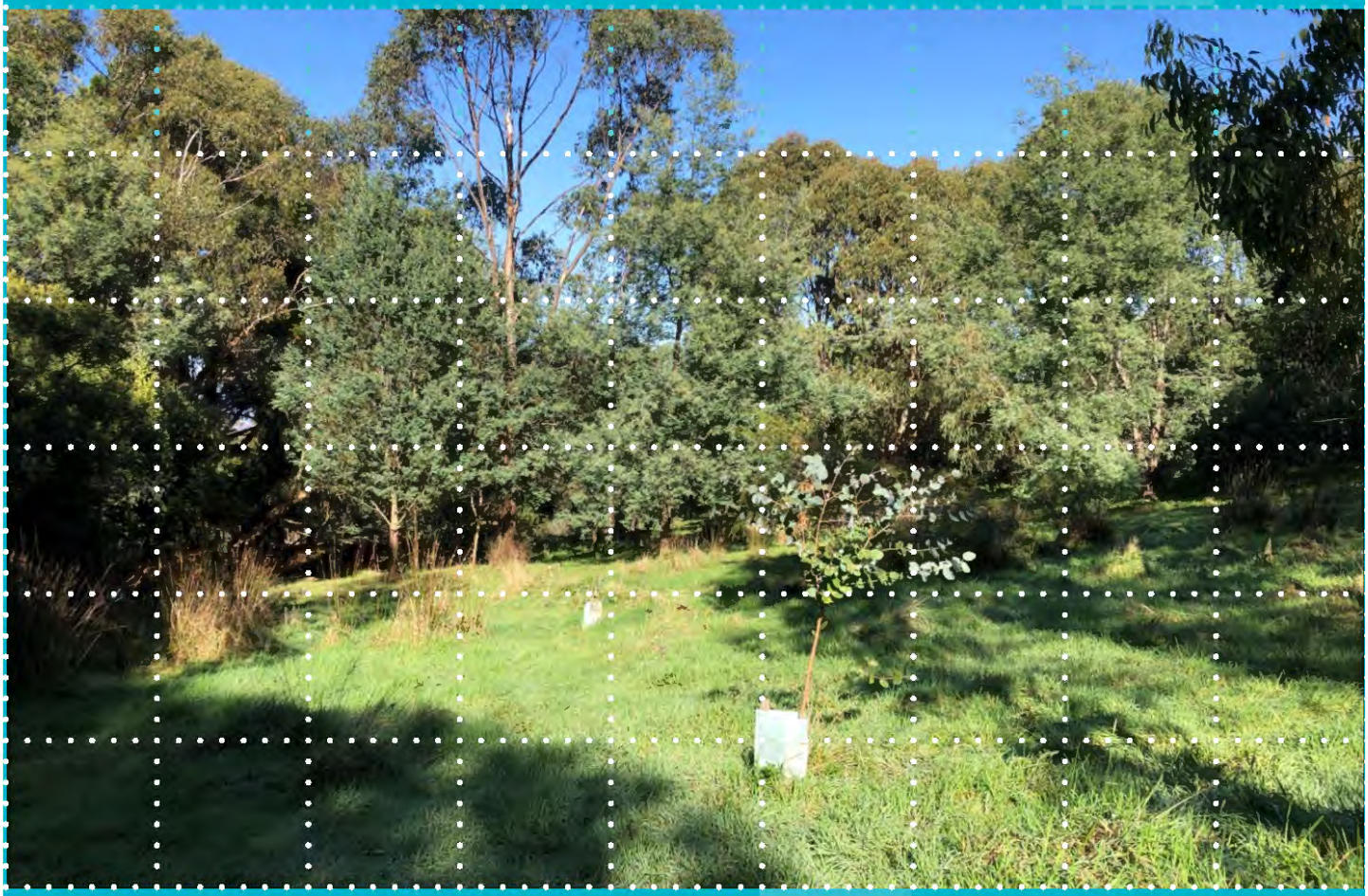
Final Report

Biodiversity Assessment: Mt Shamrock Quarry, Mt Shamrock Road, Pakenham, Victoria

Prepared for

Umwelt c\- Holcim (Australia) Pty Ltd

October 2024



Ecology and Heritage Partners Pty Ltd

MELBOURNE: 292 Mt Alexander Road, Ascot Vale VIC 3032 **GEELONG:** 230 Latrobe Terrace, Geelong West VIC 3218
BRISBANE: Level 22, 127 Creek Street, Brisbane QLD 4000 **ADELAIDE**: 78 Edmund Avenue, Unley SA 5061
CANBERRA: 19-23 Moor Street, Turner ACT 2612 **SYDNEY:** Level 5, 616 Harris Street, Ultimo NSW 2007
www.ehpartners.com.au | 1300 839 325

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Project manager	Claire Ranyard (Associate Botanist)
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Note: SLB – Shannon LeBel (Associate Ecologist).

Ecology and Heritage Partners acknowledge the Traditional Owners of the country we live and work on, and we pay our respect to Elders past, present and emerging.

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INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by Umwelt Pty Ltd on behalf of Holcim (Australia) Pty Ltd (Holcim) to undertake a Biodiversity Assessment at Mt Shamrock Quarry, Mt Shamrock Road, Pakenham, Victoria.

The broader property that the study area occurs within is an operating quarry that commenced operation in 1974, and currently operates under Work Authority WA 174. The quarry produces a range of construction related materials that are relied upon by a variety of industries. To meet the anticipated future demands for these products, Mount Shamrock Quarry is seeking to expand its existing approved extraction limit area to allow for an increase in size of the current main extraction pit and associated access roads.

We understand that Holcim is proposing to submit a Work Plan variation in order to facilitate expansion of the existing quarry operations. A preliminary site assessment was completed on the 11th October 2023 to understand the potential ecological values present within the study area, which identified suitable habitat for several significant fauna species (Ecology and Heritage Partners 2024a). Targeted fauna surveys were subsequently completed for these species, and the methods and results of these surveys are presented in Appendix 5 (Ecology and Heritage Partners 2024b).

The purpose of this assessment was to identify the extent and type of native vegetation present within the study area and to determine the likely presence of significant flora and fauna species and/or ecological communities. This report presents the results of the assessment and discusses the potential ecological and legislative implications associated with the proposed action.

1.2 Study Area

The study area is located within Mt Shamrock Quarry, Mt Shamrock Road, Pakenham (2\LP200083) and is approximately 65 kilometres south-east of Melbourne's CBD (Figure 1). It covers the proposed expansion area of the existing quarry operation, but does not include the existing extraction area or associated infrastructure within the current approved Work Plan (as this is subject to previous approval) (Figure 2).

The study area covers approximately 10.66 hectares and is bound by Huxtable Road Horseriding Reserve to the north, the existing quarry to the south and west, and adjacent agricultural grazing land to the east.

The study area currently contains areas of revegetation, internal gravel access roads and small areas of remnant vegetation. An embankment runs along the northern and eastern boundaries, which has been planted with a mixture of eucalypt and acacia species, now relatively mature. Two small dams were present along the eastern border, along with a depression at the base of the remnant stand of vegetation containing shallow water. A planted row of Blue-gum *Eucalyptus globulus* occurs directly south of this depression on an embankment, which has likely attributed to the creation of a shallow waterbody at this location.

According to the Victorian Department of Energy, Environment and Climate Action (DEECA) NatureKit Map (DEECA 2024a), the study area is located within the Highlands – Southern Fall bioregion, Melbourne Water Catchment Management Authority (CMA) and Cardinia Shire municipality.

2 METHODS

2.1 Desktop Assessment

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

- The DEECA NatureKit Map (DEECA 2024a) and Native Vegetation Regulation (NVR) Map (DEECA 2024b) for:
    - Modelled data for location risk, native vegetation patches, scattered trees and habitat for rare or threatened species; and,
    - The extent of historic and current Ecological Vegetation Classes (EVCs).
- EVC benchmarks (DEECA 2024c) for descriptions of EVCs within the relevant bioregion;
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DEECA 2024d);
- The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DCCEEW 2024);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened (DEECA 2024e) and Protected (DEECA 2024f) Lists;
- The online VicPlan Map (Department of Transport and Planning [DTP] 2024) to ascertain current zoning and environmental overlays in the study area;
- Aerial photography of the study area; and,
- Previous ecological assessments relevant to the study area; including;
    - Preliminary Ecological Assessment: Mount Shamrock Quarry, Pakenham, Victoria. Ecology and Heritage Partners 2024a.
    - Holcim Quarry Mt Shamrock 2022 Rehabilitation Report. Naturelinks Landscape Management Pty Ltd.
    - Holcim Quarry Mt Shamrock – 2021 Rehabilitation Report. Naturelinks Landscape Management Pty Ltd.

2.2 Field Assessment

A field assessment was undertaken by a habitat hectare assessor, who is accredited by DEECA in the habitat hectare assessment methodology, on 2 May 2024 to obtain information on flora and fauna values within the study area. The study area was walked, with all commonly observed vascular flora and fauna species recorded, significant records mapped, and the overall condition of vegetation and habitats noted. EVCs were determined

with reference to DEECA pre-1750 and extant EVC mapping (DEECA 2024a) and their published descriptions (DEECA 2024c).

Where native vegetation was identified a habitat hectare assessment was undertaken following the methodology described in the Vegetation Quality Assessment Manual (Department of Sustainability and Environment [DSE] 2004).

2.3 Removal, Destruction or Lopping of Native Vegetation (the Guidelines)

The clearing of native vegetation for mining and extractive industries is exempt from the requirement for a planning permit under the *Planning and Environment Act 1987* subject to an assessment as part of the work plan approval process required under the *Mineral Resources (Sustainable Development) Act 1990* (MRSD Act). The removal of native vegetation for the Earth Resources Industry (ERI) is regulated through the Mining and Extractive Industry Work Plan Process.

The Mining and Extractive Industry Work Plan Process recognises that native vegetation should be assessed and offset in accordance with the relevant legislation (i.e. *Guidelines for the removal, destruction or lopping of native vegetation* (the Guidelines) (DELWP 2017).

2.4 Assessment Qualifications and Limitations

This report has been written based on the quality and extent of the ecological values and habitat considered to be present or absent at the time of the desktop and/or field assessments being undertaken.

The 'snapshot' nature of a standard biodiversity assessment, along with seasonal constraints associated with the timing of the survey, meant that migratory, transitory or uncommon fauna species may have been absent from typically occupied habitats at the time of the field assessment. In addition, annual or cryptic flora species such as those that persist via underground tubers may also be absent.

A comprehensive list of all terrestrial flora and fauna present within the study area was not undertaken as this was not the objective of the assessment. Rather a list of observed species was recorded to inform the habitat hectare assessment and assist in determining the broader biodiversity values present within the study area.

Ecological values identified within the study area were recorded using a hand-held GPS or tablet with an accuracy of +/-3 metres. This level of accuracy is considered to provide an accurate assessment of the ecological values present within the study area; however, this data should not be used for detailed surveying purposes.

The terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources is considered to inform an accurate assessment of the ecological values present, or likely to be present within the study area.

3 RESULTS

3.1 Vegetation Condition

The vegetation within the study area largely contained planted native and indigenous vegetation, which has been gradually replanted since around 1988. Prior to the commencement of revegetation, the study area largely contain exposed soil cleared of vegetation (Plate 1). A few treed areas were retained during the initial clearing undertaken within the study area, present within the southern and northern sections (Plate 1). These areas aligned with the remnant patches of native vegetation identified during the current site assessment, which remained amongst the revegetated areas (Figure 2).

Plate 1. Historic aerial of Mount Shamrock Quarry with approximate location of current study area circled in red (Holcim Australia Pty Ltd).

Sixty-eight (68) flora species were observed within the study area, including 37 indigenous and 31 non-indigenous species. A list of all flora species recorded during the field assessment are provided in Appendix 1.1. Specific details relating to observed EVCs are provided below.

3.1.1 Patches of Native Vegetation

Native vegetation in the study area is representative of four EVCs: Damp Forest (EVC 29), Aquatic Herbland (EVC 48), Shrubby Foothill Forest (EVC 45) and Lowland Forest (EVC 16). The presence of Damp Forest, Shrubby Foothill Forest and Lowland Forest are broadly consistent with the modelled extent (2005) native vegetation mapping (DEECA 2024a). Aquatic Herbland was mapped within two low-lying areas within the study area, where the topography and flora species present best represented the Aquatic Herbland EVC.

The results of the habitat hectare assessment are provided in Appendix 1.2.

Damp Forest

Damp Forest is characterised by a tall eucalypt canopy, often with a prominent shrub layer and an understorey of native grasses, herbs and ferns (DEECA 2024c).

Four habitat zones of Damp Forest (DF) were mapped within the study area (Figure 2). All occurred in the south eastern portion of the study area and were surrounded by planted vegetation.

The larger habitat zone (DF1 on Figure 2) contained a canopy dominated by Messmate Stringybark *Eucalyptus obliqua*. A sparse shrub layer was present, containing the occasionally Shiny Cassinia *Cassinia longifolia*, Kangaroo Apple *Solanum aviculare*, Blackwood *Acacia melanoxylon* and recruiting eucalyptus (Plate 2).

The understorey contained a low cover of Weeping Grass *Microlaena stipoides* var. *stipoides,* Bidgee-widgee *Acaena novae-zelandiae*, Fishbone Water-fern *Blechnum nudum* and Mother Shield-fern *Polystichum proliferum* (Plate 2Plate 3).

Habitat zone DF3 contained several Swamp Gums *Eucalyptus ovata*, with several age cohorts present. The understorey contained limited native species, with scattered Weeping Grass and Bidgee-widgee present.

The remaining patches of Damp Forest (DF2 and DF4) were represented by either a cover of Rush Juncus sp. or Bidgee-widgee, where the projective foliage cover was approximately 30% within the mapped habitat zone (Plate 4; Plate 5).

Plate 2. Damp Forest recorded within the study area (DF1 on Figure 2) (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 3. Native ferns within the understorey of Damp Forest (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 4. Rush recorded within a Damp Forest habitat zone within the study area (DF2 on Figure 2) (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 5. Bidgee-widgee recorded within a Damp Forest habitat zone within the study area (DF4 on Figure 2) (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Aquatic Herbland

Aquatic Herbland is characterised by permanent to semi-permanent wetlands dominated by aquatic sedges or aquatic herbs, typically on heavy clays (DEECA 2024c).

Two habitat zones of Aquatic Herbland (AH) were mapped within the study area. Habitat zone AH1 was mapped within a shallow depression which has formed at the base of DF1 in response to the created embankment of planted Blue-gums along the southern boundary of the habitat zone, where the natural flow of water down the slope has been disrupted and now pools at this location (Figure 2). Slender Knotweed *Persicaria decipiens* is the main native flora species within this patch, with scattered Rush *Juncus* sp. and Common Reed *Phragmites australis* present (Plate 6). Habitat zone AH2 occurred in a small dam along the eastern boundary, which contained Slender Knotweed (Plate 7).

Plate 6. Depression where Aquatic Herbland was mapped at the base of DF1 (AH1 on Figure 2) (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 7. Slender Knotweed dominated Aquatic Herbland habitat zone (AH2 on Figure 2) (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Lowland Forest

Lowland Forest is characterised by a tall eucalypt forest that contains a diversity of shrubs, grasses and herbs in the understorey (DEECA 2024c).

Lowland Forest was mapped in a small section of the north western portion of the study area (Figure 2). The vegetation within this section contained a canopy of Narrow-leaf Peppermint *Eucalyptus radiata*, and an open grassy understory of Spear-grass *Austrostipa* sp. and Wallaby-grass *Rytidosperma* sp. (Plate 8; Plate 9).

Plate 8. Lowland Forest mapped within the north western portion of the study area (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 9. Lowland Forest mapped within the north western portion of the study area (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Shrubby Foothill Forest EVC

Shrubby Foothill Forest occurs in association with Damp Forest and Wet Forest EVCs on ridges and easterly / southerly slopes (DEECA 2024c). The EVC is characterized by a eucalypt forest over a diverse shrub layer, with a range of ferns, grasses and herbs in the understorey (DEECA 2024c).

Two habitat zones of Shrubby Foothill Forest (SFF) were mapped within the study area (Figure 2). Habitat zone SFF1 contained young Blackwood, Black Wattle *Acacia dealbata*, Rush and Bidgee-widgee (Plate 10; Plate 11). Habitat zone SFF2 contained an understorey of Bidgee Widgee and recruiting Black Wattle, which was present amongst a canopy of planted Black Wattle.

Plate 10. Shrubby Foothill Forest in the background (with planted eucalyptus behind it) (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 11. Shrubby Foothill Forest within the study area (Ecology and Heritage Partners Pty Ltd 02/05/2024).

3.1.2 Large Trees in Patches

A total of 14 Large Trees (LTs) in Damp Forest and Lowland Forest patches were present (Figure 2). Most of these specimens were Messmate Stringybark, with occasional Swamp Gum and Narrow-leaf Peppermint also present (Plate 12; Plate 13; Appendix 1.3).

Plate 12. Large Swamp Gum mapped within a Damp Forest habitat zone (Tree ID 1 on Figure 2) (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 13. Large Stag mapped within the Lowland Forest habitat zone (Tree ID 12 on Figure 2) (Ecology and Heritage Partners Pty Ltd 02/05/2024).

3.1.3 Scattered Trees

No scattered trees were recorded within the study area.

3.1.4 Introduced and Planted Vegetation

The study area was largely cleared of remnant vegetation in the 1980s, during the early operational years of the quarry (refer Section 3.1). The soil profile was modified during this time, creating embankments / bund walls / access tracks throughout the study area. Since this time, the study area has undergone large scale revegetation, and has been planted and direct seeded with a mixture of Australian native and indigenous plants. Much of this revegetation has been completed by Naturelinks Landscape Management and documented in their Rehabilitation reports prepared for the quarry. The revegetated areas were evident throughout the study area, either distinct by the tree guards, linear rows of planted vegetation on the northern and eastern boundary, similar age cohorts of vegetation and through the review of the Rehabilitation plans and aerial imagery. Planted species contained a mixture of eucalypt, wattle and understorey shrubs, and direct seeded areas were primarily with native grasses (Naturelinks Landscape Management 2021; 2022) (Plate 14; Plate 15).

Excluding the revegetated areas and areas mapped to contain patches of native vegetation, one main area remained which was dominated by exotic pasture grasses. This area occurred south of the mapped SSF1 patch (Figure 2) and contained a high cover of Yorkshire Fog *Holcus lanatus* and Sweet Vernal-grass *Anthoxanthum odoratum* (Plate 16). Scattered Black Wattle and Rush were present within this area, however did not meet the projective foliage cover of 25% to be mapped as a patch under the Guidelines (DELWP 2017).

Noxious weeds, as defined under the *Catchment and Land Protection Act 1994* (CaLP Act), were present within the study area in low numbers, including Spear Thistle *Cirsium vulgare*, Hawthorn *Crataegus monogyna* and Blackberry *Rubus fruticosus* spp. agg. (Plate 17). Weed control works are undertaken by Naturelinks Land Management on a regular basis throughout the broader property (Naturelinks Land Management 2018; 2020; 2021; 2022).

Plate 14. A row of planted Sugar Gums along the study area's northern boundary (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 15. Embankment within the study area with planted vegetation (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 16. Open grassy area dominated by Yorkshire Fog and Sweet Vernal-grass (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 17. Spear Thistle recorded within the study area (Ecology and Heritage Partners Pty Ltd 02/05/2024).

3.2 Fauna Habitat

Several forms of fauna habitat were observed within the study area, including open areas of exotic grass, forested areas and wetlands/dams. These are summarised below.

Open Grassland

The north eastern portion of the study area contained an open grassed area, dominated by exotic grasses such as Yorkshire Fog and Sweet Vernal-grass. At the time of the assessment, Eastern Grey Kangaroo and Scarlet Robin were the two main fauna species observed within this area.

These areas are likely to be used as a foraging resource by additional common generalist bird species which are tolerant of modified open areas, such as Australian Magpie *Cracticus tibicen*, Common Blackbird *Turdus merula*, Little Raven *Corvus mellori*, Magpie-lark *Grallina cyanoleuca*, House Sparrow *Passer domesticus*, Willie

Wagtail *Rhipidura leucophrys*, Red Fox *Vulpes vulpes* and European Rabbit *Oryctolagus cuniculus*. The Red Fox and European Rabbit are listed as pest animals under the CaLP Act.

Forests (remnant and planted)

Forest vegetation occurred throughout most of the study area and provides an important resource for arboreal fauna. Much of the forests were establishing eucalypt and acacia from the revegetation efforts of the quarry, which also included a range of understorey and midstorey flora species indigenous to the area. As much of the vegetation was planted post 1988, large hollow-bearing trees were limited to areas where past clearing had not occurred (i.e. Damp Forest and Lowland Forest mapped habitat zones). The forested areas are most likely used by common woodland bird and more mobile fauna species who may feed on the flowering eucalyptus, such as Grey Fantail *Rhipidura albiscapa*, Rainbow Lorikeet *Trichoglossus haematodus*, Crimson Rosella *Platycercus elegans*, Silvereye *Zosterops lateralis* and Grey Butcherbird *Cracticus torquatus*.

A number of Common Wombat *Vombatus ursinus* burrows were present throughout the forested areas, and a Short-beaked Echidna *Tachyglossus aculeatus* was foraging within the large Damp Forest habitat zone.

Waterbodies

There were constructed waterbodies throughout the study area in the form of two dams and one depression. Two of these, the larger dam and the depression, contained semi aquatic native vegetation. The smaller dam did not contain any aquatic vegetation but was located within very close proximity to the other dam, surrounded by acacia and eucalypt.

A flock of Yellow-tail Black Cockatoos *Zanda funerea* were observed drinking from the larger dam, along with Crimson Rosella and Red Wattlebird *Anthochaera carunculata*. Common Eastern Froglet *Crinia signifera*, Eastern Sign-bearing Froglet *Crinia parinsignifera* and Brown Tree Frog *Litoria ewingii* were heard calling within the waterbodies during the targeted surveys completed for Southern Toadlet *Pseudophryne semimarmorata* (Appendix 5; Ecology and Heritage Partners 2024b).

These water resources are likely to provide habitat a range of common fauna species such as Eastern Grey Kangaroo, as well as a resource for numerous birds foraging in the surrounding forest.

3.3 Significance Assessment

3.3.1 Flora

The VBA contains records of six nationally significant (i.e. under the EPBC Act) and 45 State significant (i.e. under the FFG Act) flora species previously recorded within 10 kilometres of the study area (DEECA 2023a) (Figure 3). The PMST nominated an additional 15 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DCCEEW 2024) (Appendix 1.4).

No national or State significant flora species were recorded during the site assessment. The study area was largely cleared in the 1980's and has been gradually revegetated since this time. As a result, limited areas of habitat likely to contain significant flora species remained within the study area. Within these areas (i.e. areas mapped to contain remnant native vegetation) the understorey was largely dominated by exotic grasses and common native species characteristic of the mapped EVCs (as described in Section 3.1). The past records for

significant flora species in the local area occur within forested areas to the west and north, where a variety of significant flora species occur in proximity to each other, primarily small herbs, shrubs and orchids (Figure 3).

Based on the general modified condition of the vegetation and distribution of past significant flora species records in the local area, no national or State significant flora species are likely to occur within the study area.

3.3.2 Fauna

The VBA contains records of 22 nationally significant (i.e. under the EPBC Act) and 23 State significant (i.e. under the FFG Act) fauna species previously recorded within 10 kilometres of the study area (DEECA 2024d) (Figure 4). The PMST nominated an additional 25 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DCCEEW 2024) (Appendix 2.1).

Habitat for two nationally significant fauna species, Gang-gang Cockatoo Cockatoo *Callocephalon* and Blue-winged Parrot, and three State significant fauna species, Southern Toadlet *Pseudophryne semimarmorata*, Powerful Owl *Ninox strenua* and Sooty Owl *Tyto tenebricosa*, was identified within the study area during the preliminary ecological assessment (Ecology and Heritage Partners 2024a). Targeted surveys were completed for these fauna species, and the methods, results and discussion of the targeted surveys are presented in Appendix 5 (Ecology and Heritage Partners 2024b). A summary of the key findings is provided below.

Gang-gang Cockatoo was observed within the study area during the avifauna surveys completed for the project (Ecology and Heritage Partners 2024b; Appendix 5). This species was incidentally observed around the site offices. Gang-gang Cockatoo has also been observed by Naturelinks over several years during their revegetation works around the site (Naturelinks 2023). The habitat within the study area provides moderate quality foraging habitat for Gang-gang Cockatoo, due to the presence of a eucalypt canopy. The species is unlikely to use the study area for breeding purposes, as limited hollow-bearing trees are present, and of the hollows present, few are large enough to support a breeding sites for Gang-gang Cockatoo.

The isolated nature of the study area in the local landscape provides a stepping stone for Gang-gang Cockatoo as they move through the broader area to surrounding higher quality forested habitats, opportunistically visiting the study area for forging en route to these surrounding areas.

The nocturnal bird surveys completed within the study area did not observe any State significant fauna species. The non-threatened Southern Boobook *Ninox boobook* were heard calling, along with observations of prey species for owls, such as Common Ringtail Possum *Pseudocheirus peregrinus.* State significant owl species, such as Powerful Owl, Sooty Owl and Barking Owl, are all assigned a low likelihood of occurrence within the study area (Appendix 2.1). These species have the potential to visit the study area on occasion whilst en route to higher quality habitat in the surrounding landscape, as the habitat within the study area is considered low quality, based on the limited presence of hollow-bearing trees or tall stags for breeding and/or perching and limited presence of waterbodies, however still provides some foraging opportunities with potential prey species present within the site.

The targeted surveys for Southern Toadlet did not record any individuals of the species (Appendix 5; Ecology and Heritage Partners 2024b). All waterbodies within the study area are isolated from watercourses in the broader landscape and provide no connectivity to past records of Southern Toadlet. The nearest past record is approximately four kilometres from the study area (Figure 4), and given the lack of connectivity, small home

range of the species and results of the targeted surveys, Southern Toadlet are unlikely to occur within the study area.

No additional national or State significant fauna were recorded during the site assessment or targeted fauna surveys. The existing use of the broader property as a quarry, lack of connectivity to surrounding bushland areas and limited presence of large, hollow bearing trees reduces the likelihood that any nationally or State significant fauna species would rely on habitat within the study area for foraging or breeding purposes.

3.3.3 Ecological Communities

Two nationally listed ecological communities are predicted to occur within 10 kilometres of the study area (DCCEEW 2024):

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland; and,
- Natural Damp Grassland of the Victorian Coastal Plains.

The vegetation within the study area did not meet the condition thresholds that define any national or State-significant communities. The vegetation observed did not contain the required eucalypt species to qualify as the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community, and no areas of native grassland characteristic of the Natural Damp Grassland of the Victorian Coastal Plains ecological community were recorded.

No State significant ecological communities were recorded within the study area.

4 REMOVAL, DESTRUCTION OR LOPPING OF NATIVE VEGETATION (THE GUIDELINES)

4.1 Avoid and Minimise Statement

The broader property that the study area occurs within is an active quarry that commenced operation in 1974, and currently operates under Work Authority WA 174. The proposed expansion occurs within the limits of the existing WA 174 boundary, and therefore a variation to the Work Plan is being prepared to seek approval for the expansion. The previously approved Work Authority for use of the general area as a quarry demonstrates a level of prior strategic assessment that the project has been subject to, where the use of land for extractive purposes has been approved.

The proposed use of the study area for extractive purposes requires the removal of all vegetation within the expansion footprint. As a result, there are minimal opportunities to avoid or minimise impacts to native vegetation.

The location of the proposed quarry expansion is driven by the location of the mineral resource, which has been determined through the relevant geological investigations, and the broader boundary of the land owned by the quarry. The proposed expansion footprint is primarily within an area that has been subject to historic disturbance, as described in Section 3.1. Currently, the study area supports primarily planted indigenous and native vegetation, and several remnant patches of Damp Forest, Shrubby Foothill Forest and Aquatic Herbland (Figure 2). The mapped native vegetation patches were generally present as isolated areas separated by planted vegetation and exotic vegetation, with the largest patch being 1.096 hectares containing habitat zones DF1 and AH1. All other patches were less than 0.5 hectares in total size.

All patches of native vegetation within the expansion footprint were present in a modified state, with the site condition scores of the individual habitat zones recorded during the habitat hectares assessment ranging from 11 to 37 out of a maximum of 75 (Appendix 1.2).

The Lowland Forest habitat zone mapped in the north western section of the study area is avoided entirely, which had the highest site condition score of 42 (Appendix 1.2; Figure 2).

The Strategic Biodiversity Value (SBV) provides a ranking of the biodiversity values within an area compared to other areas within Victoria, ranked between 0 (lowest value) and 1 (highest value). The Strategic Biodiversity Value mapped within the study area ranges from 0.36 to 0.65 (Appendix 3). These scores broadly align with the modelled SBV scores for the study area, which ranges between 0.21 – 0.61 (DEECA 2024b), given that much of the vegetation is planted with limited overall native species diversity and provides suboptimal habitat for any threatened native fauna (due to the general lack of structural diversity and limited presence of hollows). The loss of these biodiversity values within the proposed expansion area is not considered to result in a significant loss to Victoria's biodiversity.

The general small extent of the native vegetation patches (<0.5 hectares) proposed to be impacted, relatively low condition of the native vegetation present and the lower Strategic Biodiversity Value scores mapped within the proposed expansion area demonstrate that the project has assessed and considered the biodiversity

values present. Notwithstanding this, due to the nature of the project as an extractive operation, there are no further feasible opportunities to minimise impacts to native vegetation without compromising the objectives of the project. Offsets are proposed to be secured to compensate for the loss of biodiversity values, as outlined in Section 4.2.2 and 4.3, and mitigation measures to reduce impacts to biodiversity values are detailed in Section 6.

4.2 Residual Impacts to Native Vegetation

The below clearing scenario is based on the proposed extension footprint provided by Holcim on 21st May 2024. All proposed works, including the quarry expansion, haulage roads, stockpiles and associated operations will be contained within the provided footprint and within the existing quarry operational area.

A summary of the native vegetation proposed to be impacted within the study area is provided in Table 2.

Table 1. Summary of habitat zones proposed to be impacted within the study area.

Ecological Vegetation Class	Bioregional Conservation Status	Habitat Zone Size*	Large Trees
Damp Forest (DF)	Least Concern	DF1 = 1.0484 hectares	9
		DF2 = 0.2355 hectares	0
		DF3 = 0.772 hectares	2
		DF4 = 0.0171 hectares	0
Shrubby Foothill Forest (SFF)	Least Concern	SFF1 = 0.2322 hectares	0
		SFF2 = 0.0061 hectares	0
Aquatic Herbland (AH)	Endangered	AH1 = 0.0484 hectares	0
		AH2 = 0.001 hectares	0
Total impacts to mapped native vegetation patches		**1.666 hectares**	**11 Large Trees**

* Refer to Figure 2 for location of each habitat zone.

4.2.1 Vegetation proposed to be removed

The study area is within Location 1, with 1.666 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Detailed assessment pathway (Table 2).

Condition scores for vegetation proposed to be removed are provided in Appendix 1.2.

Table 2. Removal of Native Vegetation (the Guidelines) (DELWP 2017).

Assessment pathway	Detailed
Location Category	1
Total Extent (past and proposed) (ha)	1.666
Extent of past removal (ha)	0.000
Extent of proposed removal (ha)	1.666
Large Trees (scattered and in patches) to be removed (no.)	11
EVC Conservation Status of vegetation to be removed	Endangered (Aquatic Herbland) Least Concern (Shrubby Foothill Forest; Damp Forest)

4.2.2 Offset Targets

The offset requirements for native vegetation removal for the proposed development are 0.750 General Habitat Units and 11 Large Trees.

A summary of proposed vegetation losses and associated offset requirements is presented in Table 3 and the Native Vegetation Removal (NVR) report is presented in Appendix 3.

Table 3. Offset Targets.

General Offsets Required	0.750 General Habitat Units
Large Trees	11
Vicinity (catchment/council)	Melbourne Water CMA / Cardinia Shire municipality
Minimum Strategic Biodiversity Value*	0.443

***The minimum Strategic Biodiversity Value is 80% of the weighted average score across habitat zones where a General offset is required.

4.3 Offset Strategy

According to DEECAs Native Vegetation Offset Register (DEECA 2024d), there are 11 offset sites within the Melbourne Water CMA or Cardinia Shire municipality that can be used to satisfy the General Habitat Unit and Large tree offset requirements.

An offset register search statement identifying the relevant offsite sites is provided in Appendix 4, which provides evidence that the offset obligation can be secured should a permit be provided for the project.

5 LEGISLATIVE AND POLICY IMPLICATIONS

5.1 *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 matters of NES. A summary of potential impacts to matters of NES is provided in Table 4.

Table 4. Potential impacts to matters of NES.

Matter of NES	Potential Impacts
World Heritage properties	No. The proposed action will not impact any properties listed for World Heritage.
National Heritage places	No. The proposed action will not impact any places listed for national heritage.
Ramsar wetlands of international significance	The nearest Ramsar wetland is the Western Port Ramsar site, located approximately 10-20 kilometres downstream of the Project Area. The proposed development will not impact any wetlands of international significance.
Threatened species and ecological communities	No threatened flora species or ecological communities were recorded within the study area. One threatened fauna species was recorded within the study area, Gang-gang Cockatoo. No additional nationally significant fauna species were observed within the study area or are likely to occur within the study area.
Migratory and marine species	There is no marine habitat within the Project Area and the Project Area would not be classed as an 'important habitat' as defined under the EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines (DoE 2013), in that it does not contain: • Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; • Habitat utilised by a migratory species which is at the limit of the species range; or, • Habitat within an area where the species is declining.
Commonwealth marine area	The proposed action will not impact any Commonwealth marine areas.
Nuclear actions (including uranium mining)	The proposed action is not a nuclear action.
Great Barrier Reef Marine Park	The proposed action will not impact the Great Barrier Reef Marine Park.
Water resources impacted by coal seam gas or mining development	The proposed action is not a coal seam gas or mining project.

No nationally significant flora species or ecological communities were recorded or are likely to occur within the study area (Section 3.3.1).

The preliminary ecological assessment completed for the project identified potential habitat for two nationally significant fauna species, Blue-winged Parrot and Gang-gang Cockatoo (Ecology and Heritage Partners 2024a). Subsequently, targeted surveys were undertaken for Blue-winged Parrot and Gang-gang Cockatoo (Appendix 5; Ecology and Heritage Partners 2024b).

Blue-winged Parrot

No Blue-winged Parrot were observed during the avifauna surveys, and the habitat present contains limited characteristics of the preferred habitat for the species (i.e. open grasslands for foraging and hollows for nesting). Blue-winged Parrot may occasionally stop over within the study area, however would not rely on the habitat present as important foraging or breeding habitat. Further details on the species are provided in Appendix 5 (Ecology and Heritage Partners 2024b).

The removal of the vegetation within the proposed expansion area is unlikely to result in a significant impact to the Blue-winged Parrot.

Gang-gang Cockatoo

Gang-gang Cockatoo were observed within the broader property during the targeted surveys (Appendix 5; Ecology and Heritage Partners 2024b) and have previously been recorded within the property by Naturelinks Land Management (2022).

A significant impact assessment for Gang-gang Cockatoo has been completed against the significant impact criteria for Endangered species (Table 5). The following criteria and reference documents have been used to inform the definition of a 'significant impact'.

- DoE 2013. Matters of National Environmental Significance. Significant impact guidelines 1.1. Department of Environment, Canberra, Act.
- DAWE 2023. Conservation Advice for *Callocephalon fimbriatum* (Gang-gang Cockatoo). Commonwealth Department of Agriculture, Water, and the Environment, Canberra, ACT.

Table 5. Assessment against the significant impact criteria for Endangered species listed under the EPBC Act

Significant impact criteria	Likelihood of impact	Justification
Lead to a long-term decrease in the size of a population	Negligible	The study area contained limited breeding habitat for Gang-gang Cockatoo, with most of the canopy trees being young and not containing suitable hollows for breeding. The loss of 11 Large Trees and associated foraging habitat is not expected to result in a long-term decrease in the population size of Gang-gang Cockatoo.
Reduce the area of occupancy of the species	Negligible	The study area is likely to be used opportunistically by Gang-gang Cockatoo, primarily for foraging when passing through the area en route to higher quality, larger patches of habitat in the surrounding landscape. Consequently, the area of occupancy will not be adversely affected.

Significant impact criteria	Likelihood of impact	Justification
Fragment an existing important population into two or more populations	Negligible	The project will not result in the fragmentation of the existing local population, as Gang-gang Cockatoo are highly mobile with numerous records across the locality. The loss of 11 Large Trees and foraging habitat will not compromise landscape connectivity.
Adversely affect habitat critical to the survival of a species	Negligible	The project is not expected to adversely affect habitat critical to the survival of the species; while some hollow-bearing trees will be impacted, the species is not likely to breed within the study area.
Disrupt the breeding cycle of an important population	Negligible	11 Large Trees are proposed to be impacted, of which some contain hollows and potential breeding habitat, although Gang-gang are likely to use denser stands of forest for breeding purposes. The proposed action is not expected to disrupt the breeding cycle of Gang-gang Cockatoo.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Negligible	Native vegetation, including eucalyptus trees, are proposed to be removed as a result of the proposed action, resulting in a loss of potential foraging habitat that may be used opportunistically by the species. It is unlikely that the species would rely upon this habitat as important foraging or breeding habitat, based on the surrounding higher quality areas of available habitat (e.g. Bunyip State Park, Cardinia Reservoir and Beaconsfield Nature Conservation Reserve). Therefore, the extent of native vegetation removal is not expected to contribute to the species' decline.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	Negligible	The proposed action will not result in an invasive species being introduced that is likely to impact Gang-gang Cockatoo.
Introduce disease that may cause the species to decline	Negligible	The proposed action will not result in the introduction of disease that is likely to cause a decline to Gang-gang Cockatoo.
Interfere substantially with the recovery of the species	Negligible	The proposed action is not expected to affect the recovery of the species (i.e., involves minimal loss of potential and opportunistic foraging habitat).

Based on the stated criteria, the proposed action will not have a significant impact on Gang-gang Cockatoo populations or species habitat.

5.1.1 Implications

The proposed action is unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister is unlikely to be required regarding matters listed under the EPBC Act.

5.2 *Flora and Fauna Guarantee Act 1988* (Victoria)

The FFG Act is the primary legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria. Proponents are required to apply for an FFG Act Permit to 'take' threatened and/or declared protected flora species, listed vegetation communities and listed fish species in areas of public land (e.g. within road reserves, drainage lines and public reserves/parks). 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. However, the *Flora and Fauna Guarantee Amendment Act 2019* came into effect on

1 June 2020 and now applies the FFG Act to Crown land and private/freehold land that is managed by a public authority.

On 10 September 2019, Section 4B was incorporated into the *Flora and Fauna Guarantee Act 1988*. Section 4B now requires a decision, policy, program or process by a Minister or public authority to "give proper consideration to" the objectives of the Act, as well as Victoria's Biodiversity Strategy, Action Statements and other determinations or plans under the Act.

5.2.1 Implications

No FFG Act Listed flora species or ecological communities were recorded within the study area during the field assessment. Naturelinks Land Management (2022) have previously observed a population of Slender Sun-orchid *Thelymitra pauciflora* and Common Onion-orchid *Microtis unifolia* within the study area, both of which are declared 'general protected flora' under the FFG Act. As the study area is privately owned, a permit under the FFG Act is not required for impacts to the general protected flora.

Mitigation measures are recommended to reduce impacts to habitat identified for listed fauna species that may use the study area on occasion, including but not limited to powerful Owl, Sooty Owl and Barking Owl. Fauna specific mitigation measures are presented in Appendix 5 (Ecology and Heritage Partners 2024b).

5.3 *Mineral Resources (Sustainable Development) Act 1990* (Victoria)

Mineral exploration, extractive industry and mining in Victoria is regulated under the *MRSD Act 1990* (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.

A work plan is required to identify the risks that the work may pose to the environment, including through the removal of native vegetation. The licensee is required to eliminate or minimise those risks as far as reasonably practicable; as well as:

- Complying with the Commonwealth EPBC Act and the State FFG Act; and,
- Following Victoria's *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017).

The obligations of the Guidelines (DELWP 2017) 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).

5.3.1 Implications

The proposal to expand the quarry requires a work plan variation to be developed and submitted to Earth Resources Regulation (ERR) for approval. The proponent must address "*all necessary planning consents and approvals*" including Victoria's native vegetation policy (DPI 2009).

The work plan variation is required to include a rehabilitation plan that outlines:

- proposed land uses for the affected land after it has been rehabilitated;
- post-quarrying land form(s) that will support the proposed land use(s);

- key characteristics of the post-quarrying land form(s), having regard to the proposed post-quarrying land use(s);
- an outline of the practicality and achievability of the rehabilitated land form, including what resources will be required and their availability;
- an explanation of the activities involved in forming (e.g. blasting, dozing) the land form(s); and
- demonstration that the land form design considers threatening events such as fire, flood and drought.

Native Vegetation Removal (the Guidelines [DELWP 2017])

The study area is within Location 1, with 1.666 hectares of native vegetation proposed to be removed from the impact area. As such, the permit application falls under the Detailed assessment pathway. The offset requirement for native vegetation removal is 0.750 General Habitat Units and 11 Large Trees.

5.4 *Planning and Environment Act 1987* (Victoria)

Provided the requirements of Section 77T of the *Mineral Resources (Sustainable Development) Act 1990* (MRSD Act) are fulfilled as part of the preparation of a Work Plan, the project will be exempt from requiring a planning permit for the removal, destruction or lopping of native vegetation. The assessment and offsetting of vegetation losses will be undertaken in accordance with the Guidelines (DELWP 2017) as part of the Work Plan variation process.

5.4.1 Cardinia Planning Scheme

The study area is located within the Cardinia Shire. The following zoning and overlays apply (DTP 2024):

- Green Wedge Zone (GWZ)
- Erosion Management Overlay (BMO)
- Environmental Significance Overlay – Schedule 1 (ESO1)

Environmental Significance Overlay – Schedule 1 Northern Hills (ESO1)

The ESO1 applies to the study area. The purpose of ESO1 is to protect the significant landscape and environmental values that occur on the northern hills of the Cardinia Shire municipality. This includes protecting areas of native vegetation, wildlife habitat and wildlife corridors.

Under ESO1, a permit is required to remove native vegetation, unless an exemption under the listed exclusions apply (which includes an approved Work Plan). Regulators will consider the implications / decision guidelines of the ESO and ESO1 when assessing the Work Plan variation.

5.4.2 The Guidelines

The State Planning Policy Framework and the decision guidelines at Clause 12.01 Biodiversity and Clause 52.17 Native Vegetation require Planning and Responsible Authorities to have regard for the Guidelines (DELWP 2017).

5.4.3 *Implications*

In the event that the Work Plan variation is approved under the MRSD Act, the removal of native vegetation would be exempt from requiring a permit under Clause 52.17 and Clause 42.01 of the Cardina Shire Planning Scheme.

5.5 *Catchment and Land Protection Act 1994* (Victoria)

Three weeds listed as noxious under the CaLP Act were recorded during the assessment; Blackberry, Hawthorn and Spear Thistle. Similarly, there is evidence that the study area is currently occupied by several pest fauna species listed under the CaLP Act, European Rabbit and Red Fox. Management of listed noxious weeds and pests should be incorporated into the Work Plan variation.

5.6 *Wildlife Act 1975* and Wildlife Regulations 2013 (Victoria)

The study area currently contains two dams and an ephemeral depression, which provides habitat for native amphibians, with several species recorded during the targeted fauna surveys (Appendix 5). In addition, the woodland areas contained numerous wombat burrows in the understorey, habitat for Short-beaked Echidna and a range of woodland birds.

Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975* or under any other Act issued by DEECA.

6 MITIGATION MEASURES

Recommended measures to mitigate impacts upon terrestrial and aquatic values present within the study area include:

- All contractors should be aware of ecologically sensitive areas to minimise the likelihood of inadvertent disturbance to areas marked for retention. Native vegetation (areas of sensitivity) should be included as a mapping overlay on any construction plans;
- Staged habitat removal is recommended that occurs outside of the key breeding and nesting seasons for native fauna likely to reside within the study area (e.g. removing hollow-bearing trees outside of the breeding season for fauna that use these habitat types);
- Vegetation to be retained onsite that is in proximity to the extraction area (within 100 metres) will be protected with vegetation protection fencing (that does not restrict the movement of fauna throughout the landscape). These areas will be identified as No-Go Zone areas to avoid loss of vegetation cover, soil disturbance, compaction and weed infestation;
- Tree Protection Zones (TPZs) must be implemented to prevent indirect losses of native vegetation to be retained during construction activities (DSE 2011). A TPZ applies to a tree and is a specific area above and below the ground, with a radius 12 x the Diameter at Breast Height (DBH). At a minimum standard a TPZ should consider the following:
    - A TPZ 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 TPZ;
    - Where encroachment is 10% or more of the total area of the TPZ, the tree should be considered as lost and offset accordingly (unless an arboricultural report specifies otherwise);
    - 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 TPZ has not been met an offset may be required.
- Prior to the removal of any waterbodies or dams, they are recommended to first be drained and left for one month prior to any works occurring, to encourage fauna to relocate;
- No extraction works or associated activities are to take place within No-Go Zones and fences are not to be moved during the entire works period and will not be removed until all works have been completed;
- No machinery or earthmoving equipment, waste, storage materials or unauthorised personnel are permitted within established No-Go Zones unless specifically required for revegetation and/or weed management activities;
- Specific areas designated for vehicle re-fuelling and maintenance, dumping of waste and storage of materials and equipment will be located outside the No-Go Zones;

- Habitat relocation (e.g. placing felled logs into surrounding areas of retained vegetation for habitat values);
- Ensure that best practice sedimentation and pollution control measures are undertaken at all times, in accordance with Environment Protection Authority (EPA) guidelines (EPA 2020a; EPA 2020b; 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 works are conducted using indigenous species sourced from a local provenance, rather than exotic deciduous trees and shrubs.

Specific mitigation measures for native fauna species are presented in Appendix 5.

7 SUMMARY OF PLANNING IMPLICATIONS

Further requirements associated with development of the study area, as well as additional studies or reporting that may be required, are provided in Table 6.

Table 6. Further requirements associated with development of the study area.

Relevant Legislation	Implications	Further Action
Environment Protection and Biodiversity Conservation Act 1999	The proposed action is unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister is unlikely to be required regarding matters listed under the EPBC Act.	No further action required.
Flora and Fauna Guarantee Act 1988	No FFG Act Listed flora species or ecological communities were recorded within the study area during the field assessment. Naturelinks Land Management (2022) have previously observed a population of Slender Sun-orchid *Thelymitra pauciflora* and Common Onion-orchid *Microtis unifolia* within the study area, both of which are declared 'general protected flora' under the FFG Act. As the study area is privately owned, a permit under the FFG Act is not required for impacts to the general protected flora. Mitigation measures are recommended to reduce impacts to habitat identified for listed fauna species that may use the study area on occasion, including but not limited to powerful Owl, Sooty Owl and Barking Owl. Fauna specific mitigation measures are presented in Appendix 5 (Ecology and Heritage Partners 2024b).	Implement fauna mitigation measures prior to removal of any vegetation.
Mineral Resources (Sustainable Development) Act 1990	The study area is within Location 1, with 1.666 hectares of native vegetation and 11 large trees proposed to be removed from the impact area. As such, the permit application falls under the Detailed assessment pathway. The offset requirement for native vegetation removal is 0.750 General Habitat Units and 11 large trees. A Work Plan variation will need to be prepared and submitted in order to comply with the requirements of the MRSD Act.	Prepare and submit a variation to the Work Plan.
Planning and Environment Act 1987	The clearing of native vegetation for mining and extractive industries is exempt from the requirement for a planning permit under the *Planning and Environment Act 1987* subject to an assessment as part of the work plan approval process required under the Mineral Resources (Sustainable Development) Act 1990 (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 permit is not required where native vegetation is to be removed, destroyed or lopped to enable the carrying out of mining or an extractive industry in accordance with a Work Plan approved under the MRSD Act (Section 3.4) and authorised by a work authority granted under that Act.
Catchment and Land Protection Act 1994	Three weed species (Blackberry, Spear Thistle and Hawthorn) and two pest species (Red Fox and European Rabbit) listed under the CaLP Act were recorded within the study area.	Management of listed noxious weeds and pests should be incorporated into the Work Plan variation.

Relevant Legislation	Implications	Further Action
Wildlife Act 1975	The study area currently contains two dams and an ephemeral depression, which provides habitat for native amphibians, with several species recorded during the targeted fauna surveys (Appendix 5). In addition, the woodland areas contained numerous wombat burrows in the understorey, habitat for Short-beaked Echidna and a range of woodland birds. Any persons engaged to conduct salvage and translocation or general handling of terrestrial fauna species must hold a current Management Authorisation.	Prepare a Fauna Management Plan that includes a requirement for pre-clearance surveys. Ensure wildlife specialists hold a current Management Authorisation.

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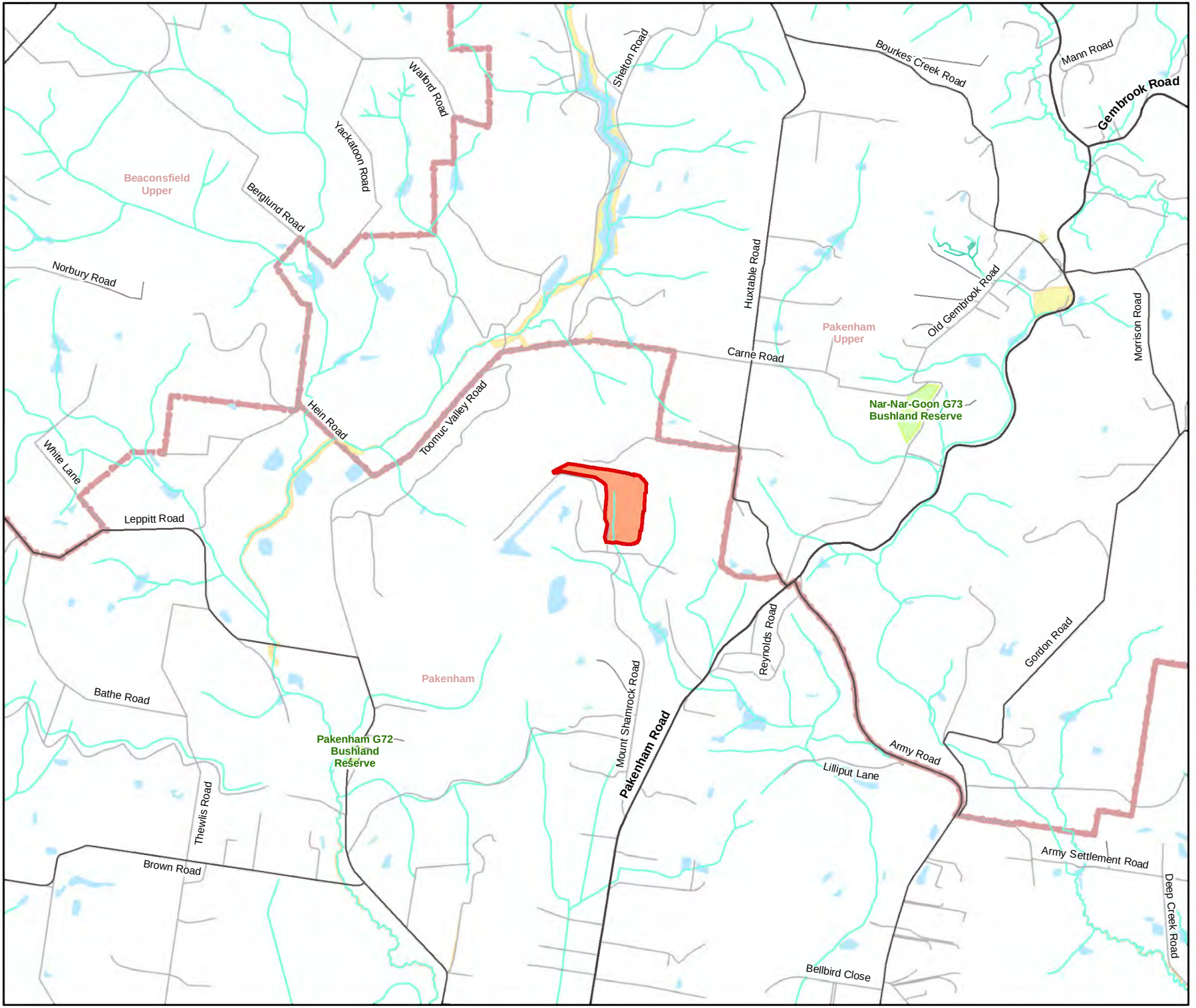
FIGURES



Legend

- Study Area
- Major Road
- Collector Road
- Minor Road
- Minor Watercourse
- Permanent Waterbody
- Parks and Reserves
- Crown Land
- Localities

Figure 1

Location of the study area

Ecological Impact Assessment for the Mt Shamrock Quarry Extension, Mt Shamrock Road, Pakenham

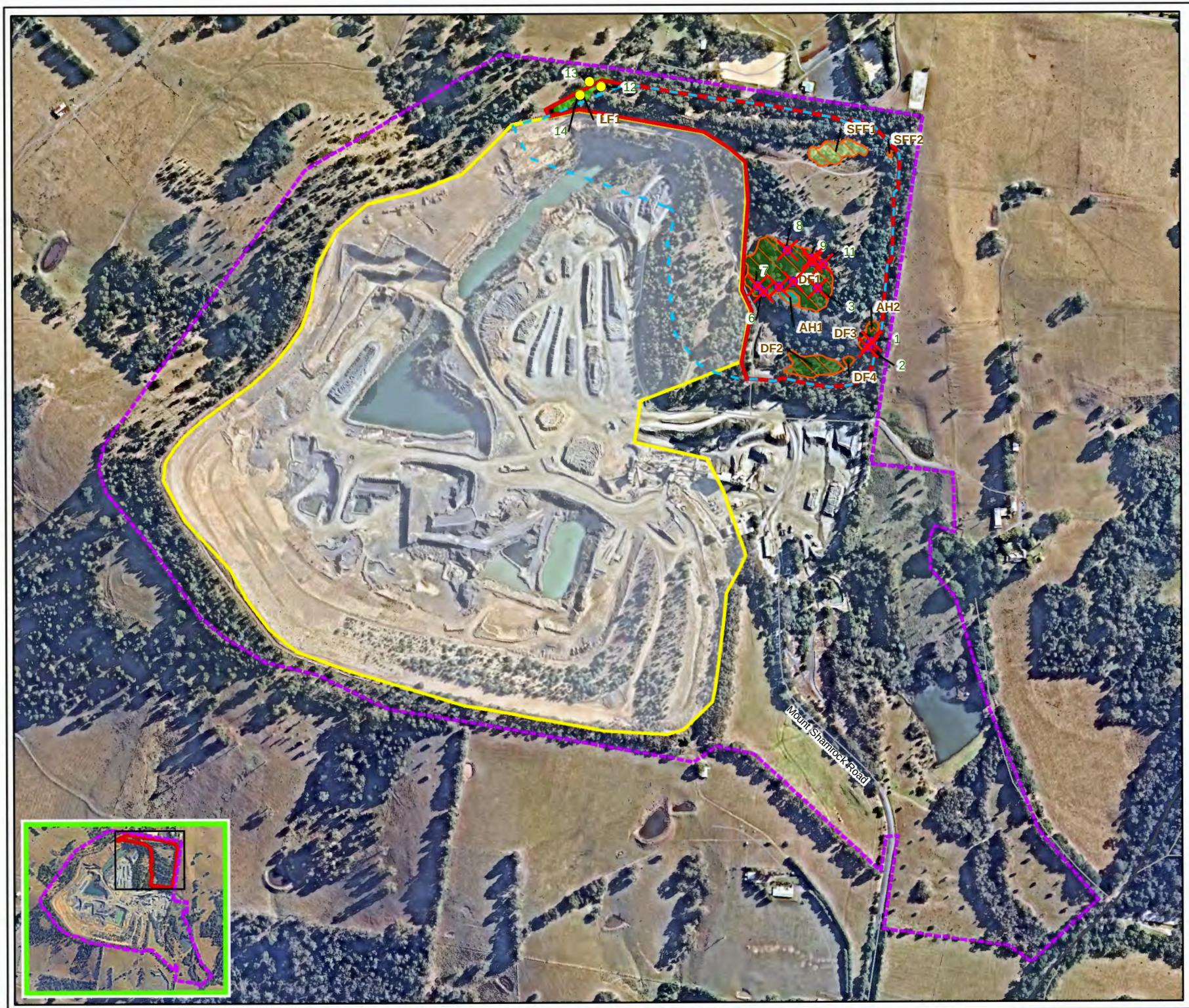
0 500 1,000

Metres

N

Map Scale: 1:30,000 @ A4
Coordinate System: GDA 1994 MGA Zone 55

ecology & heritage partners



Legend

- Study Area
- WA174 Boundary
- Existing Extraction Limit
- Proposed Extension
- Large Tree in patch
- Large Tree in patch (Retained)
- Large Tree Impacted

Ecological Vegetation Classes

- Aquatic Herbland (EVC 653)
- Damp Forest (EVC 29)
- Lowland Forest (EVC 16) - Retained
- Shrubby Foothill Forest (EVC 45)
- Impacted vegetation

Figure 2 Overview

Ecological features

Ecological Impact Assessment for the Mt Shamrock Quarry Extension, Mt Shamrock Road, Pakenham

N

0 100 200

Metres

Map Scale: 1:7,800 @ A4
Coordinate System: GDA 1994 MGA Zone 55

ecology & heritage partners

17386_Fig02_EcoFeatMB 15/10/2024 psorensen

Aerial source: Nearmap 2024

Legend

- Study Area
- WA174 Boundary
- Existing Extraction Limit
- Proposed Extension
- Large Tree in patch
- Large Tree in patch (Retained)
- Large Tree Impacted

Ecological Vegetation Classes

- Aquatic Herbland (EVC 653)
- Damp Forest (EVC 29)
- Lowland Forest (EVC 16) - Retained
- Shrubby Foothill Forest (EVC 45)
- Impacted vegetation

Figure 2a

Ecological features

Ecological Impact Assessment for the Mt Shamrock Quarry Extension, Mt Shamrock Road, Pakenham

N

0 35 70

Metres

Map Scale: 1:2,700 @ A4
Coordinate System: GDA 1994 MGA Zone 55

ecology & heritage partners

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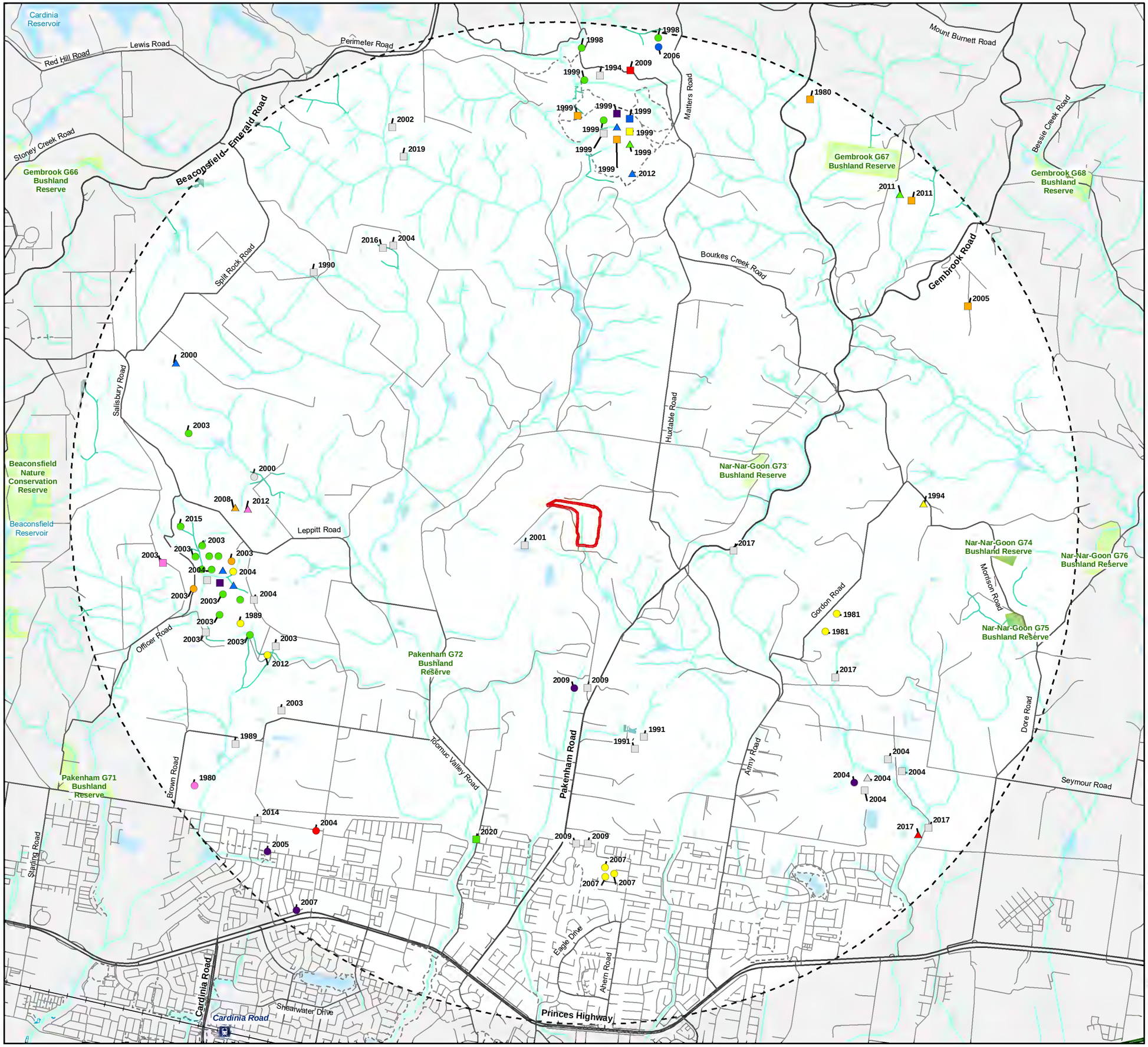
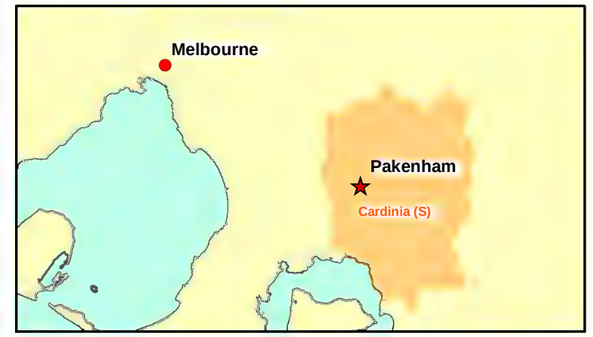
Aerial source: Nearmap 2024





Legend

- Study Area

Significant flora

- Angahook Pink-fingers
- Austral Crane's-bill
- Clover Glycine
- Cobra Greenhood
- Dandenong Wattle
- Floodplain Fireweed
- Forest Sedge
- Giant Honey-myrtle
- Green Scentbark
- Large-leaf Cinnamon-wattle
- Long Pink-bells
- Mountain Bird-orchid
- Mugga
- Powelltown Correa
- Red-tip Greenhood
- Slender Pink-fingers
- Southern Blue-gum
- Spotted Gum
- Spurred Helmet-orchid
- Swamp Bush-pea
- Victorian Flat-pea
- Wine-lipped Spider-orchid
- Winter Sun-orchid

Figure 3

Previously documented significant flora within 5km of the study area

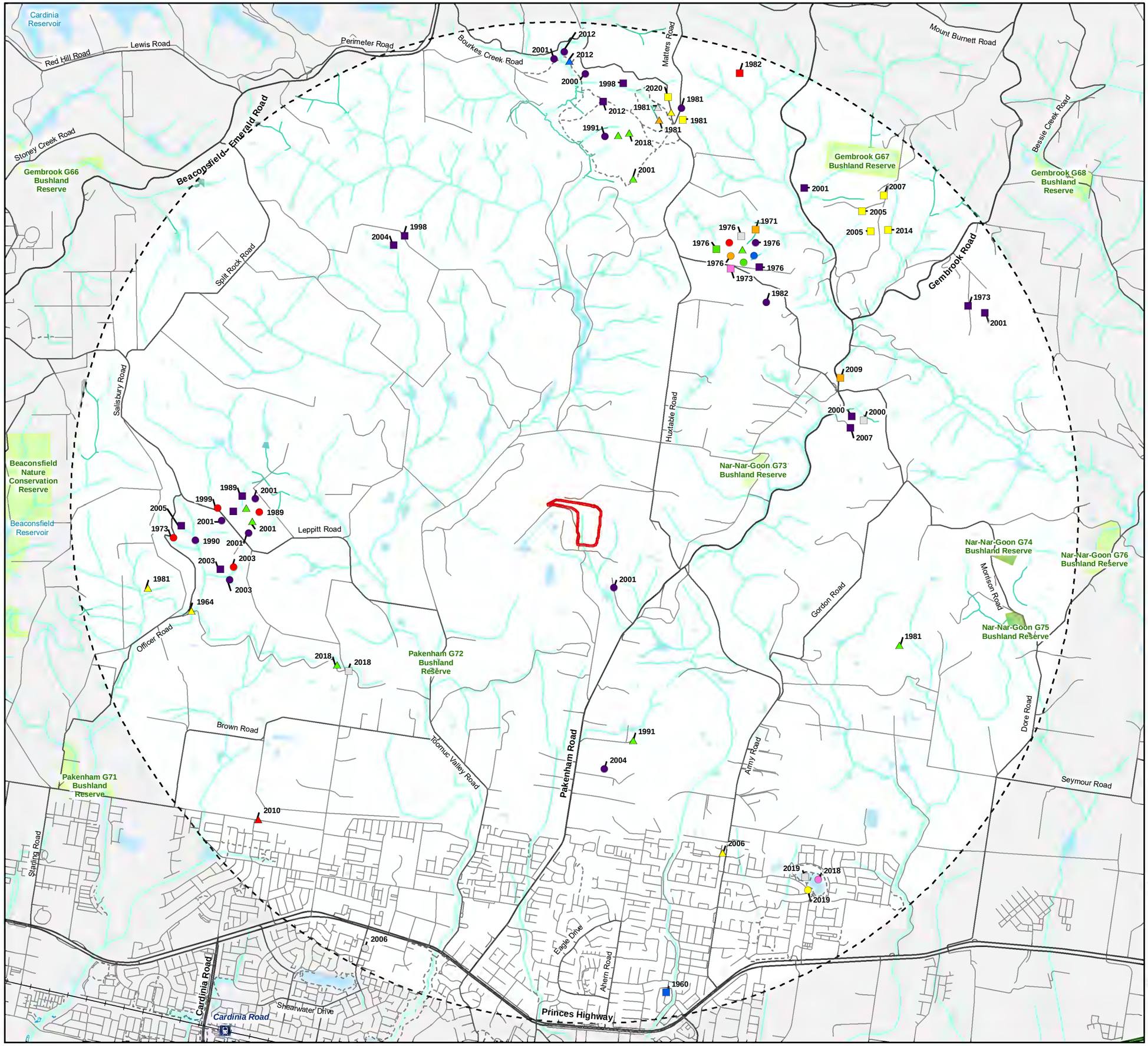
Ecological Impact Assessment for the Mt Shamrock Quarry Extension, Mt Shamrock Road, Pakenham

0 1 2

Kilometres

Map Scale: 1:38,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

ecology & heritage partners



Legend

Study Area

Significant fauna

- Australian Little Bittern
- Barking Owl
- Black Falcon
- Blue-billed Duck
- Blue-winged Parrot
- Chestnut-rumped Heathwren
- Eastern Great Egret
- Gang-gang Cockatoo
- Hardhead
- Helmeted Honeyeater
- Hooded Robin
- Lace Monitor
- Latham's Snipe
- Murray Cod
- Pilotbird
- Powerful Owl
- Sooty Owl
- Southern Brown Bandicoot
- Southern Greater Glider
- Southern Toadlet
- White-throated Needletail
- Yellow-bellied Glider

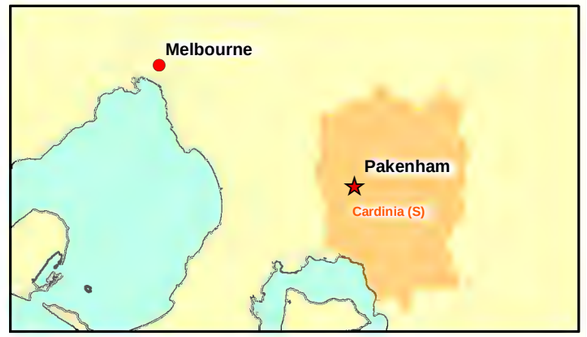


Figure 4

Previously documented significant fauna within 5km of the study area

Ecological Impact Assessment for the Mt Shamrock Quarry Extension, Mt Shamrock Road, Pakenham

N

0 1 2

Kilometres

Map Scale: 1:38,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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APPENDIX 1 FLORA

Appendix 1.1 Flora Results

Legend:

I Listed as Protected (restricted use) under the FFG Act (DEECA 2024e)
- Naturally growing (i.e. non-planted) indigenous species to the study area
+ Naturally growing indigenous species that also occurs as planted indigenous vegetation to the study area
****** Planted indigenous species to the study area
# Planted Victorian (non-indigenous) and Australian species
***** Listed as a noxious weed under the CaLP Act
w Weed of National Significance

Table A1.1. Flora within the study area.

Scientific Name	Common Name	Notes
INDIGENOUS SPECIES		
Acacia dealbata	Silver Wattle	+
Acacia melanoxylon	Blackwood	+
Acacia verticillata	Prickly Moses	**
Acaena novae-zelandiae	Bidgee-widgee	-
Amyema pendula	Drooping Mistletoe	-
Austrostipa spp.	Spear Grass	-
Blechnum nudum	Fishbone Water-fern	-
Carex spp.	Sedge	-
Cassinia longifolia	Shiny Cassinia	**
Coprosma quadrifida	Prickly Currant-bush	**
Cyathea australis	Rough Tree-fern	I
Dianella tasmanica	Tasman Flax-lily	**
Eucalyptus obliqua	Messmate Stringybark	+
Eucalyptus ovata	Swamp Gum	+
Eucalyptus radiata s.l.	Narrow-leaf Peppermint	-
Eucalyptus viminalis	Manna Gum	-
Gonocarpus tetragynus	Common Raspwort	-
Goodia lotifolia s.l.	Golden Tip	-
Hakea decurrens	Bushy Needlewood	#
Hakea ulicina	Furze Hakea	#
Juncus spp.	Rush	-

Scientific Name	Common Name	Notes
Lepidosperma elatius	Tall Sword-sedge	-
Lepidosperma laterale	Variable Sword-sedge	-
Leptospermum lanigerum	Woolly Tea-tree	**
Lomandra filiformis	Wattle Mat-rush	-
Lomandra longifolia	Spiny-headed Mat-rush	**
Microlaena stipoides var. *stipoides*	Weeping Grass	+
Ozothamnus spp.	Everlasting	**
Persicaria decipiens	Slender Knotweed	-
Phragmites australis	Common Reed	-
Polystichum proliferum	Mother Shield-fern	I
Pteridium esculentum	Austral Bracken	-
Rubus parvifolius	Small-leaf Bramble	-
Rytidosperma racemosum var. *racemosum*	Slender Wallaby-grass	-
Senecio quadridentatus	Cotton Fireweed	-
Senecio spp.	Groundsel	-
Solanum aviculare	Kangaroo Apple	-
NON-INDIGENOUS OR INTRODUCED SPECIES		
Anthoxanthum odoratum	Sweet Vernal-grass	-
Arctotheca calendula	Cape weed	-
Avena fatua	Wild Oat	-
Briza minor	Lesser Quaking-grass	-
Cardamine hirsuta s.l.	Common Bitter-cress	-
Cirsium vulgare	Spear Thistle	*
Conyza spp.	Fleabane	-
Crataegus monogyna	Hawthorn	*
Cyperus eragrostis	Drain Flat-sedge	-
Dactylis glomerata	Cocksfoot	-
Ehrharta erecta var. *erecta*	Panic Veldt-grass	-
Ehrharta longiflora	Annual Veldt-grass	-
Eucalyptus cladocalyx	Sugar Gum	#
Eucalyptus globulus	Southern Blue-gum	#
Fumaria spp.	Fumitory	-
Galium aparine	Cleavers	-
Helminthotheca echioides	Ox-tongue	-
Holcus lanatus	Yorkshire Fog	-
Hypochaeris radicata	Flatweed	-

Scientific Name	Common Name	Notes
Lysimachia arvensis	Pimpernel	-
Melaleuca armillaris subsp. *armillaris*	Giant Honey-myrtle	#
Myosotis arvensis	Field Forget-me-not	-
Pinus radiata	Radiata Pine	-
Plantago lanceolata	Ribwort	-
Raphanus raphanistrum	Wild Radish	-
Rubus fruticosus spp. agg.	Blackberry	*w
Schinus molle	Pepper Tree	-
Silybum marianum	Variegated Thistle	-
Sonchus asper s.l.	Rough Sow-thistle	-
Stellaria media	Chickweed	-
Vicia sativa	Common Vetch	-

Appendix 1.2 Habitat Hectare Assessment

Table A1.2. Habitat Hectare Assessment Table.

Vegetation Zone		DF1	DF2, DF4	DF3	LF1	AH1, AH2,	SFF1	SFF2
Bioregion		HSF	HSF	HSF	HSF	GipP	HSF	HSF
EVC		DF	DF	DF	LF	AH	SFF	SFF
EVC Number		29	29	29	16	653	45	45
EVC Conservation Status		LC	LC	LC	LC	En	LC	LC
Site Condition /75	Large Trees /10	5	0	9	7	N/A	0	0
	Tree Canopy Cover /5	4	0	4	4	N/A	0	0
	Lack of Weeds /15	2	2	2	6	6	2	2
	Understorey /25	15	5	5	10	5	5	5
	Recruitment /10	3	0	5	5	3	5	0
	Organic Matter /5	5	4	5	5	4	3	3
	Logs /5	3	0	5	5	N/A	0	0
	Treeless EVC Multiplier	1.00	1.00	1.00	1.00	1.36	1.00	1.00
	Subtotal =	37.00	11.00	35.00	42.00	24.48	15.00	10.00
Landscape Context /25	Patch Size /10	6	6	6	6	6	6	6
	Neighbourhood /10	2	2	2	2	2	2	2
	Distance to Core Area /5	1	1	1	1	1	1	1
	Subtotal =	9	9	9	9	9	9	9
Habitat Points /100		46	20	44	51	33	24	19
Habitat Score		**0.46**	**0.20**	**0.44**	**0.51**	**0.33**	**0.24**	**0.19**

Note: HSF = Highland – Southern Fall; DF = Damp Forest; LF = Lowland Forest; AH = Aquatic Herbland; SFF = Shrubby Foothill Forest

Appendix 1.3 Large Trees in Patches

Table A1.3. Scattered Trees and Large Trees in Patches.

Tree # (Figure 2)	Species Name	Common Name	DBH (cm)	Size Class	Scattered / Patch	Status
1	*Eucalyptus ovata*	Swamp Gum	114	Large	Patch	Direct Impact
2	*Eucalyptus ovata*	Swamp Gum	120	Large	Patch	Direct Impact
3	*Eucalyptus viminalis*	Manna Gum	98	Large	Patch	Direct Impact
4	*Eucalyptus obliqua*	Messmate Stringybark	91	Large	Patch	Direct Impact
5	*Eucalyptus obliqua*	Messmate Stringybark	92	Large	Patch	Direct Impact
6	*Eucalyptus obliqua*	Messmate Stringybark	90	Large	Patch	Direct Impact
7	*Eucalyptus obliqua*	Messmate Stringybark	93	Large	Patch	Direct Impact
8	*Eucalyptus obliqua*	Messmate Stringybark	101	Large	Patch	Direct Impact
9	*Eucalyptus obliqua*	Messmate Stringybark	92	Large	Patch	Direct Impact
10	*Eucalyptus obliqua*	Messmate Stringybark	90	Large	Patch	Direct Impact
11	*Eucalyptus obliqua*	Messmate Stringybark	94	Large	Patch	Direct Impact
12	*Eucalyptus* sp.	Stag	130	Large	Patch	**Retained**
13	*Eucalyptus viminalis*	Manna Gum	125	Large	Patch	**Retained**
14	*Eucalyptus radiata*	Narrow-leaf Peppermint	130	Large	Patch	**Retained**

Appendix 1.4 Significant Flora Species

Significant flora within 10 kilometres of the study area is provided in the Table A1.4.3 at the end of this section, with Tables A1.4.1 and A1.4.2 below providing the background context for the values in Table 1.4.3.

Table A1.4.1 Conservation status of each species for each Act/policy. The values in this table correspond to Columns 5 to 7 in Table A1.4.3.

EPBC Act (*Environment Protection and Biodiversity Conservation Act 1999*):		FFG Act (*Flora and Fauna Guarantee Act 1988*):	
EX	Extinct	L	Listed as threatened
CR	Critically endangered	N	Nominated for listing as threatened
EN	Endangered	D	Delisted as threatened
VU	Vulnerable	I	Rejected for listing as threatened; taxon invalid
#	Listed on the Protected Matters Search Tool	X	Rejected for listing as threatened; taxon ineligible

Table A1.4.2 Likelihood of occurrence rankings: Habitat characteristics assessment of significant flora species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area to determine their likelihood of occurrence. The values in this table correspond to Column 8 in Table A1.4.3.

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 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.

Table A1.4.3 Significant flora recorded within 10 kilometres of the study area.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
NATIONAL SIGNIFICANCE							
Amphibromus fluitans #	River Swamp Wallaby-grass	-	-	VU	-	4	No past records and limited suitable habitat present.
Astelia australiana #	Tall Astelia	-	-	VU	en	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Asterolasia asteriscophora subsp. *albiflora*	White Star-bush	10	2013	CR	cr	4	Limited past records and understorey largely modified.
Caladenia orientalis #	Eastern Spider Orchid	-	-	EN	en	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Caladenia tessellata #	Thick-lipped Spider-orchid	-	-	VU	-	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Dianella amoena	Matted Flax-lily	35	2020	EN	cr	4	Recent past records in the local area however not observed during preliminary or detailed vegetation mapping, and understorey largely dominated by exotic vegetation.
Eucalyptus crenulata	Buxton Gum	2	2007	EN	en	4	Limited past records and most of the canopy contains planted eucalypt.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
Eucalyptus strzeleckii #	Strzelecki Gum	-	-	VU	cr	4	No past records within the local area and limited suitable habitat present.
Glycine latrobeana	Clover Glycine	2	2003	VU	vu	4	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Lepidium aschersonii #	Spiny Peppercress	-	-	VU	en	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Pomaderris vacciniifolia #	Round-leaf Pomaderris	-	-	CR	cr	5	No past records in local area and understorey dominated largely by exotic grasses as a result of historic disturbance.
Prasophyllum frenchii	Maroon Leek-orchid	15	2005	EN	en	4	Several past records in local area however understorey largely modified through past disturbance and limited suitable habitat remains.
Prasophyllum spicatum #	Dense Leek-orchid	-	-	VU	cr	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Pterostylis chlorogramma #	Green-striped Greenhood	-	-	VU	en	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
Pterostylis cucullata #	Leafy Greenhood	-	-	VU	-	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Senecio psilocarpus #	Swamp Fireweed	-	-	VU	-	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Syzygium paniculatum	Magenta Cherry	2	2017	VU	-	4	Limited past records in local area and understorey largely modified through past disturbance and limited suitable habitat remains.
Thelymitra epipactoides #	Metallic Sun-orchid	-	-	EN	en	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Thelymitra orientalis #	Hoary Sun-orchid	-	-	CR	cr	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Thesium australe #	Austral Toadflax	-	-	VU	en	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Xerochrysum palustre #	Swamp Everlasting	-	-	VU	cr	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
STATE SIGNIFICANCE							
Acacia howittii	Sticky Wattle	1	2005	-	vu	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Acacia leprosa var. *uninervia*	Large-leaf Cinnamon-wattle	1	2009	-	en	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Acacia stictophylla	Dandenong Wattle	19	2015	-	en	4	Not observed during site assessment and most of the understorey contains planted shrubs or native grasses / ferns.
Angophora floribunda	Rough-barked Apple	1	2014	-	en	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Austrostipa rudis subsp. *australis*	Veined Spear-grass	5	2004	-	en	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Billardiera scandens s.s.	Velvet Apple-berry	1	2008	-	en	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
Bossiaea cordigera	Wiry Bossiaea	2	2019	-	en	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Burnettia cuneata	Lizard Orchid	2	2009	-	en	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Caladenia maritima	Angahook Pink-fingers	1	2000	-	cr	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Caladenia oenochila	Wine-lipped Spider-orchid	9	2012	-	cr	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Caladenia vulgaris	Slender Pink-fingers	4	2009	-	vu	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Carex alsophila	Forest Sedge	2	1996	-	en	5	No suitable habitat and no recent records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Chiloglottis jeanesii	Mountain Bird-orchid	1	1999	-	vu	5	No suitable habitat and no recent records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
Correa reflexa var. *lobata*	Powelltown Correa	12	2013	-	en	4	No suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Corybas aconitiflorus	Spurred Helmet-orchid	3	2008	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance..
Corymbia maculata	Spotted Gum	7	2017	-	vu	5	Outside of natural distribution range for species.
Craspedia canens	Grey Billy-buttons	1	2001	-	cr	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Dianella longifolia var. *grandis s.l.*	Glaucous Flax-lily	20	2018	-	cr	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Diuris punctata var. punctata	Purple Diuris	15	1986	-	en	5	No suitable habitat or past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Eucalyptus fulgens	Green Scentbark	67	2021	-	en	4	Not observed during site assessments and vegetation within the study area is largely planted.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
Eucalyptus globulus subsp. *globulus*	Southern Blue-gum	1	2004	-	en	4	Outside of natural distribution range for species. Planted Blue-gum present in study area.
Eucalyptus sideroxylon subsp. *sideroxylon*	Mugga	1	2020	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Eucalyptus X studleyensis	Studley Park Gum	3	2010	-	cr	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Euphrasia caudata	Tailed Eyebright	1	2005	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Geranium solanderi var. *solanderi s.s.*	Austral Crane's-bill	5	2008	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Isolepis wakefieldiana	Tufted Club-sedge	1	2004	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
Lachnagrostis semibarbata var. *semibarbata*	Purple Blown-grass	1	2002	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Lastreopsis hispida	Bristly Shield-fern	2	1996	-	en	5	No suitable habitat and no recent records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Melaleuca armillaris subsp. *armillaris*	Giant Honey-myrtle	10	2018	-	en	5	Outside of natural distribution range for species. Planted individuals present.
Olearia asterotricha	Rough Daisy-bush	1	1980	-	en	5	No suitable habitat and no recent records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Platylobium reflexum	Victorian Flat-pea	6	2020	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Prasophyllum lindleyanum	Green Leek-orchid	4	2001	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
Pterostylis clivosa	Red-tip Greenhood	2	2011	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Pterostylis grandiflora	Cobra Greenhood	15	2012	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Pterostylis X ingens	Sharp Greenhood	1	1770	-	vu	5	No suitable habitat and no recent records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance..
Pterostylis X toveyana	Mentone Greenhood	1	1896	-	en	5	No suitable habitat and no recent records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Pultenaea weindorferi	Swamp Bush-pea	2	1994	-	en	5	No suitable habitat and no recent records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Senecio campylocarpus	Floodplain Fireweed	3	2017	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
Tetratheca stenocarpa	Long Pink-bells	15	2019	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Thelymitra hiemalis	Winter Sun-orchid	1	2012	-	cr	5	No suitable habitat and no recent records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Thelymitra X irregularis	Crested Sun-orchid	1	1770	-	en	5	No suitable habitat and no recent records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Tmesipteris ovata	Oval Fork-fern	3	2018	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Tmesipteris parva	Small Fork-fern	1	1973	-	en	5	No suitable habitat and no recent records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.
Xanthosia tasmanica	Southern Xanthosia	2	2008	-	en	4	Limited suitable habitat and few past records in local area. Understorey dominated largely by exotic grasses as a result of historic disturbance.

Data Sources: Victorian Biodiversity Atlas (DEECA 2024d); Protected Matters Search Tool (DCCEEW 2024).

APPENDIX 2 FAUNA

Appendix 2.1 Significant Fauna Species

Significant fauna within 10 kilometres of the study area is provided in the Table A2.1.3 at the end of this section, with Tables A2.1.1 and A2.1.2 below providing the background context for the values in Table 2.1.3.

Table A2.1.1 Conservation status of each species for each Act/policy. The values in this table correspond to Columns 5 to 8 in Table A2.1.3.

EPBC (*Environment Protection and Biodiversity Conservation Act 1999*):				FFG (*Flora and Fauna Guarantee Act 1988*):			
EX	Extinct	VU	Vulnerable	ex	Extinct	vu	Vulnerable
CR	Critically endangered	CD	Conservation Dependent	cr	Critically endangered	cd	Conservation Dependent
EN	Endangered	#	Listed on the Protected Matter Search Tool	en	Endangered		

Table A2.1.2 Likelihood of occurrence rankings: Habitat characteristics assessment of significant fauna species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area to determine their likelihood of occurrence. The values in this table correspond to Column 9 in Table A2.1.3.

1	Known Occurrence	• Recorded within the project area recently (i.e. within 10 years).
2	High Likelihood	• Likely resident in the study area based on site observations, database records, or expert advice; and/or, • Recent records (i.e. within five years) of the species in the local area (DELWP 2018); and/or, • The study area contains the species' preferred habitat.
3	Moderate Likelihood	• The species is likely to visit the study area regularly (i.e. at least seasonally); and/or, • Previous records of the species in the local area (DEECA 2024d); and/or, • The study area contains some characteristics of the species' preferred habitat.
4	Low Likelihood	• The species is likely to visit the study area occasionally or opportunistically whilst en route to more suitable sites; and/or, • There are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or, • The study area contains few or no characteristics of the species' preferred habitat.

5	Unlikely	• No previous records of the species in the local area; and/or, • The species may fly over the study area when moving between areas of more suitable habitat; and/or, • Out of the species' range; and/or, • No suitable habitat present.

Table A2.1.3. Significant fauna within 10 kilometres of the study area.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area	Rationale for likelihood of occurrence
NATIONAL SIGNIFICANCE							
Antechinus minimus maritimus #	Swamp Antechinus (mainland)	-	-	VU	vu	4	No past local records and the study area contains limited suitable habitat.
Anthochaera phrygia #	Regent Honeyeater	-	-	CR	cr	4	No past records in local area and limited suitable habitat.
Aphelocephala leucopsis #	Southern Whiteface	-	-	VU	-	5	No past records in local area and generally found north of the dividing range.
Botaurus poiciloptilus	Australasian Bittern	1	2017	EN	cr	5	No past records and minimal suitable habitat. Species prefers wetland habitat.
Calidris acuminata #	Sharp-tailed Sandpiper	-	-	VU	-	5	No past records and minimal suitable habitat. Species prefers wetland habitat.
Calidris canutus #	Red Knot	-	-	VU	en	5	No past records and minimal suitable habitat. Species prefers wetland habitat.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area		Rationale for likelihood of occurrence
Calidris ferruginea #	Curlew Sandpiper	-	-	CR	cr	5		No past records and minimal suitable habitat. Species prefers wetland habitat.
Callocephalon fimbriatum	Gang-gang Cockatoo	91	2013	EN	en	1		Species observed adjacent to study area during targeted surveys, and previously observed within study area by Naturelinks Land Management (2022).
Charadrius leschenaultii #	Greater Sand Plover	-	-	VU	vu	5		No past records and minimal suitable habitat. Species prefers wetland habitat.
Climacteris picumnus	Brown Treecreeper	3	2018	VU	-	4		Limited past records and relatively sedentary species.
Dasyurus maculatus maculatus	Spot-tailed Quoll	1	2003	EN	en	4		Limited past records and limited suitable habitat.
Falco hypoleucos #	Grey Falcon	-	-	VU	vu	5		No past records and generally occurs north of the dividing range within drier areas of the state.
Galaxiella pusilla	Dwarf Galaxias	29	2010	VU	en	4		Limited suitable habitat within the study area and not connected to any nearby waterways.
Gallinago hardwickii #	Latham's Snipe	-	-	VU	-	5		No past records and minimal suitable habitat. Species prefers wetland habitat.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area		Rationale for likelihood of occurrence
Grantiella picta #	Painted Honeyeater	-	-	VU	vu	5		No past records and generally occurs north of the dividing range.
Hirundapus caudacutus	White-throated Needletail	30	2018	VU	vu	4		Primarily aerial species. May pass over study area on occasion.
Isoodon obesulus obesulus	Southern Brown Bandicoot	6	2013	EN	en	4		Low likelihood due to general open understorey structure and lack of records in the local area.
Lathamus discolor	Swift Parrot	3	1998	CR	cr	4		Foraging and roosting habitat is present in the wooded areas of the study area, although likely to rely on larger patches of woodland in the local area and throughout its core over-wintering range.
Lichenostomus melanops cassidix	Helmeted Honeyeater	491	1999	CR	cr	4		Low likelihood due to open nature of the understorey vegetation, lack of riparian vegetation and lack of Mountain Swamp Gum.
Liopholis montana #	Mountain Skink	-	-	EN	en	5		No past records and limited suitable habitat present.
Lissolepis coventryi	Swamp Skink	2	2006	EN	en	4		Limited past records in local area and the study area contains limited suitable habitat due to relatively open understorey.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area		Rationale for likelihood of occurrence
Litoria raniformis	Growling Grass Frog	173	2018	VU	vu	4		Limited suitable habitat and nearest population is located five kilometres south, with no habitat connectivity to the study area. The smaller dam had a high canopy cover, and the larger water body had a moderate canopy cover and limited suitable vegetation.
Maccullochella peelii	Murray Cod	2	1960	VU	en	5		No suitable habitat within the study area and not connected to any nearby waterways.
Macquaria australasica	Macquarie Perch	1	1970	EN	en	5		No suitable habitat within the study area and not connected to any nearby waterways.
Mastacomys fuscus mordicus	Broad-toothed Rat	1	1993	VU	vu	4		Limited past records in local area and the study area contains limited suitable habitat due to relatively open understorey.
Melanodryas cucullata	Hooded Robin	3	2009	EN	vu	4		The canopy within the study area is largely dominated by eucalyptus and acacia. However, limited records in the local area as the species is largely restricted north of the Great Divided Range (drier woodland and forest habitats).

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area		Rationale for likelihood of occurrence
Nannoperca obscura #	Yarra Pygmy Perch	-	-	EN	vu	5		No suitable habitat within the study area and not connected to any nearby waterways.
Neophema chrysostoma	Blue-winged Parrot	4	2002	VU	-	4		When the species is in Victoria, it is generally within near coastal areas. May stop over the study area on occasion for foraging.
Numenius madagascariensis #	Eastern Curlew	-	-	CR	cr	5		No past records and minimal suitable habitat. Species prefers wetland habitat.
Pedionomus torquatus #	Plains-wanderer	-	-	CR	cr	5		No past records and no suitable habitat present.
Petauroides volans	Southern Greater Glider	17	2018	EN	en	4		Most of the canopy within the study area is immature. Few large trees were observed within the Damp Forest and Lowland Forest, that contain hollows. Past records located 6.5 kilometres north of the study area.
Petaurus australis	Yellow-bellied Glider	17	2019	VU	vu	4		Limited suitable habitat within the study area, as the canopy is generally young with limited large trees and small patch size.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area		Rationale for likelihood of occurrence
Petaurus australis australis #	Yellow-bellied Glider (south-eastern)	-	-	VU	-	4		No past local records and the study area contains limited suitable habitat.
Potorous tridactylus trisulcatus #	Long-nosed Potoroo (southern mainland)	-	-	VU	vu	4		No past local records and the study area contains limited suitable habitat.
Prototroctes maraena	Australian Grayling	1	1873	VU	en	5		No suitable habitat within the study area and not connected to any nearby waterways.
Pseudomys fumeus #	Smoky Mouse	-	-	EN	en	4		No past local records and the study area contains limited suitable habitat.
Pseudomys novaehollandiae #	New Holland Mouse	-	-	VU	en	4		No past local records and the study area contains limited suitable habitat.
Pteropus poliocephalus	Grey-headed Flying-fox	4	2017	VU	vu	4		Limited past records within the local area but some suitable foraging habitat present (eucalypt trees).
Pycnoptilus floccosus	Pilotbird	20	1978	VU	vu	4		Minimal suitable habitat due to relatively open understorey and no past records within proximity to the study area
Rostratula australis #	Australian Painted Snipe	-	-	EN	cr	4		No past records and minimal suitable habitat. Species prefers wetland habitat.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area		Rationale for likelihood of occurrence
Stagonopleura guttata	Diamond Firetail	1	1912	VU	vu	4		No recent records and limited suitable habitat present.
Sternula nereis nereis #	Australian Fairy Tern	-	-	VU	cr	5		No past records in local area and no suitable habitat.
Synemon plana #	Golden Sun Moth	-	-	VU	vu	5		No past records in local area and no suitable habitat.
Tringa nebularia #	Common Greenshank	-	-	EN	en	5		No past records and minimal suitable habitat. Species prefers wetland habitat.
STATE SIGNIFICANCE								
Actitis hypoleucos	Common Sandpiper	73	2021	-	vu	4		Several past records however minimal suitable habitat. Species prefers wetland habitat.
Ardea alba modesta	Eastern Great Egret	18	2019	-	vu	4		Few past records and minimal suitable habitat. Species prefers wetland habitat.
Biziura lobata	Musk Duck	87	2006	-	en	4		Limited suitable habitat present within study area. previously recorded from larger waterbodies in the broader area (e.g. Cardinia Reservoir).
Calamanthus pyrrhopygius	Chestnut-rumped Heathwren	2	1994	-	vu	5		No recent records and species distribution generally within the Mount Lofty Ranges in South Australia.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area		Rationale for likelihood of occurrence
Engaeus victoriensis	Foothill Burrowing Crayfish	2	1964	-	en	5		No recent records and preferred habitat not present within the study area (i.e. wet streamsides).
Falco subniger	Black Falcon	14	2022	-	vu	4		Several past records in the local area and some suitable habitat. May fly over on occasion.
Haliaeetus leucogaster	White-bellied Sea-Eagle	7	2014	-	cr	4		Limited past records and limited suitable habitat. May fly over on occasion.
Hydroprogne caspia	Caspian Tern	1	1997	-	vu	4		No recent records in local area and minimal suitable habitat. Species prefers wetland habitat.
Hyridella (Hyridella) depressa	Depressed Mussel	29	2021	-	vu	5		No suitable habitat within the study area. Occurs within rivers and streams.
Ixobrychus dubius	Australian Little Bittern	16	2019	-	vu	4		Several past records however minimal suitable habitat. Species prefers wetland habitat.
Lewinia pectoralis	Lewin's Rail	2	2020	-	en	4		Several past records however minimal suitable habitat. Species prefers wetland habitat.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area		Rationale for likelihood of occurrence
Miniopterus orianae oceanensis	Eastern Bent-winged Bat	59	2019	-	vu	4		May forage within woodland areas but likely to rely on surrounding woodland areas where higher quality habitat is present.
Ninox connivens	Barking Owl	60	2019	-	vu	4		Not detected during targeted surveys however past records nearby and some suitable habitat present. May stop over on occasion.
Ninox strenua	Powerful Owl	1	2018	-	en	4		Not detected during targeted surveys and limited past records in local area. However some suitable habitat present. May stop over on occasion.
Ornithorhynchus anatinus	Platypus	3	1999	-	en	5		No suitable habitat or connectivity to nearby waterways.
Oxyura australis	Blue-billed Duck	1	1971	-	vu	4		Limited suitable habitat present within study area. previously recorded from larger waterbodies in the broader area (e.g. Cardinia Reservoir).
Pasma tasmanica	Two-spotted Grass-skipper Butterfly	1	2020	-	cr	4		Limited past records however some suitable habitat present (Weeping Grass)

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in study area		Rationale for likelihood of occurrence
Pseudemoia rawlinsoni	Glossy Grass Skink	1	1994	-	en	4		No recent records and limited suitable habitat present. Prefers dense vegetation along/near watercourses.
Pseudophryne semimarmorata	Southern Toadlet	24	2020	-	en	4		Not detected during targeted surveys and species relatively immobile. No habitat connection to surrounding populations.
Pyrrholaemus sagittatus	Speckled Warbler	1	1975	-	cr	4		No recent records and limited suitable habitat present.
Spatula rhynchotis	Australasian Shoveler	1	1998	-	vu	4		No recent records and limited suitable habitat present.
Stictonetta naevosa	Freckled Duck	3	2021	-	en	4		Limited suitable habitat present within study area. previously recorded from larger waterbodies in the broader area (e.g. Cardinia Reservoir).
Tyto tenebricosa	Sooty Owl	13	2020	-	en	4		Not detected during targeted surveys however past records nearby and some suitable habitat present.
Varanus varius	Lace Monitor	2	1907	-	en	4		No recent records however some suitable habitat present.

Data Sources: Victorian Biodiversity Atlas (DEECA 2023a); Protected Matters Search Tool (DCCEEW 2024).

APPENDIX 3 NATIVE VEGETATION REMOVAL (NVR) REPORT

Native vegetation removal report

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

Date of issue: **21/10/2024**
Time of issue: **2:30 pm**

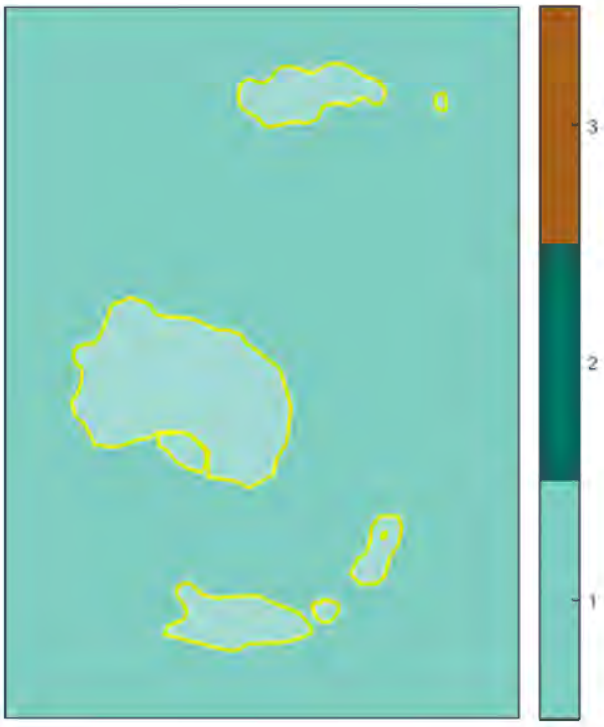
Report ID: EHP_2024_143

Project ID	EHP17386_Pakenham_VG94_31052024

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	1.666 ha
Extent of past removal	0.000 ha
Extent of proposed removal	1.666 ha
No. Large trees proposed to be removed	11
Location category of proposed removal	Location 1 The native vegetation is not in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map), sensitive wetland or coastal area. Removal of less than 0.5 hectares in this location will not have a significant impact on any habitat for a rare or threatened species

1. Location map



Offset requirements if a permit is granted

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

General offset amount[1]	0.750 general habitat units
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or Cardinia Shire Council
Minimum strategic biodiversity value score[2]	0.443
Large trees	11 large trees

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

Appendix 1 includes information about the native vegetation to be removed

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

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

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

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

Next steps

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

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

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

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

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

Additional application requirements must be met including:

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

Authorised by the Victorian Government, 8 Nicholson Street, East Melbourne.

For more information contact the DELWP Customer Service Centre 136 186

www.delwp.vic.gov.au

Appendix 1: Description of native vegetation to be removed

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

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

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

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

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

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

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

Native vegetation to be removed

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	**Type**	**BioEVC**	**BioEVC conservation status**	**Large tree(s)**	**Partial removal**	**Condition score**	**Polygon Extent**	**Extent without overlap**	**SBV score**	**HI score**	**Habitat units**	**Offset type**
1-C	Patch	hsf_0045	Least Concern	0	no	0.190	0.006	0.006	0.360		0.001	General
2-B	Patch	gipp0653	Endangered	0	no	0.330	0.001	0.001	0.590		0.000	General
3-A	Patch	hsf_0029	Least Concern	0	no	0.200	0.017	0.017	0.590		0.004	General
4-A	Patch	hsf_0029	Least Concern	0	no	0.200	0.236	0.236	0.624		0.057	General
5-A	Patch	hsf_0029	Least Concern	9	no	0.460	1.048	1.048	0.574		0.569	General
6-B	Patch	gipp0653	Endangered	0	no	0.330	0.048	0.048	0.650		0.020	General
9-C	Patch	hsf_0045	Least Concern	0	no	0.240	0.232	0.232	0.362		0.057	General
7-A	Patch	hsf_0029	Least Concern	2	no	0.440	0.077	0.077	0.590		0.041	General

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

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

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
Dandenong Wattle	*Acacia stictophylla*	505140	Rare	Dispersed	Habitat importance map	0.0010
White Star-bush	*Asterolasia asteriscophora subsp. albiflora*	505647	Endangered	Dispersed	Habitat importance map	0.0010
Wine-lipped Spider-orchid	*Caladenia oenochila*	503694	Vulnerable	Dispersed	Habitat importance map	0.0009
Strzelecki Gum	*Eucalyptus strzeleckii*	504558	Vulnerable	Dispersed	Habitat importance map	0.0007
Swamp Bush-pea	*Pultenaea weindorferi*	502881	Rare	Dispersed	Habitat importance map	0.0006
Powelltown Correa	*Correa reflexa var. lobata*	505404	Rare	Dispersed	Habitat importance map	0.0004
Long Pink-bells	*Tetratheca stenocarpa*	503354	Rare	Dispersed	Habitat importance map	0.0004
Mountain Bird-orchid	*Chiloglottis jeanesii*	504499	Rare	Dispersed	Habitat importance map	0.0003
Green Scentbark	*Eucalyptus fulgens*	505175	Rare	Dispersed	Habitat importance map	0.0002
Spurred Helmet-orchid	*Corybas aconitiflorus*	500835	Rare	Dispersed	Habitat importance map	0.0002
Green-striped Greenhood	*Pterostylis chlorogramma*	504728	Vulnerable	Dispersed	Habitat importance map	0.0002
Rough Daisy-bush	*Olearia asterotricha*	502300	Rare	Dispersed	Habitat importance map	0.0002
Large-leaf Cinnamon-wattle	*Acacia leprosa var. uninervia*	505141	Rare	Dispersed	Habitat importance map	0.0001
Cobra Greenhood	*Pterostylis grandiflora*	502798	Rare	Dispersed	Habitat importance map	0.0001
Lacy Wedge-fern	*Lindsaea microphylla*	502015	Rare	Dispersed	Habitat importance map	0.0001
Tufted Club-sedge	*Isolepis wakefieldiana*	501789	Rare	Dispersed	Habitat importance map	0.0001
Forest Phebalium	*Phebalium squamulosum subsp. squamulosum*	504817	Rare	Dispersed	Habitat importance map	0.0001
Southern Toadlet	*Pseudophryne semimarmorata*	13125	Vulnerable	Dispersed	Habitat importance map	0.0001
Wiry Bossiaea	*Bossiaea cordigera*	500435	Rare	Dispersed	Habitat importance map	0.0001

Velvet Apple-berry	*Billardiera scandens s.s.*	504290	Rare	Dispersed	Habitat importance map	0.0001
Winter Sun-orchid	*Thelymitra hiemalis*	505006	Endangered	Dispersed	Habitat importance map	0.0001
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	10220	Vulnerable	Dispersed	Habitat importance map	0.0000
Masked Owl	*Tyto novaehollandiae novaehollandiae*	10250	Endangered	Dispersed	Habitat importance map	0.0000
Powerful Owl	*Ninox strenua*	10248	Vulnerable	Dispersed	Habitat importance map	0.0000
Brickmaker's Sedge	*Gahnia grandis*	501390	Vulnerable	Dispersed	Habitat importance map	0.0000
Lace Monitor	*Varanus varius*	12283	Endangered	Dispersed	Habitat importance map	0.0000
Sooty Owl	*Tyto tenebricosa tenebricosa*	10253	Vulnerable	Dispersed	Habitat importance map	0.0000
Greater Glider	*Petauroides volans*	11133	Vulnerable	Dispersed	Habitat importance map	0.0000
White-throated Needletail	*Hirundapus caudacutus*	10334	Vulnerable	Dispersed	Habitat importance map	0.0000
Clover Glycine	*Glycine latrobeana*	501456	Vulnerable	Dispersed	Habitat importance map	0.0000
Parsley Xanthosia	*Xanthosia leiophylla*	504562	Rare	Dispersed	Habitat importance map	0.0000
Small Fork-fern	*Tmesipteris parva*	503405	Rare	Dispersed	Habitat importance map	0.0000
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	11008	Endangered	Dispersed	Habitat importance map	0.0000

Habitat group

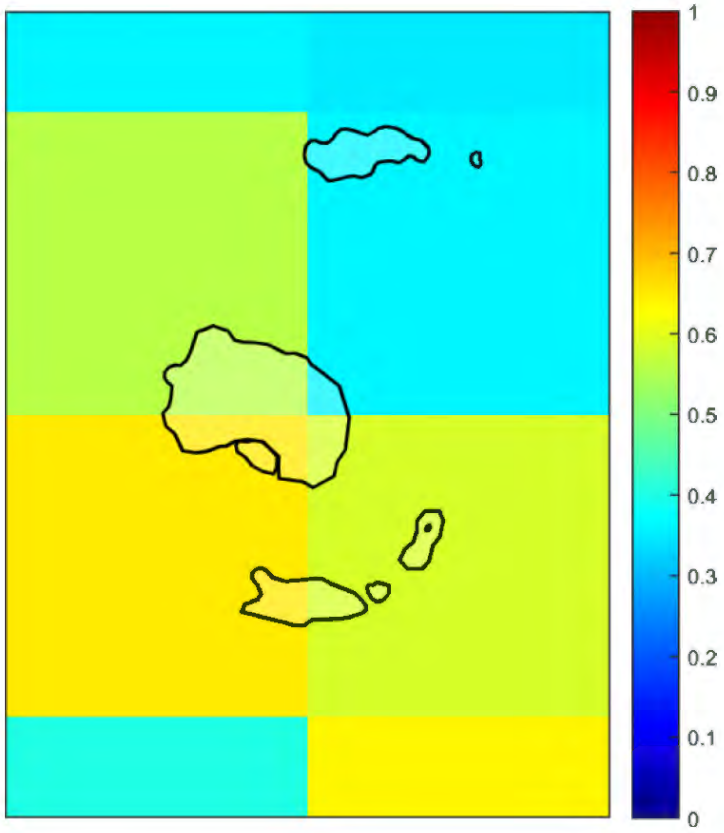
- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

Habitat impacted

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

Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map



3. Aerial photograph showing mapped native vegetation

4. Map of the property in context

Yellow boundaries denote areas of proposed native vegetation removal.

APPENDIX 4 AVAILABLE NATIVE VEGETATION CREDITS

Report of available native vegetation credits

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

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

Date and time: 31/05/2024 03:35 **Report ID: 24596**

What was searched for?

General offset

General habitat units	Strategic biodiversity value	Large trees	Vicinity (Catchment Management Authority or Municipal district)	
0.75	0.443	11	CMA	Melbourne Water
			or LGA	Cardinia Shire

Details of available native vegetation credits on 31 May 2024 03:35

These sites meet your requirements for general offsets.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
BBA-0277	2.315	443	Melbourne Water	Mornington Peninsula Shire	No	Yes	No	Abezco, Ethos, VegLink
BBA-0670	16.212	106	Melbourne Water	Cardinia Shire	No	Yes	No	Abezco, VegLink
BBA-0677	7.936	1414	Melbourne Water	Whittlesea City	No	Yes	No	Abezco, VegLink
BBA-0678	42.899	2599	Melbourne Water	Nillumbik Shire	No	Yes	No	VegLink
BBA-2789	1.317	14	Melbourne Water	Baw Baw Shire	Yes	Yes	No	Contact NVOR
BBA-2790	2.911	116	Melbourne Water	Baw Baw Shire	Yes	Yes	No	Contact NVOR
BBA-2870	2.544	431	Melbourne Water	Yarra Ranges Shire	Yes	Yes	No	VegLink
BBA-2871	14.783	1662	Melbourne Water	Yarra Ranges Shire	Yes	Yes	No	VegLink
VC_CFL-3710_01	6.300	322	Melbourne Water	Yarra Ranges Shire	Yes	Yes	No	VegLink
VC_CFL-3744_01	1.164	349	Melbourne Water	Macedon Ranges Shire	Yes	Yes	No	VegLink

These sites meet your requirements using alternative arrangements for general offsets.

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

There are no sites listed in the Native Vegetation Credit Register that meet your offset requirements when applying the alternative arrangements as listed in section 11.2 of the Guidelines for the removal, destruction or lopping of native vegetation.

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

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
VC_CFL-3746_01	4.962	563	Melbourne Water	Macedon Ranges Shire	Yes	Yes	No	VegLink

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

Next steps

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

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

Broker contact details

Broker Abbreviation	Broker Name	Phone	Email	Website
Abezco	Abzeco Pty. Ltd.	(03) 9431 5444	offsets@abzeco.com.au	www.abzeco.com.au
Baw Baw SC	Baw Baw Shire Council	(03) 5624 2411	bawbaw@bawbawshire.vic.gov.au	www.bawbawshire.vic.gov.au
Bio Offsets	Biodiversity Offsets Victoria	0452 161 013	info@offsetsvictoria.com.au	www.offsetsvictoria.com.au
Contact NVOR	Native Vegetation Offset Register	136 186	nativevegetation.offsetregister@delwp.vic.gov.au	www.environment.vic.gov.au/native-vegetation
Ecocentric	Ecocentric Environmental Consulting	0410 564 139	ecocentric@me.com	Not avaliable
Ethos	Ethos NRM Pty Ltd	(03) 5153 0037	offsets@ethosnrm.com.au	www.ethosnrm.com.au
Nillumbik SC	Nillumbik Shire Council	(03) 9433 3316	offsets@nillumbik.vic.gov.au	www.nillumbik.vic.gov.au
TFN	Trust for Nature	8631 5888	offsets@tfn.org.au	www.trustfornature.org.au
VegLink	Vegetation Link Pty Ltd	(03) 8578 4250 or 1300 834 546	offsets@vegetationlink.com.au	www.vegetationlink.com.au
Yarra Ranges SC	Yarra Ranges Shire Council	1300 368 333	biodiversityoffsets@yarraranges.vic.gov.au	www.yarraranges.vic.gov.au

For more information contact the DEECA Customer Service Centre 136 186 or the Native Vegetation Credit Register at nativevegetation.offsetregister@delwp.vic.gov.au

APPENDIX 5 TARGETED FAUNA REPORT

Final Report

Targeted Fauna Surveys: Mount Shamrock Quarry, Pakenham, Victoria

Prepared for

Umwelt Pty Ltd c\- Holcim Australia

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Ecology and Heritage Partners Pty Ltd

MELBOURNE: 292 Mt Alexander Road, Ascot Vale VIC 3032 **GEELONG:** 230 Latrobe Terrace, Geelong West VIC 3218
BRISBANE: Level 22, 127 Creek Street, Brisbane QLD 4000 **ADELAIDE**: 78 Edmund Avenue, Unley SA 5061
CANBERRA: 19-23 Moor Street, Turner ACT 2612 **SYDNEY:** Level 5, 616 Harris Street, Ultimo NSW 2007
www.ehpartners.com.au | 1300 839 325

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Project manager	Claire Ranyard (Associate Botanist)
Report reviewer	Shannon LeBel (Associate Ecologist)
Other EHP staff	Claire Mackay (Consultant Zoologist), Emma Hinde (Zoologist)
Mapping	Diana Valadares (GIS Officer)
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Ecology and Heritage Partners acknowledge the Traditional Owners of the country we live and work on, and we pay our respect to Elders past, present and emerging.

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1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by Umwelt Pty Ltd on behalf of Holcim Australia (Holcim) to undertake Targeted Fauna Surveys at Mount Shamrock Quarry, Pakenham, Victoria. The Mount Shamrock Quarry is an active quarry operated by Holcim, which produces high quality construction materials such as rail ballast, aggregate and road bases.

We understand that Holcim is proposing to submit a planning application in order to facilitate expansion of the existing quarry operations. A preliminary biodiversity assessment was completed by Ecology and Heritage Partners (EHP) (2024a) that identified suitable habitat for several significant fauna species, and targeted surveys were recommended to confirm the presence and/or habitat suitability for these species.

The targeted surveys focused on two fauna species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and three fauna species listed under the State *Flora and Fauna Guarantee Act 1988* (FFG Act), including:

- Gang-gang Cockatoo *Callocephalon fimbriatum* (Endangered under EPBC Act and FFG Act);
- Blue-winged Parrot *Neophema chrysostoma* (Vulnerable under EPBC Act);
- Powerful Owl *Ninox strenua* (Endangered under FFG Act);
- Sooty Owl *Tyto tenebricosa* (Endangered under FFG Act); and,
- Southern Toadlet *Pseudophryne semimarmorata* (Endangered under FFG Act).

This report details the methodology and results of the targeted surveys completed for the project. A detailed Biodiversity Assessment has been completed for the proposed quarry expansion (EHP 2024b). The Biodiversity Assessment details the potential policy and legislative implications associated with the project, based on the results of these targeted surveys and the results of the vegetation assessments presented in the Biodiversity Assessment (EHP 2024b). As a result, this report does not include a discussion of policy and legislation implications.

1.2 Study Area

The study area is located at 95 Mount Shamrock Road, Pakenham (2\LP200083), approximately 65 kilometres south-east of Melbourne's CBD (Figure 1). The current Mount Shamrock Quarry covers an area of approximately 95.33 hectares, with the study area comprising a 10.66 hectare area that will be assessed as part of a proposed future quarry extension. The study area is bound by the Pakenham Pony Club to the north, agricultural land to the east and the existing quarry operations to the west and south.

The study area currently contains areas of revegetation, internal gravel access roads and small areas of remnant vegetation. An embankment runs along the northern and eastern boundaries, which has been planted with a mixture of eucalypt and acacia species, now relatively mature and containing some small

hollows. Two small dams were present along the eastern border, along with a depression at the base of the remnant stand of Damp Forest vegetation containing shallow water.

According to the Victorian Department of Energy, Environment and Climate Action (DEECA) NatureKit Map (DEECA 2024a), the study area is located within the Highlands – Southern Fall bioregion, Melbourne Water Catchment Management Authority (CMA) and Cardinia Shire municipality.

1.3 Objectives

The objectives of the targeted surveys were to:

- Determine the presence/absence of targeted fauna species recorded or considered likely to occur within the study area;
- Complete an assessment of habitat suitability for any threatened fauna species recorded within the local area;
- Provide information to inform any implications of Commonwealth and State environmental legislation and Government policy associated with the proposed quarry expansion;
- Determine any potential impacts on targeted fauna species, and their habitats at a national and State level associated with the proposed quarry expansion; and,
- Provide advice on mitigation measures that can be undertaken to avoid and/or mitigate potential adverse impacts on significant fauna species that may occur within the study area.

2 TARGET SPECIES DESCRIPTIONS

2.1 Nationally Significant Species

2.1.1 *Gang-gang Cockatoo*

EPBC Act Conservation Status: Endangered

FFG Act Conservation Status: Endangered

Description

The Gang-gang Cockatoo is a small, stocky, yet distinct cockatoo, usually between 32 and 37 centimetres in length, with a wingspan between 62 and 76 centimetres. These birds are primarily slate-grey, with the males easily identifiable with a scarlet-coloured head and wispy crest, and the females supporting yellow and pink edged underbelly feathers, giving a barred effect. Juveniles are similar in appearance to the females, however their crest is rudimentary, while their underparts and upper wings appear a washed-green (Higgins 1999). Their call is also distinct, often likened to a creaking gate, or a cork being pulled from a bottle (NSW OEH 2023).

Plate 1. Gang-gang Cockatoo (Ecology and Heritage Partners Pty Ltd).

Distribution

Gang-gang Cockatoo are endemic to south-eastern Australia. They are considered widespread through the north-east and southern regions of Victoria, with records in east Melbourne, Mornington Peninsula, and south-west Gippsland (Higgins 1999; Menkhorst *et al.* 2017; DAWE 2022).

Ecology

Monogamous breeders, the Gang-gang Cockatoo breeding season occurs from October to January, however breeding records from late August, early September and March exist (Higgins 1999).

Gang-gang Cockatoo are an altitudinal migrant. Being well-adapted to cooler climates, the species is most common at higher altitudes and southern latitudes (DAWE 2022). During the summer months, the species primarily occurs in mature, wet sclerophyll forests dominated by eucalypts with dense, shrubby understories dominated by acacia and banksia (NSW Scientific Committee 2008a). However, during the winter months, they migrate to lower altitudes with drier woodland habitats and open eucalypt assemblages (Higgins 1999). Importantly, some overlapping of winter and summer ranges is common (Higgins 1999). Outside of the breeding season (October to January), the species can also be observed in suburban areas (i.e. Canberra, Sydney and Melbourne) including parks, gardens, and road-side plantations (DAWE 2022).

Foraging primarily occurs in the canopy of woodland assemblages (particularly eucalypts), typically feeding in small groups of up to 25 individuals (Higgins 1999). The species has a wide-ranging diet, regularly feeding on flower buds, seed pods blossoms, leaf buds, fruit and seed from native and ornamental species.

Gang-gang Cockatoo rely on eucalypts and acacia when feeding on native vegetation (DAWE 2022), and species such as Hawthorn *Crataegus monogyna*, Cotoneaster *Cotoneaster glaucophyllus* and *Pyracantha* berries when feeding on introduced vegetation (DAWE 2022). Gang-gang Cockatoo will also feed on insect larvae (Menkhorst *et al.* 2017).

Habitat

The species nest in old-growth hollows, which primarily occur in the tree trunk and limb or within the dead sprout of large, living eucalypts (DAWE 2022). Nest and roost sites are often located near water (Beruldsen 1980; DAWE 2022). Breeding aggregations are reliant on stands of suitable hollow-bearing trees (NSW OEH 2017; Davey and Mulvaney 2020), where multiple nests may be positioned in close proximity (i.e. within a few hundred metres).

Gang-gang Cockatoo create or enlarge suitable nesting hollows and may return to the same nest and roost sites over multiple years (Higgins 1999) (Davey and Mulvaney 2020). Preferred hollow attributes are presented in Table 1.

Table 1. Preferred hollow attributes of Gang-gang Cockatoos (Davey and Mulvaney 2020; DAWE 2022).

Hollow attribute	Dimensions
Entrance height	21.3 cm (minimum 12 cm)
Entrance width	13.1 cm (range 9-24) cm
Floor diameter*	20 cm
Hollow depth*	50.5 cm (range 22-90 cm)
Height above ground*	7.5 m (5 - 9.4 m)

*Hollow attributes considered a key component of habitat critical to the survival of Gang-gang Cockatoo (DAWE 2022).

2.1.2 *Blue-winged Parrot*

EPBC Act Conservation Status: Vulnerable

FFG Act Conservation Status: Unlisted

Description

Plate 2. Blue-winged Parrot (https://birdlife.org.au/bird-profiles/blue-winged-parrot/)

Measuring up to 24 centimetres in length and weighing less than 50 grams, Blue-winged Parrot can be characterised by their slender build. The species supports an olive-green head and upper body, with lighter green hue on the throat. The upper tail displays shades of green-blue with yellow sides, while its underparts are predominantly yellow, often featuring an orange centre on the belly. A yellow facial patch extends backward to the eye, complemented by a narrow, dark blue band stretching from eye to eye across the forehead. Notably, the Blue-winged Parrot earns its name from the prominent dark blue patch adorning its wings. While both sexes

share similar characteristics, females typically exhibit slightly subdued colours compared to males (DCCEEW 2023).

Distribution

Blue-winged Parrot primarily breed on mainland Australia, south of the Great Dividing Range, particularly in southern Victoria extending from Port Albert in Gippsland and west through to Nelson. During winter, a portion of the Tasmanian populations migrates across Bass Strait to Victoria, with some evidence suggesting non-stop flights due to limited records from Bass Strait islands. In the non-breeding season, from autumn to early spring, these parrots are observed in northern Victoria, eastern South Australia, south-western Queensland, and western New South Wales. Some individuals may also reach south-east New South Wales and eastern Victoria, particularly during southern migrations (Higgins 1999).

Habitat

Blue-winged Parrots are found in various habitats, ranging from coastal and sub-coastal areas to inland regions, including semi-arid zones. They show a preference for grasslands, grassy woodlands, and areas near wetlands, both along the coast and in semi-arid regions (Higgins 1999). Additionally, the species can be found in modified environments such as airfields, golf courses, and paddocks. Typically seen in pairs or small groups, Blue-winged Parrots primarily forage near or on the ground, feeding on a diverse array of seeds from native and introduced grasses, herbs, and shrubs (Higgins 1999; DCCEEW 2023).

2.2 State Significant Species

2.2.1 Powerful Owl

EPBC Act Conservation Status: Not listed

FFG Act Conservation Status: Vulnerable

Plate 3. Powerful Owl. (Ecology and Heritage Partners Pty Ltd.)

Description

Powerful Owl are the largest owl species in Australia, reaching a size of 67 centimetres and 58 centimetres in males and females, respectively (SWIFFT 2024). They mate for life (approximately 30 years) and a breeding pair defend their home-range all year round. Home-ranges are known to vary widely depending upon landscape matrix, size of bushland patches, and prey and/ or tree-hollow density (Bilney 2013). They may cycle through multiple preferred nest hollows, spending between two and five years at each nest site before moving to the next (McNabb 1996) or continually utilise the same hollow (SWIFFT 2024).

Habitat

Powerful Owl are typically found in tall open sclerophyll forest and woodlands, requiring large, hollow-bearing eucalypts for breeding. The species prefers areas with dense scrub nearby, particularly large tracts of

continuous forest, but has been recorded in more fragmented landscapes, or near permanent streams dominated by Mountain Grey Gum *Eucalyptus cypellocarpa* and other eucalypts.

Powerful Owl is occasionally recorded in parklands and adjoining suburban areas, but rarely, if ever, breed in these areas (Higgins 1999). They have been increasingly reported in urban environments, that provide adequate prey, tree hollows for nesting, and a high canopy cover with structural diversity of vegetation for roosting (Isaac *et al*. 2013), but rarely breed in these areas (Higgins 1999).

Suitable nesting hollows are generally considered to at least 50 centimetres wide, and one metre deep (Cooke *et. al.,*2002). The species prefer older forests, with dense gullies for roosting and breeding sites. A territory of 400 hectares in high quality habitat may support a pair of Powerful Owl (Higgins and Davies 1999), though territories of over 4,000 hectares can be required in lower quality or fragmented landscapes (Soderquist *et al.* 2002).

2.2.2 *Sooty Owl*

EPBC Act Conservation Status: Not listed

FFG Act Conservation Status: Endangered

Plate 4. Sooty Owl (eBird 2024).

Description

The Sooty Owl is a medium-sized owl reaching 51 centimetres in length in females, and 43 centimetres in males. They are dark sooty-grey above with fine white spots throughout their plumage, a prominent pale heart-shaped disc surrounding their face, and large feet and claws (Schodde & Mason 1981, Jackson & Kavanagh 1997). Adults have a piercing downscale territorial call, known commonly as the 'falling bomb-whistle', as well as harsh screeches, trilling and churring calls (DSE 2011b).

Ecology

Sooty Owl occur in along the east Australian coast in central and southern Queensland, New South Wales, and through eastern Victoria to the north-eastern and eastern outskirts of Melbourne (DSE 2011b). Home ranges are known to vary widely depending upon landscape matrix, size of bushland patches, prey abundance, and tree hollow density. Males typically occupy an average home range of 3,025 hectares whilst females occupy only 994 hectares (Bilney et al. 2011). Sooty Owl are sedentary and strongly territorial, preying upon ground dwelling and arboreal mammals, and consuming a wide range of mammal species (Bilney et al. 2006) (Bilney 2020).

Habitat

Sooty Owl are typically associated with tall and wet forest types, especially in areas with senescent growth stages, being rare on the western slopes of the Great Dividing Range. They roost within large tree hollows, caves, rock overhangs or within dense foliage during daylight hours, and are nocturnal, though can become active as dusk falls (Menkhorst et al. 2017).

2.2.3 *Southern Toadlet*

EPBC Act Conservation Status: Not Listed

FFG Act Conservation Status: Endangered

Plate 5. Southern Toadlet (Ecology and Heritage Partners 2024).

Description

Southern Toadlet *Pseudophryne semimarmorata* is a small frog, with an adult body length up to 30 millimetres. The back is warty and varies from brown to dark olive-green with darker flecks (Barker *et al.* 1995; Robinson 2000). The chest has black and white marbling, while the throat, lower belly and underside of the limbs are tan to orange in colour (Barker *et al.* 1995; Robinson 2000). Males have a granular belly, while the female's belly is smooth (Hero *et al.* 1991; Barker *et al.* 1995; Robinson 2000). Tadpoles are dark grey to brown and relatively small (total length 30 mm), with a small oval body and rounded snout. They contain a copper-coloured stripe that runs along their back, along with very small gold iridosphores (Anstis 2002). Tadpole eyes are gold flecked with a gold ring that surrounds the pupil.

Distribution

The distribution of Southern Toadlet is likely to have declined, potentially due to adverse impacts from the water-borne fungal pathogen *Batrachochytrium dendrobatydis* (Chytridiomycosis). However, insufficient data is present to draw definitive conclusions. Furthermore, factors such as more frequent intense bush fires and increased frequency of drought is predicted to cause large-scale mortality and habitat destruction/degradation for this frog species (Carey et al. 2003).

Habitat

Southern Toadlet can be found in forest, woodland, shrubland, grassland and heathland. Adults shelter under leaf litter, rocks, logs and other debris in damp areas (Hero *et al.* 1991; Robinson 2000). They are a ground dwelling frog with a preference for walking (Hero *et al.* 1991). Males of this species call from shallow burrows in low lying areas, usually near water or boggy ground from under leaf litter, logs or rocks (Hero *et al.* 1991; Robinson 2000). Males usually call in autumn, before periods of heavy rain (Robinson 2000).

3 METHODS

3.1 Desktop Assessment

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

- Conservation Advice for *Callocephalon Fimbriatum* (Gang-gang Cockatoo). Department of Agriculture, Water and the Environment (DAWE) 2022;
- Report on a Survey of Breeding activity of the Gang-gang Cockatoo within Urban Canberra 2019 – 2020. Davey, C and Mulvaney, M. Canberra Bird Notes 45 (3) 2020;
- Conservation Advice for *Neophema chrysotoma* (Blue-winged Parrot). Department of Climate Change, Energy, the Environment and Water, March 2023;
- Interim survey guidelines for toadlet *Pseudophryne* species in Victoria. De Anglis, D and Cleelend, C, March 2023;
- Breeding habitat characteristics of the threatened Southern Toadlet *Pseudophryne semimarmorta* (anura: Myobatrachidae). Jenner, B 2012;
- Survey Standards: Powerful Owl, *Ninox strenua*. Department of Sustainability and Environment, May 2011;
- Threatened Species Assessment: *Ninox strenua* Powerful Owl. Department of Environment, Land, Water and Planning, June 2021;
- Action Statement: Sooty Owl (*Tyto tenebricosa*). *Flora and Fauna Guarantee Act 1988*. Department of Energy, Environment and Climate Action (DEECA), August 2023;
- Action Statement: Powerful Owl (*Ninox strenua*). *Flora and Fauna Guarantee Act 1988*. Department of Energy, Environment and Climate Action (DEECA), August 2023;
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DEECA 2024a);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened (DEECA 2024b) Lists;
- The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DCCEEW 2024);
- Aerial photography of the study area; and,
- Ecological assessments relevant to the study area; including;

- Preliminary Ecological Assessment: Mount Shamrock Quarry, Pakenham, Victoria. Ecology and Heritage Partners 2024a.
- Biodiversity Assessment: Mount Shamrock Quarry, Pakenham, Victoria. Ecology and Heritage Partners 2024b.

3.2 Field Assessment

Targeted fauna surveys were undertaken between 26 March and 2 May 2024 in areas of suitable habitat within the study area by two experienced zoologists for the following species:

- Gang-gang Cockatoo and Blue-winged Parrot (Habitat Assessments, Diurnal Fixed-point Bird Count and Roaming Surveys) (26 March 2024, 12 and 30 April 2024);
- Powerful Owl and Sooty Owl (Habitat Assessments and Nocturnal Bird Surveys) (26 and 27 March 2024); and,
- Southern Toadlet (Habitat Assessment and Nocturnal Frog Surveys) (30 April 2024, 1 and 2 May 2024).

All fieldwork was carried out under the appropriate licences, including:

- The current Research Permit (#10010929) issued by DEECA on 26 October 2023 under the *Wildlife Act 1975;*
- The permit (#10010917) issued by DEECA on 14 November 2023 under the FFG Act*;* and,
- An Animal Research permit issued by the Wildlife and Small Institutions Animal Ethics Committee on 14 December 2023 (05.17).

3.2.1 Gang-gang Cockatoo and Blue-winged Parrot Surveys

Habitat Assessment

An assessment of suitable habitat for Gang-gang Cockatoo and Blue-winged Parrot was completed within the study area. The surveys primarily sought to assess the condition and suitability of the vegetation within the study for foraging, nesting, and breeding purposes of Gang-gang Cockatoo and Blue-winged Parrot. A focus was given to the presence and suitability of hollow-bearing trees, with trees in which hollows were observed being mapped. The assessment was based on the presence of preferred habitat characteristics outlined in Section 2.1.1 and Section 2.1.2.

Diurnal Bird Survey

Two zoologists experienced in bird identification completed fixed-point count and roaming surveys of diurnal birds, to the specifications outlined below. The purpose of the fixed-point count surveys was to observe habitat use of diurnal birds within the study area, and not as a measure to determine presence/absence of either Gang-gang Cockatoo or Blue-winged Parrot. As Gang-gang Cockatoo had previously been observed within the broader quarry site by Naturelinks Land Management, the fixed-point count surveys were an opportunity to observe habitat use by Gang-gang Cockatoo within the study area, should they be present during the surveys.

10 × 42 binoculars were be used to identify the bird to species. Any incidental observations of additional bird species were also recorded to aid in understanding the general use of the habitat within the study area by similar species (i.e. Cockatoos and Parrots).

Three rounds of fixed-point count surveys were undertaken between early 26 March and 30 April 2024 to capture the altitudinal movements of the Gang-Gang Cockatoo (DAWE 2022) and non-breeding season movements of the Blue-winged Parrot (DCCEEW 2023). The following were undertaken as part of each round of fixed-point bird counts:

- A total of three sites within the study area were selected in which to undertake fixed point counts. The locations were chosen to ensure that the entire study area was sampled and that the full range of habitat types represented in that sample were captured;
- The search radius from the point was at least 100 metres for small birds (i.e. Blue-winged Parrot) and up to 800 metres for large birds (i.e. Gang-gang Cockatoo), or further, if accurate identification to species level was achievable, using prominent landmarks;
- The duration of each fixed-point count was 20 minutes;
- Each point was surveyed at different times of day (e.g. early morning, late morning, early afternoon and late afternoon) to account for diurnal differences in bird activity; and,
- Each point was surveyed three times between March-May 2024.

Incidental Observations and Roaming Surveys

In addition to bird species recorded during the fixed-point count surveys, incidental observations of bird species were recorded while walking between point counts and during other field-based activities. Birds seen adjacent to the study area were also recorded.

3.2.2 Powerful Owl and Sooty Owl Surveys

Habitat Assessment

An assessment of suitable habitat for Powerful Owl and Sooty Owl was completed within the study area. The assessment sought to confirm the extent of suitable breeding and foraging habitat within the study area, based on the presence of preferred habitat characteristics outlined in Section 2.2.1. and 2.2.2.

Nocturnal Bird Surveys

Nocturnal bird surveys were completed by two qualified zoologists on two consecutive nights on the 26 and 27 March 2024 with the primary aim to determine the presence or absence of Powerful Owl and Sooty Owl, and to further investigate the presence and abundance of potential roosting sites within the study area. Survey methods were in accordance with the Powerful Owl (DSE 2011a) and Sooty Owl Survey Standards (DSE 2011b).

Call playback was employed during each spotlighting transect survey, where recordings of the vocalisations of animals are broadcast in order to elicit a response, either vocal or behavioural. In order to survey for the Powerful Owl and Sooty Owl concurrently, multi species playback sessions were undertaken along a transect.

One continuous transect that navigated through the study area, covering all key areas of habitat, was completed on each of the two survey nights. The following was undertaken for nocturnal bird surveys:

- The transects were a minimum of one hour in length;
- Transect locations and tracks were recorded by GPS for accurate reporting;
- 1200 Lumen spotlights were used along each transect;
- GPS locations were recorded for all individuals identified during spotlight surveys, along with their microhabitat;
- Spotlighting surveys were conducted after call playback was performed; and,
- Weather and environmental conditions (e.g. temperature, wind speed, cloud cover and moon phase) were recorded at the commencement of the transect, and unfavourable weather, such as heavy rain or high winds, was avoided.

3.2.3 Southern Toadlet

Targeted surveys for Southern Toadlet were conducted by two qualified zoologists over three consecutive nights between 30 April and 2 May 2024, and were undertaken in accordance with best practice methods described in the *Interim survey guidelines for toadlets* Pseudophryne *spp. in Victoria* (De Angelis and Cleeland 2023) (Table 1).

Southern Toadlet occur in damp habitats that are inundated during late autumn and winter (ephemeral depressions and waterbodies), often where logs or leaf litter are present.

The surveys were conducted in areas of potential habitat identified within the study area. Surveys were undertaken over three nights and involved:

- Spotlighting, call identification, and active searching for adults and metamorphs during the species known breeding season (late March – early May);
- Accessing a reference site located in Churchill National Park, Lysterfield South, to confirm the species was actively calling prior to undertaking surveys; and,
- Active call playback at all areas of suitable habitat.

Habitat characteristics were also recorded at each survey site, and included:

- Vegetation structure and composition at the survey site and nearby surrounding area; and,
- Availability and suitability of habitat (organic litter and logs).

Table 1. Recommended survey requirements for *Pseudophryne* spp. in Victoria (De Angelis and Cleeland 2023).

Minimum number of surveys (on separate nights) at each potential breeding site	3
Time of year	Late March to early May in lowland areas and most inland slopes, with at least one survey in April. Surveys outside these times should be informed by weather conditions and if it is known the species is calling nearby
Time of day	From sunset and after dark (i.e. from 6pm)
Duration on each survey at each site	5 minutes (plus additional time as needed to drive slowly between multiple sites while periodically stopping to listen)

Ambient temperature at the time of survey	> 11^{0}C
Other weather variables	Not in heavy wind or rain

3.3 Assessment Qualifications and Limitations

This report has been written based on the quality and extent of the ecological values and habitat considered to be present or absent at the time of the desktop and/or field assessments being undertaken.

Data and information held within the ecological databases and mapping programs reviewed as part of the desktop assessment are unlikely to represent all observations of the target species that have occurred within and surrounding, the study area. However, the data collected during the field assessment, and information obtained from relevant sources (e.g. biological databases and relevant literature) are considered adequate to provide an accurate assessment of the presence/absence of the target significant fauna species within the study area.

The process for determining a species likelihood of occurrence within the study area was based off a combination of methods, such as habitat suitability, presence of nearby records, results of the targeted searches for specific fauna species and any published survey guidelines/conservation advice relevant to the targeted fauna species. The results of all methods were considered when assessing likelihood of occurrence (i.e. the results of the targeted fauna searches were not used as a sole determinate for absence given the limited survey window of the fixed-point count surveys, nocturnal bird surveys and Southern Toadlet surveys).

Ecological values identified within the study area were recorded using a hand-held GPS or tablet with an accuracy of +/-3 metres. This level of accuracy is considered to provide an accurate assessment of the ecological values present within the study area; however, this data should not be used for detailed surveying purposes.

4 RESULTS

4.1 Gang-gang Cockatoo and Blue-winged Parrot Surveys

4.1.1 Database Searches and Literature Review

Gang-gang Cockatoo

The VBA contains 91 past records of Gang-gang Cockatoo (most recent record from 2013) within 10 kilometres of the study area (DEECA 2024a) (Figure 2). A summary of past sightings of Gang-gang Cockatoo that occur closet to the study area include:

- Mount Shamrock Quarry site (Naturelinks 2022);
- Pakenham and Beaconsfield townships – consistent and recent sightings of Gang-gang Cockatoo in the region (eBird 2024); and,
- Gembrook G67 Bushland Reserve (4.5 kilometres north-east of the study area) – includes records of Gang-gang from 2020-2021 (Birdata 2024).

Blue-winged Parrot

The VBA contains four past records of Blue-winged Parrot (most recent record from 2002) within 10 kilometres of the study area (DEECA 2024a) (Figure 2). A summary of past sightings of Blue-winged Parrot that occur closet to the study area include:

- Gembrook G67 Bushland Reserve (4.5 kilometres north-east of the study area) – Blue-winged Parrot observed there in 2020 (Birdata 2024); and,
- Bunyip State Park (over 8.5 kilometres north-east of the study area)– consistent sightings of Blue-winged Parrot in recent years throughout the state park, particularly along Buttongrass Walk and near Nash Creek Campground (Birdata 2024; eBird 2024).

4.1.2 Habitat Assessment

Gang-gang Cockatoo

The study area contained large stands of eucalyptus and acacia, which are some of the preferred foraging vegetation for Gang-gang Cockatoo (DAWE 2022). The vegetation present within the study area would provide a range of flower buds, seeds, leaf buds and gumnuts, likely to attract Gang-gang Cockatoo passing through the area, primarily when the eucalypt and acacias are in flower (e.g. late winter through to summer). A total of 8.2 hectares of suitable foraging habitat was mapped within the study area (Figure 3).

Five hollow bearing trees were observed within the study area, with their locations shown on Figure 3. Of these, one hollow was observed that potentially met the preferred hollow attributes for Gang-gang Cockatoo (as described in Table 1, Section 2.1.1). This hollow was located between approximately seven to nine meters up a Messmate Stringybark stag and had an opening that appeared large enough to support a breeding pair of Gang-gang Cockatoo (Plate 5). The floor diameter and hollow depth were not measured due to the hollows

location. The opening of the hollow appeared to be facing upwards, which is unlikely to be preferred due to the exposure to weather. No evidence of chewing at the hollow edges was observed.

All other hollows observed within the study area were small (i.e. <10 centimetres) and did not contain the preferred hollow attributes for Gang-gang Cockatoo (Plate 6).

The general structure of the vegetation within the study area was not consistent with the preferred habitat for the species. The study area was largely dominated by young eucalyptus and wattle, which have been planted as a part of a revegetation program. Gang-gang Cockatoo are commonly associated with dense forest or woodland areas, where mature canopy trees are present that provide a range of suitable nesting hollows (DAWE 2022).

Plate 5. Messmate Stringybark stag with medium sized hollow observed within the study area. Hollow located between red lines (Ecology and Heritage Partners Pty Ltd 02/05/2024).

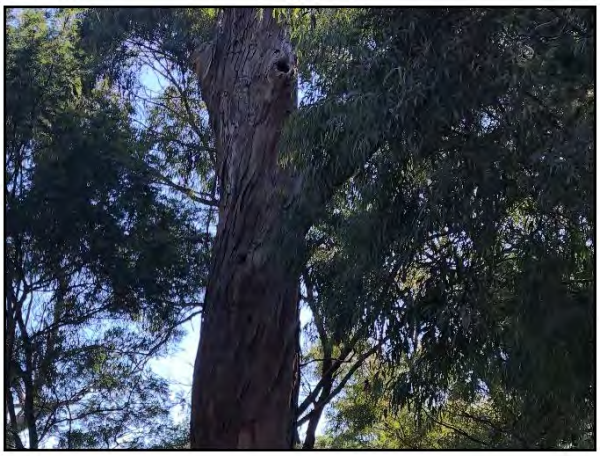

Plate 6. Small hollows observed within stag in the north western corner of the study area (Ecology and Heritage Partners Pty Ltd 30/04/2024).

Blue-winged Parrot

Foraging habitat for Blue-winged Parrot was present within the study area in the areas of open grassland, largely dominated by exotic grasses (Plate 7). This covered an area of approximately 1.3 hectares. The species also forage on a variety of shrubs, however there was generally a limited shrub cover within the study area.

Breeding and roosting habitat for Blue-winged Parrot was limited within the study area, with five trees identified that contained hollows, and of these, four trees provided potential breeding habitat (Figure 3). An example of hollows observed within the study area that may be suitable for Blue-winged Parrot breeding are shown in Pate 6 above. Several of the hollow openings on one of the hollow-bearing trees were facing upwards, and therefore unlikely to be suitable (Plate 8). These hollows were also located close to the ground (i.e. within 3 meters), increasing the likelihood of predation by cats.

Plate 7. Open area dominated by exotic grasses within the study area (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 8. Hollow with upwards facing entrance observed within the study area (Ecology and Heritage Partners Pty Ltd 30/04/2024).

4.1.3 Fixed-point Count Survey Results

Fixed-point counts were undertaken to aid in understanding the use of habitat within the study area, targeting Gang-gang cockatoo and Blue-winged Parrot. No Gang-gang Cockatoo or Blue-winged Parrots were observed during the surveys, however these surveys were not relied upon to determine presence/absence.

Prior to the commencement of the fixed-point surveys on the 30th April 2024, seven Gang-gang Cockatoo's were opportunistically observed foraging in tall eucalypts and drinking water from a low water trough in the broader Mount Shamrock Quarry site, approximately 300 metres south of the study area (Figure 3). The individuals were observed within tall stands of eucalypts along both sides of the road that enters the quarry near the Holcim site office (located outside of the study area).

Twenty-eight (28) bird species were observed during fixed-point bird counts, consisting of entirely native species and no introduced bird species. There were 234 individuals recorded during the fixed-point bird counts. The most frequently recorded species included Australian Magpie *Gymnorhina tibicen*, Crimson Rosella *Platycercus elegans*, Rainbow Lorikeet *Trichoglossus moluccanus*, Grey Fantail *Rhipidura albiscapa* and Silvereye *Zosterops lateralis.* One Southern Boobook *Ninox novaeseelandiae* individual was observed roosting in a Willow *Salix* sp. with dense foliage cover within the study area during all three rounds of diurnal bird surveys (Plate 9).

A complete list of species recorded during the diurnal bird surveys is in Appendix 1.

Plate 9. Southern Boobook observed within the study area (Ecology and Heritage Partners Pty Ltd 30/04/2024).

4.1.4 Implications

Gang-gang Cockatoo

Gang-gang Cockatoo are known to visit the study area on an opportunistic basis for foraging, given the presence of suitable foraging habitat (i.e. eucalyptus and acacia) within the study area, alongside consistent recent sightings of the species within five kilometres of the study area (including within the Mount Shamrock Quarry site). All foraging habitat is regarded as habitat critical to the survival of the species (DAWE 2022).

One hollow was observed within the study area that contained some of the preferred characteristics for use by Gang-gang Cockatoo for breeding, however the entrance faced upwards and therefore would unlikely be used. The remainder of the trees within the study area were either too young and therefore had not developed any hollows, or had hollows too small to be suitable for Gang-gang Cockatoo. Based on this, no breeding habitat for Gang-gang Cockatoo was considered present within the study area.

The Significant Impact Criteria for endangered species (i.e. Gang-gang Cockatoo) list that an action is likely to have a significant impact on an endangered species if it will adversely affect habitat critical to the survival of a species (DoE 2013). The foraging habitat within the study area largely comprised planted vegetation, which has gradually been rehabilitated primarily with eucalyptus and acacia species. An overview of the rehabilitation progress is shown below, which compare the status of the broader quarry site in 2001 to 2024 (Plate 10; Plate 11). A comparison of these images shows plantation undertaken along the southern, western, northern and north eastern corner, with the north eastern corner forming the current study area. This highlights that whilst foraging habitat is proposed to be removed, it is largely present as a result of the rehabilitation efforts of the quarry previously undertaken, with additional areas of suitable foraging habitat planted in areas that previously did not contain any foraging habitat.

The ongoing rehabilitation program associated with the quarry, in accordance with the Work Authority Approval, will ultimately result in all areas eventually being rehabilitated, and will include large areas of planted native trees and shrubs.

A significant impact assessment for Gang-gang Cockatoo is provided in the Biodiversity Assessment (EHP 2024b), which concludes that the proposed action is unlikely to have a significant impact on Gang-gang Cockatoo.

Plate 10. Vegetation cover at the broader Mount Shamrock Quarry (Google Earth Imagery 2001).

Plate 11. Vegetation cover at the broader Mount Shamrock Quarry (Google Earth Imagery 2024).

Blue-winged Parrot

The foraging opportunities within the study area for Blue-winged Parrot are primarily restricted to the areas of open grassland (approximately 1.3 hectares) and four of the five hollow-bearing trees observed provide potential breeding habitat based on the sized and condition of the hollows observed. The surrounding landscape outside of the quarry boundary primarily contains agricultural land in the immediate vicinity, and forested areas further out.

Blue-winged Parrot are a highly mobile species and are likely to use a range of habitats in the surrounding landscape that are more suitable (i.e. larger fields of open grassland and forested areas that provide a higher selection of suitable breeding hollows).

The proposed action is considered unlikely to have a significant impact on Blue-winged Parrot (EHP 2024b).

4.2 Powerful Owl and Sooty Owl Surveys

4.2.1 Database Searches

The VBA contains one record of Powerful Owl (recorded in 2018) and 13 records of Sooty Owl (most recent record from 2020) within 10 kilometres of the study area (DEECA 2024a) (Figure 2). Based on a review of online databases (ALA 2024; eBird 2023; Birdata 2023), key recent records (i.e. within 10 kilometres of the study area) of Powerful and Sooty Owl occur in:

- Beaconsfield Flora and Fauna Reserve – contains consistent sightings of Powerful Owl, including nine records of Powerful Owl within 2024;
- Gembrook G67 Bushland Reserve (located 4.5 kilometres north-east of the study area) – contains sightings across 2021-2022 of Powerful Owl (Birdata 2024);

- RJ Chambers Flora and Fauna Reserve (3.4 kilometres north of the study area) – contains one record of Sooty Owl in 2015 (Birdata 2024);
- Bunyip State Forest along Gembrook-Tonimbuk Road (approximately 12 kilometres north-east of the study area) – consistent sightings from 2016-2019 of Sooty Owl (Birdata 2024).

4.2.2 *Habitat Assessment*

Powerful Owl prefer tall open sclerophyll forest and woodlands, whilst Sooty Owl prefer tall and wet forest types, especially in areas with senescent growth stages.

The study area contained tall eucalypts offering perches which provide a potential vantage point for hunting, primarily along the northern, eastern and southern portion of the study area. Prey species, such as Common Ringtail Possum *Pseudocheirus peregrinus* and one Krefft's Glider (previously Sugar Glider) *Petaurus notatus,* were observed within eucalypts within the study area during the targeted surveys.

No large hollows that would be suitable for either Powerful Owl or Sooty Owl breeding were observed within the study area. All hollow openings were less than 30 centimetres wide. Powerful Owl require nesting hollows of at least 50 centimetres wide and one metre deep to breed (Cooke *et al*. 2002), and Sooty Owl require hollow openings of at least 30 centimetres wide (NSW Scientific Committee 2008b).

4.2.3 *Survey Results*

No Powerful Owl or Sooty Owl were detected within the study area or surrounding landscape during the targeted surveys. Southern Boobook were heard on multiple occasions during the surveys, with a total of five individuals recorded calling from the two survey nights. Incidental species observed during the surveys included other nocturnal birds and mammals, including Common Ringtail Possum, Krefft's Glider, Common Wombat *Vombatus ursinus*, Short-beaked Echidna *Tachyglossus aculeatus,* White-striped Free-tailed Bat *Tadarida australis* and Eastern Grey Kangaroo *Macropus giganteus*.

No other national or State-listed species were recorded during the nocturnal bird surveys.

Table 2. Survey and weather details for the two nights of nocturnal bird surveys at Mt Shamrock Quarry.

Date	Survey time	Observers	Temp. (ambient)	Wind speed/ direction	Nightlight (0-4)*	Moon Phase	Cloud cover (%)	Rain
26 March 2024	20:30-22:30	EH, CM	12.2	7.4 km/ ESE	4	Full	25	None
27 March 2024	20:15-22:30	EH, CM	11.3	3.7 km/ SSE	3	Full	80	None

*Nightlight is quantified as 0: No light, 2: Some light, 3: Relatively bright, 4: Full brightness associated with a full moon.

4.2.4 *Implications*

Powerful Owl and Sooty Owl were not detected within the study area during targeted surveys. The habitat assessment identified no hollows within the study area that would be suitable for breeding use by either species, due to the small size of the hollows observed (i.e. < 30 centimetres wide).

It is unlikely that Powerful Owl or Sooty Owl rely on habitat within the study area, given the absence of suitable nesting habitat (i.e. mature trees with large hollows). All past records of Powerful and Sooty Owl occur within dense bushland, such as Beaconsfield Nature Conservation Reserve and Bunyip State Park) (DEECA 2024a). The home range for both species varies, ranging approximately between 1,000 to 3,000 hectares, depending on the habitat type present (DSE 2011a; Bilney *et al.* 2011).

Based on the location of several past records for Powerful Owl within a five kilometre radius of the study area, the study area may occur within the home range for a pair of Powerful Owl. Whilst the study area may be within the home range, the study area is not connected to any surrounding forested areas by any densely treed corridors. It is considered unlikely that Powerful Owl would seek out foraging habitat within the study area based on the presence of higher quality foraging, roosting and breeding habitat in the surrounding forests.

All past records for Sooty Owl occur more than eight kilometres away from the study area (DEECA 2024a), and the home range for these individuals is unlikely to overlap with the study area. Most of the past records are within Bunyip State Park, a densely forested area that contains higher quality habitat.

The nearby presence of this high quality habitat and limited preferred habitat characteristics (i.e. foraging habitat only) within the study area reduces the likelihood that Powerful Owl or Sooty Owl would use the habitat within the study area for foraging on a regular basis. However, as recent records of both species occur within a 10 kilometre radius of the study area, these species may opportunistically visit the study area to hunt for prey.

4.3 Southern Toadlet

4.3.1 Database Searches

The VBA has 24 records of Southern Toadlet (most recent record in 2020) within 10 kilometres of the study area (DEECA 2024a) (Figure 2). A review of online databases (ALA 2024; iNaturalist 2024) reported the closest recent records of the species (i.e. within 10 kilometres of the study area) in the following locations:

- Pakenham High School within the Pakenham Township – recorded Southern Toadlet in 2006;
- RJ Chambers Flora and Fauna Reserve (3.4 kilometres north of the study area) – contains records of Southern Toadlet from 1981;
- Drainage lines directly south and south west of Hillview Bushland Reserve (3.3 kilometres west of the study area) – recorded Southern Toadlet in 1981.

4.3.2 Habitat Assessment

Southern Toadlet occur in damp habitats that are inundated during late autumn and winter (e.g. ephemeral depressions and waterbodies), often where logs or leaf litter are present. Four sites were selected to undertake habitat suitability surveys and call-playback for the species, which included two dams and one ephemeral depression (Figure 5). Drainage lines were walked between sites to record any incidental species that may be calling.

It was found that most survey sites lacked a substantial canopy and shrub layer however some leaf litter alongside several scattered fallen logs was present which would be suitable for Southern Toadlet (Table 3).

Table 3. Southern Toadlet habitat assessment at Mt Shamrock Quarry.

Frog Site (Figure 5)	Observers	Canopy at calling site	Shrub layer at calling site	Ground layer at calling site	Canopy surrounding forest	Shrub layer in the surrounding forest	Ground layer in the surrounding forest
1	EH, CM	0	0	0	2 (25 meters away)	1	2.5
2	EH, CM	3	1	1 to 2	2	0	1 to 2
3	EH, CM	0	1	1 to 2	2 to 3	1	2
4	EH, CM	0	1	2 to 3	2	2	Grass

Canopy: (0 = absent, 1 = open, 2 = moderate, 3 = closed); Shrub: (0 = absent, 1 = open, 2 = moderate, 3 = closed); Ground layer: (0 = bare, 1 = leaf litter, 2 = sparse vegetation, 3 = dense vegetation) (data fields based on the Ecological Consultants Association (ECA) Victoria *Pseudophryne* Survey datasheet).

4.3.3 Survey Results

No Southern Toadlet were observed or heard calling within the study area. Despite the surveys being undertaken at temperatures below the recommended 11 degrees, the species was confirmed calling at a known reference site within Lysterfield National Park on each of the survey nights, which is located 20.5 kilometres west of the study area. Temperatures at the reference site were recorded as low as 7 degrees with Southern Toadlet actively calling at these temperatures.

Three frog species were identified during the survey, calling at the four locations investigated and included Southern Brown Tree Frog *Litoria ewingii*, Common Eastern Froglet *Crinia signifera* and Eastern Sign Bearing Frog *Crinia parinsignifera.*

Species recorded are generalist frog species which used waterbodies, puddles and drainage lines within or in close proximity to the chosen site locations.

4.3.4 Implications

The targeted surveys for Southern Toadlet did not record any individuals of the species. All waterbodies within the study area are isolated from watercourses in the broader landscape and provide no connectivity to past records of Southern Toadlet. The nearest past record is approximately four kilometres from the study area (DEECA 2024a), and given the lack of connectivity, small home range of the species and results of the targeted surveys, a population of Southern Toadlet is not considered to be present within the study area.

Table 4. Survey and weather details for the three nights of Southern Toadlet surveys at Mt Shamrock Quarry.

Date	Site number	Survey time	Observers	Temp. (ambient)	Wind speed/ direction	Rain	Moon phase	Sky condition	Frogs observed
30/04/2024	1	19:58-20:15	EH, CM	10.29	9.3 km/ E	0	No moon	Partial cloud	Common Eastern Froglet
30/04/2024	2	20:25-20:35	EH, CM	10.33	3.7 km/ E	0	No moon	Partial cloud	-
30/04/2024	3	20:41-20:51	EH, CM	10.30	5.5 km/ ESE	0	No moon	Partial cloud	Common Eastern Froglet
30/04/2024	4	20:59-21:05	EH, CM	10.30	5.5 km/ E	0	No moon	Partial cloud	Eastern Sign Bearing Froglet, Common Eastern Froglet
1/05/2024	1	19:24-19:35	EH, CM	10.1	13 km/ ESE	0	No moon	Clear	Eastern Sign Bearing Froglet, Common Eastern Froglet
1/05/2024	2	19:46-19:57	EH, CM	9.8	7.4 km/ESE	0	No moon	Clear	Southern Brown Tree Frog, Common Eastern Froglet
1/05/2024	3	20:03-20:15	EH, CM	9.5	5.5 km/ ESE	0	No moon	Clear	Southern Brown Tree Frog, Common Eastern Froglet
1/05/2024	4	20:20-20:30	EH, CM	9.6	7.4 km/ E	0	No moon	Clear	Common Eastern Froglet, Southern Brown Tree Frog
2/05/2024	1	22:11-22:22	EH, CM	7.5	0	0	No moon	Clear	-
2/05/2024	2	22:27-22:40	EH, CM	7.5	0	0	No moon	Clear	-
2/05/2024	3	22:45-22:56	EH, CM	7.3	0	0	No moon	Clear	-
2/05/2024	4	23:00-23:11	EH, CM	7.0	0	0	No moon	Clear	Southern Brown Tree Frog

Plate 12. Frog Site 1 which constitutes an ephemeral depression (Ecology and Heritage Partners Pty Ltd 30/04/2024).

Plate 13. A dried waterbody which was the location of Frog Site 3 (Ecology and Heritage Partners Pty Ltd 02/05/2024).

Plate 14. Frog site 1 being actively searched (Ecology and Heritage Partners Pty Ltd 30/04/2024).

Plate 15. Southern Brown Tree Frog identified within the study area (Ecology and Heritage Partners Pty Ltd 30/04/2024).

5 MITIGATION MEASURES AND RECOMMENDATIONS

During all phases of construction and extraction operations, fauna salvage and relocation measures are recommended to be undertaken (where practical) to minimise displacement and injury to animals in areas affected by native vegetation clearance works within the project. A Fauna Management Plan is recommended to be prepared and implemented to aid in reducing risks to native fauna. The Fauna Management Plan may include actions such as, but not be limited to:

- A qualified wildlife specialist should be present to conduct pre-clearance searches in any identified fauna habitats, and to supervise any habitat removal in order to salvage fauna as per protocols;
- Staged habitat removal is recommended that occurs outside of the key breeding and nesting seasons for native fauna likely to reside within the study area (e.g. removing hollow-bearing trees outside of the breeding season for fauna that use these habitat types);
- Prior to the removal of any waterbodies or dams, they are recommended to first be drained and left for one month prior to any works occurring, to encourage fauna to relocate;
- Salvage and relocation strategy for displaced fauna;
- Habitat relocation (e.g. placing felled logs into surrounding areas of retained vegetation for habitat values);
- Adherence to speed limits and appropriate signage for all vehicular traffic along haulage and internal access roads/tracks;
- Recommendations for escape features and refuges that provide for suitable fauna egress from the operational area of the Project to adjacent areas of retained vegetation; and
- Installation of nest boxes in adjacent retained habitat to compensate for the removal of any hollow-bearing trees.

6 CONCLUSION

Targeted fauna surveys and habitat assessments were undertaken for the nationally significant Gang-gang Cockatoo and Blue-winged Parrot, and State significant Powerful Owl, Sooty Owl and Southern Toadlet within the proposed quarry extension area between 26 March 2024 to 2 May 2024.

Gang-gang Cockatoo was identified within the broader Mount Shamrock Quarry site during targeted surveys, and suitable foraging habitat was present within most of the study area. Gang-gang Cockatoo are expected to forage on the eucalyptus and acacia within the study area on occasion but are unlikely to breed within the study area due to the lack of suitably sized hollows. A total of 8.2 hectares of suitable foraging habitat was mapped within the study area, based on the characteristics outlined in the Conservation Advice (DAWE 2022).

Limited foraging and breeding habitat for Blue-winged Parrot was observed within the study area, with approximately 1.3 hectares of open exotic grassland present providing foraging habitat and five trees present with medium to small sized hollows. Blue-winged Parrot are a highly mobile species and are likely to use a range of habitats in the surrounding landscape that are more suitable (i.e. larger fields of open grassland and forested areas that provide a higher selection of suitable breeding hollows).

Powerful Owl and Sooty Owl may stop over within the study are infrequently whilst en route to higher quality habitat in the surrounding landscape. The habitat within the study area is considered low quality, based on the lack of suitably sized hollow-bearing trees for breeding and limited presence of tall stags for perching and limited presence of waterbodies, however still provides some foraging opportunities with potential prey species present within the site.

Southern Toadlet were not recorded within the study area during the targeted surveys and are unlikely to occur. The areas of suitable habitat within the study area are isolated from any nearby waterways, and do not provide connectivity to any nearby previously recorded individuals.

Implementation of fauna mitigation measures are recommended to reduce the risk of any adverse impacts to native fauna as a result of the project.

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FIGURES

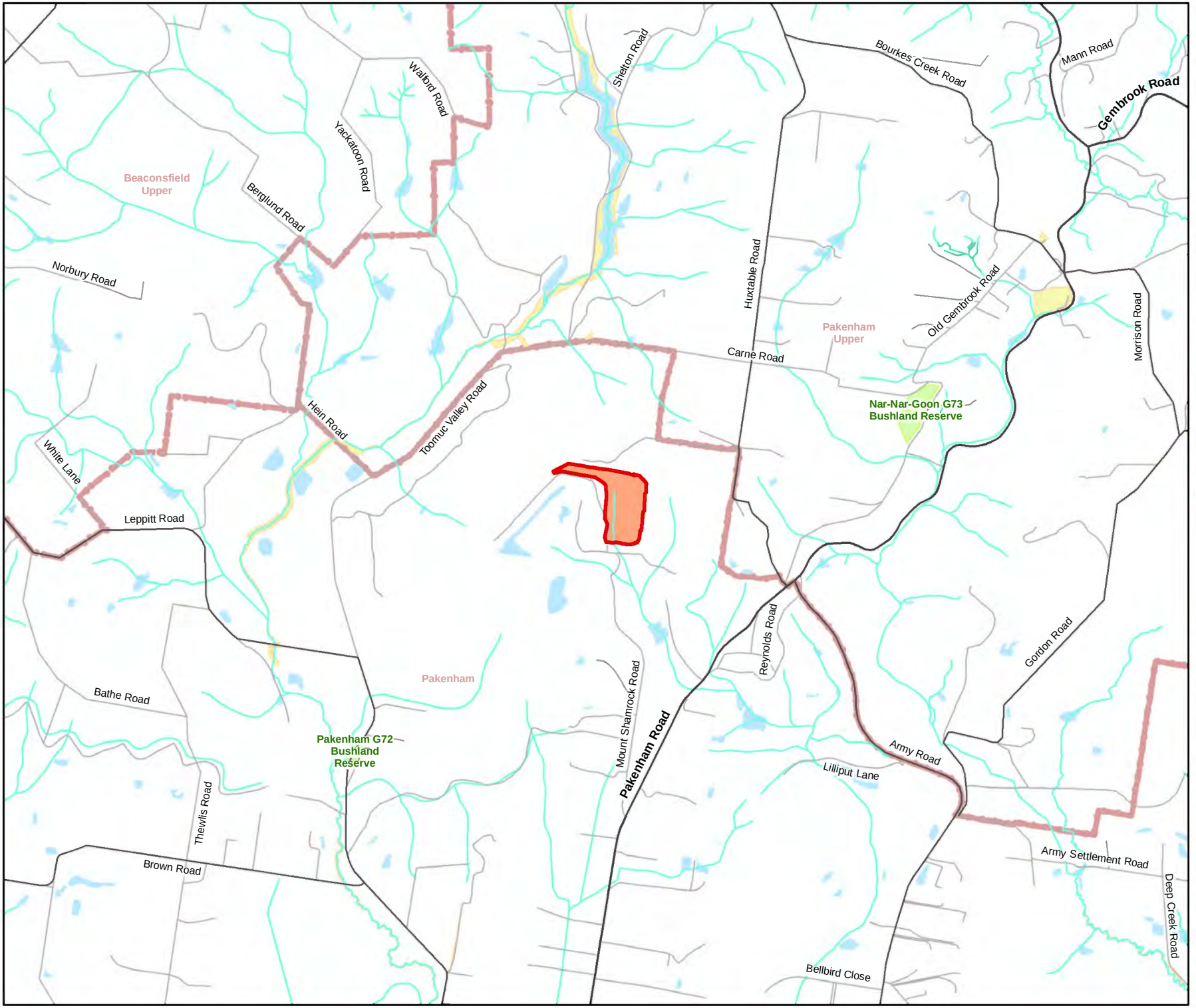


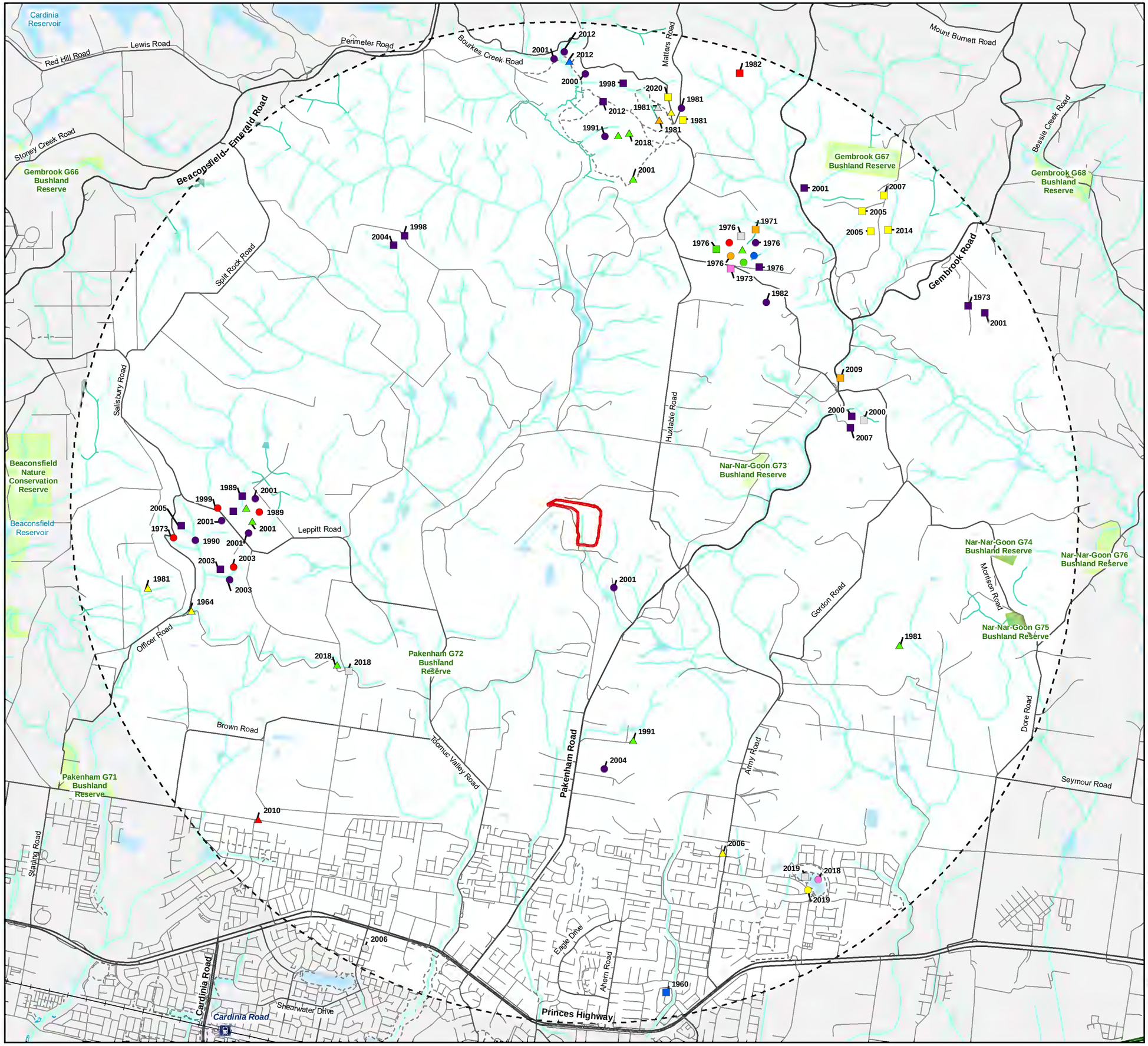
Figure 1

Location of the study area

Targeted fauna surveys for Mount Shamrock Quarry, Pakenham

ecology & heritage partners

17386_Fig01_StudyArea 31/05/2024 dvaladares



Legend

- Study Area

Significant fauna

- Australian Little Bittern
- Barking Owl
- Black Falcon
- Blue-billed Duck
- Blue-winged Parrot
- Chestnut-rumped Heathwren
- Eastern Great Egret
- Gang-gang Cockatoo
- Hardhead
- Helmeted Honeyeater
- Hooded Robin
- Lace Monitor
- Latham's Snipe
- Murray Cod
- Pilotbird
- Powerful Owl
- Sooty Owl
- Southern Brown Bandicoot
- Southern Greater Glider
- Southern Toadlet
- White-throated Needletail
- Yellow-bellied Glider

Figure 2

Previously documented significant fauna within 5km of the study area

Targeted fauna surveys for Mount Shamrock Quarry, Pakenham

0 1 2

Kilometres

Map Scale: 1:38,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

ecology & heritage partners

Legend

- Study Area
- WA174 Boundary
- Existing Extraction Limit
- Proposed Extension
- Hollow-bearing Trees
- Fixed Point Count Location
- Gang-gang Cockatoo
- Gang-gang Cockatoo foraging habitat

Figure 3

Diurnal bird survey results

Targeted fauna surveys for Mount Shamrock Quarry, Pakenham

N

0 50 100

Metres

Map Scale: 1:4,500 @ A4
Coordinate System: GDA 1994 MGA Zone 55

ecology & heritage partners

17386_Fig03_DiurnalBirds 15/10/2024 psorensen

Aerial source: Nearmap 2024

Figure 4

Nocturnal bird survey results

Targeted fauna surveys for Mount Shamrock Quarry, Pakenham

0 40 80

Metres

Map Scale: 1:2,900 @ A4
Coordinate System: GDA 1994 MGA Zone 55

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17386_Fig04_NocturnalBirds 15/10/2024 psorensen

Aerial source: Nearmap 2024

Legend

- Study Area
- WA174 Boundary
- Existing Extraction Limit
- Proposed Extension
- Waterbody
- Dam

Survey tracks

- Survey date: 30/04/2024
- Survey date: 01/05/2024
- Survey date: 02/05/2024

Figure 5

Southern Toadlet survey results

Targeted fauna surveys for Mount Shamrock Quarry, Pakenham

0 40 80
Metres

Map Scale: 1:3,500 @ A4
Coordinate System: GDA 1994 MGA Zone 55

ecology & heritage partners

17386_Fig05_SouthToad 15/10/2024 psorensen

Aerial source: Nearmap 2024

APPENDIX 1 – DIURNAL BIRD SURVEY RESULTS

Appendix 1.1 –Birds observed during survey

Legend:

EN Listed as Endangered under the EPBC Act;

Table A1.1. Bird species identified within the study area during diurnal bird surveys.

Species Name	Common Name	Notes
INDIGENOUS SPECIES		
Gymnorhina tibicen	Australian Magpie	-
Accipiter sp.	Brown Goshawk/ Collared Sparrowhawk	-
Acanthiza pusilla	Brown Thornbill	-
Platycercus elegans	Crimson Rosella	-
Callocephalon fimbriatum	Gang-gang Cockatoo	EN
Pachycephala pectoralis	Golden Whistler	-
Cracticus torquatus	Grey Butcherbird	-
Rhipidura albiscapa	Grey Fantail	-
Dacelo novaeguineae	Laughing Kookaburra	-
Corvus mellori	Little Raven	-
Grallina cyanoleuca	Magpie-lark	-
Manorina melanocephala	Noisy Miner	-
Strepera graculina	Pied Currawong	-
Trichoglossus moluccanus	Rainbow Lorikeet	-
Anthochaera carunculata	Red Wattlebird	-
Pachycephala rufiventris	Rufous Whistler	-
Petroica boodang	Scarlet Robin	-
Zosterops lateralis	Silvereye	-
Ninox boobook	Southern Boobook	-
Pardalotus punctatus	Spotted Pardalote	-
Cacatua galerita	Sulphur-crested Cockatoo	-
Malurus cyaneus	Superb Fairywren	-
Hirundo neoxena	Welcome Swallow	-
Lichenostomus leucotis	White-eared Honeyeater	-
Rhipidura leucophrys	White-throated Treecreeper	-
Zanda funerea	Yellow-tailed Black Cockatoo	-

Appendix 1.2 – Fixed-point Count survey details

Table A1.5. Survey details for the three rounds of diurnal bird surveys at Mt Shamrock Quarry.

Date	Fixed-point survey site	Survey time	Observers	Temp. (ambient)	Precipitation	Wind speed / direction	Cloud cover (%)
26 March 2024	1	18:10 – 18:30	EH, CM	15.5	0	3.7 km/ SSW	5%
26 March 2024	2	18:55 -- 19:15	EH, CM	14.6	0	0 km/ -	5%
26 March 2024	3	19:20 – 19:40	EH, CM	14.6	0	5.5 km/ SE	5%
12 April 2024	1	9:35 – 9:55	CM	10.3	0	1.8 km/ E	90%
12 April 2024	2	10:05 – 10:25	CM	10.2	0	3.7 km/ E	80%
12 April 2024	3	10:41 – 11:01	CM	10.8	0	1.8 km/ NW	80%
30 April 2024	1	15:17-15:37	EH, CM	9.8	0	5.5 km/ E	75%
30 April 2024	2	15:42-16:05	EH, CM	10.4	0	7.4 km/ ESE	75%
30 April 2024	3	16:18-16:40	EH, CM	10.1	0	7.4 km/ ESE	80%