3. Attachment C – Ecological Assessment for a Proposed Quarry on Sanders Road, Garfield, Victoria

ecology & heritage partners

Final Report

Ecological Assessment for a Proposed Quarry on Sanders Road, Garfield, Victoria

Prepared for

Hanson Construction Materials Pty Ltd

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Ecology and Heritage Partners Pty Ltd

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GLOSSARY

Acronym	Description
AVW	Atlas of Victorian Wildlife
CaLP	*Catchment and Land Protection Act 1994*
CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authority
CMP	Conservation Management Plan
DBH	Diameter at Breast Height
DEPI	Victorian Department of Environment and Primary Industries
DoE	Federal Department of the Environment
DTPLI	Victorian Department of Transport, Planning and Local Infrastructure
EES	Environment Effects Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988*
FIS	Flora Information System
HabHa	Habitat Hectare
LOT	Large Old Tree
NES	National Environmental Significance
NVIM Tool	Native Vegetation Information Management Tool (DEPI)
PMST	Protected Matters Search Tool (DoE)
TRZ	Tree Retention Zone
VBA	Victorian Biodiversity Atlas (DEPI)

SUMMARY

Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by Hanson Construction Materials Pty Ltd to conduct an Ecological Assessment at a Proposed Quarry on Sanders Road, Garfield, Victoria. This assessment was undertaken to identify and characterise the vegetation and habitats on-site, to determine the presence (or likelihood thereof) of any significant flora and fauna species and/or ecological communities, and to address any implications under Commonwealth and State environmental legislation.

Methods

A field assessment was undertaken on 27 October and 3 November 2014 to obtain information on terrestrial flora and fauna values within the study area. A habitat hectare assessment was undertaken in conjunction with the flora survey. Vegetation within the study area was assessed in accordance with the habitat hectare methodology, which is described in the Vegetation Quality Assessment Manual.

Results

Flora

A total of 145 flora species (94 indigenous and 51 non-indigenous) were recorded within the study area during the field assessment. No significant flora species were recorded during the site assessment; however there is suitable habitat within the study area for flora species of national (Green-striped Greenhood and Strzelecki Gum) and State (Green Scentbark, Long Pink-bells, Marsh Sun-orchid, and Swamp Bush-pea) conservation significance.

Fauna

Eighty-one fauna species were recorded within the study area during the field assessment, including: seven mammals (five native, two introduced), 71 birds (64 native, seven introduced) and three native frogs. There is suitable habitat within the study area for fauna species of national (Southern Brown Bandicoot, Australasian Bittern, Growling Grass Frog and Dwarf Galaxias,), State (White-footed Dunnart, Greater Glider, Black Bittern, Lewin's Rail, Baillon's Crake, Masked Owl, Powerful Owl, Barking Owl, Sooty Owl, Southern Toadlet and Swamp Skink) and regional (Latham's Snipe) conservation significance.

Communities

Vegetation within the study area did not meet the condition thresholds that define any significant ecological communities.

Permitted Clearing Assessment (the Guidelines)

Based on DEPI's NVIM Tool (DEPI 2014b) and BIOR report (Appendix 4), the study area is situated in Location A with 46.378 hectares (comprising 44.337 hectares of remnant patch vegetation, and 29 scattered trees) of native vegetation proposed to be impacted as part of the proposed quarry development (Appendix 4). As such, the permit application falls under the Moderate Risk-based pathway. The offset requirement for native vegetation removal is 0.009 General Biodiversity Equivalence Units (BEU) and 33.712 specific BEUs for Spotted Gum, 37.491 specific BEUs for Cobra Greenhood, and 37.347 specific BEUs for Green Scentbark.

Legislative and Policy Implications

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act - Federal)

There is suitable habitat within the study area for two flora species (Green-striped Greenhood, Strzelecki Gum) and five fauna species (Southern Brown Bandicoot, Australasian Bittern, Latham's Snipe, Growling Grass Frog and Dwarf Galaxias,) listed under the EPBC Act. Based on likely impacts to Dwarf Galaxias, potential impacts to Australasian Bittern, Latham's Snipe (and Green-striped Greenhood, Southern Brown Bandicoot and Growling Grass Frog pending the results of targeted surveys), a referral to the Commonwealth Environment Minister will be required.

Flora and Fauna Guarantee Act 1988 (FFG Act - Victoria)

There is suitable habitat within the study area for several species listed or protected under the FFG Act. However, the study area is privately owned, as such a permit under the FFG Act is not required.

Environment Effects Act 1978 (Victoria)

Based on the current development plan, vegetation proposed to be removed and other associated impacts, the development may trigger the requirement for an Environment Effects Statement (EES). A referral under the *Environment Effects Act 1978* should be considered to ensure that all environmental impacts are considered and mitigated in an appropriate manner prior to development.

Mineral Resources (Sustainable Development) Act 1990 (MRSD Act)

A work plan will need to be prepared as the proposed development does not meet any of the exemptions listed under the Act. In order for a Work Plan to be approved by DEPI, the Department must be satisfied of "all necessary planning consents and approvals" including where Victoria's native vegetation policy requires action has been addressed.

Planning and Environment Act 1987

The clearing of native vegetation for extractive industries is exempt from the requirement for a planning permit subject to an assessment as part of the work plan approval process (MRSD Act). The removal of native vegetation for the Earth Resources Industry (ERI) is regulated through the Mining and Extractive Industry Work Approvals Process. A Memorandum of Understanding (MoU) between the former DSE and DPI recognises that native vegetation should be offset in accordance with the relevant State policy (i.e. the Guidelines).

Other Legislation and Policy

Implications relating to other State Government policy (e.g. *Wildlife Act 1975*, *Catchment and Land Protection Act 1994*) along with additional assessments or reporting that may be required (e.g. targeted surveys, Conservation Management Plan, Weed Management Plan, Construction Environment Management Plan) are provided in Section 8.

Additional Surveys

Given the presence of potentially suitable habitat for nationally significant species (i.e. EPBC Act-listed species), targeted surveys are required to determine the presence or absence of these species within the study area. If one or more of these species are present an assessment of the species' likely use of the study area (extent or distribution across, and/or adjacent to the study area), the abundance and importance of the

habitats within the study area for the species, and the likely or potential impacts to the species associated with the proposed development is required.

Although surveys for State and regionally significant species are not a legislative requirement, there is a requirement for DEPI to consider all state matters listed under the FFG Act as part of the planning and assessment approval process. There is also a possibility that the project will trigger the Environment Effects Act and be assessed under an EES, in which case such surveys are likely to be required. As such, targeted surveys for significant flora and fauna species that have the potential to use habitat resources within the study area, either as residents or visitors on a regular, occasional or rare basis is recommended. Targeted surveys should be undertaken as part of the planning and assessment of the proposed development for the following species:

- Nationally significant flora species (Green-striped Greenhood and Strzelecki Gum) and fauna (Southern Brown Bandicoot, Australasian Bittern, Growling Grass Frog and Dwarf Galaxias).
- State-significant flora (Green Scentbark, Long Pink-bells, Marsh Sun-orchid and Swamp Bush-pea) and fauna species (i.e. White-footed Dunnart, Greater Glider, Black Bittern, Lewin's Rail, Baillon's Crake, Masked Owl, Powerful Owl, Barking Owl, Sooty Owl, Southern Toadlet and Swamp Skink); and,
- Regionally significant fauna species (Latham's Snipe) and microbats.

Table S1. Application requirements for a permit to remove native vegetation (*Victoria Planning Provisions* Clause 52.17 -3; DEPI 2013a)

No.	Application Requirement	Response
Application requirements for Moderate risk pathway applications:		
1	The location of the site of native vegetation to be removed.	Refer to Section 1.3.
2	A description of the native vegetation to be removed, including the area of the patch of native vegetation and/or the number of any scattered trees to be removed.	Refer to Section 3.2.
3	Maps or plans containing information set out in the Guidelines, (Department of Environment and Primary Industries, September 2013)	Refer to Figures and BIOR report (Appendix 4.1).
4	Recent dated photographs of the native vegetation to be removed.	Refer to Section 3.
-	Topographic information, highlighting ridges, crests and hilltops, streams and waterways, slopes of more than 20 percent, drainage lines, low lying areas, saline discharge areas, and areas of existing erosion.	Refer to Section 1.3, Figure 2.
5	The risk-based pathway of the application to remove native vegetation.	Refer to Section 4.
6	Where the purpose of removal, destruction or lopping of native vegetation is to create defendable space, a statement is required that explains why removal, destruction or lopping of native vegetation is necessary. The statement must have regard to other available bushfire risk mitigation measures. This requirement does not apply to the creation of defendable space in conjunction with an application under the Bushfire Management Overlay.	Not applicable.
7	A copy of any property vegetation plan that applies to the site.	Not applicable.
8	Details of any other native vegetation that was permitted to be removed on the same property with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before the application to remove native vegetation is lodged.	Not applicable.
9	The strategic biodiversity score of the native vegetation to be removed.	Refer to Section 4 and BIOR report (Appendix 4.1).
10	The offset requirements should a permit be granted to remove native vegetation.	Refer to Section 4.2 and BIOR report (Appendix 4.1).
11	A habitat hectare assessment of the native vegetation to be removed.	Refer to Section 4 and BIOR report (Appendix 4.1).
12	A statement outlining what steps have been taken to minimise the impacts of the removal of native vegetation on biodiversity.	Refer to Section 7.1.
13	An assessment of whether the proposed removal of native vegetation will have a significant impact on Victoria's biodiversity, with specific regard to the proportional impact on habitat for any rare or threatened species.	Refer to Section 7.1.
14	An offset strategy that details how a compliant offset will be secured to offset the biodiversity impacts of the removal of native vegetation.	Refer to Section 7.2.1.1.

CONTENTS

1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by Hanson Construction Materials Pty Ltd (Hanson) to conduct a Ecological Assessment at Proposed Quarry on Sanders Road, Garfield, Victoria. The study area is proposed to be developed as a hard rock extractive quarry, with production anticipated to reach approximately two million tonnes of hard rock per annum. .

Previous flora assessment and fauna assessments have been undertaken across the proposed quarry site (Ecology Australia Pty Ltd 2009; Ecology Partners Pty Ltd 2008). However, a planning permit application to develop the site has not been prepared, and given the time that has passed since the previous assessments (i.e. nearly 5 years), it was considered prudent to undertake an additional assessment to obtain up to date information on the extent and significance of ecological values within the study area as part of the proposed development.

The purpose of this assessment was to identify the current extent and type of remnant native vegetation and fauna habitat present within the study area, and to determine the likely or potential presence of significant flora and fauna species and/or ecological communities. The following presents the results of the assessment and discusses the likely or potential ecological and legislative implications associated with the proposed development. Recommendations to avoid and minimise direct and indirect impacts to ecological values, along with the requirement for further targeted surveys for significant species are also provided.

1.2 Scope and Objectives

The objectives of the ecological assessment were to:

- Review the previous ecological assessments;
- Review the relevant flora and fauna databases and available literature;
- Conduct a detailed site assessment to identify flora and fauna values within the study area;
- Provide figures showing areas of remnant native vegetation and locations of any significant flora and fauna species, and/or fauna habitat;
- Classify any flora and fauna species and vegetation communities identified or considered likely to occur within the study area in accordance with Commonwealth and State legislation;
- Provide information with respect to environmental legislation and policy that is relevant to the proposed development;
- Document any opportunities and constraints associated with the proposed development; and,
- Advise whether any additional flora and/or fauna surveys are required as part of the planning and approval of the proposed quarry (e.g. targeted surveys for significant flora and fauna species).

Where areas of remnant native vegetation are present within the study area, the following was undertaken to address requirements under the 'Permitted clearing of native vegetation - Biodiversity Assessment Guidelines' (the Guidelines) (DEPI 2013a):

- A habitat hectare assessment of any areas of remnant native vegetation within the study area;
- Recommendations to address requirements under the Guidelines (DEPI 2013a) to avoid and/or minimise impacts to remnant vegetation; and,
- Provision of offset targets for any native vegetation, scattered trees and habitat for significant species proposed to be impacted as a result of the proposed development.

1.3 Study Area

The study area is located on the southern side of Sanders Road between Wallaby Court and Tonimbuk Road, approximately 80 kilometres east of Melbourne's CBD (Figure 1). The site covers approximately 157 hectares and is bound by Sanders Road to the north, private agricultural land to the south and east, and partially bound by private property and Wallaby Court to the west. Adjoining the western boundary of the study area is approximately 120 hectares of remnant vegetation comprising privately owned land, and the Mt Cannibal Flora and Fauna Reserve.

The study area is privately-owned and has previously been subject to extensive vegetation clearance in the northern half for farming and grazing purposes. The majority of the land to the north and south of the study area is also predominantly used for farming and/or grazing purposes. Land to the east and west are forested private properties with a pine plantation along part of the eastern boundary. There are 12 artificial wetlands/dams scattered throughout the study area, with a large wetland existing directly south of the southern study area boundary (Figure 2).

A tributary of Two Mile Creek runs to the north of Sanders Road and south of the study area (Figure 2). A tributary of Cannibal Creek extends through the south-western portion of the study area, and joins Cannibal Creek approximately one kilometre to the south of the site. Two Mile Creek and Cannibal Creek join the Bunyip River to the east of the study area.

The property varies topographically from a height of 150 metres above sea level (a.s.l) along a ridge in the north-central portion of the study area, down to 90 metres a.s.l in the south-west, and far north of the study area, and 80 metres to the far east.

According to the Department of Environment and Primary Industries (DEPI) Biodiversity Interactive Map (DEPI 2014a), the study area occurs within the Highlands – Southern Fall bioregion. It is located within the jurisdiction of the Port Phillip and Westernport Catchment Management Authority (CMA) and the Cardinia Shire Council municipality. The planning scheme zoning and overlays relevant to the study area are provided below (Section 6.5.1).

2 METHODS

2.1 Nomenclature

Common and scientific names of vascular plants follow the Victorian Biodiversity Atlas (VBA) (DEPI 2014b) and the Census of Vascular Plants of Victoria (Walsh and Stajsic 2007). Vegetation community names follow DEPI's Ecological Vegetation Classes (EVC) benchmarks (DEPI 2014c). The names of aquatic and terrestrial vertebrate and invertebrate fauna follow the VBA (DEPI 2014b).

2.2 Desktop Assessment

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

- The DEPI Biodiversity Interactive Map (DEPI 2014a) for:
    - modelled data for location risk, remnant vegetation patches, scattered trees and habitat for rare or threatened species;
    - the extent of historic and current EVCs; and,
    - the location of sites of biological significance (BioSites) within the region.
- The VBA (DEPI 2014b), Flora Information System (FIS) (Viridans 2013a) and Atlas of Victorian Wildlife (AVW) (Viridans 2013b) for previously documented flora and fauna records within the project locality;
- The Federal Department of the Environment (DoE) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DoE 2014);
- The Victorian Department of Transport, Planning and Linear Infrastructure Planning Maps Online to ascertain current zoning and environmental overlays (DTPLI 2014);
- Aerial photography of the study area;
- Relevant environmental legislation and policies; and,
- Previous ecological assessments within the study area:
    - Ecology Australia Pty Ltd 2009; and,
    - Ecology Partners Pty Ltd 2008.

2.3 Ecological Assessment

An ecological assessment comprising a total of four person days was undertaken by two qualified ecologists on 27 October and 3 November 2014 to obtain information on ecological values within the study area. The study area was assessed, with all observed flora species recorded, any significant records mapped and the overall condition of vegetation noted. Remnant vegetation in the local area was also investigated to assist in

determining the pre-European vegetation within the study area. EVCs were determined with reference to DEPI pre-1750 and extant EVC mapping and their published descriptions (DEPI 2014c).

The study area was visually assessed for fauna and active searching under and around ground debris for reptiles, frogs and small mammals was undertaken. Binoculars were also used to scan the area for birds, and observers listened for calls and searched for other signs of fauna such as nests, remains of dead animals, droppings and footprints. Potential habitat for fauna was assessed, with a particular emphasis on habitats that may provide shelter, food or other resources for significant species.

The significance assessment criteria of taxa and vegetation communities are presented in Appendix 1.

2.4 Permitted Clearing Assessment (the Guidelines)

2.4.1 Risk-based Pathway

The planning system manages the impacts on biodiversity from native vegetation removal using a risk-based approach. Two factors – extent risk and location risk – are used to determine the risk associated with an application for a permit to remove native vegetation (Table 1). The extent risk is determined by the extent of native vegetation (in hectares) or the number of scattered trees that are proposed to be removed. The location risk (A, B or C) has been determined for all areas in Victoria and is available on DEPI's Native Vegetation Information Management (NVIM) Tool (DEPI 2014d). The risk-based pathway is determined by combining the extent risk and the location risk of the vegetation to be removed (Table 1). If the risk-based pathway for vegetation differs to that for scattered trees, the higher of the two must be applied.

Table 1. Risk-based pathways for applications to remove native vegetation (DEPI 2013a)

Extent*		Location		
		A	B	C
Native Vegetation	< 0.5 hectares	Low	Low	High
	≥ 0.5 hectares and < 1 hectare	Low	Moderate	High
	≥ 1 hectare	Moderate	High	High
Scattered Trees	< 15 scattered trees	Low	Moderate	High
	≥ 15 scattered trees	Moderate	High	High

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

2.4.2 Vegetation Assessment

The 'habitat hectare' is a unit of measurement which combines the condition and extent of native vegetation. The methodology for undertaking a habitat hectare assessment is described in the Vegetation Quality Assessment Manual (DSE 2004) and summarised in Table 2. Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'. Under the Biodiversity Assessment Guidelines, native vegetation is classified into two categories, remnant patches of native vegetation and scattered trees (Table 2).

For Moderate and High Risk-based pathways the extent (in hectares) and condition score are calculated based on a detailed habitat hectare assessment conducted by a qualified ecologist.

Table 2. Assessment of remnant native vegetation under Moderate and High Risk-based pathways (DEPI 2013a)

Category	Definition	Extent	Condition
Remnant patch of native vegetation	An area of native vegetation where at least 25 per cent of the total perennial understorey plant cover is native plants. OR An area with three or more native canopy trees where the canopy foliage cover is at least 20 per cent of the area.	Measured in hectares. Based on hectare area of the remnant patch.	Vegetation Quality Assessment Manual (DSE 2004).
Scattered tree	A native canopy tree that does not form part of a patch.	Measured in hectares. Each scattered tree is assigned an extent of 0.071 hectares (30m diameter).	Scattered trees are assigned a default condition score of 0.2.

2.4.3 Avoid and Minimise

Avoid and minimise requirements are summarised in Table 3. The impact avoidance and minimisation measures are discussed in Section 7.

Table 3. Avoid, minimise and offset requirements

Risk-based Pathway	Avoid	Minimise	Offset
Low	X	X	✓
Moderate	X	✓	✓
High	✓*	✓	✓

*Where native vegetation makes a significant contribution to Victoria's biodiversity

2.4.4 Offset

When the removal of native vegetation has a significant impact on habitat for a rare or threatened species[1], the offset must compensate for the removal of that species' habitat. Offsets are divided into two categories: General and Specific. General offsets are based on the contribution a site makes to biodiversity overall, while Specific offsets consider the contribution a site makes to the persistence of rare or threatened species.

General offsets require an offset multiplier (Risk Factor) of 1.5 with restrictions on location (same Catchment Management Authority boundary or municipal district) and biodiversity value (strategic biodiversity score at least 80% that of the vegetation to be removed). A Specific offset requires an offset multiplier of 2, with no location or biodiversity value restrictions, and must support habitat for each rare or threatened species for which an offset is required (currently designated by DEPI).

The tools used to determine offset obligations are summarised in Appendix 1.5.1, and offset site criteria are summarised in Appendix 1.5.2.

[1] Only species listed as 'critically endangered', 'endangered', 'vulnerable' or 'rare' on DEPI's advisory lists (DEPI 2014e; DSE 2013) for flora and fauna are considered a rare or threatened species.

2.4.5 Biodiversity Impact and Offset Requirements (BIOR) Report

The offset requirements for native vegetation removal are calculated by DEPI, based on the vegetation condition scores determined during the biodiversity assessment. The resulting Biodiversity Impact and Offset Requirements report (BIOR) produced by DEPI is presented in Appendix 4.

2.5 Assessment Qualifications and Limitations

Data and information held within the ecological databases and mapping programs reviewed in the desktop assessment (e.g. VBA, PMST, Biodiversity Interactive Maps etc.) are unlikely to represent all flora and fauna observations within, and surrounding, the study area. It is therefore important to acknowledge that a lack of documented records does not necessarily indicate that a species or community is absent, but instead may reflect a lack of survey effort.

The 'snap shot' nature of a standard ecological assessment reduces the likelihood of mobile, migratory, seasonal, cryptic, nocturnal or uncommon species being detected. Generally, targeted or repeated surveys, at specific times of the year, are required to detect such species, and to assess the relative use and importance of habitats within the study area.

Notwithstanding the above, terrestrial ecological data collected during the current and previous (Ecology Australia Pty Ltd 2009; Ecology Partners Pty Ltd 2008) field assessments, and information obtained from relevant sources (e.g. biological databases and relevant literature) are considered suitable to provide an accurate assessment of the preliminary ecological values within the study area.

3 RESULTS

3.1 Flora and Fauna

A total of 145 flora species (94 indigenous and 51 non-indigenous) were recorded within the study area during the field assessment. A consolidated list of flora species recorded is provided below (Appendix 2.1). Planted trees and shrubs were not recorded unless they were seen to be naturally spreading on site.

Eighty-one fauna species were recorded within the study area during the field assessment, including: seven mammals (five native, two introduced), 71 birds (64 native, seven introduced) and three native frogs. A consolidated list of fauna species recorded is provided below (Appendix 3.1).

3.2 Existing Conditions

The assessment recorded three remnant EVCs within the study area: Riparian Scrub (EVC 191), Herb-rich Foothill Forest (EVC 23), and Lowland Forest (EVC 16). This assessment is broadly consistent the previous flora assessment (Ecology Partners Pty Ltd 2008) and with extant (2005) DEPI mapping that shows these areas contain Riparian Scrub (EVC 191), Herb-rich Foothill Forest (EVC 23), Lowland Forest (EVC 16), and Damp Heathy Woodland (EVC 793) (DEPI 2014a).

The study area supports five broad vegetation and habitat types: Forest, shrubland, scattered trees, artificial dams and introduced grassland. These are discussed in further detail below.

3.2.1 Forest

3.2.1.1 Vegetation Condition

Much of the remnant native vegetation within the study area is dominated by forest, located throughout the western and southern portions of the property (Figure 2; Plate 1 - 2). Based on the field assessment, forest vegetation within the study area is consistent with Herb-rich Foothill Forest and Lowland Forest EVCs.

Herb-rich Foothill Forest

Herb-rich Foothill Forest is typically an open forest with an understorey supporting shrubs and bracken with a diversity of grasses and herbs (Oates and Taranto 2001). The overstorey is typically dominated by Messmate Stringybark *Eucalyptus obliqua* and Narrow-leaf Peppermint *Eucalyptus radiata*, however several other eucalypt species can also occur (Oates and Taranto 2001). It generally occurs on relatively fertile, well-drained soils in foothill areas with moderate rainfall (Oates and Taranto 2001).

Herb-rich Foothill Forest is the dominant EVC within the study area and generally occurs south of the ridge line on the south-facing slopes (Figure 2). Although Messmate Stringybark and Narrow-leaf Peppermint are present, the dominant overstorey species is Mountain Grey-gum *E. cypellocarpa*. The understorey component ranges from dominance by shrubs, herbs and native grasses to introduced pasture grasses (Plate 1). Typical native species present in the understory include Austral Bracken *Pteridium* esculentum, Hop Goodenia *Goodenia ovata*, Prickly Moses *Acacia verticillata*, Weeping Grass *Microlaena stipoides var. stipoides*, Wattle Mat Rush *Lomandra filiformis*, Common Heath *Epacris impressa*, Bog Sedge *Schoenus apogon*, and Dusty Miller *Spyridium parvifolium*.

A small thin strip running north-south in the central part of the area (HrFF h – Figure 2) comprises a planted overstorey component (as evidenced by the straight row of trees and established irrigation line). Therefore, the overstorey component of this patch was discounted as part of the habitat hectare assessment.

Lowland Forest

Lowland Forest is typically an open forest dominated by Messmate Stringybark and Narrow-leaf Peppermint with an understorey of shrubby ericoid species, saw-sedges and wire-grasses (Oates and Taranto 2001). It generally occurs within lowland plains and lower foothill slopes on moderately fertile soils (Oates and Taranto 2001).

Lowland Forest generally occurs within the drier areas on north and east-facing slopes within the far eastern and far western portion of the study area (Figure 2). It is generally dominated by Messmate Stringybark and Narrow-leaf Peppermint however Lowland Forest areas to the west of the property also support Mountain Grey-gum and Manna Gum *E. viminalis* subsp. *viminalis* (Plate 2). In most cases, areas containing Lowland Forest vegetation are contiguous with remnant vegetation in adjoining properties to the east and west of the study area (Figure 2).

The understorey within Lowland Forest is generally of high quality, supporting a high cover of indigenous shrubs, sedges, herbs and grasses including Trailing Ground-berry *Acrotriche prostrate*, Clustered Everlasting *Chrysocephalum semipapposum*, Austral Bear's-ear *Cymbonotus preissianus*, Pale Sundew *Drosera peltata subsp. peltata*, Common Raspwort *Gonocarpus tetragynus*, Hairy Pennywort *Hydrocotyle hirta*, Common Rice-flower *Pimelea humilis*, Ivy-leaf Violet *Viola hederacea*, Kangaroo Grass *Themeda triandra* and Weeping Grass.

A small area on the western boundary of the study area (LF c and LF d – Figure 2) comprises a modified patch of Lowland Forest with all overstorey species removed. A high cover of Kangaroo Grass and Weeping Grass is present in the understory, along with a high diversity of groundcovers including Trailing Ground-berry, Early Nancy *Wurmbea dioica*, Common Onion-orchid *Microtis unifolia*, Chocolate Lily *Arthropodium strictum* s.l., Blue Pincushion *Brunonia australis*, Clustered Everlasting, Pale Sundew, Common Raspwort, Hairy Pennywort, Common Rice-flower, Ivy-leaf Violet, Kangaroo Grass and Weeping Grass.

Plate 1. Herb-rich Foothills Forest within the study area

Plate 2. Lowland Forest within the study area

3.2.1.2 Fauna Habitat

Forested areas provide moderate to high quality habitat for a variety of fauna including arboreal mammals, ground dwelling mammals, microbats, birds and reptiles. During the current survey a variety of birds were observed foraging within the canopy, including Rainbow Lorikeet *Trichoglossus haematodus*, Musk Lorikeet *Glossopsitta concinna,* White-plumed Honeyeater *Lichenostomus penicillatus,* Brown Thornbill *Acanthiza pusilla,* Spotted Pardalote *Pardalotus punctatus,* Striated Pardalote *Pardalotus striatus* and Eastern Spinebill *Acanthorhynchus tenuirostris*.

These trees provide suitable breeding, shelter and foraging habitat for a range of arboreal mammals. Many of the trees had signs of use by arboreal mammals such as possums and gliders, with numerous scratches present on the trunks, hollows with marks around the entrances and scats found in these areas. Common Brushtail Possum *Trichosurus vulpecula*, Common Ringtail Possum *Pseudocheirus peregrinus* and Sugar Glider *Petaurus breviceps* are all likely to be present, while habitat is also suitable for the State significant Greater Glider *Petauroides volans*.

A range of microbats are likely to forage for insects around the trees and roost within hollows and fissures, while hollows are also likely to be used by arboreal mammals and nocturnal raptors such as Southern Boobook *Ninox novaeseelandiae*, and the State significant Powerful Owl *Ninox strenua*, Barking Owl *Ninox connivens connivens*, Sooty Owl *Tyto tenebricosa tenebricosa* and Masked Owl *Tyto novaehollandiae novaehollandiae*.

Ground cover provides suitable habitat for ground-dwelling mammals such as Common Wombat *Vombatus ursinus* and Short-beaked Echidna *Tachyglossus aculeatus*, along with a diversity of small mammals and reptiles.

3.2.2 Shrubland

3.2.2.1 Vegetation Condition

Riparian Scrub

Riparian Scrub is typically a closed scrub dominated by Scented Paperbark *Melaleuca squarrosa* or Swamp Paperbark *M. ericifolia* but can also be dominated by Wattle Acacia spp. and Tea-tree *Leptospermum* spp. (Oates and Taranto 2001). Emergent eucalypts can be present and the ground cover is typically comprised of shrubs, sedges, rushes and ferns (Oates and Taranto 2001). Riparian Scrub occurs in areas of relatively high rainfall on infertile waterlogged soils near creeks and tributaries (Oates and Taranto 2001).

A high quality remnant of Riparian Scrub occurs in the south-western portion of the study area (Figure 2). Although Scented Paperbark is not present, the patch is dominated by a dense cover of Prickly Tea-tree *Leptospermum continentale*. Burgan *Kunzea ericoides* and Prickly Moses *Acacia verticillata* and Swamp Paperbark are also present. The northern portion of the Riparian Scrub patch (Figure 2) is dominated by Swamp Paperbark and Burgan further upslope. The ground layer is dominated by mosses together with indigenous rushes and sedges such as Variable Sword-sedge *Lepidosperma laterale* and Thatch Saw-sedge *Gahnia radula* (Plate 3).

Introduced species such as Gorse *Ulex europaeus* and Spanish Heath *Erica lusitanica* are also scattered throughout the Riparian Scrub.

3.2.2.2 Fauna Habitat

The areas of riparian scrub are likely to provide suitable refuge, foraging and nesting habitat for a diversity of small birds such as Superb Fairy-wren *Malurus cyaneus*, Yellow-rumped Thornbill *Acanthiza chrysorrhoa* and White-browed *Scrubwren Sericornis frontalis*, small mammals such as Agile Antechinus *Antechinus agilis*, Swamp Antechinus *Antechinus minimus maritimus* and Dusky Antechinus *Antechinus swainsonii* are also likely to be present, potentially along with the nationally significant Southern Brown Bandicoot *Isoodon obesulus obesulus*. Common reptiles, potentially including the State significant Swamp Skink *Egernia coventryi* may reside within these areas.

3.2.3 Scattered Trees

3.2.3.1 Vegetation Condition

The area north of the ridge line sloping down towards Sanders Road (Figure 2) supports several native scattered trees that are generally Mountain Grey-gum closer towards the ridge line and Silver-leaf Stringybark *E. cephalocarpa* further north towards Sanders Road.

3.2.3.2 Fauna Habitat

Scattered remnant trees occur throughout the study area and provide an important resource for more mobile tree-dependent fauna. The majority of the scattered eucalypts are mature, providing an array of small, medium, large and very large hollows, bark fissures and crevices. These are likely to be used for shelter and nesting by a range of hollow-dependent fauna including parrots, microbats, possums, gliders and potentially owls. Scattered trees provide foraging habitat for insectivorous and nectivorous birds as well as vantage points and nesting areas for diurnal and nocturnal raptors. These trees also provide stepping stones for more mobile fauna moving through the study area, enhancing landscape permeability for native fauna.

Many of the scattered trees are likely to be over 300 years of age. Due to the paucity of woodland and forest habitat in the local area and across the landscape, tree hollows are important in the life history of many woodland and forest-dependent birds and mammals as they are likely to be scarce.

Plate 3. Riparian Scrub within the study area

Plate 4. Native Grassland within the study area

3.2.4 Artificial Dams

3.2.4.1 Vegetation Condition

Tall Spike-sedge *Eleocharis sphacelata* is present within most of the waterbodies within the study area. Other tall aquatic species present in low densities include Broad-leaf Cumbungi *Typha orientalis* and Tall Rush *Juncus procerus*. Submerged and floating aquatic species include Blunt Pondweed *Potamogeton ochreatus*, Swamp Lily *Ottelia ovalifolia* subsp. *ovalifolia*, Amphibious Water-milfoil *Myriophyllum simulans*, Ferny Azolla *Azolla pinnata*, Round Water-starwort *Callitriche muelleri* and Slender Knotweed *Persicaria decipiens*. Species present along the fringes of the waterbodies include Common Spike-sedge *Eleocharis acuta*, Swamp Club-sedge *Isolepis inundata* and Billabong Rush *Juncus usitatus* (Plate 5).

3.2.4.2 Fauna Habitat

Wetlands throughout the study area have been created by either being dug out or by damming a section of the catchment. The majority of dams provide moderate to high quality habitat to a diversity of aquatic fauna. Species recorded within the wetlands during the current assessment include Purple Swamphen *Porphyrio porphyrio*, Dusky Moorhen *Gallinula tenebrosa*, Eurasian Coot *Fulica atra*, White-necked Heron *Ardea pacifica,* Eastern Great Egret *Ardea modesta* and White-faced Heron *Egretta novaehollandiae*.

Eastern Great Egret, recorded in the wetland on the southern boundary of the study area (Site 14), is a State significant species, listed under the FFG Act. A previous fauna study (Ecology Australia Pty Ltd 2009) recorded several species of significance in wetland habitats in and around the study area, including:

- Dwarf Galaxias (nationally significant, listed as Vulnerable under the EPBC Act) was recorded at Site 14, and in Cannibal Creek, approximately one kilometre south of the study area, in January 2009;
- Australasian Bittern (nationally significant, listed as Endangered under the EPBC Act) was recorded at Site 14 in January 2009; and,
- Latham's Snipe (regionally significant, listed as Near Threatened under the DEPI Advisory List) was recorded at Site 14 in January 2009.

A wide range of additional species are likely to use these areas, potentially including the State significant Black Bittern *Ixobrychus flavicollis australis*, Lewin's Rail *Rallus pectoralis* and Baillon's Crake *Porzana pusilla*.

3.2.5 Introduced Grassland

3.2.5.1 Vegetation Condition

The majority of the area north of the ridge line sloping down towards Sanders Road (Figure 2) supports little indigenous vegetation, aside from several native scattered trees that are generally Mountain Grey-gum closer towards the ridge line, and Silver-leaf Stringybark *E. cephalocarpa* further north towards Sanders Road (Plate 4). Introduced pasture grasses are dominant and include Kikuyu *Pennisetum clandestinum*, Sweet Vernal-grass *Anthoxanthum odoratum* and Brown-top Bent *Agrostis capillaris* (Plate 6)

3.2.5.2 Fauna Habitat

Areas of introduced grassland are considered to be of low habitat value for fauna, likely to be utilised by locally common birds and mammals adapted to open areas, such as Australian Magpie *Gymnorhina tibicen*,

Magpie-lark *Grallina cyanoleuca*, Little Raven *Corvus mellori* and Willie Wagtail *Rhipidura leucophrys*. Diurnal and nocturnal raptors are likely to forage over these areas, with Wedge-tailed Eagle *Aquila audax* and Black-shouldered Kite *Elanus axillaris* observed during the current assessment, and a large mob of Eastern Grey Kangaroo *Macropus giganteus* (approximately 60 individuals) was observed foraging in grassland areas throughout the study area.

Plate 5. Artificial dam within the study area

Plate 6. Introduced Grassland within the study area

3.2.6 Notable Habitat Values

3.2.6.1 Landscape Permeability

Adjoining the western boundary of the study area is approximately 120 hectares of remnant vegetation comprising privately owned land, and the Mt Cannibal Flora and Fauna Reserve. Vegetation within the study area provides connective habitat between these forested areas, remnant forest patches in private properties to the east of the study area and branches of Cannibal Creek (Plates 7 and 8). Such connectivity is important in a landscape that has largely been cleared for agricultural purposes. Wildlife corridors and 'stepping stones' of vegetation have numerous benefits to native flora and fauna populations, particularly in modified landscapes where much of the surrounding vegetation is restricted to linear strips along roadsides. Some of the key benefits of habitat patches and wildlife corridors associated with the maintenance of biodiversity on a local and landscape level include:

- Protection and ongoing maintenance of ecosystem functionality through the reduction of threatening processes (erosion, weed spread, hydrological alterations);
- Protection for populations of threatened species, or disturbance sensitive species (e.g. orchids) that may have been lost from the surrounding landscape;
- Provision of habitat (refuge, shelter, breeding opportunities) for a range of fauna either residing within corridors, or moving through the landscape;
- Maintenance of species richness and diversity;
- A source of seed dispersal for flora species sensitive to moderate levels of disturbance;
- Immigration of animals to supplement declining populations, thus reducing the likelihood of local extinctions;

- Availability of habitat for reintroduction following extinction events;
- Prevent demographic changes occurring in populations that may result from prolonged isolation from other populations of the same species by aiding gene flow, thus enhancement of genetic variation and prevention of inbreeding; and,
- Facilitating fauna movement through modified landscapes to more optimal habitats.

3.2.6.2 Hollow-bearing Trees

A large number of Australia's fauna species use hollows, with a previous estimate by Ambrose (1982) of approximately 400 species. As stated by Gibbons and Lindenmayer (2002) approximately 13% of Australian amphibians, 10% of reptiles, 15% of birds and 31% of mammals may at some time use hollows. Many of these species are considered rare or threatened in Australia and ongoing loss of hollows due to firewood collection, logging, grazing pressures, and land clearing places pressure on fauna populations to a point where they may not, in many areas, be viable in the long-term.

Eucalypt hollows can occur in living and dead branches of the crown, at the base of trees (basal or butt hollows), and in the main trunk or stem of trees (Gibbons and Lindenmayer 2002). Mature trees often support vertical fissures or cracks along branches and trunks, which provide habitat for species such as insectivorous bats and small gliders. The presence of a range of different hollow types (i.e. opening size, shape, depth and height from the ground) is an important habitat feature, as individual fauna species are likely to be dependent upon a particular hollow type.

Several factors influence the presence of hollows in trees, including the type of species and tree form, its age and diameter, and the presence of a fire scar. The occurrence and overall density of hollow-bearing trees is typically greater in older stands of forest/woodland, in moist fertile gullies, and in areas that have not been extensively disturbed through logging or land clearing (Lindenmayer *et al.* 1991).

Many of the large trees within the study area are likely to be over 200 years of age, which demonstrates that there is a long period before suitable hollow formation occurs, and subsequent use by fauna. Due to the paucity of woodland and forest habitat in the local area and across the landscape, tree hollows are important in the life history of many woodland and forest-dependent birds and mammals as they are likely to be scarce.

Plate 7. Habitat corridor within the western portion of the study area

Plate 8. Habitat corridor into the study area from the west (looking south from the ridge)

3.3 National Significance Assessment

National significance for flora and fauna is defined in Appendix 1.2.

3.3.1 Flora

The VBA and FIS contain records of two nationally listed flora species (Strzelecki Gum and Green-Striped Greenhood) previously recorded within 10 kilometres of the study area (DEPI 2014b; Viridans 2013a) (Appendix 2.2; Figure 3). The PMST nominated an additional five nationally significant species which have not been recorded in the locality but have the potential to occur (DoE 2014; Appendix 2.2).

Of these species, there is suitable habitat within the study area for the Strzelecki Gum *Eucalyptus strzeleckii*, and the Green-striped Greenhood *Pterostylis chlorogramma*. As no Strzelecki Gum were observed within the study area during the previous assessment (Ecology Partners Pty Ltd 2008) or the current assessment, it is unlikely that it occurs on site. However, given the number of records recorded within 10 kilometres of the site, there is potential habitat present for this species to recruit (albeit low likelihood).

Green-striped Greenhood

Listed as Vulnerable under the EPBC Act.

The Green-striped Greenhood is a perennial orchid to 45 centimetres tall, with up to seven distinctive green striped flowers. Each flower generally comprises an emerald green (occasionally brownish) labellum, galea up to 12 millimetres long and petals with prominent flanges. It flowers through late winter into spring (July – September) (Backhouse and Jeanes 1995; Viridans 2013a). Green-striped Greenhood is endemic to Victoria, and generally occurs within heathy woodland habitat.

The Green-striped Greenhood has been recorded 28 times within 10 kilometres of the study area, including several recorded by David Piko (Australian Native Orchid Society) within the Mt Cannibal Flora and Fauna Reserve (Piko, D, 2014). Suitable habitat exists within the study area towards the west on the southern slopes (patches LF c, LF d, LF f, HrFF d and HrFF g) and east (patches HrFF a, HrFF c, HrFF d, HrFF f, LF e) of the study area.

It is recommended that targeted surveys are undertaken for the Green-striped Greenhood during the flowering season (July – September) to determine the presence and/or distribution, or otherwise, of the species within the study area.

3.3.2 Fauna

The VBA and AVW contain records of seven nationally listed fauna species previously recorded within 10 kilometres of the study area (DEPI 2014b; Viridans 2013b) (Appendix 3.2; Figure 4). The PMST nominated an additional nine nationally significant species which have not been recorded in the locality but have the potential to occur (DoE 2014).

There is suitable habitat within the study area for several of these species (Table 4).

Table 4. Fauna species of National significance that may occur within the study area

Species	Suitable habitat within the study area	Survey conducted in 2009*	Updated survey proposed	Proposed survey method	Survey timing
Southern Brown Bandicoot *Isoodon obesulus obesulus*	Areas of Herb-rich Foothill Forest along the eastern and western boundaries, and within Riparian Scrub (Figure 2a). There are numerous records of Southern Brown Bandicoot south of the Princes Highway, approximately four kilometres south of the study area. Surveys undertaken in 2009 employed only the use of hair tubes for detection of Southern Brown Bandicoot. This method is not considered sufficient to detect the species, nor is it consistent with requirements under the EPBC Act survey guidelines *Guidelines for detecting mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*. Further survey is recommended.	✓	✓	Infra-red cameras, hair tubes	Year round
Growling Grass Frog *Litoria raniformis*	Wetland habitats (Figure 2b). There is a record of Growling Grass Frog (taken in 1982) in Two Mile Creek approximately 400 metres of the study area (Figure 2b). Surveys undertaken in 2009 did not detect the species, however based the on high quality habitat within the study area further surveys for this species are recommended.	✓	✓	Spotlight and call playback	October - January
Dwarf Galaxias *Galaxiella pusilla*	The species was recorded at Site 14, and in Cannibal Creek (approximately one kilometre south of the study area) in January 2009 (Ecology Australia 2009). Surveys were undertaken at Sites 1, 2 and 11, along with Two Mile Creek, but the species was not detected. The continued presence of Dwarf Galaxias should be assumed at Site 14, Cannibal Creek, and any waterbodies with suitable habitat that are connected to existing populations, or have been connected during times of flooding previously. As wetlands within the study area are uphill of waterways they are unlikely to have been connected during times of flooding and the species is unlikely to be present. However, the primary survey methods used in 2009* were dip-net and electrofishing. Electrofishing is generally considered an inefficient method for detecting very small bodied fish such as the Dwarf Galaxias (Dolan and Miranda 2003), while dip-netting, which is suitable as a rapid method for detecting Dwarf Galaxias when in high abundance, is generally not suitable for establishing presence in low-abundance populations. Electrofishing and dip-netting are also ineffective when used in areas of high cover of aquatic vegetation, as preferred by Dwarf Galaxias (DSEWPAC 2011). In light of the above, it may be prudent to undertake further survey of aquatic habitats within the study area where surveys for Dwarf Galaxias failed to detect the species.	✓(r)	✓	Active netting (dip net and seine net), and setting of overnight passive nets (illuminated bait traps and fyke nets)	Year round

Species	Suitable habitat within the study area	Survey conducted in 2009*	Updated survey proposed	Proposed survey method	Survey timing
Australasian Bittern *Botaurus poiciloptilus*	The species was recorded at Site 14 in January 2009 (Ecology Australia 2009). Other potential habitat includes wetland habitats throughout the study area (Figure 2b). The species was not detected at other wetlands within the study area. However based the on high quality habitat present further survey is recommended.	✓(r)	✓	Spotlight and call playback	October - March

Notes: (r) = recorded on site. * Ecology Australia 2009.

3.3.3 Communities

One nationally listed ecological community (White Box-Yellow Box-Blakeley's Red Gum Grassy Woodland and Derived Native Grassland) is predicted to occur within 10 kilometres of the study area (DoE 2014). Vegetation within the study area did not meet the condition thresholds that define this community, and it is considered that this community does not occur within the study area.

3.4 State Significance Assessment

State significance for flora and fauna is defined in Appendix 1.2.

3.4.1 Flora

The VBA and FIS contain records of 30 State-significant flora species within 10 kilometres of the study area (DEPI 2014b; Viridans 2013a) (Appendix 2.2; Figure 3).

Of these species, all 30 have previously been recorded within 10 kilometres of the study area. There is suitable habitat within the study area for Green Scentbark *Eucalyptus fulgens*, Long Pink-bells *Tetratheca stenocarpa*, Marsh Sun-orchid *Thelymitra longiloba*, and Swamp Bush-pea *Pultenaea weindorferi* (Appendix 2.2).

3.4.2 Fauna

The VBA and AVW contain records of 26 State-significant fauna species within 10 kilometres of the study area (DEPI 2014b; Viridans 2013b) (Appendix 2.2; Figure 4).

There is suitable habitat within the study area for several of these species, summarised in Table 5.

Table 5. Fauna species of State significance that may occur within the study area

Species	Suitable habitat within the study area	Survey conducted in 2009*	Updated survey proposed	Proposed survey method	Survey timing
Black Bittern *Ixobrychus flavicollis australis*	Wetland habitats (Figure 2a). These species were not detected during surveys undertaken in 2009*. However based the on high quality habitat present further survey is recommended.	✗	✓	Spotlight and call playback	October - March
Lewin's Rail *Rallus pectoralis*		✓	✓	Spotlight and call playback	October - March
Baillon's Crake		✓	✓	Spotlight and	October -

Species	Suitable habitat within the study area	Survey conducted in 2009*	Updated survey proposed	Proposed survey method	Survey timing
Porzana pusilla				call playback	March
Masked Owl *Tyto novaehollandiae*	Forested areas supporting large, hollow-bearing trees (Figure 2b). Barking Owl and Powerful Owl were recorded immediately west of the study area in 1988 and 1991 (Figure 2b). These species were not detected during surveys undertaken in 2009*. However only 2 surveys were completed whereas DEPI survey guidelines** recommend a minimum of 5 surveys. As such, further survey is recommended.	✓	✓	Spotlight and call playback	Year round
Powerful Owl *Ninox strenua*		✓	✓	Spotlight and call playback	March - December
Barking Owl *Ninox connivens*		✓	✓	Spotlight and call playback	November - June
Sooty Owl *Tyto tenebricosa*		✗	✓	Spotlight and call playback	Year round
White-footed Dunnart *Sminthopsis leucopus*	Areas of Herb-rich Foothill Forest along the eastern and western boundaries, and within Riparian Scrub (Figure 2a). This species was not detected during surveys undertaken in 2009*. However surveys undertaken for Southern Brown Bandicoot (above) and Swamp Skink (below) will also serve to identify White-footed Dunnart.	✓	✓	Infra-red cameras, hair tubes	Year round (preferably between Spring – early autumn)
Greater Glider *Petauroides volans*	Forested areas supporting large, hollow-bearing trees (Figure 2b). Greater Glider has been recorded on numerous occasions in the local area, with most records located in Bunyip State Park. However based the on high quality habitat present targeted survey is recommended for this species.	✗	✓	Spotlight	Year round
Southern Toadlet *Pseudophryne semimarmorata*	Periodically inundated areas and seeps throughout the study area. Southern Toadlet was recorded immediately east of the study area in 1960.	✓	✓	Spotlight and call playback	April - July
Swamp Skink *Egernia coventryi*	Within Herb-rich Foothill Forest and Riparian Scrub along the western boundary (Figure 2a). Surveys undertaken for Swamp Skink will also serve to identify small mammals residing in the study area, including White-footed Dunnart. Although unlikely to be present, this may also include the State significant Broad-toothed Rat *Mastacomys fuscus mordicus*.	✗	✓	Elliott traps, tin and ply refugia	October - March

Notes: (r) = recorded on site. * Ecology Australia 2009. **The Department of Sustainability and Environment Approved Survey Standards: Masked Owl, Powerful Owl and Sooty Owl Date: 2 May 2011. Version 1.0.

3.4.3 Communities

Vegetation within the study area did not meet the condition thresholds that define any State-significant communities, and none are modelled to occur within the property (DEPI 2014a).

3.5 Regional Significance Assessment

Regional significance for fauna is defined in Appendix 1.2.

The VBA and AVW contain records of nine regionally significant fauna species within 10 kilometres of the study area (DEPI 2014b; Viridans 2013b) (Appendix 2.2; Figure 4).

There is suitable habitat within the study area for several of these species, summarised in Table 6.

Table 6. Fauna species of Regional significance that may occur within the study area

Species	Suitable habitat within the study area	Survey conducted in 2009*	Updated survey proposed	Proposed survey method	Survey timing
Latham's Snipe *Gallinago hardwickii*	Wetland habitats (Figure 2b).	✓(r)	✓	Spotlight and call playback	October - March
Small mammals	Surveys undertaken for Swamp Skink (above) will also serve to identify small mammals residing in the study area.	✗	✓	Elliott traps, tin and ply refugia	October - March
Microbats	Forested areas and scattered trees supporting hollows, spouts and fissures or loose or shedding bark (Figure 2b).	✓(r)	✓	Anabat	October - March

Notes: (r) = recorded on site. * Ecology Australia 2009.

4 PERMITTED CLEARING ASSESSMENT

Aside from the native vegetation situated within the 100 metre landscape buffer that extends around the internal property boundary, all vegetation within the study area is proposed to be removed based on the extraction limit proposed for the Work Authority for the quarry site (Figure 2).

4.1 Risk-based Pathway

Based on DEPI's NVIM Tool (DEPI 2014b) and BIOR report (Appendix 4), the study area is situated in Location A with 46.378 hectares (comprising 44.337 hectares of remnant patch vegetation, and 29 scattered trees) of native vegetation proposed to be impacted as part of the proposed quarry development (Appendix 4). As such, the permit application falls under the **Moderate Risk-based pathway**. Site information and proposed vegetation losses are summarised in Table 7, and detailed in Appendix 4.

As the current proposal falls under the Moderate Risk-based pathway, the Guidelines (DEPI 2013a) require the relevant authorities to consider whether reasonable steps have been taken to ensure that impacts of the proposed removal of native vegetation on biodiversity have been minimised.

Table 7. Permitted Clearing Assessment (the Guidelines)

Location		A
Strategic Biodiversity Score (of vegetation to be removed)		0.359
Vegetation to be removed	Remnant Patch (ha)	44.337
	Scattered Trees (no)	29 (2.041 ha)*
	Total Hectares	46.378
	Total Habitat Hectares	23.068
Risk	Vegetation Risk	Moderate
	Scattered Trees Risk	Moderate
	Risk Pathway	Moderate

Note. * = Scattered trees are converted to hectares by multiplying the number of trees by a default extent (DEPI 2014d).

4.2 Offset Targets

The offset requirements for native vegetation removal, as prescribed by the Guidelines (DEPI 2013a) have been calculated by DEPI, based on the habitat hectares scores as assessed during the flora and fauna assessment. The resulting Biodiversity Impact and Offset Requirements report (BIOR) produced by DEPI is presented in Appendix 4. A summary of proposed vegetation losses is presented in Table 7, while the results of the habitat hectare assessment are provided in Appendix 2.3.

The specific-general offset test found that the proposed removal of vegetation does have a proportional impact on three (Spotted Gum *Corymbia maculata*, Cobra Greenhood *Pterostylis grandiflora* and Green Scentbark *Eucalyptus fulgens*) rare or threatened species habitats above the specific offset threshold, and therefore, specific offsets are required for these species (Appendix 4).

The offset requirement for native vegetation removal is 0.009 General Biodiversity Equivalence Units (BEU) and 33.712 specific BEUs for Spotted Gum, 37.491 specific BEUs for Cobra Greenhood, and 37.347 specific BEUs for Green Scentbark.

If a permit is granted to remove the vegetation identified in the study area (as summarised in Table 7), a requirement to obtain native vegetation offsets will be included in the permit conditions. The offsets must meet the requirements of Table 8 (detailed in Appendix 4).

Table 8. Offset requirements for the permitted clearance of vegetation

Offset requirements	General Offsets Required (BEU)	0.009
	Specific Offsets Required (BEU)	33.712 specific units of habitat for Spotted Gum 37.491 specific units of habitat for Cobra Greenhood 37.347 specific units of habitat for Green Scentbark
	Vicinity (catchment / LGA)	Port Phillip and Westernport CMA / Cardinia Shire Council (For General BEUs) No Restrictions (for Specific BEUs)
	Minimum Strategic Biodiversity Score*	0.125

Note: BEU = Biodiversity Equivalence Units; * Minimum strategic biodiversity score is 80% of the weighted average score across habitat zones where a general offset is required.

5 POTENTIAL IMPACTS

The proposed development is likely to directly impact on several indigenous flora and fauna species, and communities present within the study area. Information on likely and potential impacts to ecological values within and/or adjacent to the study area is provided:

- The study area forms part of the catchment area for wetlands and waterways (e.g. Cannibal Creek, Two Mile Creek) supporting populations of the nationally significant Dwarf Galaxias and Australasian Bittern, and the regionally significant Latham's Snipe. Loss of this catchment area may cause permanent changes to hydrological conditions of waterways downstream of the impact area, including changes to overall availability of water. Such loss may be considered a 'significant impact' under the EPBC Act for all three species (see Section 6.1.4 for more information on implications under the EPBC Act);
- Loss of potential habitat for national (Green-striped Greenhood and Strzelecki Gum), and several State and regionally significant flora species (see Appendix 2.1);
- Loss of potential habitat for national (Southern Brown Bandicoot and Growling Grass Frog), and a range of State and regionally significant fauna species;
- The removal and fragmentation of areas of high quality EVCs (Riparian Scrub, Lowland Forest and Herb-rich Foothill Forest);
- Loss of habitat and potential mortality for locally common fauna species dependent on tree hollows (e.g. Common Brush-tailed Possum *Trichosurus vulpecula*, Eastern Rosella *Platycercus eximius*, Rainbow Lorikeet *Trichoglossus haematodus,* Gould's Wattled Bat *Chalinolobus gouldii*), loose or shedding bark (e.g. Lesser Long-eared Bat *Nictophilus geoffroyi*) and leaf litter and other ground debris (e.g. lizards, snakes, frogs and invertebrates) for foraging, shelter, roosting or nesting;
- Decreased habitat quality downstream of the study area due to inadequate sedimentation controls and subsequent deterioration of water quality;
- Loss of habitat and potential mortality for locally common fauna species dependent on wetlands or inundated areas for foraging, shelter or nesting (e.g. aquatic or wading birds, frogs, microbats);
- Loss of habitat for local populations of Eastern Grey Kangaroo;
- Potential for further habitat fragmentation in a fragmented landscape and the associated creation of barriers to the movement and migration of indigenous fauna;
- Potential for an increase to levels of indigenous fauna roadkill along new or upgraded road alignments due to increased traffic;
- Potential for the spread of weeds and soil pathogens due to on-site activities;
- Disturbance to wildlife from increased human activity and noise during construction; and,
- Indirect impacts on adjacent areas if construction activities and drainage are not appropriately managed.

6 LEGISLATIVE AND POLICY IMPLICATIONS

This section identifies biodiversity policy and legislation relevant to the proposed development, principally:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth);
- *Flora and Fauna Guarantee Act 1988* (FFG Act) (Victoria);
- *Mining Resources (Sustainable Development) Act 1990;*
- *Environment Effects Act 1978* (Victoria);
- *Planning and Environment Act 1987* (Victoria);
    - Local Planning Schemes;
    - Victoria's Native Vegetation Permitted Clearing Regulations.
- *Wildlife Act 1975* and Wildlife Regulations 2002 (Victoria);
- *Catchment and Land Protection Act 1994* (CALP Act) (Victoria); and,
- *Water Act 1989* (Victoria).

6.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The EPBC Act establishes a Commonwealth process for the assessment of proposed actions (i.e. project, development, undertaking, activity, or series of activities) that are likely to have a significant impact on matters of national environmental significance (NES), or on Commonwealth land. An action, unless otherwise exempt, requires approval from the Commonwealth Environment Minister if it is considered likely to have an impact on any of the following matters of NES:

- World Heritage properties;
- National heritage places;
- Ramsar wetlands of international significance;
- Threatened species and ecological communities;
- Migratory and marine species;
- Commonwealth marine area;
- Nuclear actions (including uranium mining);
- Great Barrier Reef Marine Park; or,
- Water resources impacted by coal seam gas or mining development.

6.1.1 Ramsar wetlands of international significance

The study area occurs approximately 25 kilometres upstream of the Western port Ramsar wetland (DoE 2014).

The Western Port Ramsar wetlands are unlikely to be impacted as it is situated a considerable distance from the proposed action. Provided management practices and construction techniques are consistent with Construction Techniques for Sediment Pollution Control (EPA 1991) and Environmental Guidelines for Major Construction Sites (EPA 1996), and pollution run-off and sedimentation via Cannibal Creek / Two Mile Creek and Bunyip River which flows into Western Port Bay is minimised, the project is unlikely to affect the ecological character of any Ramsar wetland.

6.1.2 Threatened species and ecological communities

Flora: There is suitable habitat within the study area for two flora species listed under the EPBC Act (Green-striped Greenhood and Strzelecki Gum) (Section 3.3.1).

Fauna: Two fauna species listed under the EPBC Act (Dwarf Galaxias and Australasian Bittern) have been recorded at Site 14, adjacent to the study area, and there is suitable habitat for two additional species (Southern Brown Bandicoot and Growling Grass Frog) (Section 3.3.2).

The population of Dwarf Galaxias is considered an 'important population', as per the Significant Impact Guidelines (DEWHA 2009), as they are near the limit of the species range. Additionally, they may also be a key source population for breeding or dispersal, and/or necessary for maintaining genetic diversity, however the species dispersal requirements and population structure in the area are unknown. Generally, where scientific uncertainties regarding a determination of significant impacts of matters of NES exist, the precautionary principal applies (DEWHA 2009).

Potential impacts on Dwarf Galaxias have 'a real chance or possibility of' triggering the following EPBC Act Significant Impact Guidelines thresholds for Vulnerable listed species (DEWHA 2009):

- Adversely affect habitat critical to the survival of the species; and,
- Modify, destroy, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Consequently, a referral to the Commonwealth environment Minister is recommended, and a Threatened Species Conservation Management Plan is likely to be required for any development likely to impact Dwarf Galaxias, as detailed in Section 7.

Communities: No ecological communities listed under the EPBC Act are present within the study area (Section 3.3.3).

6.1.3 Migratory and marine species

Thirty-four Migratory and/or Marine species have been recorded within 10 kilometres of the study area (DEPI 2014b; Appendix 3.1). The wetland on the southern boundary of the study area (Site 14) may be considered to be 'important habitat' for Latham's Snipe as defined under the EPBC Act Policy Statement 3.21 *Significant impact guidelines for 36 migratory shorebird species Migratory species*, which states that important habitat for Latham's snipe occurs at sites that:

- Support at least 18 individuals of the species; and,

- Are naturally occurring open freshwater wetland with vegetation cover nearby (for example, tussock grasslands, sedges, lignum or reeds within 100 m of the wetland).

6.1.4 Implications

There is suitable habitat within the study area for two flora species (Green-striped Greenhood, Strzelecki Gum) and five fauna species (Southern Brown Bandicoot, Australasian Bittern, Latham's Snipe, Growling Grass Frog and Dwarf Galaxias,) listed under the EPBC Act. Based on likely impacts to Dwarf Galaxias, potential impacts to Australasian Bittern, Latham's Snipe (and Green-striped Greenhood, Southern Brown Bandicoot and Growling Grass Frog pending the results of targeted surveys), a referral to the Commonwealth Environment Minister will be required.

6.2 Flora and Fauna Guarantee Act 1988 (Victoria)

The FFG Act is the primary Victorian legislation providing for the conservation of threatened species and ecological communities, and for the management of processes that are threatening to Victoria's native flora and fauna. The FFG Act contains protection procedures such as the listing of threatened species and/or communities, and the preparation of action statements to protect the long-term viability of these values.

Proponents are required to apply for an FFG Act Permit to 'take' listed and/or protected[2] flora species, listed vegetation communities and listed fish species in areas of public land (i.e. within road reserves, drainage lines and public reserves). An FFG Act permit is generally not required for removal of species or communities on private land, or for the removal of habitat for a listed terrestrial fauna species.

Flora: No 'listed' flora species and 16 'protected' flora species (See Appendix 2.1) were recorded within the study area during the field assessment. There is suitable habitat within the study area for several flora species listed under the FFG Act (Section 3.3.1 and 3.4.1).

Fauna: There is suitable habitat within the study area for 13 fauna species listed under the FFG Act (Section 3.3.2 and 3.4.2).

Communities: No ecological communities listed under the FFG Act were recorded, or are modelled to occur within the study area.

Threatening processes: The following threatening processes listed under the FFG Act should be considered in relation to the proposed development:

- Alteration to the natural flow regimes of rivers and streams;
- Alteration to the natural temperature regimes of rivers and streams;
- Degradation of native riparian vegetation along Victorian rivers and streams;
- Habitat fragmentation as a threatening process for fauna in Victoria;
- Increase in sediment input into Victorian rivers and streams due to human activities;

[2] In addition to 'listed' flora species, the FFG Act identifies 'protected' flora species. This includes any of the Asteraceae (Daisies), all orchids, ferns (excluding *Pteridium esculentum*) and Acacia species (excluding *Acacia dealbata*, *Acacia decurrens*, *Acacia implexa*, *Acacia melanoxylon* and *Acacia paradoxa*), as well as any taxa that may be a component of a listed ecological community. A species may be both listed and protected.

- Invasion of native vegetation by Blackberry *Rubus fruticosus* L. agg.;
- Invasion of native vegetation by 'environmental weeds'.
- Infection of amphibians with Chytrid Fungus, resulting in chytridiomycosis;
- Loss of hollow-bearing trees from Victorian native forests;
- The spread of *Phytophthora cinnamomi* from infected sites into parks and reserves, including roadsides, under the control of a state or local government authority;
- Use of Phytophthora-infected gravel in construction of roads, bridges and reservoirs; and,
- Wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing.
- Input of toxic substances into Victorian rivers and streams; and,
- Soil and vegetation disturbance resulting from marble mining.

6.2.1 Implications

The local planning authority may consider flora, fauna and communities listed under the FFG Act when making decisions regarding the use and development of land.

There is suitable habitat within the study area for several species listed or protected under the FFG Act. However, the study area is privately owned, as such a permit under the FFG Act is not required.

6.3 Mineral Resources (Sustainable Development) Act 1990

Mineral exploration, extractive industry and mining in Victoria is regulated under the *Mineral Resources (Sustainable Development) Act 1990* (MRSD Act) (DPI 2008). The purpose of this Act is to encourage an economically viable mining industry that operates in a way that is compatible with the environmental, social and economic objectives of the state.

One of the key objectives of this legislation is to establish a legal framework to ensure that mineral resources are developed in ways that minimise the impacts on the environment (DPI 2008). The MRSD Act requires that a licensee proposing to work under a mining licence must submit a work plan. A work plan is not required if the proposed development is:

- On land that has an area of less than five hectares;
- Has a depth less than five metres;
- Does not require blasting; and,
- Does not require clearing of native vegetation (DPI 2010).

If no exemptions apply, then Section 79 of the MRSD Act requires that the work plan include a 'rehabilitation plan' for the progressive rehabilitation of land disturbed by the project. A rehabilitation plan must set out the following:

- The concepts for the possible end use of the site;

- The proposal for the progressive rehabilitation to a safe and stable landform of extraction areas including slope batters, road cuttings and dumps;
- The proposals for landscaping to minimise the visual impact of the site;
- Any proposals to protect and conserve native vegetation during the production phase of the operation; and,
- Any proposals for the final rehabilitation and vegetation of the site including final security of the site, securing water dams and slimes dams and removal of plant and equipment.

If native vegetation is present within the study area, the rehabilitation plan must also describe how native vegetation will be protected during the production phase of the project (DPI 2010) as well as:

- Complying with the Commonwealth EPBC Act and the State FFG Act;
- Following Victoria's Permitted Clearing of Native Vegetation: Biodiversity Assessment Guidelines (DEPI 2013a); and,
- Preparing an Offset Management Plan (OMP) if vegetation is removed.

The obligations of the Guidelines are applied through the specific mechanism of the relevant legislation (in this case, the MRSD Act) and where applicable vegetation avoidance and/or minimisation must be demonstrated, then offset any clearing must be applied and documented (DPI 2009).

6.3.1 Implications

A work plan will need to be prepared as the proposed development does not meet any of the exemptions listed above. This work plan will need to comply with the requirements of the MRSD Act, and must include a detailed rehabilitation plan which includes:

- Assessment of pre- and post-mining flora and fauna;
- Provision of habitat corridors;
- Weed management; and,
- Monitoring of flora and fauna (including weeds).

In order for a Work Plan to be approved by DEPI, the department must be satisfied of "all necessary planning consents and approvals" including where Victoria's native vegetation policy requires action has been addressed (DPI 2009). If vegetation is to be cleared then Hansen must prepare an OMP, which is agreed between Hansen and DEPI prior to clearing commencing. Hansen will need to include the relevant requirements of the OMP in their work plan and the DEPI includes relevant conditions in the work plan and/or mining or exploration licence (DPI 2009).

6.4 Environment Effects Act 1978 (Victoria)

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

- One of the following occurs:

- Potential clearing of 10 hectares or more of native vegetation from an area that:
  - is of an EVC identified as endangered by DEPI;
  - is, of Very High conservation significance; or,
  - is not authorised under an approved Forest Management Plan or Fire Protection Plan.
- Potential long-term loss of a significant proportion (1-5% depending on conservation status of species) of known remaining habitat or population of a threatened species within Victoria.
- Potential greenhouse gas emissions exceeding 200,000 tonnes of CO_2 equivalent per annum, directly attributable to the operation of the facility;
- Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long term;

- Or where two or more of the following occur:
  - Potential clearing of 10 hectares or more of native vegetation, unless authorised under an approved Forest Management Act or Fire Protection Plan;
  - Matters listed under the FFG Act:
    - Potential loss of a significant area of a listed ecological community;
    - Potential loss of a genetically important population of an endangered or threatened species;
    - Potential loss of critical habitat; or,
    - Potential significant effects on habitat values of a wetland supporting migratory birds.
  - Potential exposure of a human community to severe or chronic health hazards or safety hazards over the short or long term, due to emissions to air or water or noise or chemical hazards or associated transport;
  - Potential extensive or major effects on land stability, acid sulphate soils or highly erodible soils over the short or long term;
  - Potential significant effects on the amenity of a substantial number of residents, due to extensive, or major long term changes in visual, noise and traffic conditions.

6.4.1 Implications

Based on the current development plan, vegetation proposed to be removed and other associated impacts, the development may trigger the requirement for an Environment Effects Statement (EES). A referral under the *Environment Effects Act 1978* should be considered to ensure that all environmental impacts are considered and mitigated in an appropriate manner prior to development.

6.5 Planning and Environment Act 1987 (Victoria)

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17 which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation on a site of more than 0.4 hectares, unless an exemption under clause 52.17-7 of the Victorian Planning Schemes applies (Appendix 1.5.3) or a subdivision is proposed with lots less than 0.4 hectares[3]. Local planning schemes may contain other provisions in relation to the removal of native vegetation (Section 6.5.1).

Where the clearing of native vegetation is permitted, the quantity and type of vegetation to be offset is determined using methodology specified in the Guidelines (DEPI 2013a).

6.5.1 Local Planning Schemes

The study area is located within the Cardinia Shire Council municipality. The following zoning and overlays apply (DTPLI 2014):

- Green Wedge Zone – Schedule 1; and,
- Ecological Significance Overlay – Schedule 1 (ESO1).

6.5.1.1 Implications

The clearing of native vegetation for mining and extractive industries is exempt from the requirement for a planning permit subject to an assessment as part of the work plan approval process (MRSD Act). The removal of native vegetation for the Earth Resources Industry (ERI) is regulated through the Mining and Extractive Industry Work Approvals Process (DPI 2009). A Memorandum of Understanding (MoU) between the former DSE and DPI recognises that native vegetation should be offset in accordance with the relevant legislation (DPI 2007).

It should be noted that the MoU has yet to be updated to reflect the recent (late 2013) changes to Victoria's native vegetation policy. However, the current MOU is to remain in place until a review is completed by DEPI, with the assessment and offset of works to be carried out in accordance with the Guidelines (*pers.comm* Mark Chisholm, Native Vegetation Review Team – DEPI).

6.5.2 The Guidelines

In December 2013 the Victorian Government integrated the 'Permitted clearing of native vegetation - Biodiversity assessment guidelines' (the Guidelines) (DEPI 2013a) into the Victorian Planning Provisions, replacing the *Victoria's Native Vegetation Management – A Framework for Action* (The Framework) (NRE 2002). The primary objective of the regulations is "no net loss in the contribution made by native vegetation to Victoria's biodiversity". The State Planning Policy Framework and the decision guidelines at Clause 52.17 (Native Vegetation) of Particular Provisions and Clause 12.01 require Planning and Responsible Authorities to have regard for the Biodiversity Assessment Guidelines.

[3] In accordance with the Victorian Civil and Administrative Tribunal's (VCAT) decision Villawood v Greater Bendigo CC (2005) VCAT 2703 (20 December 2005) all native vegetation is considered lost where proposed lots are less than 0.4 hectares in area and must be offset at the time of subdivision.

In addition, a permit must be referred to DEPI if vegetation removal meets one or more of the below thresholds (Table 9).

Table 9. Permit to remove native vegetation – application referral triggers (Clause 66, Referral and Notice Provisions)

Native Vegetation	• Remove, destroy or lop native vegetation where the area to be cleared is 0.5 hectares or more
	• Remove, destroy or lop native vegetation which is to be considered under the High Risk-based pathway
Other Circumstances	• Remove, destroy or lop native vegetation if a property vegetation plan applies to the site
	• Remove, destroy or lop native vegetation on Crown land which is occupied or managed by the responsible authority (DEPI)

6.5.2.1 Implications

Areas of remnant native vegetation, scattered trees and habitat for significant species must be offset if they are proposed to be disturbed as part of the project. The results of the permitted clearing assessment under the Guidelines are presented in Section 4.

6.5.3 Additional information

Given the presence of potentially suitable habitat for Nationally significant species (i.e. EPBC Act-listed species), targeted surveys are required to determine the presence or absence of these species within the study area. If one or more of these species are present an assessment of the species' likely use of the study area (extent or distribution across, and/or adjacent to the study area), the abundance and importance of the habitats within the study area for the species, and the likely or potential impacts to the species associated with the proposed development is required.

Although surveys for State and regionally significant species are not a legislative requirement, there is a requirement for DEPI to consider all state matters listed under the FFG Act as part of the planning and assessment approval process. There is also a possibility that the project will trigger the *Environment Effects Act* and be assessed under an EES, in which case such surveys are likely to be required. As such, targeted surveys for significant flora and fauna species that have the potential to use habitat resources within the study area, either as residents or visitors on a regular, occasional or rare basis is recommended. Targeted surveys should be undertaken as part of the planning and assessment of the proposed development for the following species:

- Nationally significant flora species (Green-striped Greenhood and Strzelecki Gum) and fauna (Southern Brown Bandicoot, Australasian Bittern, Growling Grass Frog and Dwarf Galaxias).
- State-significant flora (Green Scentbark, Long Pink-bells, Marsh Sun-orchid and Swamp Bush-pea) and fauna species (i.e. White-footed Dunnart, Greater Glider, Black Bittern, Lewin's Rail, Baillon's Crake, Masked Owl, Powerful Owl, Barking Owl, Sooty Owl, Southern Toadlet and Swamp Skink); and,
- Regionally significant fauna species (Latham's Snipe) and microbats.

6.6 Wildlife Act 1975 and Wildlife Regulations 2002 (Victoria)

The *Wildlife Act 1975* (and associated Wildlife Regulations 2002) is the primary legislation in Victoria providing for protection and management of wildlife. The Act requires people engaged in wildlife research (e.g. fauna surveys, salvage and translocation activities) to obtain a permit under the Act to ensure that these activities are undertaken in a manner consistent with the appropriate controls.

The *Wildlife Act 1975* has the following objectives:

- To establish procedures for the promotion of protection and conservation of wildlife, the prevention of species extinctions, and the sustainable use and access to wildlife; and,
- To prohibit and regulate the conduct of those involved in wildlife related activities.

6.6.1 Implications

Authorisation for habitat removal may be obtained under the *Wildlife Act 1975* through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*. Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*.

6.7 Water Act 1989 (Victoria)

The purposes of the *Water Act 1989* are manifold but (in part) relate to the orderly, equitable, efficient and sustainable use of water resources within Victoria. This includes the provision of a formal means of protecting and enhancing environmental qualities of waterways and their in-stream uses as well as catchment conditions that may affect water quality and the ecological environments within them.

The study area forms part of the catchment area for wetlands and waterways (e.g. Cannibal Creek, Two Mile Creek). Loss of this catchment area may cause permanent changes to hydrological conditions of waterways downstream of the impact area, including changes to overall availability of water.

6.7.1 Implications

A 'works on waterways' permit from the Port Phillip and Westernport CMA is likely to be required where any action impacts on waterways within the study area. Additionally, where structures are installed within or across waterways that potentially interfere with the passage of fish or the quality of aquatic habitat, these activities should be referred to DEPI with the Port Phillip and Westernport CMA included for comment.

6.8 Catchment and Land Protection Act 1994 (Victoria)

The *Catchment and Land Protection Act 1994* (CaLP Act) contains provisions relating to catchment planning, land management, noxious weeds and pest animals. The Act also provides a legislative framework for the management of private and public land and sets out the responsibilities of land managers, stating that they must take all reasonable steps to:

- Avoid causing or contributing to land degradation which causes or may cause damage to land of another land owner;
- Protect water resources;

- Conserve soil;
- Eradicate regionally prohibited weeds;
- Prevent the growth and spread of regionally controlled weeds; and,
- Prevent the spread of, and as far as possible eradicate, established pest animals.

6.8.1 Implications

A number of weeds listed as noxious under the CaLP Act were recorded during the assessment (see Appendix 2.1). Similarly, there is evidence that the study area is currently occupied by several pest fauna species listed under the CaLP Act (Spear Thistle, Soursob, Flax-leaf Broom, Gorse, Blackberry). Landowners are responsible for the control of any infestation of noxious weeds and pest fauna species. To meet CaLP Act requirements listed noxious weeds should be appropriately controlled throughout the study area to minimise their spread and impact on ecological values, and a Weed Management Plan and pest fauna eradication plan may be required as part of the Work Plan.

7 MITIGATION MEASURES

Any loss of ecological values should be viewed in the overall context of on-going loss, fragmentation, and deterioration in the quality of remnant vegetation throughout the greater Highlands – Southern Fall bioregion.

The current proposal falls under the Moderate Risk-based pathway. As such, the Guidelines require the relevant authorities to consider whether reasonable steps have been taken to ensure that impacts of the proposed removal of native vegetation on biodiversity have been avoided and minimised.

7.1 Minimise Impacts

For the removal of vegetation that falls under the Moderate Risk-based pathway, the Guidelines require the relevant authorities to consider whether reasonable steps have been taken to ensure that impacts of the proposed removal of native vegetation on biodiversity have been minimised. These steps should have regard to the contribution to biodiversity made by the native vegetation to be removed and the native vegetation to be retained.

In this instance, demonstrating minimisation of impacts to native vegetation and habitat values outside of the 100 metre landscape buffer area is difficult given the nature of the proposed development. However, where possible, further mitigation of impacts to remnant vegetation in the south-western portion of the study area, and associated impacts to creeks and tributaries of Cannibal Creek and Two Mile Creek should be seen as a priority.

Potential minimisation and mitigation measures within the study area could include:

- Protection zones (i.e. through fencing) during any future construction phase around areas of native vegetation and trees to be retained (with an area of at least 15 metres around remnant trees);
- Ensuring any proposed works remain within the intended extraction footprint, i.e. not disturbing or removing areas of native vegetation outside the proposed works area. This also applies to machinery storage, materials stockpiles, personnel rest areas and access roads;
- Minimise impacts to native vegetation and habitats through construction and micro-siting techniques, including fencing retained areas of native vegetation. If indeed necessary, trees should be lopped or trimmed rather than removed. Similarly, soil disturbance and sedimentation within wetlands should be avoided or kept to a minimum, to avoid, or minimise impacts to fauna habitats;
- All contractors should be aware of ecologically sensitive areas to minimise the likelihood of inadvertent disturbance to areas marked for retention. Habitat Zones (areas of sensitivity) should be included as a mapping overlay on any construction plans;
- Tree Retention Zones (TRZs) should be implemented to prevent indirect losses of native vegetation during construction activities (DSE 2010). See Appendix 1.6;
- Where possible, removal of any habitat trees or shrubs (particularly hollow-bearing trees) should be undertaken between February and September to avoid the breeding season for the majority of fauna species. If any habitat trees or shrubs are proposed to be removed, this should be undertaken under the supervision of an appropriately qualified zoologist to salvage and translocate any

displaced fauna. A Fauna Management Plan may be required to guide the salvage and translocation process;

- Where possible, construction stockpiles, machinery, roads, and other infrastructure should be placed away from areas supporting native vegetation, large mature trees and waterbodies;
- Ensure that best practice sedimentation and pollution control measures are undertaken at all times, in accordance with Environment Protection Agency guidelines (EPA 1991; EPA 1996; Victorian Stormwater Committee 1999) to prevent offsite impacts to waterways and wetlands; and,
- As indigenous flora provides valuable habitat for indigenous fauna, it is recommended that any landscape plantings that are undertaken as part of the proposed quarry are conducted using indigenous species sourced from a local provenance, rather than exotic deciduous trees and shrubs.

In addition to these measures, the following documents may need to be prepared and implemented (based on feedback from DEPI) as part of the work plan prior to any construction activities:

- Significant Species Conservation Management Plan (CMP). A CMP will be required if significant species or their habitats are likely to be impacted (e.g. Dwarf Galaxias, Australasian Bittern, Latham's Snipe). The CMP should include a population and habitat monitoring program for Dwarf Galaxias in the local area, specifically in wetlands and waterways whose hydrological cycles are likely to be impacted by the proposed action and/or the loss of catchment area. Study design for the Dwarf Galaxias monitoring should:
    - Include collection of sufficient baseline data to properly account for natural variations in the population to help prevent the apparent detection of false impacts. Ideally, the monitoring study may be able to utilise suitable non-impacted 'control site' populations if suitable sites are identified;
    - Account for the fact that the Dwarf Galaxias is an annual species, with size, sex and abundance changing rapidly throughout each year; these seasonal trends should be quantified;
    - Occur at least 12 months prior to commencement of works, and throughout operation of the site for such a time as to determine impacts at the peak of their risk (e.g. once total proposed loss of catchment area above the population is reached, and representative dry years);

Specific details would be determined pending further investigation and consultation with relevant authorities.

- Construction Environmental Management Plan (CEMP). The CEMP should include specific species/vegetation conservation strategies, daily monitoring, sedimentation management, site specific rehabilitation plans, weed and pathogen management measures, etc.;
- Weed Management Plan. This plan should follow the guidelines set out in the CaLP Act, and clearly outline any obligations of the project team in relation to minimising the spread of weeds as a result of this project. This may include a pre-clearance weed survey undertaken prior to any construction activities to record and map the locations of all noxious and environmental weeds;

- Fauna Management Plan. This may be required if habitat for common fauna species is likely to be impacted and salvage and translocation must be undertaken to minimise the risk of injury or death to those species (e.g. hollow-bearing trees, wetlands, etc.); and,

7.2 Offset Impacts

7.2.1 Offset Criteria

The Biodiversity Assessment Guidelines require offsetting as the final step in considering the impacts of development on native vegetation. Emphasis is placed on avoiding (High Risk) and minimising impacts, and only after these steps have been taken should offsets (actions undertaken to achieve commensurate gains) be considered.

Offset targets must be met, as specified in Section 4.2. In determining the appropriate offset responses for permitted vegetation clearance, the Guidelines set out several criteria which must be considered for any offset site. These criteria are presented in Appendix 1.5.

7.2.1.1 Offset Options

Potential offsets may be sourced using the following mechanisms:

- BushBroker: BushBroker maintains a register of landowners who are willing to sell offset credits. Offsets secured by Bushbroker are done so via a Section 69 Agreement under the *Conservation, Forest and Lands Act 1987*.
- Trust for Nature: Trust for Nature holds a list of landowners who are willing to sell vegetation offsets. Offsets secured by Trust for Nature are done so under the Victorian *Conservation Trust Act 1972*.
- Local Councils: The proponent may contact local councils to seek availability of offsets.
- Enhanced management of existing vegetation, and/or revegetation (or natural recruitment)within existing land owned by the proponent.
- Over-the-Counter Offsets Scheme: The Guidelines include the expansion of the "Over-the-Counter" (OTC) Offsets Scheme, allowing non-government agencies to establish themselves as OTC Facilities. OTC Facilities will broker native vegetation offsets (credits) between landholders (with offset sites) and permit holders (with offset requirements). The OTC Offsets Scheme differs from other third party offsets (Bushbroker, Trust for Nature) as permit holders will not be required to negotiate directly with landholders. Instead, they can review available credits and relevant sale prices at each private OTC Facility, and purchase their required credits through them. Following payment, the permit holder will receive a Credit Extract as proof that they have satisfied their offset requirements. Ecology and Heritage Partners is an accredited OTC Facility.

7.2.2 Offset Strategy

Management commitments/arrangements to meet offset obligations at any offset site can be broken up into two main strategies; 1) maintenance and 2) improvement. Some of these techniques include:

Maintenance

- Retention of all remnant trees (both alive and dead specimens).

- Removal of woody and herbaceous weeds.
- Foregoing allowed uses such as grazing and slashing activities.

Improvement

- Control/eradication of environmental or noxious weeds including those that are a threat to existing remnant vegetation.
- Fencing to restrict public/grazing access into areas of ecological value.
- Control of introduced animals such as foxes, rabbits and feral cats.
- Revegetation and/or supplement planting of locally indigenous tree, shrub and understorey species in appropriate areas (need to consider ecological function).

It is understood that Hanson are in the process of investigating the feasibility of purchasing additional land nearby to the study area to meet the offset obligations generated by the proposed vegetation removal associated with the proposed quarry development. Further information on the offsets able to be generated by these sites will be presented in due course.

Any additional offsets not able to be met through the enhanced management of existing vegetation on the above sites are proposed to be sourced through the Bushbroker, or Over-The-Counter Offsets scheme.

8 FURTHER REQUIREMENTS

Further requirements associated with development of the study area, as well as additional studies or reporting that may be required, are provided in Table 10, below.

Table 10. Further requirements associated with development of the study area

Relevant Legislation	Implications	Further Action
Environment Protection and Biodiversity Conservation Act 1999	There is suitable habitat within the study area for two flora species (Green-striped Greenhood, Strzelecki Gum) and five fauna species (Southern Brown Bandicoot, Australasian Bittern, Latham's Snipe, Growling Grass Frog and Dwarf Galaxias,) listed under the EPBC Act. Based on likely impacts to Dwarf Galaxias, potential impacts to Australasian Bittern, Latham's Snipe (and Green-striped Greenhood, Southern Brown Bandicoot and Growling Grass Frog pending the results of targeted surveys), a referral to the Commonwealth Environment Minister will be required.	Conduct targeted surveys for flora and fauna species listed under the EPBC Act (Section 6.1.4).
Flora and Fauna Guarantee Act 1988	There is suitable habitat within the study area for several species listed or protected under the FFG Act. However, the study area is privately owned, as such a permit under the FFG Act is not required.	No further action required.
Environment Effects Act 1978	Based on the current development plan, vegetation proposed to be removed and other associated impacts, the development may trigger the requirement for an Environment Effects Statement (EES). A referral under the Environment *Effects Act 1978* should be considered to ensure that all environmental impacts are considered and mitigated in an appropriate manner prior to development.	Prepare and submit a referral under the *Environment Effects Act 1978* to DEPI.
Mining Resources (Sustainable Development) Act 1990	A work plan will need to be prepared as the proposed development does not meet any of the exemptions listed above. This work plan will need to comply with the requirements of the MRSD Act, and must include a detailed rehabilitation plan.	Prepare and submit a Work Plan (approved by DEPI) under the MRSD Act.
Planning and Environment Act 1987	The clearing of native vegetation for Mining Industries is exempt from the requirement for a planning permit subject to an assessment as part of the work plan approval process (MRSD Act). The removal of native vegetation for the Earth Resources Industry (ERI) is regulated through the Mining and Extractive Industry Work Approvals Process (DPI 2009). A Memorandum of Understanding (MoU) between the former DSE and DPI recognises that native vegetation should be offset in accordance with the relevant legislation (DPI 2007). Based on DEPI's NVIM Tool (DEPI 2014b) and BIOR report (Appendix 4), the study area is situated in Location A with 46.378 hectares (comprising 44.337 hectares of remnant patch vegetation, and 29 scattered trees) of native vegetation proposed to be impacted as part of the proposed quarry development	No further action required.

Relevant Legislation	Implications	Further Action
	(Appendix 4). As such, the permit application falls under the **Moderate Risk-based pathway**. The offset requirement for native vegetation removal is 0.009 General Biodiversity Equivalence Units (BEU) and 33.712 specific BEUs for Spotted Gum, *37.491* specific BEUs for Cobra Greenhood, and 37.347 *specific* BEUs for Green Scentbark.	
Catchment and Land Protection Act 1994	Several weed species listed under the CaLP Act were recorded within the study area. To meet requirements under the CaLP Act, listed noxious weeds should be appropriately controlled throughout the study area.	Planning Permit conditions are likely to include a requirement for a Weed Management Plan.
Water Act 1989	A 'works on waterways' permit is likely to be required from the Port Phillip and Westernport CMA where any action impacts on waterways within the study area.	Obtain a 'works on waterways' permit from Port Phillip and Westernport CMA.
Wildlife Act 1975	Any persons engaged to conduct salvage and translocation or general handling of terrestrial fauna species must hold a current Management Authorisation.	Ensure wildlife specialists hold a current Management Authorisation.

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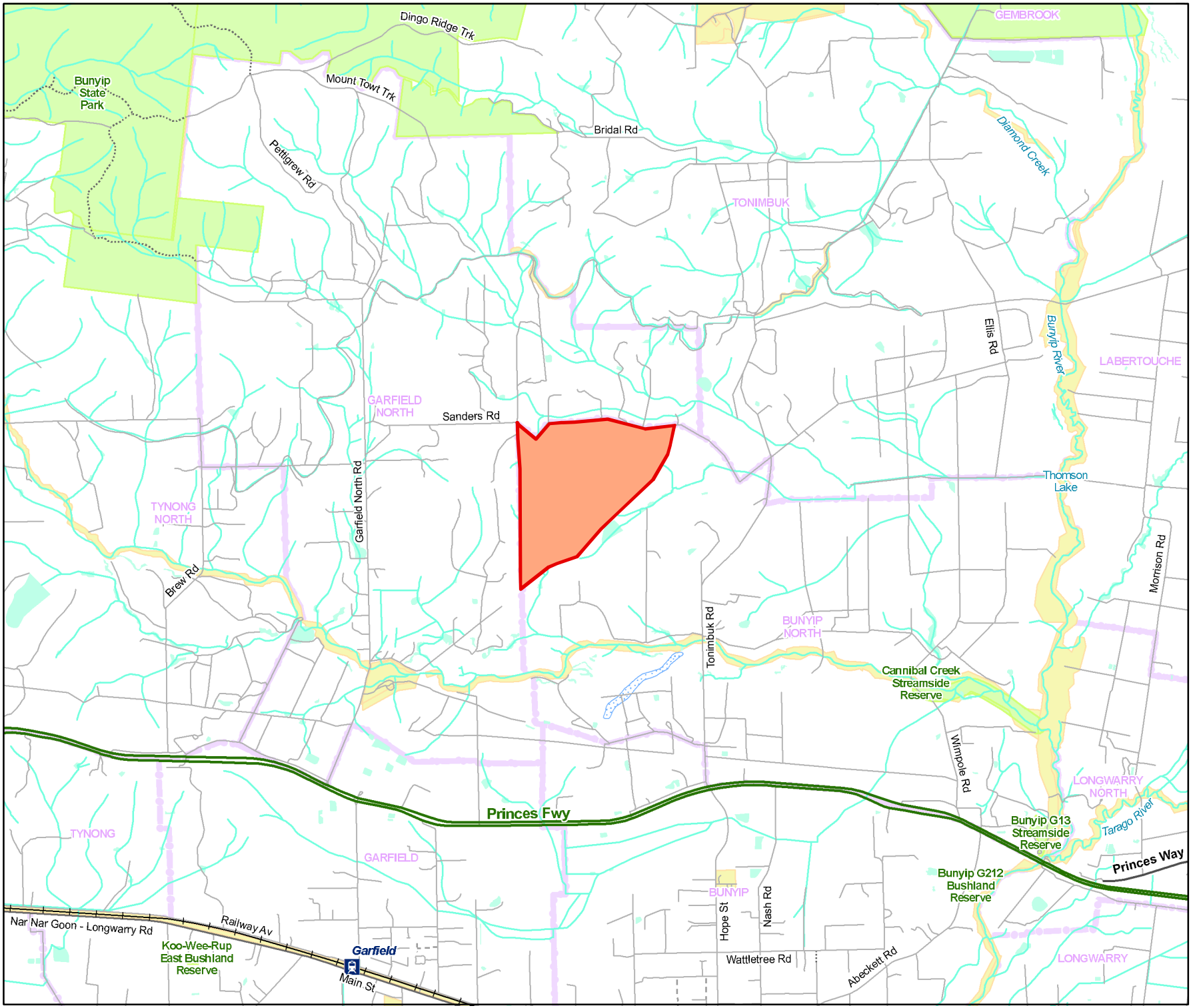
FIGURES



Legend

- Study Area
- Freeway
- Major Road
- Collector Road
- Minor Road
- Proposed Road
- Walking Track
- Minor Watercourse
- Permanent Waterbody
- Land Subject to Inundation
- Parks and Reserves
- Crown Land
- Localities

Figure 1

Location of the study area

Biodiversity Assessment for a proposed hard rock extraction site on Sanders Road, Garfield

N

0 495 990

Metres

ecology & heritage partners

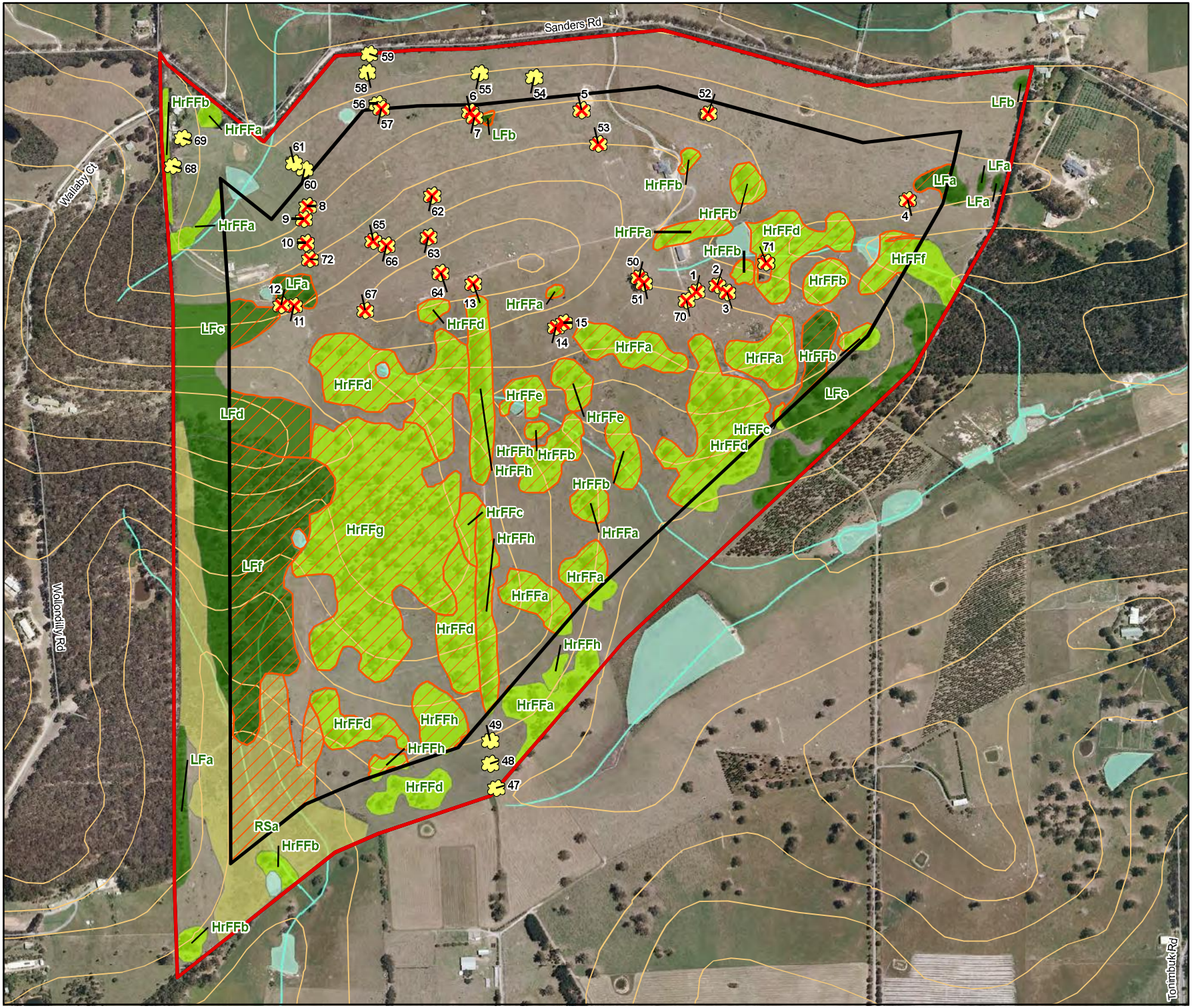
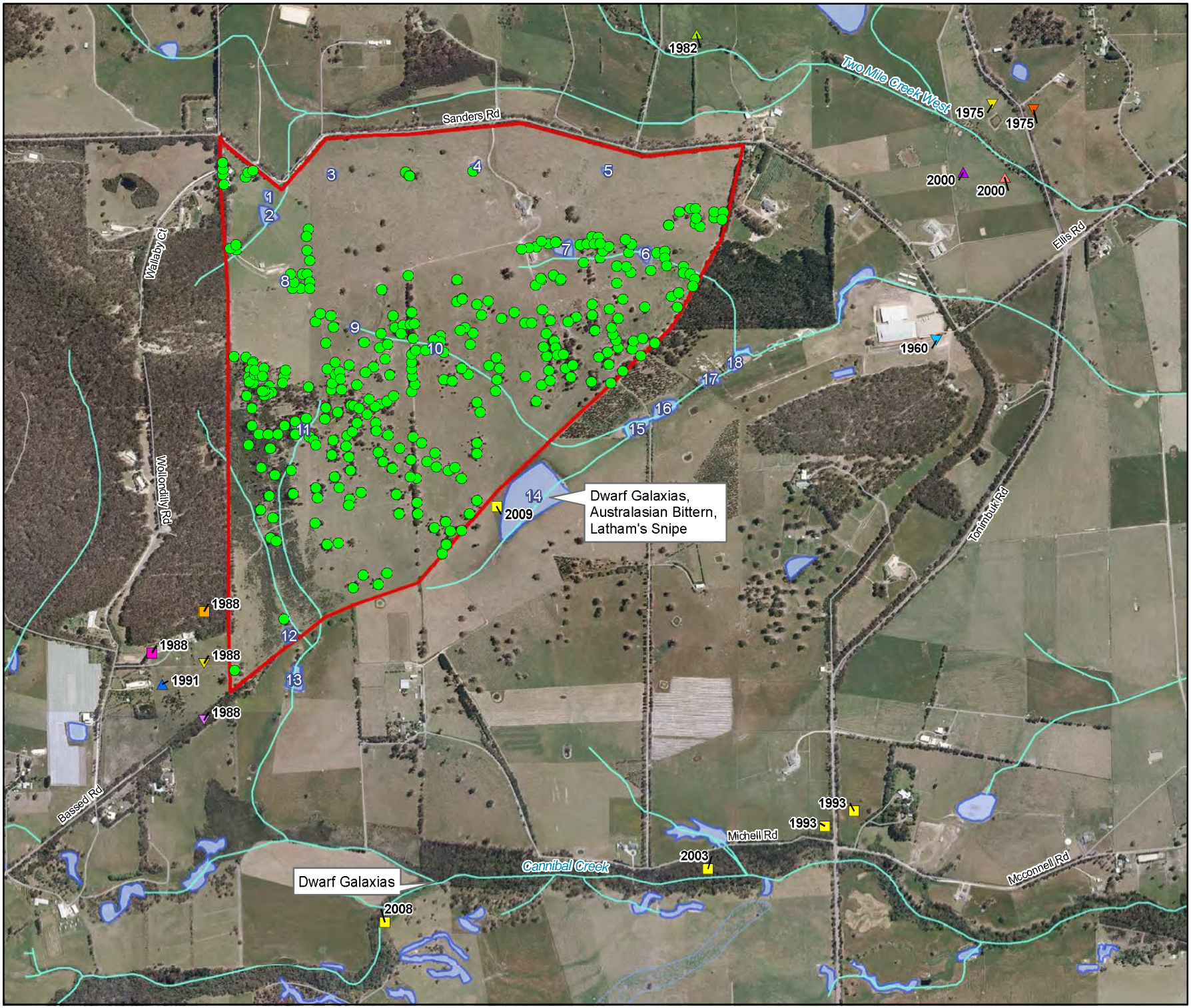


Figure 2a

Ecological features

Biodiversity Assessment for a proposed hard rock extraction site on Sanders Road, Garfield

ecology & heritage partners



Legend

- Study Area
- Large and Very Large Old Trees
- 7 Aquatic habitat
- Minor Watercourse

Significant fauna (VBA 2014)

- Azure Kingfisher
- Barking Owl
- Dwarf Galaxias
- Eastern Great Egret
- Growling Grass Frog
- Powerful Owl
- Royal Spoonbill
- Southern Brown Bandicoot
- Southern Toadlet
- Spotted Quail-thrush
- White-throated Needletail

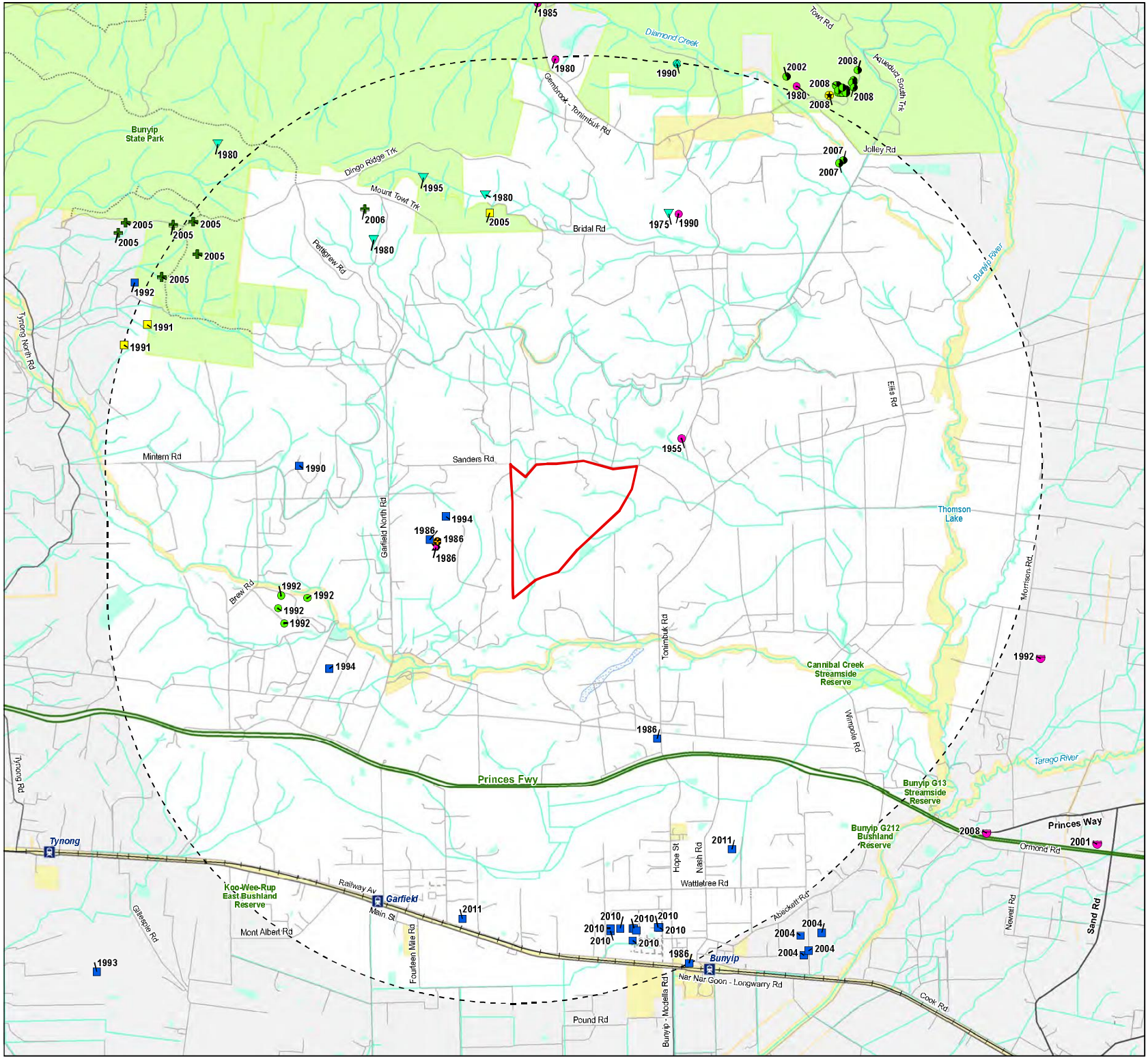
Figure 2b

Fauna habitat

Biodiversity Assessment for a proposed hard rock extraction site on Sanders Road, Garfield

0 200 400
Metres

ecology & heritage partners



Legend

Study Area

Significant flora

- Finger Hakea
- Green Scentbark
- Green-striped Greenhood
- Hoary Rapier-sedge
- Powelltown Correa
- River Leafless Bossiaea
- Slender Tick-trefoil
- Small Fork-fern
- Southern Bristle-sedge
- Strzelecki Gum
- Summer Spider-orchid
- Swamp Bush-pea

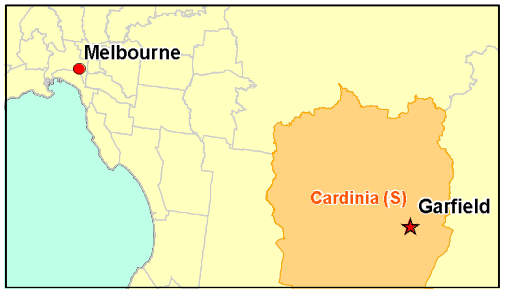


Figure 3

Previously documented significant flora within 5km of the study area

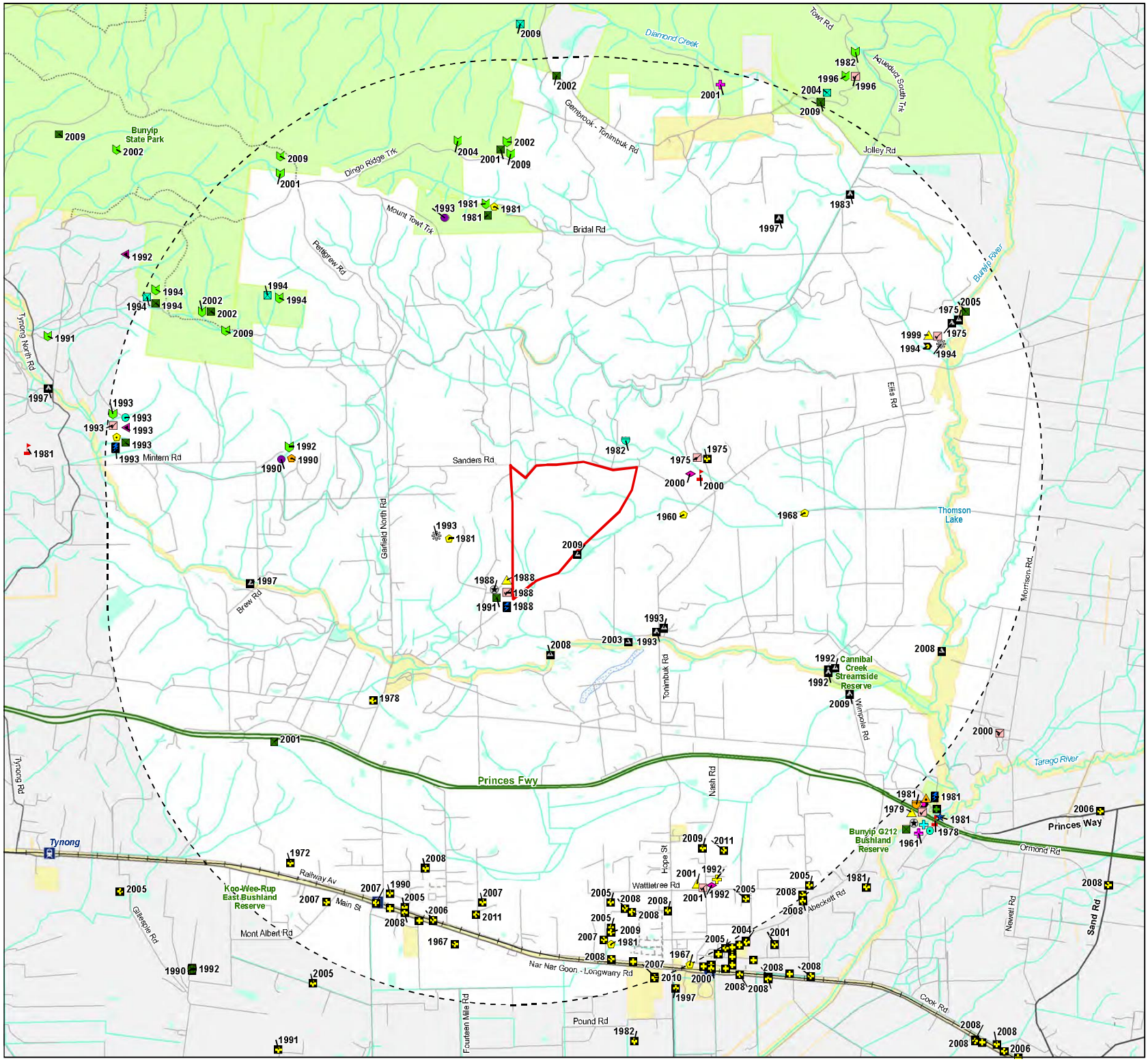
Biodiversity Assessment for a proposed hard rock extraction site on Sanders Road, Garfield

N

0 1 2

Kilometres

ecology & heritage partners



Legend

Study Area

Significant fauna

- Australasian Bittern
- Australasian Shoveler
- Australian Grayling
- Azure Kingfisher
- Barking Owl
- Blue-billed Duck
- Broad-toothed Rat
- Common Bent-wing Bat
- Dwarf Galaxias
- Eastern Great Egret
- Glossy Ibis
- Greater Glider
- Growling Grass Frog
- Hardhead
- Helmeted Honeyeater
- Intermediate Egret
- Latham's Snipe
- Masked Owl
- Musk Duck
- Nankeen Night Heron
- Pied Cormorant
- Powerful Owl
- Royal Spoonbill
- Sooty Owl
- Southern Brown Bandicoot
- Southern Toadlet
- Spotted Quail-thrush
- White-footed Dunnart
- White-throated Needletail

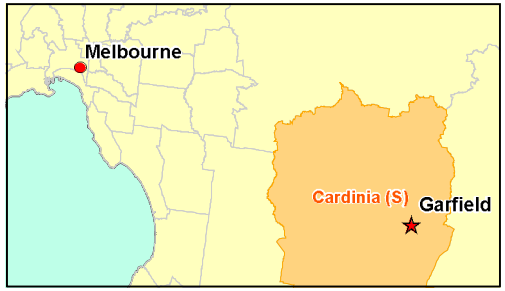


Figure 4

Previously documented significant fauna within 5km of the study area

Biodiversity Assessment for a proposed hard rock extraction site on Sanders Road, Garfield

N

0 1 2

Kilometres

ecology & heritage partners

6427_Fig04_SigFauna 2011/2014 mebber

APPENDICES

APPENDIX 1

Appendix 1.1 – Rare or Threatened Categories for Listed Victorian Taxa

Table A1.1. Rare or Threatened categories for listed Victorian taxa.

Rare or Threatened Categories
Conservation Status in Australia (Based on the EPBC Act 1999)
EX - Extinct: Extinct is when there is no reasonable doubt that the last individual of the species has died.
CR - Critically Endangered: A species is critically endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
EN - Endangered: A species is endangered when it is not critically endangered but is facing a very high risk of extinction in the wild in the near future.
VU - Vulnerable: A species is vulnerable when it is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term future.
R* - Rare: A species is rare but overall is not currently considered critically endangered, endangered or vulnerable.
K* - Poorly Known: A species is suspected, but not definitely known, to belong to any of the categories extinct, critically endangered, endangered, vulnerable or rare.
Conservation Status in Victoria (Based on DEPI 2014e, DSE 2009, DSE 2013)
x - Presumed Extinct in Victoria: not recorded from Victoria during the past 50 years despite field searches specifically for the plant, or, alternatively, intensive field searches (since 1950) at all previously known sites have failed to record the plant.
e - Endangered in Victoria: at risk of disappearing from the wild state if present land use and other causal factors continue to operate.
v - Vulnerable in Victoria: not presently endangered but likely to become so soon due to continued depletion; occurring mainly on sites likely to experience changes in land-use which would threaten the survival of the plant in the wild; or, taxa whose total population is so small that the likelihood of recovery from disturbance, including localised natural events such as drought, fire or landslip, is doubtful.
r - Rare in Victoria: rare but not considered otherwise threatened - there are relatively few known populations or the taxon is restricted to a relatively small area.
k - Poorly Known in Victoria: poorly known and suspected, but not definitely known, to belong to one of the above categories (x, e, v or r) within Victoria. At present, accurate distribution information is inadequate.

Appendix 1.2 – Defining Ecological Significance

Table A1.2. Criteria for defining Ecological Significance ratings for significant flora, fauna and communities.

National Significance
Flora: National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. extinct, critically endangered, endangered, vulnerable).
Fauna: National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. Extinct, Critically Endangered, Endangered, Vulnerable). Fauna listed as Extinct, Critically Endangered, Endangered, Vulnerable, or Rare under National Action Plans for terrestrial taxon prepared for DoE: threatened marsupials and monotremes (Maxwell et al. 1996), rodents (Lee 1995), bats (Duncan et al. 1999), birds (Garnett and Crowley 2000), reptiles (Cogger et al. 1993), amphibians (Tyler 1997) and butterflies (Sands and New 2002).
Communities: Vegetation communities considered critically endangered, endangered or vulnerable under the EPBC Act and considering vegetation condition.
State Significance
Flora: Threatened taxa listed under the provisions of the FFG Act. Flora listed in the State Government's Advisory List of Rare or Threatened Plants in Victoria (DEPI 2014E).
Fauna: Threatened taxon listed under Schedule 2 of the FFG Act. Fauna listed as Extinct, Critically Endangered, Endangered and Vulnerable on the State Government's Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013). Listed as Lower Risk (Near Threatened, Conservation Dependent or Least concern) or Data Deficient under National Action Plans for terrestrial species prepared for the DoE: threatened marsupials and monotremes (Maxwell et al. 1996), rodents (Lee 1995), bats (Duncan et al. 1999), birds (Garnett and Crowley 2000), reptiles (Cogger et al. 1993), amphibians (Tyler 1997) and butterflies (Sands and New 2002).
Communities: Ecological communities listed as threatened under the FFG Act. EVC listed as threatened (i.e. endangered, vulnerable) or rare in a Native Vegetation Plan for a particular bioregion (DSE 2013c) and considering vegetation condition.
Regional Significance
Fauna: Fauna with a disjunct distribution, or a small number of documented recorded or naturally rare in the particular Bioregion in which the study area is located. A particular taxon that is has an unusual ecological or biogeographical occurrence or listed as Lower Risk – Near Threatened, Data Deficient or Insufficiently Known on the State Government's Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013).
Communities: EVC listed as depleted or least concern in a Native Vegetation Plan for a particular bioregion (DSE 2013c) and considering vegetation condition. EVC considered rare by the author for a particular bioregion.
Local Significance
Local significance is defined as flora, fauna and ecological communities indigenous to a particular area, which are not considered rare or threatened on a national, state or regional level.

Appendix 1.3 – Defining Site Significance

Table A1.3. Criteria for defining Site Significance ratings.

National Significance
A site is of National significance if: • It regularly supports, or has a high probability of regularly supporting individuals of a taxon listed as 'Critically Endangered' or 'Endangered' under the EPBC Act and/or under National Action Plans for terrestrial taxon prepared for the DoE. • It regularly supports, or has a high probability of supporting, an 'important population' as defined under the EPBC Act of one or more nationally 'vulnerable' flora and fauna taxon. • It is known to support, or has a high probability of supporting taxon listed as 'Vulnerable' under National Action Plans. • It is known to regularly support a large proportion (i.e. greater than 1%) of a population of a taxon listed as 'Conservation Dependent' under the EPBC Act and/or listed as Rare or Lower Risk (near threatened, conservation dependent or least concern) under National Action Plans. • It contains an area, or part thereof designated as 'critical habitat' under the EPBC Act, or if the site is listed under the Register of National Estate compiled by the Australian Heritage Commission. • It is a site which forms part of, or is connected to a larger area(s) of remnant native vegetation or habitat of national conservation significance such as most National Park, and/or a Ramsar Wetland(s).
State Significance
A site is of State significance if: • It occasionally (i.e. every 1 to 5 years) supports, or has suitable habitat to support taxon listed as 'Critically Endangered' or 'Endangered' under the EPBC Act and/or under National Action Plans. • It regularly supports, or has a high probability of regularly supporting (i.e. high habitat quality) taxon listed as 'Vulnerable', 'Near threatened', 'Data Deficient' or 'Insufficiently Known' in Victoria (DEPI 2014E, 2013), or species listed as 'Data Deficient' or 'Insufficiently Known' under National Action Plans. • It contains an area, or part thereof designated as 'critical habitat' under the FFG Act. • It supports, or likely to support a high proportion of any Victorian flora and fauna taxa. • It contains high quality, intact vegetation/habitat supporting a high species richness and diversity in a particular bioregion. • It is a site which forms part of, or connected to a larger area(s) of remnant native vegetation or habitat of state conservation significance such as most State Parks and/or Flora and Fauna Reserves.
Regional Significance
A site is of Regional significance if: • It regularly supports, or has a high probability of regularly supporting regionally significant fauna as defined in Table 1.2. • Is contains a large population (i.e. greater than 1% or 5%) of flora considered rare in any regional native vegetation plan for a particular bioregion. • It supports a fauna population with a disjunct distribution, or a particular taxon that has an unusual ecological or biogeographical occurrence. • It is a site which forms part of, or is connected to a larger area(s) of remnant native vegetation or habitat of regional conservation significance such as most Regional Parks and/or Flora and Fauna Reserves.
Local Significance
Most sites are considered to be of at least local significant for conservation, and in general a site of local significance can be defined as: • An area which supports indigenous flora species and/or a remnant EVC, and habitats used by locally significant fauna species. • An area which currently acts, or has the potential to act as a wildlife corridor linking other areas of higher conservation significance and facilitating fauna movement throughout the landscape.

Appendix 1.4 – Vegetation Condition and Habitat Quality

Table A1.4.1 Defining Vegetation Condition ratings.

Criteria for defining Vegetation Condition
High Quality: Vegetation dominated by a diversity of indigenous species, with defined structures (where appropriate), such as canopy layer, shrub layer, and ground cover, with little or few introduced species present.
Moderate Quality: Vegetation dominated by a diversity of indigenous species, but is lacking some structures, such as canopy layer, shrub layer or ground cover, and/or there is a greater level of introduced flora species present.
Low Quality: Vegetation dominated by introduced species, but supports low levels of indigenous species present, in the canopy, shrub layer or ground cover.

Table A1.4.2 Defining Habitat Quality.

Criteria for defining Habitat Quality
High Quality: • High degree of intactness (i.e. floristically and structurally diverse), containing several important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component. • High species richness and diversity (i.e. represented by a large number of species from a range of fauna groups). • High level of foraging and breeding activity, with the site regularly used by native fauna for refuge and cover. • Habitat that has experienced, or is experiencing low levels of disturbance and/or threatening processes (i.e. weed invasion, introduced animals, soil erosion, salinity). • High contribution to a wildlife corridor, and/or connected to a larger area(s) of high quality habitat. • Provides known, or likely habitat for one or more rare or threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DEPI 2014E; 2009 or 2013.
Moderate Quality: • Moderate degree of intactness, containing one or more important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component. • Moderate species richness and diversity - represented by a moderate number of species from a range of fauna groups. • Moderate levels of foraging and breeding activity, with the site used by native fauna for refuge and cover. • Habitat that has experienced, or is experiencing moderate levels of disturbance and/or threatening processes. • Moderate contribution to a wildlife corridor, or is connected to area(s) of moderate quality habitat. • Provides potential habitat for a small number of threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DEPI 2014e; 2009 or 2013.
Low Quality: • Low degree of intactness, containing few important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component. • Low species richness and diversity (i.e. represented by a small number of species from a range of fauna groups). • Low levels of foraging and breeding activity, with the site used by native fauna for refuge and cover. • Habitat that has experienced, or is experiencing high levels of disturbance and/or threatening processes. • Unlikely to form part of a wildlife corridor, and is not connected to another area(s) of habitat. • Unlikely to provide habitat for rare or threatened species listed under the EPBC Act, FFG Act, or considered rare or threatened according to DEPI 2014e; 2009 or 2013.

Appendix 1.5 – Offsets and Exemptions

Table A1.5.1. Calculation of Biodiversity Equivalence Scores and General or Specific Offsets (DEPI 2013a)

Pathway	Biodiversity Assessment Tools	Information Source
Low Risk-based pathway	Condition Score	Modelled data, NVIM Tool (DEPI 2014d)
	Habitat Hectares	= Condition Score x Extent (ha)
	Strategic Biodiversity Score	Modelled data, NVIM Tool (DEPI 2014d)
	General Biodiversity Equivalence Score	= Habitat Hectares x Strategic Biodiversity Score
Moderate or High Risk-based pathway	Condition Score	Habitat hectare assessment
	Habitat Hectares	= Condition Score x Extent (ha)
	Strategic Biodiversity Score and Habitat Importance Score	Modelled data, determined by DEPI
	Specific Biodiversity Equivalence Score **(A)**	= Habitat Hectares x Habitat Importance Score
	Sum of Specific Biodiversity Equivalence Scores of remaining habitat **(B)**	Data gathered during the site assessment is provided to DEPI for analysis and a resulting assessment offset report is provided by the Department.
	Specific Offset Threshold **(C)**	
	General/Specific Threshold Test: If **A ÷ B > C** a **Specific** offset is required If **A ÷ B < C** a **General** offset required	

Table A1.5.2. Summary of offset requirements (DEPI 2013a)

Risk –based Pathway	Offset Type	Offset Amount (Risk adjusted biodiversity equivalence score)	Offset Attributes		
			Habitat for Species	Vicinity	Strategic Biodiversity Score
Low Risk	General offset	1.5 times the general biodiversity equivalence score of the native vegetation to be removed.	No restrictions	In the same Catchment Management Authority or Local Government Area boundary as the native vegetation to be removed.	At least 80 per cent of the strategic biodiversity score of the native vegetation to be removed.
Moderate or High Risk	General offset	1.5 times the general biodiversity equivalence score of the native vegetation to be removed.	No restrictions	In the same Catchment Management Authority or Local Government Area boundary as the native vegetation to be removed.	At least 80 per cent of the strategic biodiversity score of the native vegetation to be removed.
Moderate or High Risk	Specific offset	For each species impacted, 2 times the specific biodiversity equivalence score of the native vegetation to be removed.	Likely habitat for each rare or threatened species that a specific offset is required for, according to the specific-general offset test.	No restrictions	No restrictions

Table A1.5.3. Permit exemptions (from *Victorian Planning Provisions* Clause 52.17 -7)

No permit is required to remove, destroy or lop native vegetation to the minimum extent necessary if any of the following apply:	
Property size	A permit is not required for removal of native vegetation if the native vegetation is on land which, together with all contiguous land in one ownership, has an area of less than 0.4 hectares. This exemption does not apply to native vegetation within a road reservation, or where a subdivision is proposed with lots less than 0.4 hectares[4].
Lopping or pruning	Generally, minor lopping or pruning of up to a third of the foliage (not including the trunk) that does not affect the continued health of the tree does not require a permit or attract an offset requirement.
Regrowth	A permit is not generally not required for removal of native vegetation that is For regrowth which has naturally established or regenerated on land lawfully cleared of naturally established native vegetation and is: a) Less than 10 years old; or, b) Bracken (*Pteridium esculentum*); or, c) Less than ten years old at the time of a Property Vegetation Plan being signed by the Secretary of the Department of Sustainability and Environment (as constituted under Part 2 of the *Conservation, Forest and Lands Act 1987*), and is shown on that Plan as being 'certified regrowth', and is on land that is to be used or maintained for cultivation or pasture during the term of that Plan; or, d) Within the boundary of a timber production plantation, as indicated on a Plantation Development Notice or other documented record, and has established after the plantation. This exemption does not apply to land on which native vegetation has been cleared or otherwise destroyed or damaged as a result of flood, fire or other natural disaster.
Weeds	A permit is not required for removal of native vegetation to enable the removal or destruction of a weed listed in the schedule to the clause. The maximum extent of native vegetation removed, destroyed or lopped under this exemption on contiguous land in the same ownership in a five year period must not exceed any of the following: a) 1 hectare of native vegetation which does not include a tree; or, b) 15 native trees if each tree has a DBH of less than 20.
Planted vegetation	The removal of planted trees does not require a permit or attract an offset requirement, except if public funding was provided to assist in planting or managing the native vegetation and the terms of the funding did not anticipate removal or harvesting of the vegetation.
Other	Numerous additional exemptions apply to works relating to approvals granted prior to 15 September 2008, fencing, mowing, stone exploration / extraction, utility maintenance, crown land, emergency works, works in Farming Zone and Rural Activity Zone, fire protection, geothermal energy exploration, grazing, greenhouse gas sequestration, harvesting timber, mineral exploration / extraction, pest animal burrow removal, road safety, stock movement on roads and surveying. See Clause 52.17 -6 for details.

[4] In accordance with the Victorian Civil and Administrative Tribunal's (VCAT) decision Villawood v Greater Bendigo CC (2005) VCAT 2703 (20 December 2005) all native vegetation is considered lost where proposed lots are less than 0.4 hectares in area and must be offset at the time of subdivision.

Appendix 1.6 – Tree Retention Zones

Tree Retention Zones (TRZs) should be implemented to prevent indirect losses of native vegetation during construction activities (DSE 2010). A TRZ applies to a tree and is a specific area above and below the ground, with a radius 12 x the DBH. At a minimum standard a TRZ should consider the following:

- A TRZ of trees should be a radius no less than two metres or greater than 15 metres;
- Construction, related activities and encroachment (i.e. earthworks such as trenching that disturb the root zone) should be excluded from the TRZ;
- Where encroachment exceeds 10% of the total area of the TRZ, the tree should be considered as lost and offset accordingly;
- Directional drilling may be used for works within the TRZ without being considered encroachment. The directional bore should be at least 600 millimetres deep;
- The above guidelines may be varied if a qualified arborist confirms the works will not significantly damage the tree (including stags / dead trees). In this case the tree would be retained and no offset would be required; and,
- Where the minimum standard for a TRZ has not been met an offset may be required.

APPENDIX 2 - FLORA

Appendix 2.1 – Flora Results

Table A2.1. Flora recorded within the study area.

Botanical Name	Common Name	Status
NATIVE SPECIES		
Acacia genistifolia	Spreading Wattle	P
Acacia mearnsii	Black Wattle	P
Acacia melanoxylon	Blackwood	
Acacia paradoxa	Hedge Wattle	
Acacia retinodes s.l.	Wirilda	P
Acacia verticillata	Prickly Moses	
Acaena novae-zelandiae	Bidgee-widgee	
Acianthus spp.	Mosquito Orchid	P
Acrotriche prostrata	Trailing Ground-berry	
Acrotriche serrulata	Honey-pots	
Adiantum aethiopicum	Common Maidenhair	
Allocasuarina littoralis	Black Sheoak	
Amyema pendula	Drooping Mistletoe	
Arthropodium strictum s.l.	Chocolate Lily	
Austrodanthonia spp.	Wallaby Grass	
Austrostipa spp.	Spear Grass	
Azolla pinnata	Ferny Azolla	
Billardiera scandens s.l.	Common Apple-berry	
Brunonia australis	Blue Pincushion	P
Bursaria spinosa subsp. *spinosa*	Sweet Bursaria	
Callitriche muelleri	Round Water-starwort	
Cassinia aculeata	Common Cassinia	P
Cheilanthes sieberi subsp. *sieberi*	Narrow Rock-fern	P
Chrysocephalum semipapposum	Clustered Everlasting	P
Coprosma quadrifida	Prickly Currant-bush	
Craspedia glauca spp. agg.	Common Billy-buttons	P
Crassula helmsii	Swamp Crassula	
Cymbonotus preissianus	Austral Bear's-ear	P
Daucus glochidiatus	Australian Carrot	
Dichondra repens	Kidney-weed	

Botanical Name	Common Name	Status
Drosera peltata subsp. *peltata*	Pale Sundew	
Eleocharis acuta	Common Spike-sedge	
Eleocharis sphacelata	Tall Spike-sedge	
Elymus scaber var. *scaber*	Common Wheat-grass	
Epacris impressa	Common Heath	
Eucalyptus cephalocarpa s.l.	Silver-leaf Stringybark	
Eucalyptus cypellocarpa	Mountain Grey-gum	
Eucalyptus dives	Broad-leaf Peppermint	
Eucalyptus obliqua	Messmate Stringybark	
Eucalyptus radiata	Narrow-leaf Peppermint	
Eucalyptus viminalis subsp. *viminalis*	Manna Gum	
Exocarpos cupressiformis	Cherry Ballart	
Gahnia radula	Thatch Saw-sedge	
Gahnia sieberiana	Red-fruit Saw-sedge	
Geranium solanderi s.l.	Austral Crane's-bill	
Glycine clandestina	Twining Glycine	
Gonocarpus tetragynus	Common Raspwort	
Goodenia lanata	Trailing Goodenia	
Goodenia ovata	Hop Goodenia	
Hibbertia fasciculata var. *prostrata*	Bundled Guinea-flower	
Hydrocotyle laxiflora	Stinking Pennywort	
Hypericum gramineum	Small St. John's Wort	
Isolepis inundata	Swamp Club-sedge	
Juncus pallidus	Pale Rush	
Juncus procerus	Tall Rush	
Juncus subsecundus	Finger Rush	
Kunzea ericoides spp. agg.	Burgan	
Lepidosperma laterale	Variable Sword-sedge	
Lepidosperma longitudinale	Pithy Sword-sedge	
Leptorhynchos tenuifolius	Wiry Buttons	P
Leptospermum continentale	Prickly Tea-tree	
Leptospermum myrsinoides	Heath Tea-tree	
Lomandra filiformis subsp. *filiformis*	Wattle Mat-rush	
Lythrum hyssopifolia	Small Loosestrife	
Melaleuca ericifolia	Swamp Paperbark	
Microlaena stipoides var. *stipoides*	Weeping Grass	
Microtis arenaria	Notch Onion-orchid	P

Botanical Name	Common Name	Status
Myriophyllum sp	Water-milfoil	
Olearia lirata	Snowy Daisy-bush	P
Ottelia ovalifolia subsp. *ovalifolia*	Swamp Lily	
Oxalis perennans	Grassland Wood-sorrel	
Ozothamnus ferrugineus	Tree Everlasting	P
Persicaria decipiens	Slender Knotweed	
Pimelea humilis	Common Rice-flower	
Poa ensiformis	Sword Tussock-grass	
Poa morrisii	Soft Tussock-grass	
Poa sieberiana	Grey Tussock-grass	
Potamogeton ochreatus	Blunt Pondweed	
Pteridium esculentum	Austral Bracken	
Pultenaea scabra	Rough Bush-pea	
Ranunculus lappaceus	Australian Buttercup	
Schoenus apogon	Common Bog-sedge	
Senecio linearifolius	Fireweed Groundsel	P
Senecio quadridentatus	Cotton Fireweed	P
Spyridium parvifolium	Dusty Miller	
Stylidium graminifolium s.l.	Grass Triggerplant	
Tetrarrhena juncea	Forest Wire-grass	
Tetratheca ciliata	Pink-bells	
Themeda triandra	Kangaroo Grass	
Thysanotus patersonii	Twining Fringe-lily	
Tricoryne elatior	Yellow Rush-lily	
Typha orientalis	Broad-leaf Cumbungi	
Viola hederacea sensu Willis (1972)	Ivy-leaf Violet	
Wurmbea dioica	Early Nancy	
EXOTIC SPECIES		
Acetosella vulgaris	Sheep Sorrel	
Agrostis capillaris	Brown-top Bent	
Anthoxanthum odoratum	Sweet Vernal-grass	
Arctotheca calendula	Cape Weed	
Brassica spp.	Turnip	
Briza maxima	Large Quaking-grass	
Bromus catharticus	Prairie Grass	
Bromus hordeaceus subsp. *hordeaceus*	Soft Brome	
Centaurium spp.	Centaury	

Botanical Name	Common Name	Status
Chenopodium album	Fat Hen	
Cirsium vulgare	Spear Thistle	N
Conyza bonariensis	Flaxleaf Fleabane	
Cupressus spp.	Cypress	
Cynodon dactylon var. *dactylon*	Couch	
Cynosurus echinatus	Rough Dog's-tail	
Cyperus eragrostis	Drain Flat-sedge	
Dactylis glomerata	Cocksfoot	
Digitaria sanguinalis	Summer Grass	
Ehrharta erecta var. *erecta*	Panic Veldt-grass	
Erica lusitanica	Spanish Heath	
Galium aparine	Cleavers	
Gamochaeta purpurea i	Purple Cudweed	
Genista linifolia	Flax-leaf Broom	N
Holcus lanatus	Yorkshire Fog	
Hordeum spp.	Barley Grass	
Hypochoeris radicata	Flatweed	
Juncus acuminatus	Sharp-fruited Rush	
Lolium perenne	Perennial Rye-grass	
Lotus corniculatus var. *corniculatus*	Bird's-foot Trefoil	
Malva parviflora	Small-flower Mallow	
Oxalis pes-caprae	Soursob	N
Paspalum dilatatum	Paspalum	
Pennisetum clandestinum	Kikuyu	
Phalaris aquatica	Toowoomba Canary-grass	
Phalaris minor	Lesser Canary-grass	
Pinus radiata	Radiata Pine	
Pittosporum undulatum	Sweet Pittosporum	#
Plantago coronopus	Buck's-horn Plantain	
Plantago lanceolata	Ribwort	
Poa annua	Annual Meadow-grass	
Polygonum aviculare s.l.	Prostrate Knotweed	
Prunella vulgaris	Self-heal	
Prunus spp.	Prunus	
Romulea rosea	Onion Grass	
Rubus fruticosus spp. agg.	Blackberry	N, W
Rumex conglomeratus	Clustered Dock	

Botanical Name	Common Name	Status
Setaria parviflora	Slender Pigeon Grass	
Solanum nigrum sensu *Willis (1972)*	Black Nightshade	
Sporobolus africanus	Rat-tail Grass	
Trifolium repens var. *repens*	White Clover	
Ulex europaeus	Gorse	N, W

Notes: P = Protected under the FFG Act; W = Weed of National Significance; N = Noxious Weed; # = Native species growing outside of natural range

Appendix 2.2 – Significant Flora Species

Table A2.2 Significant flora recorded within 10 kilometres of the study area

Key:

X	Extinct
e	Endangered
v	Vulnerable
r	Rare
k	Poorly Known
L	Listed
EX	Extinct
CR	Critically endangered
EN	Endangered
VU	Vulnerable
K	Poorly Known (Briggs and Leigh 1996)
#	Records identified from EPBC Act Protected Matters Search Tool.
*	Records identified from the FIS

EPBC	Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
FFG	Flora and Fauna Guarantee Act 1988 (FFG Act)
DSE	Advisory List of Threatened Flora in Victoria (DEPI 2014e)
1	*Known Occurrence :* Recorded within the study area recently (i.e. within ten years)
2	*High Likelihood:* Previous records of the species in the local vicinity; and/or, the study area contains areas of high quality habitat.
3	*Moderate Likelihood*: Limited previous records of the species in the local vicinity; and/or, the study area contains poor or limited habitat.
4	*Low Likelihood*: Poor or limited habitat for the species however other evidence (such as a lack of records or environmental factors) indicates there is a very low likelihood of presence.
5	*Unlikely*: No suitable habitat and/or outside the species range.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DSE	Likelihood of occurrence in study area
NATIONAL SIGNIFICANCE							
# Amphibromus fluitans	River Swamp Wallaby-grass	-	-	VU	-	-	4
# Caldenia orientalis	Eastern Spider-orchid	-	-	EN	L	e	3
# Dianella amoena	Matted Flax-lily	-	-	EN	L	e	3
# Eucalyptus strzeleckii	Strzelecki Gum	36	2008	VU	L	v	2

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DSE	Likelihood of occurrence in study area
# *Glycine latrobeana*	Clover Glycine	-	-	VU	L	v	4
# *Prasophyllum frenchii*	Maroon Leek-orchid	-	-	EN	L	e	3
# *Pterostylis chlorogramma*	Green-striped Greenhood	28	2009	VU	L	v	2
STATE SIGNIFICANT							
**Acacia leprosa* var. *uninervia*	Large-leaf Cinnamon Wattle	1	2005	-	-	r	4
Allocasuarina media	Prom Sheoak	1	1982	-	-	k	4
Bossiaea riparia	River Leafless Bossiaea	1	1986	-	-	r	4
Burnettia cuneata	Lizard Orchid	1	1770	-	-	r	3
Caladenia flavovirens	Summer Spider-orchid	1	1986	-	-	r	3
Cardamine tenuifolia	Slender Bitter-cress	3	1996	-	-	k	3
Carex alsophila	Forest Sedge	2	1980	-	-	r	3
Cephalomanes caudatum	Jungle Bristle-fern	2	1980	-	-	r	4
Chiloglottis jeanesii	Mountain Bird-orchid	1	1998	-	-	r	3
Chorizandra australis	Southern Bristle-sedge	1	1990	-	-	k	4
Correa reflexa var. *lobata*	Powelltown Correa	10	2008	-	-	r	3
Corybas aconitiflorus	Spurred Helmet-orchid	1	1934	-	-	r	3
Desmodium varians	Slender Tick-trefoil	3	2005	-	-	k	3
Eucalyptus fulgens	Green Scentbark	29	2011	-	-	r	2
Eucalyptus yarraensis	Yarra Gum	1	1853	-	-	r	3
* *Eucalyptus* sp. aff. *camphora* (Bunyip)	Giant Swamp-gum	6	1980	-	-	v	3
Gahnia grandis	Brickmaker's Sedge	4	1980	-	-	v	3
Grevillea barklyana	Gully Grevillea	6	1973	-	L	v	3
Hakea dactyloides	Finger Hakea	1	2008	-	-	r	3

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DSE	Likelihood of occurrence in study area
Lastreopsis hispida	Bristly Shield-fern	2	1934	-	-	r	3
Lepidosperma canescens	Hoary Rapier-sedge	4	1992	-	-	r	3
Olearia asterotricha	Rough Daisy-bush	2	1980	-	-	r	3
Oxalis thompsoniae	Fluffy-fruit Wood-sorrel	1	1982	-	-	k	3
* *Prasophyllum pyriforme* s.s.	Silurian Leek-orchid	1	1932	-	-	e	3
Pultenaea weindorferi	Swamp Bush-pea	18	2004	-	-	r	2
Schoenus carsei	Wiry Bog-sedge	1	1982	-	-	r	3
Sowerbaea juncea	Rush Lily	1	1993	-	-	r	3
Tetratheca stenocarpa	Long Pink-bells	6	1982	-	-	r	2
Thelymitra longiloba	Marsh Sun-orchid	4	1941	-	-	e	2
Tmesipteris parva	Small Fork-fern	6	1995	-	-	r	3