avoidance is not possible, a range of mitigation measures will be employed to minimise the risk and/or severity of impacts. Where native vegetation is unable to be retained, offsets will be obtained under the Guidelines.

6.1 Avoid

The Project footprint has evolved throughout the design process to allow as much retention of native vegetation and fauna habitat as possible, whilst still maintaining the key safety objectives for the Project. A number of design elements and re-designs have been incorporated into the current Project design to allow further retention of native vegetation including the following:

- Incorporating a 2.2 m centre median instead of the standard 6 m;
- Installation of a shared user path only on the western side of the road, conserving vegetation on the eastern side;
- The use of 2:1 batters wherever practicable instead of the standard 4:1 to reduce the overall project footprint;
- The use of retaining walls at several locations (between Service Road A and Yan Yean Road, Ironbark Road, north of Oatlands Road and Jorgensen Avenue) to reduce the Project footprint and retain trees at these locations;
- Redesign of the Bridge Inn Road intersection to avoid the two Doreen River Red-gums;
- Micro siting the footpaths, shared user paths and temporary infrastructure during the design and construction to further avoid impacts to trees where possible, prioritising large and hollow-bearing trees.

Further avoidance of native vegetation will occur during later design stages (post-EES) and during construction, and the totals detailed within this report are a conservative estimate only. Native vegetation to be retained within the Project footprint will be protected within no-go zones.

6.1.1 Doreen River Red-Gums

Thirteen design options were considered for the Bridge Inn Road/Yan Yean road intersection to avoid impacting the two Doreen River Red Gums. Option B is confirmed to avoid impacts on these trees and is presented in Figure 10: Design option B for Bridge Inn Road - illustrative only and subject to change.

Figure 10: Design option B for Bridge Inn Road - illustrative only and subject to change

Construction will occur within the Tree Protection Zones (TPZs) of the two Doreen River Redgum trees, with care being taken to avoid impacting on roots, which will be identified through 3D survey. A non-destructive digging assessment conducted by an arborist has demonstrated that no roots occur adjacent the existing road formation within the top 600 mm of soil. Should impacts to roots occur during construction that results in unacceptable incursion of the structural root zone, the tree(s) will be offset in accordance with DELWP Guidelines (2017).

6.1.2 No-Go Zones

A total of 144 no-go zones have been developed in collaboration with design engineers during design to avoid impacts on native vegetation and scattered trees along the full project alignment (Figure 11). Those of note include:

- Twenty-one no-go zones at Yarrambat Park Public Golf Course, comprising 19 patches of potential Swift Parrot habitat containing 137 key habitat trees. the establishment of no-go zones across the whole golf course was necessary due to potential reconfiguration of a playing hole causing potential impacts to vegetation outside the road reserve and within the golf course;
- Two no-go zones within the Yarra Valley Water pump station area north of Vista Court, which will 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, one key habitat tree for Swift Parrot, and 174 secondary 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 will be protected;
- Wetland vegetation within Orchard Park at Orchard Road, containing habitat for common fauna species; and
- Secondary Swift Parrot habitat trees on private property south east of the intersection of Yan Yean and Doctors Gully Roads.

Additional no-go zones have been developed to protect individual trees along the length of the Project area. Avoidance of native vegetation and individual trees also incorporates the protection of potential foraging habitat for Swift Parrot.

6.2 Minimise

The following mitigation measures will be employed during the post-EES design, construction and operational phases of the project in line with the EES Environmental Performance Requirements (EPRs) which are detailed in Section 7.

6.2.1 Tree Management

During the design phase, a review of potential tree impacts will be undertaken to further minimise tree loss from encroachment of TPZs. This may be achieved by:

- Micro siting permanent and temporary infrastructure to further reduce the impact to TPZs;
- The location and width of walking and cycling paths and footpaths may be varied further if possible to minimise TPZ encroachment;
- Applying suitable construction techniques to minimise impact on TPZs, including limiting excavation depth or building above grade;
- Inclusion of additional retaining walls where appropriate;
- Optimise the design of Safety Barriers to retain trees, such as avoiding trenching and footing;
- Preparation of a Tree Impact Assessment including consideration of necessary cut and fill and grading requirements;
- Establishment of no-go zones to exclude and protect the trees within the Project area;
- Services to be located outside of TPZs or bored underneath;
- To reduce tree removal and retain trees for as long as possible, tree removal should be staged with relevant construction works
- Development of a Tree Management Plan (in line with AS 4970-2009) which covers:
  - 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 (i.e. boring locations)
  - Location of tree protection measures and ground protection

6.2.2 Construction Impact Minimisation Measures

Potential impacts to biodiversity values from construction activities will be managed through the development and implementation of a CEMP. The CEMP will include standard construction measures in addition to specific measures to minimise the risk of impacting biodiversity values relevant to the Project area, in accordance with the MRPV Fauna Sensitive Road Design Guideline (2019). The CEMP will include the following requirements and procedures:

- Fencing protected areas and no-go zones with exclusion fencing and sufficient signage;
- 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;
- Measures during clearing and construction including weed and disease hygiene (i.e. vehicle and plant washdown requirements) and management, monitoring and reporting measures to reduce weed and pathogen introduction and spread;
- Controlling noise and dust during works in accordance with relevant standards;

- Fire risk management measures;
- Protocols around the handling of fauna during construction;
- Retention of dead, declining, or impacted trees for use as habitat where practicable;
- Minimised impact 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 early in the morning.

6.2.3 Salvage and Translocation

The two impacted Matted Flax-lily plants will be salvaged from the Project area and translocated to an appropriate conservation site. A salvage and translocation plan will be developed to the satisfaction of state and Commonwealth government agencies, including:

- Obtaining approval from DAWE to remove Matted Flax-lily plants to be impacted;
- Obtaining a permit from DELWP under the FFG Act for the translocation of threatened flora;
- Undertaking consultation with DELWP, City of Whittlesea and Nillumbik Shire on an appropriate location and process for the translocated plants.

Monitoring will then be undertaken at the translocation site to assess the success of the translocation over time.

Seeds from Studley Park-gum will be collected where possible and utilised during landscaping works for the Project.

6.2.4 Fauna Sensitive Design

Fauna sensitive design techniques and measures will be employed to minimise the impact to fauna following completion of the Project in line with the MRPV Fauna Sensitive Road Design Guideline (2019). The measures will aim to prevent and minimise collision risk with vehicles, mitigate the loss of connectivity of habitats, minimise movement barriers and limit disturbance from street lighting. The design techniques and measures will include:

- Use of fauna-friendly fencing where fencing is required (avoidance of chain-mesh fencing and barbed wire). If chain mesh fencing is required, it must be designed to minimise collision risk;
- Investigate mitigation measures for the high fence adjacent the golf course to reduce the risk of fauna collisions such as use of ultra-violet reflective elements to increase its visibility;
- 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 design which may be trialled to minimise collision risk, particularly for Eastern Grey Kangaroos;
- Installation of rope bridges in key connectivity areas for arboreal mammals, to be installed as early as practicable during construction;

Additionally, the Project will be compliant with the mitigation measures specified in the Swift Parrot Management Plan, including:

- Using approved cleared areas and existing road formation for material lay down areas for storage, plant and vehicle storage and site compounds;
- Establish and maintain no-go zones to reduce impacts on Swift Parrot;
- Design to avoid incorporating chain-mesh or barbed wire fences as well as clear glass for any structures (bush shelters, barriers). If chain mesh fencing is required at Yarrambat Golf Course, it must be designed to minimise collision risk;
- Inducting construction workers to communicate permit conditions, environmental requirements regarding fauna management and no-go zones;
- Where practicable, tree removal will be conducted during spring and summer, when Swift Parrots are in Tasmania;
- Controlling noise and dust during works in accordance with relevant standards.

6.2.5 Revegetation

Areas requiring revegetation will aim to minimise fragmentation and provide additional habitat resources for fauna species that may frequent the area, with a focus on threatened fauna including Swift Parrot and Grey-headed Flying-fox. Revegetation will be undertaken in accordance with the Project's Landscape Strategy and will include:

- Using indigenous species as appropriate from relevant EVCs 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 plants as appropriate which will complement retained habitat.

6.2.6 Monitoring and Maintenance

Following completion of the Project, monitoring and maintenance activities will be undertaken to ensure fauna sensitive design measures are working and effective, minimise any new weed infestations and monitor the progress of the translocated Matted Flax-lily plants. Monitoring and maintenance activities will include:

- A post-construction weed survey of the Project area;
- Follow-up weed monitoring and control within the road reserve annually for two years, with targeted control of noxious or environmental weeds as required under the CaLP Act;
- Monitoring of Matted Flax-lily plants at the translocation site as agreed with the state and Commonwealth government agencies;
- Ongoing maintenance of fences, signage and fauna crossings; and
- Potential monitoring of the use of fauna crossings.

6.3 Offset

Native vegetation removal will be offset in accordance with DELWP's *Guidelines for the removal, destruction or lopping of native vegetation 2017* (DELWP 2017c).

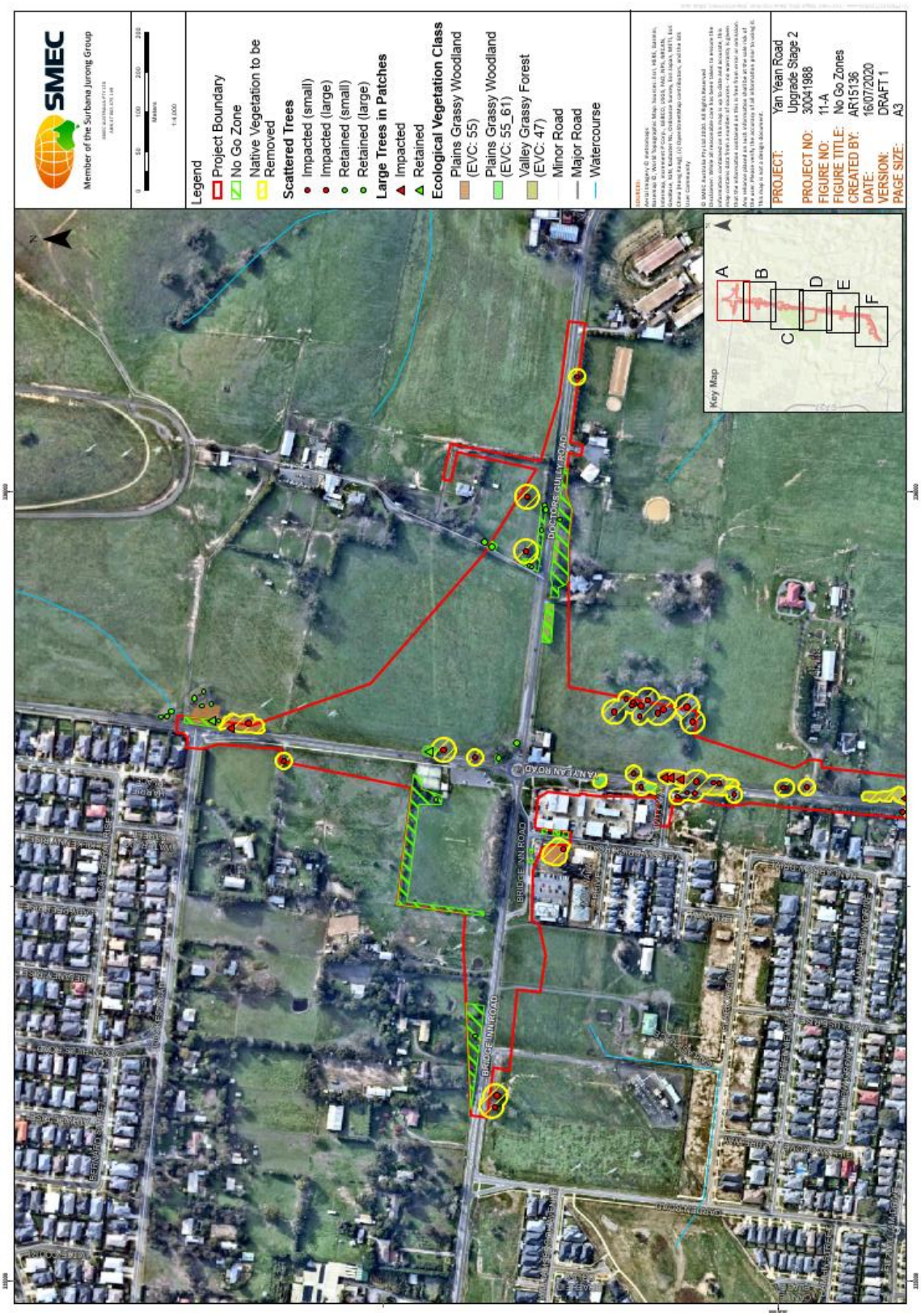
A Native Vegetation Removal (NVR) report for the Project has been obtained from DELWP. A summary of the NVR report is provided below in (Table 14) and details offset requirements. The NVR report, and a report of available native vegetation credits for species units required are provided in Appendix D.

Native vegetation removal associated with Yan Yean Road Upgrade Stage 1, or any other project, was not included when processing native vegetation offset requirements in accordance with Tables 11 and 13 in Appendix 3 of the *Assessor's handbook – Applications to remove, destroy or lop native vegetation* (DEWLP 2018).

Table 14: Proposed native vegetation offset requirements placeholder table

PROPOSED NATIVE VEGETATION REMOVAL DETAILS	
Assessment pathway	Detailed
Extent of removal (includes patches and scattered trees)	17.458 ha (includes 11.88 ha of patches of native vegetation and equivalent area for 204 scattered trees)
No. large trees to be removed	174
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	1.860 species units of habitat for Little Pink Spider-orchid (*Caladenia rosella*)
Large trees	47 trees
Total number of large trees that the offset must protect	174

Figure 11: No-Go zones




SMEC
Member of the Surbana Jurong Group
Legend
Project Boundary
No Go Zone
Native Vegetation to be Removed
Scattered Trees
Impacted (small)
Impacted (large)
Retained (small)
Retained (large)
Large Trees in Patches
Impacted
Retained
Ecological Vegetation Class
Aquatic Herbland (EVC: 653)
Grassy Dry Forest (EVC: 22)
Plains Sedgy Wetland (EVC: 136)
Tall Marsh (EVC: 821)
Valley Grassy Forest (EVC: 47)
Minor Road
Major Road
Waterbody
Watercourse
Key Map
A
B
C
D
E
F
PROJECT: Yan Yean Road Upgrade Stage 2
PROJECT NO: 30041988
FIGURE NO: 11-B
FIGURE TITLE: No Go Zones
CREATED BY: AR15136
DATE: 16/07/2020
VERSION: DRAFT 1
PAGE SIZE: A3


SMEC
Member of the Surbana Jurong Group
Legend
Project Boundary
No Go Zone
Native Vegetation to be Removed
Scattered Trees
Impacted (small)
Impacted (large)
Retained (small)
Retained (large)
Large Trees in Patches
Impacted
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Ecological Vegetation Class
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F
PROJECT: Yan Yean Road Upgrade Stage 2
PROJECT NO: 30041988
FIGURE NO: 11-C
FIGURE TITLE: No Go Zones
CREATED BY: AR15136
DATE: 16/07/2020
VERSION: DRAFT 1
PAGE SIZE: A3
LAURIE STREET
RANNOCH LANE
JEFFRIES DRIVE


SMEC
Member of the Surbana Jurong Group
Legend
Project Boundary
No Go Zone
Native Vegetation to be Removed
Scattered Trees
Impacted (small)
Impacted (large)
Retained (small)
Retained (large)
Large Trees in Patches
Impacted
Retained
Ecological Vegetation Class
Grassy Dry Forest (EVC: 22)
Plains Grassy Woodland (EVC: 55)
Plains Sedgy Wetland (EVC: 136)
Swampy Woodland (EVC: 937)
Valley Grassy Forest (EVC: 47)
Minor Road
Major Road
Waterbody
Watercourse
PROJECT: Yan Yean Road Upgrade Stage 2
PROJECT NO: 30041988
FIGURE NO: 11-D
FIGURE TITLE: No Go Zones
CREATED BY: AR15136
DATE: 16/07/2020
VERSION: DRAFT 1
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Key Map
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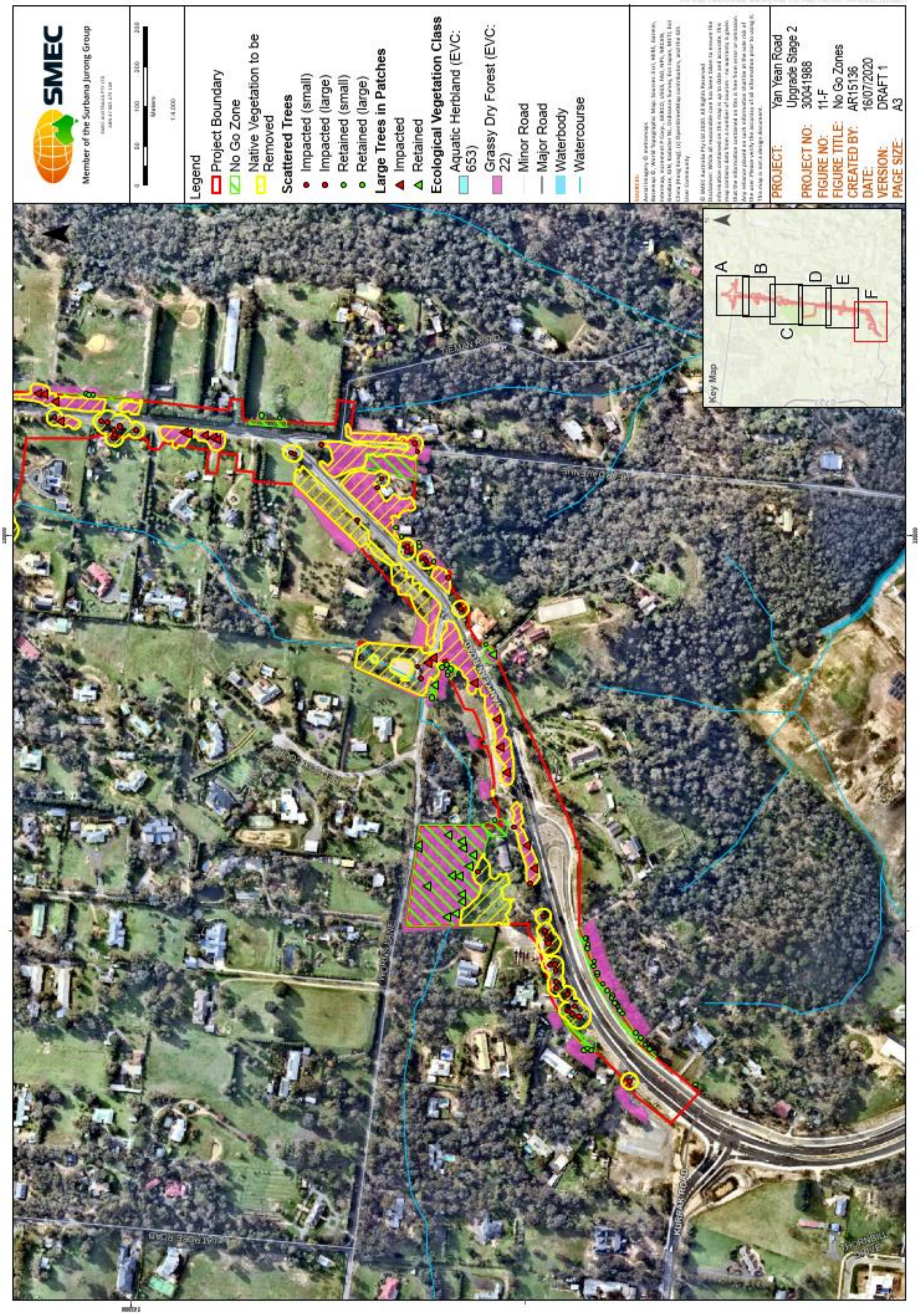
YAN YEAN ROAD
RANNOCH DRIVE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Native Vegetation to be Removed
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Impacted (large)
Retained (small)
Retained (large)
Large Trees in Patches
Impacted
Retained
Ecological Vegetation Class
Aquatic Herbland (EVC: 653)
Grassy Dry Forest (EVC: 22)
Minor Road
Major Road
Waterbody
Watercourse
PROJECT: Yan Yean Road Upgrade Stage 2
PROJECT NO: 30041988
FIGURE NO: 11-F
FIGURE TITLE: No Go Zones
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VERSION: DRAFT 1
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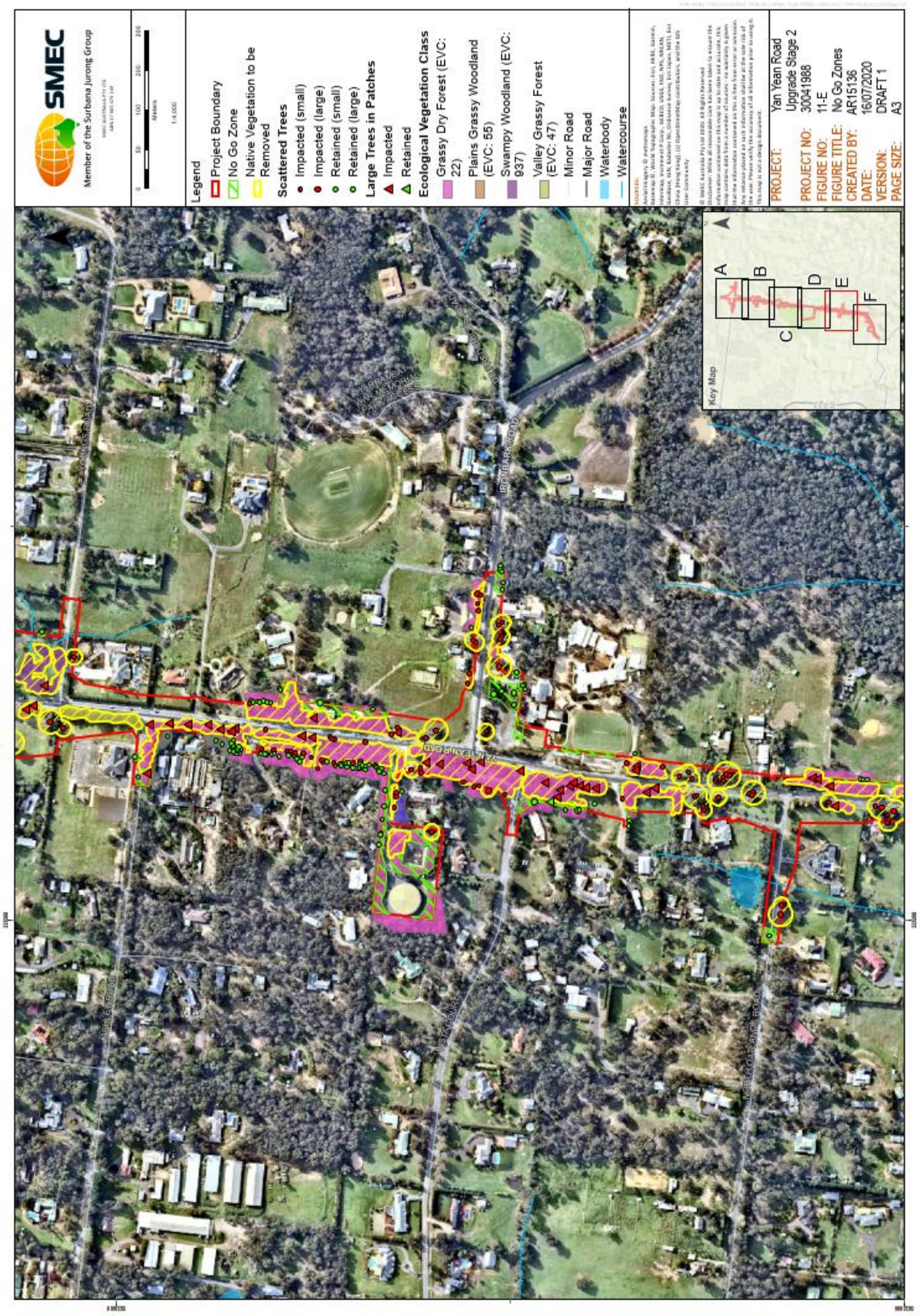
KURRAK ROAD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PROJECT: Yan Yean Road Upgrade Stage 2
PROJECT NO: 30041988
FIGURE NO: 11-E
FIGURE TITLE: No Go Zones
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7 Environmental Performance Requirements

Table 15 presents the Environmental Performance Requirements relevant to potential impacts to biodiversity.

Table 15: Environmental Performance Requirements

PERFORMANCE OBJECTIVE	APPLICABLE LEGISLATION, POLICY AND GUIDELINE	EPR CODE	ENVIRONMENTAL PERFORMANCE REQUIREMENT	PROJECT PHASE
Ecology To avoid where possible, and otherwise minimise adverse impacts on native vegetation and listed migratory and protected species / ecological communities, and their habitat To address relevant offset requirements consistent with state and commonwealth policies	*Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) *Planning and Environment Act 1987* Guidelines for the removal, destruction or lopping of native vegetation (DELWP, 2017) *Flora and Fauna Guarantee Act 1988* Australian Standard 4970-2009 Protection of Trees on Development Site	E1	**Native vegetation** Develop and implement measures to avoid where possible, and otherwise minimise impacts on native vegetation through design and construction, including: • Minimising footprint and disturbance of temporary and permanent works, such as through design of: – 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 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 *Map Book*. Native vegetation removal must be offset in accordance with DELWP's Guidelines for the removal, destruction or lopping of native vegetation 2017 (DELWP 2017c).	Design and construction

PERFORMANCE OBJECTIVE	APPLICABLE LEGISLATION, POLICY AND GUIDELINE	EPR CODE	ENVIRONMENTAL PERFORMANCE REQUIREMENT	PROJECT PHASE
	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) *Planning and Environment Act 1987* *Flora and Fauna Guarantee Act 1988* *Wildlife Act 1975* MRPV Fauna Sensitive Road Design Guideline (2020)	E2	**Flora and fauna - design** 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: • Utilising the MRPV Fauna Sensitive Road Design Guideline (2020) to incorporate fauna sensitive design, including: – 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 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

	Australian Standard 4970-2009 Protection of Trees on Development Sites MRPV Fauna Sensitive Road Design Guideline (2020) *Catchment and Land Protection Act 1994*	E3	**Flora and fauna – construction** 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: • 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 • Fencing no-go zones (refer to Attachment VI *Map Book*) 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	Design and construction

PERFORMANCE OBJECTIVE	APPLICABLE LEGISLATION, POLICY AND GUIDELINE	EPR CODE	ENVIRONMENTAL PERFORMANCE REQUIREMENT	PROJECT PHASE
			trenches cannot be closed, check trenches for fauna early in the morning.	
		E4	**Swift Parrot Management Plan** Implementing the mitigation measures specified in the Swift Parrot Management Plan, including: • 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 *Map Book*) 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
		E5	**Matted Flax-lily** 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 Environment, prior to the commencement of relevant works.	Design and construction
	Planning and Environment Act 1987	E6	**Strategic revegetation** Strategic revegetation in accordance with the Project's Landscape Strategy (see also EPRs AR4 and LV2) to minimise long term fragmentation impacts by: • 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
	Catchment and Land Protection Act 1994	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
	Catchment and Land Protection Act 1994	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 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: • 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 *Map Book* 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
		AR2	**Tree Protection Management Plan** 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: • 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

		AR3	**Doreen River Red Gums** 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. 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: • 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 • 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.	Design and construction
		AR4	**Reinstatement**	Design and construction

PERFORMANCE OBJECTIVE	APPLICABLE LEGISLATION, POLICY AND GUIDELINE	EPR CODE	ENVIRONMENTAL PERFORMANCE REQUIREMENT	PROJECT PHASE
			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: • Protecting retained trees • Ensuring new tree planting does not adversely impact existing vegetation.	
Landscape and visual To avoid where possible, and otherwise minimise adverse effects on landscape values, and to maximise the enhancement of these values where opportunities exist	*Heritage Act 2017* *Planning and Environment Act 1987*	LV1	**Implement the Landscape Strategy** Implement the Landscape Strategy (refer to Technical Report G) during design and construction to minimise adverse effects on landscape values and visual impacts, particularly in relation to: • Retaining and reinforcing key existing views as identified within the Landscape Strategy • Heritage values • Existing and proposed landmark elements across the Project • High value vegetation as identified within the Landscape Strategy's 'Cultural Value of Vegetation Assessment' • Community and recreational centres and open space, including existing Council masterplans for Doreen Recreational Reserve, Yarrambat Park & Golf Course and Yarrambat Township • Residential and business interfaces. See also EPRs E6, AR1, AR4, LV2 and V1.	Design and construction

PERFORMANCE OBJECTIVE	APPLICABLE LEGISLATION, POLICY AND GUIDELINE	EPR CODE	ENVIRONMENTAL PERFORMANCE REQUIREMENT	PROJECT PHASE
		LV2	**Replanting and reinstatement of vegetation** Replanting and reinstatement of vegetation must occur in accordance with the Project's Landscape Strategy (see also EPRs E6, AR1, AR4, LV1 and V1) in consultation with the relevant land manager, including: • Ensure tree planting is fully coordinated with services, easements and utilities including required height limits and offsets • Ensure new tree planting is climate resilient and suitable for the local context • Maximises the enhancement of landscape, Aboriginal and historical cultural heritage, and vegetation and habitat connectivity values, where opportunities exist • Provide replacement screening vegetation where feasible to reduce impacts to visual amenity • Enhance existing vegetation along the road corridor and around infrastructure elements • Provide contextual planting along roads and walking and cycling paths where feasible to achieve tree canopy cover for shade, shelter and habitat creation and connectivity • Seek to improve user amenity through identifying opportunities within public open space in accordance with relevant Council masterplans • Enhance intersections and identified gateways with distinctive native plantings to act as visual marker along the road corridor.	Design and construction

8 Conclusion

8.1 Overview

SMEC was commissioned by MRPV to undertake an assessment of the potential impacts to biodiversity associated with the Yan Yean Road Upgrade – Stage 2 project (the Project). The proposed Project involves the duplication of a 5.5 km section of Yan Yean Road between Kurrak Road and Bridge Inn Road, Doreen, including associated intersection upgrades and installation of new walking and cycling paths. The impact assessment aims to summarise the key impacts and risks to the ecological values of the Project area resulting from the construction and operational phases of the Project.

This assessment utilises the data from previous ecological investigations undertaken within and adjacent the Project area, presented within the comprehensive flora and fauna report provided by WSP - Yan Yean Road Upgrade - Stage 2: Kurrak Road to Bridge Inn Road Flora and Fauna Existing Conditions Assessment (WSP 2020).

8.2 Existing Conditions

The Project area contains approximately 17 ha of native vegetation comprised of seven EVCs, and the vast majority (14.301ha) was identified as Grassy Dry Forest (EVC 22). Trees that met the definition of native vegetation in the Project area comprised 2,505 native canopy trees in patches and 270 scattered trees. There were 7,030 trees recorded in the Project area and 20 m buffer zone in total, including indigenous, planted native and exotic trees.

Three listed rare or threatened flora species and one threatened ecological community were recorded in the Project area:

- Matted Flax-lily (listed under the EPBC Act, FFG Act and Advisory List);
- Studley Park-gum (listed under the Advisory List);
- Pale-flower Crane's-bill (listed under the Advisory List); and
- *Western Basalt Plains (River Red Gum) Grassy Woodland* (listed under the FFG Act).

Threatened fauna species with a moderate or higher likelihood to occur in the Project area include:

- Grey-headed Flying-Fox;
- Swift Parrot;
- White-throated Needletail;
- Rufous Fantail;
- Brush-tailed Phascogale;
- Common Bent-wing Bat; and
- Tussock Skink.

The primary fauna habitat type present within the Project area included patches of woodland vegetation and planted trees and shrubs. Aquatic habitat present within the Project area was present in farm dams and landscaped wetlands.

8.3 Risk and Impact Assessment

Key risks to biodiversity values of the Project area are defined as having an initial rating of 'significant' or above and include:

- Potential removal, destruction or lopping of native vegetation (including patches and scattered trees);
- Potential impact on Commonwealth and/or Victorian listed threatened species and communities, or their habitat (including freshwater ecology);
- Potential impact on wildlife or their habitat;
- 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.

Overall impacts resulting from the Project includes the following:

Native Vegetation and Trees

- Up to 11.888 ha native vegetation patches plus 40 large scattered trees and 164 small scattered trees to be removed (equivalent to approximately 17 ha);
- Up to 4,777 trees to be removed (including native, planted and exotic trees);

Listed Species and Communities

- Removal of two EPBC Act-listed Matted Flax-lily plants;
- Removal of two flora species listed under the Advisory List – one Studley Park Gum and three Pale-flowered Crane's-bill
- Removal of up to eight FFG Act-listed Protected flora species;
- Removal of 0.186 ha of a listed FFG Act community: Western Basalt Plains (River Red Gum) Grassy Woodland, synonymous with patches of Plains Grassy Woodland (EVC 55);
- Direct and indirect impacts to four listed fauna species (Swift Parrot, Grey-headed Flying-Fox, Brush-tailed Phascogale and Tussock Skink) including:
  - Habitat removal
  - Habitat degradation (e.g. through weed incursion, dust, erosion and sedimentation, contamination)
  - Disturbance or alteration of habitat conditions from increased noise, light and vehicle movement
  - Increased predation and competition with aggressive native and invasive species
  - Increased risk of vehicle strike
  - Fragmentation and additional barriers to movement.

The Project has been designed to avoid impacts to the biodiversity values of the Project area where possible, whilst still maintaining the required safety outcomes for Yan Yean Road. Where avoidance is not possible, a range of mitigation measures will be employed to minimise the risk and/or severity of impacts and are captured within the EPRs for the Project.

8.4 Swift Parrot Assessment of Cumulative Impacts

Swift Parrots are consistently observed using areas of suitable habitat in the north-east Melbourne region each year, including the Plenty River corridor. Considering the species demonstrates a high degree of site fidelity and is observed consistently in higher value habitat within 10 km of the Project area, the species has not been recorded using preferred eucalypt foraging species within or abutting the Project area. Potential habitat for Swift Parrot within the Project area comprises key and secondary eucalypt foraging species. The majority of the trees proposed to be lost are secondary foraging species as they flower during spring and summer when Swift Parrot are largely in Tasmania. The available habitat for Swift Parrot within the Project area is considered to be of low to moderate value;

- 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)

Noting that habitat loss is noted as a threatening process for Swift Parrot in the species recovery plan (Saunders and Tzaros, 2011) and listing advice (TSSC, 2016), even if 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:

- The relatively low number of foraging trees providing viable potential foraging habitat;
- extensive areas of higher quality and protected habitat in both 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; and,
- continued declines and fragmentation in preferred overwintering habitat in central and north-eastern Victoria, the western slopes, central coast and coastal regions in NSW and south-eastern Queensland.

Vegetation and preferred foraging trees losses resulting from the Project are unlikely to contribute to a cumulative impact on the Swift Parrot population.

8.5 Offsets

All native vegetation removal will be offset in accordance with DELWP's *Guidelines for the removal, destruction or lopping of native vegetation 2017* (DELWP 2017c). A total of 4.478 general units, 174 large trees and 1.861 species units for Little Pink Spider-orchid are required to be secured.

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Appendix A Swift Parrot ACI - Supplementary Information

The potential for the project to contribute to cumulative impacts on Swift Parrot was cited as one of the primary reasons for the project requiring an Environment Effects Statement (EES). As such, an Assessment of Cumulative Impacts (ACI) for Swift Parrot has been undertaken as part of this study.

Legislative Framework

Assessing cumulative impacts on biodiversity values is only recently becoming more commonplace in road projects in Victoria although consideration in Environment Effects Statements (EES) in Victoria has typically been applied to wind farms. In the Ministerial Guidelines for Assessment of Environmental Effects under the *Environment Effects Act 1978*, information around cumulative effects are detailed as follows;

> *"Cumulative effects An EES should identify the potential for cumulative effects, i.e. where a project, in combination with one or more other proposed projects, or existing activities in an area, may have an overall significant effect on the same environmental asset. A regional perspective can be helpful in this regard, by putting the potential effects of a project in a wider context.*
>
> *While cumulative effects may be a relevant consideration for the assessment of a project, a proponent may not have a practical ability to provide such an assessment, for example because of their limited access to information on the effects of other existing activities or potential projects. Similarly, the ability of a proponent to provide a regional perspective in an EES will depend on the availability – usually from government agencies – of relevant regional policies, plans, strategies, as well as regional data.*
>
> *A proponent will at least need to provide an assessment of relevant effects (e.g. on landscape values, risks to fauna or emissions to air) in a form that can be integrated with information relating to other projects or activities, and thus enable the Minister to assess the potential cumulative effects. A specific need for a proponent to document potential cumulative effects may arise where a project is to be undertaken in a series of stages.*
>
> *Because of the factors constraining quantitative assessment of cumulative effects, often only a qualitative assessment will be practicable."*

There is no specific mention of cumulative impacts under Victoria's *Flora and Fauna Guarantee Act 1988* (FFG Act) or the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act requires the federal Minister for the Environment to give regard to 'staged developments' and 'related actions'; however, legislation around cumulative impacts under the EPBC Act remains unclear.

In an independent review of the EPBC Act, a recurring theme in public comment was the Acts perceived failure to adequately manage cumulative environmental impacts (Hawke 2009). In the recent EPBC Act review, public comments have again focussed on the requirement for assessment of cumulative impacts on matters of national environmental significance, with particular reference to species which are migratory and/or have large geographic ranges.

Species Ecology

Description

The Swift Parrot is a slim, medium-sized parrot with a streamlined shape in flight, angular pointed wings and a long-pointed purple-red tail. The body is mostly bright green, with a dark blue patch on the crown (Higgins and Davies, 1999). The forehead to throat is crimson and there is a crimson patch at the bend of the wing. The female is slightly duller, with a creamy underwing bar (Higgins and Davies, 1999). In flight, the bright green body, dark flight feathers and scarlet underwing coverts are obvious and differentiate the species from other similar looking lorikeet species (Higgins and Davies, 1999). Growing to only 25 cm in overall length, and weighing 65 g, they are noisy, active and showy, with a very fast, direct flight – up to 88 km/hr. One of most distinctive features from a distance is its long (12 cm), thin tail, which is dark red. This distinguishes it from the similar lorikeets, with which it often flies and feeds. Can also be recognised by its flute-like chirruping or metallic "kik-kik-kik" call (Higgins and Davies, 1999).

Conservation Status

The Swift Parrot *Lathamus discolor* is listed as 'Critically Endangered' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is also listed as a threatened species in each other state and territory in which it occurs, as detailed below:

- Tasmanian *Threatened Species Protection Act 1995* (TSP Act) (Schedule 4, Endangered)

- New South Wales *Threatened Species Conservation Act 1995* (TSC Act) (Endangered)
- Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) (Schedule 2, Endangered)
- South Australian *National Parks and Wildlife Act 1972* (NPW Act) (Schedule 7, Endangered)
- Queensland *Nature Conservation Act 1992* (NC Act) (Endangered)
- Australian Capital Territory *Nature Conservation Act 1980* (ACT NC Act) (Section 21, Vulnerable)

The Swift Parrot is also listed as 'Endangered' on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN 2004).

There are no recent estimates of the number of swift parrots in the wild. Garnett et al., (2011) derived an estimate of approximately 2,000 mature individuals as part of the Bird Action Plan 2010 assessment process and considered the population to be declining. As the most recent estimate was made in 2010, and the population was thought to be declining then, the population is now likely considerably less than 2,000 birds (TSSC, 2016).

Range and Movements

Swift Parrots breed in the eastern and south-eastern parts of Tasmania during spring and summer. The breeding range closely mirrors the distribution of blue gum (Eucalyptus globulus) in Tasmania. The species has also been observed breeding in the north-west of the state between Launceston and Smithton, however, the number of birds involved, and frequency of these breeding events is not well understood. Potential breeding habitat remaining in the north-west is scarce and highly fragmented (Saunders & Tzaros 2011). 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. In NSW, the species mostly occurs in coastal regions and south west slopes. Small numbers of swift parrots are observed in the Australian Capital Territory and in southeastern Queensland on a regular basis. The species is less frequently observed in the southern Mount Lofty Ranges and the Bordertown-Naracoorte area in south-eastern South Australia (Saunders & Tzaros 2011).

The Swift Parrot is migratory between its Tasmanian summer breeding habitat and vast winter foraging grounds of south-eastern Australia measuring approximately 1, 250, 000 km2 in area (Map 2). Birds fly across Bass Straight to forage across south-east Australia during March and April and through to August each year. Across the mainland distribution the species is nomadic following the flowering of eucalypts and psyllid lerp infestations.

In most years, a large proportion of the Swift Parrot population winters in central Victoria with a smaller proportion migrating and foraging at more distant locations particularly along the New South Wales coast. In Victoria, their distribution is centred on box-ironbark forests, but they are often seen in town parks and occur sporadically elsewhere in dry forests, dry woodlands and wooded farmlands. Swift Parrots are rarely observed in treeless areas, rainforests or wet forests (Higgins 1999; Pizzey and Knight 2007). In urban areas, birds feed mainly in winter flowering eucalypts, especially Yellow Gums and Red Ironbarks, and may roost in ornamental trees and shrubs (Higgins 1999; Swift Parrot Recovery Team 2001).

During periods of drought Swift Parrots can undertake large scale movements of over 1000 km, often traveling to wetter coastal areas of New South Wales or where extensive eucalypt flowering (e.g. prolific flowering of Spotted Gums *Corymbia maculata* along the NSW coast in 2012).

While small numbers of birds may remain on the mainland during summer, the majority of the population migrate south to Tasmania from September onwards. Birds forage in eucalypt forests and woodlands of eastern Tasmania with breeding occurring largely in the south-east coastal forests. Within its Tasmanian winter range, there is a strong preference for Tasmanian Blue Gum Eucalyptus globulus for foraging and breeding. From March birds migrate across Bass Straight to southern Victoria, moving towards central Victoria in most years.

Although an annual migrant, movement pathways used by Swift Parrots throughout their range are not well understood given observations of such events are rare and tracking individuals over long distances is not currently possible with existing satellite tracking technology. The complexity of their mainland habitat use and migratory movements is highlighted by the distribution of observations over years (Figure 2) based on bird atlas data (Griffioen and Clarke 2002). Although large scale movement trends have been demonstrated across mainland Australia (Saunders et al. in prep), it is not known if long distance movements across Bass Strait or on the mainland are undertaken in groups, nocturnally or diurnally, at specific heights or what triggers such movements. Further information is required to identify potential movement pathways, the importance of such pathways and potential threats that occur in these areas.

Habitat Requirements / Usage (primary / secondary habitat detail)

Vegetation communities and key tree species that provide important nesting and foraging habitat for Swift Parrots are detailed below (Table 1 and 2). The use of these habitats is dependent on prevailing climatic conditions and corresponding food availability. The production of lerp and nectar food resources in these habitats and the availability of nesting hollows are considered the main limiting factors to the species' survival and capacity to breed. Due to the variable production of nectar and lerps across this species' range, it is considered important to protect and manage a broad range of habitats to provide a range of foraging resources (Kennedy and Overs 2001; Brereton et al. 2004; Kennedy and Tzaros 2005; Saunders et al. 2007; Saunders 2008; Tzaros et al. 2009).

According to the Swift Parrot Recovery Plan (Saunders and Tzaros, 2011), of particular importance for conservation management are habitats which are used:

- for nesting,
- by large proportions of the Swift Parrot population,
- repeatedly between seasons (site fidelity), or
- for prolonged periods of time (site persistence).

Nesting / Breeding

Swift parrots breed in tree-hollows in old-growth or other forest with suitable hollows, in relatively proximity to the main food source, flowering Tasmanian blue gum. Several pairs often nest in proximity, in the same or neighbouring trees (Webb et al., 2007). Breeding success is correlated with the intensity and extent of flowering, which is highly variable between years. In poor years, swamp (black) gum (*E. ovata*) is used as food source (Brereton et al., 2004). The species exhibits high site fidelity, returning to locations on an irregular cyclic basis (Saunders 2008). The most common tree species used for nesting are stringybark *E. obliqua*, white peppermint *E. pulchella* and Tasmanian blue gum *E. globulus*, white gum *E. viminalis*, gum-topped stringybark *E. delegatensis* and dead stags (D. Saunders in litt. 2007).

Over-Wintering Habitats

Swift Parrots disperse across eastern Tasmania after breeding and migrate to overwinter on the mainland in flowering woodlands and forests. They feed preferentially in the largest trees available (Kennedy & Overs 2001; Kennedy & Tzaros 2005). Their distribution fluctuates with food availability as they feed on psyllid lerps, seeds and fruit (Kennedy & Tzaros 2005). Non-breeding birds preferentially feed in inland box-ironbark and grassy woodlands, and coastal swamp mahogany (*E. robusta*) and spotted gum (*Corymbia maculata*) woodland when in flower; otherwise often in coastal forests from eastern Victorian to the central coast of New South Wales.

The Swift Parrot Recovery Plan (Saunders and Tzaros, 2011) lists key species of eucalypt which provide primary foraging and roosting habitat for the species whilst overwintering on the mainland (Table 16).

Table 16: Key eucalypt species for Swift Parrots across their mainland overwintering range. From the National Recovery Plan for the Swift Parrot Lathamus discolour (Saunders and Tzaros, 2011)

Foraging habitat types – mainland		**Regional distribution (natural resource management regions)**			
Key tree species – common name	**Key tree species – scientific name**	**Victoria**	**New South Wales/ACT**	**Queensland**	**South Australia**
Yellow Gum	*Eucalyptus leucoxylon*	Central and Western (North Central, Glenelg Hopkins, Wimmera)			South-east (South-east, Murray Darling Basin, Adelaide & Mt Lofty Ranges)
Red Ironbark	*Eucalyptus tricarpa*	Central (North Central)			
Mugga Ironbark	*Eucalyptus sideroxylon*	North-east (North East, Goulburn Broken)	Western Slopes and Central Coast (Murray, Murrumbidgee, Lachlan, Central West, Namoi, Border Rivers - Gwydir, Hawkesbury - Nepean)		
Grey Box	*Eucalyptus microcarpa*	Central, North-east and West (North Central, North East, Goulburn Broken, Wimmera)	Western Slopes and Central Coast (Murray, Murrumbidgee, Lachlan, Central West, Namoi, Border Rivers - Gwydir, Hawkesbury - Nepean)	South-east (Border Rivers Maranoa-Balonne, Condamine, South East Queensland, Burnett Mary)	South-east (South-east, Murray Darling Basin, Adelaide & Mt Lofty Ranges)
White Box	*Eucalyptus albens*	Central, North-east (North Central, Goulburn Broken, North East)	Western Slopes (Murray, Murrumbidgee, Lachlan, Central West, Namoi, Border Rivers - Gwydir)		
Yellow Box	*Eucalyptus melliodora*	Central, North-east, South, West (Wimmera, Glenelg Hopkins, Port Phillip Westernport, North Central, West Gippsland, Goulburn Broken, North East)	Western Slopes (Murray, Murrumbidgee, Lachlan, Central West, Namoi, Border Rivers - Gwydir) ACT (Murrumbidgee)	South-east (Border Rivers Maranoa-Balonne, Condamine, South East Queensland, Burnett Mary	
Swamp Mahogany	*Eucalyptus robusta*		Coastal (Southern Rivers, Hunter - Central Rivers, Northern Rivers, Sydney Metro, Hawkesbury - Nepean)	South-east (Burnett Mary, South East Queensland)	
Forest Red Gum	*Eucalyptus tereticornis*		Coastal (Southern Rivers, Hunter - Central Rivers, Northern Rivers, Sydney Metro, Hawkesbury - Nepean)	South-east (Border Rivers Maranoa-Balonne, Condamine, South East Queensland, Burnett Mary)	
Blackbutt	*Eucalyptus pilularis*		Coastal (Hunter - Central Rivers, Northern Rivers, Hawkesbury - Nepean)		
Spotted Gum	*Corymbia maculata*		Coastal (Southern Rivers, Hunter - Central Rivers, Northern Rivers, Sydney Metro, Hawkesbury - Nepean)		

Although Swift Parrots have been recorded in a wider range of habitats than those provided in Table 1, some of these are considered to be used opportunistically rather than providing a reliable quantity and quality of resources upon which the species can depend (Saunders and Tzaros, 2011). For example, planted eucalypts are sometimes used by this species opportunistically when natural foraging resources are scarce (Saunders and Tzaros, 2011). Although the species can adapt to utilise such a variety of habitats, the prolonged use of such habitats and co-existence with aggressive species that tend to inhabit disturbed areas may be energetically expensive and reduce overall fitness and survival of the species (Saunders and Tzaros, 2011). Contributing factors may include reduced food quality, increased distance travelled in search of food, increased competition from large, aggressive bird species and/or increased exposure to collision hazards in the built environment (Saunders and Tzaros, 2011).

Site Fidelity

Site fidelity is considered to be important for the long-term survival of migrants at both breeding and non-breeding sites (Villard et al. 1995). Information obtained through the recovery program demonstrates the importance of site fidelity for the Swift Parrot population (Kennedy and Tzaros 2005). However, the importance of areas where site fidelity has not yet been established should not be dismissed since this may be due to observational and accessibility limitations and long-term resource availability cycles (Saunders et al. 2007).

Diet

Swift Parrots mainly feed on nectar from flowering eucalypt species, as well as psyllids and lerp, other insects, seeds and fruits. Swift Parrot have also been observed feeding on the flowers and seeds of Xanthorrhoea grass trees, Callistemon and Banksia flowers, galls on eucalypt foliage, and the buds of Golden Wattle *Acacia pycnantha* (Higgins and Davies, 1999).

The species is largely arboreal, occasionally coming to ground to feed on seeds, fallen eucalypt flowers and fruits, fallen lerp and to drink (Higgins and Davies, 1999).

Factors Influencing Occurrence

Where Swift Parrots occur on the mainland during their mainland over-wintering period appears to be strongly influenced by flowering box-ironbark forests and preferred eucalypt species, psyllid infestations, and the flowering Golden Wattle *Acacia pycnantha* in some areas (MacNally and Horrocks, 2000; Higgins and Davies, 1999). Published research on habitat use has largely been restricted to the box-ironbark woodlands of central Victoria (MacNally and Horrocks, 2000; Kennedy and Tzaros, 2005) and to the south-western slopes region of NSW (Kennedy and Overs, 2001).

There is substantial evidence for Swift Parrot preferring the most mature trees in these landscapes, thought to be due to providing a more reliable food resource, and for certain eucalypt species (Saunders and Tzaros, 2011). Key eucalypt foraging tree species include Yellow Gum, Red Ironbark, Mugga Ironbark, Grey Box, White Box *E. albens*, and Yellow Box (Saunders, 2007; Saunders and Tzaros, 2011). Although coastal habitats of NSW are also known to be used by Swift Parrots, the relative importance of these habitats for the swift parrot remains largely unknown.

The density of certain aggressive nectar feeding honeyeaters and parrots may also negatively affect the occurrence of Swift Parrot including such species such as Noisy Miner *Manorina melanocephala*, Fuscous Honeyeater *Lichensostomus fuscus*, White-plumed Honeyeater *Lichensostomus penicillatus*, Yellow-tufted Honeyeater *Lichensostomus melanops* and the Red Wattlebird *Anthochaera carunculata*. Small remnant patches may be particularly important elements in the landscape for the over-wintering swift parrots.

Key Threats / Impacts (population / range level)

Until recently the main threat to swift parrots was thought to be habitat loss and alteration within breeding and drought refuge habitats. However, predation on the nest by sugar gliders *Petaurus breviceps* is now considered to pose a significant threat to the species, as sugar gliders take not only the young or eggs in the nest but also often kill the sitting female (Heinsohn et al., 2015; TSSC, 2016). While a species native to the Australian mainland, sugar gliders are thought to be introduced to mainland Tasmania (Rounsevell et al., 1991; Lindenmayer 2002; Hui 2006; TSSC, 2016). Predation by sugar gliders has been recorded at all locations on mainland Tasmania where swift parrots breed. On the Tasmanian mainland, predation rates interact with the extent of habitat disturbance from logging, with a positive relationship between nest survival and increasing mature forest cover at the landscape scale (Stojanovic et al., 2014).

Habitat loss through land clearing for plantation development and intensive native forest silviculture also poses a significant threat to Swift Parrot. The clearance of foraging and nesting habitat has been extensive and dramatic in many areas reducing the available nesting and foraging habitat to small remnants of what

previously existed (Prober and Thiele 1995; Saunders et al. 2007). Twenty ecological communities providing potential habitat for Swift Parrots have been listed as endangered or vulnerable, and in Tasmania important foraging habitat including grassy Blue Gum forest and Black Gum forest are recognised as threatened vegetation communities. Habitat loss and alteration also occurs through residential, agricultural and industrial development, and dieback in agricultural and urban areas (Saunders and Tzaros, 2011).

The main threat in Victoria is a reduction in the extent of Box Ironbark woodlands which provide a source of winter flowering, nectar and pollen.

The threatening processes identified in the species recovery plan (Saunders and Tzaros, 2011) and the Threatened Species Scientific Committee Conservation Advice (2016) includes;

- Predation by sugar gliders in breeding grounds
- Habitat Loss and alteration
  - Forestry activities including firewood harvesting
  - Residential and industrial development
  - Agricultural tree senescence and dieback
  - Regeneration suppression
  - Frequent Fire
- Climate change
- Collision mortality
- Competition
- Psittacine Beak and Feather Disease
- Illegal wildlife capture and trading
- Feral/Introduced animals

Appendix B Key threatening processes

The potential for the Project to exacerbate key threatening processes listed under the EPBC Act and FFG Act and cause significant effects on biodiversity values was considered as part of the impact assessment. An assessment of key threatening processes considered relevant to the project are presented below in Table 17.

Table 17: Key threatening processes and their likelihood of occurrence

KEY THREATENING PROCESS	LISTING	LIKELIHOOD OF OCCURRENCE	POTENTIAL FOR SIGNIFICANT EFFECT ON BIODIVERSITY VALUES
Aggressive exclusion of birds from potential woodland and forest habitat by over-abundant Noisy Miners (*Manorina melanocephala*) Reduction in biodiversity resulting from Noisy Miner (*Manorina melanocephala*) populations in Victoria.	EPBC Act, FFG Act	Present Noisy Miner recorded in Project area, and assuming to be excluding other birds from woodland and forest habitat.	No – The Project is unlikely to increase Noisy Miner abundance given that the Project area occurs within an existing highly fragmented urban landscape, which favours Noisy Miner.
Competition and land degradation by rabbits Reduction in biomass and biodiversity of native vegetation through grazing by the Rabbit *Oryctolagus cuniculus*.	EPBC Act, FFG Act	Moderate Rabbit recorded in Project area but are not likely to persist in high numbers due to the Project area being a highly urbanised environment.	Unlikely – The Project is unlikely to increase the abundance of Rabbit in the Project area.
Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)	EPBC Act	Low No evidence of *Phytophthora cinnamomi* in Project area.	Unlikely – The Project would employ hygiene protocols to prevent the introduction and spread of *Phytophthora.*
Habitat fragmentation as a threatening process for fauna in Victoria	FFG Act	Present The Project will remove native vegetation along the length of the Project area.	Yes – The Project would cause fragmentation of habitat for fauna, albeit within an already-fragmented urban landscape. Mitigations such as the installation of fauna crossing structures and other measures listed in Section 7 will minimise the likelihood of the Project to exacerbate this process.
Increase in sediment input	FFG Act	Low	No – The Project would employ sediment control measures to avoid

Appendix B Key threatening processes

KEY THREATENING PROCESS	LISTING	LIKELIHOOD OF OCCURRENCE	POTENTIAL FOR SIGNIFICANT EFFECT ON BIODIVERSITY VALUES
into Victorian rivers and streams due to human activities		No rivers or streams occur in the Project area, however ephemeral drainage lines occur which flow into Plenty River.	input into drainage lines in the Project area flowing into Plenty River.
Infection of amphibians with chytrid fungus resulting in chytridiomycosis	EPBC Act, FFG Act	Moderate Amphibian Chytrid Fungus assumed to be present in frog populations within the Project area.	No – the Project would employ hygiene protocols to minimise the spread of Amphibian Chytrid Fungus.
Invasion of native vegetation by Blackberry (*Rubus fruticosus* spp. agg.)	FFG Act	High Blackberry present in Project area.	Possible – the Project would employ weed control protocols and follow-up monitoring to prevent the invasion of Blackberry.
Invasion of native vegetation by 'environmental weeds'	FFG Act	High Environmental weed species and declared weeds under the CaLP Act present in Project area.	Unlikely – the Project would employ weed control protocols and follow-up monitoring to prevent the invasion of Environmental Weeds.
Land clearance	EPBC Act	Present The Project will result in land clearance.	Yes – The Project will result in the removal of native vegetation. A small area of Plains Grassy Woodland (EVC 55) vegetation (0.233 ha) is considered synonymous with the FFG Act-listed community. No vegetation in the Project area is considered critical habitat for the survival or persistence of threatened flora or fauna.
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	EPBC Act	High The Project area already contains garden escapees.	No - The Project would employ weed control protocols and follow-up monitoring to prevent the invasion of garden escapees in areas of native vegetation to be retained.
Loss of biodiversity as a result of the spread of Coast Wattle (*Acacia longifolia* subsp. *sophorae*) and Sallow Wattle (*Acacia longifolia* subsp. *longifolia*) into areas outside its natural range	FFG Act	High Project area contains Sallow Wattle.	Possible - The Project would employ weed control protocols and follow-up monitoring to prevent the invasion of Sallow Wattle. The landscape works in the Project area post-construction would also be undertaken to minimise the risk of Sallow Wattle invasion.

KEY THREATENING PROCESS	LISTING	LIKELIHOOD OF OCCURRENCE	POTENTIAL FOR SIGNIFICANT EFFECT ON BIODIVERSITY VALUES
Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases	EPBC Act, FFG Act	Low The Project area occurs within an urban environment and is dominated by vegetation adapted to dry conditions.	No – The Project would not exacerbate the effects of climate change to cause loss of habitat.
Loss of coarse woody debris from Victorian native forests and woodlands	FFG Act	High The Project will remove coarse woody debris from the Project area due to fire risk.	No – The removal of coarse woody debris in itself is unlikely to have a significant effect on biodiversity values.
Loss of hollow-bearing trees from Victorian native forests.	FFG Act	High The Project will remove hollow-bearing trees.	Possible – The removal of hollow-bearing trees would impact fauna-dependent species. The Project area contains no known populations of or breeding sites for threatened fauna species dependent on hollows.
Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species	EPBC Act	Low Swift Parrot has not been recorded using habitat within the Project area and this habitat is unlikely to be important to the species.	No – If the Swift Parrot population becomes infected by Psittacine Circoviral Disease, the removal of vegetation within the Project area is unlikely to exacerbate the effects of Psittacine Circoviral Disease on this species.
Spread of *Pittosporum undulatum* in areas outside its natural distribution.	FFG Act	High Sweet Pittosporum recorded in the Project area.	Possible - The Project would employ weed control protocols and follow-up monitoring to prevent the invasion of Sweet Pittosporum. The landscape works in the Project area post-construction would also be undertaken to minimise the risk of Sweet Pittosporum invasion.
Use of Phytophthora-infected gravel in construction of roads, bridges and reservoirs.	FFG Act	Low No evidence of *Phytophthora cinnamomi* observed in Project area. Gravel unlikely to be sourced from a *Phytophthora*-infected area.	No - The Project would employ hygiene protocols to prevent the invasion and spread of *Phytophthora*.
Wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing.	FFG Act	Low All wetlands within or adjacent the Project area are constructed or highly modified. The Project would not result in a change in water regime, dredging, draining, filling or grazing.	No – Wetlands in the Project area do not support habitat for threatened species, and where retained, are not expected to experience different conditions post-construction. The Project would employ sediment control protocols to prevent the sedimentation and erosion of waterways and waterbodies.

Appendix C EPBC Act significant impact assessments

Three EPBC Act-listed species have the potential to be impacted by the Project:

- Matted Flax-lily – listed as Endangered;
- Swift Parrot – listed as Critically Endangered; and
- Grey-headed Flying-fox, listed as Vulnerable.

An action 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**;
- reduce the area of occupancy of the species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to 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;
- introduce disease that may cause the species to decline; or,
- interfere with the recovery of the species.

An action 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;
- reduce the area of occupancy of an **important population;**
- fragment an existing **important population** into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an **important population**;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- introduce disease that may cause the species to decline; or,
- interfere substantially with the recovery of the species.

Assessments of proposed impacts against EPBC Act significant impact criteria in accordance with *Matters of National Environmental Significance Significant impact guidelines 1.1* (DoE 2013) are provided below in Tables 18 – 20.

Table 18: Matted Flax-lily EPBC Act Significant Impact Assessment

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
Lead to a long-term decrease in the size of a population	Low. The estimated number of Matted Flax-lily plants remaining in Victoria is approximately 2,500, across 120 significant sites (National Recovery Plan for Matted Flax-lily, Carter 2010). There were two Matted Flax-lily plants (with approximately 100 ramets each) recorded in the Project area, occurring in modified, fragmented Grassy Dry Forest vegetation within the Yan Yean Road reserve which is 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. The removal of the two plants within the Project area is not likely to lead to a long-term decrease of the species such that it is likely to decline.	**Low**	If unable to be retained in situ, the Matted Flax-lily plants would be translocated to a suitable recipient site (EPR E2). Translocation of this species is an objective of the National Recovery Plan (Carter 2010) and has been successfully carried out for other projects (e.g. Mernda Rail Extension).	Low	**Low**
Reduce the area of occupancy of the species.	Low. The Project will reduce the area of occupancy for the species within the Project area boundary. The Project area is not considered an important site for the species and is subject to ongoing disturbance from maintenance activities. No other Matted Flax-lily plants were recorded within the Project area during ecological surveys. The loss of habitat within the Project area is not considered to reduce the area of occupancy of Matted Flax-lily such that the species would decline.	**Low**	Translocation of Matted Flax-lily plants would enable the species to occupy a new area, therefore resulting in a no net loss of area of occupancy.	N/A	**Low**

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
Fragment an existing population into two or more populations.	Low. The Project will remove two Matted Flax-lily plants, which are believed to represent the only population of Matted Flax-lily in the Project area. No fragmentation of a larger, important population will occur.	**Low**	Not applicable.	N/A	**Low**
Adversely affect habitat critical to the survival of a species	Low. The Project area contains disturbed, fragmented areas of native vegetation and is not listed as an important known site for Matted Flax-lily in the National Recovery Plan for Matted Flax-lily (Carter 2010). Impacts will be limited to the Project area, which is not considered habitat critical to the survival of Matted Flax-lily.	**Low**	Not applicable.	N/A	**Low**
Disrupt the breeding cycle of a population	Low. The project will not disrupt the breeding cycle of Matted Flax-lily.	**Low**	Not applicable.	N/A	**Low**
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Low. The Project is likely to remove habitat containing the two Matted Flax-lily plants, and other 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.	**Low**	If removed, the translocation of Matted Flax-lily would mitigate the loss of habitat for plants in the Project area.	N/A	**Low**
Result in invasive species that are harmful to a critically endangered or endangered species becoming	Low. The Project may result in the invasion of weeds including declared weeds such as Blackberry, and environmental weeds such as Sallow Wattle and Sweet Pittosporum, which are listed as key threatening processes under the FFG Act. The habitat for Matted Flax-lily within the Project area is	**Low**	Weed management protocols will be employed by the Project to prevent weed invasion and spread in the Project area (EPR E3).	N/A	**Low**

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
established in the endangered or critically endangered species' habitat	already highly modified and contains weeds.				
Introduce disease that may cause the species to decline	Low. 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.	**Low**	Hygiene protocols will be employed by the Project to prevent invasion and spread of Phytophthora in the Project area (EPR E3).	N/A	**Low**
Interfere with the recovery of the species	Moderate. 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, but to a small extent and not within a known important population for the species.	**Moderate**	If removed, the translocation of Matted Flax-lily would mitigate the loss of plants in the Project area as per the listed objectives in the recovery plan for the species (Carter 2010).	N/A	**Low**

Table 19: Swift Parrot EPBC Act Significant Impact Assessment

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
Lead to a long-term decrease in the size of a population	Low. There are no confirmed records of Swift Parrot from the project area, and the project area is not considered to comprise important or priority habitat for the species. The project area and suitable habitats on mainland Australia are not breeding 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.	**Low**	Not applicable.	Low	**Low**
Reduce the area of occupancy of the species.	Low. 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. As 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, the potential loss of preferred foraging trees will not reduce the area of occupancy of the Swift Parrot.	**Low**	Not applicable.	N/A	**Low**

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
Fragment an existing population into two or more populations.	Low. Swift Parrot are a highly mobile species which cover large distances and occupy a variety of core habitat areas when in mainland Australia. The population of Swift Parrot can be spread 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.	**Low**	Not applicable.	N/A	**Low**
Adversely affect habitat critical to the survival of a species	Low. 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 – Priority habitat, as listed in the species recovery plan (Saunders, D and Tzaros, T, 2011)	**Low**	Not applicable.	N/A	**Low**

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
Disrupt the breeding cycle of a population	Swift Parrot breed in Tasmania, the proposed Yan Yean Road stage two upgrades will not disrupt the breeding cycle or breeding activity of the species.	**Low**	Not applicable.	N/A	**Low**
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Potential habitat provided by preferred foraging trees within the Project Area does not constitute important habitat for Swift Parrot. 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 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 1165 small secondary foraging trees)	**Low**	Not applicable.	N/A	**Low**

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
	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	The Project Area is situated in a highly modified, urbanised landscape. An abundance of common aggressive nectarivous 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: – Introduction and spread of the Large Earth Bumblebee *Bombus terrestris* – Competition from feral honeybees *Apis mellifera* – Predation of native wildlife by cats *Felis catus* The Yan Yean Road Stage 2 upgrade is unlikely to result in an increase in numbers of invasive or pest species that are not already present.	**Low**	Not applicable.	N/A	**Low**
Introduce disease that may cause the species to decline	Psittacine Beak and Feather Disease is a known threat to the Swift Parrot (Saunders, D & Tzaros 2011) and a listed Commonwealth threatening process. The Yan Yean Road Stage 2 upgrade is unlikely to introduce or exacerbate this disease.	**Low**	Not applicable.	N/A	**Low**

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
Interfere with the recovery of the species	Low. 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 are are considered to be areas of low to moderate value habitat that are potentially useful for opportunistic foraging and roosting in some years. Based on the significant impact guidelines (Commonwealth of Australia 2013), habitat present would 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 proposed Yan Yean Road stage 2 upgrade will not interfere with the recovery of Swift Parrot.	**Low**	Not applicable.	N/A	**Low**

Table 20: Grey-headed Flying-fox EPBC Act Significant Impact Assessment

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
Lead to a long-term decrease in the size of an important population	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 2521 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 proposed Yan Yean Road Stage 2 upgrade will not lead to any decrease in the size of an important population of Grey-headed Flying-fox.	**Low**	Not applicable.	N/A	**Low**
Reduce the area of occupancy of an important population.	The project area is not recognised as important habitat for Grey-headed Flying-fox Proposed works would not reduce area of occupancy for an important population of this species.	**Low**	Not applicable.	N/A	**Low**
Fragment an existing important population into two or more populations.	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	**Low**	Not applicable.	N/A	**Low**

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
Adversely affect habitat critical to the survival of a species	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, the proposed road upgrade will not adversely affect habitat critical to the survival of Grey-headed Flying-fox.	**Low**	Not applicable.	N/A	**Low**
Disrupt the breeding cycle of an important population	There are no known breeding colonies of Grey-headed Flying-fox in the local area. The proposed road upgrade will not result in the disruption of an important population of the species.	**Low**	Not applicable.	N/A	**Low**
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	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 proposed works 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.	**Low**	Not applicable.	N/A	**Low**
Result in invasive species that are harmful to a critically endangered or endangered species becoming	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	**Low**	Not applicable.	N/A	**Low**

Significant Impact Criteria	Risk without impact avoidance measures	Likelihood of Significant Impact w/o impact avoidance measures	Impact avoidance Measure(s)	Residual Risk with impact avoidance measures	Likelihood of Significant Impact with impact avoidance measures
established in the endangered or critically endangered species' habitat	key threatening process for Grey-headed Flying-fox. It is highly unlikely that the Yan Yean Road stage 2 upgrade would result in any invasive species becoming established in the local area.				
Introduce disease that may cause the species to decline	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 proposed works will result in the introduction of disease that would cause species decline.	**Low**	Not applicable.	N/A	**Low**
Interfere with the recovery of the species	The proposed works will not interfere with the recovery of Grey-headed Flying-fox	**Low**	Not applicable.	N/A	**Low**

Appendix D Native Vegetation Removal (NVR) report and available native vegetation credits

Native vegetation removal report

This report provides information to support an application to remove, destroy or lop native vegetation in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*. The report **is not an assessment by DELWP** of the proposed native vegetation removal. Native vegetation information and offset requirements have been determined using spatial data provided by the applicant or their consultant.

Date of issue: 29/07/2020
Time of issue: 5:11 pm

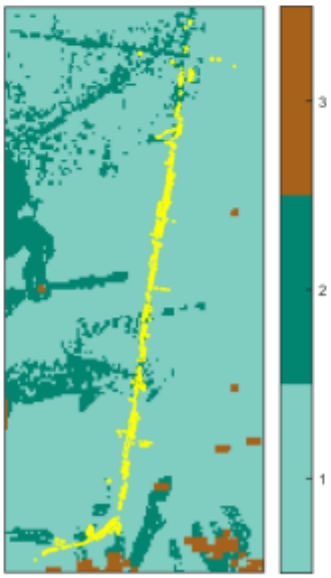
Report ID: SME_2020_010

Project ID	YY2_Vegetation Removal_Option B_V11

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	17.458 ha
Extent of past removal	0.000 ha
Extent of proposed removal	17.458 ha
No. Large trees proposed to be removed	174
Location category of proposed removal	Location 2 The native vegetation is in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map). Removal of less than 0.5 hectares of native vegetation in this location will not have a significant impact on any habitat for a rare or threatened species.

1. Location map



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Native vegetation removal report

Offset requirements if a permit is granted

Any approval granted will include a condition to obtain an offset that meets the following requirements:

General offset amount[1]	4.478 general habitat units
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or Nillumbik Shire, Whittlesea City Council
Minimum strategic biodiversity value score[2]	0.423
Large trees*	127 large trees
Species offset amount[3]	1.860 species units of habitat for Little Pink Spider-orchid, *Caladenia rosella*
Large trees*	47 trees
*** The total number of large trees that the offset must protect**	174 large trees to be protected in either the general, species or combination across all habitat units protected

NB: values within tables in this document may not add to the totals shown above due to rounding

Appendix 1 includes information about the native vegetation to be removed

Appendix 2 includes information about the rare or threatened species mapped at the site.

Appendix 3 includes maps showing native vegetation to be removed and extracts of relevant species habitat importance maps

1 The general offset amount required is the sum of all general habitat units in Appendix 1.

2 Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

3 The species offset amount(s) required is the sum of all species habitat units in Appendix 1.

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Native vegetation removal report

Next steps

Any proposal to remove native vegetation must meet the application requirements of the Detailed Assessment Pathway and it will be assessed under the Detailed Assessment Pathway.

If you wish to remove the mapped native vegetation you are required to apply for a permit from your local council. Council will refer your application to DELWP for assessment, as required. **This report is not a referral assessment by DELWP.**

This *Native vegetation removal report* must be submitted with your application for a permit to remove, destroy or lop native vegetation.

Refer to the *Guidelines for the removal, destruction or lopping of native* vegetation (the Guidelines) for a full list of application requirements This report provides information that meets the following application requirements:

- The assessment pathway and reason for the assessment pathway
- A description of the native vegetation to be removed (partly met)
- Maps showing the native vegetation and property (partly met)
- Information about the impacts on rare or threatened species.
- The offset requirements determined in accordance with section 5 of the Guidelines that apply if approval is granted to remove native vegetation.

Additional application requirements must be met including:

- Topographical and land information
- Recent dated photographs
- Details of past native vegetation removal
- An avoid and minimise statement
- A copy of any Property Vegetation Plan that applies
- A defendable space statement as applicable
- A statement about the Native Vegetation Precinct Plan as applicable
- A site assessment report including a habitat hectare assessment of any patches of native vegetation and details of trees
- An offset statement that explains that an offset has been identified and how it will be secured.

Appendix 1: Description of native vegetation to be removed

The species-general offset test was applied to your proposal. This test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the species offset threshold. The threshold is set at 0.005 per cent of the mapped habitat value for a species. When the proportional impact is above the species offset threshold a species offset is required. This test is done for all species mapped at the site. Multiple species offsets will be required if the species offset threshold is exceeded for multiple species.

Where a zone requires species offset(s), the species habitat units for each species in that zone is calculated by the following equation in accordance with the Guidelines:

Species habitat units = extent x condition x species landscape factor x 2, where the species landscape factor = 0.5 + (habitat importance score/2)

The species offset amount(s) required is the sum of all species habitat units per zone

Where a zone does not require a species offset, the general habitat units in that zone is calculated by the following equation in accordance with the Guidelines:

General habitat units = extent x condition x general landscape factor x 1.5, where the general landscape factor = 0.5 + (strategic biodiversity value score/2)

The general offset amount required is the sum of all general habitat units per zone.

Native vegetation to be removed

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
20-P	Patch	vvp_0821	Vulnerable	0	no	0.387	0.077	0.077	0.384		0.031	General
43-P	Patch	hsf_0022	Least Concern	0	no	0.210	0.460	0.460	0.523	0.610	0.155	503669 Little Pink Spider-orchid *Caladenia rosella*
41-P	Patch	hsf_0022	Least Concern	0	no	0.170	0.017	0.017	0.680	0.380	0.004	503669 Little Pink Spider-orchid *Caladenia rosella*
48-P	Patch	hsf_0022	Least Concern	0	no	0.220	0.046	0.046	0.500		0.011	General
61-P	Patch	hsf_0022	Least Concern	2	no	0.330	0.017	0.017	0.660		0.007	General
103-P	Patch	hsf_0022	Least Concern	0	no	0.470	0.070	0.070	0.550		0.038	General
102-P	Patch	hsf_0022	Least Concern	0	no	0.290	0.025	0.025	0.550		0.008	General
108-P	Patch	hsf_0022	Least Concern	1	no	0.170	0.014	0.014	0.190		0.002	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
109-P	Patch	hsf_0022	Least Concern	1	no	0.210	0.038	0.038	0.190	0.320	0.010	503669 Little Pink Spider-orchid *Caladenia rosella*
110-P	Patch	hsf_0022	Least Concern	0	no	0.170	0.017	0.017	0.190		0.003	General
125-P	Patch	hsf_0653	Endangered	0	no	0.495	0.028	0.028	0.550		0.016	General
120-P	Patch	hsf_0653	Endangered	0	no	0.495	0.013	0.013	0.550		0.007	General
129-P	Patch	hsf_0022	Least Concern	0	no	0.220	0.317	0.317	0.721		0.090	General
100-P	Patch	hsf_0022	Least Concern	1	no	0.330	0.370	0.370	0.687		0.154	General
101-P	Patch	hsf_0022	Least Concern	2	no	0.570	0.348	0.348	0.702		0.253	General
97-P	Patch	hsf_0022	Least Concern	8	no	0.340	0.243	0.243	0.626		0.101	General
95-P	Patch	hsf_0937	Endangered	1	no	0.340	0.236	0.236	0.479		0.089	General
52-P	Patch	hsf_0047	Vulnerable	3	no	0.370	0.459	0.459	0.490		0.190	General
50-P	Patch	hsf_0022	Least Concern	5	no	0.310	0.341	0.341	0.493		0.118	General
28-P	Patch	hsf_0047	Vulnerable	4	no	0.380	0.225	0.225	0.645	0.455	0.124	503669 Little Pink Spider-orchid *Caladenia rosella*
13-P	Patch	hsf_0047	Vulnerable	3	no	0.190	0.129	0.129	0.381		0.025	General
32-P	Patch	hsf_0022	Least Concern	1	no	0.470	0.097	0.097	0.640	0.432	0.065	503669 Little Pink Spider-orchid *Caladenia rosella*
41-JA	Patch	hsf_0022	Least Concern	0	no	0.170	0.014	0.014	0.680	0.550	0.004	503669 Little Pink Spider-orchid *Caladenia rosella*
41-JB	Patch	hsf_0022	Least Concern	0	no	0.170	0.004	0.004	0.680	0.550	0.001	503669 Little Pink Spider-orchid *Caladenia rosella*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
88-JA	Patch	hsf_0022	Least Concern	0	no	0.290	0.013	0.013	0.540		0.004	General
124-JA	Patch	hsf_0022	Least Concern	0	no	0.240	0.528	0.528	0.552		0.147	General
89-P	Patch	hsf_0022	Least Concern	2	no	0.420	0.056	0.056	0.540		0.027	General
87-P	Patch	hsf_0022	Least Concern	0	no	0.330	0.064	0.064	0.540		0.025	General
90-P	Patch	hsf_0022	Least Concern	0	no	0.280	0.005	0.005	0.540		0.002	General
98-P	Patch	hsf_0022	Least Concern	0	no	0.260	0.003	0.003	0.720		0.001	General
94-P	Patch	hsf_0055	Endangered	2	no	0.300	0.044	0.044	0.569		0.015	General
96-P	Patch	hsf_0047	Vulnerable	0	no	0.230	0.134	0.134	0.570		0.036	General
92-P	Patch	hsf_0047	Vulnerable	2	no	0.350	0.123	0.123	0.437		0.046	General
91-P	Patch	hsf_0022	Least Concern	0	no	0.280	0.004	0.004	0.360		0.001	General
93-P	Patch	hsf_0055	Endangered	0	no	0.230	0.018	0.018	0.360		0.004	General
99-P	Patch	hsf_0022	Least Concern	0	no	0.540	0.073	0.073	0.720		0.051	General
107-P	Patch	hsf_0022	Least Concern	6	no	0.340	0.477	0.477	0.550		0.189	General
105-P	Patch	hsf_0022	Least Concern	1	no	0.360	0.032	0.032	0.550		0.013	General
104-P	Patch	hsf_0022	Least Concern	0	no	0.320	0.031	0.031	0.550		0.011	General
113-P	Patch	hsf_0022	Least Concern	8	no	0.320	0.301	0.301	0.604		0.116	General
114-P	Patch	hsf_0022	Least Concern	2	no	0.380	0.094	0.094	0.650		0.044	General
115-P	Patch	hsf_0022	Least Concern	2	no	0.330	0.152	0.152	0.650		0.062	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
117-P	Patch	hsf_0022	Least Concern	1	no	0.310	0.036	0.036	0.590		0.013	General
116-P	Patch	hsf_0022	Least Concern	3	no	0.360	0.177	0.177	0.590		0.076	General
119-P	Patch	hsf_0022	Least Concern	5	no	0.330	0.149	0.149	0.590		0.059	General
118-P	Patch	hsf_0022	Least Concern	0	no	0.290	0.035	0.035	0.590		0.012	General
124-P	Patch	hsf_0022	Least Concern	0	no	0.240	0.326	0.326	0.555		0.091	General
128-P	Patch	hsf_0022	Least Concern	5	no	0.390	0.454	0.454	0.593		0.211	General
121-P	Patch	hsf_0022	Least Concern	0	no	0.390	0.249	0.249	0.706	0.390	0.135	503669 Little Pink Spider-orchid *Caladenia rosella*
123-P	Patch	hsf_0022	Least Concern	0	no	0.390	0.310	0.310	0.591		0.144	General
126-P	Patch	hsf_0022	Least Concern	0	no	0.390	0.045	0.045	0.590		0.021	General
122-P	Patch	hsf_0022	Least Concern	0	no	0.360	0.084	0.084	0.710	0.390	0.042	503669 Little Pink Spider-orchid *Caladenia rosella*
132-P	Patch	hsf_0022	Least Concern	2	no	0.360	0.129	0.129	0.754		0.061	General
54-P	Patch	hsf_0047	Vulnerable	1	no	0.320	0.025	0.025	0.490		0.009	General
7-P	Patch	vvp_0055	Endangered	1	no	0.110	0.085	0.085	0.405		0.010	General
131-P	Patch	hsf_0022	Least Concern	0	no	0.390	0.001	0.001	0.550		0.001	General
19-P	Patch	vvp_0647	Endangered	0	no	0.428	0.049	0.049	0.311		0.020	General
18-P	Patch	vvp_0653	Endangered	0	no	0.374	0.025	0.025	0.261		0.009	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
26-P	Patch	hsf_0047	Vulnerable	0	no	0.270	0.048	0.048	0.650	0.422	0.019	503669 Little Pink Spider-orchid *Caladenia rosella*
25-P	Patch	hsf_0047	Vulnerable	1	no	0.360	0.027	0.027	0.650	0.590	0.015	503669 Little Pink Spider-orchid *Caladenia rosella*
23-P	Patch	hsf_0047	Vulnerable	1	no	0.340	0.053	0.053	0.650	0.590	0.029	503669 Little Pink Spider-orchid *Caladenia rosella*
34-P	Patch	hsf_0022	Least Concern	1	no	0.450	0.161	0.161	0.660	0.625	0.118	503669 Little Pink Spider-orchid *Caladenia rosella*
36-P	Patch	hsf_0022	Least Concern	1	no	0.520	0.047	0.047	0.680	0.640	0.040	503669 Little Pink Spider-orchid *Caladenia rosella*
31-P	Patch	hsf_0022	Least Concern	2	no	0.430	0.055	0.055	0.640	0.341	0.032	503669 Little Pink Spider-orchid *Caladenia rosella*
30-P	Patch	hsf_0022	Least Concern	0	no	0.420	0.005	0.005	0.640	0.340	0.003	503669 Little Pink Spider-orchid *Caladenia rosella*
37-P	Patch	hsf_0022	Least Concern	1	no	0.620	0.083	0.083	0.680	0.557	0.080	503669 Little Pink Spider-orchid *Caladenia rosella*
40-P	Patch	hsf_0022	Least Concern	1	no	0.320	0.048	0.048	0.630	0.516	0.024	503669 Little Pink Spider-orchid *Caladenia rosella*
35-P	Patch	hsf_0022	Least Concern	13	no	0.370	0.665	0.665	0.650	0.503	0.370	503669 Little Pink Spider-orchid *Caladenia rosella*
38-P	Patch	hsf_0022	Least Concern	3	no	0.410	0.238	0.238	0.680	0.571	0.154	503669 Little Pink Spider-orchid *Caladenia rosella*
42-P	Patch	hsf_0022	Least Concern	2	no	0.420	0.077	0.077	0.641	0.557	0.051	503669 Little Pink Spider-orchid *Caladenia rosella*
45-P	Patch	hsf_0022	Least Concern	3	no	0.420	0.142	0.142	0.571	0.560	0.093	503669 Little Pink Spider-orchid *Caladenia rosella*
44-P	Patch	hsf_0022	Least Concern	0	no	0.340	0.044	0.044	0.500		0.017	General
47-P	Patch	hsf_0047	Vulnerable	0	no	0.340	0.004	0.004	0.500		0.002	General
51-P	Patch	hsf_0047	Vulnerable	0	no	0.230	0.009	0.009	0.490		0.002	General
58-P	Patch	hsf_0022	Least Concern	1	no	0.310	0.055	0.055	0.490		0.019	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
53-P	Patch	hsf_0022	Least Concern	3	no	0.260	0.233	0.233	0.490		0.068	General
60-P	Patch	hsf_0022	Least Concern	0	no	0.370	0.033	0.033	0.490		0.014	General
57-P	Patch	hsf_0022	Least Concern	1	no	0.460	0.036	0.036	0.490		0.018	General
56-P	Patch	hsf_0022	Least Concern	0	no	0.370	0.085	0.085	0.490		0.035	General
59-P	Patch	hsf_0022	Least Concern	0	no	0.240	0.061	0.061	0.634		0.018	General
55-P	Patch	hsf_0022	Least Concern	0	no	0.170	0.006	0.006	0.490		0.001	General
69-P	Patch	hsf_0022	Least Concern	5	no	0.310	0.140	0.140	0.376		0.045	General
67-P	Patch	hsf_0022	Least Concern	0	no	0.220	0.028	0.028	0.360		0.006	General
72-P	Patch	hsf_0937	Vulnerable	1	no	0.260	0.183	0.183	0.452		0.052	General
62-P	Patch	hsf_0022	Least Concern	2	no	0.330	0.016	0.016	0.360		0.005	General
86-P	Patch	hsf_0022	Least Concern	2	no	0.490	0.033	0.033	0.540		0.018	General
84-P	Patch	hsf_0022	Least Concern	0	no	0.400	0.012	0.012	0.540		0.006	General
80-P	Patch	hsf_0022	Least Concern	1	no	0.490	0.049	0.049	0.540		0.028	General
82-P	Patch	hsf_0022	Least Concern	0	no	0.400	0.030	0.030	0.540		0.014	General
88-P	Patch	hsf_0022	Least Concern	0	no	0.260	0.080	0.080	0.540		0.024	General
1-P	Patch	hsf_0055	Endangered	2	no	0.290	0.099	0.099	0.370		0.030	General
10-P	Patch	vvp_0055	Endangered	3	no	0.270	0.056	0.056	0.480		0.017	General
12-P	Patch	vvp_0047	Vulnerable	0	no	0.230	0.015	0.015	0.480		0.004	General
11-P	Patch	vvp_0047	Vulnerable	0	no	0.230	0.032	0.032	0.480		0.008	General
9-P	Patch	vvp_0055	Endangered	0	no	0.180	0.023	0.023	0.480		0.005	General
8-P	Patch	vvp_0055	Endangered	0	no	0.180	0.022	0.022	0.480		0.004	General
14-P	Patch	vvp_0047	Vulnerable	0	no	0.160	0.059	0.059	0.223		0.009	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
16-P	Patch	hsf_0821	Vulnerable	0	no	0.238	0.035	0.035	0.110		0.007	General
17-P	Patch	hsf_0821	Vulnerable	0	no	0.455	0.282	0.282	0.222		0.118	General
15-P	Patch	hsf_0047	Vulnerable	0	no	0.160	0.027	0.027	0.110		0.004	General
22-P	Patch	hsf_0047	Vulnerable	2	no	0.290	0.084	0.084	0.650	0.590	0.039	503669 Little Pink Spider-orchid *Caladenia rosella*
21-P	Patch	hsf_0047	Vulnerable	2	no	0.290	0.062	0.062	0.650		0.022	General
29-P	Patch	hsf_0022	Least Concern	2	no	0.340	0.056	0.056	0.642	0.342	0.025	503669 Little Pink Spider-orchid *Caladenia rosella*
27-P	Patch	hsf_0047	Vulnerable	0	no	0.310	0.030	0.030	0.650	0.350	0.013	503669 Little Pink Spider-orchid *Caladenia rosella*
33-P	Patch	hsf_0022	Least Concern	3	no	0.280	0.282	0.282	0.640	0.425	0.113	503669 Little Pink Spider-orchid *Caladenia rosella*
201-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.013	0.773		0.003	General
202-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.017	0.780		0.005	General
209-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.019	0.640		0.005	General
210-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.010	0.569		0.002	General
211-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.022	0.550		0.005	General
212-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.026	0.550		0.006	General
213-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.018	0.360		0.004	General
214-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.019	0.360		0.004	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
215-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.012	0.360		0.002	General
216-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.015	0.360		0.003	General
217-ST	Scattered Tree	vvp_0055	Endangered	0	no	0.200	0.031	0.026	0.480		0.006	General
218-ST	Scattered Tree	vvp_0047	Vulnerable	0	no	0.200	0.031	0.019	0.490		0.004	General
219-ST	Scattered Tree	vvp_0047	Vulnerable	0	no	0.200	0.031	0.019	0.490		0.004	General
220-ST	Scattered Tree	vvp_0047	Vulnerable	0	no	0.200	0.031	0.017	0.480		0.004	General
221-ST	Scattered Tree	vvp_0047	Vulnerable	0	no	0.200	0.031	0.016	0.480		0.004	General
222-ST	Scattered Tree	vvp_0055	Endangered	0	no	0.200	0.031	0.031	0.480		0.007	General
223-ST	Scattered Tree	vvp_0047	Vulnerable	0	no	0.200	0.031	0.013	0.480		0.003	General
224-ST	Scattered Tree	vvp_0047	Vulnerable	0	no	0.200	0.031	0.031	0.481		0.007	General
225-ST	Scattered Tree	vvp_0047	Vulnerable	0	no	0.200	0.031	0.031	0.490		0.007	General
226-ST	Scattered Tree	hsf_0055	Endangered	0	no	0.200	0.031	0.031	0.316		0.006	General
227-ST	Scattered Tree	vvp_0055	Endangered	1	no	0.200	0.071	0.063	0.490		0.014	General
228-ST	Scattered Tree	vvp_0055	Endangered	1	no	0.200	0.071	0.063	0.490		0.014	General
229-ST	Scattered Tree	vvp_0055	Endangered	1	no	0.200	0.071	0.041	0.490		0.009	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
230-ST	Scattered Tree	vvp_0055	Endangered	1	no	0.200	0.071	0.046	0.490		0.010	General
231-ST	Scattered Tree	vvp_0055	Endangered	1	no	0.200	0.071	0.045	0.490		0.010	General
232-ST	Scattered Tree	vvp_0055	Endangered	1	no	0.200	0.071	0.049	0.490		0.011	General
233-ST	Scattered Tree	hsf_0055	Endangered	1	no	0.200	0.071	0.071	0.480		0.016	General
234-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.041	0.636		0.010	General
235-ST	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.071	0.056	0.641	0.368	0.015	503669 Little Pink Spider-orchid *Caladenia rosella*
236-ST	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.071	0.028	0.650	0.550	0.009	503669 Little Pink Spider-orchid *Caladenia rosella*
237-ST	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.071	0.045	0.650	0.550	0.014	503669 Little Pink Spider-orchid *Caladenia rosella*
238-ST	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.071	0.057	0.650	0.550	0.018	503669 Little Pink Spider-orchid *Caladenia rosella*
239-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.043	0.654	0.499	0.013	503669 Little Pink Spider-orchid *Caladenia rosella*
240-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.050	0.490		0.011	General
241-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.050	0.490		0.011	General
242-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.071	0.550		0.016	General
243-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.071	0.590		0.017	General
244-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.070	0.190		0.012	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
245-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.071	0.410		0.015	General
246-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.059	0.590		0.014	General
247-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.059	0.590		0.014	General
248-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.066	0.650		0.016	General
249-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.500		0.007	General
250-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.490		0.007	General
251-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.012	0.490		0.003	General
252-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.014	0.490		0.003	General
253-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.012	0.490		0.003	General
254-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.008	0.490		0.002	General
255-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.016	0.490		0.004	General
256-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.016	0.490		0.004	General
257-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.019	0.550		0.004	General
258-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.031	0.550		0.007	General
259-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.013	0.550		0.003	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
260-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.000			0.000	
261-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.029	0.550		0.007	General
262-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.031	0.550		0.007	General
263-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.031	0.550		0.007	General
264-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.029	0.550		0.007	General
265-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.031	0.550		0.007	General
266-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.012	0.550		0.003	General
267-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.004	0.550		0.001	General
268-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.018	0.550		0.004	General
269-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.007	0.550		0.002	General
270-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.020	0.710	0.390	0.006	503669 Little Pink Spider-orchid *Caladenia rosella*
271-ST	Scattered Tree	hsf_0055	Endangered	0	no	0.200	0.031	0.031	0.519		0.007	General
272-ST	Scattered Tree	hsf_0055	Endangered	0	no	0.200	0.031	0.024	0.570		0.006	General
273-ST	Scattered Tree	hsf_0937	Endangered	0	no	0.200	0.031	0.031	0.490		0.007	General
274-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.031	0.538		0.007	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
275-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.022	0.360		0.005	General
276-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.018	0.360		0.004	General
277-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.017	0.360		0.003	General
278-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.028	0.495		0.006	General
279-ST	Scattered Tree	vvp_0047	Vulnerable	0	no	0.200	0.031	0.028	0.480		0.006	General
280-ST	Scattered Tree	vvp_0047	Vulnerable	0	no	0.200	0.031	0.017	0.480		0.004	General
281-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.041	0.650		0.010	General
282-ST	Scattered Tree	hsf_0055	Endangered	1	no	0.200	0.071	0.071	0.480		0.016	General
283-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.071	0.780		0.019	General
284-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.071	0.750		0.019	General
285-ST	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.071	0.071	0.550		0.016	General
286-ST	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.071	0.071	0.550		0.016	General
287-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.049	0.490		0.011	General
288-ST	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.071	0.071	0.514		0.016	General
289-ST	Scattered Tree	hsf_0055	Endangered	1	no	0.200	0.071	0.071	0.570		0.017	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
290-ST	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.071	0.052	0.361		0.011	General
291-ST	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.071	0.071	0.360		0.014	General
292-ST	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.071	0.052	0.410		0.011	General
293-ST	Scattered Tree	hsf_0055	Endangered	1	no	0.200	0.071	0.071	0.570		0.017	General
294-ST	Scattered Tree	vvp_0055	Endangered	1	no	0.200	0.071	0.071	0.490		0.016	General
295-ST	Scattered Tree	hsf_0055	Endangered	1	no	0.200	0.071	0.055	0.550		0.013	General
296-ST	Scattered Tree	vvp_0047	Vulnerable	1	no	0.200	0.071	0.062	0.480		0.014	General
297-ST	Scattered Tree	hsf_0055	Endangered	1	no	0.200	0.071	0.071	0.310		0.014	General
298-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.026	0.360		0.005	General
299-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.026	0.360		0.005	General
300-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.000	0.490		0.000	General
301-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.490		0.007	General
302-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.490		0.007	General
303-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.021	0.490		0.005	General
304-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.540		0.007	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
305-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.401		0.007	General
306-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.021	0.190	0.320	0.005	503669 Little Pink Spider-orchid *Caladenia rosella*
307-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.021	0.190		0.004	General
308-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.019	0.550		0.004	General
309-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.000	0.590		0.000	General
310-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.000			0.000	
311-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.550		0.007	General
312-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.010	0.410		0.002	General
313-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.025	0.590		0.006	General
314-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.004	0.590		0.001	General
315-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.020	0.590		0.005	General
316-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.020	0.590		0.005	General
317-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.021	0.590		0.005	General
318-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.020	0.590		0.005	General
319-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.019	0.590		0.004	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
320-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.019	0.590		0.004	General
321-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.590		0.007	General
322-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.027	0.590		0.007	General
323-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.020	0.650		0.005	General
324-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.009	0.650		0.002	General
325-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.000			0.000	
326-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.003	0.650		0.001	General
327-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.000			0.000	
328-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.007	0.650		0.002	General
329-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.014	0.650		0.004	General
330-ST	Scattered Tree	vvp_0055	Endangered	0	no	0.200	0.031	0.000			0.000	
331-ST	Scattered Tree	vvp_0055	Endangered	0	no	0.200	0.031	0.006	0.490		0.001	General
332-ST	Scattered Tree	vvp_0055	Endangered	0	no	0.200	0.031	0.003	0.490		0.001	General
333-ST	Scattered Tree	vvp_0055	Endangered	0	no	0.200	0.031	0.021	0.490		0.005	General
334-ST	Scattered Tree	vvp_0055	Endangered	0	no	0.200	0.031	0.015	0.490		0.003	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
335-ST	Scattered Tree	hsf_0055	Endangered	0	no	0.200	0.031	0.031	0.371		0.006	General
336-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.025	0.110		0.004	General
337-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.025	0.110		0.004	General
338-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.031	0.110		0.005	General
339-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.016	0.550		0.004	General
340-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.016	0.550		0.004	General
341-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.029	0.592	0.390	0.008	503669 Little Pink Spider-orchid *Caladenia rosella*
342-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.019	0.190	0.320	0.005	503669 Little Pink Spider-orchid *Caladenia rosella*
343-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.021	0.190		0.004	General
344-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.017	0.190	0.320	0.004	503669 Little Pink Spider-orchid *Caladenia rosella*
345-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.018	0.190		0.003	General
346-ST	Scattered Tree	hsf_0055	Endangered	0	no	0.200	0.031	0.031	0.410		0.007	General
347-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.018	0.650		0.004	General
348-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.018	0.650		0.004	General
349-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.031	0.650		0.008	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
350-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.550		0.007	General
351-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.022	0.490		0.005	General
352-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.010	0.490		0.002	General
353-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.019	0.490		0.004	General
354-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.490		0.007	General
355-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.031	0.640	0.340	0.008	503669 Little Pink Spider-orchid *Caladenia rosella*
356-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.015	0.550		0.004	General
357-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.020	0.550		0.005	General
358-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.026	0.490		0.006	General
359-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.018	0.490		0.004	General
360-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.013	0.490		0.003	General
361-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.027	0.490		0.006	General
362-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.030	0.550		0.007	General
363-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.650		0.008	General
364-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.001	0.780		0.000	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
365-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.001	0.780		0.000	General
366-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.029	0.751		0.008	General
367-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.022	0.750		0.006	General
368-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.020	0.750		0.005	General
369-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.019	0.750		0.005	General
370-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.016	0.750		0.004	General
371-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.009	0.750		0.002	General
372-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.013	0.750		0.003	General
373-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.000	0.750		0.000	General
374-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.020	0.750		0.005	General
375-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.750		0.008	General
376-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.780		0.008	General
377-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.360		0.006	General
378-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.360		0.006	General
379-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.009	0.490		0.002	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
380-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.016	0.490		0.004	General
381-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.031	0.490		0.007	General
382-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.025	0.540		0.006	General
383-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.026	0.537		0.006	General
384-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.018	0.490		0.004	General
385-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.014	0.490		0.003	General
386-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.012	0.490		0.003	General
387-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.012	0.490		0.003	General
388-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.022	0.490		0.005	General
389-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.030	0.490		0.007	General
390-ST	Scattered Tree	hsf_0937	Vulnerable	0	no	0.200	0.031	0.031	0.360		0.006	General
391-ST	Scattered Tree	hsf_0937	Vulnerable	0	no	0.200	0.031	0.031	0.360		0.006	General
392-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.016	0.490		0.003	General
393-ST	Scattered Tree	hsf_0047	Vulnerable	0	no	0.200	0.031	0.022	0.490		0.005	General
394-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.022	0.650		0.006	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
395-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.021	0.650		0.005	General
396-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.027	0.650		0.007	General
397-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.010	0.590		0.002	General
398-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.013	0.590		0.003	General
399-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.000	0.590		0.000	General
400-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.000			0.000	
401-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.029	0.490		0.006	General
402-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.016	0.490		0.004	General
403-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.013	0.490		0.003	General
404-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.016	0.490		0.003	General
405-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.018	0.490		0.004	General
406-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.018	0.490		0.004	General
407-ST	Scattered Tree	hsf_0937	Vulnerable	0	no	0.200	0.031	0.031	0.360		0.006	General
408-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.021	0.490		0.005	General
409-ST	Scattered Tree	hsf_0022	Least Concern	0	no	0.200	0.031	0.021	0.490		0.005	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	**Type**	**BioEVC**	**BioEVC conservation status**	**Large tree(s)**	**Partial removal**	**Condition score**	**Polygon Extent**	**Extent without overlap**	**SBV score**	**HI score**	**Habitat units**	**Offset type**
601-ST	Scattered Tree	hsf_0055	Endangered	1	no	0.200	0.071	0.055	0.550		0.013	General

Appendix 2: Information about impacts to rare or threatened species' habitats on site

This table lists all rare or threatened species' habitats mapped at the site.

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
Little Pink Spider-orchid	*Caladenia rosella*	503669	Endangered	Dispersed	Habitat importance map	0.0082
Melbourne Yellow-gum	*Eucalyptus leucoxylon subsp. connata*	504484	Vulnerable	Dispersed	Habitat importance map	0.0027
Wine-lipped Spider-orchid	*Caladenia oenochila*	503694	Vulnerable	Dispersed	Habitat importance map	0.0022
Large-flower Crane's-bill	*Geranium sp. 1*	505342	Endangered	Dispersed	Habitat importance map	0.0013
Slender Stylewort	*Levenhookia sonderi*	501998	Rare	Dispersed	Habitat importance map	0.0013
Brush-tailed Phascogale	*Phascogale tapoatafa*	11017	Vulnerable	Dispersed	Habitat importance map	0.0012
Crimson Spider-orchid	*Caladenia concolor*	504347	Endangered	Dispersed	Habitat importance map	0.0012
Emerald-lip Greenhood	*Pterostylis smaragdyna*	503915	Rare	Dispersed	Habitat importance map	0.0011
Dandenong Wattle	*Acacia stictophylla*	505140	Rare	Dispersed	Habitat importance map	0.0009
Brown Toadlet	*Pseudophryne bibronii*	13117	Endangered	Dispersed	Habitat importance map	0.0008
Eltham Copper	*Paralucia pyrodiscus lucida*	65003	Endangered	Dispersed	Habitat importance map	0.0008
Matted Flax-lily	*Dianella amoena*	505084	Endangered	Dispersed	Habitat importance map	0.0007
Pale-flower Crane's-bill	*Geranium sp. 3*	505344	Rare	Dispersed	Habitat importance map	0.0007
Forest Bitter-cress	*Cardamine papillata*	505034	Vulnerable	Dispersed	Habitat importance map	0.0007
Yarra Gum	*Eucalyptus yarraensis*	501326	Rare	Dispersed	Habitat importance map	0.0005
Arching Flax-lily	*Dianella sp. aff. longifolia (Benambra)*	505560	Vulnerable	Dispersed	Habitat importance map	0.0005
Rosemary Grevillea	*Grevillea rosmarinifolia subsp. rosmarinifolia*	504066	Rare	Dispersed	Habitat importance map	0.0005
Speckled Warbler	*Chthonicola sagittatus*	10504	Vulnerable	Dispersed	Habitat importance map	0.0005
Barking Owl	*Ninox connivens connivens*	10246	Endangered	Dispersed	Habitat importance map	0.0005

Austral Crane's-bill	*Geranium solanderi var. solanderi s.s.*	505337	Vulnerable	Dispersed	Habitat importance map	0.0004
Slender Mint-bush	*Prostanthera saxicola var. bracteolata*	502750	Rare	Dispersed	Habitat importance map	0.0003
Smooth Grevillea	*Grevillea rosmarinifolia subsp. glabella*	501536	Rare	Dispersed	Habitat importance map	0.0003
Tangled Pseudanthus	*Pseudanthus orbicularis*	502760	Rare	Dispersed	Habitat importance map	0.0003
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	10220	Vulnerable	Dispersed	Habitat importance map	0.0003
Square-tailed Kite	*Lophoictinia isura*	10230	Vulnerable	Dispersed	Habitat importance map	0.0002
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	10498	Vulnerable	Dispersed	Habitat importance map	0.0002
Clover Glycine	*Glycine latrobeana*	501456	Vulnerable	Dispersed	Habitat importance map	0.0002
Bearded Dragon	*Pogona barbata*	12177	Vulnerable	Dispersed	Habitat importance map	0.0002
Velvet Apple-berry	*Billardiera scandens s.s.*	504290	Rare	Dispersed	Habitat importance map	0.0002
Golden Sun Moth	*Synemon plana*	15021	Critically endangered	Dispersed	Habitat importance map	0.0002
Leafy Twig-sedge	*Cladium procerum*	500786	Rare	Dispersed	Habitat importance map	0.0002
Swift Parrot	*Lathamus discolor*	10309	Endangered	Dispersed	Habitat importance map	0.0002
Tufted Club-sedge	*Isolepis wakefieldiana*	501789	Rare	Dispersed	Habitat importance map	0.0001
Common Bent-wing Bat (eastern ssp.)	*Miniopterus schreibersii oceanensis*	61342	Vulnerable	Dispersed	Habitat importance map	0.0001
Painted Honeyeater	*Grantiella picta*	10598	Vulnerable	Dispersed	Habitat importance map	0.0001
Growling Grass Frog	*Litoria raniformis*	13207	Endangered	Dispersed	Habitat importance map	0.0001
White-throated Needletail	*Hirundapus caudacutus*	10334	Vulnerable	Dispersed	Habitat importance map	0.0001
Lace Monitor	*Varanus varius*	12283	Endangered	Dispersed	Habitat importance map	0.0001
Southern Toadlet	*Pseudophryne semimarmorata*	13125	Vulnerable	Dispersed	Habitat importance map	0.0001
Powerful Owl	*Ninox strenua*	10248	Vulnerable	Dispersed	Habitat importance map	0.0001

Plump Swamp Wallaby-grass	*Amphibromus pithogastrus*	503624	Endangered	Dispersed	Habitat importance map	0.0001
Western Golden-tip	*Goodia medicaginea*	501518	Rare	Dispersed	Habitat importance map	0.0000
Purple Blown-grass	*Lachnagrostis punicea subsp. punicea*	504206	Rare	Dispersed	Habitat importance map	0.0000
Swamp Fireweed	*Senecio psilocarpus*	504659	Vulnerable	Dispersed	Habitat importance map	0.0000
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0000
Common Dunnart	*Sminthopsis murina murina*	11061	Vulnerable	Dispersed	Habitat importance map	0.0000
Australian Little Bittern	*Ixobrychus dubius*	10195	Endangered	Dispersed	Habitat importance map	0.0000
Floodplain Fireweed	*Senecio campylocarpus*	507136	Rare	Dispersed	Habitat importance map	0.0000
Lewin's Rail	*Lewinia pectoralis pectoralis*	10045	Vulnerable	Dispersed	Habitat importance map	0.0000
Australasian Shoveler	*Anas rhynchotis*	10212	Vulnerable	Dispersed	Habitat importance map	0.0000
Hardhead	*Aythya australis*	10215	Vulnerable	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Baillon's Crake	*Porzana pusilla palustris*	10050	Vulnerable	Dispersed	Habitat importance map	0.0000
Small Scurf-pea	*Cullen parvum*	502773	Endangered	Dispersed	Habitat importance map	0.0000
Plains Yam-daisy	*Microseris scapigera s.s.*	504657	Vulnerable	Dispersed	Habitat importance map	0.0000
Annual Fireweed	*Senecio glomeratus subsp. longifructus*	507144	Rare	Dispersed	Habitat importance map	0.0000

Habitat group

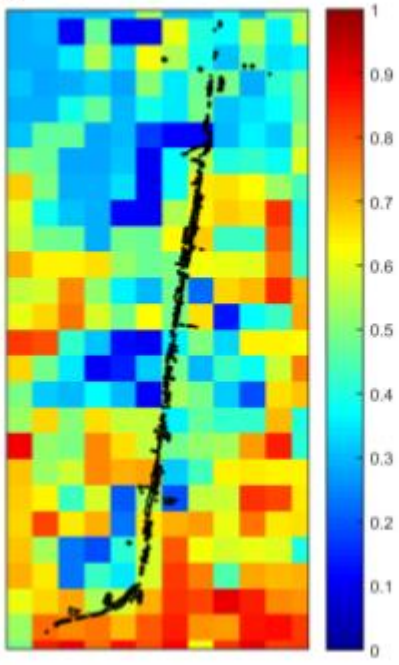
- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

Habitat impacted

- Habitat importance maps are the maps defined in the Guidelines that include all the mapped habitat for a rare or threatened species
- Top ranking maps are the maps defined in the Guidelines that depict the important areas of a dispersed species habitat, developed from the highest habitat importance scores in dispersed species habitat maps and selected VBA records
- Selected VBA record is an area in Victoria that represents a large population, roosting or breeding site etc.

Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map



3. Aerial photograph showing mapped native vegetation

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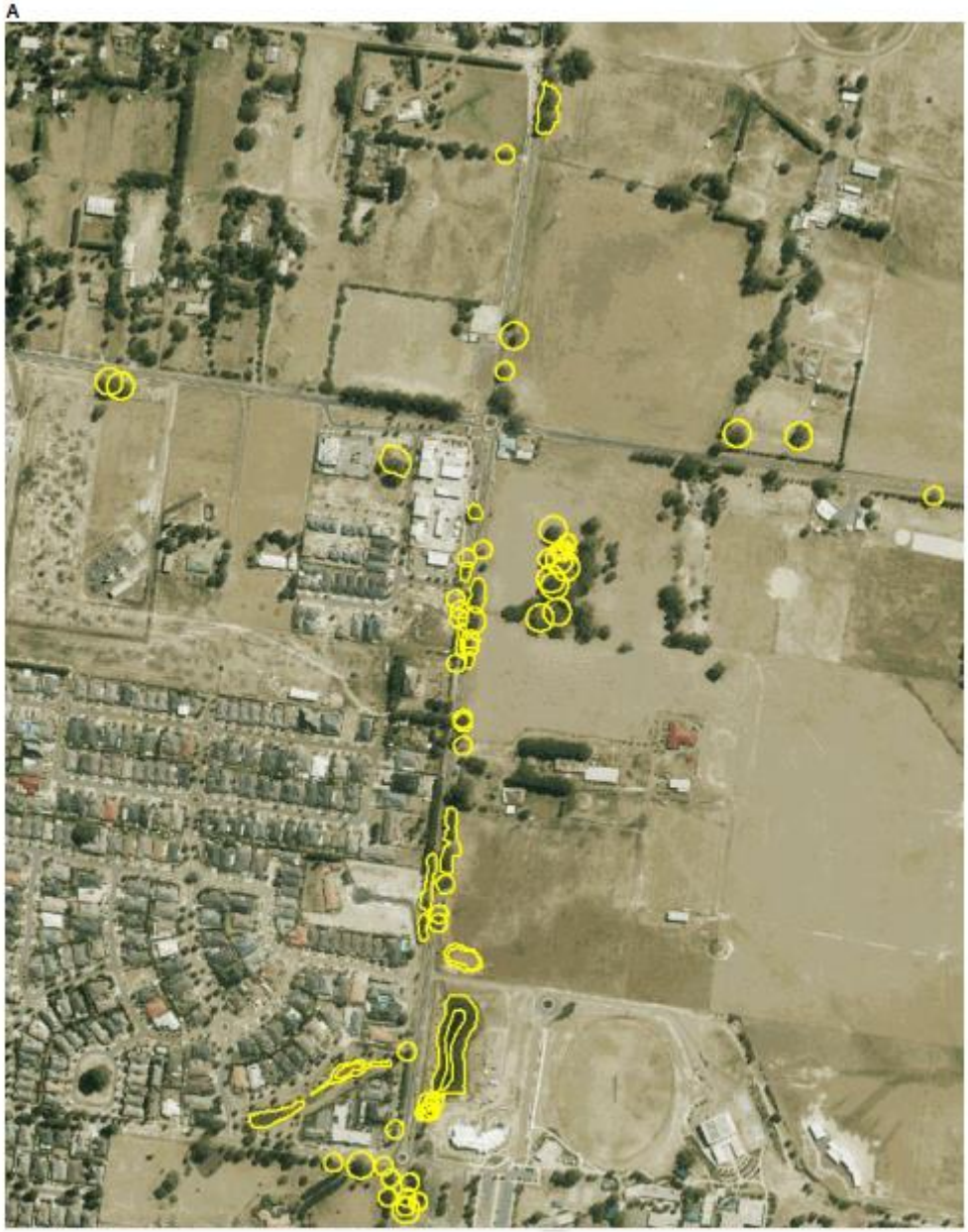

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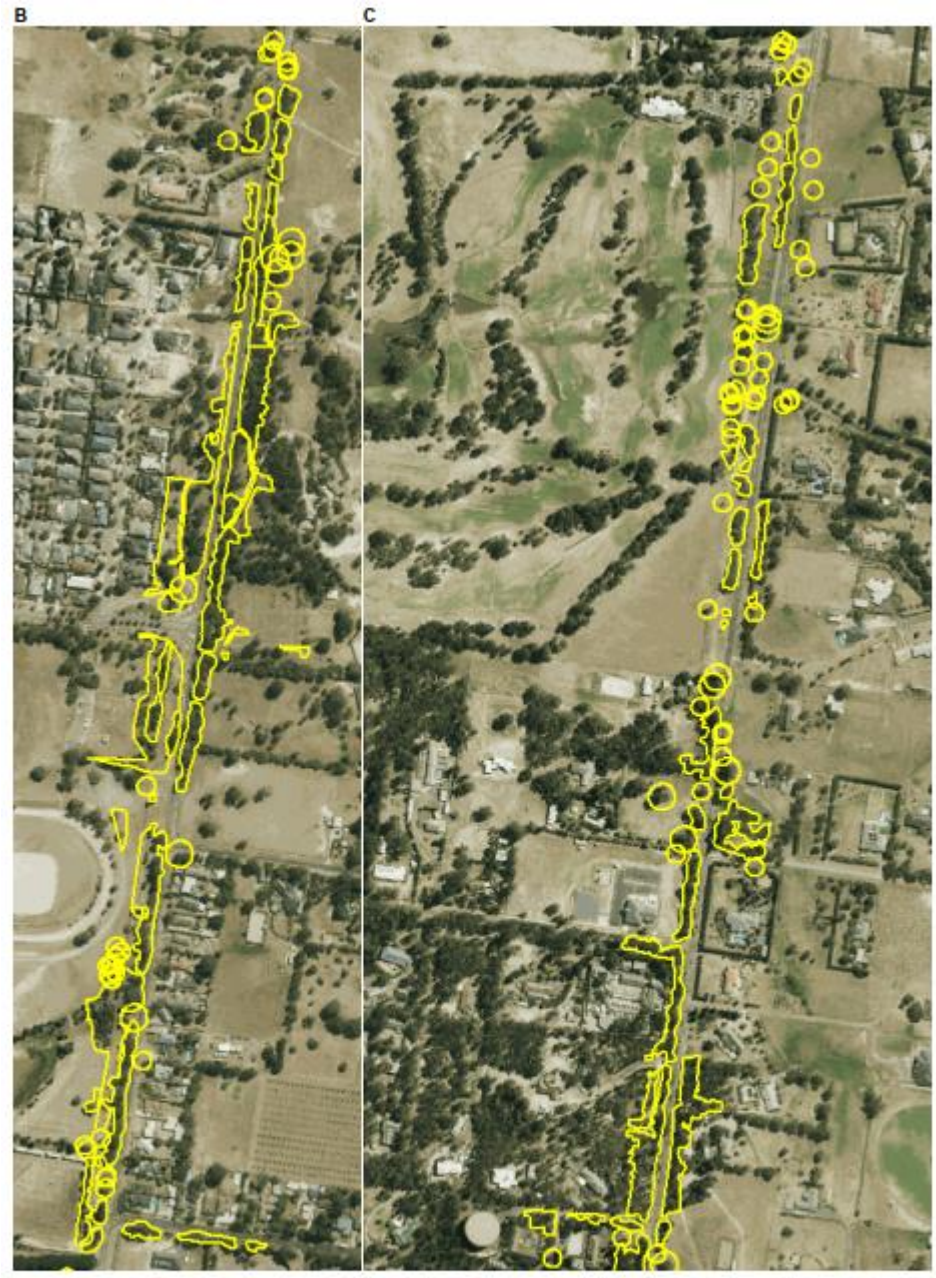

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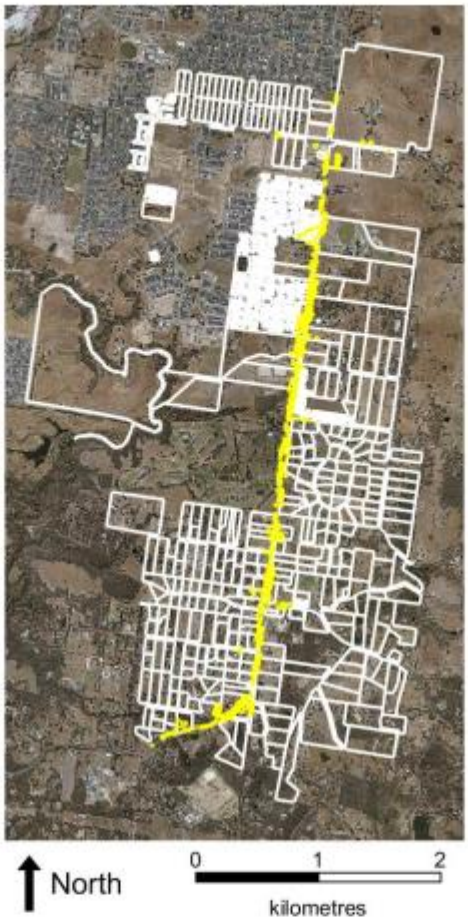
4. Map of the property in context



Yellow boundaries denote areas of proposed native vegetation removal.

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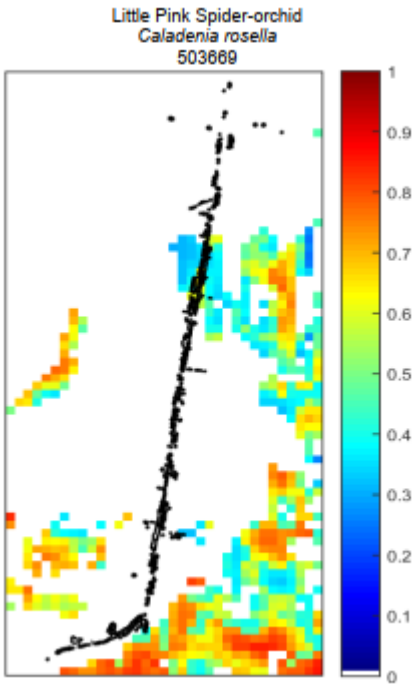
4. Habitat importance maps



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Report of available native vegetation credits

This report lists native vegetation credits available to purchase through the Native Vegetation Credit Register.

This report is **not evidence** that an offset has been secured. An offset is only secured when the units have been purchased and allocated to a permit or other approval and an allocated credit extract is provided by the Native Vegetation Credit Register.

Date and time: 30/07/2020 12:58 **Report ID: 5151**

What was searched for?

Species offset

Common Name (*Scientific name*)		Species habitat units
Little Pink Spider-orchid *(Caladenia rosella)*		1.86
with number of large trees	0	

Details of available native vegetation credits on 30 July 2020 12:58

These sites meet all your requirements for species offsets.

Credit Site ID	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
VC_CFL-3016_01	36	Port Phillip And Westernport	Yarra Ranges Shire	Yes	Yes	No	VegLink

Species common name	Species scientific name	SHU
Little Pink Spider-orchid	Caladenia rosella	2.088

These sites meet some of your requirements for species offsets, you may be able to meet all your requirements across multiple sites.

Credit Site ID	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)

There are no sites listed in the Native Vegetation Credit Register that meet some of your offset requirements.

These potential sites are not yet available, land owners may finalise them once a buyer is confirmed.

Credit Site ID	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)

There are no potential sites listed in the Native Vegetation Credit Register that meet your offset requirements.

LT - Large Trees *CMA - Catchment Management Authority* *LGA - Municipal District or Local Government Authority*

Next steps

If applying for approval to remove native vegetation
Attach this report to an application to remove native vegetation as evidence that your offset requirement is currently available.

If you have approval to remove native vegetation
Below are the contact details for all brokers. Contact the broker(s) listed for the credit site(s) that meet your offset requirements. These are shown in the above tables. If more than one broker or site is listed, you should get more than one quote before deciding which offset to secure.

Broker contact details

Broker Abbreviation	Broker Name	Phone	Email	Website
Abezco	Abzeco Pty. Ltd.	(03) 9431 5444	offsets@abzeco.com.au	www.abzeco.com.au
Baw Baw SC	Baw Baw Shire Council	(03) 5624 2411	bawbaw@bawbawshire.vic.gov.au	www.bawbawshire.vic.gov.au
Bio Offsets	Biodiversity Offsets Victoria	0452 161 013	info@offsetsvictoria.com.au	www.offsetsvictoria.com.au
Contact NVOR	Native Vegetation Offset Register	136 186	nativevegetation.offsetregister@delwp.vic.gov.au	www.environment.vic.gov.au/native-vegetation
Ecocentric	Ecocentric Environmental Consulting	0410 564 139	ecocentric@me.com	Not avaliable
Ethos	Ethos NRM Pty Ltd	(03) 5153 0037	offsets@ethosnrm.com.au	www.ethosnrm.com.au
Nillumbik SC	Nillumbik Shire Council	(03) 9433 3316	offsets@nillumbik.vic.gov.au	www.nillumbik.vic.gov.au
TFN	Trust for Nature	8631 5888	offsets@tfn.org.au	www.trustfornature.org.au
VegLink	Vegetation Link Pty Ltd	(03) 5470 5232	offsets@vegetationlink.com.au	www.vegetationlink.com.au
Yarra Ranges SC	Yarra Ranges Shire Council	1300 368 333	biodiversityoffsets@yarraranges.vic.gov.au	www.yarraranges.vic.gov.au

local people
global experience

SMEC is recognised for providing technical excellence and consultancy expertise in urban, infrastructure and management advisory. From concept to completion, our core service offering covers the life-cycle of a project and maximises value to our clients and communities. We align global expertise with local knowledge and state-of-the-art processes and systems to deliver innovative solutions to a range of industry sectors.