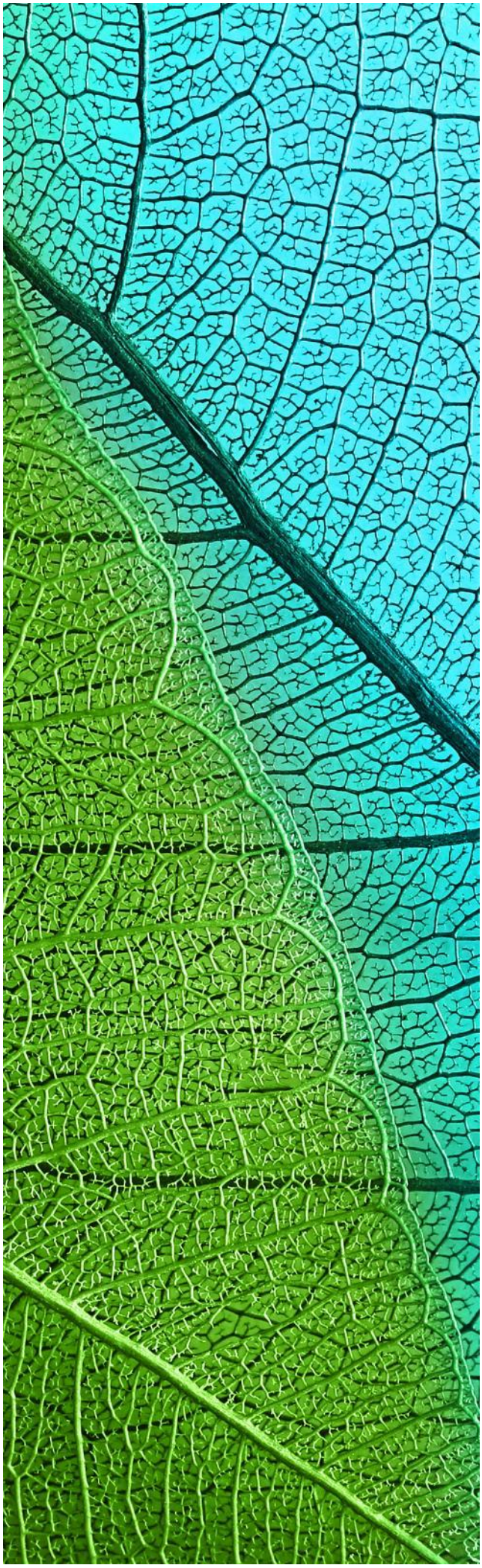

Goschen Rare Earths and Mineral Sands Project

Native Vegetation and Flora Assessment

Prepared for VHM and AECOM

October 2023
Report No. 18163.7 (1.7)

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This document is based on the information available, and the assumptions made, as at the date of the document. This document is to be read in full. No excerpts are to be taken as representative of the findings without appropriate context.

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Overview

This technical report is an attachment to VHM Limited's Goschen Rare Earth and Mineral Sands Project (the Project) Environment Effects Statement (EES). It has been used to inform the EES required for the Project.

Existing environment

The study area for this investigation (Figure 7) comprised a matrix of public road reserves and private farming land, approximately 35 kilometres south-west of Swan Hill in northwest Victoria.

The project consists of construction and operation of two mine site areas (Figures Figure 3 & Figure 4), a water-supply pipeline of approximately 37-kilometres within the existing road network (assumed to be constructed within a 6m right of way in the road reserve). This water supply-pipeline runs from Kangaroo Lake at the eastern extent of Mystic Park East Road to the mine site. Haulage will be via the existing road network with eight intersections requiring modification.

Excluding the pipeline component, the study area spans approximately 25 kilometres north to south and 17 kilometres east to west (Figure 7).

The study area largely supported red brown sandy soils, across a landscape of undulating inland dunes. Most of the study area comprised private farmland that supported extensive areas of cereal cropping. Linear stretches of remnant native vegetation existed commonly along public roads, as well as along farm lanes and fences separating farm properties. A few large remnants of native mallee vegetation occurred on private land, ranging in size from 5 to 20 hectares. Numerous scattered trees occurred in farmed paddocks, most of which were old multi-stemmed mallee eucalypts, although Buloke and Slender Cypress Pine were occasionally recorded.

Where farmhouses and outbuildings occurred in private property, planted trees were common. Planted tree species included Pepper Tree and Sugar Gum, both introduced species.

Mallee woodland comprised much of the native vegetation recorded in the study area, occurring on red sands throughout the central and eastern parts of the area. The western part of the study area was on the edge of a floodplain and portions supported a healthy canopy of large Black Box trees over a chenopod shrub dominated understorey. Small, scattered occurrences of Buloke Woodlands existed in the western and northern parts of the study area.

Remnant mallee vegetation was distinguished by an open canopy of typical mallee eucalypts. The four most common canopy trees recorded were Dumosa Mallee, Oil Mallee, Red Mallee and Bull Mallee, many of which were old growth multi-stemmed trees. The understorey often comprised a mid-layer of shrubs (including Cattle Bush, Weeping Pittosporum, Sugarwood and Umbrella Wattle) as well a diverse ground layer of saltbushes, with Hedge Saltbush, Prickly Saltwort, Ruby Saltbush, Grey Copperburr and Black Cotton-bush commonly recorded. Native grasses and herbs were present but generally sparse. Common herbs included Pale Twin-leaf and Variable Sida. Introduced flora varied in cover across the study area and survey period, with the vast majority being annual grasses, which had died off by the time of the summer and autumn surveys. Other common weed species included African Box-thorn and Common Heliotrope.

No EPBC Act-listed threatened flora species were recorded in the study area during the field assessment and none are considered to have the potential to occur based on habitat suitability and a paucity of regional records.

The following two EPBC Act-listed threatened ecological communities were recorded during the field assessment:

- *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions* (Critically Endangered) – Distinguishable where Black Mallee Box, Bull Mallee, Red Mallee or Dumosa Mallee were the dominant species of Eucalyptus. This community occurred extensively throughout the study area.
- *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions* (Endangered) – Characterised by the dominance or co-dominance of Buloke. This community had a limited occurrence in the study area, occurring within habitat zones AES, CCE, CDM, EES, FCS, FCY and IDE.

One FFG Act-listed threatened ecological community was recorded during the field assessment:

- *Semi-arid Shrubby Pine-Buloke Woodland Community* (Threatened) – Distinguished by a canopy of Slender Cypress-pine and Buloke, over a characteristic shrub layer of Weeping Pittosporum, Cattlebush and various chenopods and herbs. This community is associated with the EPBC Act-listed community *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions* that was recorded in the following mapped habitat zones: AES, CCE, CDM, EES, FCS, FCY and IDE.

Assessment findings

An iterative assessment was undertaken to evaluate potential impacts associated with the project, considering the existing environment within the study area and associated construction and operational activities.

The assessment found the following key impacts:

- Impacts to native vegetation
- Impacts to listed threatened flora species
- Impacts to protected flora species
- Impacts to listed threatened ecological communities.

These are summarised separately below.

Native vegetation

The current development plan will result in the loss of a total extent of 14.36 hectares of native vegetation as documented in the Scenario Test Native Vegetation Removal (NVR) report prepared on the 31st August 2022 (Appendix 2). Note this area includes all patches of native vegetation to be removed as well as converted areas for all scattered trees to be removed (10-metre-radius circle area for small trees; 15-metre-radius circle area for large trees) (Attachment 2). This extent of loss includes 568 large trees.

The native vegetation to be removed is in an area mapped as an endangered Ecological Vegetation Class (as per the state-wide EVC map). The area affected by the water supply pipeline includes an intake point in a wetland designated under the Convention on Wetlands of International Importance (the Ramsar Convention) (i.e. the Kerang Lakes Ramsar Site); and a wetland listed in the Directory of Important Wetlands of Australia (Kangaroo Lake).

This extent of removal is a worst case scenario calculation based on removal of all native vegetation within defined mining blocks, specifically stockpile, pit shell and connecting locations within these areas, and assuming removal of native vegetation where a 6-metre construction right of way within the road reserve for the water supply pipeline would impact patches of native vegetation.

Two alternate water supply pipeline routes have been investigated to avoid areas of dense native vegetation along smaller roadsides on the original proposed pipeline route (Figure 5). Assessment of these routes was undertaken by a botanist using the Habitat Hectares approach and by an arborist (Treetec 2022). Route A3 was determined to have significantly less native vegetation, with no trees likely to be impacted (Treetec 2022) and therefore the current report has presented impacts associated with this option. Note that 4.289 hectares of vegetation removal associated with the construction of the water-supply pipeline, is due to the potential removal of 61 trees, with removal calculated according to the Guidelines as a 15m radius around each tree (0.07ha per tree).

Listed threatened flora species

No EPBC Act-listed threatened flora species were recorded in the study area during the field assessment and none are considered to have the potential to occur based on habitat suitability and a paucity of regional records. Therefore, no EPBC Act-listed flora species are expected to be impacted by the development.

Nine FFG Act-listed threatened flora species were recorded during the field assessments and targeted survey. The following six species were recorded within the development footprint and are therefore likely to be impacted by the proposed development:

- Bush Minuria – *Minuria cunninghamii* (18 individuals impacted)
- Dwarf Myall – *Acacia ancistrophylla* var. *lissophylla* (one individual impacted)
- – *Rhagodia parabolica* (11 individuals impacted)
- Frosted Goosefoot – *Chenopodium desertorum subsp. desertorum* (54 individuals impacted)
- Umbrella Wattle – *Acacia oswaldii* (353 individuals impacted)
- Yarran – *Acacia melvillei* (17 individuals impacted)

The following three species were not recorded within any area where impacts to native vegetation are proposed and are therefore considered unlikely to be impacted by the proposed development:

- Buloke – *Allocasuarina luehmannii*
- Frosted Goosefoot – *Chenopodium desertorum* subsp. *rectum*
- Three-nerved Wattle – *Acacia trineura*

A further 13 FFG Act-listed threatened flora species were considered to have the potential to occur in the study area, but none of these species were recorded during any flora surveys of the study area:

- Buloke Mistletoe - *Amyema linophylla* subsp. *orientalis*
- Club-hair New Holland Daisy - *Vittadinia condyloides*
- Common White Sunray - *Rhodanthe floribunda*
- Downy Swainson-pea – *Swainsona swainsonioides*
- Glandular Phebalium – *Phebalium glandulosum* subsp. *macrocalyx*
- Round Templetonia – *Templetonia egena*
- Salt Copperburr – *Sclerolaena ventricosa*
- Satin Daisy-bush – *Olearia minor*
- Spear-grass – *Austrostipa trichophylla*

- Spiny Goosefoot – *Rhagodia ulicina*
- Spreading Scurf-pea - *Cullen patens*
- Veined Peppercress – *Lepidium phlebopetalum*
- Winged New Holland Daisy – *Vittadinia pterochaeta*

Protected flora species

Twenty-three FFG Act-protected flora species were recorded during the field assessment. Twenty-one are considered likely to be impacted by the proposed development, four of which are also listed as threatened under the FFG Act:

- Annual New Holland Daisy – *Vittadinia cervicularis*
- Berrigan – *Eremophila longifolia*
- Bush Minuria – *Minuria cunninghamii* (FFG Vulnerable)
- Comb Grevillea – *Grevillea huegelii*
- Common Emu-bush – *Eremophila glabra* subsp. *glabra*
- Common Nardoo – *Marsilea drummondii*
- Dwarf Myall – *Acacia ancistrophylla* var. *lissophylla* (FFG Endangered)
- Fuzzweed – *Vittadinia cuneata* var *cuneata*
- Eumong – *Acacia stenophylla*
- Gold-dust Wattle – *Acacia acinacea*
- Grey Mulga – *Acacia brachybotrya*
- Hakea Wattle – *Acacia hakeoides*
- Hall's Wattle – *Acacia halliana*
- Hoary Scurf-pea – *Cullen cinereum*
- Lemon Beauty-heads – *Calocephalus citreus*
- Mallee Wattle – *Acacia montana*
- Nealie – *Acacia loderi*
- Pimelea Daisy-bush – *Olearia pimeleoides*
- Umbrella Wattle – *Acacia oswaldii* (FFG Critically Endangered)
- Woolly Yellow-heads – *Trichanthodium skirrophorum*
- Yarran – *Acacia melvillei* (FFG Critically Endangered)

The following two protected flora species were not recorded within any area where impacts to native vegetation are proposed and are therefore considered unlikely to be impacted by the proposed development:

- Buloke – *Allocasuarina luehmannii* (FFG Critically Endangered)
- Three-nerve Wattle – *Acacia trineura (*FFG Critically Endangered)

EPBC Act-listed threatened ecological communities

The current development plan will result in the removal of 11.347 hectares of the EPBC Act-listed community *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions* (*Critically Endangered*).

FFG Act-listed threatened ecological communities

The current development plan will not result in the loss any FFG Act-listed flora communities.

Mitigation and contingency measures

Design of the mine and pipeline locations by VHM have been guided by the avoid and minimise principal to reduce impacts on native vegetation. Potential impacts on native vegetation and ecological values due to the project would be avoided, minimised or managed to required standards through additional recommended mitigation measures. These include:

- The potential for extensive further retention of native vegetation patches and scattered trees by careful micro-siting of the pipeline with an arborist engaged on site to direct the installation to avoid the TPZ and structural root zones of roadside trees.
- Small drilling and earth moving machinery will be used to install the water supply pipeline, to ensure that its maximum trench width does not exceed 700mm.
- Clearly marked and sign-posted vegetation protection zones will be established around areas of native vegetation to be retained prior to works.
- Appropriate, clearly marked and sign-posted tree protection zones will be established around scattered native trees to be retained prior to works.
- All construction personnel will be appropriately briefed prior to works, and no construction personnel, machinery or equipment to be placed inside vegetation/tree protection zones.
- Appropriate dust minimisation and fire management measures will be in place during construction and operation.
- Appropriate mitigation measures during construction and operation that restrict any changes to surface water drainage and any saline discharge to adjacent areas of retained native vegetation will be established.
- Appropriate hygiene controls for personnel and machinery to control the spread of weeds during construction and operation will be established.

Residual impacts

The residual impacts on flora and native vegetation from the project are described in the Native Vegetation Removal Reports prepared by DELWP at **Appendix 3**. This indicates that, after application of the minimisation measures detailed in Section 6.4, the impacts of the project will involve:

- Removal of total extent of 14.36 hectares of native vegetation, including 568 large trees.

No impacts are anticipated on EPBC Act listed flora species. The proposed water pipeline will remove an area of the critically endangered EPBC Act listed threatened community Plains Mallee Box Woodlands of

the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions totalling 11.347 hectares.

FFG Act listed flora species (including threatened species and common but protected flora species) will be affected. A targeted survey undertaken in December 2022 determined that the following FFG-listed threatened species will be impacted:

- Bush Minuria – *Minuria cunninghamii* (18 individuals impacted)
- Dwarf Myall – *Acacia ancistrophylla* var. *lissophylla* (one individual impacted)
- Fragrant Saltbush – *Rhagodia parabolica* (11 individuals impacted)
- Frosted Goosefoot – *Chenopodium desertorum subsp. desertorum* (54 individuals impacted)
- Umbrella Wattle – *Acacia oswaldii* (353 individuals impacted)
- Yarran – *Acacia melvillei* (17 individuals impacted)

Cumulative impacts

A review of projects being assessed under the *Environmental Effects Act 1978* and the *Major Transport Projects Facilitation Act 2009* (DELWP 2022) determined that no large-scale projects are proposed within the surrounding landscape that would cause direct or indirect impacts to native vegetation or ecological values that overlap with the study area. The closest large-scale project to the study area is the *Nyah, Vinifera and Burra Creek Floodplain Restoration Projects* which lies approximately 35km to the north. The project occurs within riparian habitats associated with the Murray River and is not expected to impact on similar environmental assets to those that will be impacted by the Goschen Rare Earths and Mineral Sands Project.

Offsets

The offset target for the proposed removal of native vegetation for this project totals 4.819 general habitat units (GHU) plus 568 large trees (mallee trees), in an area with a strategic biodiversity value score of at least 0.179 in the North Central CMA region and/or Gannawarra Shire.

The credit register was searched for available offsets. Available offset credit options were found and are listed in Appendix 3.

1 Introduction

1.1. Requirement for an EES

The Project was referred to the Minister for Planning to seek advice on the need for an EES under the Environment Effects Act 1978 (Vic) (EE Act).

On 10 October 2018, the Minister for Planning decided that an EES was required on the basis that the Project has the potential for a range of significant environmental effects.

On 19 December 2018 under delegated authority from the Minister for the Environment, the Department of the Environment and Energy (now referred to as the Department of Climate Change, Energy, the Environment and Water (DCCEEW)) made a decision that the Project is a controlled action under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and would require assessment and a decision about whether approval should be given under the EPBC Act. The Project will be assessed under a bilateral agreement under the EPBC Act through the EES process.

The EES allows stakeholders to understand the likely environmental impacts of the Project and how they are proposed to be managed. The Minister's assessment of the EES will also inform statutory decisions that need to be made on the Project.

The scoping requirements for the EES were developed in consultation with the community and stakeholders.

1.2. Context

VHM Limited engaged Nature Advisory Pty Ltd to conduct a flora and native vegetation assessment of a matrix of public road reserves and private farming land, approximately 35 kilometres south-west of Swan Hill in north-west Victoria.

This investigation was commissioned to provide information on the extent and condition of native vegetation in the study area according to Victoria's *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a), herein referred to as 'the Guidelines', as well as any potential impacts on flora and threatened communities listed under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This report outlines any implications under relevant national, state and local legislation and policy frameworks.

Specifically, the scope of the investigation included:

A desktop flora and native vegetation assessment including review of:

- Existing biodiversity assessment reports for the site:
    - Ecological Characterisation Assessment of the Proposed Goschen Mineral Sands Project, Goschen, Victoria (EHP 2018a);
    - Ecological Impact Assessment: Goschen Mineral Sands Project, Goschen, Victoria (EHP 2018b); and
    - Goschen Project - Targeted Conservation Significant Fauna Survey (Ecoscape Australia 2018).
- State and Commonwealth databases:
    - Victorian Biodiversity Atlas, administered by the Department of Department of Energy, Environment and Climate Action (DEECA);

  - The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool;
  - NatureKit (DEECA);
  - Flora and Fauna Guarantee Act 1988 (FFG Act) – Threatened List: Characteristics of Threatened Communities;
  - FFG Act – Threatened List;
  - FFG ACT - Protected Flora List;
  - DEECA Native Vegetation Information Management system (NVIM); and
  - BOM Groundwater Dependent Ecosystems Atlas.
- Relevant State planning schemes:
  - Gannawarra Planning Scheme; and
  - Swan Hill Planning Scheme.
- Examination of high-resolution aerial photography of the study area (Google Earth Pro and Nearmap).
- Field-based flora and native vegetation assessments involving:
  - Characterisation and mapping of native vegetation on the site, as defined in Victoria's *Guidelines for the removal, destruction or lopping of native vegetation* (the 'Guidelines' (DELWP 2017);
  - Assessment of native vegetation in accordance with the Guidelines, including habitat hectare assessment and/or scattered tree assessment;
  - Compilation of a flora species list for the site;
  - Assessment of introduced weed species listed under the Victorian *Catchment and Land Protection Act 1994* (CaLP Act); and
  - A targeted survey for FFG Act and EPBC Act threatened flora species in areas of native vegetation likely to be impacted by the proposed development.

This investigation was undertaken by a team from Nature Advisory Pty Ltd, comprising Justin Sullivan (Senior Ecologist), Elinor Ebsworth (Senior Ecologist), Annette Cavanagh (Botanist), Arend Kwak (Botanist), Merinda Day-Smith (Botanist), Dean Karopoulos (Botanist), Verity Fyfe (Senior Ecologist), Brett Macdonald (Senior Ecologist), Kate Callister (Senior Ecologist & Project Manager) and Brett Lane (Principal Consultant).

2. Project description

2.1. Project overview

The Goschen Project is an approximately 20-25 year rare earth and mineral sands mine and processing facility. VHM has been developing the Project in the context of a rapidly growing global demand for rare earths. One of the world's largest, highest grade zircon, rutile and rare earth mineral deposits is in the Loddon Mallee region of Victoria in Australia. VHM intends to establish the Project to mine these deposits and process to produce and market a range of products to national and international consumers.

The mine footprint has been restricted to avoid intersection with groundwater and significant areas of remnant native vegetation. VHM will implement a staged development approach. Initially developing phase 1 consisting of a mining unit plant (MUP), wet concentrator plant (WCP), rare earth mineral concentrate (REMC) flotation plant and a hydrometallurgical plant (AREM) that will further refine the REMC that is produced at Goschen. The product suite for phase 1 consists of a zircon/titania heavy mineral concentrate (HMC) and mixed rare earth carbonate (MREC).

Phase 2 will commence approximately 2 years post-production and consist of an additional mineral separation plant (MSP) and, subject to prevailing market circumstances at that time, hot acid leach (HAL) and chrome removal circuit, that will produce additional products such as premium zircon, zircon concentrate, HiTi rutile, HiTi leucoxene, LoTi leucoxene, low chromium ilmenite.

The Goschen Project is located approximately 4 hours' drive (275 kilometres) northwest of Melbourne and 30 minutes (35 km) south of Swan Hill within Gannawarra Shire. Figure 1 shows the location of the project relative to VHM's licences. Note the exploration licence gives the licence holder exclusive rights to explore for specific minerals within the specified licence area. A retention licence is an optional licence between the exploration and mining stages. It gives the licence holder tenure over the land before progressing to a mining licence.

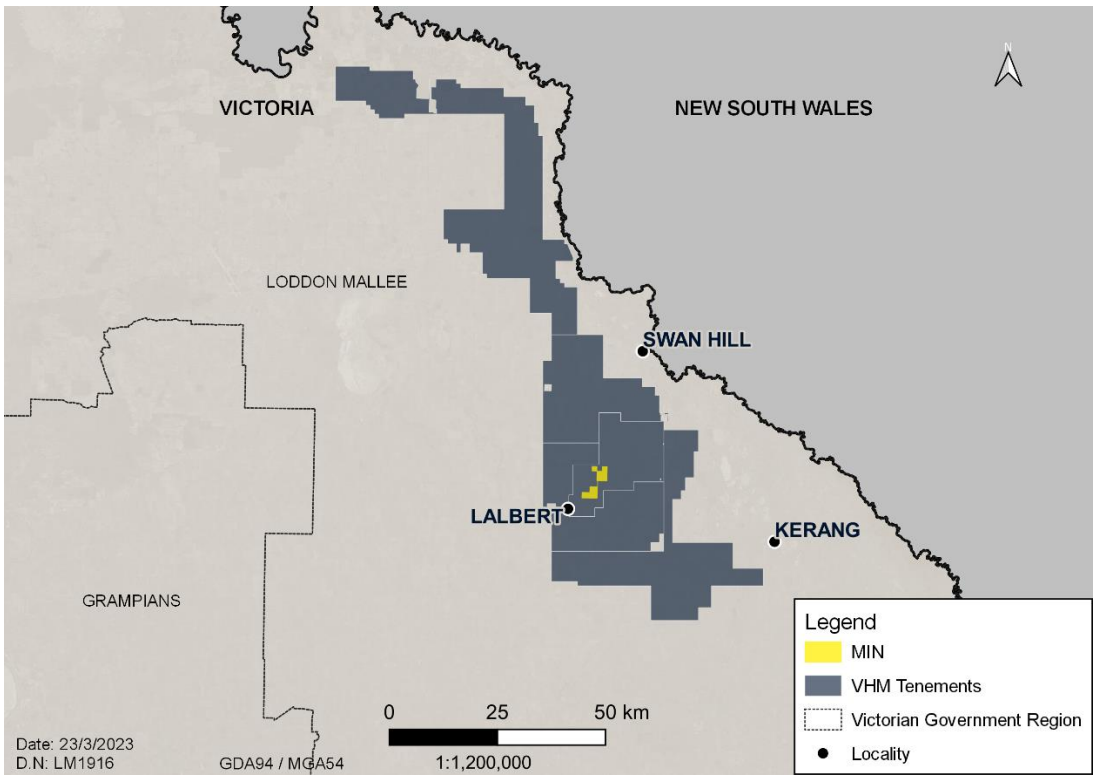


Figure 1 Goschen Project Location

2.2. Project development

It is recognised that there are opportunities to avoid and minimise environmental impacts during the many stages of project development. During project inception and early design development stages, decisions on the location of the project, its design and construction techniques have enabled impacts to be avoided and minimised in accordance with the hierarchy presented in Figure 2.

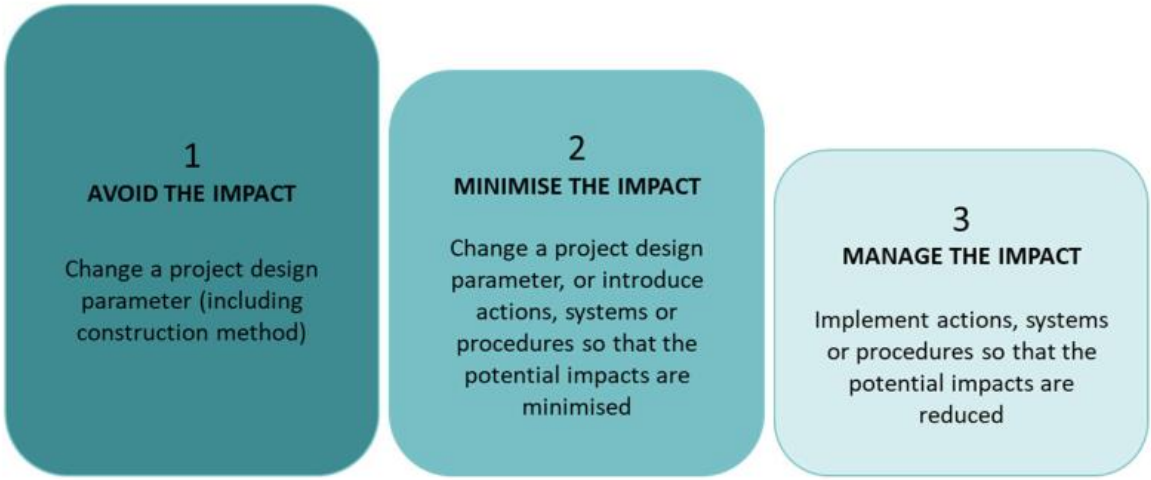


Figure 2: Mitigation hierarchy

Avoidance and minimisation of social and environmental impacts is central to the project's decision making and as such, the project will continue to be refined in response to technical requirements and potential environmental and social impacts identified during the development phase.

A description of how avoidance of impact has informed the project in relation to native vegetation and flora can be found in Section 6.4. Examples of this include the decision to create vegetation protection zones within the project (mining area) and restricting mining to depths above the water table to avoid groundwater drawdown.

After opportunities to avoid impact were incorporated into the Project, minimisation and rehabilitation measures were developed. These are described in the construction and operation impact assessment sections later in this report.

2.3. Key project components

The Project site consists of a heavy mineral sand mining and processing operation that will produce several heavy mineral concentrates (HMC) and a range of critical rare earth minerals across two defined mining areas known as Area 1 and Area 3 (Figure 3 and Figure 4).

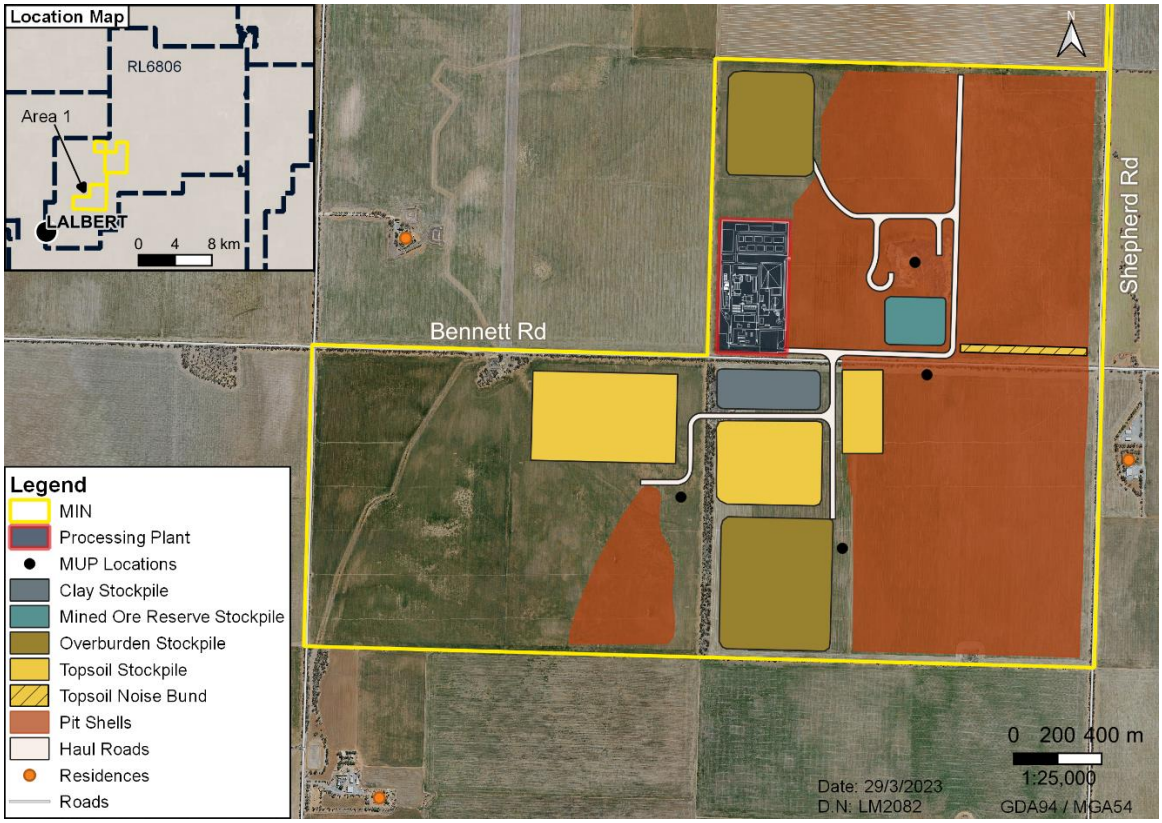


Figure 3. Area 1 Goschen Project

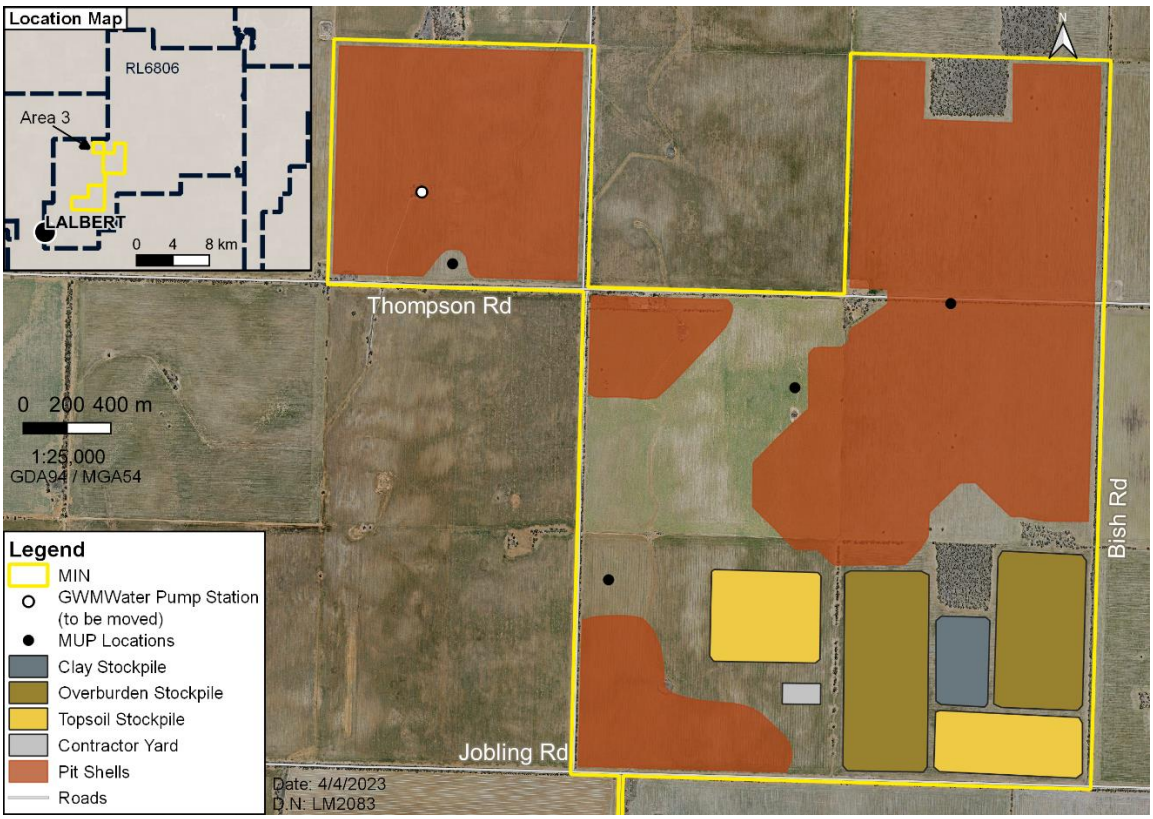


Figure 4. Area 3 Goschen Project

The key components that make up the project are described below.

Mining – Mining will take approximately 20-25 years at 5M tonnes of ore produced per year and will occur only above groundwater (no dewatering) across approximately 1,479 hectares of farmland using conventional open cut mining methods of excavation, load, and haul.

Processing – Heavy mineral sands and rare earths ores will be separated via an on-site WCP and MSP to generate a Rare Earth Mineral Concentrate (REMC). Refining of the REMC on-site is limited to hydrometallurgical extraction to produce a mixed rare earth carbonate. Tailings from the various mineral processes will be homogenised and placed back into the ore zone earlier mined.

Rehabilitation – The mined areas will be progressively backfilled in a staged manner, with tailings dewatered in-pit to allow overburden and topsoil placement in a profile that reinstates the background soil structure. This will result in the ability for a return to the current agricultural land uses within 3 years.

Power – Electrical power needed for mining and processing will be produced on-site from dual fuel diesel/LNG fired power generators, with a gradual evolution over the life of mine to renewables, hydrogen and/or battery as technologies and commercial viability increase. Heat energy for the on-site gas fired appliances shall be provided from an extension of the distribution network from the main LNG storage and regasification system.

Transport – Final products shall be containerised in 20ft sealed sea containers on site and exported via Melbourne Port (else Geelong, Portland, or Adelaide Ports) using road and/or rail-based land logistics solutions. Ultima will provide intermodal rail, to reach the shipping export ports.

Water – Water will be required for construction earthworks, processing, dust suppression and rehabilitation. Up to 4.5 GL a year will be needed for the start-up of the Project. Water will be sourced from Goulburn Murray Water (GMW) from a new pumpstation at Kangaroo Lake via the open water market. GMW have confirmed that the water allocation is available for purchase on the market and therefore should not result in any modifications to inundation timing, depth or duration to Kangaroo Lake or other wetlands. A 38km underground pipeline is proposed beneath existing local road easements as shown in Figure 5 below. Note three alternatives have been investigated through the central section of the pipeline to determine the optimal route to minimise native vegetation impacts.

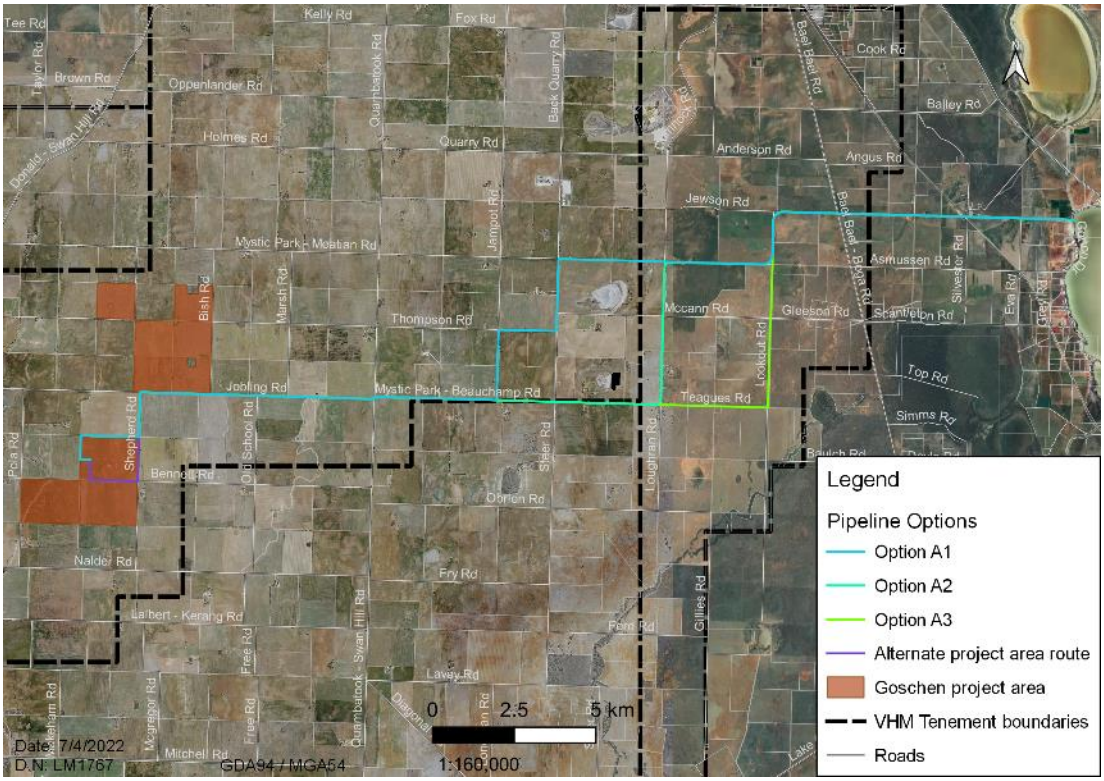


Figure 5. Proposed water supply pipeline route options

2.4. Native vegetation and flora assessment overview

The study area for this investigation (Figure 7) comprised a matrix of public road reserves and private farming land. The area subject to this investigation, referred to herein as the 'study area', occurred immediately north of the town of Lalbert, and was bounded by Kelly Road and Holmes Road to the north, Quambatook – Swan Hill Road to the east, Nalder Road and Lalbert – Kerang Road to the south, and Donald – Swan Hill Road and Ultima Road to the west.

The study area also includes land within 38-kilometres of the existing road network which will be required for a water supply pipeline (assumed to be constructed within a 6m right of way in the road reserve). This water supply pipeline runs from Kangaroo Lake at the eastern extent of Mystic Park East Road to the mine site. Haulage will be via the existing road network with minor road widening potentially required at eight intersections.

Excluding the pipeline component, the study area spanned approximately 25 kilometres north to south and 17 kilometres east to west, though not all land within this broader area formed part of the investigation (see Figure 7).

3. Scoping

3.1. EES evaluation objectives and scoping requirements

The scoping requirements for the Goschen Rare Earths and Mineral Sands Project Environment Effects Statement ('scoping requirements') by the Minister for Planning, set out the specific environmental matters the project must address in order to satisfy the Victorian assessment and approval requirements.

The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project in accordance with the *Ministerial guidelines for assessment of environmental effects* under the EE Act.

The following evaluation objective is relevant to native vegetation and flora*:*

To avoid or minimise potential adverse effects on biodiversity values within and near the site including native vegetation, listed threatened species and ecological communities, and habitat for these species, as well as address offset requirements for residual environmental effects consistent with state and commonwealth policies.

The aspects from the scoping requirements relevant to the evaluation objective are shown in Table 1.

Table 1: Scoping requirements relevant to native vegetation and flora

Aspect	Scoping requirement	Section addressed
Key issues	Direct loss or degradation of native vegetation and associated listed ecological communities, including those listed as threatened under the EPBC Act, the FFG Act and/or DELWP advisory lists.	Sections 9.1 - 9.3
	Direct loss or degradation of habitat for flora listed as threatened under the EPBC Act, the FFG Act and/or DELWP advisory lists.	Sections 9.1, 9.2 & 9.3
	Disturbance and/or degradation of adjacent or nearby habitat that may support listed species or other protected flora, fauna or ecological communities.	Sections 8.1, 8.2 & 8.3
	Indirect habitat loss or degradation resulting from other effects, such as edge effects, surface hydrological changes, groundwater drawdown, groundwater mounding, dust deposition, traffic, noise, vibration, light or the introduction of weeds/pathogens.	Section 10.1. & Table 9
	Disruption to the movement of fauna between areas of habitat across the broader landscape.	Fauna matters were beyond the scope of this assessment
	The availability of suitable offsets for the loss of native vegetation and habitat for listed threatened species under the FFG Act and the EPBC Act.	Section 9.6

Aspect	Scoping requirement	Section addressed
Existing environment	Characterise the type, distribution and condition of native vegetation, terrestrial and aquatic habitat and habitat corridors or linkages that could be impacted by the project.	The native vegetation and flora components of this scoping requirement is covered in Sections 7.1, 7.2 & 7.3
	Identify the existing or potential presence of any flora species listed under the EPBC Act, FFG Act and DELWP advisory lists that could be impacted by the project, as well as declared weeds, pathogens and pest animals.	Sections 7.2, 7.3,7.4, 7.6, 9.2 & 9.3
	Identify the existing or likely presence of communities listed under the EPBC Act and FFG Act, including Buloke Woodland Threatened Ecological Community.	Sections 7.4
	Identify and characterise any areas of native vegetation and groundwater dependant ecosystems that may be affected by groundwater mounding, groundwater drawdown in particular by mine dewatering, or by water supply borefields.	Section 7.5
	Describe the biodiversity values that could be affected by the project, including: – native vegetation and any ecological communities listed under the EPBC Act and FFG Act; – presence of, or suitable habitats for, native flora and fauna species, in particular species listed under the EPBC Act, FFG Act, and DELWP advisory lists; and – potential use of the site and its environs for movement by the EPBC Act, FFG Act, and DELWP advisory listed fauna species including: Plains-wanderer (*Pedionomus torquatus*), Corbens 16 Long-eared bat (*Nyctophilus corbeni*), Australasian Bittern (*Botaurus poiciloptilus*), Curlew Sandpiper (*Calidris ferruginea*) and Australian Painted-snipe (*Rostratula australis*).	The native vegetation and flora components of this scoping requirement are addressed in Sections 7.1, 7.2, 7.3, 7.4, & 7.5
	Describe the existing threats to biodiversity values, including: - direct removal of individuals or destruction of habitat; - historic or ongoing disturbance or alteration of habitat conditions (e.g. habitat fragmentation, severance of wildlife corridors or habitat linkages, changes to water quantity or quality, fire hazards, etc.); - background threats to mortality of listed threatened fauna; and - the presence of any declared weeds, pathogens and pest animals within and in the vicinity of the project area.	Sections 6.5, 8. & 9

Aspect	Scoping requirement	Section addressed
	Characterisation of the existing environment is to be informed by the literature (and published data) and appropriate seasonal or targeted surveys of the potential and actual presence of threatened species and communities, in line with commonwealth and state survey guidelines, conservation advice and threatened species recovery plans. Where surveys do not identify a listed species but past records and/or habitat analysis suggest that it may occur locally, justification will need to be provided if further investigations or further mitigation measures are not proposed.	Section 7 & Table 7
Likely effects	Assess the effects (including facilitated effects) of the project and feasible alternatives, on native vegetation, and EPBC Act and/or FFG Act listed ecological communities, listed threatened and other protected flora, including: – Buloke Woodlands Threatened Ecological Community; - Chariot Wheels (*Maireana cheelii*); - Candy Spider-orchid (*Caladenia versicolor*); - Greencomb Spider-orchid (*Caladenia tensa*); - Winged Peppercress (*Lepidium monoplocoides*); and - Slender Darling-pea (*Swainsona murrayana*).	Sections 9.1, 9.2, 9.3 & 9.4 Table 7
	Assess the effects (including facilitated effects) of the project and feasible alternatives, on protected fauna, and associated habitat and movement corridors, especially for listed threatened fauna species under the EPBC Act and/or FFG Act.	Fauna matters were beyond the scope of this assessment
	Assess the effects (including facilitated effects) of the project, including transport route upgrades and use, on biodiversity values, including: - direct removal of individuals or destruction of habitat; - disturbance or alteration of habitat conditions (e.g. habitat fragmentation, severance of wildlife corridors or habitat linkages, changes to water quantity or quality, fire hazards, etc.); - threats to mortality of listed threatened fauna; and - the presence of any declared weeds, pathogens and pest animals within and in the vicinity of the project area.	Sections 7.6, 9.1, 9.2, 9.3 & 9.3 Fauna matters were beyond the scope of this assessment
Design and mitigation measures	Identify potential alternatives and proposed design options and measures which could avoid or minimise significant biodiversity effects at all stages of the project. This includes potential effects on native vegetation, EPBC Act listed ecological communities and/ or threatened flora species or any other listed protected flora species and their habitat.	Sections 6.4, 9.4, 10 & 11

Aspect	Scoping requirement	Section addressed
	Develop hygiene controls for vehicle and machinery movement to minimise the spread of pathogens and weeds.	Section 11.1
	Justify and describe the assumptions and level of uncertainty associated with the proposed measures achieving their desired outcomes.	Section 10 & 11
	Justify and describe the three-step approach to avoiding the removal of native vegetation, minimising impacts from removal of native vegetation that cannot be avoided and providing an offset to compensate for the biodiversity impact from the removal of native vegetation.	Sections 6.4, 9.4, 11 & 12.2.1
Performance objectives and management	Describe proposed commitments to manage residual effects of the project on biodiversity values, including an outline of an offset strategy and offset management plan that sets out the ability to secure the appropriate offsets to satisfy both commonwealth and state offset policy requirements.	Section 9.6
	Describe the approach to develop contingency measures to be implemented in the event of adverse residual effects on flora values requiring further management.	Sections 10 & 11
	Identify any further commitments proposed to monitor and manage risks and effects on biodiversity values and native vegetation, including as part of the EMF.	Section 11.2

4. Evaluation framework

The assessment will consider legislation, policy and standards relevant to native vegetation and flora along with specific assessment criteria that have been derived for the purposes of the study.

4.1. Legislation, policy, guidelines and standards

The legislation, policy, guidelines and standards relevant to this assessment are summarised in Table 2.

Table 2: Legislation, policy, guidelines and standards relevant to the assessment

Document title	Summary	Relevance to flora and native vegetation
Commonwealth government		
EPBC Act	The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects a number of threatened species and ecological communities that are considered to be of national conservation significance. Any significant impacts on these matters require the approval of the Australian Minister for the Environment. For 'nuclear actions', the matter protected is 'the environment'. Of relevance to flora and native vegetation, this includes: (a) ecosystems and their constituent parts, and (b) natural and physical resources.	The study area supports the following EPBC Act-listed value which will be impacted by the development: Threatened ecological community *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions* (critically endangered). A total extent of 11.347 hectares of this community will be impacted. Under the EPBC legislation (Section 158A), a listing made after the referral decision was made cannot be assessed for that referral. This means the Plains Mallee Box Woodlands TEC listed in 2021 cannot be assessed for this referral as the referral decision was made in 2018.. As a 'nuclear action' all ecosystems, their constituent parts and natural and physical resources impacted by the proposed development are subject to the EPBC Act. This applies to all components of the action that have triggered a 'nuclear action' under section 22 of the EPBC Act.
Victorian Government		
EE Act	One or a combination of a number of criteria may trigger a requirement for a Referral to the Victorian Minister for Planning who will determine if an Environmental Effects Statement (EES) is required according to the "Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978" (DSE 2006).	A Referral to the State Minister for Planning has been made under the EE Act for the project due to the proposed removal of >10 hectares of native vegetation from an endangered EVC, namely Ridged Plains Mallee (EVC 96) and Plains Savannah (EVC 826). The project will be assessed via an Environment Effects Statement (EES) for its impacts on biodiversity among other matters.

Document title	Summary	Relevance to flora and native vegetation
FFG Act	The Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) FFG Act lists threatened and protected species and ecological communities. Any removal of protected flora, which includes threatened flora species and the plants that make up threatened communities, listed under the FFG Act from public land requires a Protected Flora Licence or Permit under the Act, obtained from DEECA.	The study area supports nine FFG Act-listed threatened flora species, six of which will be impacted by the development. A further 13 FFG Act-listed threatened flora species were considered to have the potential to occur in the study area, but were not found during a targeted survey. The study area supports 23 FFG Act-protected flora species, 21 of which are likely to be impacted by the development.
The Guidelines	Vegetation removal will be addressed via an incorporated document and is therefore exempt from requiring a permit under Cl.52.17. The incorporated document requires any application to remove destroy or lop native vegetation to comply with Victoria's Guidelines for the removal destruction or lopping of native vegetation.	The current development plan indicates that the project will result in the loss of 14.36 hectares of native vegetation. A permit will be required under the Guidelines for the removal of native vegetation within the study area, in the form of patches, scattered trees and scattered native plants.
Local Government		
Clause 21.03 of the Gannawarra Planning Scheme – Environmental and Landscape Values	This Clause provides local content to support Clause 12 (Environmental and Landscape Values) of the State Planning Policy Framework. It recognises the value in native vegetation and habitat and has strategies aimed at the retention of native vegetation that provides corridors for wildlife and/or higher value remnant vegetation.	The study area lies largely within the Gannawarra Local Government Area. The project must align with the objectives contained within this Clause.
Clause 22.02 of the Gannawarra Planning Scheme - Conservation of Native Flora and Fauna	This clause identifies flora and fauna values, with the objective to protect native vegetation and habitat, particularly on roadsides and critical habitat, of EPBC listed, Victorian Rare and Threatened Flora and Fauna species.	The study area lies largely within the Gannawarra Local Government Area. The project must align with the objectives contained within this Clause.

Document title	Summary	Relevance to flora and native vegetation
Environmental Significance Overlay – Schedule 2 (ESO2) – of the Gannawarra Planning Scheme	This overlay aims to achieve the following environmental objectives that concern native vegetation within the Gannawarra Local Government Area: ▪ Maintain and enhance the safety and amenity of main roads. ▪ Preserve and enhance the tree lined character of the roadsides along the approaches to the towns and along main roads. ▪ Preserve and improve scenic views from land in a Transport Zone 2 or Transport Zone 3 and to preserve and enhance the visual character of the areas adjacent to a Transport Zone 2 or Transport Zone 3, both approaching and within the towns. Ensure that all existing trees and natural features which are within the overlay area are conserved within the limits of practicability and are not wantonly damaged, destroyed or removed.	ESO2 applies along Donald – Swan Hill Road from Nalder Road to Mystic Park – Meatian Road. A total of 0.01 ha hectares of native vegetation and 3 canopy trees are proposed to be removed from habitat zones subject to this overlay. A permit would be required to remove any vegetation in the area relevant to this overlay.
Vegetation Protection Overlay – Schedule 1 (VPO1) – of the Swan Hill Planning Scheme	This overlay aims to achieve the following vegetation protection objectives within the Swan Hill Local Government Area: ▪ Protect and preserve indigenous vegetation and rare and endangered flora and fauna species on linear reserves. ▪ Achieve high landscape quality on roadsides. ▪ Maintain and enhance habitat and corridor requirements for indigenous fauna. Encourage the establishment and enhancement of habitat corridors to link pockets of remnant vegetation.	VPO1 applies to several areas of land in the region. The closest example of this overlay is a 35-hectare area, approximately 170 metres south of Holmes Road. A total of 0.32 hectares of native vegetation and 4 canopy trees are proposed to be removed from habitat zones subject to this overlay. A permit would be required to remove any native vegetation in the area covered by this overlay.

5. Consultation and engagement

Development of the project and preparation of the EES have been informed by consultation with stakeholders and the community. Table 3 lists key stakeholder feedback on the presentation of native vegetation and flora to the Technical Reference Group in May 2019 and how this feedback has been considered by the project in this impact assessment. Table 4 outlines community and stakeholder engagement undertaken for the Native Vegetation and Flora Technical Study between March to August 2022. No issues related to native vegetation or flora were raised in these sessions.

Table 3: Stakeholder feedback on the presentation of native vegetation and flora to the Technical Reference Group in May 2019

Community and stakeholder feedback	Consideration in project design or impact assessment
The study area needs to be better defined in relation to the proposed project. Clarification should be provided regarding whether only direct impacts from mining or indirect impacts from environmental and infrastructure consideration are being assessed.	The study area was originally defined as a worst-case scenario in terms of both direct and indirect impacts. The footprint of the proposed project has since been reduced in order to lessen impacts to native vegetation. A paragraph has been added further define the study area.
Section 3.5 of the EES should note that potential biodiversity risks were one of the reasons for the Minister for Planning's decision to require an EES, and the scoping requirements that have been issued that are relevant to biodiversity aspects.	This is noted in Table 2 of this report.
Clarification is needed on what the phrase “large trees were not mapped, rather counted” means, and the methodology for counting large trees.	The EES has been updated to further describe methodology for recording large trees and limiting factors.
Further discussion is needed on the implications of the seasonally dry conditions in the study area noted during the field survey, which likely resulted in less graminoids and herbs being detectable.	Section 6.89 of the EES has been updated to provide further clarity. An update has also been made referencing annual rainfall from 2016 to 2019, as well as average annual rainfall.
The conservation status of recorded EVCs should be shown.	Table 5 of the EES has been updated to show the BCS of each EVC.
The assessment is preliminary only, and additional impact assessment and mitigation requirements will be needed.	Revised alignments have been developed and show further avoid and minimise efforts.
The assessment of the likelihood of occurrence of Chariot Wheels needs to be further explained.	Likelihood of occurrence assessment for Chariot Wheels expanded to provide further evidence for conclusion drawn.
Impacts to TPZs need to consider any activities that lead to compaction or excavation rather than only earthworks.	Analysis of impacts in the EES has been updated to reflect this feedback.

Community and stakeholder feedback	Consideration in project design or impact assessment
Further discussion of the methodology and reasoning regarding the absence of the Natural Grassland Community is required, particularly in relation to the classification of grassy areas as derived from treed vegetation types.	The EES has been updated to provide further evidence for the conclusions made regarding the absence of the Natural Grassland Community in the study area.
The extent of assessed vegetation does not appear to include all patches in paddocks. Further detail on which areas have been assessed is required in figures.	Figures have been updated to clarify what is included in the study area. The updated study area now reflects areas that have been assessed by Nature Advisory for native vegetation, where access to land was granted. Areas where access was unavailable have been excluded from the study area.

Table 4 Community and Stakeholder engagement undertaken for Native Vegetation and Flora Technical Study

Community and stakeholder sessions	Comments
• Gannawarra Air Muster – 26+27 March 2022 • Minerals Council of Victoria – site tour for James Sorahan – 31 March 2022 • Rotary Club of Kerang Annual Art Show – 15-17 April 2022 (VHM sponsored this event) • Murrabit Easter Market – 16 April 2022 • Cohuna Farmers and Makers Market – 17 April 2022 • Kerang Community Market – 28 May 2022 • Murrabit Country Market – 4 June 2022 • Kerang Community Market – 25 June 2022 • Mallee Machinery Field Days- 3 & 4 August 2022	No flora or vegetation related concerns raised.
Community drop-in information session; Lalbert Football Facility.	No flora or vegetation related concerns raised.
Community drop-in information session; VHM Warehouse Kerang-28 July 2022.10.30AM-2.00PM	No flora or vegetation related concerns raised.
Community drop-in information session; Swan Hill Club-28 July 2022. 4.00PM-7.30PM	No flora or vegetation related concerns raised.
Project Bulletin's displayed at Shire office Kerang- March 2022 on-going.	**Project Update 1- March 22:** Topic-Goshen Project redefined **Project Update 2- March 22:** Topic/s- Community engagement team; community engagement and EES process.

Community and stakeholder sessions	Comments
	Project Update 3 - June 22: Topic's-Airbourne geophysical survey; Drilling program; community engagement activities, stage of the EES process & community support.
Technical Reference Group (TRG) Lalbert - May 2019	The TRG provided comments on the Native Vegetation and Flora report.
Technical Reference Group (TRG) Meeting Online Meeting -	Presentation of fauna results to TRG, 22 May 2019

5.1. Assessment criteria

The assessment criteria relevant to this flora and native vegetation assessment are outlined below.

5.1.1. Victorian assessment criteria

Flora and native vegetation assessment

Any native vegetation proposed to be removed for the project has been assessed in accordance with the methods prescribed in Victoria's *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a), henceforth referred to as the 'Guidelines'. Details on the Guidelines definition of native vegetation and the field assessment methods for such are provided below in Section 6.3.2.

State planning provisions relative to the removal of native vegetation

State planning provisions are established under the *Victorian Planning and Environment Act 1987*.

Vegetation removal for the project will be addressed via an incorporated document and is therefore exempt from requiring a permit under Cl.52.17. The incorporated document requires any application to remove destroy or lop native vegetation to comply with Victoria's Guidelines for the removal destruction or lopping of native vegetation.

Application requirements

Any application to remove, destroy or lop native vegetation must comply with the application requirements specified in the Guidelines (DELWP 2017a).

When assessing an application, Responsible Authorities are also obliged to refer to Clause 12.01-2 (Native vegetation management) in the Planning Scheme that, in addition to the Guidelines, refers to the following:

- *Assessor's handbook – applications to remove, destroy or lop native vegetation* (Version 1.1) (DELWP 2018a).
- Statewide biodiversity information maintained by DEECA.

The application of the Guidelines (DELWP 2017a) is explained further in Appendix 2.

Referral to DEECA

Clause 66.02-2 of the planning scheme determines the role of DEECA in the assessment of native vegetation removal permit applications. If an application is referred, DEECA may make certain recommendations to the responsible authority in relation to the permit application.

Any application to remove, destroy or lop native vegetation must be referred to DEECA if any of the following apply:

- The impacts to native vegetation fall within the Detailed Assessment Pathway;
- A property vegetation plan applies to the site; or
- The native vegetation is on Crown land that is occupied or managed by the responsible authority.

Flora and Fauna Guarantee Act 1988

The Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) establishes a threatened species list, a protected species list and a list of threatened communities of flora and fauna (DELWP 2017b, DELWP 2018b).

Any removal of protected flora, including threatened flora species and plants that constitute threatened communities listed under the FFG Act from public land, requires a Protected Flora Licence or Permit under the Act that can be obtained from DEECA.

Any native vegetation proposed to be removed for the project has been assessed against the FFG Act threatened species list, protected species list and the FFG Act-listed community descriptions (SAC 2015). The FFG Act was updated in October 2021 to revise the conservation status of Victorian threatened species. Much of the fieldwork for the project was undertaken before the updated FFG Act threatened species lists were published. They were instead guided by the DELWP Advisory Lists, which no longer exist as they have been superseded by the newer FFG Act lists. Thus, not all FFG Act listed threatened or protected flora species were identified in all field assessments. To account for this change, in December 2022 a targeted flora survey was undertaken within proposed impact areas to determine the presence and abundance of any FFG listed species based on the latest list.

5.1.2. Commonwealth assessment criteria

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act): The EPBC Act is Australia's key Commonwealth legislation for the protection of threatened species and ecological communities.

Any native vegetation proposed to be removed for the project has been assessed against the published descriptions of relevant listed ecological communities modelled potentially to occur in the study area, as identified using the online EPBC Act Protected Matters Search Tool (DAWE 2022a) for the search region. These community descriptions comprised identification criteria and condition thresholds from listing advice for EPBC Act communities.

Habitat for EPBC Act-listed species modelled to potentially occur in the study area was assessed for its suitability to support such species. A list of these species was obtained using the online EPBC Act *Protected Matters Search Tool* (DAWE 2022a) for the search region.

As the Project is defined as a 'nuclear action', 'the environment' is protected under the EPBC Act, including ecosystems and their constituent parts, and natural and physical resources. All flora, native vegetation and communities are considered in this report in components of the action that have triggered a 'nuclear action'.

6. Methodology

6.1. Overview of method

This section describes the method that was used to assess the potential impacts of the project. Figure 6 shows an overview of the assessment method. A risk-based approach was applied to prioritise the key issues for assessment and inform measures to avoid, minimise and offset potential effects.

The approach used in the assessment has been guided by the evaluation framework that applies to the project comprising the regulatory framework (that is, applicable legislation and policy) as well as the scoping requirements set by the Victorian Minister for Planning.

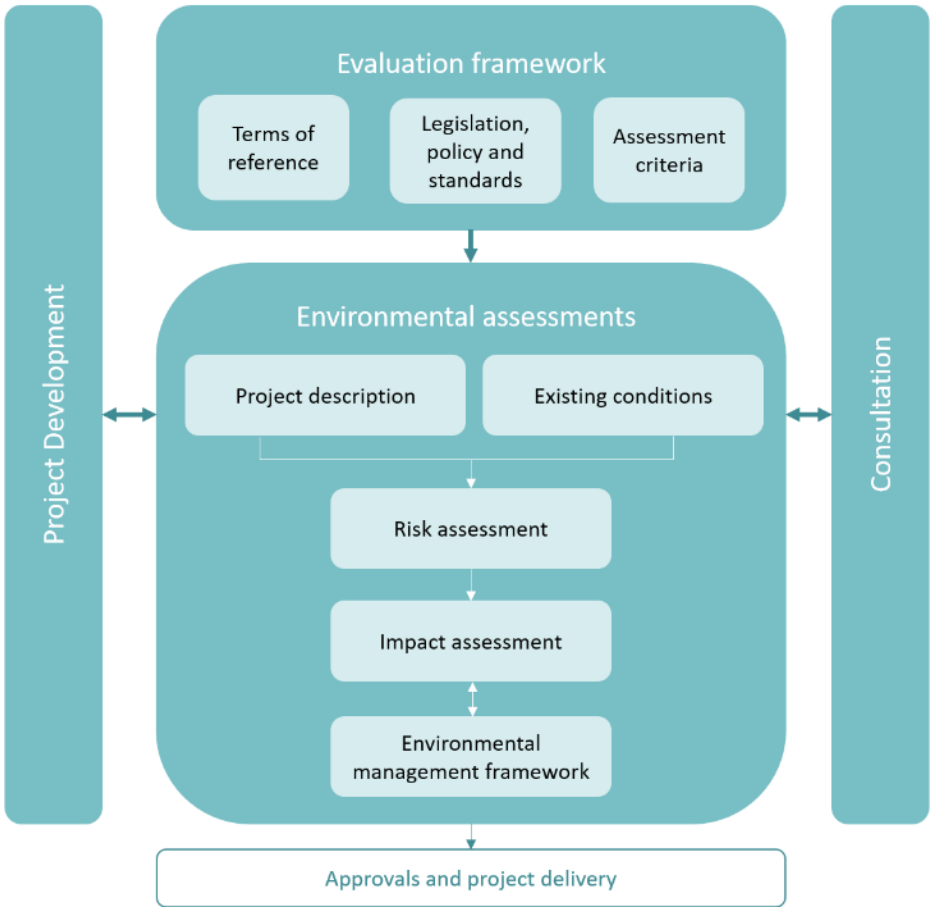


Figure 6: Overview of assessment framework

The environmental assessments were undertaken according to the following steps:

- Establishment of a study area and characterisation of existing environment.
- Review of the project description, comprising the key project components (including locations and form), proposed construction and operation activities (in the context of existing environment) to determine the location, duration and spatial distribution of potential project interactions with native flora and floristic communities.
- An initial risk-based analysis to evaluate the potential effects of proposed project activities and their likelihood of occurring (considering initial mitigation measures) to determine the relative importance of environmental impacts associated with the project and therefore prioritise issues for attention in

the subsequent assessment of impacts. Initial mitigation measures would include measures that are common industry practice or required to meet legislation.

- An assessment of impacts that examines the severity, extent, and duration of the potential impacts and considers the sensitivity and significance of the affected receptors. Potential impacts included all foreseeable project interactions with native flora and floristic communities, both direct and indirect that may adversely effect extent, quality (as defined by 'the Guidelines') or long-term persistence of native flora and floristic communities.
- Evaluation of predicted outcomes against benchmarks and criteria such as those described in applicable legislation, policy and standards.
- Evaluation of the potential for cumulative impacts (where relevant) caused by impacts of the project in combination with impacts of other existing and proposed projects that may have an overall significant impact on the same environmental asset.
- Identification of additional mitigation measures where necessary to address potentially significant environmental impacts.
- Evaluation and reporting of the residual environmental impacts including magnitude, duration and extent, taking into account the proposed mitigation measures and their likely effectiveness.

Based on the findings of the environmental assessments, an Environmental Management Framework (EMF) has been prepared to monitor and control environmental performance during project implementation. The EMF has specified the committed mitigation measures to avoid, minimise and manage impacts, proposed contingency measures and offset commitments, and describe the roles and responsibilities for implementation throughout project construction, operation and decommissioning.

The specific methods adopted during the key steps are described in the sections below.

6.2. Study area

The majority, or core, of the area subject to this investigation, referred to herein as the 'study area', was situated just north of the town of Lalbert, and was bounded by Kelly Road and Holmes Road in the north, Quambatook - Swan Hill Road in the east, Nalder Road in the south, and Donald - Swan Hill Road and Ultima Road in the west (Figure 7).

The route of a proposed water pipeline from Kangaroo Lake to the mine areas forms the eastern extent of the study area. At approximately 37 kilometres in length, the pipeline route commences on Jobling Road, at the eastern boundary of the mining areas, with three alternative routes investigated to continue east to the shoreline of Kangaroo Lake. The three alternative routes are presented in Figure 5.

Eight intersections also constitute part of the study area. These intersections are presented in Attachment 1.

While the study area spans approximately 25 kilometres north to south and 17 kilometres east to west, not all land within this broader area formed part of the investigation. Rather the study area is defined as all areas surveyed for this investigation. This includes several public roads as well as selected areas of private property for which access was granted at the time of the survey, as indicated in Figure 7. The Goschen Rare Earths and Mineral Sands Project is proposed within a subset of the study area.

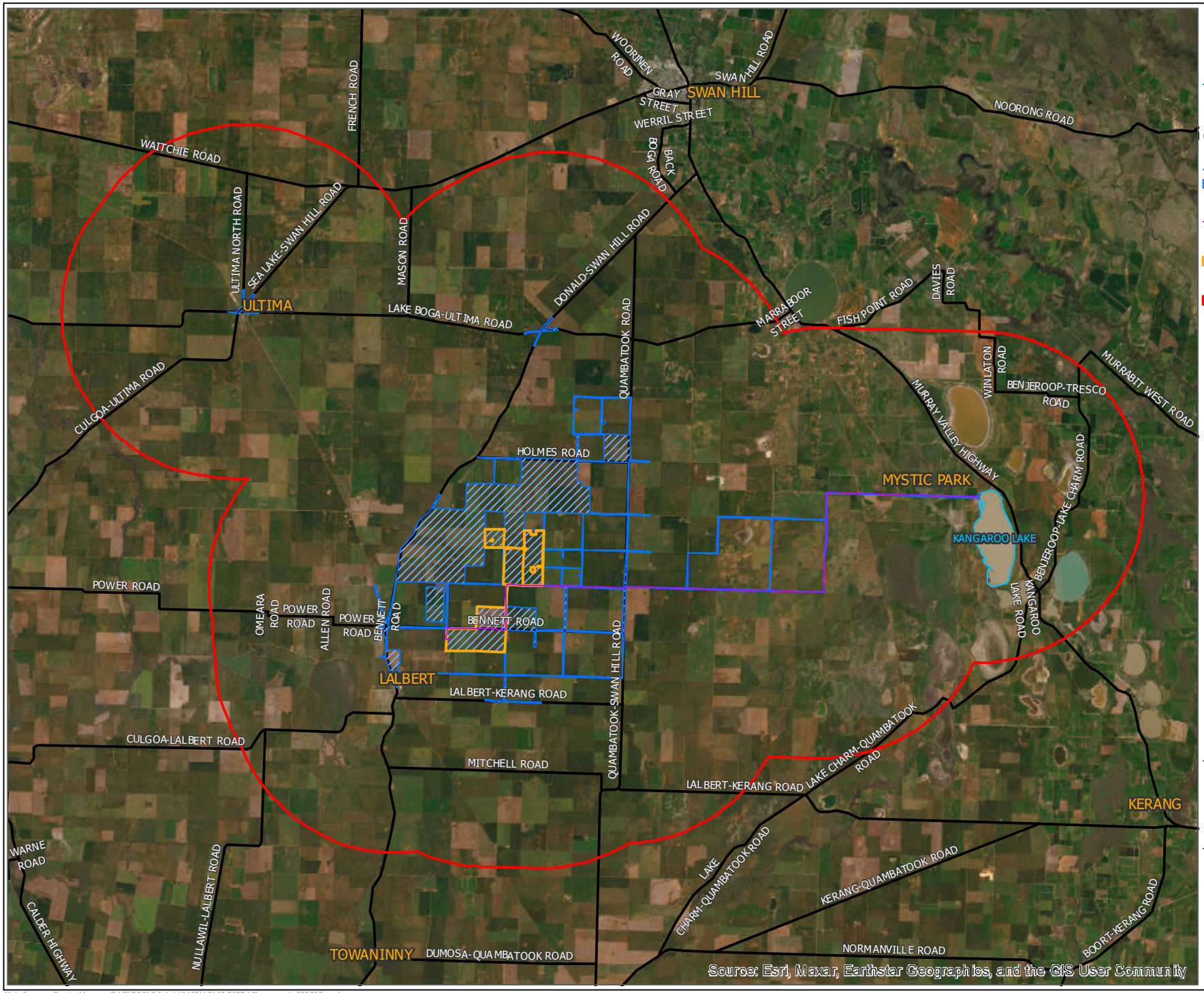


Figure 7: Study area, including 10 km search region buffer

Project: Goschen Mineral Sands Project
Client: VHM Exploration Pty Ltd
Date: 25/11/2022

- Study area
- Pipeline route (Option A3)
- Mine Site
- 10km buffer from study areas

N

Metres
0 5,000

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

6.3. Existing environment

A comprehensive assessment was undertaken to understand the existing environment of the study area to inform the environmental impact assessment for the works. This assessment included a desktop review of existing reporting and documentation relating to the study area and a field-based assessment.

6.3.1. Desktop investigation

Existing biodiversity assessment reports for the site were reviewed, including:

- Ecological Characterisation Assessment of the Proposed Goschen Mineral Sands Project, Goschen, Victoria (EHP 2018a);
- Ecological Impact Assessment: Goschen Mineral Sands Project, Goschen, Victoria (EHP 2018b); and
- Goschen Project - Targeted Conservation Significant Fauna Survey (Ecoscape Australia 2018).

State and Commonwealth databases were reviewed, including:

- Victorian Biodiversity Atlas, administered by the Department of Energy, Environment and Climate Action (DEECA 2023a);
- The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool (DEECCW 2023);
- NatureKit (DELWP 2021b);
- Flora and Fauna Guarantee Act 1988 (FFG Act) – Threatened List: Characteristics of Threatened Communities;
- FFG Act – Threatened List;
- FFG ACT - Protected Flora List; and
- DELWP Native Vegetation Information Management system (NVIM).

Relevant State planning schemes were reviewed, including:

- Gannawarra Planning Scheme; and
- Swan Hill Planning Scheme.

High-resolution aerial photography of the study area (Google Earth Pro and Nearmap) was also examined.

Native vegetation

Pre-1750 (pre-European settlement) vegetation mapping administered by DEECA was reviewed to determine the type of native vegetation likely to occur in the study area and surrounds. Information on Ecological Vegetation Classes (EVCs) was obtained from published EVC benchmarks for the Murray Mallee bioregion (DSE 2004a).

Listed matters

Existing flora species records and information about the potential occurrence of listed matters was obtained from an area termed the 'search region' (Figure 7), defined here as a polygon with a 10-kilometre buffer around the following co-ordinates:

Latitude (S)	Longitude (E)
-35°40'30.3312"	143°22'39.2268"
-35°40'31.3356"	143°22'50.3508"
-35°40'30.3312"	143°22'28.1028"
-35°36'07.1604"	143°21'16.4160"
-35°34'55.8012"	143°23'11.3604"
-35°33'02.1924"	143°24'46.5300"
-35°32'15.9324"	143°25'49.5624"
-35°31'14.5740"	143°26'29.1156"
-35°31'12.5616"	143°33'02.1492"
-35°35'02.8356"	143°32'54.7332"
-35°35'03.8400"	143°31'38.1036"
-35°40'36.3576"	143°31'30.6876"
-35°40'30.3312"	143°22'39.2268"

A list of the flora species recorded in the search region was obtained from the Victorian Biodiversity Atlas (VBA), a database administered by DEECA.

The online EPBC Act Protected Matters Search Tool (DECCW 2023) was consulted to determine whether nationally listed species or communities potentially occurred in the search region based on habitat modelling.

6.3.2. Field-based investigation

Field surveys

The field assessment was conducted across multiple visits over the following survey dates:

- 17th to 21st September 2018;
- 8th to 12th October 2018;
- 11th to 15th February 2019;
- 2nd to 5th April 2019;
- 25th to 27th May 2021;
- 25th to 29th October 2021;
- 20th to 23rd June 2022; and
- 19th to 23rd December 2022.

During the field assessments, the study area was surveyed initially by vehicle and areas supporting native vegetation were inspected in more detail on foot.

Native vegetation recorded in the study area (patches and scattered trees) was mapped through a combination of aerial photograph interpretation and ground-truthing using a tablet with inbuilt GPS.

In areas of native vegetation proposed to be impacted, parallel transects spaced five metres apart were traversed and visually inspected for threatened flora species. The location of threatened flora was taken using a tablet with inbuilt GPS.

Native vegetation definitions

Native vegetation is currently defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'. The Guidelines (DELWP 2017a) further classify native vegetation as belonging to two categories:

- Patch; or
- Scattered tree.

The definitions of these categories are provided below, along with the prescribed DELWP methods to assess them.

Patch

A patch of native vegetation is either:

- An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native; or
- Any area with three or more native canopy trees[1] where the drip line[2] of each tree touches the drip line of at least one other tree, forming a continuous canopy; or
- Any mapped wetland included in the *Current wetlands map*, available in DELWP systems and tools.

Patch condition is assessed using the habitat hectare method (Parkes *et al*. 2003; DSE 2004b) whereby components of the patch (e.g. tree canopy, understorey and ground cover) are assessed against an EVC benchmark. The score effectively measures the percentage resemblance of the vegetation to its original condition.

The Native Vegetation Information Management (NVIM) system (DELWP 2021b) provides modelled condition scores for native vegetation to be used in certain circumstances.

Scattered tree

A scattered tree is:

- A native canopy tree[2] that does not form part of a patch.

Scattered trees are counted and mapped, the species identified and their circumference at 1.3 m above the ground is recorded.

[1] A native canopy tree is a mature tree (i.e. it is able to flower) that is greater than 3 metres in height and is normally found in the upper layer of the relevant vegetation type.
[2] The drip line is the outermost boundary of a tree canopy (leaves and/or branches) where the water drips on to the ground.

Native vegetation assessment

Patches of native vegetation were assessed using the habitat hectare assessment method. Given the very high number of large trees present in patches, namely in Woorinen Mallee (EVC 824), the precise location of each large tree was not mapped for all trees, but in patches where trees were not mapped, the number of large trees were counted in the field.

A subset of large trees was measured (DBH) and mapped using GPS to obtain size averages to extrapolate average DBH for large trees along the pipeline route as well as determine position on the roadside reserves. This DBH average was used to inform the TPZ in impact areas where DBH was not measured.

Due to safety reasons, for all linear patches of mallee along Quambatook – Swan Hill Road, large tree numbers in patches were sampled per 100 metres and a total number of large trees was determined for each patch through extrapolation of sample areas. Note that the arborist report (Treetec 2022) states that no trees will be lost along this relatively wide, bitumen road. Scattered trees were mapped and classified as either small or large based on the benchmark for the relevant EVC.

Patches of native vegetation that had been previously classified and mapped by EHP (2018) were confirmed or rectified and a habitat hectare assessment was then undertaken. Scattered trees previously mapped by EHP (2018) were also confirmed or rectified.

Habitat zones HAA through HBU (47 patches out of a total of 987) were not assessed in the field as access to these areas was not permitted during the investigation. In these cases, where impacts are proposed under the development footprint, the following has been undertaken to determine the impact to native vegetation in these areas:

- EHP mapping was used to map native vegetation extent where it existed;
- Where EHP mapping did not exist, aerial photography was used to map the extent of native vegetation;
- Vegetation was classified to EVC based on EHP mapping and based on vegetation mapped in the current investigation by Nature Advisory nearby;
- The average habitat score determined during the current investigation for the relevant EVC was assigned (For EVC 824 this was 39/100); and
- A large tree count was estimated for the zone based on the proportionate area of the zone compared to adjacent patches mapped in the current investigation.

Based on the overall uniform nature of much of the native vegetation recorded in the study area, this was considered an appropriate method to determine the extent and quality of native vegetation in these areas The modelled vegetation condition score was used for aquatic and riparian vegetation within Kangaroo Lake.

Flora species and habitats

Flora species were recorded during the habitat hectare assessments described above. Specimens requiring identification using laboratory techniques were collected.

Flora species listed as protected under the FFG Act were determined by crosschecking against the FFG Act Protected Flora List (DEECA 2023b). The presence of any threatened and/or protected flora were noted for each patch of vegetation, and numbers recorded. The FFG Act was updated in October 2021 to revise the conservation status of Victorian threatened species. The survey design, fieldwork and development of mitigation measures for listed species were undertaken before the updated FFG Act threatened species lists were published. They were instead guided by the DELWP Advisory Lists, which no longer exist as they have been superseded by the newer FFG Act lists. Further amendments to the list came into effect on June 1, 2022. This led to a change in status of a number of species. Therefore not

all FFG listed species were consistently mapped across the study area. FFG listed species have been mapped along the majority of pipeline route, however, not all acacia species were able to be identified to species level at the time of the initial survey.

A follow-up targeted survey for all FFG listed species considered to have potential to occur was undertaken in December 2022 within areas of native vegetation likely to be impacted, based on the most recent layout. The surveys were planned for spring but were delayed until December 2022 due to inundation of the study area prohibiting access. This is not considered a significant limitation as soil moisture levels were well above average in late 2022 and late spring flowering species would still have been detected.

The potential for habitats to support listed threatened flora species was assessed based on the criteria outlined below:

- The presence of suitable habitat for flora species such as soil type, floristic associations and landscape context; and
- The level of disturbance of suitable habitats by anthropogenic disturbances and invasion by pest plants and animals.

Wherever appropriate, a precautionary approach was adopted in determining the likelihood of occurrence or flora listed as threatened under the EPBC Act and FFG Act. That is, where insufficient evidence was available on the potential occurrence of a threatened species, it is assumed that it could be in an area of suitable habitat.

Threatened ecological communities

The study area was assessed against published descriptions of relevant listed ecological communities modelled to potentially occur in the study area.

Reviewed ecological community descriptions comprised identification criteria and condition thresholds from listing advice for EPBC Act communities as well as FFG Act listed community descriptions (SAC 2015).

Groundwater Dependent Ecosystems

The presence of potential groundwater dependent ecosystems in the study area was determined via examination of the Bureau of Meteorology's Groundwater Dependent Ecosystems Atlas (BOM 2022), which indicated that the main groundwater dependent ecosystems in the region occur in direct association with waterways and wetlands, such as Kangaroo Lake and Lalbert Creek (Figure 8)

6.4. Avoidance and minimisation

Both the State Guidelines and the provisions of the Commonwealth EPBC Act provide clear guidance on avoidance and minimisation/mitigation principles, particularly the mitigation hierarchy. These are outlined below.

In accordance with the Guidelines (DELWP 2017a), "the three-step approach (avoid, minimise, offset) is the key policy in relation to the removal of native vegetation to achieve no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation. It is a precautionary approach that aims to ensure that the removal of native vegetation is restricted to only what is reasonably necessary, and that biodiversity is appropriately compensated for any removal of native vegetation that is approved."

The three-step approach is hierarchical and each step must be fully considered before moving onto the next step.

*Step 1: **Avoid** the removal, destruction or lopping of native vegetation.*

"An application to remove native vegetation must demonstrate or provide appropriate evidence to show that no options exist to avoid native vegetation removal, that will not undermine the objectives of the proposed use or development."

*Step 2: **Minimise** impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.*

"An application to remove native vegetation must demonstrate or provide appropriate evidence to show that no options exist to further minimise the impacts of native vegetation removal, that will not undermine the objectives of the proposed use or development."

*Step 3: Provide an **offset** to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation.*

"An application to remove native vegetation must include an offset strategy that includes evidence that an offset that meets the offset requirements for the proposed native vegetation removal is available, and explains how the offset will be secured if a permit is granted."

According to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999, Environmental Offsets Policy* (DSEWPC 2012), "avoidance and mitigation measures are the primary strategies for managing the potential significant impact of a proposed action. Mitigation corresponds with the 'minimisation' step under the Victorian Guidelines. They directly reduce the scale and intensity of the potential impacts of a proposed action. Offsets do not reduce the likely impacts of a proposed action, but instead compensate for any residual significant impact.

Avoidance of impacts on protected matters may be achieved through comprehensive planning and suitable site selection. After all reasonable avoidance measures have been put in place, mitigation of any remaining significant impact must be undertaken. Avoidance and mitigation measures can reduce and, in some cases, remove the need for offsets if the residual impact is not significant. Offsets will not be considered until all reasonable avoidance and mitigation measures are considered, or acceptable reasons are provided as to why avoidance or mitigation of impacts is not reasonably achievable."

The project has been guided by a priority to retain native vegetation where possible. Alternatives that avoid native vegetation removal have been employed wherever practicable. The measures described below have been adopted in relation to the design, construction and operation of the project to avoid and minimise impacts to native vegetation and listed flora values. These measures are described separately for each main element of the project.

6.4.1. Water pipeline

Two alternative routes for the water pipeline were investigated, in addition to the initial pipeline route (Figure 5) to determine a route that would minimise native vegetation impacts.

A more detailed description of avoidance and minimisation to native vegetation and listed flora values associated with the water pipeline is provided in Section 9.4.

6.4.2. Mine Site Area 1

Mine design and operational changes to avoid and minimise impacts to native vegetation within Mine Site Area 1 have been adopted that will result in the retention of a total extent of 15.442 hectares of native vegetation, including 14.019 hectares of vegetation patches and 22 scattered trees. This has been achieved by careful siting of mine infrastructure to avoid native vegetation, retaining trees along

boundaries by appropriate buffers from infrastructure and careful siting of access routes within the mine site to avoid lines of trees.

Key examples of avoidance and minimisation are provided below:

- Creation of a 25m buffer between the mine operation areas and the perimeter of Mine Site Area 1, to avoid impacts to several patches of native vegetation along the mining area boundary;
- Retention of the vast majority of the largest patch of native vegetation within Mine Site Area 1, identified as Habitat Zone FEQ;
- Retention of Habitat Zone IAX in its entirety;
- Retention of Habitat Zone EEW in its entirety;
- Retention of Habitat Zone EEX in its entirety;
- Retention of approximately one third of Habitat Zone IAL;
- Retention of approximately one third of Habitat Zone IAM; and
- Retention of 22 scattered trees (including 19 large scattered trees and three small scattered trees).

No further opportunities to avoid and minimise impacts to native vegetation within Mine Site Area 1 were considered feasible without undermining the key objectives of the proposal.

All retained native patches constituted Woorinen Mallee (EVC 824) and the majority were identified as the EPBC Act-listed community *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions* (Critically Endangered).

A more detailed description of avoidance and minimisation to native vegetation and listed flora values within Mine Site Area 1, including figures and a breakdown of native vegetation areas to be retained, is provided in Section 9.4.

6.4.3. Mine Site Area 3

Mine design and operational changes to avoid and minimise impacts to native vegetation associated with Mine Site Area 3 have been adopted that will result in the retention of a total extent of 22.707 hectares of native vegetation, including 21.829 hectares of vegetation patches and 17 scattered trees.

Key avoidance and minimisation measures are provided below:

- Siting Mine Site Area 3 to exclude two large patches of native vegetation, identified as Habitat Zones FEP and HAR;
- Creation of a 25m buffer between the mine operation areas and the perimeter of Mine Site Area 3, to avoid impacts to several patches of native vegetation along the mining boundary;
- Retention of the largest patch of native vegetation within Mine Site Area 3 in its entirety, identified as Habitat Zone HBQ;
- Retention of the second largest patch of native vegetation within the area in its entirety, identified as Habitat Zone HBU;
- Retention of smaller Habitat Zones FEL, FEM, FEN and FEO in their entirety; and
- Retention of 17 scattered trees (including nine large scattered trees and eight small scattered trees).

No further opportunities to avoid and minimise impacts to native vegetation within Mine Site Area 3 were considered to be feasible that would not undermine the key objectives of the proposal.

All retained native patches constituted Woorinen Mallee (EVC 824) and were identified as the EPBC Act-listed community *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions (critically endangered)*.

A more detailed description of avoidance and minimisation to native vegetation and listed flora values within Mine Site Area 3, including figures and a breakdown of native vegetation areas to be retained, is provided in Section 9.4.

6.5. Risk assessment

A risk assessment of project activities was performed to focus the impact assessments and development of mitigation measures on priority issues. The risk pathways link project activities (causes) to their potential effects on the environmental assets, values or uses that are considered in more detail in the impact assessment. Risks were assessed separately for the construction and operation phases of the Project.

The likelihood and consequence ratings determined during the risk assessment process and the adopted mitigation measures are presented in Appendix 1. The risk assessment has been undertaken in line with the Preparation of Work Plans and Work Plan Variations Guideline for Mining Projects December 2020 (version 1.3).

6.6. Impact assessment

A change to baseline conditions (or the no-project case) caused by project activities in any of the project phases (construction, operation or decommissioning) may give rise to impacts.

The impact assessment involved identifying the severity, extent and duration of any impacts, positive or negative, that the project may have on the existing environment.

The significance of the impacts has been assessed in accordance with the evaluation framework, based on applicable legislation, policy and standards and the evaluation objectives and environmental significance guidelines arising from the EES scoping guidelines established to guide the assessments.

This study has assessed the impacts of construction and operation of the project on native vegetation and flora assets and values.

6.6.1. Direct removal of native vegetation

To determine impacts to native vegetation, the proposed development plan was overlaid with the native vegetation mapped as part of this investigation.

In accordance with the Assessor's Handbook (DELWP 2018a), the extent of native vegetation to be removed has been calculated by adding together the extent of any patches of native vegetation and the extent of any scattered trees.

- the extent of a patch is the area of the patch (including mapped wetland) being impacted (removed or destroyed) in hectares.
- the extent of a small scattered tree is the area of a circle with a 10 metre radius (with the trunk at the centre of the circle) in hectares.
- the extent of a large scattered tree (dead or alive) is the area of a circle with a 15 metre radius (with the trunk at the centre of the circle) in hectares.

Multi-stemmed trees, and trees with multi-stemmed coppice regrowth, are mapped and assessed as single trees. Their size is determined from the stem with the largest circumference at 1.3 metres above the ground.

Native vegetation occurring in the following locations was considered to be removed based on the proposed development footprint.

- Construction footprint for Mine Site proper Area 1, including:

- Pit shells;
- Plant pad;
- Hydrometallurgical plant (AREM);
- Stockpiling areas;
- Mining Unit Plant (MUP);
- Noise bund; and
- Haul roads.

- Construction footprint for Mine site proper Area 3, including:
  - Pit shells;
  - Stockpiling areas;
  - MUP; and
  - Contractor yard.
- Construction of water-supply pipeline located on a series of road reserves that support varying areas and quality of remnant native vegetation; and
- Construction footprint for the transport route retained fully within the existing road with vegetation clearance associated with widening of eight intersections along the transport route.

6.6.2. *Assumed (indirect) removal of native vegetation*

In accordance with the Assessor's Handbook (DELWP 2018a), indirect impacts of the development which may destroy native vegetation and wetlands must be accounted for in the calculation of native vegetation removal. This includes:

- shading
- changes to hydrology
- effluent discharge
- stormwater runoff
- compaction
- excavation

Assumed removal from patches of native vegetation

Assumed removal from patches of native vegetation (including trees within patches – see below), was calculated along the six-metre-wide construction right of way for the installation of the water supply pipeline, within mine site areas 1 and 3, and the eight modified intersections.

Assumed removal of trees

In accordance with the *Assessor's Handbook* (DELWP 2018a), unless an arborist report indicates otherwise, a tree is deemed lost when earthworks encroach on more than 10% of its Tree Protection Zone (TPZ). A TPZ is defined as an area around the trunk of the tree which has a radius of 12 times the DBH (to a maximum of 15 metres but no less than 2 metres). Dead trees are treated in the same manner. This applies to canopy trees in native vegetation patches and scattered trees. This method was applied for the mine site areas and road intersections. For a long and linear development such as the water pipeline,

where it is impractical for an arborist to individually assess every tree where more than 10 per cent of the TPZ is impacted, an arborist can assess the proposal (rather than assessing each tree) (DELWP 2019). From this, an arborist can determine the projects likely impact on trees to decide whether they should be deemed lost based on impacts in the TPZ.

An arborist assessment of the water pipeline route was undertaken between 4 – 6 May 2022 (Treetec 2022). The assessment of trees deemed lost was determined by the distance from the one-metre-wide trench (road centre) and the type of road, indicating compaction of soils and therefore likely presence of tree roots. An indicative count of the likely tree losses generated by the pipeline construction was undertaken by the arborist and a total of 61 trees were deemed likely to be lost due to potential impacts to the TPZ. Pruning was also considered and will be required for some trees with low overhanging canopies. No trees were identified as needing to be removed for the works to occur.

The arborists assessment considered the likely impact from the proposed construction (1m trench in the centre of the road) and the current state of the of the surrounding areas i.e. the road width and surface compaction. The assessment also considered the species of trees and likely impacts of trench construction on the root zone. The arborist determined that this approach was appropriate, given the large number of trees and provided a conservative assessment, meaning that the actual number of trees impacted is expected to be lower than the 61 trees deemed 'lost' in this report.

To determine offsets along the pipeline, the partial removal method was applied as per Appendix 3 of the Assessors Handbook. (DELWP 2018). As data were incomplete for the trees to be removed (tree location and DBH were not provided) an approach that represents the worst-case scenario of the potential impacts was applied whereby all trees were assumed to be:

- Large trees (therefore the maximum 15m radius TPZ applied), and
- In a patch of native vegetation of the maximum condition score recorded along the pipeline (61).

6.7. Assessment of potential impacts on matters of national environmental significance

Potential impacts on matters of national environmental significance (MNES) have been assessed in line with Commonwealth regulatory requirements, including the Significant Impact Guidelines 1.1 (DEE, 2013). This assessment included a systematic evaluation of potential impacts of the project on MNES. Key steps include:

- Desktop and field-based data collection to inform and describe the existing biodiversity values within the study area, including any MNES that would potentially be impacted by the proposed development.
- Determination of likelihood for the potential for MNES to occur within the study area, including any MNES that would potentially be impacted by the proposed development.
- Assessment of risk and impacts for relevant MNES values.

The assessment of potential impacts on MNES involved evaluation of predicted outcomes against benchmarks and significant impact criteria such as those described in applicable legislation, policy and standards.

6.8. Assessment of cumulative impacts

A review of projects being assessed under the Environmental Effects Act 1978 and the Major Transport Projects Facilitation Act 2009 (DELWP 2022) determined that no large-scale projects are proposed within the surrounding landscape that would cause direct or indirect impacts to native vegetation or ecological values that overlap with the study area. The closest large-scale project to the study area is the *Nyah, Vinifera and Burra Creek Floodplain Restoration Projects* which lies approximately 35km to the north. The project occurs within riparian habitats associated with the Murray River and is not expected to impact on

similar environmental assets to those which will be impacted by the Goschen Rare Earths and Mineral Sands Project.

6.9. Limitations, uncertainties and assumptions

Short duration and seasonal timing of field assessments can also often result in some species not being detected when they may occur at other times.

The field assessments were undertaken from spring 2018 through to late autumn 2021 and again in winter and summer 2022. Based on Bureau of Meteorology (BOM) data, rainfall at Lalbert in 2018 totalled 223mm, with 104mm recorded up to June 2019. Annual rainfall in previous years was much higher with 2016 and 2017 receiving 484mm and 436mm annual rainfall respectively. The average annual rainfall recorded at Lalbert based on data recorded over the last 100 years (1917 to 2018) is 369 mm (BOM 2019). This suggests the 2018 and 2019 survey was conducted in seasonally dry conditions. Rainfall from data at Lalbert in 2020 totalled 343mm, while rainfall in the months between January 2021 and April 2021 varied from 0.8mm-21mm.

The seasonally dry conditions in the study area noted during the field surveys up until June 2019 (particularly during summer 2019), are likely to have resulted in less graminoids and herbs being detectable. Targeted flora surveys in December 2022 followed above average rainfall and therefore conditions were suitable for detecting many herbs, graminoids and flowering shrubs that may not have been detected in earlier years. Targeted surveys were delayed due to extensive flooding in the region, however, due to cool and wet conditions, flowering parts were observable on most shrubs, herbs and graminoids.

7. Existing environment

7.1. Native vegetation

The study area largely supported red brown sandy soils, across a landscape of undulating inland jumbled dunes. The vast majority of the study area comprised private farmland, most of which supported extensive areas of cereal cropping, namely wheat. Linear stretches of remnant native vegetation commonly existed along public roads, as well as along farm lanes and fences dividing farm properties. Few large remnants of native mallee vegetation occurred in private land, ranging in size from 5 and 20 hectares. The majority of treed patches supported old-growth trees. Numerous scattered trees dotted farm paddocks, most of which were old multi-stemmed mallee eucalypts, although Buloke and Slender Cypress Pine were occasionally recorded.

Where farm houses and outbuildings occurred in private property, planted trees were common. Planted tree species included Pepper Tree and Sugar Gum, both introduced species.

Mallee comprised the vast majority of the native vegetation recorded in the study area, occurring on red sands throughout the central and eastern parts of the site. The western portion of the study area was on the edge of a floodplain and supported a healthy canopy of large Black Box trees over a chenopod dominated understorey. Small scattered occurrences of Buloke Woodlands existed in the western and northern parts of the study area.

Remnant mallee vegetation was distinguished by an open canopy of typical mallee eucalypts. The four most common canopy trees recorded were Dumosa Mallee, Oil Mallee, Red Mallee and Bull Mallee, many of which were old growth multi-stemmed trees. The understorey often comprised a mid-layer of shrubs (including Cattle Bush, Weeping Pittosporum, Sugarwood and Umbrella Wattle) as well as a diverse ground layer of saltbushes, with Hedge Saltbush, Prickly Saltwort, Ruby Saltbush, Grey Copperburr and Black Cotton-bush commonly recorded. Native grasses and herbs were present but generally sparse. Common herbs included Pale Twin-leaf and Variable Sida. Introduced flora varied in cover across the study area and survey period, with the vast majority being annual grasses, which had died off by the time of the summer and autumn surveys. Other common weed species included African Box-thorn and Common Heliotrope.

During the field assessment 122 plant species were recorded within the study area. Of these, 88 (72%) were indigenous and 34 (28%) were introduced or non-indigenous native in origin. A complete list of the recorded flora species is provided in Appendix 5.

7.1.1. Patches of native vegetation

Pre–European EVC mapping (DELWP 2021a) indicated that the study area and surrounds would have supported Ridged Plains Mallee (EVC 96), Woorinen Mallee (EVC 824), Plains Savannah (EVC 826), Riverine Chenopod Woodland (EVC 103) and Semi-arid Woodland (EVC 97) prior to European settlement based on modelling of factors including rainfall, aspect, soils and remaining vegetation.

Evidence on site, including floristic composition and soil characteristics, suggested that the following EVCs were present in the study area:

- Woorinen Mallee (EVC 824);
- Ridged Plains Mallee (EVC 96);
- Semi-arid Woodland (EVC 97);
- Plains Savannah (EVC 826);

- Chenopod Grassland (EVC 829); and
- Riverine Chenopod Woodland (EVC 103).

The DEECA native vegetation mapping suggested that Woorinen Mallee (EVC 824) and Ridged Plains Mallee (EVC 96) form the most dominant vegetation types in the study area however the modelled boundaries between these two EVCs are not well defined (DELWP 2022b). The classification of EVCs in the field was therefore made based on the descriptions as well as the floristic species and covers of the published EVC benchmarks.

Based on this, Woorinen Mallee (EVC 824) was considered to be the most dominant remnant vegetation type in the study area. This EVC was largely distinguished by the occurrence on red-brown sandy soils and where chenopods formed the dominant life form in the ground layer. Ridged Plains Mallee (EVC 96) occurred where the ground layer in the understorey supported a higher cover of graminoids. Both these EVCs had a similar canopy/overstorey comprising at least one of the four most common mallee eucalypts:

- Red Mallee (*Eucalyptus calycogona*)
- Dumosa Mallee (*Eucalyptus dumosa*)
- Oil Mallee (*Eucalyptus oleosa*)
- Bull Mallee (*Eucalyptus behriana*)

Plains Savannah (EVC 826) was mapped in the study area when Buloke and/or Slender Cypress Pine formed a notable portion of the canopy. Riverine Chenopod Woodland (EVC 103) was distinguished by the presence of Black Box in the canopy. Semi-arid Woodland (EVC 97) was distinguished by a canopy/sub-canopy dominance or co-dominance of Belah.

A total of 1,220 habitat zones, comprising the above EVCs were recorded, mapped and assessed in the study area. Given the extensive dataset, a summary of the findings is provided in this section.

A summary of the patch native vegetation recorded in the study area by EVC is presented below in Table 5 and the location and extent of these patches is presented in Attachment 1.

Table 5: Summary of native patch vegetation recorded in the study area

Ecological Vegetation Class (EVC)	Bioregional Conservation Status	Number of Habitat Zones	Area (ha)	No. of Large Trees in HZ
Woorinen Mallee (EVC 824) (Murray Mallee bioregion)	Vulnerable	990	429.859	45,020
Ridged Plains Mallee (EVC 96) (Murray Mallee bioregion)	Endangered	94	42.529	513
Semi-arid Woodland (EVC 97) (Murray Mallee bioregion)	Vulnerable	2	2.530	13
Plains Savannah (EVC 826) (Murray Mallee & Victorian Riverina bioregions)	Endangered	38	9.709	89

Ecological Vegetation Class (EVC)	Bioregional Conservation Status	Number of Habitat Zones	Area (ha)	No. of Large Trees in HZ
Riverine Chenopod Woodland (EVC 103) (Murray Mallee bioregion)	Depleted	68	41.627	272
Riverine Chenopod Woodland (EVC 103) (Victorian Riverina bioregion)	Vulnerable	26	15.252	4
Chenopod Grassland (EVC 829) (Victorian Riverina bioregion)	Endangered	2	0.166	NA
TOTAL		**1,220**	**541.672**	**45,911**

7.1.2. Scattered trees

Scattered trees were recorded in the study area, many of which occurred along road reserves and along farm fence lines. Fewer occurred as scattered paddock trees. Scattered trees recorded in the study area would have once comprised the canopy component of Woorinen Mallee (EVC 824), Chenopod Grassland (EVC 829), Ridged Plains Mallee (EVC 96), Semi-arid Woodland (EVC 97), Plains Savannah (EVC 826) or Riverine Chenopod Woodland (EVC 103). A total of 1,103 scattered trees occurred in the study area, as summarised in Table 6.

Table 6: Scattered trees recorded in the study area

Size class	Number of scattered trees recorded
Large	800
Small	303
TOTAL	**1,103**

7.2. Threatened flora species

VBA records (DEECA 2023a) and the EPBC Protected Matters Search Tool (DCCEEW 2023) indicated that within the search region there were records of, or there occurred potential suitable habitat for, 13 species listed under the Commonwealth EPBC Act and 81 listed under the state FFG Act, including eight listed under both Acts.

Species considered 'likely to occur' are those that have a very high chance of being in the study area based on numerous records in the search region and suitable habitat in the study area. Species considered to have the 'potential to occur' are those for which suitable habitat exists, but recent records are scarce.

No EPBC Act-listed threatened flora species were recorded in the study area during the field assessment and none are considered to have the potential to occur in the study area based on habitat suitability and

a paucity of records. Therefore, no EPBC Act-listed flora species are expected to be impacted by the development.

Seven FFG Act-listed threatened flora species were initially recorded during the field assessments, from a total of 21 FFG listed species considered likely or to have potential to occur within the study area. Two additional FFG Act-listed threatened flora species were recorded during the follow-up targeted survey; *Fragrant Saltbush* and *Three-nerved Wattle*. There had been no previous records of Three-nerved Wattle within a 10km radius of the site, therefore this species was not listed in the VBA search.

Of the FFG listed species recorded during field surveys, the following six species were recorded within the development footprint and are therefore likely to be impacted by the proposed development:

- Bush Minuria – *Minuria cunninghamii* (18 individuals impacted)
- Dwarf Myall – *Acacia ancistrophylla* var. *lissophylla* (one individual impacted)
- Fragrant Saltbush – *Rhagodia parabolica* (11 individuals impacted)
- Frosted Goosefoot – *Chenopodium desertorum* subsp. *desertorum* (54 individuals impacted)
- Umbrella Wattle – *Acacia oswaldii* (353 individuals impacted)
- Yarran – *Acacia melvillei* (17 individuals impacted)

The following three species were not recorded within any area where impacts to native vegetation are proposed and are therefore considered unlikely to be impacted by the proposed development:

- Buloke – *Allocasuarina luehmannii*
- Frosted Goosefoot – *Chenopodium desertorum* subsp. *rectum*
- Three-nerved Wattle – *Acacia trineura* (not previously recorded within 10km of the study area)

The following 13 FFG Act-listed threatened flora species considered to have the potential to occur in the study area, but none were recorded in the targeted survey:

- Buloke Mistletoe - *Amyema linophylla* subsp. *orientalis*
- Club-hair New Holland Daisy - *Vittadinia condyloides*
- Common White Sunray - *Rhodanthe floribunda*
- Downy Swainson-pea – *Swainsona swainsonioides*
- Glandular Phebalium – *Phebalium glandulosum* subsp. *macrocalyx*
- Round Templetonia – *Templetonia egena*
- Salt Copperburr – *Sclerolaena ventricosa*
- Satin Daisy-bush – *Olearia minor*
- Spear-grass – *Austrostipa trichophylla*
- Spiny Goosefoot – *Rhagodia ulicina*
- Spreading Scurf-pea - *Cullen patens*
- Veined Peppercress – *Lepidium phlebopetalum*
- Winged New Holland Daisy – *Vittadinia pterochaeta*

The likelihood of occurrence in the study area of flora species listed as threatened under the EPBC Act and FFG Act is addressed in Table 7.

Table 7: Listed flora species and likelihood of occurrence in the study area

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Dwarf Myall	*Acacia ancistrophylla* var. *lissophylla*		EN	Confined in Victoria to scattered localities between Lake Hindmarsh and Swan Hill. Grows mostly on flats in sandy loam and loam over limestone usually in mallee communities (Entwisle et al. 1996).	14	30/06/2010	**Recorded** in a small number of instances in the study area.
Nealie	*Acacia loderi*		CR	In Victoria, restricted to near Merbein and Nyah in the north-west, and near Pyramid Hill and Nathalia in the central north. It exists now as mostly remnant stands on or near private land (Entwisle et al. 1996).	3	30/06/2011	No suitable habitat. **Unlikely to occur**.
Yarran	*Acacia melvillei*		CR	Scattered through north-western Victoria, mostly along Murray River and its flood-plain, often in woodland (Entwisle et al. 1996).	21	17/10/2018	**Recorded** in a small number of instances in the study area.
Umbrella Wattle	*Acacia oswaldii*		CR	Widespread but rather uncommon through northwestern Victoria, mainly in calcareous sands or loam (Entwistle et al. 1996).	35	17/10/2018	**Recorded** commonly in several patches of remnant mallee (namely Woorinen Mallee, EVC 824) on roadsides within the study area.
Weeping Myall	*Acacia pendula*		CR	Rare in Victoria with isolated occurrences near Warracknabeal and Echuca. Mainly on floodplains in fertile alluvial clay and red earth soils (Entwisle et al. 1996).	1	1/01/1994	Very conspicuous wattle species. Not recorded during the survey. Most recent record in the search region from 25 years ago. **Unlikely to occur.**
Three-nerved Wattle	*Acacia trineura*		CR	SA, NSW & Vic. In Vic, usually found in red earths or clays near water sources.	None		No previous records within 10km. **Recorded within study area**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Buloke	*Allocasuarina luehmannii*		CR	Woodlands on non-calcareous soils. Commonly grows with Grey Box (Entwisle et al. 1996).	8	17/10/2018	**Recorded** as a canopy tree in a number of patches, mostly Plains Savannah (EVC 826), and occasionally as scattered paddock trees. The following habitat zones comprised Buloke: AQN, EAC, AES, APQ, APR, CCE, CDM, EES, FCL, FCN, FCS, FCY, FDD, FDO.
Dwarf Amaranth	*Amaranthus macrocarpus var. macrocarpus*		EN	NSW, NT, QLD and SA. Victoria, rare, appearing only after summer rains along Murray River floodplain downstream from about Echuca; sometimes present on roadsides and in railyards where possibly introduced with grain etc. (VicFlora 2022).	4	15/05/2008	No suitable habitat (areas prone to inundation) within the study area. Only records within 10km are west of Murray Valley Highway, from 15 years ago. **Unlikely to occur.**
Jerry-jerry	*Ammannia multiflora*		EN	Mostly confined in Victoria to the Murray River floodplain in the north-west on heavy soils, occasionally submerged. Disjunct occurrences known from e.g. Kerang and Barmah areas (Entwisle et al. 1996).	2	12/03/2011	No extensive aquatic habitats occur in the study area. **Unlikely to occur.**
Buloke Mistletoe	*Amyema linophylla* subsp. *orientalis*		CR	Previously widespread in western Victoria, but somewhat depleted now due to the small number of its host plant, Buloke (Jeanes 1999).	3	3/05/2004	The study area supports Buloke and records exist within close proximity to the study area. **Likely to occur, but not recorded in targeted survey.**
Twin-leaf Bedstraw	*Asperula gemella*		EN	Rare in Victoria where known only from moist riparian sites along the Murray River downstream from Kerang, and with an isolated record from the upper Avoca River (Jeanes 1999).	1	10/07/2011	Only one record within 10km of the study area and study area does not support suitable riparian habitat. **Unlikely to occur**.

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Angular Saltbush	*Atriplex angulata*		CR	Known in Victoria by a single 1955 collection from mallee sandhill country beside the Murray River at Boundary Bend (Walsh 1996).	1	12/09/2013	No suitable habitat within study area. Only one historic record within 10km from 10 years ago, west of Murray Valley Highway. **Unlikely to occur.**
Paddle Saltbush	*Atriplex turbinata*		CR	In Victoria apparently restricted to the Murray River floodplain near Winlaton.	4	11/12/2014	No suitable habitat within study area. Few historic records within 10km from 10 years ago, west of Murray Valley Highway. **Unlikely to occur.**
Mallee Cucumber	*Austrobryonia micrantha*		EN	Drying or dried clay soils, eg lake beds, ephemeral water courses and lagoons on the Murray floodplain.	4	15/05/2008	No suitable aquatic or riparian habitat within study area. Historic records within 10km from 15 years ago, nearer lakes and other large waterbodies. **Unlikely to occur.**
Cane Spear-grass	*Austrostipa breviglumis*		EN	Scattered and uncommon to rare. Usually occurring on skeletal soils in drier areas of central to mid-western Victoria (e.g. Inglewood, St Arnaud) with outlying occurrences near Bacchus Marsh west of Melbourne (Walsh 1994).	1	1/01/1991	Only one record within 10km of the study area and study area does not support suitable Plains Woodland habitat. **Unlikely to occur**.
null	*Austrostipa metatoris*	VU		No records in Victoria	None	N/A	No records exist within 10km of the study area. **Unlikely to occur**.
Spear-grass	*Austrostipa trichophylla*		EN	Relatively rare in Victoria where known from scattered sites in the west and north-west (Little Desert, Black Range near Stawell, Wedderburn, Gunbower, Ouyen, Mildura areas), and occurring in mallee and woodland formations (Walsh 1994).	1	18/11/2003	One record within 10km of the study area and study area supports suitable habitat. **Potential to occur, but not recorded in targeted survey.**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
	Austrostipa wakoolica	EN		Species probably requires periodic flooding of its habitat to maintain wet conditions.	None	N/A	No suitable habitat (areas prone to inundation) within study area. . No records exist within 10km of the study area. **Unlikely to occur.**
Jerry Water-fire	*Bergia ammannioides*		EN	Africa, Asia and all mainland states. Victoria, rare, apparently confined to far north-west (Hattah Lakes and Mildura areas), collected from Lake Hindmarsh and near Dimboola late last century; usually growing on recently inundated sandy soil beside lakes, rivers and billabongs (VicFlora 2022).	1	11/07/2011	No suitable aquatic or riparian habitat within study area. One historic record within 10km from over 10 years ago, near water bodies at Koorangie Wildlife Reserve. **Unlikely to occur.**
Small Water-fire	*Bergia trimera*		EN	Rare in Victoria, confined to floodplains of the Murray River in the far northwest (Red Cliffs, Lake Wallawalla), and areas prone to inundation near Kerang. Rarely observed in the absence of recent floods (Walsh 1996).	1	12/03/2011	One record within 10km of the study area. By and large the study area does not support areas prone to inundation. **Unlikely to occur.**
Reader's Daisy	*Brachyscome readeri*		EN	Usually growing in areas subject to inundation in the south-west and in the north of the state near the Murray River, between Swan Hill and Ulupna Island (Short 1999).	2	11/09/2013	Two records within 10km of the study area. By and large the study area does not support areas prone to inundation. **Unlikely to occur.**
Rigid Spider-orchid	*Caladenia tensa*	EN		Known to occur in Eucalyptus and Callitris woodland in well-drained sandy loams, among shrubs. Widespread within and near Little Desert. (Jones 2006).	None	N/A	Sandy soils present, though well beyond known range. No records in search region. **Unlikely to occur.**
Candy Spider-orchid	*Caladenia versicolor*	VU	EN	Restricted to the western part of the Midlands region in the vicinity of Stawell, in woodland on winter-wet sandy loam (Entwisle 1994).	None	N/A	No suitable habitat occurs in the study area. Well beyond known range. No

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
							records in search region. **Unlikely to occur.**
Twining Purslane	*Calandrinia volubilis*		VU	Largely restricted in Victoria to the far north-west in samphire and saltbush communities on saline flats and around salt lakes (Walsh 1996).	1	3/09/2003	One record within 10km of the study area, though study area does not support suitable saline habitats. **Unlikely to occur**.
Western Bitter-cress	*Cardamine lineariloba*		EN	Drainage lines, saline flats and stream banks.	1	26/09/2017	No suitable habitat occurs in the study area. Single historic record outside the study area, near Lake Lalbert. **Unlikely to occur.**
Riverina Bitter-cress	*Cardamine moirensis*		EN	Seasonally wet areas (Thompson 1996).	2	10/07/2011	Two records within 10km of the study area. By and large the study area does not support areas prone to inundation. **Unlikely to occur**.
Compact Sneezeweed	*Centipeda crateriformis subsp. compacta*		EN	Principally grows on the shores of drying watercourses and in seasonally inundated swamps and depressions in the west, from the Grampians region north.	1	11/07/2011	One record exists within 10km of the study area. No suitable habitat (areas prone to inundation) within study area. **Unlikely to occur**.
Lagoon Sneezeweed	*Centipeda crateriformis subsp. crateriformis*		EN	In Victoria grows in clay soils of seasonally inundated areas and depressions in regions surrounding the Murray River from Kerang through to South Australia.	1	15/12/2011	One record exists within 10km of the study area. No suitable habitat (areas prone to inundation) within study area. **Unlikely to occur**.
Desert Sneezeweed	*Centipeda thespidioides s.s.*		EN	On heavy clay soils prone to inundation in depressions surrounded by halophytic shrublands in regions surrounding the Murray River from Kerang through to South Australia with an	1	29/04/2012	One record exists within 10km of the study area. By and large the study area does not support areas prone to inundation. **Unlikely to occur**.

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
				isolated occurrence near the Grampians (Walsh 1999).			
Frosted Goosefoot	*Chenopodium desertorum* subsp. *desertorum*		EN	In Victoria largely confined to the far north-west (Hattah and Wyperfeld National Parks, Annuello etc.) where occurring mainly on sand-ridges and apparently not common (Walsh 1996).	1	13/10/2011	**Recorded** within study area during targeted survey.
Frosted Goosefoot	*Chenopodium desertorum* subsp. *rectum*		EN	Mallee scrub and heavy soils.	2	18/12/1995	**Recorded** within the study area.
Desert Bindweed	*Convolvulus clementii*		EN	In Victoria, confined to the north-west part of the State, growing in a variety of habitats, but commonly from seasonally wet depressions .	1	31/10/2017	No suitable habitat (areas prone to inundation). One record exists within 10km of the study area, at Kangaroo Lake. **Unlikely to occur**.
Grassland Bindweed	*Convolvulus graminetinus*		EN	Apparently rare in Victoria where known from grassland or woodland communities on relatively fertile soils sometimes prone to inundation (Wycheproof, Swan Hill, Kerang, Omeo areas) (Jeanes 2015, updated by Walsh 2016).	2	15/12/2004	Two records exist within 10km of the study area. No suitable habitat (areas prone to inundation). **Unlikely to occur**.
Hoary Scurf-pea	*Cullen cinereum*		EN	Endangered in Victoria, known only from a few localities in the far north-west of the state where it grows in moist depressions and on floodplains (Jeanes 1996).	7	28/09/2017	No suitable habitat (areas prone to inundation). **Unlikely to occur**.
Spreading Scurf-pea	*Cullen patens*		EN	Known from very few collections in the far north-west of Victoria, growing in clay or sandy clay soils.	1	1/01/1982	Lack of recent records – single record from over 40 years ago, near (outside) of the study area at Ultima.

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
							However, study area contains suitable soil type. **Potential to occur but not found in targeted survey**
Tough Scurf-pea	*Cullen tenax*		EN	Grasslands and grassy woodlands, subject to irregular flooding, with relatively rich soils derived from alluvium. *An exception is the population near Shelford, which grows from rocky clay soils derived from basalt* (DSE 2005).	2	22/12/2011	No suitable habitat. **Unlikely to occur**.
Slender Water-ribbons	*Cycnogeton dubium*		EN	Occurs in still ephemeral fresh water to 50 cm deep, in swamps creeklets and floodplains, typically in *Eucalyptus largiflorens/ Muehlenbeckia florulenta* sites (Messina 2014, updated by Stajsic 2019).	4	5/11/1989	No extensive aquatic habitats occur in the study area. **Unlikely to occur.**
Downs Nutgrass	*Cyperus bifax*		CR	Known in Victoria only from the Kerang and Lalbert areas, but widespread in inland Australia, especially on floodplains on heavy clay soils (Wilson 1994).	7	10/07/2011	Records exist within close proximity to the study area, at Lake Lalbert. No suitable habitat within study area (areas prone to inundation) **Unlikely to occur**.
Spiny Lignum	*Duma horrida subsp. horrida*		CR	Silty soils and clays fringing shallow swamps and lakes (Walsh 1996).	11	18/09/2018	No suitable habitat in the study area. **Unlikely to occur.**
Small Monkey-flower	*Elacholoma prostrata*		EN	In Victoria, confined to north-western and north-central areas and rather uncommon. Mostly on heavy soils prone to seasonal inundation (gilgais, floodplains etc.) (Barker & Harden 1999).	2	28/09/2017	Two records within 10km of the study area. No suitable habitat (areas prone to inundation). **Unlikely to occur**.
Striate Spike-sedge	*Eleocharis obicis*	VU		Ephemerally wet locations, such as roadside mitre drains and depressions, usually in low-lying grasslands (Harden 1993).	None	N/A	No extensive aquatic habitats occur in the study area. **Unlikely to occur.**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Flat Spike-sedge	*Eleocharis plana*		CR	Moist situations, near Tallangatta (Wilson 1994).	6	15/05/2008	No suitable habitat in the study area. Records within 10km associated with large lakes west of the study area. **Unlikely to occur.**
Cane Grass	*Eragrostis australasica*		CR	Largely confined to clay-pans and shallow lakes in the north-west, from near Kerang to the SA border. More southerly records are often associated with irrigation channels and it's likely that these plants have established through inadvertent transport of seed (Walsh 1994).	10	19/09/2018	Several records exist along waterways to the east of the study area and this species is associated with wetter habitats than those found in the study area. **Unlikely to occur**.
Purple Love-grass	*Eragrostis lacunaria*		EN	Uncommon to rare, confined to sandy or alluvial soils fringing lakes and seasonally flooded areas in the far north-west (e.g. Mildura, Hattah Lakes, Lake Powell near Robinvale), with isolated more southerly records from near Dimboola and Warracknabeal (Walsh 1994).	1	1/12/1986	One record within 10km of the study area. No suitable habitat. **Unlikely to occur**.
Bristly Love-grass	*Eragrostis setifolia*		EN	Uncommon in Victoria, occurs on clayey soils of seasonally flooded areas, confined to the far north-west (Walsh 1994).	4	7/01/2010	Records exists within 10km of the study area. No suitable habitat (areas prone to inundation). **Unlikely to occur**.
Spreading Emu-bush	*Eremophila divaricata subsp. divaricata*		V	In Victoria, confined to woodland communities along the floodplain of the Murray River system north-west from Kerang.	1	1/07/1986	No suitable habitat in the study area. Single record within 10km from over 35 years ago, west of the study area at Koorangie Wildlife Reserve. **Unlikely to occur**.
Scaly Mantle	*Eriochlamys squamata*		EN	Scattered across northern and north-western Victoria from Echuca to near the South Australian border and as far south	12	5/02/2014	Numerous records exist along waterways to the south-east of the study area, though study area

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
				as Dimboola, usually in woodland on heavier clay soils (Ohlsen 2015, updated by Stajsic 2018).			typically does not support heavy clay soils. **Unlikely to occur.**
Long Eryngium	*Eryngium paludosum*		EN	Heavy soils of lake margins and river floodplains (Walsh & Entwistle 1999).	4	29/05/2012	Records exist to the south of the study area, No suitable habitat. **Unlikely to occur.**
Stiff Goodenia	*Goodenia lunata*		CR	In Victoria, known with certainty only by a few old collections from the Dimboola area, and recent collections from near Kerang (Jeanes 1999).	4	16/02/2017	Records in the search region are located on the Avoca River and associated floodplain. **Unlikely to occur.**
Pale Plover-daisy	*Leiocarpa leptolepis*		EN	The only known population in Victoria occurs along a roadside which was formerly Black Box *Eucalyptus largiflorens* woodland on clay floodplain (Parsons 1987); this population is found along a roadside and the adjoining Sandilong Park Recreation Reserve approximately 4km east of Mildura (DSE 2002).	1	26/11/2014	One record exists within 10km of the study area. No suitable habitat. **Unlikely to occur.**
Spiny Peppercress	*Lepidium aschersonii*	VU	EN	The Spiny Peppercress occurs in periodically wet sites such as gilgai depressions and the margins of freshwater and saline marshes and shallow lakes, usually on heavy clay soil. Almost all sites receive some degree of soil waterlogging or seasonal flooding.	None	N/A	No records exist within 10km of the study area and study area does not support typical habitat. **Unlikely to occur.**
Basalt Peppercress	*Lepidium hyssopifolium s.s.*	EN	EN	Known to establish on open, bare ground with limited competition from other plants. Previously recorded from Eucalypt woodland with a grassy ground cover, low open Casuarina woodland with a grassy ground cover and tussock	None	N/A	No records exist within 10km of the study area. By and large the study area does not support areas prone to inundation. **Unlikely to occur.**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
				grassland. Now generally found amongst exotic pasture grasses and beneath exotic trees (DAWE 2020).			
Winged Peppercress	*Lepidium monoplocoides*	EN	EN	Occurs predominantly in mallee scrub in semi-arid areas. Sites are seasonally moist to water-logged with heavy, fertile soils and a mean annual rainfall of around 300 to 500 mm. The predominant vegetation is usually an open-woodland dominated by Allocasuarina luehmannii and/or eucalypts, particularly *Eucalyptus largiflorens* (Black Box) or *Eucalyptus populnea* (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses (notably *Danthonia spp.* and *Stipa spp.*), but the seasonally waterlogged sites preferred by Winged Pepper-cress also support a number of moisture dependent herbs, such as Marsilea spp. Also known from riparian woodland (e.g. Gunbower Is.) (DAWE 2020).	3	8/10/1981	Study area does not support preferred waterlogged habitats. Understorey largely disturbed and constitutes high cover of introduced annual grasses. No records in the search region. **Unlikely to occur.**
Veined Peppercress	*Lepidium phlebopetalum*		EN	Very rare in Victoria, recorded in recent times only from open herbfields in the Quambatook area, often in relatively bare sites with crusting red clay loam soils.	2	7/11/2017	The study area supports at least some suitable habitat. **Potential to occur, but not recorded in targeted survey.**
Button Immortelle	*Leptorhynchos waitzia*		EN	Occurs in open grassy plains, grassy woodlands and sandy flats in mallee areas (Flann 1999).	1	1/09/2014	Only one record exists within the search region but suitable habitat. **Unlikely to occur**.
Soft Sunray	*Leucochrysum molle*		EN	Only known from three populations in Victoria	1	1/01/1985	No recent records**. Unlikely to occur**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Chariot Wheels	*Maireana cheelii*	VU	EN	Usually found on heavier, grey clay soils with *Atriplex vesicaria* (Bladder Saltbush). Recorded on the Hay Plain in *Atriplex vesicaria, Maireana aphylla* and *Acacia homalophylla* shrublands. Soils include heavy brown to red-brown clay-loams, hard cracking red clay, other heavy texture-contrast soils.	35	7/04/2020	The vast majority of the native vegetation recorded in the study area supported mallee EVCs. No preferred habitat for the species was recorded in the area, namely no floodplains supporting chenopod shrubland or grassland were present. The closest records of this species exist over 6km to the south east, and 14km to the east of the study area, and are distributed near to the Kerang Lakes and on the floodplain along the Avoca River and nearby Back Creek (DELWP 2019a). Vegetation in the south western limit of the study area (along Ultima Road and Donald-Swan Hill Road) comprised Black Box woodland on the outer edge of a floodplain which occurred further to the west. This area comprised a disturbed understorey and was not considered to support preferred habitat for the species. No other floodplain habitat exists in the study area. **Unlikely to occur.**
Coast Hollyhock	*Malva preissiana s.s (white-flowered coastal form)*		EN		2	12/09/2013	This species is restricted to the coast. **Unlikely to occur**.

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Bush Minuria	*Minuria cunninghamii*		VU	Saline sand, clay or gypseous soils.	5	7/11/2017	**Recorded** within the study area.
Smooth Minuria	*Minuria integerrima*		VU	Heavy clay and alluvial silt on floodplains.	2	10/09/2013	Two records within 10km of the study area. No suitable habitat. **Unlikely to occur**.
Satin Daisy-bush	*Olearia minor*		EN	Scattered on loamy soils with mallee in the north-west (Bambill, Murrayville, Beulah, fringes of the Little Desert), localized, but locally common in dry forest in the northern Brisbane Ranges and Werribee Gorge (Walsh & Lander 1999).	1	5/09/1999	One record within 10km of the study area and study area supports suitable habitat. **Potential to occur, but not recorded in targeted survey.**
Glandular Phebalium	*Phebalium glandulosum* subsp. *macrocalyx*		CR	Confined to mallee woodland between Lake Boga, Ultima and Lalberrt, north-west Victoria (Walsh 2016).	13	10/12/2014	Numerous records exist within close proximity to the study area and study area supports suitable habitat. **Likely to occur, but not recorded in targeted survey.**
Hairy Tails	*Ptilotus erubescens*		CR	Occasional on relatively fertile soils supporting grassland and woodland communities in northern and western Victoria, but not in mallee areas.	2	13/10/2011	Not found in mallee areas. **Unlikely to occur**.
Fragrant Saltbush	*Rhagodia parabolica*		VU	Steep rocky and broad ridges between Sunbury and Geelong, but can be locally common (Walsh 1996).	1	29/05/2012	**Recorded** within study area during targeted survey.
Spiny Goosefoot	*Rhagodia ulicina*		EN	Localized in the northern part of the Sunset Country (north and north-west of Hattah), but locally common. Occurring on red loamy soils, usually containing limestone, in dune swales and on flat ground (Walsh 1996).	6	19/11/2003	Records exist within close proximity to the study area. **Likely to occur, but not recorded in targeted survey.**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Common White Sunray	*Rhodanthe floribunda*		EN	Known in Victoria only from Hattah and Kerang areas, with an additional pre-1900 specimen labelled 'Upper Yarra' being of dubious origin.	5	3/01/2001	Historic records within 10km from over 20 years ago, near the Murray River in Winlaton. **Potential to occur but** not recorded in targeted survey
Dwarf Bitter-cress	*Rorippa eustylis*		EN	Restricted to scattered swamps and flood-plains near the Murray River (Entwisle 1996).	1	10/07/2011	One record within 10km of the study area. No suitable habitat.. **Unlikely to occur**.
Glistening Dock	*Rumex crystallinus s.s.*		EN	Rare in Victoria, occurring only in the far north-west of the state on the Murray River floodplain, recorded only from the margins and drying beds of Lakes Wallawalla, Hattah and Lalbert.	3	27/09/2017	Records exist at Lalbert Lake, though the study area does not support suitable floodplain or drying lake bed habitats. **Unlikely to occur**.
Turnip Copperburr	*Sclerolaena napiformis*	EN	CR	Grows in native grasslands and grassy woodlands on relatively fertile clay-loam soils. In Victoria the species grows on red clay to red loam soils, and associated species include Common Wallaby-grass, Rough Spear-Grass, Spurred Spear-Grass, Common Everlasting and Buloke. Anecdotal evidence suggests that Turnip Copperburr can tolerate waterlogging in the spring, and all remaining populations are located in close vicinity to a water course or swamp.	None	N/A	No records exist within 50km of the study area. Study area is outside species range. **Unlikely to occur**.
Salt Copperburr	*Sclerolaena ventricosa*		EN	Known in Victoria from a few small populations on treeless, saline, alluvial flats at Neds Corner in the far north-west and in black box-chenopod woodland near Kerang.	1	10/07/2011	Other chenopod species (including *Sclerolaena muricata*) occurred commonly in the understorey through much of the native vegetation recorded. **Potential to occur**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
							in areas of Black Box woodland, **but not recorded in targeted survey.**
Stiff Groundsel	*Senecio behrianus*	EN	CR	Heavy, winter wet and clayey soils (Walsh 1999).	None	N/A	No records exist within 10km of the study area. No suitable habitat in the study area. **Unlikely to occur**.
Floodplain Fireweed	*Senecio campylocarpus*		EN	In Victoria mostly throughout central Victoria and in the north-east in loam to clay soils in forest and woodland, usually in seasonally inundated areas (Ohlsen 2015, updated by Stajsic 2018).	1	6/02/2012	One record within 10km of the study area. No suitable habitat - areas prone to inundation. **Unlikely to occur**.
Branching Groundsel	*Senecio cunninghamii* var. *cunninghamii*		EN	Heavy, sometimes winter-wet soils, dry rocky soils, common on embankments and escarpments.	1	1/01/1991	No recent records within 10km of the study area and study area does not support typical habitat. **Unlikely to occur**.
Riverina Fireweed	*Senecio longicollaris*		EN	Grows on floodplains and by water in forest, woodland and shrubland mainly in the north of the state with scattered occurrences in the south at Portland, Beaumaris and Sandringham.	1	15/12/2011	No suitable habitat in the study area. Single record within 10km located at Koorangie Wildlife Reserve. **Unlikely to occur**.
Riverina Groundsel	*Senecio productus subsp. productus*		EN	Rare along the edges of watercourses in clay soils and in chenopod shrubland, often with Senecio glossanthus, in areas near the Murray River upstream to near Kerang.	1	11/07/2011	No suitable habitat in the study area. Single record within 10km located at Koorangie Wildlife Reserve. **Unlikely to occur**.
Twiggy Sida	*Sida intricata*		EN	Moderately common in open areas of the far north and north-west, usually on heavier loam and clay loam soils not far from the Murray River (Barker 1996).	7	18/09/2018	No suitable habitat in the study area. Records within 10km located around Kangaroo Lake. Other records in the wider region are in close proximity to

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
							large lakes and the Murray River. **Unlikely to occur.**
Yakka Grass	*Sporobolus caroli*		EN	Seasonally inundated areas along the Murray River floodplain.	11	7/11/2017	One record within 10km of the study area. By and large the study area does not support areas prone to inundation. **Unlikely to occur.**
Slender Darling-pea	*Swainsona murrayana*	VU	EN	The Slender Darling-pea often grows in heavy soils, especially depressions, and is also found on grey and red to brown clay and clay-loam soils in *Atriplex vesicaria* (Bladder Saltbush) herbland, *Eucalyptus largiflorens* (Black Box) woodland and grassland communities and is frequently associated with Maireana species. In Victoria, the species is found in seasonally inundated flats around lakes (DAWE 2020).	7	10/09/2020	No lakes or floodplain vegetation occur in the study area. Only small remnants of Black Box dominant woodland occur. **Unlikely to occur**
Yellow Swainson-pea	*Swainsona pyrophila*	VU		Mallee shrublands on calcareous sands or loams. Prefers heavy red sands and clay loams between sand rises. Commonly found with Red Mallee, Dumosa Mallee, Yorrell, Oil Mallee and Grey Mallee. The maintenance of populations is dependant on fire (Earl et al. 2003).	None	N/A	No records within 10km of the study area and study area does not support typical habitat. **Unlikely to occur.**
Downy Swainson-pea	*Swainsona swainsonioides*		EN	Heavier clay soils in woodland (Jeanes 1996).	6	20/09/2019	Limited woodland habitat, though several records in the search region. **Potential to occur** in areas of Black Box woodland, **but not recorded in targeted survey.**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Blackseed Glasswort	*Tecticornia pergranulata* subsp. *divaricata*		EN	Margins of salt lakes and marshes (Walsh 1996).	4	31/05/2012	The study area does not support suitable habitat for this species. **Unlikely to occur.**
Round Templetonia	*Templetonia egena*		EN	Favours deep sandy soils in mallee and woodland communities.	6	10/07/2011	Records within close proximity to the study area and study area supports suitable habitat. **Likely to occur, but not recorded in targeted survey.**
Small Burr-grass	*Tragus australianus*		EN	Rare in Victoria and generally confined to sandy tracts of the far north-west (Mildura area, Murrayville, Swan Hill) with disjunct occurrences further east (e.g. Pyramid Hill and Nathalia areas).	2	27/01/2007	No recent records within close proximity to the study area. **Unlikely to occur.**
Six-point Arrowgrass	*Triglochin hexagona*		EN	Occurs in slightly saline areas, in sandy to clayey soils (Conn & Aston 1994). Known to prefer permanently aquatic habitats.	2	6/11/1982	No suitable habitat in the study area. Lack of recent records. Records within 10km from over 40 years ago and located near large lakes at Koorangie Wildlife Reserve. **Unlikely to occur.**
Sweet Fenugreek	*Trigonella suavissima*		EN	Grows along seasonal watercourses, floodplains and depressions (Conn & Aston 1994).	6	28/09/2017	Records within 10km of the study area, at Lake Lalbert, though the study area does not support areas prone to inundation. **Unlikely to occur.**
Club-hair New Holland Daisy	*Vittadinia condyloides*		EN	Grassland and grassy woodlands on better mallee soils and loams.	1	24/10/1995	One record within 10km of the study area and study area supports suitable habitat. **Potential to occur, but not recorded in targeted survey.**
Fuzzy New Holland Daisy	*Vittadinia cuneata var. morrisii*		EN	Only known from a few small populations.	1	1/10/1998	Little known about habitat. However no recent records

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
							within close proximity to the study area. Single historic record within 10km from over 20 years ago and located east of the Murray Valley Highway. **Unlikely to occur.**
Winged New Holland Daisy	*Vittadinia pterochaeta*		EN	Very rare in Victoria, known by only a few collections in the Quambatook-Leaghur region, near Warracknabeal and Walpolla Island west of Mildura. Apparently confined to relatively fertile clay-loam soils (Walsh 1996).	7	29/05/2012	Two records within close proximity to the study area and study area supports at least some suitable habitat. **Potential to occur, but not recorded in targeted survey.**

Notes: EPBC = threatened species status under EPBC Act (CR = critically endangered; EN = endangered; VU = vulnerable); **FFG** = threatened species status under the FFG Act (CR = critically endangered; EN = endangered; VU = vulnerable).

7.3. Protected flora species

Twenty-three FFG Act-protected flora species were recorded during the field assessment. Twenty-one are considered likely to be impacted by the proposed development, four of which are also listed as threatened under the FFG Act:

- Annual New Holland Daisy – *Vittadinia cervicularis*
- Berrigan – *Eremophila longifolia*
- Bush Minuria – *Minuria cunninghamii*
- Comb Grevillea – *Grevillea huegelii*
- Common Emu-bush – *Eremophila glabra* subsp. *glabra*
- Common Nardoo – *Marsilea drummondii*
- Dwarf Myall – *Acacia ancistrophylla* var. *lissophylla*
- Fuzzweed – *Vittadinia cuneata* var *cuneata*
- Eumong – *Acacia stenophylla*
- Gold-dust Wattle – *Acacia acinacea*
- Grey Mulga – *Acacia brachybotrya*
- Hakea Wattle – *Acacia hakeoides*
- Hall's Wattle – *Acacia halliana*
- Hoary Scurf-pea – *Cullen cinereum*
- Lemon Beauty-heads – *Calocephalus citreus*
- Mallee Wattle – *Acacia montana*
- Nealie – *Acacia loderi*
- Pimelea Daisy-bush – *Olearia pimeleoides*
- Umbrella Wattle – *Acacia oswaldii*
- Woolly Yellow-heads – *Trichanthodium skirrophorum*
- Yarran – *Acacia melvillei*

The following two species were not recorded within any area where impacts to native vegetation are proposed and are therefore considered unlikely to be impacted by the proposed development:

- Buloke – *Allocasuarina luehmannii*
- Three-nerve Wattle – *Acacia trineura*

7.4. Threatened ecological communities

7.4.1. EPBC Act-listed threatened ecological communities

The EPBC Protected Matters Search Tool (DAWE 2022) indicated that six ecological communities listed under the EPBC Act had the potential to occur in the study area. The presence or absence of these communities in the study area has been determined in Table 8 based on analysis of the quality of native

vegetation recorded in the study area against the relevant Commonwealth guidance documents available for each community.

Table 8: EPBC Act listed ecological communities and likelihood of occurrence in the study area

Ecological community	EPBC	Occurrence in the study area
Plains Mallee Box Woodland of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	CR	Patches of native vegetation occurring within the proposed layout of the Goschen Rare Earths and Mineral Sands Project were assessed against the key diagnostic characteristics and condition indicators outlined in the Conservation Advice for the community (DAWE 2021). Where information on patch quality was not available, a precautionary approach was taken, and patches were considered to be of sufficient quality for listing as condition Class A (Table 3, DAWE 2021) where Black Mallee Box, Bull Mallee, Red Mallee or Dumosa Mallee were the dominant species of eucalypts and the minimum patch size requirement of 0.5ha in conjunction with other nearby patches was met. For the purposes of this assessment, this precautionary approach was also applied to all parts of the study area occurring outside the proposed layout of the Goschen Rare Earths and Mineral Sands Project. Two of the three listed variants were present on the site; Variant 1 – *Eucalyptus behriana* as the structural dominant and Variant 3 – *Eucalyptus dumosa* as the structural dominant. This community was **found to occur extensively throughout the study area**, comprising most recorded patches of Woorinen Mallee (EVC 824) and Ridged Plains Mallee (EVC 96).
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	EN	For the purpose of this investigation, this community was classified as present where Buloke was noted to be the dominant or co-dominant canopy tree species in the patch, as defined in the Recovery Plan for the community (DSE 2011), and the patch was at least 0.1 hectares in area. On this basis the following habitat zones were classified as the listed community: AES, CCE, CDM, EES, FCS, FCY, IDE. **Community recorded in the study area in the above listed habitat zones.**
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	EN	Grey Box (the dominant canopy species in this community) was not recorded in the study area. **Community does not occur in the study area.**

Ecological community	EPBC	Occurrence in the study area
Natural Grasslands of the Murray Valley Plains	CR	While some small treeless areas of native vegetation were recorded in roadsides in the study area, these areas were considered to have been derived from the treed EVCs recorded broadly throughout the study area, namely the mallee EVCs and Black Box Woodland. Treeless patches were recorded between areas of treed vegetation and lacked any noticeable change in the understorey flora from the adjoining treed areas. Further to this, treeless patches did not meet the native flora species diversity requirements as detailed in the listing advice for the Natural Grasslands of the Murray Valley Plains community (DSEWPC 2012). For the above reasons, treeless areas were not considered to constitute the native grassland community. **Community not considered to occur in the study area.**
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	CR	No native wetlands were recorded in the study area. Remnant native vegetation was associated with mallee woodland and chenopod-dominated EVCs, which are contraindicative of this listed community. Patches of native vegetation did not support the characteristic biota of this listed community as a dominant component (e.g. native wetland graminoids), as per the listing advice for Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (TSSC 2012). Based on a desktop review of aerial photography and knowledge of the study area and surrounding landscape, no native wetlands are considered to exist within 1-kilometre of the study area boundary. **Community does not occur in the study area.**
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CR	White Box, Yellow Box and Blakely's Red Gum were not recorded in the study area and are not associated with the EVCs identified or modelled to occur in the study area. Furthermore, associated and co-dominant tree species were also absent from the study area. Given that these species are the characteristic canopy species of this community, their absence indicates that this community is unlikely to have occurred in the study area or its immediate surrounds. **Community does not occur in the study area.**

Notes: EPBC = status under EPBC Act: CR = critically endangered; EN = endangered.

Based on the detail provided in Table 8, the following two EPBC Act-listed threatened ecological communities were found to occur in the study area:

- *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions*.

  This community was classified as present where Buloke was noted to be the dominant or co-dominant canopy tree species in the patch, as defined in the Recovery Plan for the community (DSE 2011), and the patch was at least 0.1 hectares in area. It was determined to occur in habitat zones AES, CCE, CDM, EES, FCS, FCY and IDE.

- *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions.*

  This community was classified as present where patches were considered to be of sufficient quality for listing and where Black Mallee Box, Bull Mallee, Red Mallee or Dumosa Mallee were the dominant species of Eucalyptus and the minimum patch size requirement of 0.5ha in conjunction with other nearby patches was met, as outlined in the listing advice (DAWE 2021). It was determined to occur extensively throughout the study area.

  It should be noted that this community was listed as a threatened community on 10 June 2021, and as such, is covered under the "controlled action" EPBC decision (on 19/12/2018). A variation to the original proposed action was accepted on 30th January 2023, covering the current study area. Therefore significant impacts to this community cannot be assessed for that referral.

  However, as a 'nuclear action', the scope of commonwealth assessment of the project extends to all ecosystems and their constituent parts, and therefore the community is relevant to this consideration where components of the action have triggered a 'nuclear action' under Section 22 of the EPBC Act.

7.4.2. FFG Act-listed threatened ecological communities

Based on a review of FFG Act listed community descriptions (SAC 2015), one FFG Act-listed threatened ecological community was considered to occur in the study area:

- *Semi-arid Shrubby Pine-Buloke Woodland Community*.

  This community is distinguished by a canopy of Slender Cypress-pine and Buloke, over a characteristic shrub layer of Weeping Pittosporum, Cattlebush and various chenopods and herbs. This community is associated with the EPBC Act-listed community *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions* that was recorded in habitat zones AES, CCE, CDM, EES, FCS, FCY and IDE.

7.5. Groundwater dependent ecosystems and surface runoff

Scattered potential GDEs are present throughout the project area and along the pipeline (Bureau of Meteorology Groundwater Dependent Ecosystems (GDE) Atlas, Figure 8), however, none of these are considered high potential GDE's. Due to the depth of groundwater (average 31 metres below ground level) and high salinity, it is unlikely that groundwater contributes ecologically to wetlands, streams or lakes within 10km of the mine sites. Furthermore, there will be no direct impacts to groundwater as; 1) the groundwater level is deeper than the proposed pit depths; and, 2) there will be no use of groundwater by the project (Mackenzie, 2022). There may be small indirect impacts to recharge and discharge mechanisms due to mounding associated with backfill of the mine pits at the cessation of mining, but the likelihood of any impacts on GDE's is considered low (CDM Smith 2022).

Kangaroo Lake is not mapped as a GDE and therefore not expected to be impacted by changes in groundwater. Water use for the mine will be drawn from Kangaroo Lake. This is a large permanent lake utilised by the Victorian Mid Murray Storages (VMMS) project and is artificially regulated to supply Torrumbarry Irrigation System and therefore changes in water level and water conditions are unlikely. The lake is a part of the Kerang Wetlands Ramsar site, and any activity or changes in hydrology must operate within the set boundaries to avoid impact on RAMSAR values at the Lake.

Detailed modelling of changes in surface level water of the project area and surrounds have been undertaken (Water Technology 2022). The main potential impact to flora identified is a decrease in surface water runoff to two patches of native vegetation to the west of Area 1, caused by the exclusion of surface water runoff from Area 1 (Figure 11). The reduction to patches of native vegetation is

approximately 12cm in a one in one-hundred year event (1% AEP flood event) and is anticipated to be temporary during the mine life time. There are no anticipated runoff changes associated with Area 3.

While access to these patches of vegetation was not possible, aerial photography (Figure 9 and Figure 10) indicates the vegetation consists of trees, with minimal understorey. As the patches do not appear to be fenced from surrounding farmland, it is assumed the condition of these patches would be moderate to low. NatureKit has modelled the EVC of the northern block as Ridged Plains Mallee, and the southern block as including Ridged Plains Mallee, Woorinen Mallee and Plains Savannah. These EVC's are not anticipated to be sensitive to the minor reduction in surface water. They are distributed widely in the region, and many of the associated species occur further north in lower rainfall areas and are relatively drought tolerant.

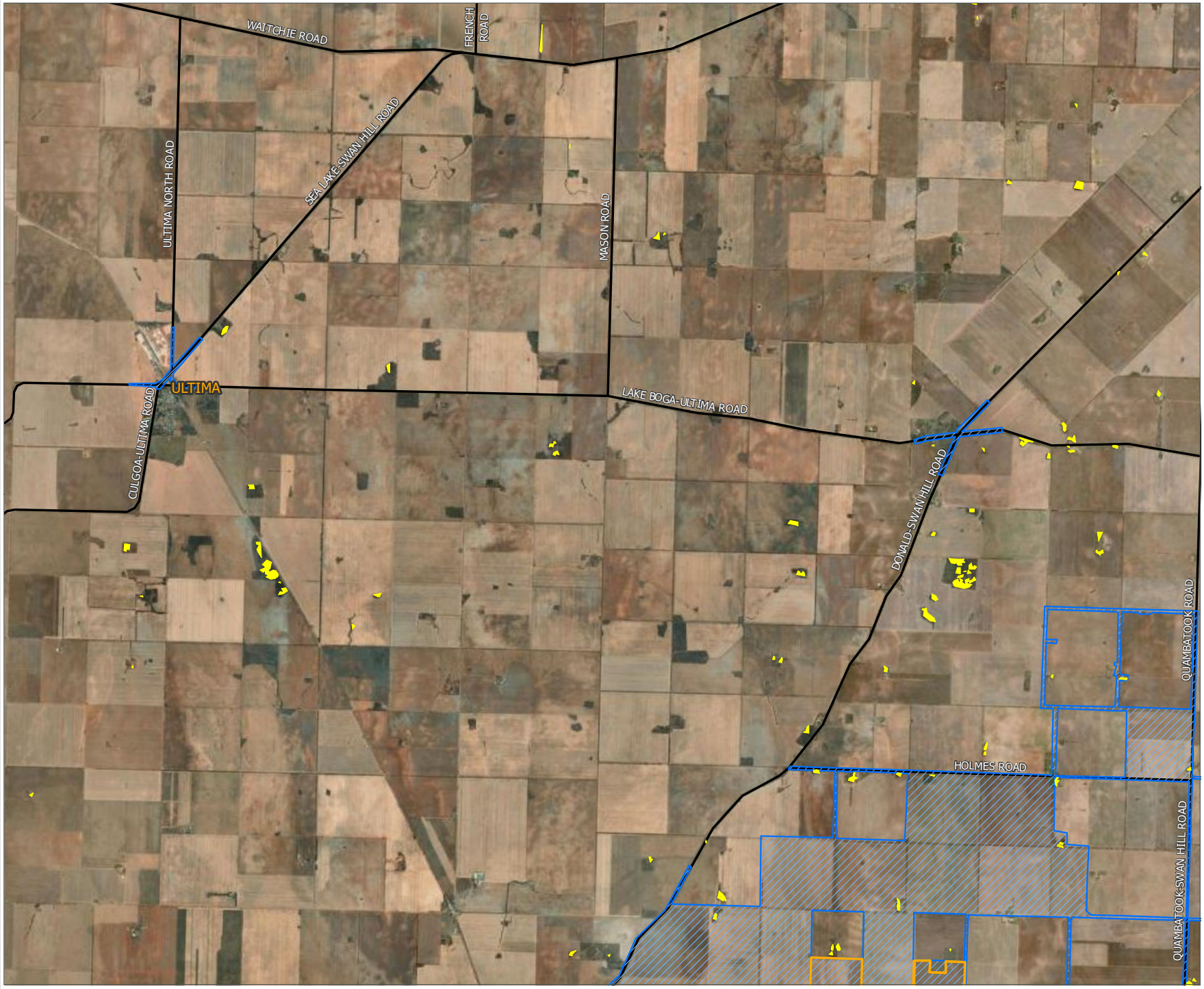
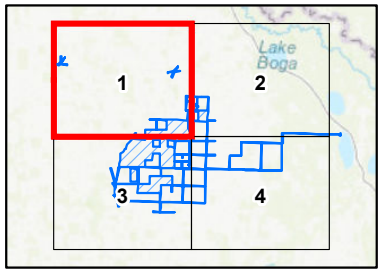


Figure 8-**1:** Ground water dependent ecosystems

Project: Goschen Mineral Sands Project
Client: VHM Exploration Pty Ltd
Date: 17/02/2023

Study area
Mine Site
Ground water dependent ecosystems



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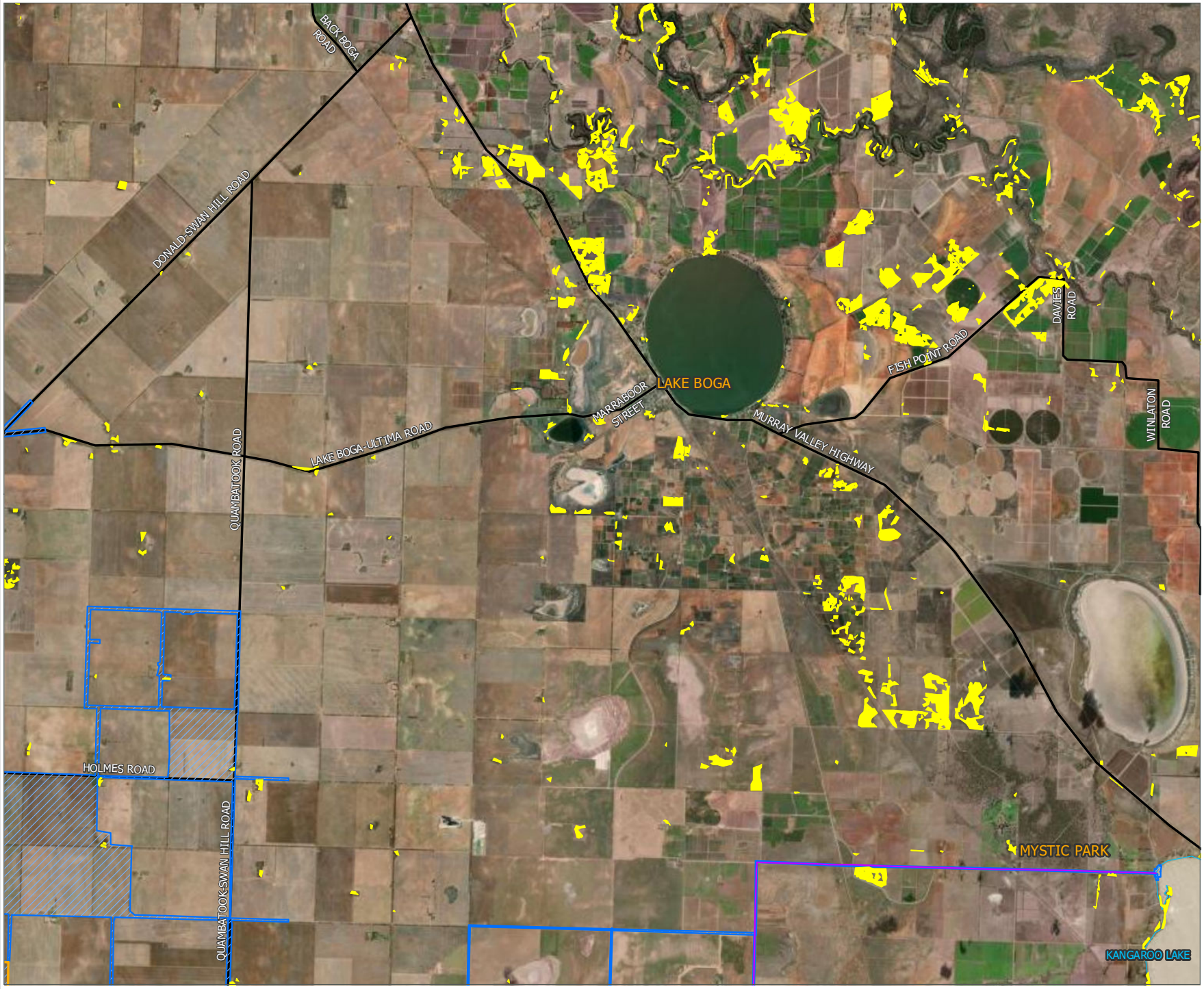
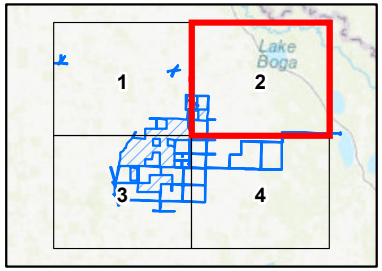


Figure 8-2: Ground water dependent ecosystems

Project: Goschen Mineral Sands Project
Client: VHM Exploration Pty Ltd
Date: 17/02/2023

- Study area
- Pipeline route (Option A3)
- Mine Site
- Ground water dependent ecosystems



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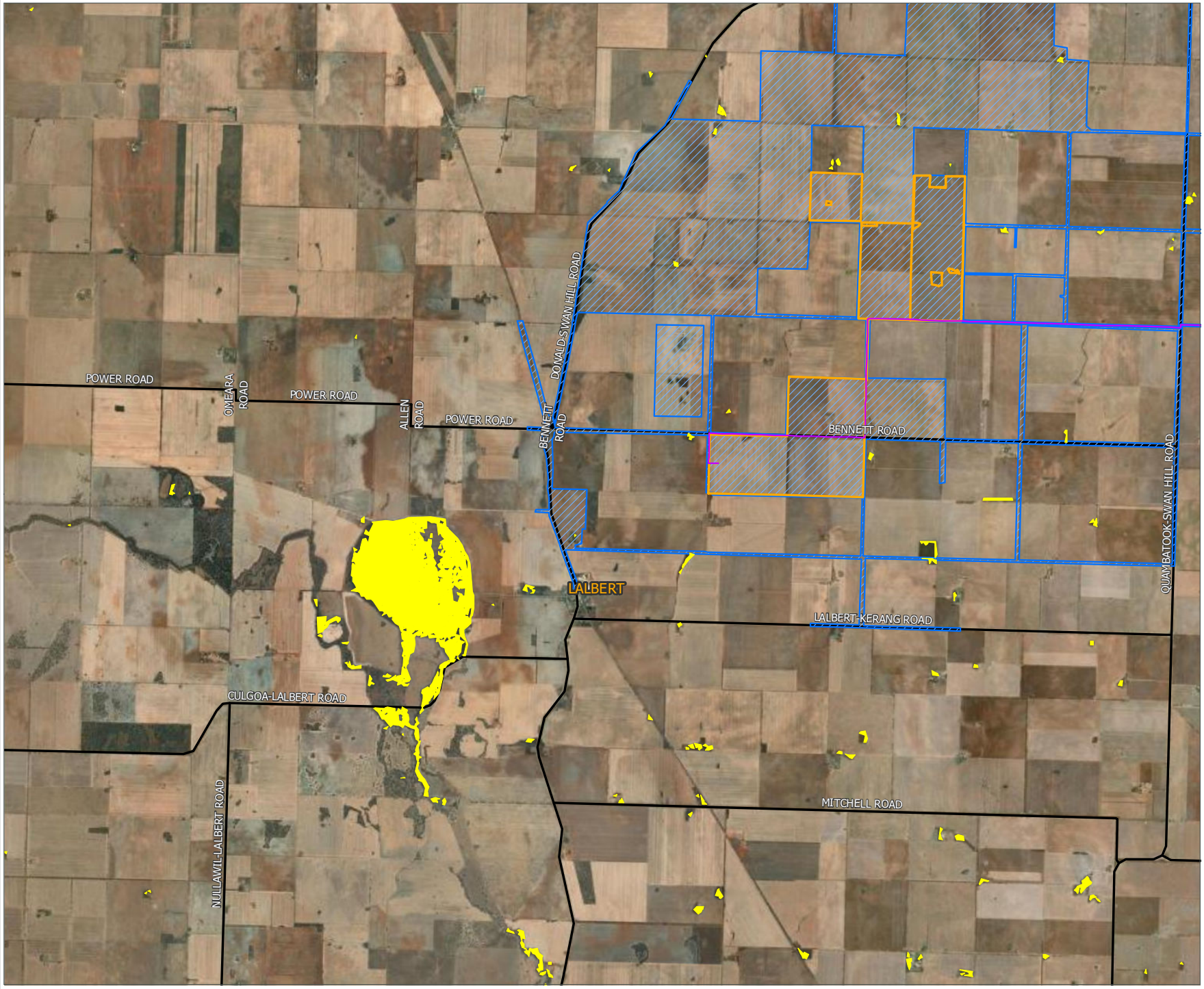
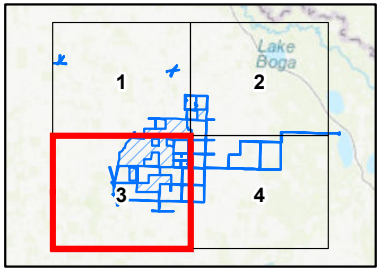


Figure 8-3: Ground water dependent ecosystems

Project: Goschen Mineral Sands Project
Client: VHM Exploration Pty Ltd
Date: 17/02/2023

- Study area
- Pipeline route (Option A3)
- Mine Site
- Ground water dependent ecosystems



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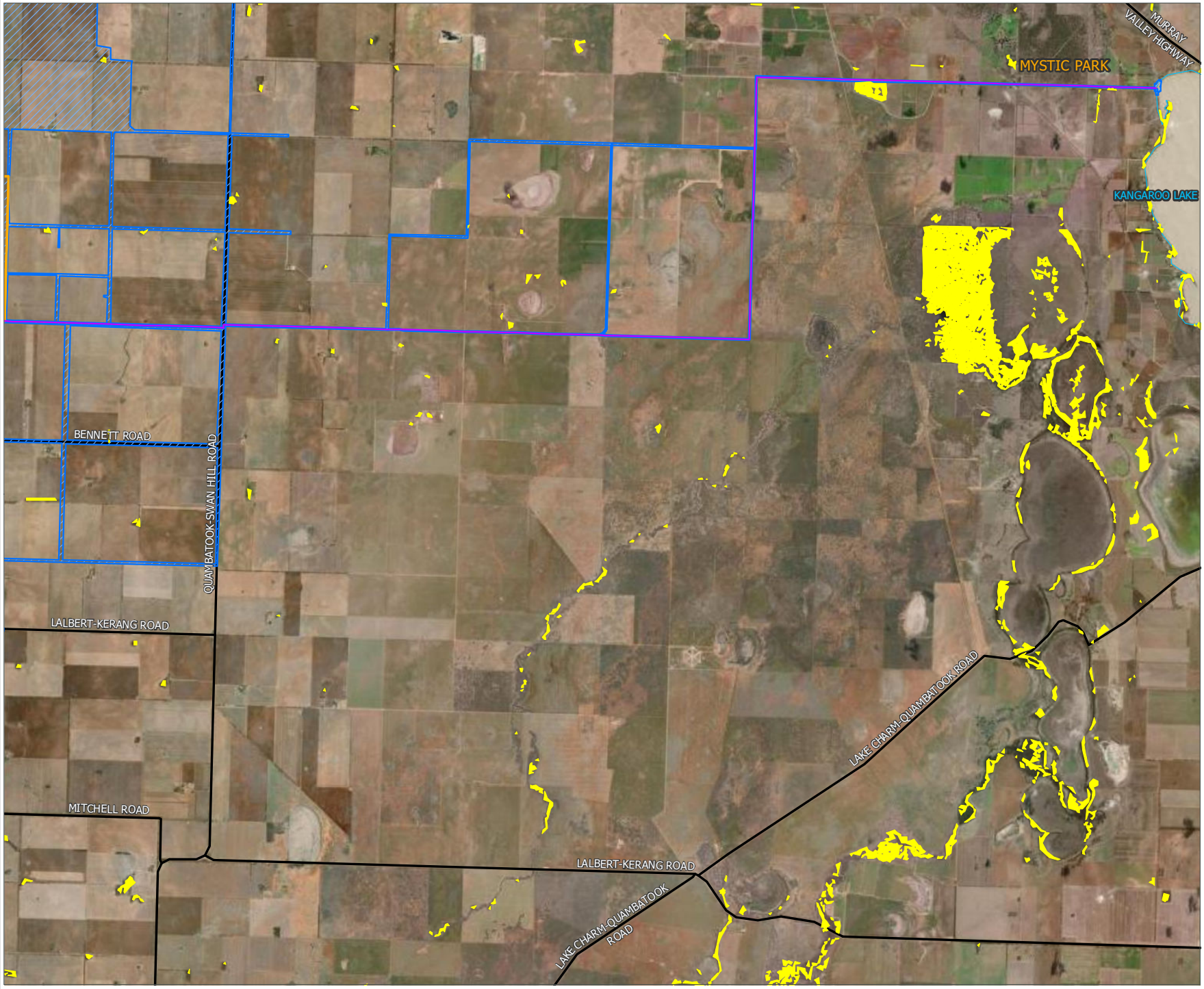

Figure 8-4: Ground water dependent ecosystems

Project: Goschen Mineral Sands Project
Client: VHM Exploration Pty Ltd
Date: 17/02/2023

- Study area
- Pipeline route (Option A3)
- Mine Site
- Ground water dependent ecosystems

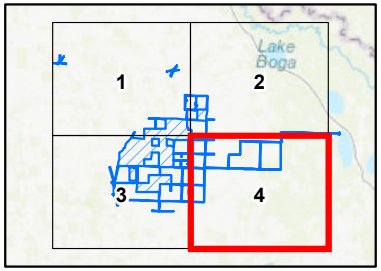

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Figure 9. Google Earth Pro image showing patch of native vegetation to west of mining Area1, in region of decreased surface water

Figure 10. Google Earth Pro image showing southern patch of native vegetation to west of mining Area 1, in region of decreased surface water

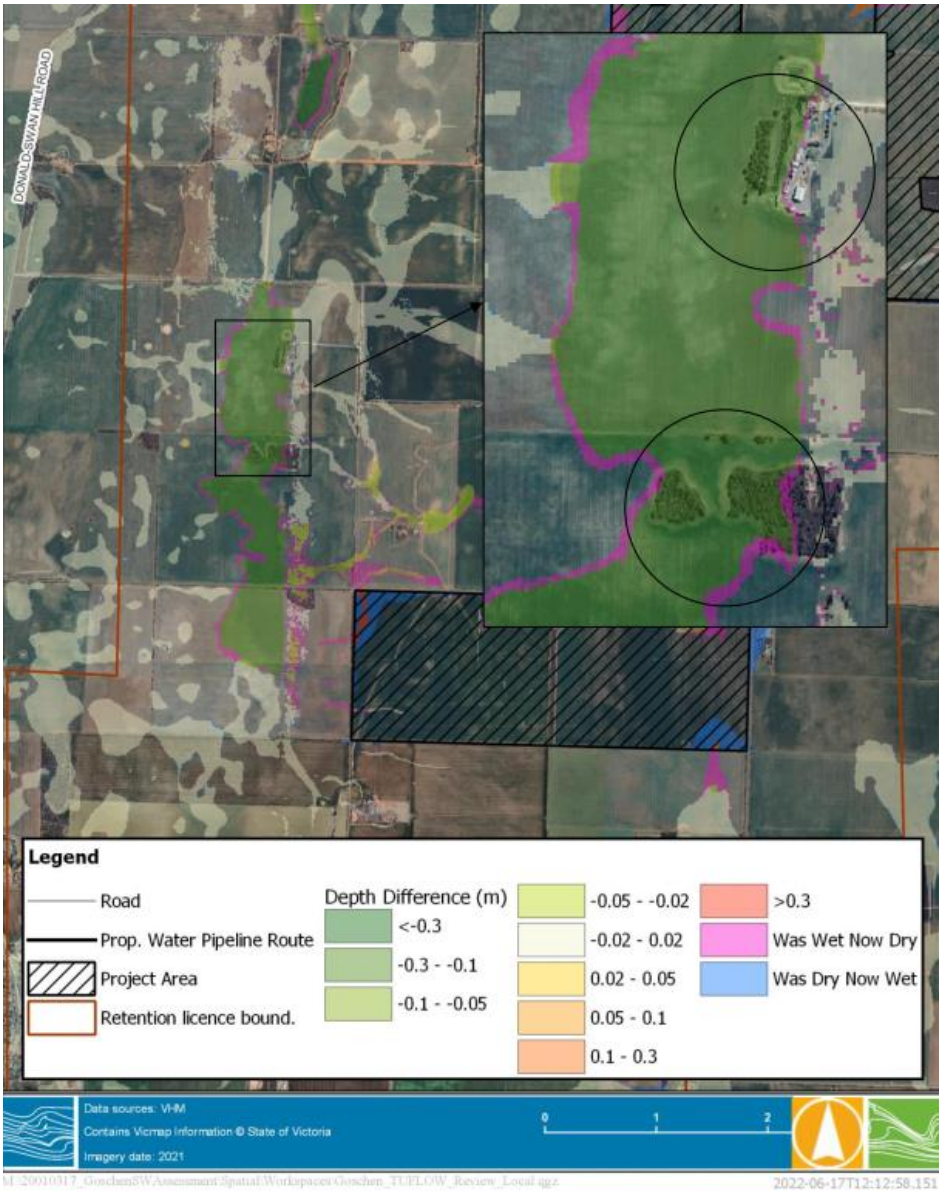

Figure 11. Change in 1% AEP water levels due to implementation of bunds – west of Area 1 (Water Technology 2022)

7.6. Declared pest plants, animals and pathogens

A total of 34 introduced flora species were recorded in the study area during the field assessment. The highest proportion of weed cover was from annual grasses. The most common broadleaf weed recorded was Common Heliotrope, a common farm weed that was present throughout most of the study area.

Two woody weeds were recorded in the study area, namely African Box-thorn (sparse though recorded throughout the study area) and Prickly Pear (sparse and largely in disturbed sites). Introduced (planted) trees included Pepper Tree and Sugar Gum.

Eight weed species listed under the CaLP Act were recorded in the study area including five species listed as 'Regionally Controlled' (African Box-thorn, Field Dodder, Horehound, Paterson's Curse and Sticky Ground-cherry) and three species listed as 'Restricted' (Bridal Creeper, Onion Weed and Soursob). Of these eight CaLP Act listed species, most were recorded in low numbers, and never formed a dense infestation.

8. Risk assessment

A risk assessment was undertaken of the project addressing the requirements of Appendix A of the *Preparation of Work Plans and Work Plan Variations - Guideline for mining projects. Version 1.3, December 2020.* Specifically, Appendix A outlines the risk assessment approach, including likelihood and consequence criteria relevant to impacts on flora, fauna and native vegetation, as well as a standardised risk matrix.

The identified risks and associated residual risk ratings are listed in Table 9. The likelihood and consequence ratings determined during the risk assessment process and the mitigation measures to be achieved are presented in Appendix 1. It is noted that as removal of native vegetation, including vegetation that has the potential to support listed flora species and vegetation that represents an EPBC Act threatened community cannot be completely avoided, the risk ratings for most impacts don't change substantially.

It is noteworthy that the current mine and pipeline design has avoided and minimised impacts on native vegetation, resulting in a reduction from over 70 hectares to under 15 hectares in the extent of affected native vegetation. The avoidance and minimisation measures that have occurred are described in detail in Section 9.4 of this report. As the current residual amount of native vegetation impacted is above 10 hectares, notwithstanding significant avoidance and minimisation of impacts, the risk rating remains very high in accordance with the consequence ratings and risk matrix in the work plan guidelines.

Detailed design and targeted construction environmental management measures, including advice from an arborist in relation to the potential to tree damage from works near TPZ's may significantly reduce the extent of native vegetation removal for the project. The current very high risk rating for this and related impacts on vegetation and flora species requires high priority to be given to further avoidance and minimisation measures through design and construction environmental management.

Table 9: Native vegetation and flora risks

Risk ID	Potential threat and effects on the environment	Residual risk rating
Construction Phase		
R01	Direct impacts to native vegetation as a result of clearing (for the water supply pipeline, and mine sites).	Very High
R02	Direct impacts to listed threatened flora species known or likely to occur in the study area as a result of clearing (for the water supply pipeline, and mine sites).	Very High
R03	Direct impacts to listed threatened ecological communities known to occur in the study area as a result of clearing (for the water supply pipeline, and mine sites).	Very High
Operations Phase		
R04	Indirect impacts to flora and native vegetation due to introduction or spread of weeds or pathogens, fragmentation, reduced habitat connectivity, edge effects, dust deposition, erosion, or contamination by saline water, hazardous chemicals or hydrocarbons.	Moderate
R05	Potential for indirect significant effects on biodiversity values as a result of off-site activities including transportation and storage of heavy mineral concentrate.	Low

9. Construction impact assessment

This section discusses the potential impacts of the project as a result of construction activities and the associated mitigation measures that aim to reduce impacts to as low a level as possible. Mitigation measures referred to are summarised in Section 10.

9.1. Direct impacts to native vegetation

Direct impacts to native vegetation will occur through the construction of:

- mine sites 1 and 3, and associated infrastructure;
- water supply pipeline installation of the pump adjacent to Kangaroo Lake; and
- intersection widening along the transport route.

The current development plan will result in the loss of a total extent of 14.36 hectares of native vegetation, as documented in the Native Vegetation Removal Reports (NVR) (Appendix 3).

This includes 568 large trees and 14 small scattered trees (Table 10, Attachment 2). The breakdown of vegetation removal in each project area is outlined in Table 10. This extent includes all patches of native vegetation to be removed as well as converted areas for all scattered trees to be removed (10-metre-radius circle area for small trees; 15-metre-radius circle area for large trees).

The largest impact is along the pipeline, with 4.695 ha to be impacted. The majority of this impact (4.289 ha) is due to 61 trees that will be retained but may require pruning for machinery access or have impacts to their Tree Protection Zone (TPZ) (each with an impact area of 15m radius (Appendix 3.B.2, DELWP 2018). Impacts to the TPZ are defined as "12 x the diameter at breast height at 1.4m above the ground and a tree or trees will be deemed lost if the encroachment into the Tree Protection Zone / Structural Root Zone is s greater than 10%" (DELWP 2017). Despite this, it is anticipated all trees will be retained in-situ, and the deemed "loss" of these trees represents a worst-case scenario.

The remaining 0.406ha of removal along the pipeline is due to impacts associated with the pumping station at Kangaroo Lake and small incursions into the road reserve where the width of the existing road does not accommodate the 6m wide pipeline construction footprint.

Table 10. Native vegetation removal in patches extent in mine site areas, pipeline and intersections (note this excludes the area of removal associated with scattered trees).

Project area	Native vegetation in patches (ha)	Number of patches	Trees in patches	Large scattered trees	Small scattered trees
Mine site 1	4.095	13	253	6	5
Mine site 3	2.699	17	187	31	9
Pipeline	4.695	49	61 (as noted in arborists report)	0	0
Intersections	0.274	28	30	0	0

The native vegetation to be removed for the mine, pipeline and intersections is in an area mapped as an endangered Ecological Vegetation Class (as per the state-wide EVC map). The area affected by the water supply pipeline includes a wetland designated under the Convention on Wetlands of International Importance (the Ramsar Convention) (i.e. the Kerang Lakes Ramsar Site); and a wetland listed in the Directory of Important Wetlands of Australia (Kangaroo Lake).

Small drilling and earth moving machinery will be used to achieve the narrowest possible pipeline trench at a maximum width of 700mm, and impacts will be confined to a 6m wide construction corridor.

This predicted extent of vegetation removal is the worst case scenario based on removal of all native vegetation within the Mine Site Areas 1 and 3 stockpile, pit shell and connecting locations within these areas and assuming removal of any native vegetation intersecting the 6m corridor for the construction of the water supply pipeline. While 'The Guidelines' specifies an area of radius of 15m around each large tree is considered removed, this is an over-estimate of the area of native vegetation associated with these smaller mallee trees.

It is anticipated that this extent will be reduced by undertaking further measures to avoid and minimise. For example, engaging an arborist to assist with micro-siting of the pipeline and identify measures to avoid adverse impacts to structural root zones and safeguard trees may reduce the total loss of native vegetation and the number of trees deemed to be removed. In addition, provision of no-go fencing may enable protection of some understorey vegetation within the 6m construction corridor, particularly in areas where native vegetation occurs only on one side of the road reserve.

Measures that have been undertaken to avoid impacts are outlined in section 9.4.

9.2. Direct impacts to listed threatened flora species

Refer to Section 9.1 above for a description of impact areas for the pipeline, mine site and intersection components of the project.

No EPBC Act-listed threatened flora species were recorded in the study area during the field assessment, and none are considered to have the potential to occur there based on habitat suitability and a paucity of regional records. Therefore, no EPBC Act-listed flora species are expected to be impacted by the development.

The targeted survey undertaken in December 2022 determined that the following FFG-listed threatened species occur within areas of native vegetation that will be impacted by the proposal:

- Bush Minuria – *Minuria cunninghamii* (18 individuals impacted)
- Dwarf Myall – *Acacia ancistrophylla* var. *lissophylla* (one individual impacted)
- Fragrant Saltbush – *Rhagodia parabolica* (11 individuals impacted)
- Frosted Goosefoot – *Chenopodium desertorum subsp. desertorum* (54 individuals impacted)
- Umbrella Wattle – *Acacia oswaldii* (353 individuals impacted)
- Yarran – *Acacia melvillei* (17 individuals impacted)

The majority of these species' records occurred on public land within the road reserves of Bennett Road and Thompson road.

9.2.1. Significance of impacts to FFG Act listed species

FFG Action Statements have not been prepared for any of the listed species identified within the study area. The majority of FFG listed species identified in the study area consist of semi-arid to arid zone species that are more widely distributed in Australia, but are at the southern most distribution of their range in north west Victoria. As native vegetation in the study area has been historically cleared from cropping, most remnant vegetation persists in roadside reserves, many of which are relatively high quality. Impacts to roadsides should be avoided where possble, and minesite rehabilitation and revegetation should include these species, within the appropriate EVC's, even if these species were not previously recorded at the site. Impacts on roadsides are restricted to a narrow strip (a few metres) on the road

verge adjoining the road surface during the pipeline works. As this will affect only a small proportion of the width of the road reserve, it is not anticipated that habitat fragmentation will occur. Impacts are not anticipated to adversely affect habitat critical to the survival of these species, or lead to a long-term decrease in the size of a population.

Where larger numbers of individuals are impacted, further discussion is outlined below:

Umbrella Wattle (*Acacia oswaldii*) is widely distributed across semi-arid to arid Australia, with the most southerly distribution in Victoria. It is readily propagated, although slow growing and particularly vulnerable to grazing whilst seedlings are establishing (Auld 1990). While critically endangered in Victoria, Umbrella Wattle was locally common and observed recruiting across many roadsides in the study area. Impacts to this species in this location are not likely to impact the persistence of the local population. Umbrella Wattle was locally abundant, with similar numbers of individuals across most roadsides with high quality remnant mallee vegetation in the area. Impacts under the current proposal will affect less than 1% of the local population. However, it is recommended seed and/or cuttings be taken prior to works commencing and revegetation of this species undertaken in all areas of suitable mallee EVC's following impacts.

Frosted Goosefoot (*Chenopodium desertorum* subsp. *desertorum)* is one of five subspecies, four of which are found in Victoria. North west Victoria represents the most southerly distribution of this subspecies. Not much is published about this subspecies, however, other subspecies are relatively grazing tolerant and occur commonly in semi-arid to arid regions of Australia. *Chenopodium desertorum* was observed to be locally common, although not distinguished to species level outside of the targeted surveys due to difficulties in separating subspecies without flowering parts and a hand lens. It is unlikely that impacts would have a significant impact on the sub-species locally, as the species was observed across the study area, it is expected that this sub-species would equally persist locally.

Bush Minuria – *Minuria cunninghamii* is widely distributed in semi-arid to arid regions of Australia, including WA. It was observed only at a couple of sites in the study area. It is recommended that impacts are avoided in these areas where possible. In addition, this species should be included in revegetation in relevant EVCs in the minesite rehabilitation phase."

Yarran – *Acacia melvillei* is distributed across semi-arid eastern Australia, from north west Victoria to southern Queensland. It is sensitive to grazing as a seedling (Batty & Parsons 1992), and this possibly explains why it now persists in roadside vegetation. It is locally common in woodland near the Murray River in north west Victoria (VicFlora 2023). It is not anticipated that impact of these individuals will have a significant impact on Yarran in north west Victoria, however, it is recommended that impacts are avoided in these areas where possible. This species should be included in revegetation in relevant EVCs in the minesite rehabilitation phase.

9.3. Direct impacts to listed threatened ecological communities

Refer to Section 9.1 above for a description of impact areas for the pipeline and mine site components of the project.

The current development plan will result in the following impacts to EPBC Act-listed threatened ecological communities:

- The loss of a total extent of 11.347 hectares of *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions* (critically endangered).
- There will be no impacts to *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions* (Endangered). No patches of this woodland were identified near the impact footprint.

The current development plan will not result in impacts to any FFG Act-listed communities.

Residual indirect impacts during mine operations may also contribute to decline or loss of threatened flora or communities both on and off-site. These indirect impacts include:

- Introduction or spread of weeds;
- Dust deposition on retained native vegetation;
- Erosion of areas that support retained native vegetation;
- Contamination of retained native vegetation by saline water; and
- Contamination of retained native vegetation by hazardous chemicals or hydrocarbons.

The risk of these impacts is outlined in more detail in Section 10 and remains low to moderate following implementation of the mitigation measures outlined.

9.4. Avoidance and minimisation

9.4.1. Original development layout (2019)

The original proposed mine development layout (2019) covered a far larger area than the current iteration of the development layout, as presented in Figure 12 below. This would have resulted in a total loss of 74.989 hectares of native vegetation, including 3,411 large trees. The current development layout will result in the loss of 14.36 hectares of native vegetation, including 568 large trees.

Thus, re-design of the development layout has resulted in the avoidance of 60.629 hectares of native vegetation and 2,843 large trees.

9.4.2. Water supply pipeline

Two alternate pipeline routes have been investigated to avoid areas of dense native vegetation along smaller roadsides on the original proposed pipeline route (Figure 5). Assessment of these routes was undertaken by a botanist using the Habitat Hectares, Vegetation Quality Assessment and by an arborist (Treetec 2022). Route A3 was determined to have significantly less native vegetation, with no trees likely to be impacted (Treetec 2022) and therefore the current report has presented impacts associated with this option.

The total amount of native vegetation identified by the botanist using the Habitat Hectares assessment along the roadsides of the two pipeline route alternatives is outlined in Table 11, showing significantly more native vegetation present along route A1

Table 11. Total of native vegetation identified by the botanist along the roadsides of the water supply pipeline options A1 (only includes sections avoided by route alternatives) and A3

Pipeline Route	Native vegetation in patches	Scattered trees	Canopy trees
A1	54 patches - 14.93 ha	61	2,080
A3	25 patches - 4.03 ha	13	723

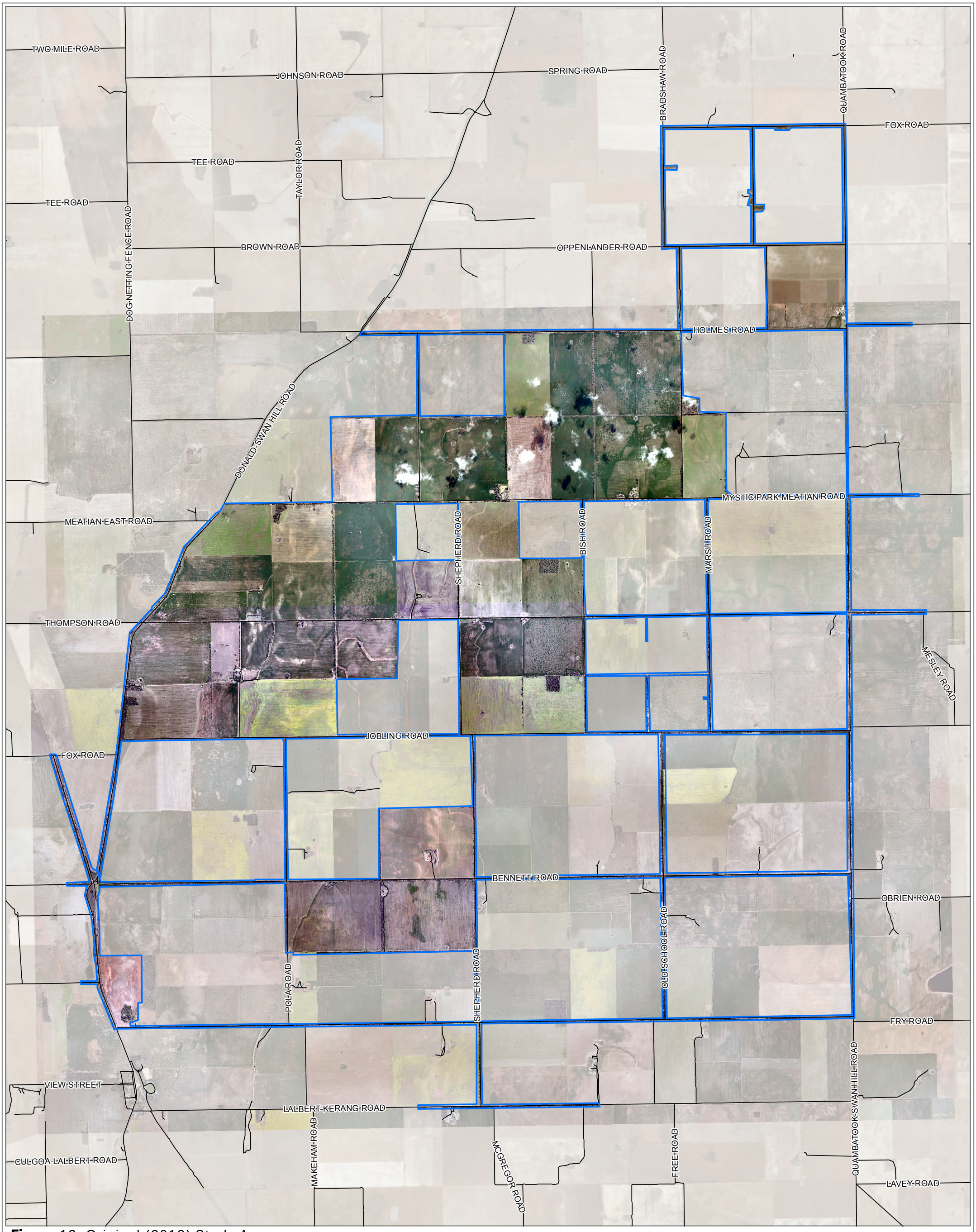

Figure 12: Original (2018) Study Area

Project: Goschen Mineral Sands and Rare Earths Project **Client**: VHM Limited **Date**: 25/07/2019

Study area

N

Metres

0 1,000

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9.4.3. Mine Site Area 1

Opportunities to avoid and minimise impacts to native vegetation within Mine Site Area 1 have been adopted that will result in the retention of a total extent of 15.442 hectares of native vegetation, including 14.019 hectares of native patches and 22 scattered trees.

Several patches of native vegetation that occurred on roadsides adjoining the mine site area that intersect the 25m buffer between the mine operation areas and the perimeter of Mine Site Area 1 will be retained.

The majority of Habitat Zone FEQ, a large linear patch located immediately to the south of Bennet Road, will be retained. This is with the exception of a 10-metre-wide portion of removal that is required for access at the northern extent of the patch. Minimised removal of this patch will result in the retention of 6.723 hectares of native vegetation.

The entirety of Habitat Zone IAX, an irregular shaped patch located immediately south of Bennet Road within the western half of the mine site will be avoided, resulting in the retention of 0.056 hectares of native vegetation.

Habitat Zones EEW and EEX located at the north-western extent of the mine site will be avoided, resulting in the retention of 1.238 hectares of native vegetation.

Approximately one third of Habitat Zone IAL, located on the northern side of Bennet Road within the eastern half of the mine site will be retained. This will result in the retention of 0.635 hectares of native vegetation.

Approximately one third of Habitat Zone IAM, located on the southern side of Bennet Road within the eastern half of the mine site will be retained. This will result in the retention of 0.911 hectares of native vegetation.

Nineteen large scattered trees and three small scattered trees will be retained.

No further opportunities to avoid and minimise impacts to native vegetation within the mine site were considered to be feasible without undermining the key objectives of the proposal.

All retained native patches constituted Woorinen Mallee (EVC 824), and the majority were identified as the EPBC Act-listed community *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions (critically endangered)*.

A breakdown of native vegetation patches to be retained within Mine Site Area 1 is provided below in Table 12, with examples of key areas shown in Figure 13.

Table 12: Breakdown of native vegetation patches to be retained within Mine Site Area 1

Habitat Zone	EVC	Condition score (out of 100)	No. of Large Trees in HZ	Area to be retained (ha)
CAQ	Woorinen Mallee (EVC 824)	32	3	0.037
CAR	Woorinen Mallee (EVC 824)	32	3	0.024
CAX	Woorinen Mallee (EVC 824)	27	5	0.059
FER	Woorinen Mallee (EVC 824)	36	40	0.409
FEU	Woorinen Mallee (EVC 824)	36	4	0.052
FFC	Woorinen Mallee (EVC 824)	33	9	0.090
CAP	Woorinen Mallee (EVC 824)	32	32	0.036
CAK	Woorinen Mallee (EVC 824)	35	101	0.000
CAL	Woorinen Mallee (EVC 824)	34	28	0.001
CAS	Woorinen Mallee (EVC 824)	35	5	0.092
CAT	Woorinen Mallee (EVC 824)	30	2	0.010
CAU	Woorinen Mallee (EVC 824)	35	5	0.067
CCQ	Woorinen Mallee (EVC 824)	32	1	0.019
AFB	Woorinen Mallee (EVC 824)	28	6	0.046
AFA	Woorinen Mallee (EVC 824)	38	8	0.069
AEZ	Woorinen Mallee (EVC 824)	41	0	0.000
AEY	Woorinen Mallee (EVC 824)	43	21	0.070
AEX	Woorinen Mallee (EVC 824)	41	20	0.023
AEW	Woorinen Mallee (EVC 824)	41	121	0.433
AEV	Woorinen Mallee (EVC 824)	43	23	0.086
FEZ	Woorinen Mallee (EVC 824)	58	52	0.204
FFA	Woorinen Mallee (EVC 824)	36	6	0.006

Habitat Zone	EVC	Condition score (out of 100)	No. of Large Trees in HZ	Area to be retained (ha)
FFB	Woorinen Mallee (EVC 824)	36	6	0.008
FFD	Woorinen Mallee (EVC 824)	36	12	0.047
FES	Woorinen Mallee (EVC 824)	36	9	0.058
FET	Woorinen Mallee (EVC 824)	40	3	0.009
FEV	Woorinen Mallee (EVC 824)	35	5	0.035
FEW	Woorinen Mallee (EVC 824)	40	7	0.039
EEW	Woorinen Mallee (EVC 824)	40	45	0.533
EEX	Woorinen Mallee (EVC 824)	37	55	0.704
HAH	Woorinen Mallee (EVC 824)	38	8	0.009
IAO	Woorinen Mallee (EVC 824)	N/A	N/A	0.000
IAP	Woorinen Mallee (EVC 824)	N/A	N/A	0.001
IAR	Woorinen Mallee (EVC 824)	N/A	N/A	0.004
IAS	Woorinen Mallee (EVC 824)	N/A	N/A	0.155
IAV	Woorinen Mallee (EVC 824)	N/A	N/A	0.229
IAW	Woorinen Mallee (EVC 824)	N/A	N/A	0.015
IAX	Woorinen Mallee (EVC 824)	N/A	N/A	0.006
IAZ	Woorinen Mallee (EVC 824)	N/A	N/A	0.006
IBA	Woorinen Mallee (EVC 824)	N/A	N/A	0.594
FEQ	Woorinen Mallee (EVC 824)	47	107	5.686
IAL	Woorinen Mallee (EVC 824)	N/A	N/A	0.473
IAM	Woorinen Mallee (EVC 824)	N/A	N/A	0.615
FEQ	Woorinen Mallee (EVC 824)	47	107	1.037
CAW	Woorinen Mallee (EVC 824)	27	8	0.065

Habitat Zone	EVC	Condition score (out of 100)	No. of Large Trees in HZ	Area to be retained (ha)
CAV	Woorinen Mallee (EVC 824)	45	145	1.362
IAF	Woorinen Mallee (EVC 824)	N/A	N/A	0.027
IAG	Woorinen Mallee (EVC 824)	N/A	N/A	0.072
IAL	Woorinen Mallee (EVC 824)	N/A	N/A	0.141
IAM	Woorinen Mallee (EVC 824)	N/A	N/A	0.255
TOTAL			**1,012**	**14.019**

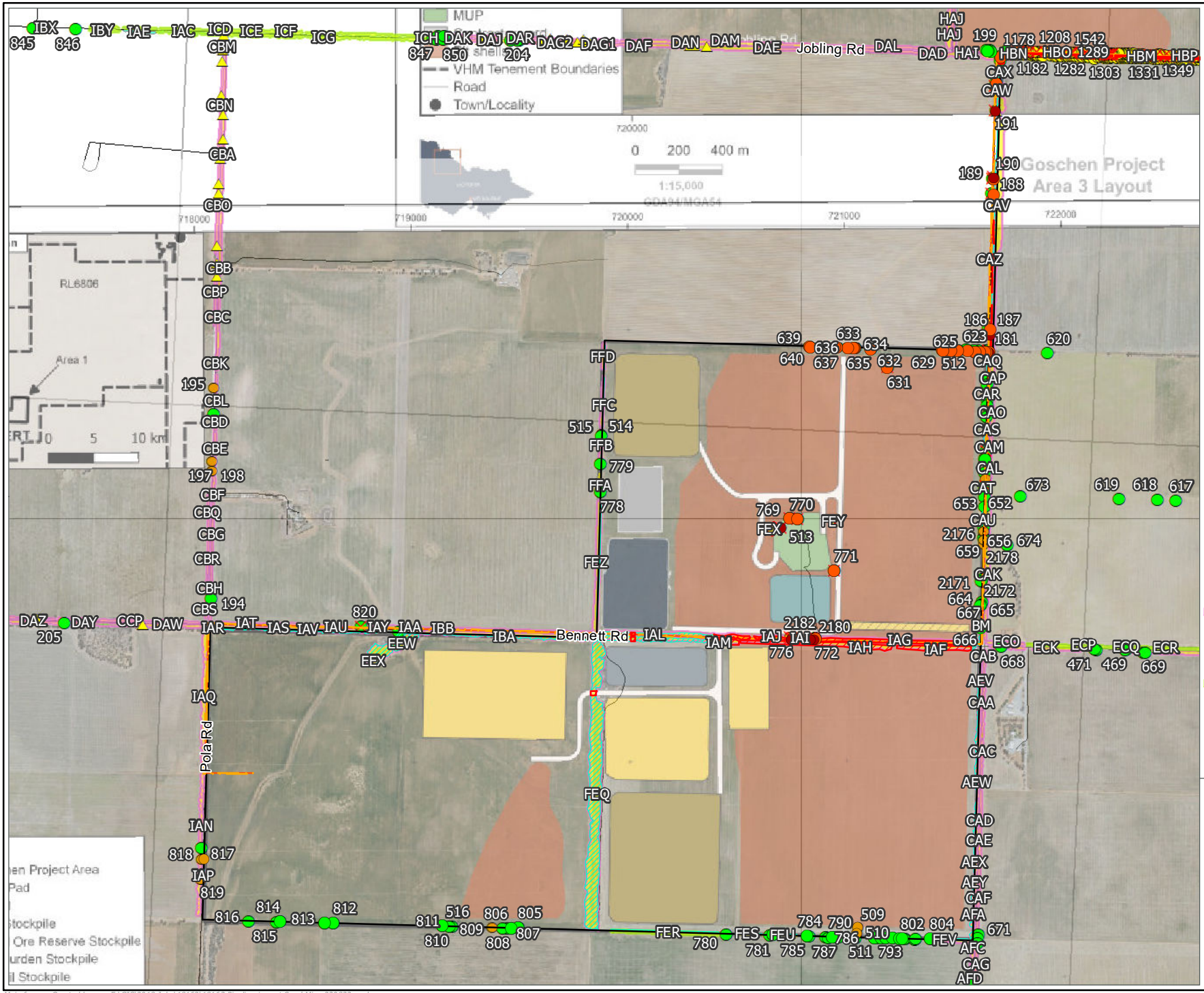

Figure 13: Patches of native vegetation to be retained within Mine Site

Project: Goschen Mineral Sands Project
Client: VHM Exploration Pty Ltd
Date: 22/08/2022

- Mine Site Area 1
- Native vegetation to be retained at Area 1

Native vegetation

- Ridged Plains Mallee (EVC 96)
- Riverine Chenopod Woodland (EVC 103)
- Woorinen Mallee (EVC 824)
- Large Scattered Tree to retained
- Small Scattered Tree to retained
- Large Scattered Tree to removed
- Small Scattered Tree to removed

EPBC Act-listed Communities

- Plains Mallee Box Woodland of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions
- Potentially the EPBC Act-listed Plains mallee box

FFG Act-listed flora species

- Acacia oswaldii

N

Metres 0 200

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9.4.4. Mine Site Area 3

Opportunities to avoid and minimise impacts to native vegetation within Mine Site Area 3 have been adopted that will result in the retention of a total extent of 22.707 hectares of native vegetation, including 21.829 hectares of native patches and 17 scattered trees.

Mine Site Area 3 has been sited to exclude two large native patches, identified as Habitat Zones FEP and HAR, situated adjacent to the north-east perimeter of the mine site. The decision to exclude these areas from the mine site automatically resulted in the retention of 0.585 hectares of native patches.

Several patches of native vegetation that occurred on roadsides adjoining the mine site area that intersect the 25m buffer between the mine operation areas and the perimeter of Mine Site Area 3 will be retained.

The entirety of Habitat Zone HBQ, a large patch within the south-eastern quarter of the mine site will be avoided, resulting in the retention of 8.289 hectares of native patch vegetation.

The entirety of Habitat Zone HBU, an irregular shaped patch within the south-eastern quarter of the mine site will be avoided, resulting in the retention of 2.322 hectares of native patch vegetation.

Habitat Zones FEL, FEM, FEN and FEO at the southern extent of the site to the north of Jobling Road will be retained, resulting in the retention of 1.352 hectares of native patch vegetation.

Nine large scattered trees and eight small scattered trees will be retained.

No further opportunities to avoid and minimise impacts to native vegetation within the mine site were considered to be feasible without undermining the key objectives of the proposal.

All retained native patches constituted Woorinen Mallee (EVC 824) and were identified as the EPBC Act-listed community *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions (critically endangered)*.

A breakdown of native vegetation patches to be retained within Mine Site Area 3 is provided below in Table 13, with examples of key areas shown in Figure 14.

Table 13: Breakdown of native vegetation to be retained associated with Mine Site Area 3

Habitat Zone	EVC	Condition score (out of 100)	No. of Large Trees in HZ	Area to be retained (ha)
AKV	Woorinen Mallee (EVC 824)	47	24	0.001
DAA	Woorinen Mallee (EVC 824)	36	5	0.060
DAB	Woorinen Mallee (EVC 824)	36	10	0.033
DAC	Woorinen Mallee (EVC 824)	22	0	0.009
FDL	Woorinen Mallee (EVC 824)	41	12	0.035
FDN	Woorinen Mallee (EVC 824)	40	27	0.282
FDO	Woorinen Mallee (EVC 824)	41	62	0.355

Habitat Zone	EVC	Condition score (out of 100)	No. of Large Trees in HZ	Area to be retained (ha)
FEL	Woorinen Mallee (EVC 824)	45	2	0.024
FEM	Woorinen Mallee (EVC 824)	40	3	0.029
FEN	Woorinen Mallee (EVC 824)	38	18	0.558
AGA	Woorinen Mallee (EVC 824)	37	7	0.082
AFT	Woorinen Mallee (EVC 824)	31	52	1.166
AFV	Woorinen Mallee (EVC 824)	44	57	0.642
AFW	Woorinen Mallee (EVC 824)	36	5	0.077
AFX	Woorinen Mallee (EVC 824)	42	4	0.070
AFY	Woorinen Mallee (EVC 824)	43	24	0.311
AFZ	Woorinen Mallee (EVC 824)	37	8	0.167
FEP	Woorinen Mallee (EVC 824)	53	400	0.579
AKZ	Woorinen Mallee (EVC 824)	16	0	0.022
ALB	Woorinen Mallee (EVC 824)	56	5	0.120
ALE	Woorinen Mallee (EVC 824)	53	6	0.071
ALF	Woorinen Mallee (EVC 824)	16	0	0.075
ALG	Woorinen Mallee (EVC 824)	37	3	0.088
ALH	Woorinen Mallee (EVC 824)	16	0	0.033
ALJ	Woorinen Mallee (EVC 824)	19	1	0.048
HAH	Woorinen Mallee (EVC 824)	38	8	0.003
HAI	Woorinen Mallee (EVC 824)	38	15	0.008
HAJ	Woorinen Mallee (EVC 824)	38	135	0.440
HAK	Woorinen Mallee (EVC 824)	38	25	0.531

Habitat Zone	EVC	Condition score (out of 100)	No. of Large Trees in HZ	Area to be retained (ha)
HAM	Woorinen Mallee (EVC 824)	38	9	0.180
HAO	Woorinen Mallee (EVC 824)	38	15	0.295
HAQ	Woorinen Mallee (EVC 824)	38	32	0.679
HAR	Woorinen Mallee (EVC 824)	38	36	0.006
HBS	Woorinen Mallee (EVC 824)	38	23	0.356
AFT	Woorinen Mallee (EVC 824)	31	52	1.166
HBI	Woorinen Mallee (EVC 824)	38	47	0.598
HBJ	Woorinen Mallee (EVC 824)	38	21	0.316
HBO	Woorinen Mallee (EVC 824)	38	27	0.519
HBP	Woorinen Mallee (EVC 824)	38	23	0.375
FEO	Woorinen Mallee (EVC 824)	36	43	0.741
ALK	Woorinen Mallee (EVC 824)	40	53	0.021
ALK	Woorinen Mallee (EVC 824)	40	53	0.049
HBQ	Woorinen Mallee (EVC 824)	38	392	8.289
HBU	Woorinen Mallee (EVC 824)	38	110	2.322
TOTAL			**1,854**	**21.829**

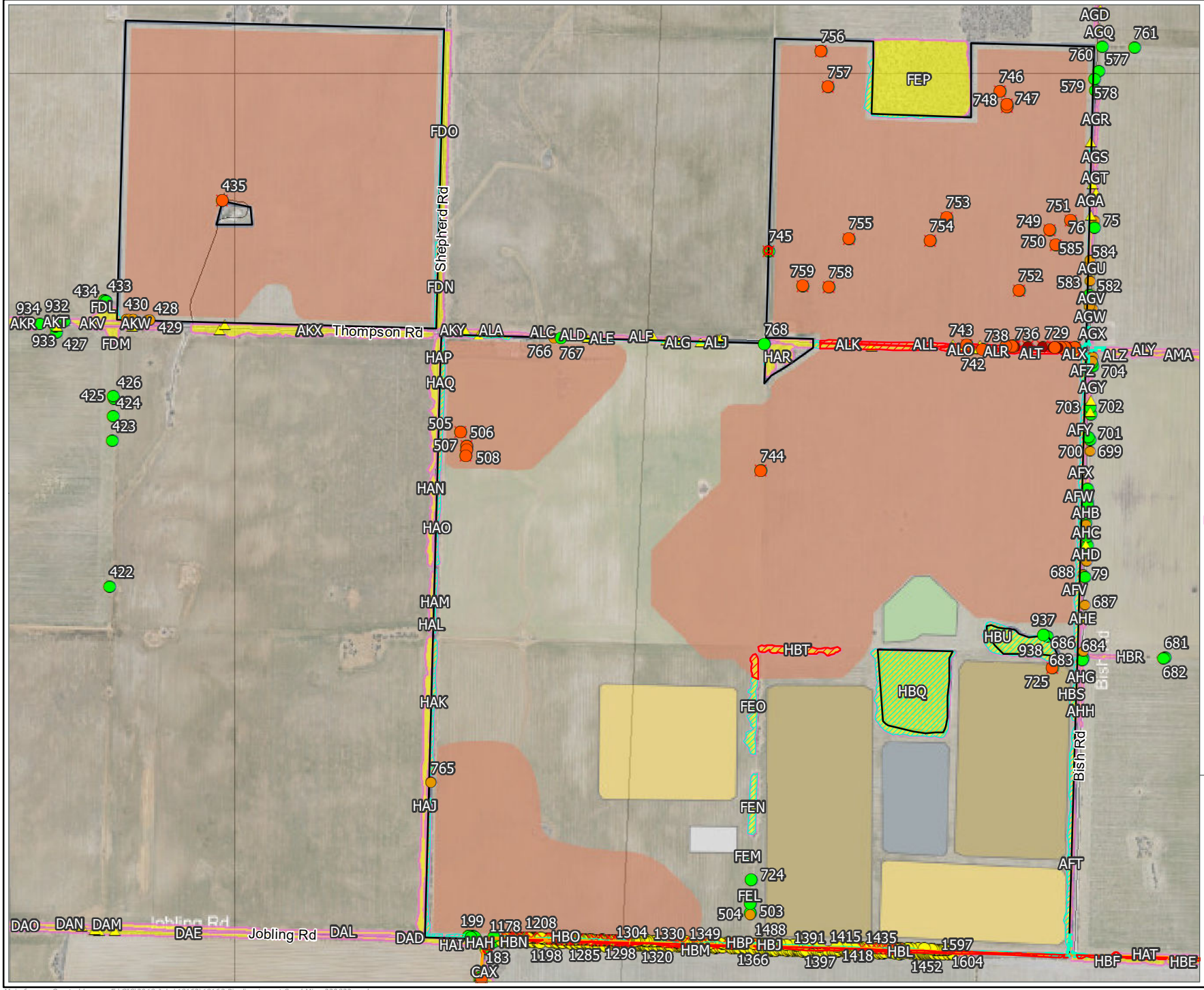

Figure 14: Patches of native vegetation to be retained within Mine Site

Project: Goschen Mineral Sands Project
Client: VHM Exploration Pty Ltd
Date: 22/08/2022

Mine Site Area

Native vegetation to be retained at Area 3

Native vegetation

Woorinen Mallee (EVC 824)

Large Scattered Tree to retained

Small Scattered Tree to retained

Large Scattered Tree to removed

Small Scattered Tree to removed

EPBC Act-listed

Plains Mallee Box Woodland of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions

FFG Act-listed flora

Acacia oswaldii

N

Metres
0 200

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9.4.5. Alternative pipeline route

An arborist has conducted an on-ground assessment of two alternative routes for the pipeline that have greatly reduced impacts to native vegetation and ecological values (Treetec 2022). The new routes investigated use of a combination of wider roads and roads with minimal native vegetation in the road reserve to minimise impacts to native vegetation and ecological values. The number of trees impacted along the pipeline has been reduced to 61, compared with 1,844 along the original pipeline route.

9.4.6. Arborist assessment

An arborist will be engaged early in the construction period to assess trees currently deemed to be lost to determine in consultation with construction planners whether any measures can be taken to avoid adverse impacts to structural root zones and safeguard trees. This approach may reduce the total loss of native vegetation and the number of trees deemed to be removed by the project.

9.4.7. Protection of native vegetation to be retained

The measures outlined below will be adopted as part of both the construction and operational phase Environmental Management Plans to protect retained native vegetation in and near the project area:

- The five largest patches of native vegetation within Mine Site Area 1 to be retained will be fenced off with permanent vegetation protection fencing from threats for the duration of the project.
- Two large remnants of native vegetation within Mine Site Area 3 will not be impacted during any phase of the project and will be retained and fenced off with permanent vegetation protection fencing from threats for the duration of the project.
- Permanent vegetation protection fencing will be installed within the already cleared land surrounding the mine on the boundary of the pit shell areas to avoid any further removal or disturbance to retained native vegetation within the mine site areas.
- Around all other patches of native vegetation to be retained prior to works.
- Tree protection zones will be established around scattered native trees to be retained prior to works. Vegetation protection zones will be established by installing temporary vegetation protection fencing. This fencing will be erected at:
    - a radius of 12 times the diameter of any tree trunk, measured at a height of 1.4 metres above ground level, to a maximum of 15 metres but no less than 2 metres from the base of the trunk of the tree; and
    - to protect patch(es) of native vegetation not containing trees at a minimum distance of 2 metres from any retained native vegetation.
    - The fence will be constructed of star pickets and paraweb or similar to the satisfaction of the Department of Energy, Environment and Climate Action. The protection fence must remain in place until all works are completed to the satisfaction of the department.
- All construction personnel will be appropriately briefed prior to works, and no machinery or equipment will be placed inside vegetation/tree protection zones.
- Appropriate mitigation measures to prevent saline discharge and altered surface water drainage from impacting areas of retained native vegetation will be put in place.
- Construction areas will be treated as required to ensure that native vegetation is not affected by dust from construction activities.
- Dirt roads used for access to the mine site areas will be treated as required to ensure that native vegetation is not affected by dust resulting from mine construction and operation associated vehicle activity.

9.4.8. Prevent the spread of weeds and pathogens

The measures outlined below will be adopted as part of both the construction and operational phase Environmental Management Plans to prevent the spread of weeds and pathogens in and near the project area:

- Clean down areas will be established within the mine site areas prior to the commencement of works.
- Clean down bays will be managed on site by burying the waste below the topsoil.
- High threat weeds within the mine site areas will be monitored and controlled for the life of the project.
- High threat weeds that occur along the pipeline route as a result of soil disturbance will be monitored and controlled for the life of the project.

9.4.9. Retain tree hollows

The following measures will be employed to reduce the impact of loss of tree hollows on fauna:

- Trees approved for removal throughout the project area will be retained in-situ wherever possible, if deemed lost due to impacts on TPZ's.
- Where trees with visible hollows must be removed, hollows will be salvaged and translocated to a suitable location.

9.5. Summary of residual impacts

Residual impacts are those that remain once mitigation and management measures have been implemented. This section describes potential residual impacts during the construction phase of the project, once mitigation and management measures have been considered and applied.

Residual impacts are expected to be high in relation to direct impacts for the project, namely impacts to native vegetation, listed flora species (FFG Act only) and listed threatened ecological communities (one critically endangered EPBC Act-listed community) as a result of clearing for the pipeline, mine sites and supporting infrastructure components of the project. The impact is likely to be permanent or of extremely long duration as many of the large trees comprising these communities are anticipated to be in the order of a 100 years old or more.

9.6. Offsets

Under the Guidelines, all applicants for permits for native vegetation removal are required to offset removed native vegetation (including large trees in patches and scattered trees). Applications for removal are required to provide an offset statement demonstrating that an offset can be found that meets the target determined in the DELWP-issued Native Vegetation Removal Report for that proposal. The availability of offsets can be found on the DELWP Native Vegetation Credit Register.

The offset target for the proposed removal of native vegetation for this project totals 4.819 general habitat units (GHU) plus 568 large trees (mallee trees), in an area with a strategic biodiversity value score of at least 0.179 in the North Central CMA region and/or Gannawarra Shire. This includes offsets for all trees that are deemed removed due to TPZ impacts or otherwise assumed lost.

The credit register was searched for available offsets. Available offset credit options were found and are listed in Appendix 3.

Once offsets are secured, the impacts of the project will be in line with the over-arching objective of the Victorian native vegetation retention controls, namely, there will be 'no net loss' of biodiversity as a consequence of native vegetation removal for the project. Operation impact assessment

This section discusses the potential impacts of the project as a result of operation of the project and the associated mitigation measures that aim to reduce impacts to as low a level as possible. Mitigation measures referred to are described in Section 11.

9.7. On-site indirect impacts to flora and vegetation

Indirect impacts to flora and vegetation can potentially occur during mine operations. These are outlined below.

- Introduction or spread of weeds;
- Dust deposition on retained native vegetation;
- Erosion of areas that support retained native vegetation;
- Contamination of retained native vegetation by saline water; and
- Contamination of retained native vegetation by hazardous chemicals or hydrocarbons.

These are explored in more detail in the sub-sections below.

9.7.1. Weed introduction

Mine operation and vehicle activity within and beyond the mine site will potentially bring in weed propagules (seeds, cuttings), leading to an increase in the number and extent of weed species in adjacent areas of retained native vegetation. Observations during the native vegetation assessment at the site indicated that the following high threat weeds are potentially of concern:

- African Box-thorn;
- Bridal Creeper;
- Field Dodder;
- Horehound;
- Onion Weed;
- Paterson's Curse;
- Soursob; and
- Sticky Ground-cherry.

9.7.2. Dust deposition

Dust generated by vehicle movements may lead to the deposition (between rainfall events) of dust from road traffic and mine operations. Dust on leaves blocks light transmission to chloroplasts, reducing photosynthesis and plant growth. This may suppress both the growth and recruitment.

9.7.3. Erosion

There is potential for erosion of areas that support retained native vegetation to occur during mine operations. Erosion of retained native vegetation can lead to a loss of groundcover species and reduced water absorption into the soil and uptake of water and nutrients by plants, which may ultimately lead to the death of trees. Erosion may also compromise tree roots and lead to the destabilisation of trees and tree death. An increase in rabbit activity may further exacerbate these effects.

9.7.4. Contamination by saline water

Contamination of areas of retained native vegetation by saline discharge or altered surface water drainage may arise during mine operations, which could potentially lead to the death of plants which do not tolerate high levels of salt or prolonged inundation.

9.7.5. Contamination by hazardous chemicals

Contamination of areas of retained native vegetation by hazardous chemicals or hydrocarbons could arise during mine operations and cause the death of plants in all layers of native vegetation (i.e., groundlayer, mid-storey and tree canopy).

9.8. Off-site indirect significant effects on native vegetation and flora

There is potential for indirect significant effects on native vegetation and flora values as a result of off-site activities including transportation and storage of heavy mineral concentrate. For example, vehicle damage to road verges may result in dust and other contaminants impacting on native vegetation and degrading and fragmenting these remnants.

9.9. Mitigation measures to manage residual on-site and off-site residual impacts

Indirect threats to native vegetation and flora values on-site may be mitigated and managed through the adoption of the following measures:

- Vegetation protection zones will be established around all other patches of native vegetation to be retained prior to works.
- Tree protection zones will be established around scattered native trees to be retained prior to works.
- All construction personnel will be appropriately briefed prior to works, and no machinery or equipment will be placed inside vegetation/tree protection zones.
- Appropriate mitigation measures to prevent saline discharge and altered surface water drainage from impacting on areas of retained native vegetation will be put in place.
- Construction areas will be wet down as required to ensure that native vegetation is not affected by dust resulting from construction activities.
- Dirt roads used for access to the mine site areas will be wet down as required to ensure that native vegetation is not affected by dust resulting from mine associated vehicle use.
- Clean down areas will be established within the mine site areas prior to the commencement of works.
- Clean down bays will be managed on site by burying the waste below the topsoil.
- High threat weeds within the mine site areas will be monitored and controlled for the life of the project.
- Ensure mineral transport vehicles remain on formed roads.
- Use appropriate dust suppression measures to reduce dust generation along the transport route.
- Ensure all mineral transport vehicles comply with effective load covering standards.

Indirect threats to native vegetation and flora values off-site may be mitigated and managed through the adoption of the following measures:

- Ensure mineral transport vehicles remain on formed roads.
- Use appropriate dust suppression measures to reduce dust generation along the transport route.
- Ensure all mineral transport vehicles comply with effective load covering standards.

9.10. Summary of residual impacts

Residual impacts are those that remain once mitigation and management measures have been implemented. This section describes potential residual impacts during the operation phase of the project, once mitigation and management measures have been considered and applied.

Residual impacts for the project in relation to ‘on-site’ indirect impacts that would arise due to the threats (risks) described in Sections 10.1.1 – 10.1.6 are expected to be between 'Low’ to ‘Medium’ compared with an initial risk level rating of ‘Medium’ to ‘Very High’, provided that appropriate mitigation measures (such as those listed above) are implemented.

Residual impacts for the project in relation to indirect impacts that would arise due to ‘off-site’ activities such as transportation and storage of heavy mineral concentrate are expected to be ‘High’ compared with an initial risk level rating of ‘Very High’, provided that appropriate mitigation measures (such as those listed above) are implemented.

10. Summary of mitigation, monitoring and contingency measures

10.1. Mitigation measures

Mitigation measures are proposed to avoid, mitigate or manage native vegetation and flora impacts associated with the project. They are summarised in Table 14. These measures assume that the 'avoid and minimise' process has been applied as described earlier and to be implemented during the construction and operation stages of the Project.

Table 14: Mitigation measures relevant to native vegetation and flora

Measure ID	Mitigation measure	Phase
MGM01	Explore further opportunities to avoid and minimise impacts to native vegetation, as follows: ▪ Arborist to assist in micro-siting of pipeline to avoid trees where possible. ▪ Arborist to assess trees deemed to be lost throughout the project area to determine whether any measures can be taken to avoid adverse impacts to structural root zones and ensure that trees persist in the long term.	Pre-construction (alternative routes have been investigated) & construction
MGM02	To protect patches of native vegetation to be retained, vegetation protection zones will be established around patches of native vegetation to be retained prior to works, as follows: ▪ For patches of native vegetation patches containing canopy trees, vegetation protection fencing must be erected at a radius of 12 times the diameter of any tree trunk, measured at a height of 1.4 metres above ground level, to a maximum of 15 metres but no less than 2 metres from the base of the trunk of the tree; ▪ For patches of native vegetation not containing canopy trees, vegetation protection fencing must be erected at a minimum distance of 2 metres from any retained native vegetation; and ▪ Vegetation protection fencing must be constructed of star pickets and para-webbing, or similar, to the satisfaction of DELWP. The protection fencing must remain in place until all works are completed to the satisfaction of DELWP.	Pre-construction

Measure ID	Mitigation measure	Phase
MGM03	To protect scattered native trees to be retained, tree protection zones will be established around scattered native trees to be retained prior to works, as follows: ▪ Tree protection fencing must be erected around protected trees at a radius of 12 times the diameter of any tree trunk, measured at a height of 1.4 metres above ground level, to a maximum of 15 metres but no less than 2 metres from the base of the trunk of the tree; and ▪ Tree protection fencing must be constructed of star pickets and para-webbing, or similar, to the satisfaction of DELWP. The protection fencing must remain in place until all works are completed to the satisfaction of DELWP.	Pre-construction
MGM04	All construction personnel will be appropriately briefed prior to works, and no machinery or equipment will be placed inside vegetation/tree protection zones.	Pre-construction & construction
MGM05	To prevent the spread of weeds and pathogens, establish clean-down areas prior to the commencement of works. These areas must meet the following criteria: ▪ Be in close proximity to site access/egress; ▪ Be at least 30m away from waterways, drainage lines or wetlands; ▪ Avoid areas of native vegetation and Tree Protection Zones; and ▪ Be bunded to prevent sediment runoff. ▪ Control high threat weeds, namely Common Heliotrope and African Box-thorn.	Pre-construction
MGM06	Prepare for land rehabilitation prior to commencing works: ▪ Prepare land rehabilitation plan prior to commencing works. ▪ Obtain seed collecting permits and collect seed from vegetation to be removed in the appropriate season prior to removal. ▪ Retain logs and mulch from tree removal for placement on site for habitat and revegetation purposes.	Pre-construction

Measure ID	Mitigation measure	Phase
MGM07	To prevent the spread of weeds and pathogens: ▪ Commence weed control measures prior to commencing works to reduce seed set and spread. ▪ Inspect all material before entry to and exit from site. ▪ Reject all material that contains noxious weed propagules; ▪ Dispose of material containing declared noxious weeds in accordance with the CaLP Act; ▪ Keep records of disposal of abovementioned materials; and ▪ Keep records for all importation and exportation of materials to and from site.	Construction & operation
MGM08	For all vehicles, machinery and equipment brought onto the site: ▪ Clean all vehicles, machinery and plant equipment before entering and leaving the site at the designated clean-down area; and ▪ Keep records and maintain a logbook for use of cleaning and washdown areas.	Construction & operation
MGM09	For existing established weeds recorded throughout the site: ▪ Control high threat weeds, namely Common Heliotrope and African Box-thorn; and ▪ Maintain a logbook that outlines weed control that has been undertaken.	Pre-construction, construction and operation
MGM10	For neighbouring land with weed infestations: ▪ Be aware of these sources and act accordingly at these interfaces when weeds spread on the site; and ▪ Request that the relevant authority controls these weed infestations where these occur on public land.	Pre-construction, construction and operation
MGM11	Manage waste from clean-down bays by burying the waste below the topsoil.	Construction & operation
MGM12	For appropriate disposal of weed materials: ▪ Control weeds prior to stockpiling of topsoil; and ▪ Dispose of material on site in the designated burn area if possible or seek permission to transport and dispose of the material at a legal place of disposal.	Construction & operation

Measure ID	Mitigation measure	Phase
MGM13	To ensure retained native vegetation is not affected by saline discharge or altered surface water drainage arising from construction and operational activities, appropriate mitigation measures must be put in place that restrict any changes to surface water drainage and any saline discharge into areas of retained native vegetation.	Construction & operation
MGM14	To ensure retained native vegetation is not affected by changes in groundwater hydrology (drawdown and mounding), arising from construction and operational activities, appropriate mitigation measures must be put in place that restricts any changes groundwater hydrology in the vicinity of areas of retained native vegetation and scattered trees.	Construction & operation
MGM15	To ensure native vegetation is not affected by dust resulting from construction activities, wet down construction areas as required.	Construction & operation

10.2. Monitoring and contingency measures

The monitoring and contingency measures that are proposed to assess native vegetation and flora impacts associated with the project are summarised in Table 15.

Table 15: Monitoring and contingency measures relevant to native vegetation and flora

Measure ID	Monitoring or contingency measure	Frequency	Phase
Monitoring measures			
MOM01	Native vegetation and scattered tree protection zones are to be inspected prior to commencement of construction, to ensure they are in the correct position and meet the required specifications (MGM02 & MGM03).	NA	Pre-construction
MOM02	Undertake inspection of vehicle and machinery clean-down areas prior to commencement of construction, to ensure they meet the required specifications (MGM05).	NA	Pre-construction
MOM03	Undertake regular visual inspections for high-threat weed outbreaks in and adjacent all works areas, with particular emphasis on the following species: ▪ Common Heliotrope; and ▪ African Box-thorn.	Monthly	Construction and operation
MOM04	Undertake regular inspections of areas of retained native vegetation and scattered trees for indications of altered surface water drainage and saline discharge resulting from construction and operational works.	Monthly	Construction and operation
MOM05	Undertake regular inspections of areas of retained native vegetation and scattered trees for indications of altered in groundwater hydrology (drawdown and mounding) resulting from construction and operational works.	Monthly	Construction and operation
MOM06	Undertake regular inspections of areas of retained native vegetation and scattered trees for excessive dust deposition on vegetation foliage.	Fortnightly	Construction and operation
MOM07	Native vegetation and scattered tree protection zones are to be regularly inspected during the operational phase of the project, to ensure they remain in the correct position and meet the required specifications (MGM02 & MGM03).	Monthly	Operation

Measure ID	Monitoring or contingency measure	Frequency	Phase
Contingency measures			
CM01	Accidental native vegetation and/or scattered tree removal will be compensated via additional offsets and/or rehabilitation/restoration, on a case-by-case basis.	As required	Construction & operation
CM02	In the event of excessive surface water runoff or saline discharge into areas of retained native vegetation or scattered trees, resulting from construction and operational works. Any damage to native vegetation and/or scattered trees will be compensated via additional offsets and/or rehabilitation/restoration, on a case-by-case basis.	As required	Construction & operation
CM03	In the event of a significant groundwater hydrology deviation from baseline conditions in the vicinity of areas of retained native vegetation or scattered trees, resulting from construction and operational works. Any damage to native vegetation and/or scattered trees will be compensated via additional offsets and/or rehabilitation/restoration, on a case-by-case basis. In the event of localised drought conditions leading to significant decline of native vegetation due to decrease in surface run-off, watering / irrigation to be considered.	As required	Construction & operation
CM04	In the event of a significant buildup of dust on the foliage of trees and plants in areas of retained native vegetation or scattered trees, dust control measures are to be intensified.	As required	Construction & operation

11. Summary of implications under relevant legislation

This study has assessed the impacts of construction and operation of the project on native vegetation and flora assets and values to be protected.

The significance of the impacts has been assessed in accordance with the evaluation framework, based on applicable legislation, policy and standards and the evaluation objectives and environmental significance guidelines arising from the government terms of reference established to guide the assessments.

The following sections summarise these identified impacts under the relevant Commonwealth and Victorian legislation.

11.1. Commonwealth

No EPBC Act-listed threatened flora species were recorded in the study area during the field assessment, and none are considered to have the potential to occur in the study area based on habitat suitability and a paucity of records (see Table 7). Therefore, no EPBC Act-listed flora species are expected to be impacted by the development.

Two EPBC Act-listed threatened ecological communities were recorded in the study area:

- *Plains Mallee Box Woodland of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions* (Critically Endangered); and
- *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions* (Endangered).

The project is likely to result in a significant impact on *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions*. A total extent of 11.347 hectares of this community could be impacted by the project according to the current development footprint. Note that nearly half of this removal (4.289 ha) is due to the potential removal of 61 trees along the pipeline route.

The significance of this removal under the EPBC Act will apply as a 'nuclear action' whereby all ecosystems, their constituent parts and natural and physical resources impacted by the proposed development are subject to the EPBC Act. Impact was determined likely to be significant based on the following significant impact criteria for critically endangered ecological communities (DEE 2013):

An action is likely to have a significant impact on a critically endangered community if there is a real chance or possibility that it will:

- *Reduce the extent of an ecological community.*
- *Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.*
- *Adversely affect habitat critical to the survival of an ecological community.*
- *Modify or destroy abiotic (non-living) factors (such as water, nutrients, soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.*
- *Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.*
- *Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to:*
    - *Assisting invasive species, that are harmful to the listed ecological community, to become established, or*

- *Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or*

Interfere with the recovery of an ecological community.

As a 'nuclear action', under the EPBC Act, the matter protected is 'the environment'. Of relevance to the current flora and native vegetation assessment, this includes: (a) ecosystems and their constituent parts, and (b) natural and physical resources. Therefore, all potential impacts listed herein may be of relevance under the EPBC Act for components of the action that have triggered a 'nuclear action' under section 22 of the EPBC Act..

11.1.1. Implications under the EPBC Act

The *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions (critically endangered)*

was listed as a threatened community on 10 June 2021, and as such, is covered under the "controlled action" EPBC decision (on 19/12/2018). A variation to the original proposed action was accepted on 30th January 2023, covering the current study area. Therefore significant impacts to this community cannot be assessed for that referral.

However, as a 'nuclear action', the scope of commonwealth assessment of the project extends to all ecosystems and their constituent parts, and therefore the community is relevant to this consideration where components of the action have triggered a 'nuclear action' under Section 22 of the EPBC Act.

11.2. Victorian

The current development plan for the project will result in the loss of a total extent of 14.36 hectares of native vegetation, including 568 large trees and 14 small scattered trees. The breakdown of vegetation removal in each project area is outlined in Attachment 2 (excluding the area of removal associated with scattered trees (2.59ha). This represents the worst-case scenario for vegetation removal, and includes:

- All patches of native vegetation potentially impacted in the mine site areas, pipeline route and intersections
- All scattered trees potentially impacted in the mine site areas, pipeline route and intersections
- all 61 trees deemed lost along the pipeline as identified in the arborist report (Treetec 2022).

The largest impact is along the pipeline, with 4.695 ha to be impacted. It should be noted that 4.289 ha of this is due to 61 trees that may have impacts to their TPZ (each with an impact area of 15m radius (Appendix 3.B.2, DELWP 2018)).

11.2.1. Implications under the Guidelines

The native vegetation to be removed is in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map). The area affected by the water supply pipeline includes a wetland designated under the Convention on Wetlands of International Importance (the Ramsar Convention) (i.e. the Kerang Lakes Ramsar Site); and a wetland listed in the Directory of Important Wetlands of Australia (Kangaroo Lake).

Vegetation removal will be addressed via an incorporated document and is therefore exempt from requiring a permit under Cl.52.17. The incorporated document requires any application to remove destroy or lop native vegetation to comply with Victoria's Guidelines for the removal destruction or lopping of native vegetation.

The *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a) stipulate that the proposal is to be assessed under the Detailed assessment pathway. Consequently, this proposal would trigger a referral to DEECA (as constituted under Part 2 of the Conservation, Forests and Land Acts 1987).

Offsets required to compensate for the proposed removal of native vegetation from the study area are provided below and documented in the *Native Vegetation Removal* (NVR) report provided by DEECA (Appendix 2).

- 4.819 general habitat units and must include the following offset attribute requirements:
    - Minimum strategic biodiversity value (SBV) of 0.179
    - Occur within the North Central CMA boundary or the Gannawarra Shire, Swan Hill Rural City municipal districts.
    - Include protection of at least 568 large trees.

Under the Guidelines all offsets must be secured prior to the removal of native vegetation. A search of available offset credits shows these are available for purchase through offset brokers (Appendix 4).

A permit is required under ESO2 of the Gannawarra Planning Scheme to remove native vegetation within the study area. The Responsible Authority will consider the information contained within this report in their decision to grant a permit.

11.2.2. FFG Act

The following FFG Act values listed as threatened are susceptible to impacts from the proposed development on public land:

- Bush Minuria – *Minuria cunninghamii* (18 individuals impacted)
- Dwarf Myall – *Acacia ancistrophylla* var. *lissophylla* (one individual impacted)
- Fragrant Saltbush – *Rhagodia parabolica* (11 individuals impacted)
- Frosted Goosefoot – *Chenopodium desertorum subsp. desertorum* (54 individuals impacted)
- Umbrella Wattle – *Acacia oswaldii* (353 individuals impacted, 348 of which occur on public land)
- Yarran – *Acacia melvillei* (17 individuals impacted, 16 of which occur on public land)

Twenty-one FFG Act-protected flora species are considered likely to be impacted by the proposed development, four of which are also listed as threatened under the FFG Act:

- Annual New Holland Daisy – *Vittadinia cervicularis*
- Berrigan – *Eremophila longifolia*
- Bush Minuria – *Minuria cunninghamii*
- Comb Grevillea – *Grevillea huegelii*
- Common Emu-bush – *Eremophila glabra* subsp. *glabra*
- Common Nardoo – *Marsilea drummondii*
- Dwarf Myall – *Acacia ancistrophylla* var. *lissophylla*
- Fuzzweed – *Vittadinia cuneata* var *cuneata*
- Eumong – *Acacia stenophylla*

- Gold-dust Wattle – *Acacia acinacea*
- Grey Mulga – *Acacia brachybotrya*
- Hakea Wattle – *Acacia hakeoides*
- Hall's Wattle – *Acacia halliana*
- Hoary Scurf-pea – *Cullen cinereum*
- Lemon Beauty-heads – *Calocephalus citreus*
- Mallee Wattle – *Acacia montana*
- Nealie – *Acacia loderi*
- Pimelea Daisy-bush – *Olearia pimeleoides*
- Umbrella Wattle – *Acacia oswaldii*
- Woolly Yellow-heads – *Trichanthodium skirrophorum*
- Yarran – *Acacia melvillei*

A Protected Flora Permit would be required from DELWP to remove the plant taxa comprising the abovementioned listed threatened flora species or otherwise protected values from public land. Application forms for Protected Flora Permits can be obtained from DELWP offices or from their customer service centre.

12. Conclusion

The purpose of this report is to assess the potential native vegetation and flora impacts associated with the Goschen Project to inform the preparation of the EES required for the project. A summary of the key assets, values or uses potentially affected by the project, and an associated assessment of native vegetation and flora impacts and recommended mitigation measures, are summarised below.

12.1. Existing environment

The vegetation in the study area is dominated by Mallee Woodlands, consisting of Woorinen Mallee (EVC 824) and Ridged Plains Mallee (EVC 96), supporting a mixed eucalypt overstorey with a range of small shrubs occurring in the understorey. Also present in the landscape are patches of Semi-arid Woodland (EVC 97) and Plains Savannah (EVC 826), featuring a canopy of Buloke and native pine. In low-lying areas that may retain water at times, Riverine Chenopod Woodland (EVC 103) and Chenopod Grassland (EVC 829) were identified.

The majority of Mallee woodland in the study area was identified as the EPBC Act-listed community *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions* (critically endangered). It occurs largely along roadsides in a landscape that has been widely cleared for cropping. Patches of vegetation were commonly in good condition, with large old trees and a range of understory species, litter cover and logs. However, the persistence of these communities in the landscape is threatened by clearing, grazing, altered fire regimes and weeds (DAWE 2021).

No EPBC Act-listed threatened flora species were recorded in the study area during the field assessment, and none are considered to have the potential to occur based on habitat suitability and a paucity of regional records.

Nine FFG Act-listed threatened flora species were recorded during the field assessment. These are listed within the assessment findings.

12.2. Impact assessment findings

The extent of vegetation removal has been calculated based on the current mine area and water pipeline supply route (Option A3, Figure 5).

The avoid and minimise principal has guided the design of the mine and siting of the water supply pipeline. Opportunities to avoid and minimise impacts to native vegetation within Mine Site Area 1 have been adopted that will result in the retention of a total extent of 23.868 hectares of native vegetation, including 22.445 hectares in patches and 22 scattered trees. In Mine Site Area 3, opportunities to avoid and minimise impacts to native vegetation have resulted in the retention of a total extent of 41.375 hectares of native vegetation, including 40.497 hectares in patches and 17 scattered trees. Assessment of two alternative water-supply pipeline routes have identified an alternative route that, combined with an assessment by an arborist has reduced vegetation removal from 1,844 trees along the pipeline to a maximum of 61 trees.

It is anticipated that this extent will be able to be reduced by undertaking further measures to avoid and minimise. It is recommended an arborist also be engaged to assess trees deemed to be lost throughout other areas of the project, in order to determine whether any measures can be taken to avoid adverse impacts to structural root zones and safeguard trees for the long term. This may significantly reduce the total loss of native vegetation and the number of trees deemed to be removed.

The current development plan for the project will result in the loss of a total extent of 14.36 hectares of native vegetation and 568 large trees.

Potential indirect impacts to flora and vegetation during mine operations have been identified including:

- introduction or spread of weeds,
- dust deposition on retained native vegetation
- erosion of areas that support retained native vegetation,
- contamination of retained native vegetation by saline water, and
- contamination of retained native vegetation by hazardous chemicals or hydrocarbons.

12.3. Mitigation and contingency measures

With the implementation of the mitigation measures recommended throughout this assessment, potential adverse impacts on vegetation communities and species have been significantly reduced.

Key mitigation measures to address indirect and operational impacts include:

- Permanent vegetation protection fencing will be installed within the already cleared land surrounding the mine on the boundary of the pit shell areas to avoid any further removal or disturbance to retained native vegetation within the mine site areas.
- Vegetation protection zones will be established around all other patches of native vegetation to be retained prior to works.
- Tree protection zones will be established around scattered native trees to be retained prior to works.
- All construction personnel will be appropriately briefed prior to works, and no machinery or equipment will be placed inside vegetation/tree protection zones.
- Appropriate mitigation measures to prevent saline discharge and altered surface water drainage from impacting on areas of retained native vegetation will be put in place.
- Construction areas will be wet down as required to ensure that native vegetation is not affected by dust resulting from construction activities.
- Dirt roads used for access to the mine site areas will be wet down as required to ensure that native vegetation is not affected by dust resulting from mine associated vehicle use.
- Measures to be adopted as part of both the construction and operational phase Environmental Management Plans to prevent the spread of weeds and pathogens in and near the project area:
  - Clean down areas will be established within the mine site areas prior to the commencement of works.
  - Clean down bays will be managed on site by burying the waste below the topsoil.
  - High threat weeds within the mine site areas will be monitored and controlled for the life of the project.

12.3.1. Residual impacts

The residual impacts on flora and native vegetation from the project are described in the Native Vegetation removal Report prepared by DELWP at **Appendix 3**. This indicates that, after application of the minimisation measures detailed in Section 6.4, the impacts of the project will involve:

- removal of a total extent of 14.36 hectares of native vegetation, including 568 large trees.

No impacts are anticipated on EPBC Act listed flora species. The proposed water pipeline will remove an area of the critically endangered EPBC Act listed threatened community Plains Mallee Box Woodlands of

the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions totalling 11.347 hectares.

Six FFG Act-listed threatened flora species and 21 protected species are likely to be impacted by the project.

12.3.2. Cumulative impacts

A review of projects being assessed under the Environmental Effects Act 1978 and the Major Transport Projects Facilitation Act 2009 (DELWP 2022) determined that no large-scale projects are proposed within the surrounding landscape that would cause direct or indirect impacts to native vegetation or ecological values that overlap with the study area. The closest large-scale project to the study area is the *Nyah, Vinifera and Burra Creek Floodplain Restoration Projects* which lies approximately 35km to the north. The project occurs within riparian habitats associated with the Murray River and is not expected to impact on similar environmental assets to those which will be impacted by the Goschen Rare Earths and Mineral Sands Project.

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Appendix 1: Risk register

Risk ID	Risk pathway *[including ID of relevant receptors]*	Causes / Background	Initial risk level			Final mitigation	Residual risk level		
			Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Construction									
R01	Direct impacts to native vegetation as a result of clearing for the pipeline, mine sites and supporting infrastructure.	Construction of pipeline, mine sites and supporting infrastructure.	Almost certain	Critical	Very High	*N/A*	Almost certain	Critical	Very High
R02	Direct impacts to listed threatened flora species known or likely to occur in the study area as a result of clearing for the pipeline, mine sites and supporting infrastructure.	Construction of pipeline, mine sites and supporting infrastructure.	Almost certain	Major	Very High	*N/A*	Almost certain	Major	Very High
R03	Direct impacts to listed threatened ecological communities known to occur in the study area as a result of clearing for the pipeline, mine sites and supporting infrastructure.	Construction of pipeline, mine sites and supporting infrastructure.	Almost certain	Critical	Very High	*N/A*	Almost certain	Critical	Very High

Risk ID	Risk pathway *[including ID of relevant receptors]*	Causes / Background	Initial risk level			Final mitigation	Residual risk level		
			Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Operation									
R04	Indirect impacts to flora and vegetation due to introduction or spread of weeds or pathogens, edge effects, dust deposition, erosion, or contamination by saline water, hazardous chemicals or hydrocarbons.	Introduction of weeds, pathogens or pollutants.	Likely	Critical	Very High	Vegetation protection zones will be established around patches of native vegetation to be retained prior to works and designated as 'no-go zones.' All construction personnel will be appropriately briefed prior to works, and no machinery or equipment will be placed inside vegetation/tree protection zones. Establish clean-down areas prior to the commencement of works. These areas must meet the following criteria: • Be in close proximity to site access/egress; • Be at least 30m away from waterways, drainage lines or wetlands; • Avoid areas of native vegetation	Possible	Moderate	Medium

Risk ID	Risk pathway *[including ID of relevant receptors]*	Causes / Background	Initial risk level			Final mitigation	Residual risk level		
			Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
						and Tree Protection Zones; and • Be bunded to prevent sediment runoff. Control high threat weeds, namely Common Heliotrope and African Box-thorn. Implement mitigation measures during operation that restrict any changes to surface water drainage and any saline discharge to areas outside of and well away from retained native vegetation.			
R05	Indirect impacts to flora and vegetation as a result of off-site activities including transportation and storage of heavy mineral concentrate.	Vehicle damage to roadside verges, dust, contamination.	Possible	Minor	Medium	Ensure mineral transport vehicles remain on formed roads. Use appropriate dust suppression measures to reduce dust generation along the transport route. Ensure all mineral transport vehicles comply with effective load covering standards.	Unlikely	Minor	Low

Appendix 2: Details of the assessment process in accordance with the Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017a)

Purpose and objective

Policies and strategies relating to the protection and management of native vegetation in Victoria are defined in the State Planning Policy Framework (SPPF). The objective of all Victorian Planning Schemes, as identified in Clause 12.01, is 'To ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

This is to be achieved through the following three-step approach, as described in the Guidelines:

1. Avoid the removal, destruction or lopping of native vegetation.
2. Minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.
3. Provide an offset to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation.

Note: While a planning permit may still be required, if native vegetation does not meet the definition of either a patch or a scattered tree, an offset under the Guidelines is not required.

Assessment pathways

The first step in determining the type of assessment required for any site in Victoria is to determine the assessment pathway for the proposed native vegetation removal. The three possible assessment pathways for applications to remove native vegetation in Victoria are the following:

- Basic;
- Intermediate; or
- Detailed.

This assessment pathway is determined by the following two factors:

- **Location Category**, as determined using the Location Map of Victoria. The location category indicates the potential risk to biodiversity from removing a small amount of native vegetation. The three location categories are defined as follows:
    - Location 1 – shown in light blue-green on the Location Map; occurring over most of Victoria.
    - Location 2 – shown in dark blue-green on the Location Map; includes areas mapped as endangered EVCs and/or sensitive wetlands and coastal areas.
    - Location 3 – shown in brown on the Location Map; includes areas where the removal of less than 0.5 hectares of native vegetation could have a significant impact on habitat for rare and threatened species.
- **Extent of native vegetation** – The extent of any patches and scattered trees proposed to be removed (and the extent of any past native vegetation removal), with consideration as to whether the proposed removal includes any large trees. Extent of native vegetation is determined as follows:
    - **Patch** – the area of the patch in hectares.
    - **Scattered Tree** – the extent of a scattered tree is dependent on whether the scattered tree is small or large. A tree is considered to be a large tree if the DBH is greater than or equal to the large tree benchmark DBH for the relevant bioregional EVC. Any scattered tree that is not a

large tree is a small scattered tree. The extent of large and small scattered trees is determined as follows:

- **Large scattered tree** – the area of a circle with a 15 metre radius, with the trunk of the tree at the centre.
- **Small scattered tree** – the area of a circle with a ten-metre radius, with the trunk of the tree at the centre.

The assessment pathway for assessing an application to remove native vegetation is subsequently determined as shown in the following matrix table:

Extent of native vegetation	Location Category		
	Location 1	Location 2	Location 3
< 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
< 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
≥ 0.5 hectares	Detailed	Detailed	Detailed

Note: If the native vegetation to be removed includes more than one location category, the higher location category is used to determine the assessment pathway.

Landscape scale information – strategic biodiversity value

The strategic biodiversity value (SBV) is a measure of a location's importance to Victoria's biodiversity, relative to other locations across the state. This is represented as a score between 0 and 1, and determined from the SBV map, available from *NVIM* (DELWP 2021b).

Landscape scale information – habitat for rare or threatened species

Habitat importance for rare or threatened species is a measure of the importance of a location in the landscape as habitat for a particular rare or threatened species, in relation to other habitat available for that species. This is represented as a score between 0 and 1 and determined from the Habitat importance maps, administered by DELWP.

This includes two groups of habitat:

- **Highly localised habitats** – Limited in area and considered to be equally important, therefore having the same habitat importance score.
- **Dispersed habitats** – Less limited in area and based on habitat distribution models.

Habitat for rare or threatened species is used to determine the type of offset required in the detailed assessment pathway.

Biodiversity value

A combination of site-based and landscape scale information is used to calculate the biodiversity value of native vegetation to be removed. Biodiversity value is represented by a general or species habitat score, as determined below.

Firstly, the extent and condition of native vegetation to be removed are combined to determine the habitat hectares as follows:

Habitat hectares = extent of native vegetation × condition score

Secondly, the habitat hectare score is combined with a landscape factor to obtain an overall measure of biodiversity value. Two landscape factors exist as follows:

- **General landscape factor** – determined using an adjusted strategic biodiversity score and relevant when no habitat importance scores are applicable;
- **Species landscape factor** – determined using an adjusted habitat importance score for each rare or threatened species habitat mapped at a site in the Habitat importance map.

These factors are subsequently used as follows to determine the biodiversity value of a site:

General habitat score = habitat hectares × general landscape factor

Species habitat score = habitat hectares × species landscape factor

Offset requirements

A native vegetation offset is required for the approved removal of native vegetation. Offsets conform to one of two types and each type incorporates a multiplier to address the risk of offset:

- A **general offset** is required when the removal of native vegetation does not have a significant impact on any habitat for rare or threatened species (i.e. the proportional impact is below the species offset threshold). In this case a multiplier of 1.5 applies to determine the general offset amount.

General offset (amount of general habitat units) = general habitat score × 1.5

- A **species offset** is required when the removal of native vegetation has a significant impact on habitat for a rare or threatened species (i.e. the proportional impact is above the species offset threshold). In this case a multiplier of 2 applies to determine the species offset amount.

Species offset (amount of species habitat units) = Species habitat score × 2

Note: If native vegetation does not meet the definition of either a patch or scattered tree, an offset is not required.

Offset attributes

Offsets must meet the following attribute requirements, as relevant:

- General offsets
    - **Offset amount** – general offset = general habitat score × 1.5

- **Strategic biodiversity value (SBV)** – the offset has at least 80% of the SBV of the native vegetation removed
- **Vicinity** – the offset is in the same CMA boundary or municipal district as the native vegetation removed
- Habitat for rare and threatened species – N/A
- **Large trees** – the offset includes the protection of at least one large tree for every large tree to be removed

- Species offsets
  - **Offset amount** – species offset = species habitat score × 2
  - Strategic biodiversity value (SBV): N/A
  - Vicinity: N/A
  - Habitat for rare and threatened species – the offset comprises mapped habitat according to the Habitat importance map for the relevant species
  - **Large trees** – the offset includes the protection of at least one large tree for every large tree to be removed

Appendix 3: Native Vegetation Removal (NVR) reports

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: **16/09/2022**
Time of issue: **6:46 pm**

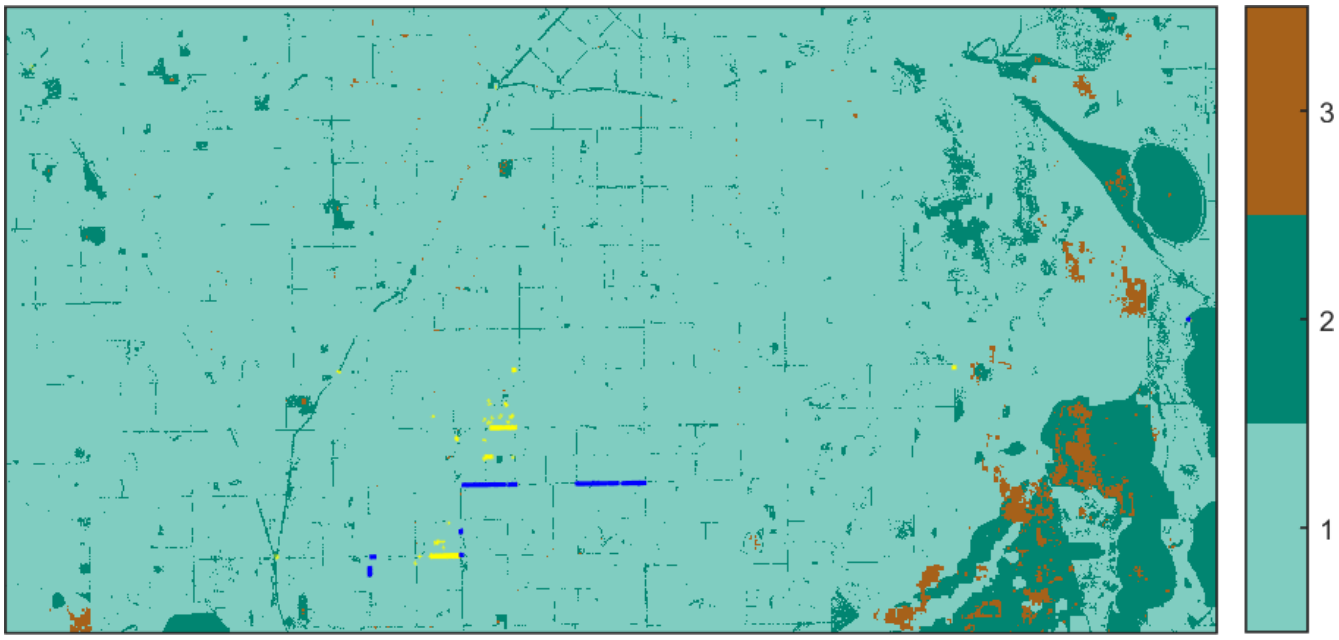
Report ID: NAA_2022_136

Project ID	18163_Goschen_Sands_ALL_Removal_B1_220830

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	10.071 ha
Extent of past removal	0.000 ha
Extent of proposed removal	10.071 ha
No. Large trees proposed to be removed	507
Location category of proposed removal	Location 3 The native vegetation is in an area where the removal of less than 0.5 hectares could have a significant impact on habitat for one or more rare or threatened species.The native vegetation is also in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map); and a wetland designated under the Convention on Wetlands of International Importance (the Ramsar Convention); and a wetland listed in the Directory of Important Wetlands of Australia.

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]	2.447 general habitat units
Vicinity	Mallee, North Central Catchment Management Authority (CMA) or Gannawarra Shire, Swan Hill Rural City Council
Minimum strategic biodiversity value score[2]	0.179
Large trees	507 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-ALX	Patch	mum_0824	Vulnerable	2	no	0.210	0.065	0.065	0.120		0.011	General
1-ALW	Patch	mum_0824	Vulnerable	1	no	0.210	0.032	0.032	0.120		0.006	General
1-ALV	Patch	mum_0824	Vulnerable	0	no	0.150	0.025	0.025	0.123		0.003	General
1-ALU	Patch	mum_0824	Vulnerable	2	no	0.250	0.028	0.028	0.190		0.006	General
1-ALS	Patch	mum_0824	Vulnerable	3	no	0.250	0.041	0.041	0.194		0.009	General
1-ALT	Patch	mum_0824	Vulnerable	13	no	0.250	0.251	0.251	0.154		0.054	General
1-ALQ	Patch	mum_0824	Vulnerable	1	no	0.230	0.028	0.028	0.200		0.006	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-ALR	Patch	mum_0824	Vulnerable	7	no	0.250	0.055	0.055	0.200		0.012	General
1-ALP	Patch	mum_0824	Vulnerable	0	no	0.150	0.041	0.041	0.200		0.005	General
1-ALO	Patch	mum_0824	Vulnerable	3	no	0.230	0.083	0.083	0.160		0.017	General
1-ALN	Patch	mum_0824	Vulnerable	0	no	0.150	0.036	0.036	0.100		0.004	General
1-ALL	Patch	mum_0824	Vulnerable	6	no	0.250	0.143	0.143	0.100		0.030	General
1-ALM	Patch	mum_0824	Vulnerable	3	no	0.280	0.055	0.055	0.100		0.013	General
1-FEX	Patch	mum_0824	Vulnerable	5	no	0.310	0.157	0.157	0.142		0.042	General
1-FEY	Patch	mum_0824	Vulnerable	0	no	0.260	0.080	0.080	0.100		0.017	General
1-HBT	Patch	mum_0824	Vulnerable	30	no	0.380	0.628	0.628	0.211		0.217	General
1-IAF2	Patch	mum_0824	Vulnerable	28	no	0.310	0.702	0.702	0.507		0.246	General
1-IAG	Patch	mum_0824	Vulnerable	105	no	0.260	1.031	1.031	0.384		0.278	General
1-IAI	Patch	mum_0824	Vulnerable	1	no	0.200	0.017	0.017	0.235		0.003	General
1-IAJ	Patch	mum_0824	Vulnerable	3	no	0.200	0.124	0.124	0.100		0.020	General
1-IAK	Patch	mum_0824	Vulnerable	2	no	0.200	0.060	0.060	0.100		0.010	General
1-ALK1	Patch	mum_0824	Vulnerable	53	no	0.400	0.387	0.387	0.115		0.130	General
1-ALK2	Patch	mum_0824	Vulnerable	53	no	0.400	0.597	0.597	0.117		0.200	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-435	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.110		0.012	General
1-745	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-746	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.270		0.013	General
1-747	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.052	0.190		0.009	General
1-748	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.052	0.190		0.009	General
1-749	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-750	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-751	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-752	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.120		0.012	General
1-753	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-754	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-755	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-756	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-757	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-758	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.160		0.012	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-759	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.160		0.012	General
1-726	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.062	0.152		0.011	General
1-729	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.067	0.158		0.012	General
1-730	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.063	0.164		0.011	General
1-735	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.066	0.165		0.012	General
1-739	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.035	0.180		0.006	General
1-740	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.034	0.148		0.006	General
1-741	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.048	0.163		0.008	General
1-742	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.059	0.200		0.011	General
1-743	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.057	0.166		0.010	General
1-727	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.006	0.120		0.001	General
1-728	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.010	0.120		0.002	General
1-731	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.010	0.120		0.002	General
1-732	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.011	0.120		0.002	General
1-733	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.029	0.137		0.005	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-734	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.010	0.121		0.002	General
1-736	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.031	0.145		0.005	General
1-737	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.029	0.143		0.005	General
1-738	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.005	0.177		0.001	General
1-505	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.200		0.013	General
1-506	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.053	0.170		0.009	General
1-507	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.050	0.135		0.009	General
1-508	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.067	0.134		0.011	General
1-725	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.260		0.013	General
1-744	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-772	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.068	0.250		0.013	General
1-776	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.063	0.100		0.010	General
1-2180	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.002	0.250		0.000	General
1-2181	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.028	0.250		0.005	General
1-2182	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.011	0.100		0.002	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-2183	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.010	0.100		0.002	General
1-769	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.140		0.012	General
1-770	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.140		0.012	General
1-513	Scattered Tree	mum_0824	Vulnerable	0	no	0.200	0.031	0.031	0.140		0.005	General
1-631	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.100		0.012	General
1-771	Scattered Tree	mum_0824	Vulnerable	1	no	0.200	0.070	0.070	0.160		0.012	General
1-FEQ	Patch	mum_0824	Vulnerable	1	no	0.470	0.056	0.056	0.110		0.022	General
1-IAH	Patch	mum_0824	Vulnerable	70	no	0.200	1.334	1.334	0.215		0.243	General
1-FEO	Patch	mum_0824	Vulnerable	10	no	0.360	0.204	0.204	0.130		0.062	General
1-IAL2	Patch	mum_0824	Vulnerable	20	no	0.200	0.236	0.236	0.256		0.045	General
1-IAM2	Patch	mum_0824	Vulnerable	18	no	0.200	0.237	0.237	0.260		0.045	General
1-IAM1	Patch	mum_0824	Vulnerable	0	no	0.200	0.042	0.042	0.250		0.008	General
1-IAL1	Patch	mum_0824	Vulnerable	0	no	0.200	0.021	0.021	0.250		0.004	General
3-BBN	Patch	mum_0824	Vulnerable	2	no	0.460	0.025	0.025	0.270		0.011	General
3-CDN	Patch	mum_0826	Endangered	0	no	0.370	0.001	0.001	0.800		0.000	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
3-EAB	Patch	mum_0826	Endangered	1	no	0.310	0.009	0.009	0.700		0.004	General
3-ADI	Patch	mum_0824	Vulnerable	4	no	0.560	0.028	0.028	0.259		0.015	General
3-AGJ	Patch	mum_0824	Vulnerable	1	no	0.440	0.007	0.007	0.270		0.003	General
3-AHI	Patch	mum_0824	Vulnerable	0	no	0.320	0.004	0.004	0.230		0.001	General
3-AFZ	Patch	mum_0824	Vulnerable	1	no	0.370	0.006	0.006	0.120		0.002	General
3-IDP	Patch	mum_0096	Endangered	0	no	0.280	0.001	0.001	0.810		0.000	General
3-IDF	Patch	mum_0096	Endangered	0	no	0.500	0.004	0.004	0.410		0.002	General
3-IDJ	Patch	mum_0096	Endangered	0	no	0.500	0.000	0.000	0.810		0.000	General
3-IEM	Patch	mum_0096	Endangered	0	no	0.340	0.001	0.001	0.210		0.000	General
3-IEN	Patch	mum_0096	Endangered	0	no	0.240	0.001	0.001	0.810		0.000	General
3-IEO	Patch	mum_0826	Endangered	0	no	0.280	0.002	0.002	0.210		0.001	General
3-HBI4	Patch	mum_0824	Vulnerable	2	no	0.380	0.019	0.019	0.220		0.006	General
3-AFT1	Patch	mum_0824	Vulnerable	2	no	0.310	0.018	0.018	0.230		0.005	General
3-AFT2	Patch	mum_0824	Vulnerable	1	no	0.310	0.010	0.010	0.230		0.003	General
3-HAS4	Patch	mum_0824	Vulnerable	1	no	0.380	0.008	0.008	0.230		0.003	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
3-HBK4	Patch	mum_0824	Vulnerable	1	no	0.380	0.022	0.022	0.224		0.008	General
3-HBF2	Patch	mum_0824	Vulnerable	2	no	0.380	0.023	0.023	0.230		0.008	General
3-HAS3	Patch	mum_0824	Vulnerable	0	no	0.380	0.002	0.002	0.230		0.001	General
3-ALY1	Patch	mum_0824	Vulnerable	3	no	0.460	0.021	0.021	0.200		0.009	General
3-ALY2	Patch	mum_0824	Vulnerable	2	no	0.460	0.018	0.018	0.630		0.010	General
3-ADH	Patch	mum_0824	Vulnerable	1	no	0.490	0.012	0.012	0.270		0.005	General
3-IDG	Patch	mum_0096	Endangered	3	no	0.480	0.024	0.024	0.410		0.012	General
3-IEY1	Patch	mum_0096	Endangered	1	no	0.600	0.004	0.004	0.980		0.004	General
3-IEY2	Patch	mum_0096	Endangered	0	no	0.600	0.001	0.001	0.980		0.001	General
5-CA	Patch	vriv0826	Endangered	0	no	0.330	0.043	0.043	0.980		0.021	General
5-JAC	Patch	vriv0826	Endangered	0	yes	0.110	0.005	0.005	0.980		0.001	General
5-43164	Patch	vriv0826	Endangered	0	no	0.700	0.042	0.042	0.980		0.044	General
5-AA	Patch	vriv0103	Vulnerable	0	no	0.250	0.001	0.001	0.616		0.000	General
5-HBJ	Patch	mum_0824	Vulnerable	0	yes	0.190	0.009	0.009	0.119		0.002	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
5-HBO	Patch	mum_0824	Vulnerable	0	yes	0.190	0.046	0.046	0.200		0.008	General
5-EEA	Patch	mum_0824	Vulnerable	0	yes	0.245	0.004	0.004	0.148		0.001	General
5-EEB	Patch	mum_0824	Vulnerable	0	yes	0.175	0.004	0.004	0.220		0.001	General
5-EEC	Patch	mum_0824	Vulnerable	0	yes	0.175	0.001	0.001	0.220		0.000	General
5-EEE	Patch	mum_0824	Vulnerable	0	yes	0.175	0.007	0.007	0.207		0.001	General
5-EEF	Patch	mum_0824	Vulnerable	0	yes	0.185	0.014	0.014	0.195		0.002	General
5-EEG	Patch	mum_0824	Vulnerable	0	yes	0.185	0.005	0.005	0.160		0.001	General
5-EEI	Patch	mum_0824	Vulnerable	0	yes	0.185	0.008	0.008	0.208		0.001	General
5-EEJ	Patch	mum_0824	Vulnerable	0	yes	0.185	0.002	0.002	0.190		0.000	General
5-EEL	Patch	mum_0824	Vulnerable	0	yes	0.165	0.010	0.010	0.212		0.001	General
5-EEM	Patch	mum_0824	Vulnerable	0	yes	0.165	0.006	0.006	0.203		0.001	General
5-EEP	Patch	mum_0824	Vulnerable	0	yes	0.175	0.016	0.016	0.173		0.003	General
5-EEQ	Patch	mum_0824	Vulnerable	0	yes	0.175	0.021	0.021	0.211		0.003	General
5-EER	Patch	mum_0824	Vulnerable	0	yes	0.175	0.010	0.010	0.190		0.002	General
5-CCQ	Patch	mum_0824	Vulnerable	0	yes	0.140	0.001	0.001	0.270		0.000	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
5-HBM 1	Patch	mum_0824	Vulnerable	0	yes	0.190	0.004	0.004	0.145		0.001	General
5-HBM 2	Patch	mum_0824	Vulnerable	0	yes	0.190	0.004	0.004	0.240		0.001	General
5-HBM 3	Patch	mum_0824	Vulnerable	0	yes	0.190	0.011	0.011	0.233		0.002	General
5-HBM 4	Patch	mum_0824	Vulnerable	0	yes	0.190	0.007	0.007	0.220		0.001	General
5-HBM 5	Patch	mum_0824	Vulnerable	0	yes	0.190	0.002	0.002	0.219		0.000	General
5-HBN	Patch	mum_0824	Vulnerable	0	yes	0.190	0.001	0.001	0.220		0.000	General
5-HBP 1	Patch	mum_0824	Vulnerable	0	yes	0.190	0.006	0.006	0.240		0.001	General
5-HBP 2	Patch	mum_0824	Vulnerable	0	yes	0.190	0.002	0.002	0.240		0.000	General
5-HBP 3	Patch	mum_0824	Vulnerable	0	yes	0.190	0.007	0.007	0.220		0.001	General
5-EED	Patch	mum_0824	Vulnerable	0	yes	0.175	0.008	0.008	0.212		0.001	General
5-EEH	Patch	mum_0824	Vulnerable	0	yes	0.185	0.008	0.008	0.180		0.001	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
5-EEK1	Patch	mum_0824	Vulnerable	0	yes	0.185	0.001	0.001	0.177		0.000	General
5-EEK2	Patch	mum_0824	Vulnerable	0	yes	0.185	0.035	0.035	0.166		0.006	General
5-IAQ1	Patch	mum_0824	Vulnerable	0	yes	0.100	0.006	0.006	0.120		0.000	General
5-IAQ2	Patch	mum_0824	Vulnerable	0	yes	0.100	0.006	0.006	0.100		0.001	General
5-IAQ3	Patch	mum_0824	Vulnerable	0	yes	0.100	0.003	0.003	0.100		0.000	General
5-IAQ4	Patch	mum_0824	Vulnerable	0	yes	0.100	0.009	0.009	0.100		0.001	General
5-HBK1	Patch	mum_0824	Vulnerable	0	yes	0.190	0.001	0.001	0.225		0.000	General
5-HBK2	Patch	mum_0824	Vulnerable	0	yes	0.190	0.003	0.003	0.220		0.001	General
5-HBK3	Patch	mum_0824	Vulnerable	0	yes	0.190	0.002	0.002	0.225		0.000	General
5-HBI1	Patch	mum_0824	Vulnerable	0	yes	0.190	0.002	0.002	0.220		0.000	General
5-HBI2	Patch	mum_0824	Vulnerable	0	yes	0.190	0.010	0.010	0.218		0.002	General
5-HBI3	Patch	mum_0824	Vulnerable	0	yes	0.190	0.001	0.001	0.110		0.000	General
5-HBL	Patch	mum_0824	Vulnerable	0	yes	0.190	0.001	0.001	0.110		0.000	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
5-CAS	Patch	mum_0824	Vulnerable	0	yes	0.160	0.001	0.001	0.217		0.000	General
5-IAT1	Patch	mum_0824	Vulnerable	0	yes	0.145	0.002	0.002	0.260		0.000	General
5-IAT2	Patch	mum_0824	Vulnerable	0	yes	0.145	0.002	0.002	0.260		0.000	General
5-IAS1	Patch	mum_0824	Vulnerable	0	yes	0.150	0.001	0.001	0.260		0.000	General
5-IAS2	Patch	mum_0824	Vulnerable	0	yes	0.150	0.002	0.002	0.260		0.000	General
3-EAA1	Patch	mum_0826	Endangered	1	no	0.440	0.001	0.001	0.190		0.000	General
3-EAA2	Patch	mum_0826	Endangered	1	no	0.440	0.004	0.004	0.700		0.002	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
Dwarf Myall	*Acacia ancistrophylla var. lissophylla*	500051	Vulnerable	Highly Localised Habitat	Habitat importance map	0.0029
Downy Swainson-pea	*Swainsona swainsonioides*	503328	Endangered	Dispersed	Habitat importance map	0.0001
Blue Mallee	*Eucalyptus polybractea*	501311	Rare	Dispersed	Habitat importance map	0.0001
Yellow-tongue Daisy	*Brachyscome chrysoglossa*	503654	Vulnerable	Dispersed	Habitat importance map	0.0001
Winged New Holland Daisy	*Vittadinia pterochaeta*	503542	Vulnerable	Dispersed	Habitat importance map	0.0001
Purple Love-grass	*Eragrostis lacunaria*	501190	Vulnerable	Dispersed	Habitat importance map	0.0001
Swamp Sheoak	*Casuarina obesa*	500682	Endangered	Dispersed	Habitat importance map	0.0001
Yarran	*Acacia melvillei*	500058	Vulnerable	Dispersed	Habitat importance map	0.0001
Riverine Flax-lily	*Dianella porracea*	504266	Vulnerable	Dispersed	Habitat importance map	0.0001
Long Eryngium	*Eryngium paludosum*	501238	Vulnerable	Dispersed	Habitat importance map	0.0001
Needle Wattle	*Acacia havilandiorum*	500043	Endangered	Dispersed	Habitat importance map	0.0001
Pin Sida	*Sida fibulifera*	503142	Vulnerable	Dispersed	Habitat importance map	0.0001
Small Monkey-flower	*Elacholoma prostrata*	502196	Rare	Dispersed	Habitat importance map	0.0001
Slender Darling-pea	*Swainsona murrayana*	503321	Endangered	Dispersed	Habitat importance map	0.0001
Milkwort Sunray	*Rhodanthe polygalifolia*	501649	Rare	Dispersed	Habitat importance map	0.0001
Broom Bitter-pea	*Daviesia genistifolia s.s.*	503813	Rare	Dispersed	Habitat importance map	0.0001
Yakka Grass	*Sporobolus caroli*	503227	Rare	Dispersed	Habitat importance map	0.0001
Heathy Bluebush	*Maireana oppositifolia*	502106	Rare	Dispersed	Habitat importance map	0.0001
Red Swainson-pea	*Swainsona plagiotropis*	503324	Endangered	Dispersed	Habitat importance map	0.0000

Desert Jasmine	*Jasminum didymum subsp. lineare*	501801	Vulnerable	Dispersed	Habitat importance map	0.0000
Bristly Love-grass	*Eragrostis setifolia*	501195	Vulnerable	Dispersed	Habitat importance map	0.0000
Small-flower Tobacco	*Nicotiana goodspeedii*	502273	Rare	Dispersed	Habitat importance map	0.0000
Fine-hairy Spear-grass	*Austrostipa puberula*	503988	Rare	Dispersed	Habitat importance map	0.0000
Small Burr-grass	*Tragus australianus*	503418	Rare	Dispersed	Habitat importance map	0.0000
Neat Spear-grass	*Austrostipa mundula*	503281	Rare	Dispersed	Habitat importance map	0.0000
Purple Pentatrope	*Rhyncharrhena linearis*	502934	Vulnerable	Dispersed	Habitat importance map	0.0000
Fuzzy New Holland Daisy	*Vittadinia cuneata var. morrisii*	505060	Rare	Dispersed	Habitat importance map	0.0000
Round Templetonia	*Templetonia egena*	503340	Vulnerable	Dispersed	Habitat importance map	0.0000
Spiny Goosefoot	*Rhagodia ulicina*	502931	Rare	Dispersed	Habitat importance map	0.0000
Green-leaf Mallee	*Eucalyptus phenax subsp. phenax*	504270	Rare	Dispersed	Habitat importance map	0.0000
Grassland Velleia	*Velleia arguta*	503487	Rare	Dispersed	Habitat importance map	0.0000
Grey Falcon	*Falco hypoleucos*	10236	Endangered	Dispersed	Habitat importance map	0.0000
Button Immortelle	*Leptorhynchos waitzia*	501949	Vulnerable	Dispersed	Habitat importance map	0.0000
Frosted Goosefoot	*Chenopodium desertorum subsp. desertorum*	504380	Rare	Dispersed	Habitat importance map	0.0000
Chariot Wheels	*Maireana cheelii*	502099	Vulnerable	Dispersed	Habitat importance map	0.0000
Twining Purslane	*Calandrinia volubilis*	500556	Rare	Dispersed	Habitat importance map	0.0000
Grey Podolepis	*Podolepis aristata subsp. affinis*	502614	Rare	Dispersed	Habitat importance map	0.0000
Dwarf Yellow-heads	*Trichanthodium baracchianum*	501476	Vulnerable	Dispersed	Habitat importance map	0.0000
Three-nerve Wattle	*Acacia trineura*	500096	Vulnerable	Dispersed	Habitat importance map	0.0000
Dwarf Swainson-pea	*Swainsona phacoides*	503323	Endangered	Dispersed	Habitat importance map	0.0000
Greater Sand Plover	*Charadrius leschenaultii*	10141	Critically endangered	Dispersed	Habitat importance map	0.0000
Yellow Burr-daisy	*Calotis lappulacea*	500598	Rare	Dispersed	Habitat importance map	0.0000

Umbrella Wattle	*Acacia oswaldii*	500070	Vulnerable	Dispersed	Habitat importance map	0.0000
Frosted Goosefoot	*Chenopodium desertorum subsp. rectum*	504382	Vulnerable	Dispersed	Habitat importance map	0.0000
Bramble Wattle	*Acacia victoriae subsp. victoriae*	500101	Rare	Dispersed	Habitat importance map	0.0000
Satin Daisy-bush	*Olearia minor*	504130	Rare	Dispersed	Habitat importance map	0.0000
Scaly Mantle	*Eriochlamys squamata*	505661	Vulnerable	Dispersed	Habitat importance map	0.0000
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	10226	Vulnerable	Dispersed	Habitat importance map	0.0000
Giant New Holland Daisy	*Vittadinia megacephala*	503540	Vulnerable	Dispersed	Habitat importance map	0.0000
Waterbush	*Myoporum montanum*	502240	Rare	Dispersed	Habitat importance map	0.0000
Sand Brome	*Bromus arenarius*	500497	Rare	Dispersed	Habitat importance map	0.0000
Hairy Tails	*Ptilotus erubescens*	502825	Vulnerable	Dispersed	Habitat importance map	0.0000
Umbrella Grass	*Digitaria divaricatissima var. divaricatissima*	501045	Vulnerable	Dispersed	Habitat importance map	0.0000
Silver Saltbush	*Atriplex rhagodioides*	500331	Vulnerable	Dispersed	Habitat importance map	0.0000
Buloke Mistletoe	*Amyema linophylla subsp. orientalis*	500217	Vulnerable	Dispersed	Habitat importance map	0.0000
Club-hair New Holland Daisy	*Vittadinia condyloides*	503536	Rare	Dispersed	Habitat importance map	0.0000
Silver Cassia	*Senna form taxon 'artemisioides'*	500663	Endangered	Dispersed	Habitat importance map	0.0000
Winged Peppercress	*Lepidium monoplocoides*	501905	Endangered	Dispersed	Habitat importance map	0.0000
Spear-grass	*Austrostipa trichophylla*	504512	Rare	Dispersed	Habitat importance map	0.0000
Mallee Annual-bluebell	*Wahlenbergia tumidifructa*	504060	Rare	Dispersed	Habitat importance map	0.0000
Southern Swainson-pea	*Swainsona behriana*	504944	Rare	Dispersed	Habitat importance map	0.0000
Little Egret	*Egretta garzetta nigripes*	10185	Endangered	Dispersed	Habitat importance map	0.0000
Buloke	*Allocasuarina luehmannii*	500678	Endangered	Dispersed	Habitat importance map	0.0000
Bristly Sea-heath	*Frankenia serpyllifolia*	501374	Rare	Dispersed	Habitat importance map	0.0000
Twin-flower Saltbush	*Dissocarpus biflorus var. biflorus*	501074	Rare	Dispersed	Habitat importance map	0.0000

Pale Plover-daisy	*Leiocarpa leptolepis*	503782	Endangered	Dispersed	Habitat importance map	0.0000
Finger Grass	*Dactyloctenium radulans*	500949	Rare	Dispersed	Habitat importance map	0.0000
Freckled Duck	*Stictonetta naevosa*	10214	Endangered	Dispersed	Habitat importance map	0.0000
Blue-billed Duck	*Oxyura australis*	10216	Endangered	Dispersed	Habitat importance map	0.0000
Australian Little Bittern	*Ixobrychus dubius*	10195	Endangered	Dispersed	Habitat importance map	0.0000
Intermediate Egret	*Ardea intermedia*	10186	Endangered	Dispersed	Habitat importance map	0.0000
Scaly Poa	*Poa fax*	502592	Rare	Dispersed	Habitat importance map	0.0000
Scrambling Twin-leaf	*Zygophyllum angustifolium*	504117	Rare	Dispersed	Habitat importance map	0.0000
Eastern Great Egret	*Ardea modesta*	10187	Vulnerable	Dispersed	Habitat importance map	0.0000
Cane Grass	*Eragrostis australasica*	501184	Vulnerable	Dispersed	Habitat importance map	0.0000
Musk Duck	*Biziura lobata*	10217	Vulnerable	Dispersed	Habitat importance map	0.0000
Small Water-fire	*Bergia trimera*	500387	Vulnerable	Dispersed	Habitat importance map	0.0000
Nealie	*Acacia loderi*	500052	Vulnerable	Dispersed	Habitat importance map	0.0000
Twiggy Sida	*Sida intricata*	503143	Vulnerable	Dispersed	Habitat importance map	0.0000
Baillon's Crake	*Porzana pusilla palustris*	10050	Vulnerable	Dispersed	Habitat importance map	0.0000
Mealy Saltbush	*Atriplex pseudocampanulata*	500330	Rare	Dispersed	Habitat importance map	0.0000
Spiny Lignum	*Duma horrida subsp. horrida*	502230	Rare	Dispersed	Habitat importance map	0.0000
Hardhead	*Aythya australis*	10215	Vulnerable	Dispersed	Habitat importance map	0.0000
Half-bearded Spear-grass	*Austrostipa hemipogon*	503985	Rare	Dispersed	Habitat importance map	0.0000
Carpet Python	*Morelia spilota metcalfei*	62969	Endangered	Dispersed	Habitat importance map	0.0000
Coral Saltbush	*Atriplex papillata*	500327	Rare	Dispersed	Habitat importance map	0.0000
Australasian Shoveler	*Anas rhynchotis*	10212	Vulnerable	Dispersed	Habitat importance map	0.0000
Dwarf Bitter-cress	*Rorippa eustylis*	502944	Rare	Dispersed	Habitat importance map	0.0000
Red Microcybe	*Microcybe multiflora subsp. multiflora*	502177	Vulnerable	Dispersed	Habitat importance map	0.0000

Smooth Minuria	*Minuria integerrima*	502201	Rare	Dispersed	Habitat importance map	0.0000
Branching Groundsel	*Senecio cunninghamii var. cunninghamii*	503104	Rare	Dispersed	Habitat importance map	0.0000
White Twin-leaf	*Zygophyllum simile*	504116	Rare	Dispersed	Habitat importance map	0.0000
Spreading Cress	*Phlegmatospermum eremaeum*	502495	Vulnerable	Dispersed	Habitat importance map	0.0000
Small Elachanth	*Elachanthus pusillus*	501135	Rare	Dispersed	Habitat importance map	0.0000
Needle Grass	*Triraphis mollis*	503456	Rare	Dispersed	Habitat importance map	0.0000
Growling Grass Frog	*Litoria raniformis*	13207	Endangered	Dispersed	Habitat importance map	0.0000
Pointed Saltbush	*Atriplex acutibractea subsp. karoniensis*	504228	Rare	Dispersed	Habitat importance map	0.0000
Slit-wing Bluebush	*Maireana georgei*	503863	Vulnerable	Dispersed	Habitat importance map	0.0000
Sarcozona	*Sarcozona praecox*	503014	Rare	Dispersed	Habitat importance map	0.0000
Streaked Wattle	*Acacia lineata*	500050	Rare	Dispersed	Habitat importance map	0.0000
Australian Bustard	*Ardeotis australis*	10176	Critically endangered	Dispersed	Habitat importance map	0.0000
Fuzzy New Holland Daisy	*Vittadinia cuneata var. hirsuta*	505068	Rare	Dispersed	Habitat importance map	0.0000
Elegant Parrot	*Neophema elegans*	10307	Vulnerable	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Cane Spear-grass	*Austrostipa breviglumis*	503268	Rare	Dispersed	Habitat importance map	0.0000
Small Podolepis	*Podolepis muelleri*	507354	Endangered	Dispersed	Habitat importance map	0.0000
Spear-fruit Copperburr	*Sclerolaena patenticuspis*	503079	Vulnerable	Dispersed	Habitat importance map	0.0000
Bush Minuria	*Minuria cunninghamii*	502199	Rare	Dispersed	Habitat importance map	0.0000
Grassland Bindweed	*Convolvulus graminetinus*	507683	Endangered	Dispersed	Habitat importance map	0.0000
Tough Scurf-pea	*Cullen tenax*	502776	Endangered	Dispersed	Habitat importance map	0.0000
Wait-a-while	*Acacia colletioides*	500022	Rare	Dispersed	Habitat importance map	0.0000
Plains-wanderer	*Pedionomus torquatus*	10020	Critically endangered	Dispersed	Habitat importance map	0.0000

Common White Sunray	*Rhodanthe floribunda*	505296	Endangered	Dispersed	Habitat importance map	0.0000
Hooded Scaly-foot	*Pygopus schraderi*	12176	Critically endangered	Dispersed	Habitat importance map	0.0000
Northern Sandalwood	*Santalum lanceolatum*	503005	Endangered	Dispersed	Habitat importance map	0.0000
Woolly Minuria	*Minuria denticulata*	502200	Rare	Dispersed	Habitat importance map	0.0000
Inland Pomaderris	*Pomaderris paniculosa subsp. paniculosa*	503943	Vulnerable	Dispersed	Habitat importance map	0.0000
Pearl Bluebush	*Maireana sedifolia*	502113	Rare	Dispersed	Habitat importance map	0.0000
Erect Peppercress	*Lepidium pseudopapillosum*	501909	Endangered	Dispersed	Habitat importance map	0.0000
Pepper Grass	*Panicum laevinode*	504808	Vulnerable	Dispersed	Habitat importance map	0.0000
Swamp Buttercup	*Ranunculus undosus*	502915	Vulnerable	Dispersed	Habitat importance map	0.0000
Twin-leaf Bedstraw	*Asperula gemella*	500280	Rare	Dispersed	Habitat importance map	0.0000
Dwarf Brooklime	*Gratiola pumilo*	503753	Rare	Dispersed	Habitat importance map	0.0000
Wilga	*Geijera parviflora*	501419	Endangered	Dispersed	Habitat importance map	0.0000
Western Rat-tail Grass	*Sporobolus creber*	503228	Vulnerable	Dispersed	Habitat importance map	0.0000
Spreading Emu-bush	*Eremophila divaricata subsp. divaricata*	501200	Rare	Dispersed	Habitat importance map	0.0000
Pop Saltbush	*Atriplex holocarpa*	500333	Vulnerable	Dispersed	Habitat importance map	0.0000
Woolly Mantle	*Eriochlamys behrii s.s.*	505666	Rare	Dispersed	Habitat importance map	0.0000
White-browed Treecreeper	*Climacteris affinis*	10561	Vulnerable	Dispersed	Habitat importance map	0.0000
Bandy Bandy	*Vermicella annulata*	12734	Vulnerable	Dispersed	Habitat importance map	0.0000
Common Dunnart	*Sminthopsis murina murina*	11061	Vulnerable	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

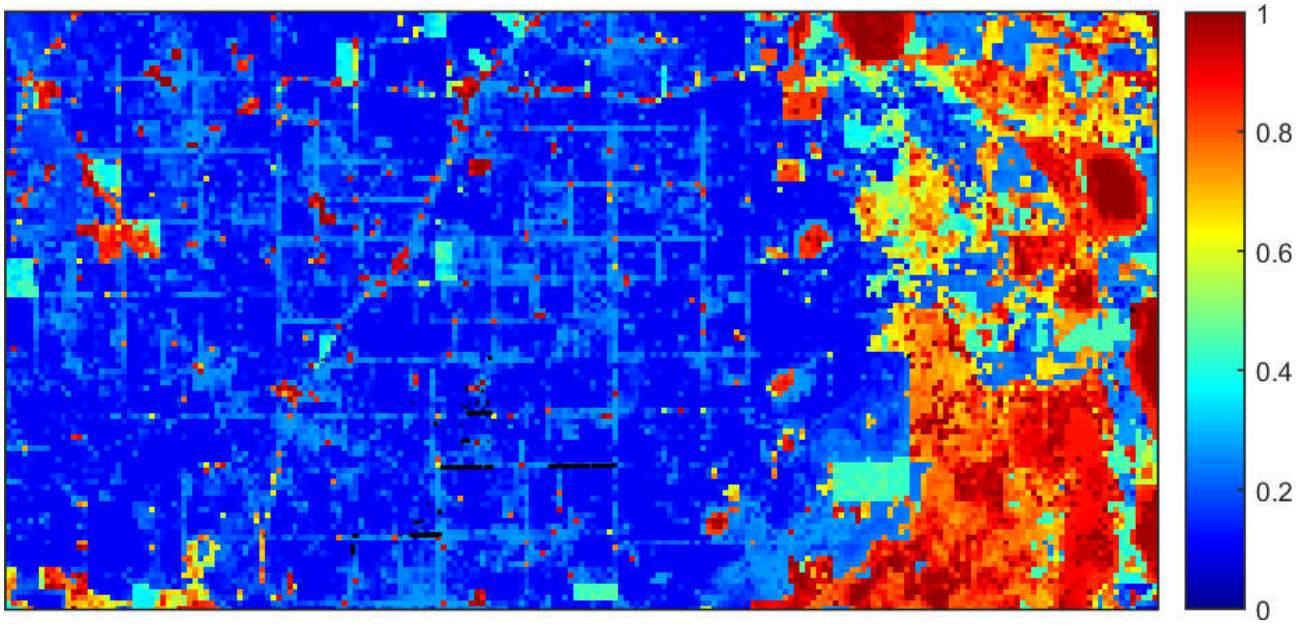
Habitat impacted

- 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

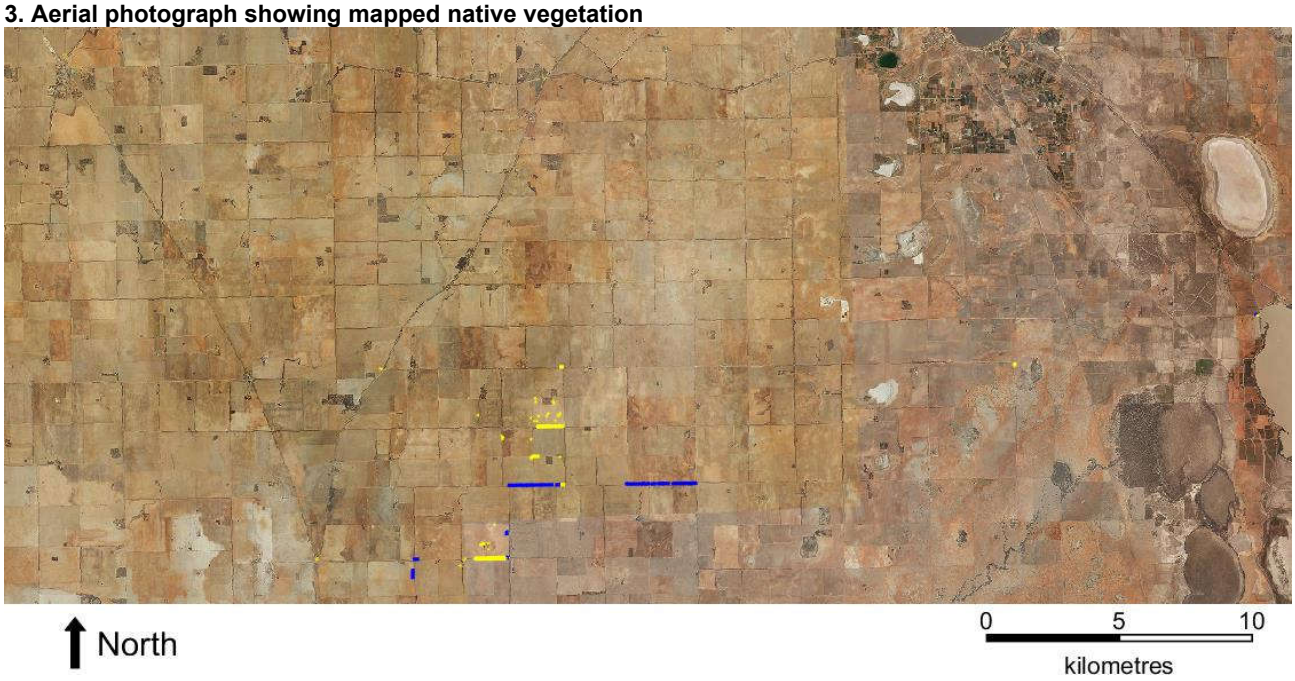
- Selected VBA record is an area in Victoria that represents a large population, roosting or breeding site etc.

Appendix 3 – Images of mapped native vegetation

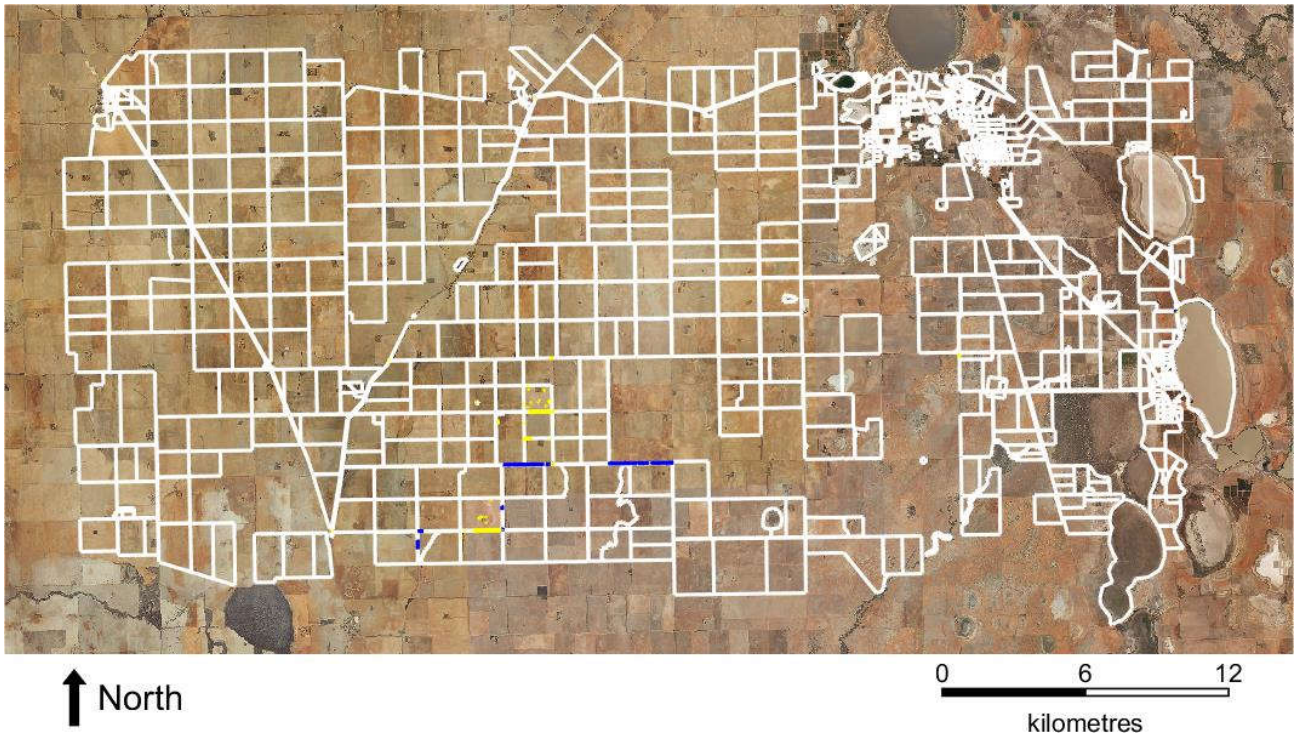
2. Strategic biodiversity values map



3. Aerial photograph showing mapped native vegetation



4. Map of the property in context



Yellow boundaries denote areas of proposed native vegetation removal.

Blue boundaries denote zones of partial removal with a halved condition score.

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: **16/09/2022**
Time of issue: **12:57 pm**

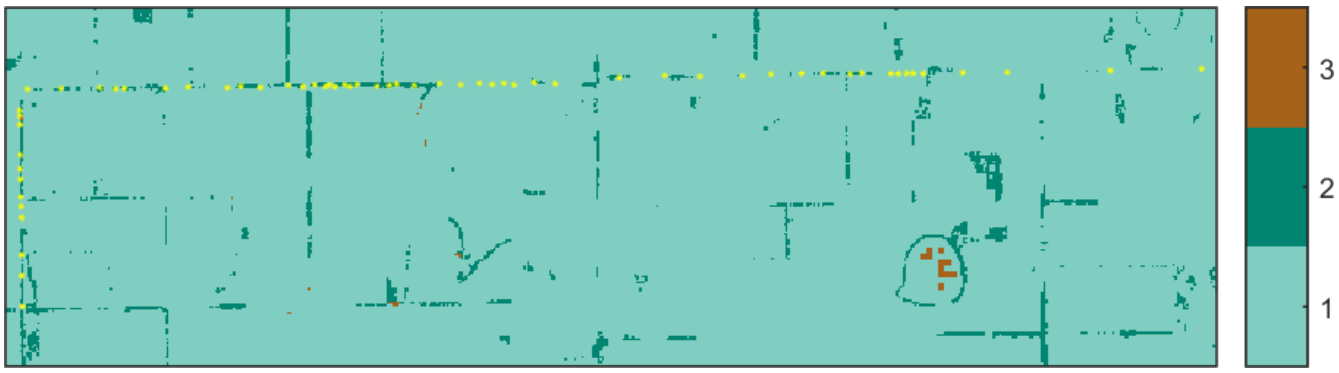
Report ID: NAA_2022_139

Project ID	18163_Goschen_Sands_ALL_Removal_B2_220830

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	4.289 ha
Extent of past removal	0.000 ha
Extent of proposed removal	4.289 ha
No. Large trees proposed to be removed	61
Location category of proposed removal	Location 3 The native vegetation is in an area where the removal of less than 0.5 hectares could have a significant impact on habitat for one or more rare or threatened species.The native vegetation is also in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map).

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]	2.372 general habitat units
Vicinity	North Central Catchment Management Authority (CMA) or Gannawarra Shire Council
Minimum strategic biodiversity value score[2]	0.167
Large trees	61 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**
5-CAV 3	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.260		0.041	General
5-CAV 4	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.270		0.041	General
5-CAV 5	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.270		0.041	General
5-CAV 6	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.270		0.041	General
5-CAV 7	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.260		0.041	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
5-CAP1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.260		0.041	General
5-CAP2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.228		0.039	General
5-CAL	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.190		0.038	General
5-CAK1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.270		0.041	General
5-CAK2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.270		0.041	General
5-AN	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.224		0.039	General
5-AQ	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.100		0.035	General
5-AP1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.210		0.039	General
5-AP2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.100		0.035	General
5-AK	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.100		0.035	General
5-AI	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.230		0.040	General
5-AF	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.130		0.036	General
5-JCY2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.140		0.037	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
5-JCY1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.100		0.035	General
5-JCZ	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.181		0.038	General
5-JCY3	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.200		0.039	General
5-JDD2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.200		0.039	General
5-JDD1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.107		0.036	General
5-JDF	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.170		0.038	General
5-JDK	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.170		0.038	General
5-JDL1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.100		0.035	General
5-JDN	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.100		0.035	General
5-JDL2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.230		0.040	General
5-EEE	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.210		0.039	General
5-EEG1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.160		0.037	General
5-EEG2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.210		0.039	General
5-EEP2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.162		0.037	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
5-EEP1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.210		0.039	General
5-EEP3	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.199		0.039	General
5-EEH	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.204		0.039	General
5-EEM	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.190		0.038	General
5-EEL	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.200		0.039	General
5-EEK1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.203		0.039	General
5-EEK2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.100		0.035	General
5-HBG2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.260		0.041	General
5-HBG1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.250		0.040	General
5-HBH2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.260		0.041	General
5-HBH1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.260		0.041	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
5-HBG3	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.259		0.040	General
5-HBH3	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.240		0.040	General
5-HBG4	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.240		0.040	General
5-HBH4	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.220		0.039	General
5-HBD	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.220		0.039	General
5-BE	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.930		0.062	General
5-HBE1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.222		0.039	General
5-HAU	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.150		0.037	General
5-HBE2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.150		0.037	General
5-HBI	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.223		0.039	General
5-HBK	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.230		0.040	General
5-HBO	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.220		0.039	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
5-HBM	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.143		0.037	General
5-HBJ	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.120		0.036	General
5-HBL2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.110		0.036	General
5-HBL1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.118		0.036	General
5-CAV 1	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.260		0.041	General
5-CAV 2	Canopy Tree	mum_0824	Vulnerable	1	no	0.610	0.070	0.070	0.260		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
Dwarf Myall	*Acacia ancistrophylla var. lissophylla*	500051	Vulnerable	Highly Localised Habitat	Habitat importance map	0.0048
Downy Swainson-pea	*Swainsona swainsonioides*	503328	Endangered	Dispersed	Habitat importance map	0.0002
Winged New Holland Daisy	*Vittadinia pterochaeta*	503542	Vulnerable	Dispersed	Habitat importance map	0.0002
Slender Darling-pea	*Swainsona murrayana*	503321	Endangered	Dispersed	Habitat importance map	0.0002
Blue Mallee	*Eucalyptus polybractea*	501311	Rare	Dispersed	Habitat importance map	0.0002
Chariot Wheels	*Maireana cheelii*	502099	Vulnerable	Dispersed	Habitat importance map	0.0002
Yarran	*Acacia melvillei*	500058	Vulnerable	Dispersed	Habitat importance map	0.0002
Purple Love-grass	*Eragrostis lacunaria*	501190	Vulnerable	Dispersed	Habitat importance map	0.0001
Riverine Flax-lily	*Dianella porracea*	504266	Vulnerable	Dispersed	Habitat importance map	0.0001
Scaly Mantle	*Eriochlamys squamata*	505661	Vulnerable	Dispersed	Habitat importance map	0.0001
Long Eryngium	*Eryngium paludosum*	501238	Vulnerable	Dispersed	Habitat importance map	0.0001
Heathy Bluebush	*Maireana oppositifolia*	502106	Rare	Dispersed	Habitat importance map	0.0001
Three-nerve Wattle	*Acacia trineura*	500096	Vulnerable	Dispersed	Habitat importance map	0.0001
Yakka Grass	*Sporobolus caroli*	503227	Rare	Dispersed	Habitat importance map	0.0001
Pin Sida	*Sida fibulifera*	503142	Vulnerable	Dispersed	Habitat importance map	0.0001
Small Monkey-flower	*Elacholoma prostrata*	502196	Rare	Dispersed	Habitat importance map	0.0001
Swamp Sheoak	*Casuarina obesa*	500682	Endangered	Dispersed	Habitat importance map	0.0001
Yellow-tongue Daisy	*Brachyscome chrysoglossa*	503654	Vulnerable	Dispersed	Habitat importance map	0.0001
Needle Wattle	*Acacia havilandiorum*	500043	Endangered	Dispersed	Habitat importance map	0.0001

Bristly Love-grass	*Eragrostis setifolia*	501195	Vulnerable	Dispersed	Habitat importance map	0.0001
Purple Pentatrope	*Rhyncharrhena linearis*	502934	Vulnerable	Dispersed	Habitat importance map	0.0001
Fine-hairy Spear-grass	*Austrostipa puberula*	503988	Rare	Dispersed	Habitat importance map	0.0001
Round Templetonia	*Templetonia egena*	503340	Vulnerable	Dispersed	Habitat importance map	0.0001
Red Swainson-pea	*Swainsona plagiotropis*	503324	Endangered	Dispersed	Habitat importance map	0.0001
Frosted Goosefoot	*Chenopodium desertorum subsp. desertorum*	504380	Rare	Dispersed	Habitat importance map	0.0001
Small Burr-grass	*Tragus australianus*	503418	Rare	Dispersed	Habitat importance map	0.0001
Milkwort Sunray	*Rhodanthe polygalifolia*	501649	Rare	Dispersed	Habitat importance map	0.0001
Neat Spear-grass	*Austrostipa mundula*	503281	Rare	Dispersed	Habitat importance map	0.0001
Fuzzy New Holland Daisy	*Vittadinia cuneata var. morrisii*	505060	Rare	Dispersed	Habitat importance map	0.0001
Small-flower Tobacco	*Nicotiana goodspeedii*	502273	Rare	Dispersed	Habitat importance map	0.0001
Yellow Burr-daisy	*Calotis lappulacea*	500598	Rare	Dispersed	Habitat importance map	0.0001
Grassland Velleia	*Velleia arguta*	503487	Rare	Dispersed	Habitat importance map	0.0001
Spiny Goosefoot	*Rhagodia ulicina*	502931	Rare	Dispersed	Habitat importance map	0.0001
Green-leaf Mallee	*Eucalyptus phenax subsp. phenax*	504270	Rare	Dispersed	Habitat importance map	0.0001
Twining Purslane	*Calandrinia volubilis*	500556	Rare	Dispersed	Habitat importance map	0.0001
Button Immortelle	*Leptorhynchos waitzia*	501949	Vulnerable	Dispersed	Habitat importance map	0.0001
Small Water-fire	*Bergia trimera*	500387	Vulnerable	Dispersed	Habitat importance map	0.0001
Grey Podolepis	*Podolepis aristata subsp. affinis*	502614	Rare	Dispersed	Habitat importance map	0.0001
Desert Jasmine	*Jasminum didymum subsp. lineare*	501801	Vulnerable	Dispersed	Habitat importance map	0.0001
Broom Bitter-pea	*Daviesia genistifolia s.s.*	503813	Rare	Dispersed	Habitat importance map	0.0001
Southern Swainson-pea	*Swainsona behriana*	504944	Rare	Dispersed	Habitat importance map	0.0001
Dwarf Swainson-pea	*Swainsona phacoides*	503323	Endangered	Dispersed	Habitat importance map	0.0001
Umbrella Wattle	*Acacia oswaldii*	500070	Vulnerable	Dispersed	Habitat importance map	0.0001

Frosted Goosefoot	*Chenopodium desertorum subsp. rectum*	504382	Vulnerable	Dispersed	Habitat importance map	0.0001
Winged Peppercress	*Lepidium monoplocoides*	501905	Endangered	Dispersed	Habitat importance map	0.0001
Sand Brome	*Bromus arenarius*	500497	Rare	Dispersed	Habitat importance map	0.0000
Satin Daisy-bush	*Olearia minor*	504130	Rare	Dispersed	Habitat importance map	0.0000
Bristly Sea-heath	*Frankenia serpyllifolia*	501374	Rare	Dispersed	Habitat importance map	0.0000
Buloke Mistletoe	*Amyema linophylla subsp. orientalis*	500217	Vulnerable	Dispersed	Habitat importance map	0.0000
Scrambling Twin-leaf	*Zygophyllum angustifolium*	504117	Rare	Dispersed	Habitat importance map	0.0000
Bramble Wattle	*Acacia victoriae subsp. victoriae*	500101	Rare	Dispersed	Habitat importance map	0.0000
Nealie	*Acacia loderi*	500052	Vulnerable	Dispersed	Habitat importance map	0.0000
Club-hair New Holland Daisy	*Vittadinia condyloides*	503536	Rare	Dispersed	Habitat importance map	0.0000
Hairy Tails	*Ptilotus erubescens*	502825	Vulnerable	Dispersed	Habitat importance map	0.0000
Spear-grass	*Austrostipa trichophylla*	504512	Rare	Dispersed	Habitat importance map	0.0000
Waterbush	*Myoporum montanum*	502240	Rare	Dispersed	Habitat importance map	0.0000
Umbrella Grass	*Digitaria divaricatissima var. divaricatissima*	501045	Vulnerable	Dispersed	Habitat importance map	0.0000
Cane Spear-grass	*Austrostipa breviglumis*	503268	Rare	Dispersed	Habitat importance map	0.0000
Coral Saltbush	*Atriplex papillata*	500327	Rare	Dispersed	Habitat importance map	0.0000
Buloke	*Allocasuarina luehmannii*	500678	Endangered	Dispersed	Habitat importance map	0.0000
Sarcozona	*Sarcozona praecox*	503014	Rare	Dispersed	Habitat importance map	0.0000
Grey Falcon	*Falco hypoleucos*	10236	Endangered	Dispersed	Habitat importance map	0.0000
Slit-wing Bluebush	*Maireana georgei*	503863	Vulnerable	Dispersed	Habitat importance map	0.0000
Cane Grass	*Eragrostis australasica*	501184	Vulnerable	Dispersed	Habitat importance map	0.0000
Spreading Cress	*Phlegmatospermum eremaeum*	502495	Vulnerable	Dispersed	Habitat importance map	0.0000
Giant New Holland Daisy	*Vittadinia megacephala*	503540	Vulnerable	Dispersed	Habitat importance map	0.0000

Pointed Saltbush	*Atriplex acutibractea subsp. karoniensis*	504228	Rare	Dispersed	Habitat importance map	0.0000
Mallee Annual-bluebell	*Wahlenbergia tumidifructa*	504060	Rare	Dispersed	Habitat importance map	0.0000
Needle Grass	*Triraphis mollis*	503456	Rare	Dispersed	Habitat importance map	0.0000
Twiggy Sida	*Sida intricata*	503143	Vulnerable	Dispersed	Habitat importance map	0.0000
Finger Grass	*Dactyloctenium radulans*	500949	Rare	Dispersed	Habitat importance map	0.0000
Spiny Lignum	*Duma horrida subsp. horrida*	502230	Rare	Dispersed	Habitat importance map	0.0000
Northern Sandalwood	*Santalum lanceolatum*	503005	Endangered	Dispersed	Habitat importance map	0.0000
Half-bearded Spear-grass	*Austrostipa hemipogon*	503985	Rare	Dispersed	Habitat importance map	0.0000
White Twin-leaf	*Zygophyllum simile*	504116	Rare	Dispersed	Habitat importance map	0.0000
Silver Cassia	*Senna form taxon 'artemisioides'*	500663	Endangered	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Branching Groundsel	*Senecio cunninghamii var. cunninghamii*	503104	Rare	Dispersed	Habitat importance map	0.0000
Streaked Wattle	*Acacia lineata*	500050	Rare	Dispersed	Habitat importance map	0.0000
Red Microcybe	*Microcybe multiflora subsp. multiflora*	502177	Vulnerable	Dispersed	Habitat importance map	0.0000
Finger-leaved Daisy	*Brachyscome exilis*	500457	Rare	Dispersed	Habitat importance map	0.0000
Small Elachanth	*Elachanthus pusillus*	501135	Rare	Dispersed	Habitat importance map	0.0000
Dwarf Bitter-cress	*Rorippa eustylis*	502944	Rare	Dispersed	Habitat importance map	0.0000
Wait-a-while	*Acacia colletioides*	500022	Rare	Dispersed	Habitat importance map	0.0000

Habitat group

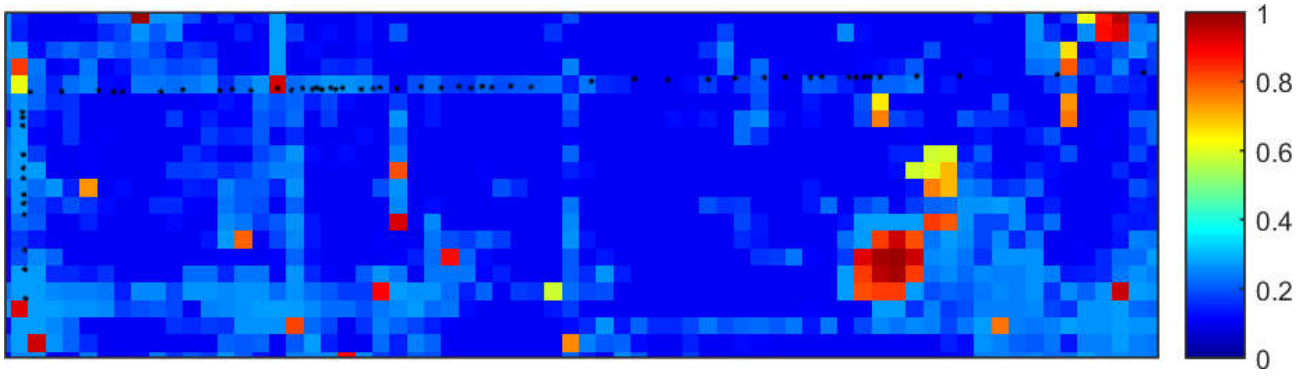
- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

Habitat impacted

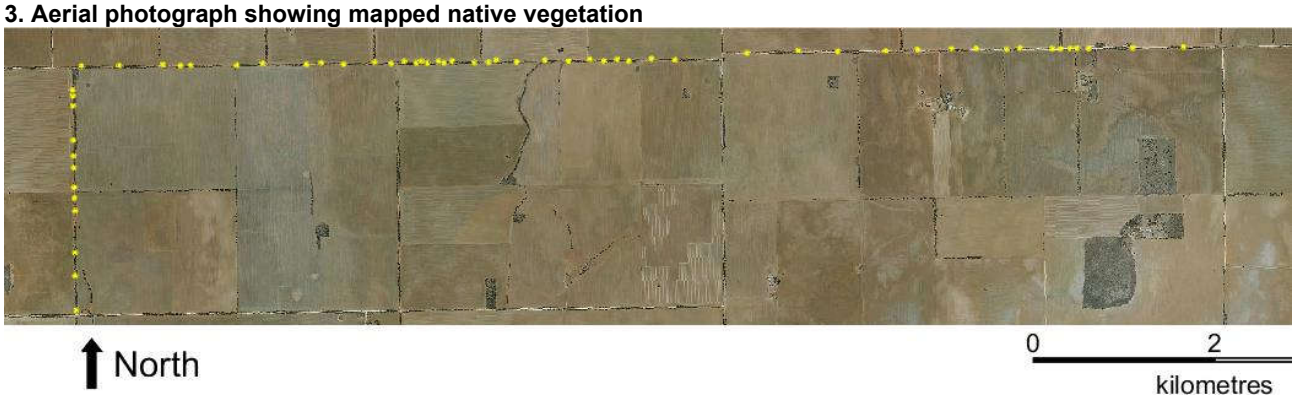
- Habitat importance maps are the maps defined in the Guidelines that include all the mapped habitat for a rare or threatened species
- Top ranking maps are the maps defined in the Guidelines that depict the important areas of a dispersed species habitat, developed from the highest habitat importance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

Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map



3. Aerial photograph showing mapped native vegetation



4. Map of the property in context

Yellow boundaries denote areas of proposed native vegetation removal.

Appendix 4: Report of 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: 20/02/2023 01:49 **Report ID: 17779**

What was searched for?

General offset

General habitat units	Strategic biodiversity value	Large trees	Vicinity (Catchment Management Authority or Municipal district)	
4.819	0.179	568	CMA	Mallee
			or CMA	North Central
			or LGA	Gannawarra Shire
			or LGA	Swan Hill Rural City

Details of available native vegetation credits on 20 February 2023 01:49

These sites meet your requirements for general offsets.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
VC_CFL-3685_01	6.146	5456	Mallee	Yarriambiack Shire	Yes	Yes	No	VegLink
VC_CFL-3686_01	10.053	1326	Mallee	Swan Hill Rural City	Yes	Yes	No	Contact NVOR
VC_CFL-3694_01	19.250	12334	Mallee	Mildura Rural City	Yes	Yes	No	Bio Offsets
VC_CFL-3773_01	6.928	1262	North Central	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_TFN-09000_01	52.172	657	Mallee	Swan Hill Rural City	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 DELWP Customer Service Centre 136 186 or the Native Vegetation Credit Register at nativevegetation.offsetregister@delwp.vic.gov.au

Appendix 5: Flora species recorded within the study area

Origin	Common name	Scientific name	Strata	FFG-T	FFG-P	CaLP Act
	Gold-dust Wattle	*Acacia acinacea s.l.*	Understory		p	
	Dwarf Myall	*Acacia ancistrophylla var. lissophylla*	Understory	EN	p	
	Grey Mulga	*Acacia brachybotrya s.l.*	Understory		p	
	Hakea Wattle	*Acacia hakeoides*	Understory		p	
	Hall's Wattle	*Acacia halliana*	Understory		p	
	Yarran	*Acacia melvillei*	Understory	CR	p	
	Mallee Wattle	*Acacia montana*	Understory		p	
	Umbrella Wattle	*Acacia oswaldii*	Understory	CR	p	
	Nealie	*Acacia rigens*	Understory		p	
	Eumong	*Acacia stenophylla*	Understory		p	
	Three-nerve Wattle	*Acacia trineura*	Understory	CR	p	
	Cattle Bush	*Alectryon oleifolius subsp. canescens*	Understory			
	Buloke	*Allocasuarina luehmannii*	Midstory/Canopy	CR	p	
*	Cape weed	*Arctotheca calendula*	Groundcover			
	Brush Wire-grass	*Aristida behriana*	Groundcover			
*	Bridal Creeper	*Asparagus asparagoides*	Scrambler			R
*	Onion Weed	*Asphodelus fistulosus*	Groundcover			R
	Flat-top Saltbush	*Atriplex lindleyi*	Groundcover			
	Old-man Saltbush	*Atriplex nummularia*	Understory			
	Mealy Saltbush	*Atriplex pseudocampanulata*	Groundcover			
	Berry Saltbush	*Atriplex semibaccata*	Groundcover			
	Desert Spear-grass	*Austrostipa eremophila*	Groundcover			
	Flat-awned Spear-grass	*Austrostipa platychaeta*	Groundcover			
	Rough Spear-grass	*Austrostipa scabra subsp. falcata*	Groundcover			
*	Wild Oat	*Avena fatua*	Groundcover			
	Red-leg Grass	*Bothriochloa macra*	Groundcover			
*	Twiggy Turnip	*Brassica fruticulosa*	Groundcover			
*	Mediterranean Turnip	*Brassica tournefortii*	Groundcover			
*	Great Brome	*Bromus diandrus*	Groundcover			
*	Red Brome	*Bromus rubens*	Groundcover			
	Scarlet Bottlebrush	*Callistemon rugulosus*	Understory			
	Slender Cypress-pine	*Callitris gracilis*	Midstory/Canopy			
	Scrub Cypress-pine	*Callitris verrucosa*	Midstory/Canopy			
	Lemon Beauty-heads	*Calocephalus citreus*	Groundcover		p	
	Ward's Weed	*Carrichtera annua*	Groundcover			

Origin	Common name	Scientific name	Strata	FFG-T	FFG-P	CaLP Act
	Coarse Dodder-laurel	*Cassytha melantha*	Scrambler			
	Frosted Goosefoot	*Chenopodium desertorum* subsp. *desertorum*	Understory	EN		
	Frosted Goosefoot	*Chenopodium desertorum* subsp. *rectum*	Understory	EN		
	Nitre Goosefoot	*Chenopodium nitrariaceum*	Understory			
	Windmill Grass	*Chloris truncata*	Groundcover			
*	Camel Melon	*Citrullus lanatus*	Groundcover			
	Small-leaved Clematis	*Clematis microphylla* s.l.	Scrambler			
	Pink Bindweed	*Convolvulus erubescens* s.l.	Groundcover			
*	Flaxleaf Fleabane	*Conyza bonariensis*	Groundcover			
	Hoary Scurf-pea	*Cullen cinereum*	Groundcover		p	
*	Field Dodder	*Cuscuta campestris*	Scrambler			C
*	Couch	*Cynodon dactylon*	Groundcover			
	Black-anther Flax-lily	*Dianella revoluta* s.l.	Groundcover			
	Silky Blue-grass	*Dichanthium sericeum* subsp. *sericeum*	Groundcover			
	Slender Hop-bush	*Dodonaea viscosa* subsp. *angustissima*	Understory			
*	Paterson's Curse	*Echium plantagineum*	Groundcover			C
	Nodding Saltbush	*Einadia nutans*	Groundcover			
	Ruby Saltbush (prostrate southern form & shrubby inland form	*Enchylaena tomentosa* var. *tomentosa*	Groundcover			
	Common Emu-bush	*Eremophila glabra* subsp. *glabra*	Understory		p	
	Berrigan	*Eremophila longifolia*	Understory		p	
	Bull Mallee	*Eucalyptus behriana*	Canopy			
	Red Mallee	*Eucalyptus calycogona*	Canopy			
*	Sugar Gum	*Eucalyptus cladocalyx*	Canopy			
	Dumosa Mallee	*Eucalyptus dumosa*	Canopy			
	Black Box	*Eucalyptus largiflorens*	Canopy			
	Slender-leaf Mallee	*Eucalyptus leptophylla*	Canopy			
	Oil Mallee	*Eucalyptus oleosa*	Canopy			
	Grey Mallee	*Eucalyptus socialis*	Canopy			
	Leafless Ballart	*Exocarpos aphyllus*	Understory/Midstory			
*	Gazania	*Gazania linearis*	Groundcover			
	Comb Grevillea	*Grevillea huegelii*	Understory		p	
	Silver Needlewood	*Hakea leucoptera* subsp. *leucoptera*	Understory/Midstory			
*	Common Heliotrope	*Heliotropium europaeum*	Groundcover			

Origin	Common name	Scientific name	Strata	FFG-T	FFG-P	CaLP Act
*	Yorkshire Fog	*Holcus lanatus*	Groundcover			
*	Barley-grass	*Hordeum murinum* s.l.	Groundcover			
	Gold Rush	*Juncus flavidus*	Groundcover			
*	Prickly Lettuce	*Lactuca serriola*	Groundcover			
*	Common Peppercress	*Lepidium africanum*	Groundcover			
*	Rye Grass	*Lolium spp.*	Groundcover			
	Australian Box-thorn	*Lycium australe*	Understory			
*	African Box-thorn	*Lycium ferocissimum*	Understory			C
*	Pimpernel	*Lysimachia arvensis*	Groundcover			
	Black Cotton-bush	*Maireana decalvans* s.l.	Groundcover			
	Wingless Bluebush	*Maireana enchylaenoides*	Groundcover			
*	Horehound	*Marrubium vulgare*	Groundcover			C
	Common Nardoo	*Marsilea drummondii*	Groundcover		p	
	Moonah	*Melaleuca lanceolata*	Understory/Midstory			
	Bush Minuria	*Minuria cunninghamii*	Groundcover	VU	p	
	Sugarwood	*Myoporum platycarpum*	Understory-Canopy			
	Nitre-bush	*Nitraria billardierei*	Understory			
	Pimelea Daisy-bush	*Olearia pimeleoides*	Understory		p	
*	Prickly pear	*Opuntia* spp.	Understory			
*	Soursob	*Oxalis pes-caprae*	Groundcover			R
*	Paspalum	*Paspalum dilatatum*	Groundcover			
*	Sticky Ground-cherry	*Physalis hederifolia*	Groundcover			C
	Weeping Pittosporum	*Pittosporum angustifolium*	Understory-Canopy			
	Hairy Forget-me-not	*Plagiobothrys elachanthus*	Groundcover			
*	Ribwort	*Plantago lanceolata*	Groundcover			
	Fragrant Saltbush	*Rhagodia parabolica*	Understory	VU		
	Hedge Saltbush	*Rhagodia spinescens*	Understory			
*	Curled Dock	*Rumex crispus*	Groundcover			
	Common Wallaby-grass	*Rytidosperma caespitosum*	Groundcover			
	Wallaby Grass	*Rytidosperma* spp.	Groundcover			
	Prickly Saltwort	*Salsola tragus*	Groundcover			
*	Wild Sage	*Salvia verbenaca*	Groundcover			
	Sweet Quandong	*Santalum acuminatum*	Understory			
*	Pepper Tree	*Schinus molle*	Midstory/Canopy			
	Grey Copperburr	*Sclerolaena diacantha*	Groundcover			
	Grey Roly-poly	*Sclerolaena muricata* var. *villosa*	Understory			

Origin	Common name	Scientific name	Strata	FFG-T	FFG-P	CaLP Act
	Broad-leaf Desert Cassia	*Senna artemisioides subsp. coriacea*	Understory			
	Fine-leaf Desert Cassia	*Senna artemisioides* subsp. *filifolia*	Understory			
	Variable Sida	*Sida corrugata*	Groundcover			
	Western Nightshade	*Solanum coactiliferum*	Groundcover			
*	Common Sow-thistle	*Sonchus oleraceus*	Groundcover			
	Flat Templetonia	*Templetonia rossii*	Understory			
	Grey Germander	*Teucrium racemosum* s.l.	Groundcover			
	Woolly Yellow-heads	*Trichanthodium skirrophorum*	Groundcover		p	
*	Narrow-leaf Clover	*Trifolium angustifolium* var. *angustifolium*	Groundcover			
	Porcupine Grass	*Triodia scariosa*	Groundcover			
	Common Vetch	*Vicia sativa subsp. sativa*	Groundcover			
	Annual New Holland Daisy	*Vittadinia cervicularis*	Groundcover		p	
	Fuzzweed	*Vittadinia cuneata* var. *cuneata*	Groundcover		p	
	Rigid Panic	*Walwhalleya proluta*	Groundcover			
	Stiff Westringia	*Westringia rigida*	Groundcover			
	Pointed Twin-leaf	*Zygophyllum apiculatum*	Groundcover			
	Shrubby Twin-leaf	*Zygophyllum aurantiacum* subsp. *aurantiacum*	Understory			
	Pale Twin-leaf	*Zygophyllum glaucum*	Groundcover			

Notes: FFG-T = threatened species status under the EPBC Act (CR = critically endangered; EN = endangered; VU = vulnerable); **FFG-P**: listed as protected (P) under the FFG Act; **CaLP Act**: declared noxious weeds under the CaLP Act (S = State Prohibited Weeds [any infestations are to be reported to DELWP. DELWP is responsible for control of State Prohibited Weeds]; P = Regionally Prohibited Weeds [Land owners must take all reasonable steps to eradicate regionally prohibited weeds on their land]; C = Regionally Controlled Weeds [Land owners have the responsibility to take all reasonable steps to prevent the growth and spread of Regionally controlled weeds on their land]; R = Restricted Weeds [Trade in these weeds and their propagules, either as plants, seeds or contaminants in other materials is prohibited].

* = introduced to Victoria

= Victorian native taxa occurring outside their natural range

Appendix 6: Photographs of native vegetation recorded in the study area

Patch of remnant Riverine Chenopod Woodland (EVC 103) comprising Black Box canopy

Patch of remnant Woorinen Mallee (EVC 824) along farm lane

Scattered Tree – Buloke (in amongst cereal crop stubble)

Patch of remnant Woorinen Mallee (EVC 824) along farm boundary

Scattered Tree – Slender Cypress Pine

Scattered tree - Dumosa Mallee