



Fingerboards Mineral Sands Project - Fauna Impact Mitigation and Landscape Plan

Kalbar

DOCUMENT TRACKING

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Abbreviations

Abbreviation	Description
DELWP	The Department of Environment, Land Water and Planning.
DAWE	The Department of Agriculture, Water and the Environment.
EE Act	<i>Environment Effects Act 1978</i> . Victorian legislation that requires the Environmental Effects of certain Works to be assessed, and for other purposes.
EES	Environment Effects Statement.
ELA	Eco Logical Australia Pty Ltd.
EMF	Environmental Management Framework.
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> . Key piece of national legislation to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places.
EVC	Ecological Vegetation Class.
FFG Act	<i>Flora and Fauna Guarantee Act 1988</i> . Key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes.
HMC	Heavy Mineral Concentrate.
Investigation Area	Up to 10 km from site, often used as a reference area to establish the likely presence of ecological values within the study area.
MNES	Matter of National Environmental Significance as defined under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
National significant	A Matter of National Environmental Significance (MNES) listed as critically endangered, endangered or vulnerable under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
PMST	Protected Matters Search Tool.
Project footprint	Area of impact.
RP	Rehabilitation Plan.
State significant	Listed as critically endangered, endangered or vulnerable in Victoria on a Department of Environment, Land, Water and Planning Advisory List (Department of Sustainability and Environment 2009; Department of Sustainability and Environment 2013; Department of Environment and Primary Industries 2014a). Listed as threatened under the Victorian <i>Flora and Fauna Guarantee Act 1988</i> .
the Plan	The Fauna Impact Mitigation and Landscape Augmentation Plan.
The Project	The Fingerboards Mineral Sands Project.
VBA	Victorian Biodiversity Atlas.

1. Introduction

1.1 Project background

The Fingerboards Mineral Sands Project (the Project) is located 20 km west of Bairnsdale in East Gippsland, Victoria. The project involves mining of mineral sands from the Fingerboards resource, which lies within the more extensive Glenaladale deposit, located in East Gippsland. Kalbar proposes to construct, operate, rehabilitate and close the mineral sands mine and associated infrastructure that form the Project. Over the life of the Project, Kalbar intends to extract 170 Mt of ore to produce around 8 Mt of heavy mineral concentrate (HMC) using the open-cut dry mining method with conventional earthmoving equipment. The mineral products will consist of rutile, zircon, ilmenite and rare earths which are in high demand globally for use in communications, transport, medicine technology and renewable energy.

The open cut mine will operate 24 hours per day, 365 days a year. The mine will be progressively rehabilitated over the life of the Project. Overburden and tailings from the operations will be returned to the void as part of the rehabilitation process. Of the material being removed during mining and processing, 95% will be returned to the void. The Project will operate for up to 20 years, including two years for construction and commissioning, 15 years of production at full capacity, followed by progressive closure activities (decommissioning, rehabilitation and post closure).

An Environment Effects Statement (EES) for the Project was submitted in September 2020, with potential for the operations to commence in 2022.

1.2 Document purpose

The Project will result in the loss, reduction or reduced viability of ecological values within the project area. Proposed actions including land clearing, the development of roads, pipelines and powerlines, disturbance to waterbodies, use of vehicles/machinery and a general increase in human activity are typically associated with several key threatening processes.

This document is a Fauna Impact Mitigation and Landscape Augmentation Plan (the Plan) for the Project. It includes actions and other information to mitigate the risk of direct and indirect impacts to fauna from potential threatening processes associated with the construction, operation and rehabilitation of the Project.

The Plan provides a framework for fauna and landscape stability management within the Fingerboards Mineral Sands Project area. This Plan should form part of the operational management plans including the Construction Environment Management Plan (CEMP).

The Plan will include the following:

- Objectives for species and species groups.
- Landform or activity specific management objectives/actions.
- Mitigation measures for each phase of the Project.
- Fauna Monitoring Program.

1.3 Study area

The project area is located in the East Gippsland region, in southeast Victoria. The proposed project area is approximately 1,675 hectares (ha), of which about 1,350 ha is proposed to be directly impacted. The progressive mining methods proposed for the project will result in a maximum area of disturbance of approximately 360 ha at any one time.

Key components of the project include:

- Project area, which includes the mine area (the area proposed to be mined) and associated infrastructure to transport and process the ore, as well as a 10-15 ha native seed production nursery.
- Infrastructure options area (separate to the project area), which includes pump stations and associated pipeline options, a groundwater borefield to supply the project with water from the Latrobe Group Aquifer, a road diversion corridor where existing roads can be diverted and relocated and new project roads and associated security infrastructure can be constructed, and options for the transport of concentrate offsite.
- Infrastructure corridor, within the infrastructure options area, which leads from the wet concentrator plant (WCP) to the Fernbank East rail siding, and includes a private haulage road, 66 kilovolt (kV) and 22 kV powerlines, and a water pipeline from the groundwater borefield to the contingency water dam.
- Transport of the concentrate by rail to the Port of Melbourne for export to overseas processing facilities (preferred option) or by road and rail to export ports.

Rehabilitation works will be carried out progressively to minimise stockpiled areas of overburden and topsoil. It is anticipated that on average, 80 ha of rehabilitation will be carried out each year, but the area will be variable.

1.4 Study methods

Relevant information sources were reviewed to identify the presence or likely occurrence of fauna species and habitat across the study area and surrounds. This included online databases, spatial datasets, scientific literature, previous reports and relevant environmental legislation, regulations and policies.

A summary of the information sources reviewed is provided in Table 1.

Table 1. Summary of information sources reviewed

Type	Source	Relevancy to assessment
Report	Detailed ecological investigations for the proposed fingerboards mineral sands project, Glenaladale, Victoria (EHP 2020)	Covers detailed biodiversity assessments and targeted flora and fauna surveys for the project area.
Report	Fingerboards mineral sands project environment effects statement (Kalbar 2020)	Assessment of the positive and negative impacts of the project, including descriptions of the proposed activities, relevant alternatives, potential environmental, health and socioeconomic issues, assessment of project impacts and proposed measures to avoid, mitigate and/or offset significant residual impacts.
Map portal	Nature Kit	Review of modelled Ecological Vegetation Classes likely to occur within the project area.
Map portal	Visualising Victoria's Biodiversity	Review of modelled Ecological Vegetation Classes, waterways and conservation reserves likely to occur within or near the project area.
Database	Victoria Biodiversity Atlas (DELWP 2020)	Review and assessment of listed species which have recorded occurrence within Gippsland Plain surrounding the study area for the purpose of confirming species with the potential to occur and recolonise the study area following rehabilitation.
Spatial datasets	Native Vegetation spatial layers, including Location Risk and Strategic Biodiversity Value maps, and habitat importance and vegetation extent/condition models (DELWP 2017)	Review and assessment of DELWP listed species habitat maps, ecological communities and native vegetation which have a modelled distribution within the project area.
Aerial imagery	Publicly available aerial imagery, including current and historical images from Google, DELWP and Esri	Review of historical vegetation cover and current landscape connectivity.
Website	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) Species Profiles (SPRAT)	Review of EPBC Act fauna species habitat requirements.
Website	Statewide Integrated Flora Fauna and Teams	Review of fauna habitat requirements.
Website	Birdlife Australia	Review of habitat requirements for bird species.

1.5 Links with other reports

This report is one of a number of specialist reports that have been prepared for the project. The objectives of this study are linked closely with those of the other studies, as outlined below.

The key document which ties in with the Plan is the Rehabilitation Plan (RP) which is an appendix to the Work Plan and will form part of Kalbar's overarching environmental management framework. Like the rehabilitation report by Landloch (2020) which informed the RP, this Fauna Plan will provide actions and specifications to assist in the implementation of the mine's environmental management with regards to the protection of fauna.

Evaluation of the types and magnitude of impacts to fauna have been based on detailed ecological studies and the risk assessments conducted for the EES. These are:

- Ecology and Heritage Partners 2020, Detailed Ecological Investigations for the Proposed Fingerboards Mineral Sands Project, Glenaladale, Victoria, Prepared for Kalbar Operations Pty Limited.
- Kalbar 2020, Fingerboards Mineral Sands Project Environment Effects Statement – in particular Chapter 08 Environmental and Socioeconomic Context, Chapter 09 Environmental and Socioeconomic Impact Assessment, Chapter 10 Matters of National Environmental Significance and Chapter 12 Environmental Management Framework.

2. Context

2.1 Proposed mining operations

The proposed mining licence required for the Fingerboards project extends over an area of approximately 1,675 ha. About 1,350 ha of this area will be mined or disturbed by mining related activities. The project is a greenfields mining project, meaning that no mining or mineral processing has previously been conducted on the land where mining activities will take place.

The proposed mining method is open cut dry mining operation using conventional earthmoving equipment. Conventional earthmoving equipment will include scrapers, excavators and trucks and tractor scoops for topsoil removal. No mine dewatering is required as the orebody is above the water table.

The mine void location will move over the life of the project. Areas disturbed by mining will be rehabilitated progressively. The progressive mining methods proposed for the project will result in a maximum area of disturbance of approximately 360 ha at any one time.

2.2 Work program

Mining is proposed to be conducted 24 hours/day and 365 days/year, subject to requirements or conditions to avoid or mitigate potential impacts on local amenity. The proposed mine pit will have an average depth of approximately 29 m and a maximum depth of approximately 45 m.

The mine void location will move over the life of the mine. The void will be progressively backfilled with tailings, overburden, and topsoil as it advances. Mining will move progressively, with topsoil and overburden layers being removed, hauled, then placed to the rear of the void in the same vertical order they were removed. After topsoil and overburden removal, ore will be mined and, in steady state operations, the tailings from ore treatment will be placed back into the void in the form of sand tailings and fines tailings.

Mining will move progressively over the plateau, with rehabilitation works also being carried out progressively to minimise stockpile areas of overburden and topsoil. It is anticipated that on average, 80 ha of rehabilitation will be carried out each year, but the area will be variable as new fines tailings cells withhold areas for rehabilitation and completed fines tailings cells allow additional areas for rehabilitation. Mining will cross all waterways on the mine footprint, and significant structures are required to ensure mine-contacted water will only be released to fluvial systems via approved and controlled discharge.

Undisturbed surface flow water from upstream of the mining area will be captured in in-stream dams and piped by bypass pipelines to be discharged downstream of mining infrastructure.

The mine schedule allows sufficient overburden to fill the final cells and restore pre-mine surface contours at the end of mining. At that time, the majority of the project area will have been progressively rehabilitated, with closure involving rehabilitation of the final pits and removal of infrastructure. Approximately 360 ha will be rehabilitated as part of final closure works.

The project is expected to run for up to 20 years (including up to a two-year construction and commissioning period). Production at full capacity is expected to take place for 15 years. Final closure may require an additional five years of landscape management to ensure closure objectives are met.

2.3 Rehabilitation

Rehabilitation works will be carried out progressively to minimise stockpile areas of overburden and topsoil. The RP has been prepared as part of the overarching environmental management framework with the goal *“to establish safe progressive rehabilitation and post-closure stable rehabilitated landforms capable of supporting native ecosystems and/or productive agriculture that will enable long-term sustainable use of the project area”*.

The post-closure land uses proposed in the RP were determined by taking into account:

- The existing land uses.
- Views expressed by stakeholders during consultation.
- Compliance with legal and policy requirements.
- Likely success of achieving closure objectives (technical risk), having regard to biophysical conditions at the site.

This process led to six proposed closure land use zones (Figure 1, Table 2) seeking to largely reinstate pre-mining beneficial uses, but with consideration given to biophysical attributes of the rehabilitated land profile and an increase in the proportion of land allocated to the rehabilitation of native vegetation and associated habitats. Amenity plantings to enhance aesthetics and landscape values are planned, particularly along public boundaries and road reserves.

The most significant proposed change in land use is the removal of blue gum plantations in the southwestern portion of the project area and their replacement with approximately 200 ha of native grassy woodland (Section 3.3).

Topsoil will be stripped to approximately 300 mm depth (depending on depth to subsoil layers) and (over most of the project) directly transferred to areas being rehabilitated. Grass will be direct seeded across the various landscape elements, with hydromulching or hydroseeding being used for situations where excessive landscape gradients and/or wind or water erosion risk is considered significant. Trees and shrubs will be direct seeded and/or planted as tubestock. In all cases, species planted will be consistent with the target vegetation communities and will use regional provenance seed. For areas with higher gradients or erosion potential – swales and plateau edges, valley side-slopes, and channels – tree and shrub densities will be increased to lesser or greater degrees to reduce lateral seepage and to restore riparian ecosystems.

Table 2. Post-closure land use zones

Zone code	Zonename	Zone area (ha) (%)	Final land use	Description/example
A	Plateau grazing	696 (55%)	Grazing	Large area of open woodland, native and improved pasture on broad undulating plateau top. Typical gradients, horizontal to 1:10
B	Swales and plateauedges	116 (9%)	Grazing/native vegetation	Relatively small area bordering plateau slopes where gradients begin to increase and runoff flows concentrate prior to discharge onto plateau slopes, supporting native trees and shrubs and native and exotic grasses. Typical gradients, 1:12 to 1:5
C	Valleyslopes	208 (17%)	Native vegetation	Native vegetation (trees, shrubs, groundcover species and exotic and native grasses) on more steeply sloping plateau edges. Typical gradients, 1:8 to 1:3
D	Channels	32 (2%)	Riparian areas and associated waterways	Riparian zones and their associated channels (waterways) (whether existing or re-established), vegetated with native riparian and/or aquatic plant species. Typical gradient along channel, 1:50 to 1:1
E	Native grass woodland	205 (16%)	Native vegetation	Native grass woodland in western part of project area broadly consistent with EVC 55 (Plains Grassy Woodland), EVC 47 (Valley Grassy Forest), and EVC 877 (Lowland Herb-rich Forest). Located on plateau landform. Typical gradients, Horizontal to 1:10
F	Road Verge	33 (3%)	Road verge. Predominantly native vegetation	Verges of realigned public roads vegetated with predominantly native grasses and forbs with low-density trees and shrubs. Typical gradients, Horizontal to 1:10

Grassy woodland restoration

The Gippsland Red Gum Grassy Woodland communities (and associated native grasslands) is an EPBC Act listed plant community. The plant community is endemic to the central Gippsland Plain between Morwell and Swan Reach. These woodlands were once found extensively across the region but are now found predominantly as small and isolated remnants. Kalbar proposes as part of the rehabilitation program for the Fingerboards Mine to reinstate native vegetation, specifically Plains Grassy Woodland to land currently used as private forestry.

The goals of the overall restoration project are:

- Restore 200+ ha of species-rich Red Gum grassy woodland to post-mined landforms (in areas that supported plantation forestry).
- Reintroduce locally threatened species (plants and animals) as part of the grassy woodland restoration program.
- Restore attractive local wildflowers and grasses to re-aligned road verges.
- Develop a 10-15 ha seed production facility to grow native seed resources for restoration.
- Restore 350 ha of slopes and gullies to complex native vegetation to increase faunal habitat value and improve stabilization.
- Restore 700 ha of grazing pasture with the inclusion of native grasses to improve resilience to drought and fire.
- Undertake extensive faunal mitigation and landscape augmentation works to create habitat for recolonising or reintroduced faunal species.
- Create opportunities for community involvement through education, training, and engagement.

Direct seeding will be used as the primary method of restoration for the understorey grasses, wildflowers and shrubs. Overstorey species including Forest Red Gum (*Eucalyptus tereticornis*) will be planted using tubestock to achieve the required density of trees in a woodland setting.

The reinstatement of Plains Grassy Woodland to locations within the project area will be progressive. It is likely that 7 to 30 ha blocks will be revegetated at a time. The scale of these areas will be determined during mine scheduling for rehabilitation.

2.4 Approvals

2.4.1 Mineral Resources (Sustainable Development) Act 1990

The Victorian *Mineral Resources (Sustainable Development) Act 1990* (MRSDA) and the associated Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2019 is the primary legislation regulating mineral and extractive industries in Victoria. The MRSDA is administered by Earth Resources Regulation Branch within the Department of Jobs, Precincts and Regions (DJPR). The MRSDA establishes a legal framework aimed at ensuring that land which has been mined is rehabilitated. Under the Act, a mining licence and a work plan are required to carry out an extractive industry. A work plan for a mining licence must contain a rehabilitation plan. Specifically, the Act requires the following:

“A rehabilitation plan to be prepared that considers any special characteristics of the land, the surrounding environment, land stability, agreed end uses, and the potential for long-term degradation of the environment. The plan must include proposals for the progressive rehabilitation, stabilisation and revegetation of extraction areas, waste disposal areas, stockpiles areas, dams and other land affected by the operation. Landscaping to minimise visual impacts and details of final rehabilitation and closure of the site must also be included in the plan.”

2.4.2 Other Legislation

Relevance to Fauna Management Plan	
EE Act	<p>The <i>Environment Effects Act 1978</i> (EE Act) requires the preparation of an Environment Effects Statement (EES) for activities considered to have, or to be capable of having, a significant effect on the environment.</p> <p>A referral under the EE Act for the project was submitted in September 2020. The requirements for the referral include an Environmental Management Framework, a draft works plan and rehabilitation plan, which set out the framework for managing environmental impacts and mitigation throughout the duration of the project.</p>
P&E Act	<p>The <i>Planning and Environment Act 1987</i> governs the use, development, and protection of land in Victoria.</p>
FFG Act	<p>The <i>Flora and Fauna Guarantee Act 1988</i> (FFG Act) regulates the protection and management of biodiversity including the conservation of threatened species and communities and the management of threatening processes. Permits are required to take, remove, or disturb listed and/or protected flora species and communities on public land. Listed fauna species are also protected under controls contained in the <i>Wildlife Management Act 1975</i>.</p>
EPBC Act	<p>The <i>Environment Protection Biodiversity Conservation Act 1999</i> (EPBC Act) is Commonwealth legislation that regulates the protection of Matters of National Environmental Significance (MNES) throughout Australia.</p>
<i>Wildlife Act 1975</i>	<p>The <i>Wildlife Act 1975</i> protects and manages wildlife (fauna) in Victoria. The purpose of the act is to provide procedures for the protection and conservation of wildlife, the prevention of wildlife extinction, sustainable use and access to wildlife, and prohibit and regulate interactions with wildlife.</p> <p>To assist in achieving a leading practice model for Fauna Management prior to, during the operational phase, and during the rehabilitation phase, all land clearing will be managed in accordance with the <i>Wildlife Act 1975</i>.</p>
CaLP Act	<p>The <i>Catchment and Land Protection Act 1994</i> (CaLP Act) is the main article of legislation governing the management of invasive plants and animals in Victoria.</p> <p>Under this Act, species of plants and animals can be declared as noxious weeds and pest animals if they have or might have the potential to become a serious threat to primary production, Crown land, the environment or community health.</p>

2.5 Biodiversity values

2.5.1 Vegetation communities

Pre-European

The Department of Environment, Land, Water and Planning's (DELWP) pre-1750 Ecological Vegetation Class (EVC) modelling indicates that the majority of the project area would have once supported Plains Grassy Woodland (EVC 55) at lower elevations and Plains Grassy Forest (EVC 151) on the upper slopes with Valley Grassy Forest (EVC 47) on the more sheltered gullies and creek lines. A strip of Lowland Herb-rich Forest (EVC 877) occurs along a gully in the west and pockets of Lowland Forest (EVC 16) intergraded with Damp Sands Herb-rich Woodland (EVC 3) occur in the east and west, which prefer well-drained soils and higher rainfall.

Pre-mining

Land within the project area is predominately modified and disturbed, comprising large areas of improved pastures and derived native grasslands, scattered patches of remnant vegetation, native

regrowth and a timber plantation (EHP, 2018). Areas that support native remnant vegetation and good quality terrestrial habitat within the project area are primarily associated with road reserves and gullies (EHP, 2018). Road reserves are dominated by Plains Grassy Woodland and Plains Grassy Forest along Bairnsdale-Dargo Road and Fernbank-Glenaladale Road, while gullies in the east of the project area are dominated by Plains Grassy Forest and Valley Grassy Forest (EHP, 2018). In the west of the project area, Lowland Herb-rich Forest fringes the tributary streams and the vegetation surrounding farm dams, while pools along tributary streams comprise Aquatic Hermland and Plains Grassy Wetland (EHP, 2018). Areas of Lowland Forest occur in the south of the project area along Fernbank-Glenaladale Road and on a private property (EHP, 2018).

Throughout the project area scattered trees are common, particularly in agricultural areas (where native understory is minimal due to past clearing and grazing); and along tributary streams (EHP, 2018). Scattered trees comprise primarily large Gippsland Red Gum *Eucalyptus tereticornis* subsp. *mediana*, Red Box *Eucalyptus polyanthemos* and White Stringybarks *Eucalyptus globoidea* (EHP, 2018). These trees provide stepping-stones between the large areas of remnant habitat (up to 40 hectares) associated with the road reserves and gullies, and smaller fragmented patches of native vegetation within the project area (EHP, 2018).

2.5.2 Habitats

Aquatic environs

Aquatic environs along drainage lines are currently located within the creeks and gullies in the project area, within Perry Gully, Simpson Gully and along Lucas creek and other associated tributaries. Aquatic habitat in the creeks and gullies was characterised as dry to supporting pools or minor flows and were marginal as aquatic habitat. Aquatic vegetation recorded within the study area included scattered occurrences of floating and emergent species such as *Azolla* sp., *Myriophyllum* sp., *Eleocharis* sp. and *Triglochin* sp.

Fringing and emergent vegetation in aquatic ecosystems provides a range of habitats for amphibians, wetland birds and in-stream species to forage, shelter and facilitate breeding. Further information on specific species which use this habitat type is provided in Appendix A.

The key themes for management of aquatic environments for fauna are:

- Water management (reduce flow velocity, increase water retention and stabilise creek channels) using instream structures such as leaky weirs and ponds.
- Restore fringing and aquatic vegetation.
- Increase diversity and density of structural habitat elements, such as instream timber.
- Reduce threatening process associated with erosion, stock access and weeds.

Valley slopes and channel

Valley slopes and channel vegetation within the study area is located within Perry Gully, Simpson Gully and along Lucas creek and other associated tributaries. Vegetation in these areas is characterised as Valley Grassy forest. This vegetation has a mixed eucalypt overstorey and an understorey dominated by bracken, with occasional shrubs, herbs and grasses present.

Dense forest provides nesting, roosting and foraging opportunities for a wide range of species, including ground-dwelling and arboreal mammals, woodland and wetland birds, bats, reptiles and amphibians. Further information on specific species which use this habitat type is provided in Appendix A.

The key themes for management of valley slopes and channel vegetation for fauna are:

- Increase diversity and density of structural habitat elements.
- Increase vegetation cover and connectivity.
- Reduce threatening process associated with erosion, stock access and weeds.

Grassy Woodland

Kalbar proposes as part of the rehabilitation program for the Fingerboards Mine to reinstate Plains Grassy Woodland to land currently used as private forestry in the west of the mine footprint.

In addition, protection and improvement of Grassy Woodland components in the south-east corner of the study area should be considered a priority for mitigation of impacts due to the presence of large trees interspersed with native grasslands which provide habitat and connectivity to the large areas of remnant woodlands to the south and east.

Grassy Woodland provides nesting and foraging habitat for a wide range of species, including ground-dwelling and arboreal mammals, woodland and wetland birds, bats and reptiles. Further information on specific species which use this habitat type is provided in Appendix A.

The key themes for management of Grassy Woodland for fauna are:

- Increase diversity and density of structural habitat elements (e.g., hollows, stags, fallen logs, litter/debris).
- Increase diversity of functional habitat elements (e.g., food plants).
- Reduce threatening process associated with erosion, stock access and weeds.

Plateau and swale

The remaining landform types and associated vegetation have been grouped under plateau vegetation, and primarily include grazing land, including swales and plateau edges, and road corridors. Habitat is comprised of scattered trees, grasslands, open woodlands and dense woody regrowth, along with farm dams and wet depressions.

Scattered remnant trees are common throughout the project area, occurring in farm paddocks and around the tributary streams. Scattered trees within the area may act as connections for wildlife, such as birds, microbats and arboreal mammals. Further information on specific species which use this habitat type is provided in Appendix A.

Roadside vegetation is located along sections of Bairnsdale-Dargo road, Fernbank-Glendale road and Chettles road. Other habitat linkages in the project area include linear remnant vegetation within Perry Gully, Simpson Gully and along Lucas creek and other minor tributaries associated with the Mitchell River.

Roadside vegetation corridors and other habitat linkages have many benefits for fauna, particularly in modified landscapes. They can provide functional foraging, roosting and breeding habitat for many species, as well as facilitation of fauna movement through the landscape between habitat areas which has benefits for maintaining species diversity in larger habitat areas and gene flow between otherwise isolated populations.

Farm dams are scattered throughout the Plateau and where good fringing and aquatic vegetation is present can provide suitable foraging or breeding habitat for birds, frogs, reptiles, invertebrates (yabbies), fish or insects and may also provide a source of freshwater wildlife within the landscape.

The key theme for management of plateau vegetation for fauna is the improvement of landscape connectivity.

Significant values

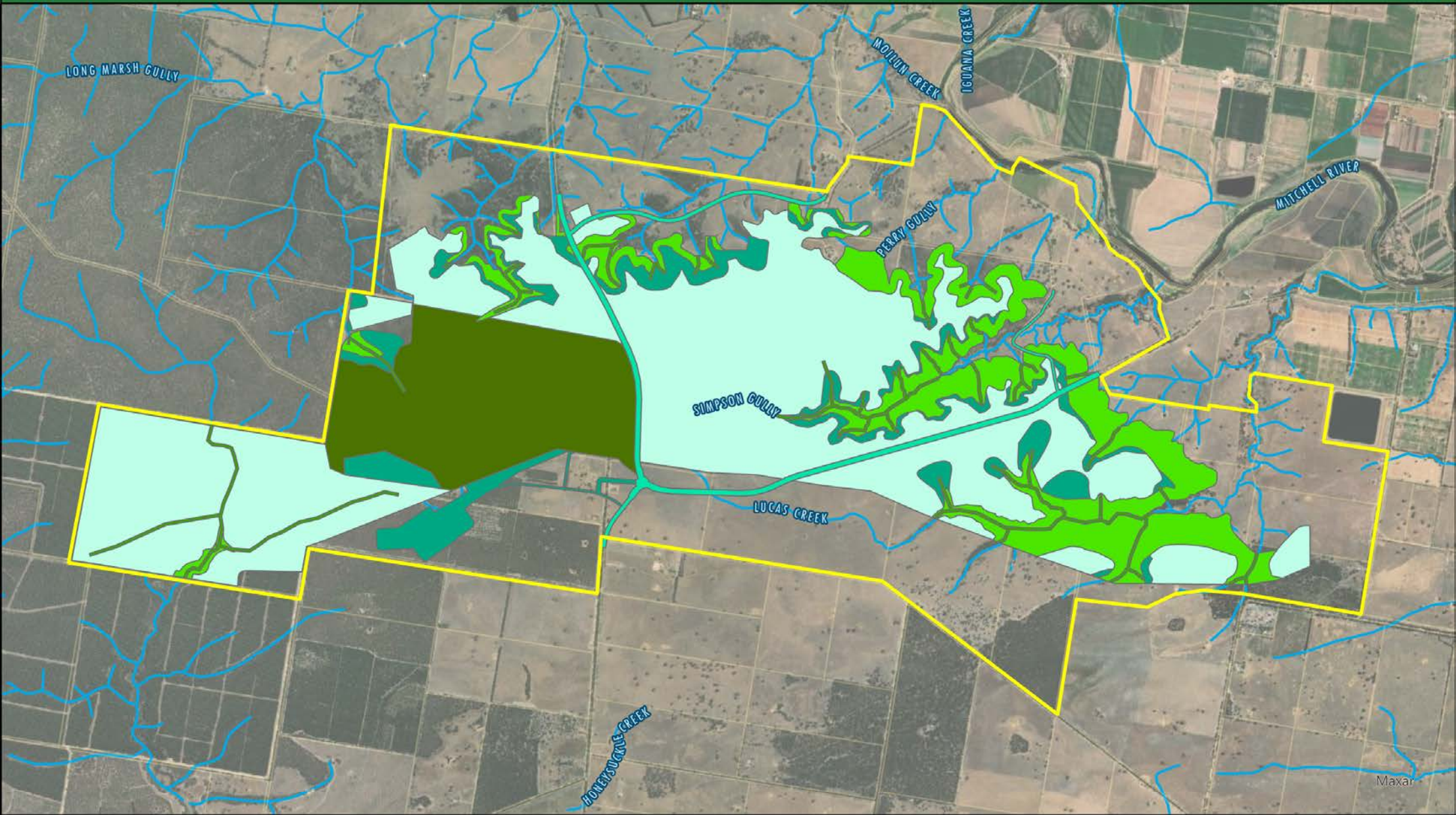
State or nationally listed ecological values within the project area include:

- Eleven ecological vegetation classes, the majority endangered
- Nationally significant Gippsland Red Gum (*Eucalyptus tereticornis* subsp. *mediana*) Grassy Woodland and Associated Native Grassland (GRGGW) ecological community
- State significant Forest Red Gum Grassy Woodland ecological community
- Known habitat for national and state significant fauna:
 - Grey-headed Flying-fox *Pteropus poliocephalus* and Australian Grayling *Prototroctes maraena* (EPBC Act)
 - Yellow-bellied Sheath-tail Bat *Saccolaimus flaviventris* (FFG Act)
- Known habitat for four state listed flora species:
 - Slender Wire-lily *Laxmannia gracilis*
 - Blue Mat-rush *Lomandra glauca* s.s.
 - Slender Tick-trefoil *Desmodium varians*
 - Sandfly Zieria *Zieria smithii* subsp. *smithii*
- Potential habitat for multiple national, state and regionally significant flora and fauna
- Wetlands.

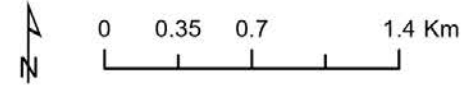
The nationally significant GRGGW ecological community is associated with Plains Grassy Woodland remnants within the road reserve along Bairnsdale-Dargo Road and Fernbank-Glenaladale Road and outside of the project area along the Gippsland railway reserve (EHP, 2018). The state significant Forest Red Gum Grassy Woodland ecological community also occurs in Plains Grassy Woodland remnants within the road reserve and across private properties; and is known habitat for the state listed Yellow-bellied Sheath-tail Bat (EHP, 2018).

Known habitat within the project area for Grey-headed Flying-fox is associated with remnant forest and woodland where this species may occasionally forage (EHP, 2018). The Mitchell River provides known habitat for Australian Grayling (EHP, 2018).

Figure 1. Post-closure land use zones



- | | | |
|-----------------|--------------|-----------------|
| Management area | Road Reserve | Valley |
| Plateau | Swale | Grassy Woodland |
| | Valley Slope | |



Scale 1:35,957

Client name: Kalbar
 Project number: 15985
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Spatial Reference: GDA 1994 MGA Zone 55

3. Impacts to fauna

3.1 Construction and operational phase impacts to fauna

Mining projects have the potential to impact on ecological values in a variety of different ways. Impacts may occur during or after construction, and may be 'direct' in nature, such as the removal of a tree, or 'indirect', such as the release of sediment into waterways and the associated impacts to habitat downstream. In developing management measures, it is therefore important to consider all potential sources of impacts a project of this nature may have.

3.1.1 Vegetation removal and terrestrial habitat loss

The key activity during construction and operations likely to impact on terrestrial and aquatic biodiversity values is the clearance of vegetation. Clearance will occur within the project area for the construction of processing infrastructure and mining activities, and within the infrastructure options area for road upgrades, the pump station and pipelines, groundwater borefield, powerlines, rail sidings and associated infrastructure.

A summary of impacts to fauna through vegetation removal and habitat loss is given below:

- Habitat loss through the removal of up to 188.50 hectares of native vegetation, 763 large trees (within patches of native vegetation and scattered), and 130 small trees (scattered).
- Loss of foraging habitat.
- Loss of hollow bearing trees.
- Loss of habitat through removal of small areas of low-quality wetland habitat (i.e., farm dams and waterways).
- Loss of ephemeral tributary streams and adjoining vegetation which provides only marginal habitat for some migratory bird species.

Hollows play a specific role in providing habitat for a wide range of fauna and are generally found in large old trees.

Three state significant and one regionally significant fauna species known, or with the potential to occur within the project area/infrastructure options area use hollow-bearing trees for breeding and roosting. These are: Yellow-bellied Sheathtail Bat, Powerful Owl, Masked Owl and Eastern Pygmy Possum.

3.1.2 Loss and degradation of aquatic habitat

The project has the potential to directly and indirectly impact aquatic areas within and outside of the project area/infrastructure options area. Waterbodies within the project area/infrastructure options area provide potential habitat for a range of flora and fauna species. Outside and downstream of the project area/infrastructure options area, waterbodies may be indirectly impacted by runoff of sediment, wastewater discharges, accidental spills of hazardous materials and changes in flow regimes or the availability of water.

Aquatic habitats within the project area/infrastructure options area are limited in extent and associated with ponds, small dams, and deep pools within the incised drainage gullies (ephemeral tributary streams predominantly of the Perry River and Mitchell River).

In areas not directly impacted, sediment-laden runoff from disturbed ground has the potential to smother aquatic habitat and facilitate the spread of weeds.

Uncontrolled sediment runoff could reduce water quality through increases in turbidity, and changes in the concentrations of nutrients and heavy metals. This however, was not considered to be a major risk (Water Technology 2020) and the establishment of sediment dams in the upper reaches of the waterways will limit the release of concentrates downstream.

Discharges of water and wastewater into waterways may also impact water quality and the natural wetting and drying regime of receiving waters.

Fuels and other hazardous materials used by the project could also accidentally enter waterways.

3.1.3 Direct fauna mortality

During vegetation clearing direct fauna mortality may occur through clearance of vegetation (e.g., as trees are felled and moved, or through vehicle collisions).

During vegetation clearing, less mobile (i.e., ground dwelling reptiles and mammals), or nocturnal species that nest or roost in tree hollows during the day, are at high risk of direct mortality. Some diurnal (day active) and mobile species will be able to disperse from the path of clearing to avoid potential mortality. Ground dwelling species unable to move across a modified landscape in the absence of woodland or forest habitat (e.g., marsupials and reptiles) could become trapped.

During daily mine operation, direct fauna mortality may occur through vehicle collisions or by entrapment in trenches or other excavations.

Fauna are also at risk of mortality through being struck by vehicles associated with the project on local roads, in particular from vehicles transporting workers and heavy mineral concentrate (HMC).

3.1.4 Habitat fragmentation and edge effects

Clearing of native vegetation can result in habitat fragmentation, whereby previously contiguous areas of habitat are separated into smaller patches. These fragments tend to be smaller and separated from each other by a matrix of less suitable habitat, resulting in reduced habitat quality of the newly created patches.

Habitat fragmentation creates small, isolated populations of fauna species, particularly those species that are less mobile such as small mammals, frogs and reptiles (e.g., Southern Toadlet), and flora species. Less mobile species may increase in numbers within a fragment, leading to increased competition and compromised long-term survival. Highly mobile fauna species that can move over extensive cleared areas are much less likely to be affected by habitat fragmentation. These species include larger mammals, bats and some birds including aggressive generalist species which have adapted to modified landscapes such as Noisy Miners (*Manorina melanocephala*). The inadvertent selection for aggressive generalist species through habitat fragmentation further decreases the population sizes of other species that remain in the fragments.

The project will remove some existing wildlife corridors, particularly those provided by remnant vegetation within road reserves, tributary streams and gullies across the project area. Some of the

highest quality patches of native vegetation recorded within the project area will be fragmented by the removal of these corridors within the project footprint.

3.1.5 Alteration to hydrological processes and regimes

Potential indirect impacts could occur to waterways located downstream of the project area, including the Mitchell River, Perry River and Gippsland Lakes Ramsar site. Potential impacts include changes to habitat conditions due to sedimentation, and alteration of water quality, flows and availability.

3.1.6 Proliferation of weed and pest species

Project activities have the potential to disperse pest species out of the project area/infrastructure options area across the surrounding landscape due to habitat removal, noise and human presence during construction and operations. The overall prevalence/distribution of pest animals or their impact on native wildlife is not expected to increase as a result of the project.

3.1.7 Pollutants

Noise

Noise and light generated by the project could alter the behaviour of animals in and adjacent to the project area. Many species detect and depend on sound to communicate, navigate, evade danger and find food. The health of vegetation may also be affected by the project if dust created during mining works settles on plants. The species most likely to be potentially impacted by noise, dust and/or light that are known or may occur in the project area include the nationally significant Swift Parrot, Grey-headed Flying Fox and Giant Burrowing Frog, and the State significant Yellow-bellied Sheath-tail Bat.

Light

The continuous nature of project operations (24-hours-a-day) means that artificial light will be required during the night. Such light can adversely affect wildlife and trigger detrimental behavioural and physiological responses. Nocturnal fauna such as possums, gliders, bats and some birds are most likely to be affected, although the impact is unlikely to extend far from the light source. Light tolerant *microchiropteran* bat species may benefit from increased lighting in the project area which may in turn increase prey (insect) abundance and availability around such sources.

Light sources will be focused on operational activities and designed to reduce light spill away from working areas, with minor impacts expected to wildlife. Light pollution is unlikely to significantly impact any fauna species known, or with the potential, to occur within the project area/infrastructure options area (DoEE 2020).

Spills of hazardous materials

Unplanned events such as accidental spills of hydrocarbon fuels and oils and HMC could occur during the project. Standard operating measures will be in place for the handling, storage and transport of all hazardous materials used during the project which reduce the risk of a spill occurring and provide for rapid response should it occur, minimising the likelihood of material migrating beyond the immediate area. Transport of HMC will occur via rail and road corridors creating a low risk of this material entering ecologically sensitive areas such as remnant native vegetation, waterways and wetlands. Any indirect impacts are likely to be localised and can be appropriately managed/mitigated.

3.2 Closure phase impacts to fauna

3.2.1 Disturbance to wildlife

Potential impacts to biodiversity from dust, noise and light from the dismantling of infrastructure and decommissioning of dams and haul roads are expected to be less than those described during the construction and operations phases of the project.

3.2.2 Sedimentation and water quality

The extent of established surface cover and the angle of slope in the new landforms will influence erosion and runoff of sediment to waterbodies. Progressive rehabilitation and revegetation across the project area will minimise the extent of disturbed ground at any one time. Erosion rates, and the potential for sedimentation and other impacts in aquatic habitats downstream of the project area, will be less than those outlined for the construction and operations phases.

3.2.3 Delayed or failed rehabilitation

Poor performance of revegetation during closure may hinder re-establishment of conditions conducive to successful biodiversity rehabilitation. Where required, progressive rehabilitation and revegetation across the project area will allow managers to repair or re-undertake failed restoration or to catch up with delayed works.

Potential impacts to terrestrial biodiversity from delayed or failed rehabilitation are poor rates of site recolonisation due to delayed or (worst-case) permanent loss of habitat.

4. Goals and objectives

4.1 Background

An Environmental Management Framework (EMF) was developed for the Project as part of the EES scoping requirements. The EMF set out the accountabilities for managing and monitoring environmental effects and hazards associated with construction, operation, decommissioning, rehabilitation, and post-closure phases of the project to achieve acceptable environmental outcomes. This includes high-level draft environmental objectives and indicators to be included in relevant sub-plans.

The following objectives identified in the Project EMF form the basis of the Fauna Plan objectives:

- To avoid and minimise, or where this is not possible, offset adverse effects on native vegetation and listed threatened flora and fauna species.
- To maintain the ecological character of the Gippsland Lakes Ramsar site.
- To establish rehabilitation conditions that are safe for humans, non-polluting, geotechnically stable, not prone to erosion and able to sustain post-mining land uses agreed with stakeholders.

4.2 Goal

The overall goal of the Plan is to maintain the abundance, diversity, geographic distribution and productivity of fauna at a species and ecosystem level through the avoidance or management of adverse impacts over the life of the mine's construction, operation and decommissioning.

4.3 Objectives

The objective of the plan is to develop management measures that maximise the ongoing protection and long-term conservation of native fauna within and adjacent to the project area. This has been developed with the following principles in mind (Table 3).

Table 3. Fauna management principles

Focus	Principles for management
Species	<ul style="list-style-type: none"> • Protection of species considered present or with a high likelihood of occurring within the project area. The primary goal for these species is to ensure that retained habitat is protected and enhanced over the life of the mines operation and that these species can recolonise rehabilitated areas. Ensuring that these species persist in the landscape throughout the operation of the mine so as to recolonise habitats after rehabilitation is considered a mandatory goal. • Reintroduction of species considered to be endemic to the Gippsland Plains region but are no longer present within the project area or surrounding land. These are species that are considered likely to have once occupied habitats within the project area prior to European colonisation. Through the protection, enhancement, and creation of extensive, functionally diverse and connected habitats, these species represent the opportunity to improve biodiversity within the region through managed recolonisation or reintroductions. The successful recolonisation or reintroduction of these species after rehabilitation is considered an aspiration goal of the management plan.

Focus	Principles for management
Habitat	<p>When considering the management and protection of habitat to support native fauna, actions are recommended across the following themes:</p> <ul style="list-style-type: none"> • Habitat protection to prevent further degradation of retained habitats. • Habitat augmentation to improve the extent and function of retained habitats and enhance connectivity across the landscape. • Habitat rehabilitation to create new, high-quality habitats within rehabilitated landforms which compliment habitat at both a local and landscape scale.
Harm minimisation	The prevention of direct and indirect harm to fauna inhabiting the project area and surrounds due to 'day-to-day' operational activities.

5. Actions

5.1 Habitat protection, augmentation and rehabilitation

Actions to protect, improve and rehabilitate habitat within the project area are provided in Table 4. These are based on the recommended management zones and staging requirements as described below.

Management zones

Given the removal of significant areas of habitat and vegetation, a key focus of the management plan is the protection, improvement and rehabilitation of fauna habitat within and outside the project area over the course of the mine's operation.

To facilitate this, the following management zones have been identified and ordered to reflect progression of the mining operation across the study area (Figure 2):

- Protection and augmentation management zones 1 – 9.
- Rehabilitation zones A – L.

In addition, each zone supports one or more of the following broad habitat types which have been used as a focus for the management actions:

- Permanent and ephemeral aquatic environs associated with drainage lines, waterbodies and sediment dams.
- Forests and shrublands associated with valley slopes and riparian zones.
- Grassy Woodlands within the south-east of the mine area and proposed for restoration in the west.
- Pastures and scattered trees associated with the plateau and swales.

Finally, consideration of landscape-scale connectivity of fauna habitat has also been incorporated into the management actions to ensure species can disperse and utilise improved and rehabilitated habitats as mine operations progress.

Factsheets for fauna guilds are provided in Appendix A. These provide a link between the management zones and habitat, and species requirements.

Staging

Staged habitat removal across the whole project area will minimise the possibility that areas of habitat remain in which fauna could find refuge and become isolated. Staging vegetation removal pushes fauna sequentially away from active worksites, reduces the risk of fauna entering work zones, and removes the need to employ qualified wildlife handlers to relocate ground-dwelling fauna. The general principle of staged works is that habitat removal should abut existing cleared land or impact areas, and progress towards areas of retained habitat. Land clearance should therefore occur in association with habitat protection and augmentation works in adjacent land. Figure 3 shows the management zones and current habitat extent outside the mine footprint, and relative staging of associated actions, to match mining operations.

Land clearance activities should also consider exit routes for wildlife where necessary. Exit routes should avoid potential hazards to animals such as nearby roads, fences and areas of current works. Where possible, fencing or other barriers should be removed prior to clearance commencing.

Exclusion fencing may be required to close off areas after the stage has started. Some fencing in strategic locations may keep wildlife out of hazardous areas for them and for workers safety. Fencing may also be utilised to guide wildlife along predicted exit routes.

The importance of staging rehabilitation is to allow the landscape to support greater numbers of fauna as the entire landscape is not lost to the fauna at one time. Staging of habitat rehabilitation minimises overall 'loss' of available habitat area, as remnant habitats are available for longer than if all activity occurs at once, and available for recolonisation sooner as rehabilitation commences sooner.

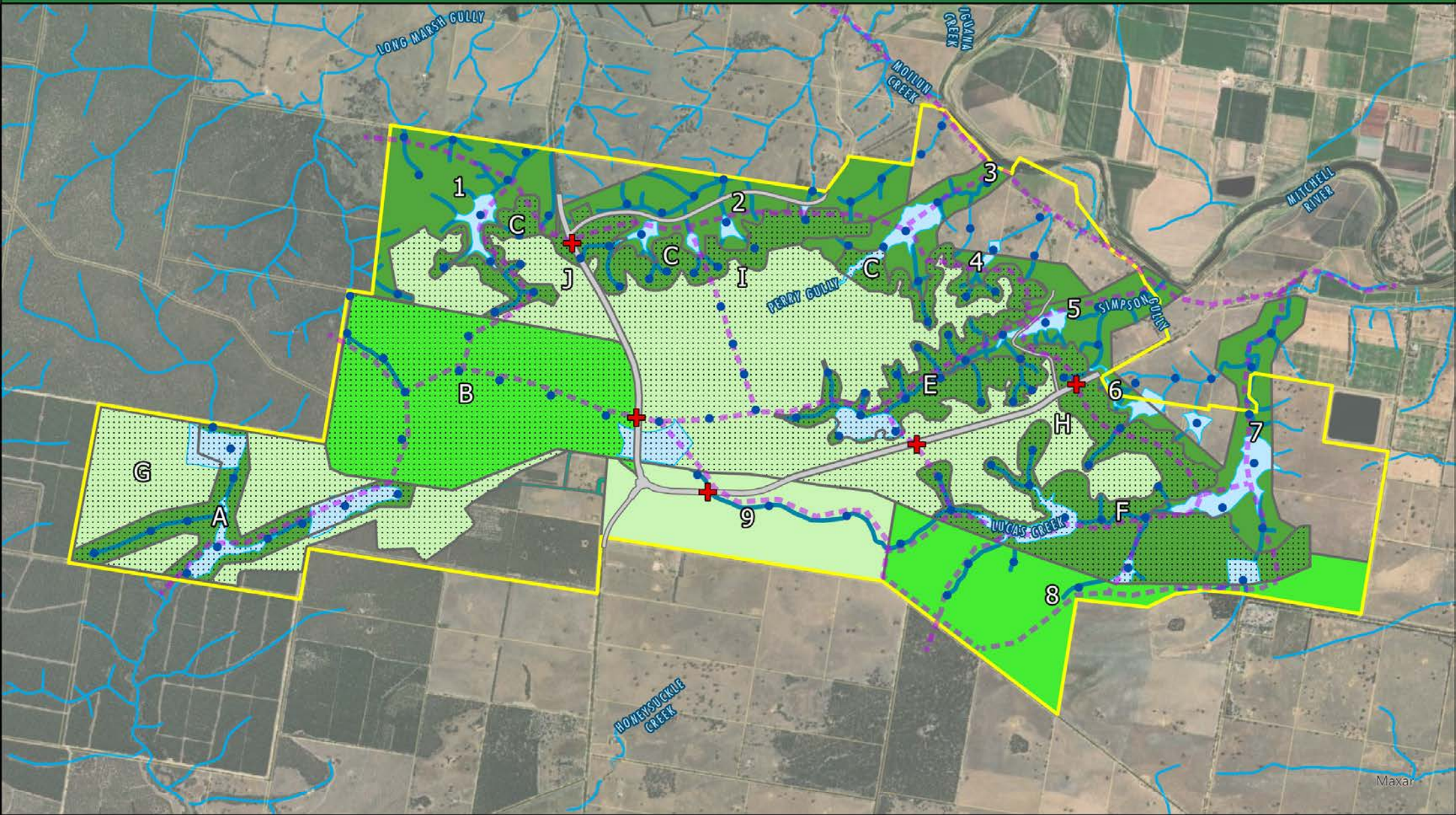
Land management

This plan acknowledges that the project area will be returned to private ownership after mine closure and rehabilitation for use in accordance with the post-closure land use zones (Figure 1).

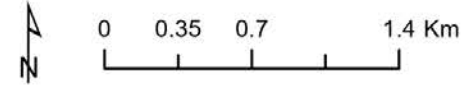
Accordingly, responsibility for the long-term management of both retained and rehabilitated habitats will rest with parties other than Kalbar, and may not meet the standard encapsulated in this plan. In some instances, post-mine land use may conflict with the actions proposed in this plan and lead to a decline in habitat extent and quality across the study area. This is particularly relevant where stock may be allowed access to previously protected areas, such as woodlands or waterbodies.

Irrespective, it is expected that Kalbar will make every effort to implement the actions within this plan to ensure the protection, augmentation and rehabilitation of fauna habitat across the entire project area is done to a standard that will set a precedence for future land managers to follow.

Figure 2. Management zones and features



- Management area
- Rehabilitation zones
- Protect zones
- Aquatic environs
- Plateau (connectivity)
- Red Gum Grassy Woodland
- Valleys slopes and riparian vegetation
- Sediment dams
- + Crossings
- Ponds
- Wildlife corridors



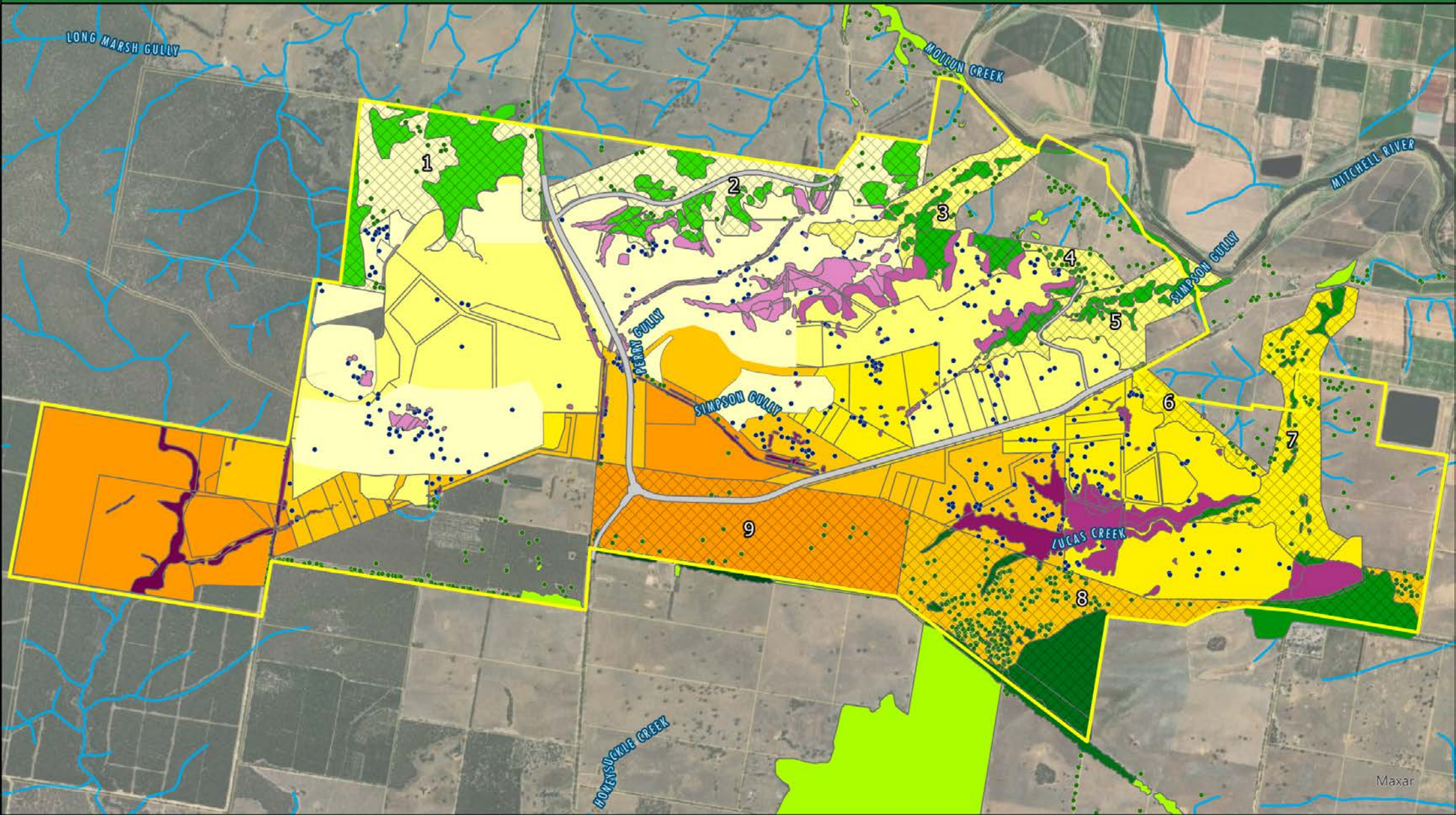
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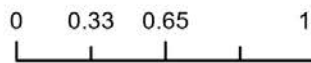


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Figure 3. Staging



Management area	Staging	Habitat (removed)	Habitat (protect and improve)	Trees (removed)
Management area	Year 1	Yr1	Outside	Trees (removed)
Protection zones	Year 5	Yr2	Year 1	Trees (retained)
Protection zones	Year 8	Yr8	Year 5	
	Year 12	Yr12	Year 8	
	Year 15	Yr15	Year 12	
			Year 15	



 Scale 1:33,000

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Actions

Table 4. Habitat protection, augmentation and rehabilitation actions

Actions	Protection zones	Rehabilitation zones
Protect habitat		
<ul style="list-style-type: none"> Retain and protect all native vegetation and habitats outside the mine footprint. This includes existing forest, woodland and scrub vegetation as well as submerged and emergent aquatic vegetation associated with dams, creeks and waterways. 	All zones	N/A
<ul style="list-style-type: none"> Avoid removal of rocks, logs, leaf litter from habitats outside the mine footprint, including both terrestrial and aquatic environs. 	All zones	N/A
<ul style="list-style-type: none"> Where practicable, install fencing to exclude stock from areas of native vegetation and creek lines outside mine footprint as per future land use recommendations. 	All zones	N/A
<ul style="list-style-type: none"> Undertake pest and weed control for high-threat species, including rabbits, foxes and cats. 	All zones	All zones
Improve habitat structure		
<ul style="list-style-type: none"> Where mature canopy trees are absent or limited, salvage and install standing dead stags as per specifications (Table 6). 	All zones	All zones
<ul style="list-style-type: none"> Where absent or limited, install nesting resources as per specifications (Table 6). 	All zones	All zones
<ul style="list-style-type: none"> Where absent or limited, install ground or instream timber, litter and rocks as per specifications (Table 6). 	All zones	All zones
Improve habitat extent		
<ul style="list-style-type: none"> Where appropriate revegetate valley slopes and channel areas devoid of woody vegetation or canopy species, focusing on establishing target cover for canopy species as per specifications (Table 7). Prioritise action along 'wildlife corridors' (Figure 2). 	Zones 1, 2, 3, 4, 5, 6, 7	N/A
<ul style="list-style-type: none"> Where feasible undertake in-fill plantings of native ground and mid-layer species within existing patches of valley slopes and channel vegetation with poor structural diversity, as per specifications (Table 7). Prioritise action along 'wildlife corridors' (Figure 2). 	Zones 1, 2, 3, 4, 5, 6, 7	N/A
<ul style="list-style-type: none"> Plant fringing and aquatic vegetation along drainage lines, focusing on areas in the upper catchment (species will disperse readily downstream during flow events), as per specifications (Table 7). 	All zones (aquatic environs)	All zones (aquatic environs)
<ul style="list-style-type: none"> Investigate opportunities to establish aquatic and fringing vegetation (Table 7) and associated habitat structures (e.g. in-stream debris; Table 6) in and around the proposed sediment dams with the aim to retain these structures within the landscape as wetlands at the completion of the project. Where possible incorporate water of varying depths suitable for both wading and diving birds. 	Sediment dams in all zones	Sediment dams in all zones
<ul style="list-style-type: none"> Where possible revegetate and widen Chettles Road vegetation corridor through supplementary planting in canopy, mid and ground layer vegetation. Plantings may be within roadside or adjoining farmland as per specifications (Table 7). 	Zone 9	N/A
Improve habitat function (connectivity)		

Actions	Protection zones	Rehabilitation zones
<ul style="list-style-type: none"> Restore terrestrial landscape connectivity along ‘wildlife corridors’ through the establishment of ‘steppingstones’, including installing salvaged stags, planting of scattered trees and small patches of dense shrubs, as per specifications (Table 8). Prioritise action along ‘wildlife corridors’ (Figure 2). 	All zones	All zones
<ul style="list-style-type: none"> Plant native canopy species in areas devoid or with low densities of scattered trees to improve connectivity within the project area. 	Zones 8 and 9	Zones C, F, I, J, K
<ul style="list-style-type: none"> Restore aquatic landscape connectivity through establishment of a ‘chain of ponds’ across rehabilitated plateau, swales and grassy woodlands, as per specifications (Table 6). Prioritise action along ‘wildlife corridors’ (Figure 2). 	N/A	Zones C, D, F, I, J, K
<ul style="list-style-type: none"> Ensure maintenance of hydrological regime along major creeks with aim to ensure permanent pools of standing water are maintained year-round. 	All zones (aquatic environs)	All zones (aquatic environs)
<ul style="list-style-type: none"> Install fauna crossing points along major roads at intersections of ‘wildlife corridors’ (Figure 2), as per specifications (Table 8). 	Zone 9	Zones A/B, D/J, G/H and J/I.
<ul style="list-style-type: none"> In collaboration with public and private landowners, identify wildlife corridors outside the project area and identify potential management actions to improve connectivity between habitat within the project area. This will help improve population resilience during construction and assist with recolonisation of rehabilitated areas. 	N/A	N/A
Improve landscape function		
<ul style="list-style-type: none"> Stabilise slopes and escarpments using salvaged timber and debris to prevent erosion and loss of habitat, as per ‘Ground timber, litter and rocks’ specification in Table 6 and ‘Sediment and erosion controls’ in Table 9. 	Zones 1, 2, 3, 4, 5, 6, 7	Zones A, C, E, F
<ul style="list-style-type: none"> Monitor sedimentation and water quality of wetlands / creeks / dams to ensure continued optimal habitat for fauna. 	All zones (aquatic environs)	All zones (aquatic environs)
<ul style="list-style-type: none"> Install leaky weirs along retained creek lines to create supplementary habitat, slow water flow and improve infiltration. Prioritise action along ‘wildlife corridors’ (Figure 2). 	Aquatic environs within all zones	Aquatic environs within all zones
<ul style="list-style-type: none"> Exclude grazing from channel areas and – at least in the short term – from valley slopes to maintain higher levels of surface cover and reduce soil surface disturbance by stock trampling. 	All zones (aquatic environs)	All zones (aquatic environs)

5.2 Harm minimisation

Harm minimise is focused on protecting fauna and habitat during mine operation. The following actions are therefore focused on the specific mine components and their associated operational activities (Table 8).

Table 5. Harm minimisation (construction and operation, activity focused)

Threat	Action	Location	Timing /sequence/activity
General measures (all zones)			
Inductions	<ul style="list-style-type: none"> Induct all staff about the appearance and conservation significance of all fauna species likely to occur within the project area, to facilitate identification and avoidance. Induct all staff regarding the appearance and significance of weeds and diseases of concern, with potential to occur in the project area. Induct staff on the objectives and approaches outlined in this management plan. 	Operational areas	Duration of project
Movement of vehicles, plant and equipment	<ul style="list-style-type: none"> Vehicles should not enter retained habitat areas except for land management and fauna relocation purposes. Clearly mark access tracks and roads to prevent establishment of secondary tracks and disturbance to adjacent habitats. Existing roads are to be used where practicable. Impose vehicle speed limits of 40 km/h for construction vehicles within the project area to minimise the risk of fauna strike and limit driving at dawn and dusk. Ensure that no food scraps are thrown out of vehicles particularly near roadsides as this may encourage fauna towards roads and result in increased vehicle strikes. 	Operational areas	Duration of project
Noise, dust, light and other environmental pollutants	<ul style="list-style-type: none"> Monitor dust pollution and where a reduction in dust is required, wet down any dirt roads or fix fine mist sprays to temporary fencing to minimise dust escaping the construction site. Night lighting shall be restricted to the minimum amount required to safely operate the site to minimise light pollution and adverse effects to nocturnal species such as bats. This will include using: <ul style="list-style-type: none"> light shields to direct light and reduce light spill. low beam vehicle lights except where safety is compromised. 	Operational areas	Duration of project
Terrestrial habitats			
Habitat removal	<ul style="list-style-type: none"> Develop a staged vegetation removal strategy to minimise disturbance and provide time for fauna to relocate themselves into adjacent habitats. 	Operational areas	Prior to any habitat removal for the duration of project

Threat	Action	Location	Timing /sequence/activity
	<ul style="list-style-type: none"> ○ Clearing should be undertaken in a suitable direction from poor habitat areas towards retained habitat so that any ground-dwelling mammals can move away from the clearing interface and into retained habitat. ○ Ensure that clearing does not result in isolation of areas of habitat and fauna can easily relocate to other areas of suitable habitat. ○ Clearly demarcate vegetation to be removed and fence off retained habitat areas where practicable to limit any off-target removal. ● Prior to works commencing, remove all sources of water near construction areas which could attract ground-dwelling mammals to the site. Stock troughs should be drained and removed prior to fencing site. ● Dewatering of wetlands and dams should be conducted prior to commencement of construction, ideally in the dry season preceding the construction year. ● Dewatering of wetlands and dams within the construction footprint should be identified and subject to pre-clearance surveys outside of breeding season by a qualified ecologist or wildlife handler. ● Avoid removing woody debris and rocks from areas not under construction. ● Undertake vegetation clearance outside of fauna breeding months where practicable. Vegetation removal should occur between February and September to avoid breeding periods for the majority of fauna species. ● Undertake pre-clearance surveys of all fauna habitats such as large trees and hollows for evidence of fauna presence (e.g., nests) immediately prior to clearing. Surveys should be undertaken by a qualified ecologist or wildlife handler. If fauna cannot be safely removed from a tree to be felled, then the tree must remain until fauna has been confirmed to have relocated to nearby habitat. ● Within one week prior to any construction works, the impact area and surrounds should be searched for wombat burrows. <ul style="list-style-type: none"> ○ Burrow entrances will be soft blocked with small sticks to determine activity. Motion-sensitive cameras should also be placed near the burrow with clear vision of the entrance for further confirmation of activity. ○ Monitor burrows following morning by observing burrow entrance and camera photos to determine activity and times of exit / entry. ○ Permanently block inactive burrows using rocks/logs. ○ Place one-way doors on active burrows to allow wombats to exit but not re-enter. 		

Threat	Action	Location	Timing /sequence/activity
	<ul style="list-style-type: none"> ○ Inspect remote cameras and one-way doors to ensure that the wombats have exited and not re-entered. If the wombat has not relocated after 24 hours continue to repeat the process. 		
	<ul style="list-style-type: none"> ● Retain cleared vegetation for reuse as structural elements in retained habitats (e.g. salvage large, hollow bearing trees for installation as standing stags, store and reuse logs, branches and large rocks as ground habitat and erosion mitigation). See specifications in Table 6 for further guidance. ● Avoid stockpiling timber and debris for more than a month within 500 metres of retained or uncleared habitat to prevent habitation by fauna. ● Prior to relocation and/or use of stockpile materials, undertake a pre-clearance survey to ensure these are free of fauna. 	Operational areas	Post habitat removal for the duration of project
Animal welfare	<ul style="list-style-type: none"> ● Check small excavations and trenches within five hours of sunrise and before sunset, where practical, for trapped fauna. If safe to do so, remove any trapped fauna, alternatively contact a qualified wildlife handler. <ul style="list-style-type: none"> ○ Do not commence works prior to completion of inspections. ○ Use fauna ramps where continual monitoring is not feasible. ● Do not use barbed wire for any fencing activities within the project area as this may injure bats and birds. Use plain wire as a substitute. ● Fix colourful flagging tape at regular intervals (particularly the top row) to any temporary fencing to limit the potential of bird strike. ● Limit the use of pesticides for insect control which can indirectly cause harm to insectivorous fauna. ● Monitor all ground-dwelling mammals that have entered the construction area and allow the animal to leave of its own accord. <ul style="list-style-type: none"> ○ If the animal is injured, or won't leave by itself, contact a licenced Wildlife Shelter, or one of these agencies for advice; Help for Wildlife (0417 380 687), Wildlife Victoria (1300 094 535), BADGAR emergency 24-hour wildlife rescue centre (1300 223 427). ○ Do not attempt to herd native animals found within the project area, this can stress the animal and cause erratic behavior, increasing the risk of injury to people and animals. All native wildlife is protected in Victoria under the <i>Wildlife Act 1975</i>. 	Operational areas	Duration of project
Pest animals	<ul style="list-style-type: none"> ● Develop and implement a pest animal control and monitoring program that meets State and local legislative requirements if pest animal activity increases within the project area. 	Operational areas	Duration of project

Threat	Action	Location	Timing /sequence/activity
	<ul style="list-style-type: none"> Encourage good housekeeping practices such as ensuring that no food scraps are left lying around the site that might encourage rodents (e.g., Black Rat): <ul style="list-style-type: none"> Provide adequate waste bins for staff. Empty waste bins daily. Ensure staff are trained and aware of best practice food scrap hygiene and pest animal issues. 		
Aquatic habitats			
Erosion and sedimentation	<ul style="list-style-type: none"> Sediment dams will be constructed to contain all “dirty” runoff water generated on the mining area. Avoid all works within 10 m of a drainage line. Where unavoidable, ensure the extent of exposed disturbed soil is minimized at all times. If a significant rainfall event is anticipated, all bare areas should be sprayed with a surface stabilizing compound to minimize sediment mobilization. Dewatering of wetlands and dams within the construction footprint should be identified and subject to pre-clearance surveys outside of breeding season by a qualified ecologist or wildlife handler. Ensure structures that cross natural waterways, including culverts and bridges, are designed to allow aquatic fauna to pass through. Monitor water quality for changes to pH and turbidity. 	Creeks and dams	Pre-construction and for the duration of project
Spills of hazardous materials or waste.	<ul style="list-style-type: none"> Avoid storage of chemicals or fuel, or re-fuelling of machinery and plant, within 30 metres of a waterway. Avoid stockpiling of spoil or introduced materials within 10 metres of a waterway. 	Creeks and dams	Duration of project
Invasive species	<ul style="list-style-type: none"> Implement weed hygiene controls when working on aquatic environs to minimise the risk of introducing invasive aquatic species. Conduct weed control along waterways and waterbodies where appropriate, focusing on invasive species such as Azolla, Water Hyacinth and Duckweed. Use control techniques such as hand pulling to minimise contamination of the wetland by chemicals where possible. Where herbicide use is required, use those with low toxicity to aquatic fauna (e.g., Roundup Biactive®, Fusilade®). Avoid spraying during the period from egg lay to dispersal of juvenile frogs into the surrounding area. Avoid using surfactants, as many of these are more toxic to wetland fauna than the herbicide. 	All aquatic environs	Duration of project

Threat	Action	Location	Timing /sequence/activity
Chytrid fungus hygiene controls	<ul style="list-style-type: none"> • Prior to any works being undertaken near aquatic environs that may support amphibians, testing for Chytrid fungus can be undertaken to better inform hygiene controls. Water testing using eDNA can detect Chytrid Fungus and should be undertaken by a qualified person. Where the fungus is detected implement the following controls: <ul style="list-style-type: none"> ○ When planning multiple sites, start at a site where the fungus is not known to be present before entering known infected areas. ○ Minimise work near waterbodies in wet or muddy conditions where possible. ○ Use single use disposable PVC gloves when handling frogs. Ideally frog handling will be undertaken by a qualified ecologist or fauna handler. ○ Non-disposal equipment should be used only once during a particular field exercise and disinfected later or between sites. ○ If frogs are required to be held, they will be held with a one frog-one bag policy and bags will only be used once and disposed of after use. ○ Any water and vegetation to be placed into the bag to assist in temporarily holding the frog will be taken from the point of capture and either dropped back at the site of the capture or disposed of after use. ○ Up to five tadpoles from the same water point may be held in a plastic bag for identification purposes. They will be held in water taken from the water point where the tadpoles were captured and returned in that water to the same point. The plastic bag will be used once and disposed of after use. ○ Frogs will not be moved from one location to another except for in exceptional circumstances, such as a translocation project, where frogs are at greater risk of remaining compared to being moved. ○ Footwear and vehicle tyres should be cleared of mud by scraping and sprayed with disinfectant benzalkonium chloride as the active ingredient, when moving from areas known to contain chytrid fungus and new areas to minimise disease transfer. 	Creeks and dams	Duration of project

6. Specifications

The following specifications are to be used in conjunction with the actions outlined in Section 6. They are designed to provide management outcomes for a range of species based on broad habitat structures (Table 6), types (Table 7) and functions (Table 8). In addition, specifications to improve and rehabilitate abiotic landscape function, such as preventing erosion, is provided in Table 9.

Table 6. Specifications for fauna habitat structures

Feature	Specifications
In-stream timber	<p>Median in-stream woody habitat (IWH) density for the South-eastern plains regions is estimated to be 0.0311 m³m² (Kitchingman et al 2016).</p> <p>For lowland reaches IWH density should aim to exceed the median volume.</p> <p>For upland reaches large woody debris is a less important component of physical habitat, IWH density. The IWH density within streams should include:</p> <ul style="list-style-type: none"> • Abundant debris from indigenous species. • Dense distribution of snags. • Mixture of snag size. • Cobble stones between 64 mm and 250 mm. • Occasional snags which are wider than the average channel width to provide stability to in-stream timber habitat. <p>For further refining of IWH volumes may be calculated using the Riverine Rehabilitation Decision Support Tool RiverRehab DST available from DELWP.</p>



Plate 1. Example of instream timber for habitat (source: Australian National University).

Feature	Specifications
Salvaged stags	<p>The salvage and relocation of standing trees provides an effective means of creating roosting and nesting habitats within parts of the landscape devoid of large trees. This can be done by:</p> <ul style="list-style-type: none"> • Prior to removal, survey trees and identify suitable candidates for stag relocation (i.e., large trees over 50 cm diameter with habitat structure e.g., hollows). • Habitat prune tree – i.e., remove canopy and smaller branches, leaving only large limbs and trunk which contain hollows (or are suitable for future hollow creation). May be done after felling of tree where damage can be avoided. • Cut trunk as close to ground level as possible with the tree supported by a crane or excavator to prevent damage to retained branches. • Transport removed tree ('stag') either via flatbed truck to the relocation sites (long distance) or Frana Crane/excavator (short distance). • Install stag upright in holes large enough to fit the trunk, to a depth of 3 – 5 metres (depending on height and weight of stag). • Backfill holes and compact soil around trunk to secure stag in upright position, ensuring they do not topple in high winds or wet soils. • Chainsaw hollows of various sizes (see below) can be added manually to relocated stags to increase habitat diversity.



Plate 2. Example of tree relocation works (source: ABC News).

Feature	Specifications
Hollows	<p>Tree hollows represent a critical habitat resource in Australia landscapes. Protect and create hollow resource in both protection and rehabilitation zones as follows:</p> <ul style="list-style-type: none"> • Install / create chainsaw hollows using qualified arborist where tree hollows are lacking. Design should be for arboreal species listed in the species factsheets. Chainsaw hollows should be the priority method for restoring the loss of tree hollows to improve fauna uptake following restoration. • Install hollows at a density of 10 hollows per hectare (including any retained hollows in live or dead trees). • Where tree hollows are lacking and chainsaw hollows are not feasible, install nest boxes designed for specific arboreal species. • Nest boxes can be obtained from La Trobe Wildlife Sanctuary (03) 9479 1206 for a range of arboreal animals including: <ul style="list-style-type: none"> ○ Microbats. ○ Brushtail Possum. ○ Ringtail Possum. ○ Sugar Glider. ○ Phascogale/Antechinus. ○ Lorikeet/Rosella and Large Parrot. ○ Owl. ○ Kookaburra. • Location of hollow resources should consider the following: <ul style="list-style-type: none"> ○ Install away from bright lights. ○ Install at least 3 metres above ground. ○ Hollows should face east. ○ One hollow per tree. • Investigate use of new prosthetic hollows for Powerful Owl which are currently being trialled by Melbourne University.



Plate 3. Chainsaw hollow installed in trunk (source: Griffiths et al 2018).

Feature	Specifications
Ground timber, litter and rocks	<p>Woody debris generated from vegetation removal should be cut into lengths less than 5 metres and utilised in protection and rehabilitation zones with no or limited groundcover as follows. Where required, secure woody debris with wooden stakes on downslope side to prevent movement during high rainfall events.</p> <p>Valley slopes and channel vegetation:</p> <ul style="list-style-type: none"> • Logs greater than 40 cm diameter at a rate of 200 m/ha placed with long axis on the contour. • Logs between 10 and 40 cm diameter at a rate of 100 m/ha placed with long axis on the contour. • Debris less than 10 cm diameter (i.e., small branches and leaves) spread to 5 cm depth at 20% of ground cover. <p>Grassy Woodland:</p> <ul style="list-style-type: none"> • Logs greater than 40 cm diameter at a rate of 100 m/ha. • Logs between 10 and 40 cm diameter at a rate of 50 m/ha. • Debris less than 10 cm diameter (i.e., small branches and leaves) spread to 5cm depth at 10% of ground cover. <p>Rocks should be installed sporadically to provide habitat for small reptiles. This can be achieved by placing clusters (>2 m²) of medium and large rocks (>30 cm diameter) in sunny positions with limited vegetation cover.</p>



Plate 4. Coarse ground-timber in woodlands (source: ELA 2021).

Table 7. Specifications for fauna habitat types

Feature	Specifications																													
Aquatic environs	Aquatic and fringing vegetation should include a mixture of deep zone emergent plants, floating and submerged plants, and a mixture of riparian plants to provide a variety of habitats. Example of plant types and densities is provided below. Further species are listed in the Sedgy Wetland (EVC 136) and Aquatic Herbland (EVC 653) benchmarks. Timing of planting of aquatic species is important due to many being dormant over the winter months, whereas ephemeral species are at risk of desiccation over the summer months if they have not had a chance for roots to establish.																													
	<table border="1"> <thead> <tr> <th>Zone</th> <th>Type/Species</th> <th>Min density</th> <th>Timing</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Deep Zone (emergents)</td> <td><i>Eleocharis</i> spp.</td> <td rowspan="2">2 per m²</td> <td rowspan="2">Summer (Oct-March)</td> </tr> <tr> <td><i>Cyanogeton procerum</i></td> </tr> <tr> <td rowspan="3">Intermediate / Deep zone (floating)</td> <td><i>Ornduffia reniformis</i></td> <td rowspan="3">1 per m²</td> <td rowspan="3">Summer (Oct-March)</td> </tr> <tr> <td><i>Potamogeton</i> spp.</td> </tr> <tr> <td><i>Myriophyllum</i> sp.</td> </tr> <tr> <td>Edge/ intermediate (fringing to emergent)</td> <td><i>Juncus</i> spp.</td> <td>2 per m²</td> <td>Winter (Apr-Sept)</td> </tr> <tr> <td rowspan="2">Edge/ Intermediate (fringing, some inundation)</td> <td><i>Pericaria decipiens</i></td> <td rowspan="2">2 per m²</td> <td rowspan="2">Summer (Oct-March)</td> </tr> <tr> <td><i>Bolboschoenous</i> spp.</td> </tr> <tr> <td rowspan="2">Edge (fringing)</td> <td><i>Lomandra longifolia</i></td> <td rowspan="2">2 per m²</td> <td rowspan="2">Winter (Apr-Sept)</td> </tr> <tr> <td><i>Poa labillardierei</i></td> </tr> </tbody> </table>	Zone	Type/Species	Min density	Timing	Deep Zone (emergents)	<i>Eleocharis</i> spp.	2 per m ²	Summer (Oct-March)	<i>Cyanogeton procerum</i>	Intermediate / Deep zone (floating)	<i>Ornduffia reniformis</i>	1 per m ²	Summer (Oct-March)	<i>Potamogeton</i> spp.	<i>Myriophyllum</i> sp.	Edge/ intermediate (fringing to emergent)	<i>Juncus</i> spp.	2 per m ²	Winter (Apr-Sept)	Edge/ Intermediate (fringing, some inundation)	<i>Pericaria decipiens</i>	2 per m ²	Summer (Oct-March)	<i>Bolboschoenous</i> spp.	Edge (fringing)	<i>Lomandra longifolia</i>	2 per m ²	Winter (Apr-Sept)	<i>Poa labillardierei</i>
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Valley slopes and channels	Plant native ground cover species for foraging, shelter and food resources. Species should comprise the Plains Grassy Forest EVC on the lower slopes and Valley Grassy Forest on the upper slopes. Species and target cover for both EVC's are outlined below. The ground layer should include complex native vegetation and habitat structure and floristic diversity. This should include:																													
	<ul style="list-style-type: none"> • Dense understory areas with multiple native species. • Species which provided both food and habitat resources. • Open areas for basking or foraging. • Low areas forming wet depressions (Southern Toadlet). • Native organic litter. 																													
	Planting or direct seeding of dryland species should generally be conducted during April to October, following the Autumn break. Optimum planting season is July to September.																													
	Riparian zones should be assessed for likelihood of frost and planting timing adjusted until after frost is unlikely to occur.																													
	Ground layer																													
	Prostrate shrub (target cover 1%):																													
	<ul style="list-style-type: none"> • Cranberry Heath <i>Astroloma humifusum</i>. • Creeping Bossiaea <i>Bossiaea prostrata</i>. • Honey Pots <i>Acrotriche serrulate</i>. 																													
	Herbs (target cover 20%-35%):																													
	<ul style="list-style-type: none"> • Common Everlasting <i>Chrysocephalum apiculatum</i>. • Common Raspwort <i>Gonocarpus tetragynus</i>. 																													
	Large Grasses (target cover 15%):																													
<ul style="list-style-type: none"> • Saw-sedge <i>Gahnia</i> sp. • Spear-grass <i>Austrostipa</i> spp. 																														

Feature	Specifications
	<p>Medium/Small Grasses/Ferns (target cover 26-45%):</p> <ul style="list-style-type: none"> • Austral Bracken <i>Pteridium esculentum</i>. • Chocolate Lily <i>Arthropodium strictum</i>. • Kangaroo Grass <i>Themeda triandra</i>. • Tussock Grass <i>Poa</i> spp. • Wallaby Grass <i>Rytidosperma</i> spp. • Wattle Mat-rush <i>Lomandra filiformis</i>. • Weeping Grass <i>Microlaena stipoides</i> var <i>stipoides</i>. • Yellow Rush Lily <i>Tricoryne elatior</i>. <p>Mid-storey</p> <p>Plant a mix of small and tall indigenous understory plants to increase foraging opportunities for insectivorous animals. Species and target cover for both EVC's are outlined below.</p> <p>Understorey tree (target cover 15%):</p> <ul style="list-style-type: none"> • Black Wattle <i>Acacia mearnsii</i>. • Cherry Ballart <i>Exocarpos cupressiformis</i>. • Lightwood <i>Acacia implexa</i>. <p>Medium shrub (target cover 25%):</p> <ul style="list-style-type: none"> • Burgan <i>Kunzea ericoides</i>. • Silver Banksia <i>Banksia marginate</i>. • Sweet Bursaria <i>Bursaria spinosa</i> ssp. <i>Spinosa</i>. <p>Prostrate shrub (target cover 5%):</p> <ul style="list-style-type: none"> • Common Rice-flower <i>Pimelea humilis</i>. <p>Canopy</p> <p>Canopy vegetation in the riparian zone is important for shading a waterway, which controls water temperature and reduce the growth of phytoplankton preventing algal blooms. Large trees stabilise the banks, and can provide a physical barrier to stock to prevent erosion and nutrient runoff.</p> <p>Riparian areas (15% cover):</p> <ul style="list-style-type: none"> • River Red Gum <i>Eucalyptus camaldulensis</i>. • Manna Gum <i>Eucalyptus viminalis</i>. • Yellow Box <i>Eucalyptus melliodora</i>. <p>Valley slopes (30% cover):</p> <ul style="list-style-type: none"> • Red Stringybark <i>Eucalyptus macrorhyncha</i>.
<p>Grassy Woodland (rehabilitated)</p>	<p>Ground layer</p> <p>Plant native ground cover species for foraging, shelter and food resources. Species should comprise the Plains Grassy Woodland EVC. Species and target cover are outlined below:</p> <p>Prostrate shrub (target cover 1%):</p> <ul style="list-style-type: none"> • Creeping Bossiaea <i>Bossiaea prostrata</i>. <p>Herbs (target cover 30%):</p> <ul style="list-style-type: none"> • Chocolate Lily <i>Arthropodium strictum</i>. • Common Everlasting <i>Chrysocephalum apiculatum</i>. • Early Nancy <i>Wurmbea dioica</i>. • Sheep's Burr <i>Acaena echinate</i>. • Sprawling Bluebell <i>Wahlenbergia gracilis</i>. • Twining Fringe Lily <i>Thysanotus patersonii</i>. • Yellow Rush Lily <i>Tricoryne elatior</i>. <p>Large Grasses (target cover 15%):</p>

Feature	Specifications
	<ul style="list-style-type: none"> • Flax Lily <i>Dianella revoluta</i>. • Saw-sedge sp. <i>Gahnia</i> sp. <p>Medium/Small Grasses (target cover 45%):</p> <ul style="list-style-type: none"> • Kangaroo Grass <i>Themeda triandra</i> . • Wallaby Grass <i>Rytidosperma</i> sp. • Wattle Mat-rush <i>Lomandra filiformis</i>. • Weeping Grass <i>Microlaena stipoides</i> var <i>stipoides</i>. <p>Mid-storey</p> <p>Plant a mix of small and tall indigenous understory plants to increase foraging opportunities for insectivorous animals such as:</p> <p>Medium shrub (target cover 10%):</p> <ul style="list-style-type: none"> • Black Wattle <i>Acacia mearnsii</i>. • Burgan <i>Kunzea ericoides</i>. • Lightwood <i>Acacia implexa</i>. <p>Small shrub (target cover 1%):</p> <ul style="list-style-type: none"> • Common Rice-flower <i>Pimelea humilis</i>. <p>Canopy</p> <p>Plant Gippsland Red Gum <i>Eucalyptus tereticornis</i> subsp. <i>mediana</i> as the dominant canopy tree, making up 50 % or more of the total tree canopy cover (EPBC Act guidelines). All other species should be planted in low densities. Plant nectar food trees for foraging and trees with ribbon or sheet bark to provide potential nesting opportunities for some species (such as microbats) where hollows are lacking. Within the Gippsland Red Gum Grassy Woodland community (Plains Grassy Woodland EVC) these could include the following additional trees in low densities (target canopy cover for all canopy species is 20%):</p> <ul style="list-style-type: none"> • Manna Gum <i>Eucalyptus viminalis</i>. • Red Box <i>Eucalyptus polyanthemos</i>. • River Red Gum <i>Eucalyptus camaldulensis</i>. • Yellow Box <i>Eucalyptus melliodora</i>.
Grassy Woodlands (retained)	<p>Grassy Woodland remnants are proposed for retention within the project area at the eastern end of Chettles Road. Management should be focused on protecting and establish the following components:</p> <ul style="list-style-type: none"> • A tall (>30m) native grassland in the ground layer • An open woodland with trees 20-50m apart • Unshaded bare ground, large rocks, and logs for basking. • Rocks piles, logs, and leaf litter for shelter. Artificial refuges such as roof tiles can be used where rock is unavailable.
Timing	<p>Planting or direct seeding of dryland species should generally be conducted during April to October, following the Autumn break. Optimum planting season is July to September.</p>

Table 8. Specifications for fauna habitat function (connectivity)

Feature	Specifications
Scattered trees	<p>Scattered trees should be established at intervals less than <50 m to facilitate movement of arboreal mammals and small birds between core habitats. Species should be selected from the Plains Grassy Forest EVC and could include the following based on the list of scattered trees recorded by EHP (2018):</p> <ul style="list-style-type: none"> • Gippsland Red-gum <i>Eucalyptus tereticornis</i> subsp. <i>mediana</i>. • Messmate <i>Eucalyptus obliqua</i>. • Red Box <i>Eucalyptus polyanthemos</i>. • Red Stringybark <i>Eucalyptus macrorhyncha</i>. • White Stringybark <i>Eucalyptus globoidea</i>. • Yellow Box <i>Eucalyptus melliodora</i>. <p>Where possible, scattered trees should be planted in association with small understory trees (e.g., Black Wattle <i>Acacia mearnsii</i>) and complimented with ground timber and rocks.</p>

**Plate 5. Scattered trees within an agricultural landscape (source: ELA 2021)**

Scattered patches	<p>Scattered small patches (100 m²) should be established at intervals less than <100 m apart to facilitate movement of mammals and birds between core habitats. Species should be selected from the Plains Grassy Forest EVC and include a range of canopy, mid and ground layer native species resilient to agricultural settings. Potential species include:</p> <ul style="list-style-type: none"> • Black Wattle <i>Acacia mearnsii</i>. • Cherry Ballart <i>Exocarpus cupressiformis</i>. • Cranberry Heath <i>Austroloma humifusum</i>. • Kangaroo Grass <i>Themeda triandra</i>. • Red Box <i>Eucalyptus polyanthemos</i>. • Red Stringybark <i>Eucalyptus macrorhyncha</i>. • Silver Banksia <i>Banksia marginate</i>. • Thatch Saw-sedge <i>Gahnia radula</i>. • Wattle Mat-rush <i>Lomandra longifolia</i>. • Weeping Grass <i>Microleana stipoides</i> var <i>stipoides</i>.
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Feature

Specifications



Plate 6. Small scattered patches within an agricultural landscape (Source: ELA 2021)

Linear patches

Where possible, linear patches should be created in associated with property or paddock boundaries as a preference to scattered trees and patches. As a minimum, corridors should:

- Be fenced to prevent stock access.
- Support both aquatic and terrestrial habitat.
- Complex native vegetation structure and floristic diversity (i.e., a diversity of ground, mid-story and canopy species) with high cover (e.g., 30% or greater).
- Canopy gaps limited to 50 m.
- Tree hollows for hollow-dependent fauna.
- High cover of different sized logs, rocks and leaf litter.
- Open areas for basking or foraging.
- A width of > 50 m (ideally 100 m or more).



Plate 7. A linear wildlife corridor (Source: Dept. Main Roads, Queensland Govt)

Feature	Specifications
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Dams and ponds

Permanent or semi-permanent waterbodies are important for facilitating movement of species dependant on aquatic systems, such as frogs, reptiles and small mammals. Waterbodies should be located no greater than 300 m apart and support:

- Permanent water where available.
- Fringing and aquatic vegetation (as per Table 7).
- Submerged logs and branches.
- Clusters (>2m²) of medium and large rocks (>30cm diameter) in sunny positions above the high-water mark.
- A combination of shallow (<0.5m) and deep water (>1m).

Where practical, waterbodies should be fenced to exclude stock access. Where required, limited access can be provided to allow for stocking water points.



Plate 8. A farm dam with fringing and riparian vegetation (source: LLS NSW)

Road crossings

Major roads pose a significant landscape barrier to connectivity for a range of species, particularly for arboreal mammals, small birds, reptiles and frogs. Providing crossing points to facilitate the movement of small wildlife along corridors improves habitat connectivity and reduces associated mortalities.

Where possible, monitoring should be undertaken to determine the most appropriate points along the road corridor for installation of the crossing.

Crossings within the study area should consist of both underpasses and canopy bridges, with the following specifications.

Overhead crossing structures:

- Use overhead crossing structures such as rope bridges and glide poles.
- Rope bridges should have a minimum clearance of seven metres above the road and can be up to 12 m.
- Crossing opportunities should be provided every 100-120 m where possum home ranges coincide with the road corridor (Department of Transport and Main Roads, 2010).
- Rope bridge size should be wide enough for the largest animal that may use it to cross. Brushtail Possum have been observed crossing a rope bridge 300 mm wide.
- Glider poles may be used to provide a launching or landing points where tree connectivity is lacking.

Feature

Specifications

- Poles must be a minimum height of 12 m (Department of Transport and Main Roads, 2010).
- Cross bars should be provided at various heights with the average cross bar height for Sugar Glider at 12 m (Department of Transport and Main Roads, 2010).
- Maximum distance between poles is 60 m (Department of Transport and Main Roads, 2010).
- Predation refuges consisting of three PVC pipes (110 x 380mm) can be attached to each pole at heights between 9-11 m (Department of Transport and Main Roads, 2010).
- Plant vegetation such as shrubs at the base of glider poles to increase the potential for use.

Culverts and underpasses:

- Install precast concrete culvert near drainage lines or other aquatic areas located near roads where fauna may need to cross. Average design is 1 m high x 3 m wide and no longer than 30 m in length (Department of Transport and Main Roads, 2010).
 - Light should be able to penetrate the culvert. Note: Culverts cannot be used where the road is in cutting.
- Use funnel fencing to divert fauna into culverts or underpasses near roads. Fencing should be frog-resistant and dug down to a depth of at least 100 mm.
- Build culverts with a raised ledge or structure (i.e., logs) to increase fauna use when water is present in the culvert.
- Place rocks and logs at the entrance of culverts and throughout to provide protection from predators.
- Provide protective cover such as trees or shrubs at either end of the culvert.

Further details on specifications can be found in Chapter 6 of the Fauna Sensitive Road Design Manual, Department of Transport and Main Roads Technical Document, 2010.



Plate 9. Overhead fauna crossing structures (source: Griffith University)

Table 9. Specifications for landscape function

Feature	Specifications
Leaky weirs and chain of ponds	<p>Weirs and ponds to be spaced between 200 to 400 metres apart to provide connectivity for amphibians and reptiles that utilise these resources.</p> <p>Leaky weirs act to trap coarse (bed load) sediment, which can then be vegetated to provide habitat and retain water. Weirs should be:</p> <ul style="list-style-type: none"> • no more than 1 metre high (so that depth and hydraulic head of ponded water is limited). • keyed into underlying bed and into banks so that flow cannot undermine or bypass the structure. • stabilised at downslope overfall so that flow over the top of the weir does not create a plunge pool. • of high porosity (at least 50%) so that flow velocity is reduced but there is no prolonged ponding. <p>Weirs should be constructed progressively along channels, starting from the lowest point in the landscape being treated, with each weir being revegetated once filled with sediment, and then a new weir being constructed upslope.</p>
	
	<p>Plate 10. Leaky weir installation along ephemeral drainage line (source: The Mulloon Institute)</p>
Sediment and erosion controls	<p>Within fluvial systems, movement of coarse (bed load) sediment can be reduced by placement of leaky weirs and by planting of riparian vegetation to increase hydraulic roughness of the channel.</p> <p>However, there are few options to control movement of finer (suspended) sediment once flows reach channels and become too large to retain and treat. The only effective approach to reduce transport of suspended sediment is to reduce or prevent its initial detachment. Within rehabilitated channels, placement of rock and establishment of vegetation cover can reduce sediment detachment. In contributing areas more remote from the channels, establishment of surface vegetative cover (with a dominant component of grasses) is a key strategy for reducing sediment detachment, particularly in areas of higher gradient. Elimination of grazing pressure on the steeper valley slopes will assist in maintaining vegetative cover.</p>
Stock access	<p>The exclusion of grazing from retained or rehabilitated habitat areas, both during and after rehabilitation, will reduce erosion risk. Elimination of grazing and associated surface trampling will reduce erosion by maintaining surface vegetation cover and preventing surface disturbance by trampling.</p> <p>Ungrazed areas will maintain higher surface vegetation cover during dry periods and will have low erosion potential relative to the wider (grazed) landscape.</p>

7. Monitoring and adaptive management

Monitoring is recommended to measure the performance of fauna management actions and feed into the overarching environmental management framework.

Monitoring for habitat protection and rehabilitation actions have been developed with a focus on the biodiversity criteria that provide an indication of the abundance and distribution of species as a proxy for overall biodiversity and ecosystem health. Monitoring is to commence in areas of retained and rehabilitated habitat one year prior to mining operations commencing within 500 metres. The relevant programs are outlined in Table 9 with further detail provided in the species factsheets (Appendix A).

Table 10. Key success criteria and monitoring for habitat protection, augmentation, and rehabilitation actions

Habitat types	Key success criteria	Monitoring program ¹
Aquatic environs	No decline in macroinvertebrate abundance or distribution.	Annual macroinvertebrate sampling in Spring using the Victorian Rapid Bioassessment Methodology for Rivers and Streams (EPA 2003). Biannual monitoring for wetland and riparian birds in late autumn / winter and spring using Birdlife Australia's 20 min / 2 ha systematic bird survey method along riparian corridors. Undertake annual spotlight monitoring for frogs following heavy rainfall and light wind. Surveys should be undertaken in March over a minimum of two nights during the peak calling time for many of these species.
Valley slopes and channel	Increase in species abundance and distribution Presence of fauna species not previously recorded in project area.	Undertake annual spotlight monitoring for frogs following heavy rainfall and light wind. Surveys should be undertaken in March over a minimum of two nights during the peak calling time for many of these species. Undertake camera trapping annually in autumn for ground-dwelling mammals over a minimum of two weeks. Annual monitoring in spring for reptiles using tile grids. Undertake biannual diurnal monitoring (morning and afternoon) for woodland birds in late autumn / winter and spring using Birdlife Australia's 20 min / 2 ha systematic bird survey method over a minimum of two days. Undertake spotlight surveys for nocturnal birds and mammals over a minimum of two nights biannually during autumn and spring. Undertake annual hollow monitoring in translocated and retained trees / stags for arboreal mammals and birds during spring using a camera-mounted pole to inspect hollows for occupancy. Undertake annual monitoring of bats using anabat recorders over minimum of two weeks along potential flyways or roost sites.
Grassy woodland	Increase in species abundance and distribution. Presence of fauna species not previously recorded in project area.	Undertake camera trapping annually in autumn for ground-dwelling mammals over a minimum of two weeks. Annual monitoring in spring for reptiles using tile grids. Undertake biannual diurnal monitoring (morning and afternoon) for woodland birds in late autumn / winter and spring using Birdlife Australia's 20 min / 2 ha systematic bird survey method over a minimum of two days. Undertake spotlight surveys for nocturnal birds and mammals over a minimum of two nights biannually during autumn and spring.

Habitat types	Key success criteria	Monitoring program ¹
		<p>Undertake annual hollow monitoring in translocated and retained trees / stags for arboreal mammals and birds during spring using a camera-mounted pole to inspect hollows for occupancy.</p> <p>Undertake annual monitoring of bats using anabat recorders over minimum of two weeks along potential flyways or roost sites.</p>
Plateau and swale	No decline in species abundance or distribution.	Undertake biannual diurnal monitoring (morning and afternoon) for birds in late autumn / winter and spring using Birdlife Australia's 20 min / 2 ha systematic bird survey method over a minimum of two days.

¹ For further detail, see Species Factsheets in Appendix A.

All species observations, including any threatened and migratory species observed within the project area must be documented and submitted to relevant authorities (i.e. DELWP via the Victorian Biodiversity Atlas and Birdlife Australia via Birdata).

The monitoring of operational areas has a strong focus on the identification of localised impacts to allow remedial actions and controls to be implemented to minimise further harm, as well as ensuring auditing requirements are met in accordance with the work plan and associated performance criteria.

Operational monitoring and reporting is recommended for the following:

- Daily inspections of fauna injury / mortality along project roads and access tracks.
- Daily inspections of open trenches or pits for trapped animals, such as reptiles and small-ground dwelling mammals. Priority should be given to areas where sensitive habitat has been identified nearby.
- Weekly inspections of habitat zones and associated fencing (both for the exclusion of people and stock) to ensure no encroachment has occurred and barriers are not compromised.
- Quarterly surveys of pest animal activity. This should include daily searches for pest animal activity (such as rabbit warrens and fox dens), and night-time spotlighting to determine the abundance and distribution of pest animals across the site.
- Annual surveys of vegetation/habitat loss using aerial imagery to ensure it is in accordance with the approved extent and staging of clearance.

7.1 Adaptive management

Adaptive management refers to a way of managing natural resources where management actions are regularly reviewed and, if necessary, modified based on monitored changes in environmental condition and/or changes in base knowledge which underpins the original management approach. This plan has been based on, as far as practical, the current state of knowledge of the species ecology and best practice habitat management approaches. When new facts emerge from future research, they should be immediately integrated into the Plan, so it remains consistent with the current state of knowledge and best practice).

The adaptive management approach has been adopted for the reasons outlined below:

- Not all the effects of the future development are accurately predictable.
- The future development presents opportunities for continuing to provide habitat concurrent with the progressive, staged development of the project.
- The methods for ensuring that permanent habitat areas remain viable are not fully understood.

Considering these uncertainties, an approach to management that includes flexible management responses guided by the results of the monitoring program is important. This will ensure that corrective or complimentary actions to ensure effective management of fauna can occur over the project's lifespan.

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Appendix A Species fact sheets

Factsheet	No. of species	Species ¹
Instream aquatic	8	<p>Existing species</p> <p>Australian Bass, Australian Smelt, Common Galaxias, Eastern Long-necked Turtle, Long-finned Eel, Platypus, Short-finned Eel, Tupong.</p>
Arboreal mammal	3	<p>Existing species</p> <p>Common Brush-tailed Possum, Eastern Pygmy Possum, Ringtail Possum.</p> <p>Recolonisation species</p> <p>Sugar Glider.</p>
Bat	10	<p>Existing species</p> <p>Chocolate Wattled Bat, Eastern Bent-wing Bat, Eastern Falsistrellus, Gould's Wattled Bat, Grey-headed Flying Fox, Large Forest Bat, Little Forest Bat, Southern Freetail Bat, White-striped Freetail Bat, Yellow-bellied Sheathtail Bat.</p>
Frogs	10	<p>Existing species</p> <p>Banjo Frog, Common Froglet, Giant Burrowing Frog, Peron's Tree Frog, Southern Brown Tree Frog, Spotted Marsh Frog, Striped Marsh Frog, Whistling Tree Frog, Dendy's Toadlet.</p>
Ground-dwelling mammal	5	<p>Existing species</p> <p>Bare-nosed Wombat, Short-beaked Echidna, Eastern Grey Kangaroo, Emu, Swamp Wallaby, Brush-tailed Rock Wallaby.</p> <p>Recolonisation species</p> <p>Bush Rat, Southern Brown Bandicoot, Spot-tailed Quoll.</p>
Reptile	7	<p>Existing species</p> <p>Common Garden Skink, Delicate Skink, Eastern Blue-tongued Lizard, Lace Monitor, Red-bellied Black Snake, <i>Lampropholis</i> sp., <i>Lerista</i> sp., Weasel Skink.</p> <p>Recolonisation species</p> <p>Eastern Three-lined Skink.</p>
Wetland / Riparian bird	13	<p>Existing species</p> <p>Australian Shelduck, Australian Wood Duck, Azure Kingfisher, Baillon's Crake, Black Swan, Chestnut Teal, Dusky Moorhen, Eastern Great Egret, Grey Teal, Hardhead, Latham's Snipe, Nankeen Night Heron, Pacific Black Duck, Purple Swamphen, Royal Spoonbill, Sharp-tailed Sandpiper, Straw-necked Ibis, White-faced Heron, Welcome Swallow, White-bellied Sea Eagle.</p>

Factsheet	No. of species	Species ¹
Woodland bird	43	<p>Existing species</p> <p>Australasian Pipit, Australian Hobby, Australian King-Parrot, Australian Magpie, Australian Owlet-nightjar, Australian Raven, Barn Owl, Black-faced Cuckoo-shrike, Brown Falcon, Brown Goshawk, Brown Thornbill, Brown-headed Honeyeater, Buff-rumped Thornbill, Chestnut-rumped Heathwren, Common Bronzewing, Crescent Honeyeater, Crested Pigeon, Crimson Rosella, Dusky Woodswallow, Eastern Rosella, Eastern Spinebill, Eastern Yellow Robin, Fan-tailed Cuckoo, Flame Robin, Galah, Golden Whistler, Grey Butcherbird, Grey Currawong, Grey Fantail, Grey Shrike-thrush, Horsfield's Bronze-cuckoo, Jacky Winter, Laughing Kookaburra, Little Raven, Magpie-lark, Masked Lapwing, Mistletoebird, Musk Lorikeet, Nankeen Kestrel, Noisy Miner, Olive-back Oriole, Pied Currawong, Rainbow Lorikeet, Red Wattlebird, Red-browed Finch, Red-capped Robin, Rufous Whistler, Sacred Kingfisher, Scarlet Robin, Silvereye, Southern Boobook, Spotted Pardalote, Striated Pardalote, Striated Thornbill, Sulphur Crested Cockatoo, Superb Fairy-wren, Tawny Frogmouth, Tree Martin, Varied Sitella, Wedge-tailed Eagle, Weebill, Whistling Kite, White-browed Scrubwren, White-eared Honeyeater, White-naped Honeyeater, White-throated Treecreeper, White-winged Chough, Willie Wagtail, Wonga Pigeon, Yellow-faced Honeyeater, Yellow-rumped Thornbill and Yellow-tailed Black Cockatoo.</p> <p>Recolonisation species</p> <p>Barking Owl, Gang-gang Cockatoo, Little Eagle, Rose Robin, Square-tailed Kite.</p>

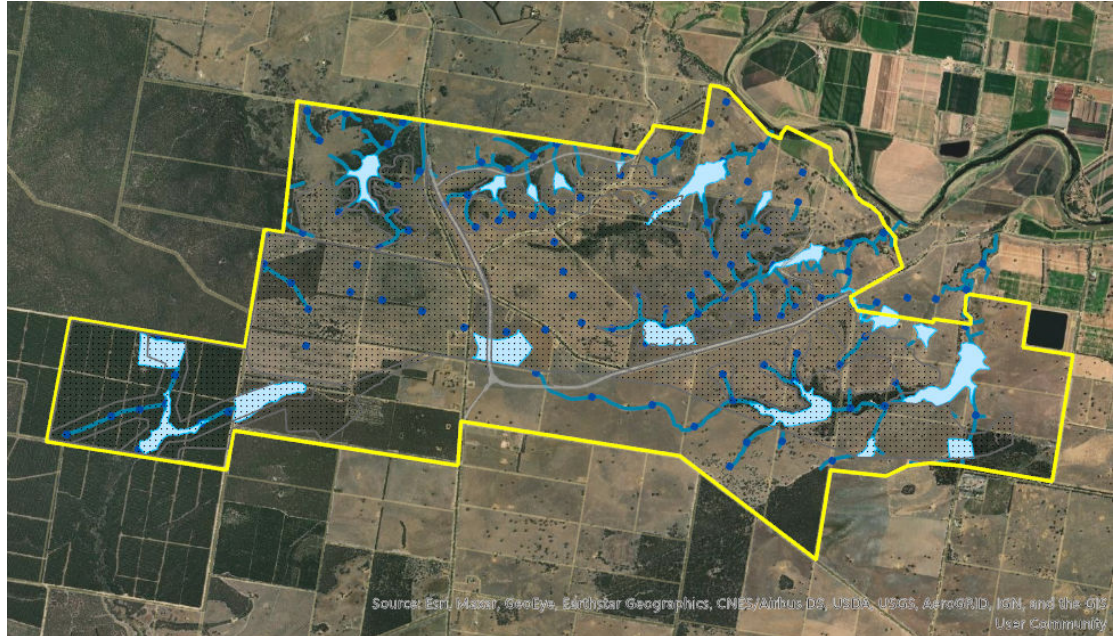
¹ Some recolonisation species may already be present within the project area but have not been previously identified during ecological assessments or previous surveys.

Background

This group primarily comprises fish but also includes platypus and the eastern long-necked turtle. These species rely on permanent water and the associated aquatic and terrestrial vegetation.

Priority habitat

Creeks, ponds and sediment dams along valley slopes and within the plateau and swales.



Priority actions

Habitat protection, augmentation, and rehabilitation

- Retain and protect all priority habitat outside the mine footprint.
- Investigate opportunities to establish aquatic and fringing vegetation and associated habitat structures (e.g. in-stream debris) in and around the proposed sediment dams with the aim to retain these structures within the landscape as wetlands at the completion of the project.
- Improve aquatic vegetation cover in protected and rehabilitated habitat with emphasis on aquatic and semi-aquatic species including:
 - *Cycnogeton procerum* (intermediate/deep pond zone)
 - *Eleocharis sp.* (deep pond zone)
 - *Juncus sp.* (intermediate/deep pond zone)
 - *Lomandra longifolia* (pond edge to attract insects)
 - *Myriophyllum sp.* (intermediate/deep pond zone)
 - *Ornduffia reniformis* (floating plant)
 - *Persicaria decipiens* (pond edge to attract insects)
 - *Potamogeton sp.* (floating plant)
- Avoid removal of rocks, logs, leaf litter and other instream debris that provide shelter and foraging opportunities. Where absent, add in-stream debris to aquatic habitats.
- Create a 'chain of ponds' across project area to improve habitat extent and connectivity. This will include the installation of leaky weirs along retained creek lines to create supplementary habitat, slow water flow and improve infiltration.
- Stabilise riverbanks to prevent erosion and downstream water turbidity by planting native vegetation in the upper, middle and ground layer.
- Ensure maintenance of hydrological regime along major creeks with aim to ensure permanent pools of standing water are maintained year-round.
- Conduct weed control along waterways and waterbodies where appropriate, focusing on invasive species such as Azolla, Water Hyacinth and Duckweed. Use control techniques such as hand pulling to minimise contamination of the wetland by chemicals where possible. Where herbicide use is required, use those with low toxicity to aquatic fauna (e.g., Roundup Biactive®, Fusilade®). Avoid spraying during the period from egg lay to dispersal of juvenile frogs into the surrounding area. Avoid using surfactants, as many of these are more toxic to wetland fauna than the herbicide.

- Install fencing to exclude stock and vehicle access from areas of priority habitat outside the mine footprint.

Harm minimisation

- Remove habitat sequentially towards retained areas of habitat to prevent fauna becoming trapped.
- Avoid all works within 10 m of a waterbody. Where unavoidable, ensure the extent of exposed disturbed soil is minimized at all times.
- Dewatering of wetlands and dams within the construction footprint should be identified and subject to pre-clearance surveys outside of breeding season by a qualified ecologist or wildlife handler.
- Monitor water quality for changes to pH and turbidity.
- Avoid storage of chemicals or fuel, or re-fuelling of machinery and plant, within 30 metres of a waterway.
- Avoid stockpiling of spoil or introduced materials within 10 metres of a waterway.
- Ensure structures that cross natural waterways, including culverts and bridges, are designed to allow aquatic fauna to pass through.

Monitoring

Undertake annual macroinvertebrate sampling in spring using the Victorian Rapid Bioassessment Methodology for Rivers and Streams (EPA 2003). Annual monitoring will follow the proposed project stages and commence up to 12 months prior to any construction works commencing. The pre-construction monitoring survey will provide initial data relating to river and creek system health prior to any potential disturbances caused by the works. Baseline data will then be used to compare future annual surveys against and make determinations as to any potential changes to river and creek system health from the construction works, including potential impacts of sedimentation.

Australian Bass *Percalates novemaculeata*



Description: Dark olive-green or grey on upper body, paler on sides with yellowish-white belly. Tapered snout, with lower jaw protruding forward. Fins usually have a distinctive lateral line. Body size 200 – 550 mm long.

Habitat types: Creeks and rivers.

Structures: Flowing permanent water, submerged and emergent aquatic vegetation, in-stream debris such as logs.

Food resources: Fish, insects, worms and water snails.

Photo credit: <https://www.flickr.com/photos/160417453@N04/41012541424>

Australian Smelt *Retropinna semoni*



Description: Small slender fish up to 100 mm long. Body colour silver to translucent with prominent silver-orange to bluish lateral band. Large eyes and forked tail.

Habitat types: Creeks and rivers.

Structures: Still or slow-moving to flowing permanent water, submerged and emergent aquatic vegetation, in-stream debris such as logs.

Food resources: Insects, crustaceans, molluscs and fish.

Photo credit: [https://commons.wikimedia.org/wiki/File:Australian_smelt_\(Retropinna_semoni\).jpg](https://commons.wikimedia.org/wiki/File:Australian_smelt_(Retropinna_semoni).jpg)

Common Galaxias *Galaxias maculatus*



- Description:** Small slender fish up to 190 mm long. Dorsal and anal fins located opposite each other at the lower body. Forked tail.
- Habitat types:** Creeks and rivers.
- Structures:** Still or slow-moving to flowing permanent water, submerged and emergent aquatic vegetation, in-stream debris such as logs.
- Food resources:** Insects, crustaceans, molluscs and fish.
- Photo credit:** <https://www.flickr.com/photos/52961925@N08/14602584988>

Eastern Long-necked turtle *Chelodina longicollis*



- Description:** Shell up to 250 mm with neck a similar length. Upper shell variable in colour from light reddish-brown to blackish with light creamy yellow to white belly.
- Habitat types:** Creeks, rivers, swamps and dams.
- Structures:** Slow-moving permanent water, fringing and aquatic vegetation including sedges and reeds and pasture.
- Food resources:** Fish, crustaceans and frogs.
- Photo credit:** https://commons.wikimedia.org/wiki/File:CSIRO_ScienceImage_7775_
Eastern_Snakeneked_Turtle.jpg

Long-finned Eel *Anguilla reinhardtii*



- Description:** Large eel with broad head and mouth with fleshy lips. Has well developed longer pectoral fins which distinguishes it from the similar short-finned eel. Body colour blotched olive-brown above and on sides with a lighter belly.
- Habitat types:** Creeks and rivers.
- Structures:** Flowing permanent water, submerged and emergent aquatic vegetation, in-stream debris such as logs.
- Food resources:** Fish, insects, worms and water snails.
- Photo credit:** <https://www.flickr.com/photos/cskk/2914236398/>

Platypus *Ornithorhynchus anatinus*



- Description:** Distinctive species with large flat bill and tail with webbed feet. Fur is thick and dense, brown in colour.
- Habitat types:** Creeks and rivers.
- Structures:** Flowing permanent water, trees, well vegetated stable riverbanks.
- Food resources:** Crustaceans, worms and aquatic insects.
- Photo credit:** <https://www.flickr.com/photos/brisbanecitycouncil/6811147158>

Short-finned Eel *Anguilla australis*



- Description:** Large eel that can be distinguished from the long-finned eel by a uniform body colour rather than blotched and shorter pectoral fins. Average body length 700 mm.
- Habitat types:** Creeks, rivers, swamps and dams.
- Structures:** Still or slow-moving to flowing permanent water, submerged and emergent aquatic vegetation, in-stream debris such as logs.
- Food resources:** Fish, insects, yabbies, shrimps, molluscs and frogs.
- Photo credit:** <https://www.inaturalist.org/photos/2535952>. No changes were made to the original photo.

Tupong *Pseudaphritis urvilli*



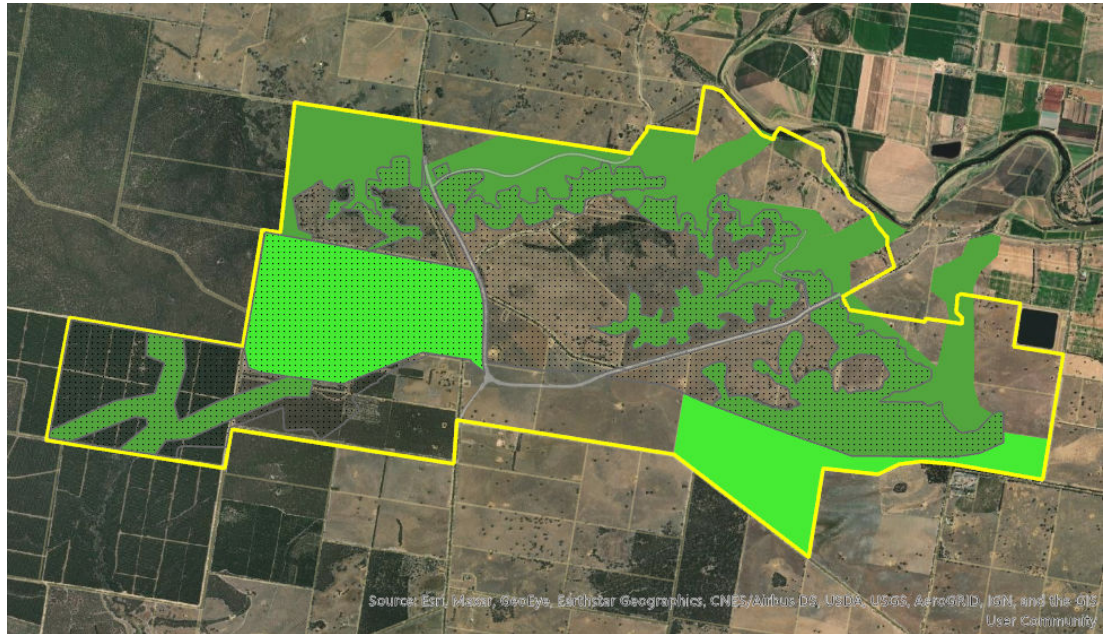
- Description:** Small slender fish usually between 100 – 200 mm but can grow to more than 350 mm in length. Body silvery with mottled brown above and on sides, silver on belly. Sharp pointed snout with two separate dorsal fins.
- Habitat types:** Creeks and rivers.
- Structures:** Still or slow-moving to flowing permanent water, submerged and emergent aquatic vegetation, in-stream debris such as logs.
- Food resources:** Insects, crustaceans, molluscs and fish.
- Photo credit:** <https://www.inaturalist.org/observations/18713076>

Background

Arboreal mammals spend most of their time in trees and are well adapted to climbing and grasping on to branches using prehensile tails. Arboreal mammals are very reliant on trees for foraging and nesting opportunities, with many requiring tree hollows for reproduction.

Priority habitat

Dense forest and woodlands.



Priority actions

Habitat protection, augmentation, and rehabilitation

- Retain and protect all priority habitat outside the mine footprint, prioritising hollow-bearing trees.
- Where absent or limited, install nesting resources (e.g. boxes, chainsaw hollows, relocated natural hollows or hollow-bearing stags).
- Improve vegetation cover with emphasis on:
 - nectar food trees for foraging and trees with ribbon or sheet bark to provide potential nesting opportunities for Eastern Pygmy Possum where hollows are lacking. This includes Manna Gum *Eucalyptus viminalis*, River Red Gum *Eucalyptus camaldulensis*, Yellow Box *Eucalyptus melliodora*, Ironbark *Eucalyptus tricarpa*.
 - nectar and pollen producing shrubs including *Acacia*, *Banksia* and *Callistemon* species.
- Install fencing to exclude stock and vehicle access from areas of priority habitat outside the mine footprint.
- Within rehabilitated pastures and roadsides plant small stands of trees and shrubs to provide stepping-stones and/or corridors through the landscape.
- Undertake pest control for foxes and cats.

Harm minimisation

- Remove habitat sequentially towards retained areas of habitat to prevent fauna becoming trapped.
- Undertake vegetation clearance outside of fauna breeding months where practicable.
- Undertake pre-clearance surveys of all fauna habitats immediately prior to clearing.
- Provide road crossing opportunities such as overhead arboreal crossing structures (rope bridges and glide poles) to minimise habitat fragmentation and potential vehicle strike.
- Reduce edge effects during construction including light, dust and noise.
- Check small excavations and trenches within five hours of sunrise and before sunset, where practical, for trapped fauna. If safe to do so, remove any trapped fauna, alternatively contact a qualified wildlife handler.
- Avoid stockpiling timber and debris to prevent habitation by fauna. Where stockpiling is required for extended periods (e.g. longer than 1 month), do so in a location which is more than 500 metres from retained or uncleared habitat.

- Do not attempt to approach, herd or harass fauna, as this can stress the animal and cause erratic behavior, increasing the risk of injury to people and animals.
- Monitor fauna that have entered the construction area and allow the individuals to leave of their own accord.
- If an animal is injured, or won't leave by itself, contact a licensed Wildlife Shelter, or one of these agencies for advice Help for Wildlife (0417 380 687), Wildlife Victoria (1300 094 535) or BADGAR emergency 24-hour wildlife rescue centre (1300 223 427).

Monitoring

Undertake annual hollow monitoring in translocated and retained trees / stags during spring using a camera-mounted pole to inspect hollows for occupancy.

Undertake spotlight surveys for nocturnal mammals over a minimum of two nights biannually during autumn and spring. Survey effort should consist of a minimum 20-minute search along a defined transect in forest and woodland habitats across all domains. Transects should be set up in areas that are representative of the habitat to be surveyed and not a mix of two habitat types.

Common Brushtail Possum *Trichosurus vulpecula*



Description: Large possum grey brown to reddish body with cream underparts. Distinct thick black bushy tail. Long ears and dark marking around nose and eyes.

Habitat types: Forest, woodland and farmland.

Structures: Trees and tree hollows.

Food resources: Leaves, blossom and fruit.

Photo credit: <https://www.flickr.com/photos/25363236@N07/32038843315>

Common Ringtail Possum *Pseudocheirus peregrinus*



Description: Variable body fur colour but usually grey-brown back and white underparts. Coiled tail with distinct white tip.

Habitat types: Forest, woodland and farmland.

Structures: Trees.

Food resources: Leaves, blossom and fruit.

Photo credit: <https://www.flickr.com>

Eastern Pygmy Possum *Cercatetus nanus*



Description: Small possum between 15 – 43 g. Light brown body with white underparts. Big forward pointing ears and almost bare tail.

Habitat types: Forest and woodland.

Structures: Trees, tree hollows and tree bark.

Food resources: Insects, nectar and pollen from *Eucalyptus*, *Banksia* and *Callistemon*.

Photo credit: <https://www.flickr.com/photos/160417453@N04/27079573528/>

Recoloniser species

Sugar Glider *Petaurus breviceps*



Description: Grey body fur and pale grey to cream underparts with a dark stripe along the head and back. Tail black with white tip. Distinctive gliding membrane between elbow and the ankle. Body length up to 20 cm.

Habitat types: Forest, woodland and farmland.

Structures: Trees and tree hollows.

Food resources: Nectar, blossom, fruit and insects.

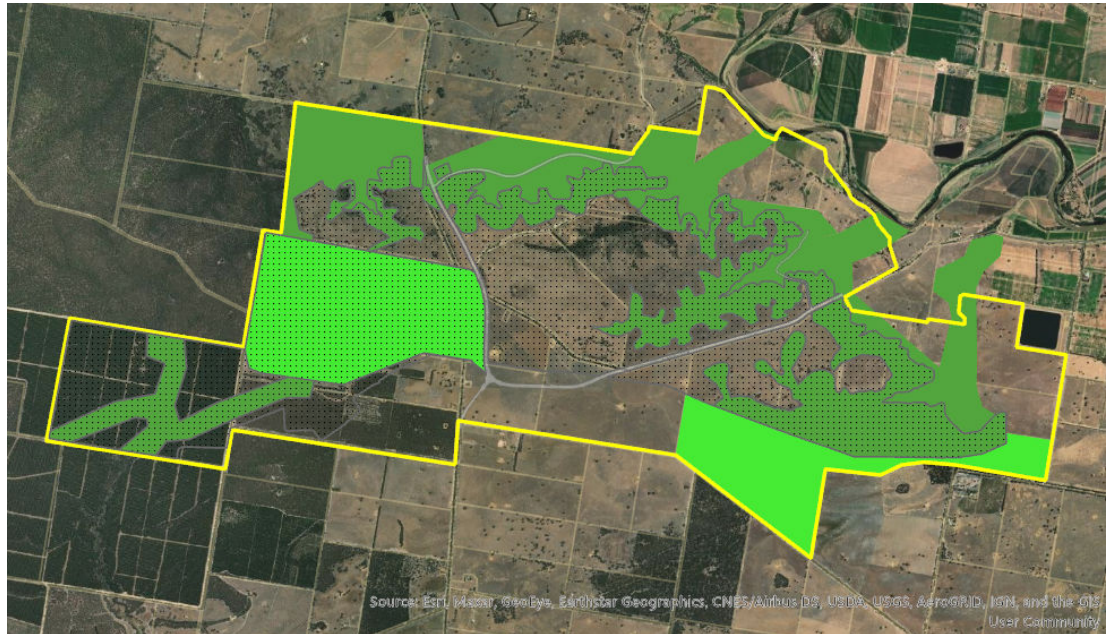
Photo credit: <https://www.flickr.com/photos/brisbanecitycouncil/8065737191>

Background

Bats are a nocturnal species that roost communally in caves or tree hollows, cracks, fissures or underneath bark. They forage at night within or above the canopy for blossoms, fruits or insects.

Priority habitat

Forest and woodland associated with valley slopes. Some species may be present in treed farmland.



Priority actions

Habitat protection, augmentation, and rehabilitation

- Retain and protect all priority habitat outside the mine footprint, prioritising hollow-bearing trees.
- Where absent or limited, install nesting resources (e.g. boxes, chainsaw hollows, relocated natural hollows or hollow-bearing stags).
- Improve vegetation cover with emphasis on:
 - trees with ribbon or sheet bark to provide potential roost sites where hollows are lacking. This includes Manna Gum *Eucalyptus viminalis*, River Red Gum *Eucalyptus camaldulensis*, Yellow Box *Eucalyptus melliodora*.
 - dense riparian vegetation in gullies for roosting opportunities, particularly Grey-headed Flying Fox.
 - indigenous understorey and ground-layer plants for bats that forage for insects below the tree canopy.
- Within rehabilitated pastures and roadsides plant small stands of trees and shrubs to provide stepping-stones and/or corridors through the landscape.
- Install fencing to exclude stock and vehicle access from areas of priority habitat outside the mine footprint.
- Undertake pest control for foxes and cats.

Harm minimisation

- Remove habitat sequentially towards retained areas of habitat to prevent fauna becoming trapped.
- Undertake vegetation clearance outside of fauna breeding months where practicable.
- Undertake pre-clearance surveys of all fauna habitats immediately prior to clearing.
- Do not use barbed wire for any fencing activities within the project area as this may injure bats. Use plain wire as a substitute.
- Limit the use of pesticides for insect control which can indirectly cause harm to bats. Bats can eat up to half of their body weight in insects per night, so having them around will keep pests in check.
- Ensure that all staff are aware of the requirement to not handle bats due to the potential for infection with Lyssavirus. If injured bats are found, staff must immediately call a local wildlife carer to remove the injured bat.
- If staff locate a roost site within the project area, work must cease immediately and notify their manager. The manager should notify the Department of Environment, Land, Water and Planning (DELWP) to determine an appropriate course of action. Bats are very sensitive to disturbance so no staff should be allowed near the roost site until advised otherwise by DELWP.

Monitoring

Undertake annual monitoring using anabat recorders over minimum of two weeks along potential flyways or roost sites to record species within priority habitat areas.

Chocolate Wattled Bat *Chalinolobus morio*

Description: Chocolate brown fur all over body. Short muzzle with distinctive fleshy lobe on lower lip. Ears are short and broad. Tragus curves forward with pointed tip. Tail enclosed in flight membrane.

Habitat types: Forest and woodland (some species may forage in agricultural land).

Structures: Trees, shrubs, tree hollows, loose bark.

Food resources: Insects.

Photo credit: https://www.flickr.com/photos/patrick_k59/29674615578/

Eastern Bent-wing Bat *Trichosurus vulpecula*

Description: Dark brown to reddish brown fur on back and paler brown on underside. Short muzzle, high domed head, short rounded ears and small eyes. Distinctive wing structure with the longer final wing bone creating a 'bent wing' appearance.

Habitat types: Forest and woodland.

Structures: Trees in proximity to roosting caves.

Food resources: Insects.

Photo credit: https://commons.wikimedia.org/wiki/File:Southern_bentwing_bat.jpg

Eastern Falsistrellus *Falsistrellus tasmaniensis*

Description: Brown to reddish body with a grey underside. Long slender ears set back on head and some sparse hair on the nose. Weighs up to 28 g. Average body length 65 mm.

Habitat types: Wet forest.

Structures: Trees, shrubs, tree hollows, loose bark.

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/37577693@N04/3607224352/>

Gould's Wattled Bat *Chalinolobus gouldii*



Description: Brown fur on body, darker almost black fur on head and shoulders. Distinct fleshy lobes at corner of mouth. Average weight 14 g. Length 11.5 cm.

Habitat types: Forest and woodland (some species may forage in agricultural land).

Structures: Trees, shrubs, tree hollows, loose bark.

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/dsevicoria/6753047927/>

Grey-headed Flying Fox *Pteropus poliocephalus*



Description: Largest Australian bat with dark grey fur on body, light grey fur on head and an orange collar. Leg fur extends to the ankle. Weighs between 750 – 1000 g.

Habitat types: Forest, woodland, agricultural land in all domains.

Structures: Trees - *Eucalyptus tereticornis*, *E. camaldulensis*, *E. melliodora*. Dense riparian vegetation for roosting.

Food resources: Nectar and pollen of *Eucalyptus*, *Melaleuca* and *Banksia*.

Photo credit: https://commons.wikimedia.org/wiki/File:Grey_headed_flying_fox_-_AndrewMercer_IMG41853.jpg

Large Forest Bat *Vespadelus darlingtoni*



Description: Dark to rusty brown body all over weighing 6 – 8.3 g. Tail enclosed in flight membrane. Ears and wings are very dark and has a triangular black patch on lower lip.

Habitat types: Forest and woodland (some species may forage in agricultural land).

Structures: Trees, shrubs, tree hollows, loose bark.

Food resources: Insects.

Photo credit: <https://inaturalist.ala.org.au/observations/46907889>.
No changes were made to the original photo.

Little Forest Bat *Vespadelus vulturnus*



Description: Small bat up to 5 cm in length and average weight of 4.3g. Brown to grey-brown fur on back and pale grey underneath. Whiteish tragus and raised forehead.

Habitat types: Forest and woodland (some species may forage in agricultural land).

Structures: Trees, shrubs, tree hollows, loose bark.

Food resources: Insects.

Photo credit: Danielle Woodhams (ELA)

Southern Freetail Bat *Mormopterus planiceps*



Description: Body brown on back to grey underneath and is less than 30 cm in length. Tail extends past flight membrane.

Habitat types: Forest and woodland (some species may forage in agricultural land).

Structures: Trees, shrubs, tree hollows, loose bark.

Food resources: Insects.

Photo credit: Matt Elsey (ELA)

White-striped Freetail Bat *Tadarida australis*



Description: Large bat weighing 33-41 g. Body dark brown to black, slightly lighter underneath. Tail extends past the tail membrane. Distinct white stipe underneath wings alongside the body.

Habitat types: Forest and woodland (some species may forage in agricultural land).

Structures: Trees, shrubs, tree hollows, loose bark.

Food resources: Insects.

Photo credit: https://en.wikipedia.org/wiki/File:White-striped_Free_fox-tailed_Bat_displaying_white_strip_along_side_of_body.jpg

Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris*



Description: Large bat up to 87 mm long, with long narrow wings, a glossy jet-black back, a white to yellow belly extending up to behind the ear. Head is distinctly flattened, muzzle sharp with forward pointing nostrils.

Habitat types: Wet forest, agricultural areas.

Structures: Trees, shrubs, tree hollows, loose bark.

Food resources: Insects.

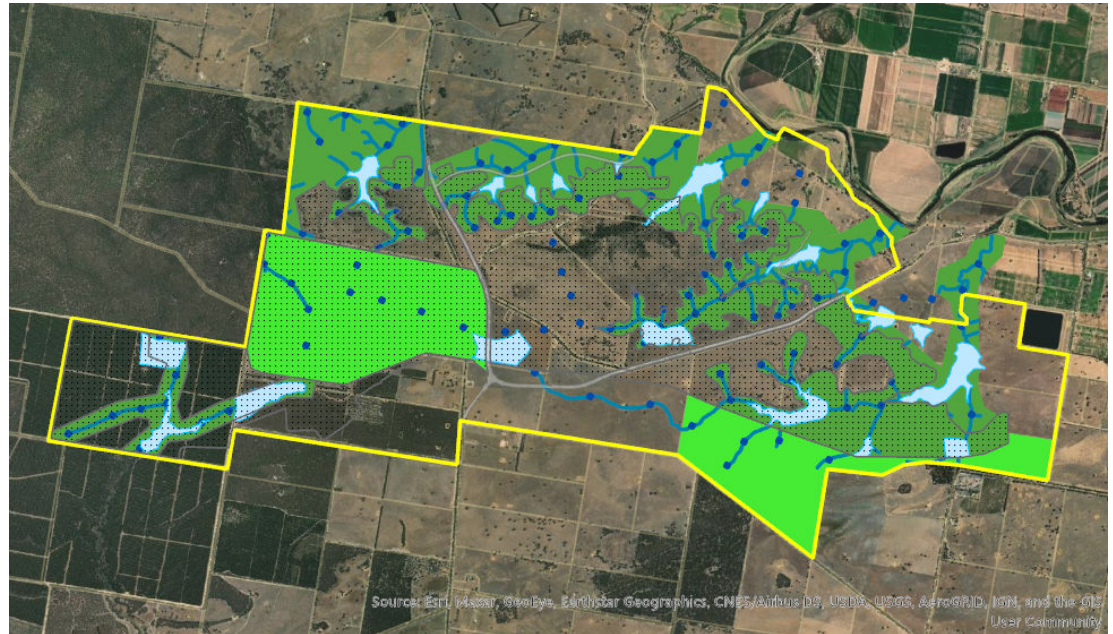
Photo credit: Matt Elsey (ELA)

Background

Frogs live in a range of habitats from more permanent aquatic environments, such as creeks and dams, to temporarily inundated areas in forests and woodland. Frogs can be found in trees, in and around waterbodies or they can burrow underground and emerge when suitable conditions occur, such as a rainfall event.

Priority habitat

Permanent and semi-permanent aquatic environs (creeks, dams and temporarily inundated areas), lower elevation damp forest and woodlands in all domains.



Priority actions

Habitat protection, augmentation, and rehabilitation

- Retain and protect all priority habitat outside the mine footprint.
- Investigate opportunities to establish aquatic and fringing vegetation and associated habitat structures (e.g. emergent debris) in and around the proposed sediment dams with the aim to retain these structures within the landscape as wetlands at the completion of the project.
- Improve aquatic vegetation cover in protected and rehabilitated habitat with emphasis on aquatic and semi-aquatic species including:
 - *Cycnogeton procerum* (intermediate/deep pond zone).
 - *Eleocharis sp.* (deep pond zone).
 - *Juncus sp.* (intermediate/deep pond zone).
 - *Lomandra longfolia* (pond edge to attract insects).
 - *Myriophyllum sp.* (intermediate/deep pond zone).
 - *Ornduffia reniformis* (floating plant).
 - *Persicaria decipiens* (pond edge to attract insects).
 - *Potamogeton sp.* (floating plant).
- Avoid removal of rocks, logs, leaf litter and other instream debris that provide shelter and foraging opportunities. Where absent, add in-stream debris to aquatic habitats.
- Create a 'chain of ponds' across project area to improve habitat extent and connectivity. This will include the installation of leaky weirs along retained creek lines to create supplementary habitat, slow water flow and improve infiltration.
- Stabilise riverbanks to prevent erosion and downstream water turbidity by planting native vegetation in the upper, middle and ground layer.
- Ensure maintenance of hydrological regime along major creeks with aim to ensure permanent pools of standing water are maintained year-round.
- Consider the use of underpasses along main roads within the project area to assist in movement of frogs between suitable wetlands, dams and creeks.
- Conduct weed control along waterways, ponds and wetlands where appropriate, focusing on invasive species such as Azolla, Water Hyacinth and Duckweed. Use control techniques such as hand pulling to minimise contamination of the wetland by chemicals where possible. Where herbicide use is required, use those with low toxicity to aquatic fauna (e.g., Roundup Biactive®, Fusilade®). Avoid spraying during

the period from egg lay to dispersal of juvenile frogs into the surrounding area. Avoid using surfactants, as many of these are more toxic to wetland fauna than the herbicide.

- Install fencing to exclude stock and vehicle access from areas of priority habitat outside the mine footprint.

Harm minimisation

- Remove habitat sequentially towards retained areas of habitat to prevent fauna becoming trapped.
- Avoid all works within 10 m of a waterbody. Where unavoidable, ensure the extent of exposed disturbed soil is minimized at all times.
- Dewatering of wetlands and dams within the construction footprint should be identified and subject to pre-clearance surveys outside of breeding season by a qualified ecologist or wildlife handler.
- Monitor water quality for changes to pH and turbidity.
- Avoid storage of chemicals or fuel, or re-fuelling of machinery and plant, within 30 metres of a waterbody.
- Avoid stockpiling of spoil or introduced materials within 10 metres of a waterbody.
- Ensure structures that cross natural waterways, including culverts and bridges, are designed to allow aquatic fauna to pass through.
- Chytrid fungus is a deadly disease for frogs which can be easily transmitted between areas. Staff should use appropriate hygiene controls as listed in the Commonwealth document "Hygiene protocols for the control of diseases in Australian frogs". Prior to any works being undertaken near aquatic environs that may support amphibians, testing for Chytrid fungus is required in form hygiene controls. Water testing undertaken by a qualified person using eDNA can detect Chytrid Fungus. Where the fungus is detected implement the following controls:
 - When planning multiple sites, start at a site where the fungus is not known to be present before entering known infected areas.
 - Minimise work near waterbodies in wet or muddy conditions where possible.
 - Use single use disposable PVC gloves when handling frogs. Ideally frog handling will be undertaken by a qualified ecologist or fauna handler.
 - Non-disposal equipment should be used only once during a particular field exercise and disinfected later or between sites.
 - If frogs are required to be held, they will be held with a one frog-one bag policy and bags will only be used once and disposed of after use.
 - Any water and vegetation to be placed into the bag to assist in temporarily holding the frog will be taken from the point of capture and either dropped back at the site of the capture or disposed of after use.
 - Up to five tadpoles from the same water point may be held in a plastic bag for identification purposes. They will be held in water taken from the water point where the tadpoles were captured and returned in that water to the same point. The plastic bag will be used once and disposed of after use.
 - Frogs will not be moved from one location to another except for in exceptional circumstances, such as a translocation project, where frogs are at greater risk of remaining compared to being moved.
 - Footwear and vehicle tyres should be cleared of mud by scraping and sprayed with disinfectant benzalkonium chloride as the active ingredient, when moving from areas known to contain chytrid fungus and new areas to minimise disease transfer.

Monitoring

Undertake annual spotlight monitoring at creeks, dams and along forest and woodland tracks following heavy rainfall and light wind. Surveys should be undertaken in March over a minimum of two nights during the peak calling time for many of these species.

Banjo Frog *Limnodynastes dumerilii*



Description: Prominent lump on hind leg, pale stripe from mouth to top of arm, white or mottled belly.

Habitat types: Wetlands, dams, creeks, road reserve, temporarily inundated areas in all domains.

Structures: Standing water, fringing vegetation, leaf litter, rocks, logs and other debris.

Food resources: Insects.

Photo credit: https://en.wikipedia.org/wiki/User:Tnarg_12345

Common Froglet *Crinia signifera*



Description: Pattern and colour are variable. Back mostly brown or black with striped, marbled or plain pattern. Small lumps on belly.

Habitat types: Wetlands, dams, creeks, road reserve, temporarily inundated areas in all domains.

Structures: Standing water, fringing vegetation, leaf litter, rocks, logs and other debris.

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/88708273@N03/8909157435/>

Dendy's Toadlet *Pseudophryne dendyi*



Description: Dark brown body with yellow patches between the eyes, upper front legs and/or between hind legs.

Habitat types: Wet and dry forest.

Structures: Damp leaf litter, logs or rocks. Shallow depressions prone to flooding.

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/160417453@N04/27079573528/>

Giant Burrowing Frog *Heleioporus australiacus*



Description: Large burrowing frog with chocolate brown body above and white underneath with scattered yellow spots on flanks and around cloaca.

Habitat types: Primarily dry forest; riparian woodland.

Structures: Small flowing streams; potentially dams for breeding. Leaf litter, logs or rocks.

Food resources: Insects.

Photo credit: [https://commons.wikimedia.org/wiki/File:Heleioporus_australiacus_\(male\).jpg](https://commons.wikimedia.org/wiki/File:Heleioporus_australiacus_(male).jpg)

Peron's Tree Frog *Litoria peronii*



Description: Pale green to red brown with emerald green flecks on its back. Black and yellow marking on thighs, groin and armpits. Cross shaped pupils.

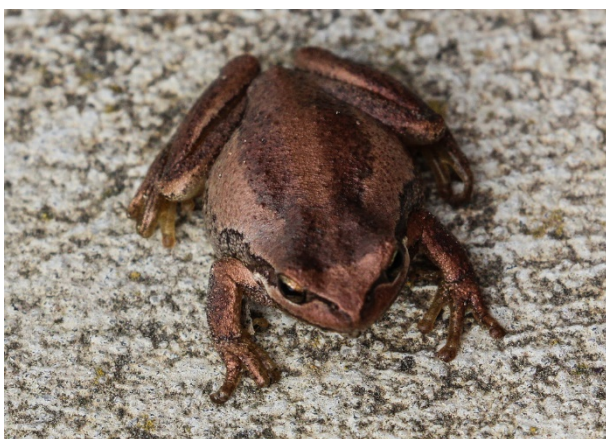
Habitat types: Wetlands, dams, creeks, road reserve, temporarily inundated areas in all domains.

Structures: Standing water, fringing vegetation, leaf litter, rocks, logs and other debris.

Food resources: Insects and invertebrates.

Photo credit: <https://commons.wikimedia.org/wiki/User:WikiWookie>

Southern Brown Tree Frog *Litoria ewingii*



Description: Pale brown with dark patches on body and middle back. Orange patches on hind legs.

Habitat types: Wetlands, dams, creeks, road reserve, temporarily inundated areas in all domains.

Structures: Standing water, fringing vegetation, leaf litter, rocks, logs and other debris.

Food resources: Insects.

Photo credit: https://www.flickr.com/photos/arthur_chapman/37369233864

Southern Toadlet *Pseudophryne semimarmorata*



Description: Dark green or brown body with orange patch on hind legs and throat. Black and white pattern on belly.

Habitat types: Wet and dry forest, woodland, heaths and grasslands.

Structures: Damp leaf litter, logs or rocks. Shallow depressions prone to flooding.

Food resources: Insects.

Photo credit: <http://www.scienceimage.csiro.au/image/7816>

Spotted Marsh Frog *Limnodynastes tasmaniensis*



Description: Large irregular-shaped olive-green blotches along back and a yellow, orange or red striped down the middle of back in some individuals.

Habitat types: Wetlands, dams, creeks, road reserve, temporarily inundated areas in all domains.

Structures: Standing water, fringing vegetation, leaf litter, rocks, logs and other debris.

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/88708273@N03/8651623582/>

Striped Marsh Frog *Limnodynastes peronii*



Description: Brown body with light and dark stripes across. Black stripe across eye. Pale yellowish stripe down middle of back in some individuals.

Habitat types: Wetlands, dams and creeks in all domains.

Structures: Permanent water for breeding; leaf litter, logs and rocks for shelter.

Food resources: Insects and smaller frogs.

Photo credit: <https://en.wikipedia.org/wiki/User:Froggydarb>

Whistling Tree Frog *Litoria verreauxii*



Description: Light brown body with dark patches on the groin and legs. Dark stripe extending from nose, through eye to top of arm. White strip along jaw.

Habitat types: Wetlands, dams, creeks, road reserve, temporarily inundated areas in all domains.

Structures: Standing water, fringing vegetation, leaf litter, rocks, logs and other debris.

Food resources: Insects and smaller frogs.

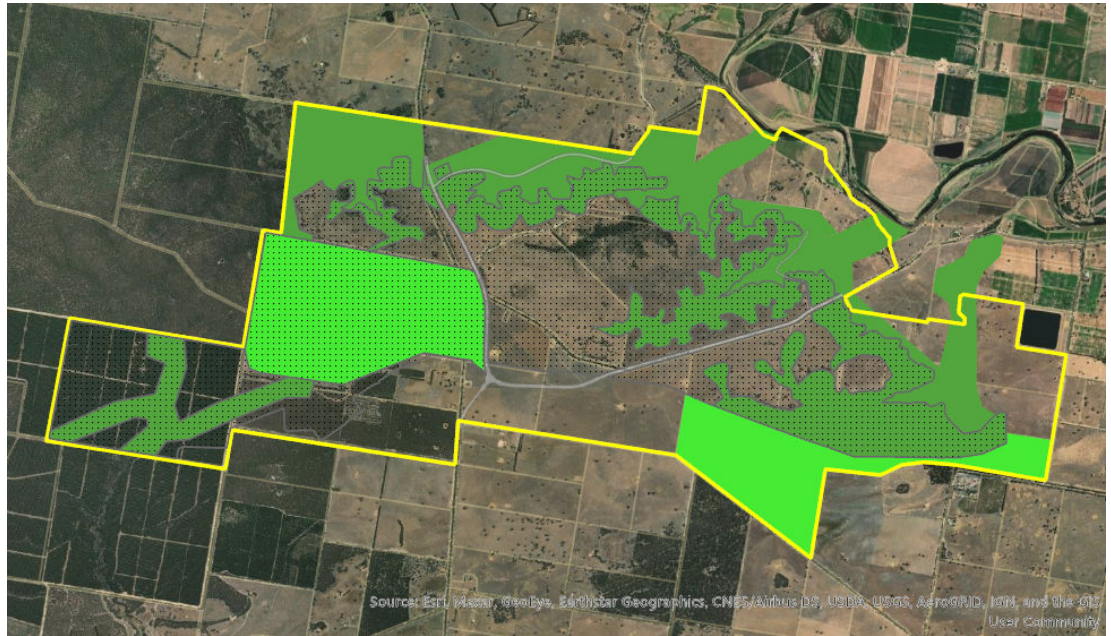
Photo credit: <http://www.scienceimage.csiro.au/image/7488>

Background

Small and large ground-dwelling mammals are located within the project area. These species rely on a variety of habitats and can be found foraging in open grassland or in more niche habitats, such as along rocky escarpments.

Priority habitat

Forest, woodland and rocky escarpments associated with valley slopes. Grassland and farmland associated with the plateau and swales may be used for grazing and foraging.



Priority actions

Habitat protection, augmentation, and rehabilitation

- Retain and protect all priority habitat outside the mine footprint.
- Improve vegetation cover with emphasis on native grass species such as *Rytidosperma* sp. and Kangaroo grass *Themeda triandra* for foraging and shrubs for cover.
- Avoid removal of rocks, logs and litter that provide foraging opportunities.
- Install fencing to exclude stock and vehicle access from areas of priority habitat outside the mine footprint.
- Within rehabilitated pastures and roadsides plant small stands of trees and shrubs to provide stepping-stones and/or corridors through the landscape.
- Undertake pest control for rabbits, foxes and cats.
- Stabilise slopes and escarpments to prevent erosion and loss of habitat.

Harm minimisation

- Remove habitat sequentially towards retained areas of habitat to prevent fauna becoming trapped.
- Undertake vegetation clearance outside of fauna breeding months where practicable.
- Undertake pre-clearance surveys of all fauna habitats immediately prior to clearing.
- Within one week prior to any construction works, the impact area and surrounds should be searched for wombat burrows. If found:
 - Burrow entrances will be soft blocked with small sticks to determine activity. Motion-sensitive cameras should also be placed near the burrow with clear vision of the entrance for further confirmation of activity.
 - Monitor burrows following morning by observing burrow entrance and camera photos to determine activity and times of exit / entry.
 - Permanently block inactive burrows using rocks/logs.
 - Place one-way doors on active burrows to allow wombats to exit but not re-enter.
 - Inspect remote cameras and one-way doors to ensure that the wombats have exited and not re-entered. If the wombat has not relocated after 24 hours continue to repeat the process.
- Remove all sources of water which could attract ground-dwelling mammals within the footprint at least one month prior to land clearing occurring. This should include stock troughs, drains and dams.

- Impose vehicle speed limits of 40 km/h for construction vehicles within the project area to minimise the risk of fauna strike and limit driving at dawn and dusk.
- Ensure that no food scraps are thrown out of vehicles particularly near roadsides as this may encourage fauna towards roads and result in increased vehicle strikes.
- Check small excavations and trenches within five hours of sunrise and before sunset, where practical, for trapped fauna. If safe to do so, remove any trapped fauna, alternatively contact a qualified wildlife handler.
- Avoid stockpiling timber and debris to prevent habitation by fauna. Where stockpiling is required for extended periods (e.g. longer than 1 month), do so in a location which is more than 500 metres from retained or uncleared habitat.
- Do not attempt to approach, herd or harass fauna, as this can stress the animal and cause erratic behavior, increasing the risk of injury to people and animals.
- Monitor fauna that have entered the construction area and allow the individuals to leave of their own accord.
- If an animal is injured, or won't leave by itself, contact a licensed Wildlife Shelter, or one of these agencies for advice Help for Wildlife (0417 380 687), Wildlife Victoria (1300 094 535) or BADGAR emergency 24-hour wildlife rescue centre (1300 223 427).

Monitoring

Undertake camera trapping annually in autumn for a minimum of two weeks within priority habitat areas. Additional trapping techniques such as Elliot traps or hair funnels may also be undertaken at the same time to assist with informing species presence and potential abundances of small mammals within the project area.

Bare-nosed Wombat (Common Wombat) *Vombatus ursinus*



Description: Short stocky body with grey-brown fur and short legs. Large ears and nose.

Habitat types: Forest and woodland primarily, also farmland.

Structures: Grasses including Wallaby and Kangaroo grass, trees and shrubs.

Food resources: Variable but consists of grasses, herbs, sedges, trees and shrub roots.

Photo credit: https://commons.wikimedia.org/wiki/File:Common_wombat_8.jpg

Brush-tailed Rock Wallaby *Petrogale penicillata*



Description: Large dark brown body with rufous rump and grey neck and shoulders. Paler belly and cheek strip. Some may have white on chest. Long dark tail with brush at tip.

Habitat types: Rocky escarpments and outcrops.

Structures: Escarpments, trees, shrubs and grasses.

Food resources: Grasses, leaves, fruits, roots and bark.

Photo credit: <https://pixabay.com/photos/brush-tailed-rock-wallaby-wallaby-4367746/>

Emu *Dromaius novaehollandiae*



Description: Large grey- brown flightless bird. Long legs. Neck blue-black.

Habitat types: Woodland and grassland.

Structures: Native grasses, trees and shrubs.

Food resources: Grasses, fruits, seeds and insects.

Photo credit: https://commons.wikimedia.org/wiki/File:Emu_1_-_Tidbinbilla.jpg

Eastern Grey Kangaroo *Macropus giganteus*



Description: Grey body fur, pale grey underneath. Tail often black at tip.

Habitat types: Forest and woodland primarily, also farmland.

Structures: Grasses including Wallaby and Kangaroo grass, trees and shrubs.

Food resources: Variable but consists of grasses, herbs, sedges, trees and shrub roots.

Photo credit: https://commons.wikimedia.org/wiki/File:Eastern_Gray_Kangaroo.jpg

Short-beaked Echidna *Tachyglossus aculeatus*



Description: Dark fur on rounded body covered in sharp creamy yellow spines.

Habitat types: Forest and woodland primarily, also farmland.

Structures: Trees, fallen logs and leaf litter.

Food resources: Ants and termites.

Photo credit: https://www.flickr.com/photos/patrick_k59/16299277295

Swamp Wallaby *Wallabia bicolor*



Description: Dark brown fur on upper body with yellow to orange brown underparts. Dark face with pale stripe on cheek.

Habitat types: Dense forest, woodlands and swampy areas.

Structures: Dense vegetation, trees and shrubs, grasses, ferns and swamps.

Food resources: Grasses, leaves, shrubs and ferns.

Photo credit: <https://pixabay.com/photos/swamp-wallaby-joey-baby-marsupial-4366382/>

Recoloniser species

Bush Rat *Rattus fuscipes*



Description: Grey-brown body fur with paler underparts. Short tail and small rounded ears.

Habitat types: Dense forest and woodland.

Structures: Dense understorey, trees and shrubs, grasses, logs and rocks.

Food resources: Grasses, fruits, seeds and insects.

Photo credit: <https://www.flickr.com/photos/160417453@N04/39141100900>

Southern Brown Bandicoot *Isodon obesulus obesulus*



Description: Brown / grey fur on upper body with pale underparts. Cone shaped face, with short tail and forelegs.

Habitat types: Dense woodland.

Structures: Mosaic of tree age classes with dense ground cover up to 1 m tall and adjacent open areas for foraging.

Food resources: Insects, plant tubers and fungi.

Photo credit: https://www.flickr.com/photos/pierre_pouliquin/96669582

Spot-tailed Quoll *Dasyurus maculatus maculatus*



Description: Varies in colour from light to dark golden brown or almost black with white spots on body and tail. Similar in body size to a domestic cat.

Habitat types: Forest, particularly wet forest with rocky outcrops and woodland.

Structures: Trees and shrubs, grasses, hollow logs and tree hollows, rock crevices.

Food resources: Possums, gliders, rabbits, small mammals, birds and insects.

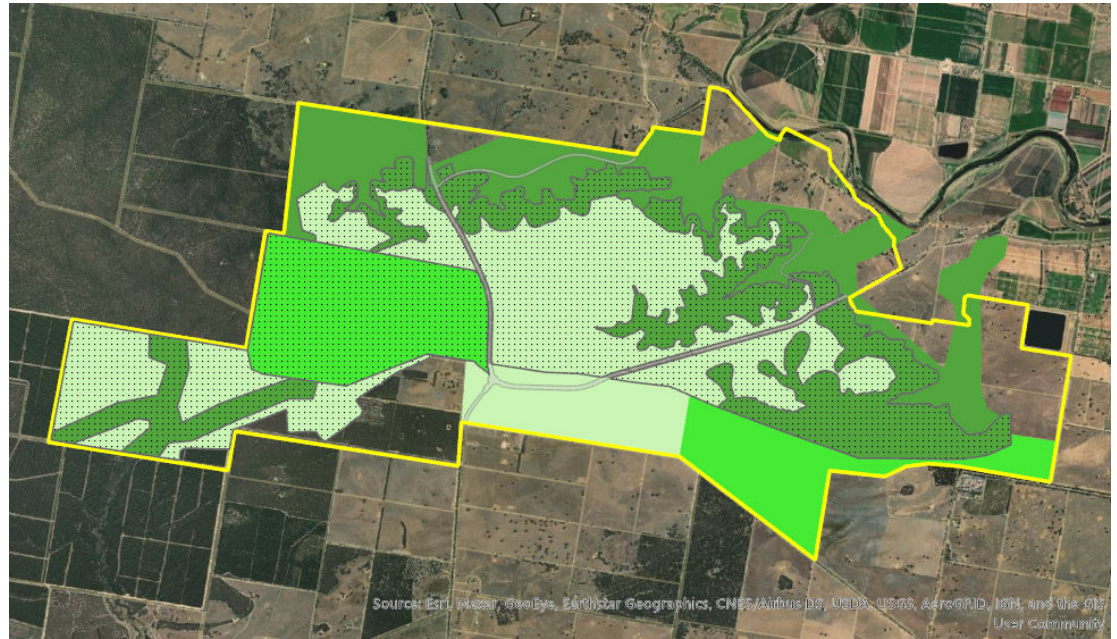
Photo credit: https://commons.wikimedia.org/wiki/File:Spotted_Tail_Quoll_2011.jpg

Background

This group primarily comprises small, medium and large reptiles that can be found residing under rocks, logs, leaf litter, tussock grasses and any other debris that might provide shelter within the project area. The largest reptile in this group, the Lace Monitor can also climb trees and utilises hollows for nesting.

Priority habitat

Forest, woodland and grasslands.



Priority actions

Habitat protection, augmentation, and rehabilitation

- Retain and protect all priority habitat outside the mine footprint.
- Improve vegetation cover with emphasis on native species such as *Dianella* sp. *Lomandra filiformis*, *Rytidosperma* sp. and *Themeda triandra*.
- Avoid removal of rocks, logs and litter that provide shelter, foraging and basking opportunities for lizards. Where absent, add supplementary habitat features that can be used for shelter including fallen logs, leaf litter, rocks (place in a sunny a sunny position, safe from predators).
- Protect and retain tree hollows, and install supplementary tree hollows in forest and woodland areas.
- Install fencing to exclude stock and vehicle access from areas of priority habitat outside the mine footprint.
- Undertake pest control for rabbits, foxes and cats.

Harm minimisation

- Remove habitat sequentially towards retained areas of habitat to prevent fauna becoming trapped.
- Check small excavations and trenches within five hours of sunrise and before sunset, where practical, for trapped fauna. If safe to do so, remove any trapped fauna, alternatively contact a qualified wildlife handler.
- Avoid stockpiling timber and debris to prevent habitation by fauna. Where stockpiling is required for extended periods (e.g. longer than 1 month), do so in a location which is more than 500 metres from retained or uncleared habitat.
- Ensure that staff are aware of the risk of encountering a red-bellied black snake within the project area. This species is venomous and if bitten, medical attention will be required. Generally, red-bellied black snakes are considered a shy snake that will flee when approached or stay still until the person or threat has passed. Nevertheless, caution is advised, and staff should never attempt to handle the snake.

Monitoring

Annual monitoring in spring within priority habitat using tile grids. Tiles will need to be installed at the survey locations a minimum of one month prior to spring survey. Additional techniques such as active searches and log / rock rolling should be used in conjunction with the tile surveys.

Common Garden Skink *Lampropholis guichenoti*



Description: Small dark brown or grey body. May have a copper colour on head when in sun.

Habitat types: Forest, woodland and grassland in all domains.

Structures: Leaf litter, rocks, logs and other debris. Tussock and pasture grass.

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/9822025@N04/4358729154/>

Delicate Skink *Lampropholis delicata*



Description: Small species up to 10 cm long. Grey body and paler belly. A thin black, often broken line along the side body with a thick continuous brown line underneath.

Habitat types: Forest, woodland and grassland in all domains.

Structures: Leaf litter, rocks, logs and other debris. Tussock and pasture grass.

Food resources: Insects.

Photo credit: [https://commons.wikimedia.org/wiki/File:Delicate_Skink_\(Lampropholis_delicata\)_8909733980.jpg](https://commons.wikimedia.org/wiki/File:Delicate_Skink_(Lampropholis_delicata)_8909733980.jpg)

Eastern Blue-tongued Lizard *Tiliqua scincoides*



Description: Body pale grey-brown on the back with barring across back. Body length up to 30 cm. Distinctive blue tongue.

Habitat types: Forest, woodland and grassland in all domains.

Structures: Leaf litter, rocks, logs and other debris. Tussock and pasture grass.

Food resources: Insects.

Photo credit: [https://commons.wikimedia.org/wiki/File:Juvenile_Eastern_Blue-tongued_Skink_\(9004112417\).jpg](https://commons.wikimedia.org/wiki/File:Juvenile_Eastern_Blue-tongued_Skink_(9004112417).jpg)

Lace Monitor *Varanus varius*



Description: Large tree goanna up to 2 m long. Body colour variable, but often black with yellow spots and stripes across body.

Habitat types: Forest and woodland in all domains.

Structures: Permanent water, logs, rocks, leaf litter, grass.

Food resources: Birds, bird eggs, insects, reptiles and small mammals.

Photo credit: <https://www.flickr.com/photos/brewbooks/2154119796>

Red-bellied Black Snake *Pseudechis porphyriacus*



Description: Shiny black body on top with red underneath and on sides. Up to 1.7 m long.

Habitat types: Creeks and rivers.

Structures: Flowing permanent water, submerged and emergent aquatic vegetation, in-stream debris such as logs.

Food resources: Fish, insects, worms and water snails.

Photo credit: [https://commons.wikimedia.org/wiki/File:Red-bellied_Black_Snake_\(Pseudechis_porphyriacus\)_8397137495.jpg](https://commons.wikimedia.org/wiki/File:Red-bellied_Black_Snake_(Pseudechis_porphyriacus)_8397137495.jpg)

Weasel Skink *Saproscincus mustelinus*



Description: Golden brown body with pale flecks all over. Some individuals may have a black streak at top of flanks and russet stripes from hind limb to tail tip. Belly white to yellow.

Habitat types: Forest, woodland and grassland in all domains.

Structures: Leaf litter, rocks, logs and other debris. Tussock and pasture grass.

Food resources: Insects.

Photo credit: [https://commons.wikimedia.org/wiki/File:Weasel_Skink_\(Saproscincus_mustelinus\)_26252273921.jpg](https://commons.wikimedia.org/wiki/File:Weasel_Skink_(Saproscincus_mustelinus)_26252273921.jpg)

Recoloniser species

Eastern Three-lined Skink *Acritoscincus duperreyi*



Description: Brown-grey lizard up to 80 mm in length with bold black and pale stripes. Orange red throat flush which may or may not be obvious.

Habitat types: Woodland and grassland in all domains.

Structures: Leaf litter, rocks, logs and other debris. Tussock and pasture grass.

Food resources: Insects and other small invertebrates.

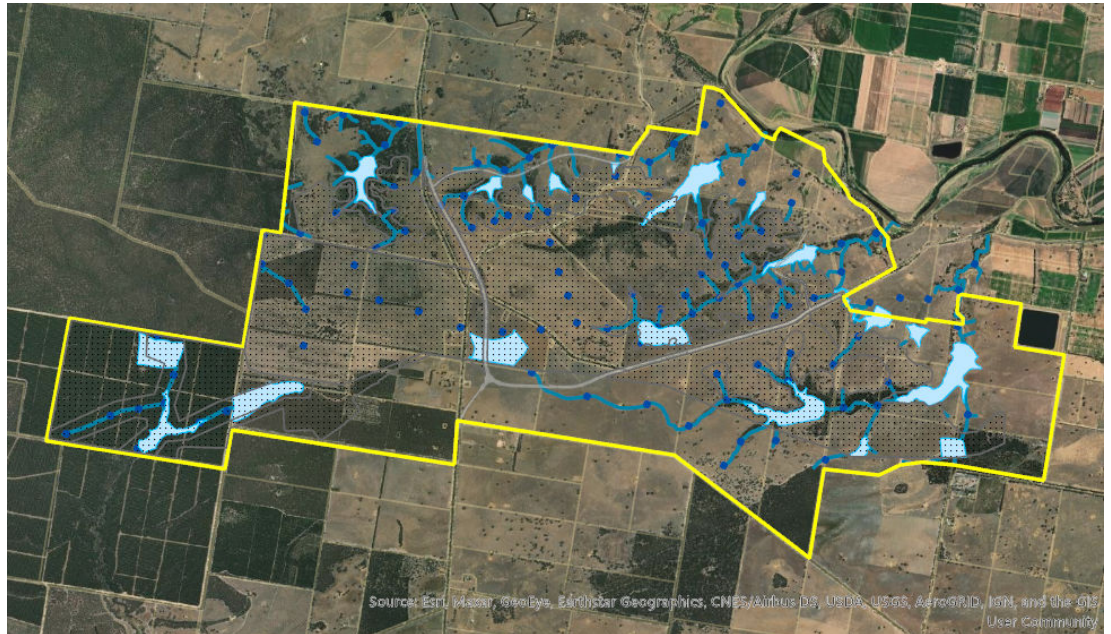
Photo credit: <https://inaturalist.ala.org.au/observations/59766827>. No changes were made from the original photo.

Background

This group primarily comprises a mix of wading birds, waterbirds and other bird species that are reliant on waterbodies or temporarily inundated areas waterbodies and their associated vegetation for foraging and breeding.

Priority habitat

Permanent and temporarily inundated areas, wetlands, ponds, sediment dams and creeks, and associated fringing and riparian vegetation.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Priority actions

Habitat protection, augmentation, and rehabilitation

- Retain and protect all priority habitat outside the mine footprint.
- Investigate opportunities to establish aquatic and fringing vegetation and associated habitat structures (e.g. emergent debris) in and around the proposed sediment dams with the aim to retain these structures within the landscape as wetlands at the completion of the project. Where possible incorporate water of varying depths suitable for both wading and diving birds. Wetland size tends to influence species diversity and therefore retention of these large dams as wetlands will benefit this faunal group.
- Create a diversity of aquatic, fringing and riparian vegetation types around waterbodies. This should include densely vegetated areas, favoring species such as rails and bitterns, as well sparsely vegetated areas, favoring waders. Some species prefer dense well-vegetated wetlands / creeks such as rails and bitterns, and most other waders, more open lightly vegetated wetlands.
- Create a 'chain of ponds' across project area to improve habitat extent and connectivity. This will include the installation of leaky weirs along retained creek lines to create supplementary habitat, slow water flow and improve infiltration.
- Stabilise riverbanks to prevent erosion and downstream water turbidity by planting native vegetation in the upper, middle and ground layer.
- Ensure maintenance of hydrological regime along major creeks with aim to ensure permanent pools of standing water are maintained year-round.

Harm minimisation

- Avoid all works within 10 m of a waterbody. Where unavoidable, ensure the extent of exposed disturbed soil is minimised at all times.
- Undertake pre-clearance surveys of all fauna habitats immediately prior to clearing.
- Dewatering of dams and wetlands should occur outside of the main breeding season for most species e.g. April and May.
- Monitor water quality for changes to pH and turbidity.
- Avoid storage of chemicals or fuel, or re-fueling of machinery and plant, within 30 metres of a waterbody.
- Avoid stockpiling of spoil or introduced materials within 10 metres of a waterbody.

- Staff should keep a record of any threatened and migratory species observed within the project area. Records can be submitted via Birdlife Australia's Birdata application online. Migratory bird species will only occupy the project area for a short period, usually a few months of the year following breeding season. For species like Latham's Snipe, this is between August and April. Sharp-tailed Sandpiper migrate to Australia between September to March.

Monitoring

Undertake biannual monitoring for wetland and riparian birds in late autumn / winter and spring using Birdlife Australia's 20 min / 2 ha systematic bird survey method along riparian corridors. Use the 500 m area search method fixed around a central point at the wetland. Survey duration should be a minimum of 20 mins per site.

Azure Kingfisher *Alcedo azurea*



Description:	Azure blue body with rufous underparts. White markings under throat and back of neck. Long powerful beak.
Habitat types:	Creeks, swamps.
Structures:	Permanent water, well-vegetated creek banks and swamps.
Food resources:	Fish, crustaceans, aquatic insects, invertebrates and frogs.
Photo credit:	https://commons.wikimedia.org/wiki/File:Azure_Kingfisher_-_Daintree_-_Queensland.jpg

Baillon's Crake *Porzana pusilla*



Description:	Pale grey / blue body with cinnamon and black streaks on upper body. Scattered white flecks above and barred streaking undertail extending towards belly. Greenish yellow bill.
Habitat types:	Wetlands, dams, swamps and temporarily inundated areas.
Structures:	Permanent or semi-permanent water, floating and fringing vegetation, pasture grass.
Food resources:	Insects and crustaceans.
Photo credit:	https://commons.wikimedia.org/wiki/File:Baillon%27s_Crake_-_Beeliar.jpg

Eastern Great Egret *Ardea modesta*



Description:	Tall, all white body with a long slender neck. Neck has a distinctive kink and gape extends past the eye which distinguishes it from other similar species.
Habitat types:	Wetlands, dams, swamps and temporarily inundated areas.
Structures:	Permanent or semi-permanent water, fringing vegetation including sedges and reeds, pasture.
Food resources:	Aquatic insects, smaller frogs, molluscs and reptiles.
Photo credit:	https://www.flickr.com/photos/geoffwhalan/49022562078/

Latham's Snipe *Gallinago hardwickii*



Description: Dark brown and white patterns above, irregular dark scalloping on breast, white belly. Tail tapered to a point past wings. Long straight bill.

Habitat types: Wetlands, dams, swamps and temporarily inundated areas.

Structures: Permanent or semi-permanent water, flooded paddocks, dense fringing vegetation including sedges and reeds, tussock grass.

Food resources: Seeds from grasses, rushes and other species. Insects.

Photo credit: Photo: <https://www.flickr.com/photos/aviceda/6698459323>

Royal Spoonbill *Platalea regia*



Description: Breeding plumage is darker brown with rufous edges on upper feathers. Nonbreeding plumage much duller, more of a grey tint. Down curved bill. White eye ring and long white brow.

Habitat types: Wetlands, dams, swamps and creeks.

Structures: Permanent water, fringing and aquatic vegetation including sedges and reeds and pasture.

Food resources: Fish, crustaceans, and aquatic insects.

Photo credit: <https://www.flickr.com/photos/volvob12b/42262904152>

Sharp-tailed Sandpiper *Calidris acuminata*



Description: Breeding plumage is darker brown with rufous edges on upper feathers. Nonbreeding plumage much duller, more of a grey tint. Down curved bill. White eye ring and long white brow.

Habitat types: Muddy edges of wetlands, dams, swamps and temporarily inundated areas.

Structures: Permanent or semi-permanent water, fringing vegetation.

Food resources: Aquatic insects, worms, molluscs, crustaceans and seeds.

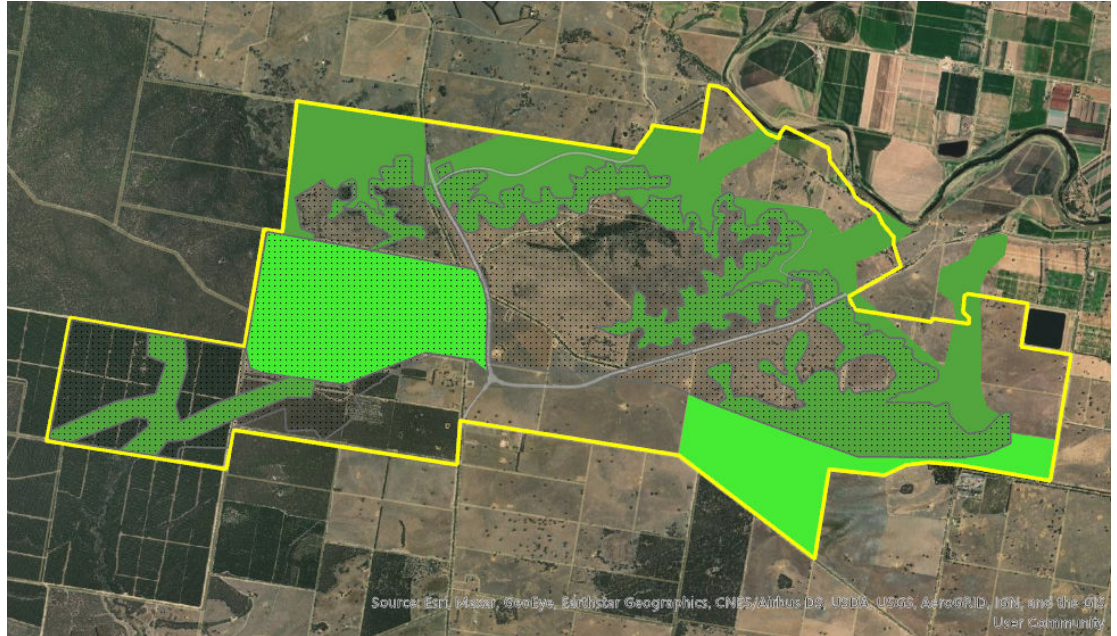
Photo credit: <https://www.flickr.com/photos/63175631@N02/40733587174>

Background

This group primarily comprises of a range of small and large woodland and grassland birds including owls and raptors.

Priority habitat

Forest and woodlands. Grasslands are used primarily for foraging.



Priority actions

Habitat protection, augmentation, and rehabilitation

- Retain and protect all priority habitat outside the mine footprint, prioritising hollow-bearing trees.
- Where absent or limited, install nesting resources (e.g. boxes, chainsaw hollows, relocated natural hollows or hollow-bearing stags).
- Improve vegetation cover with emphasis on:
 - trees with ribbon or sheet bark to provide potential foraging opportunities for insectivorous species. This includes Manna Gum *Eucalyptus viminalis*, River Red Gum *Eucalyptus camaldulensis*, Yellow Box *Eucalyptus melliodora*.
 - indigenous understorey and ground-layer plants for birds that forage for insects below the tree canopy.
- Within rehabilitated pastures and roadsides plant small stands of trees and shrubs to provide stepping-stones and/or corridors through the landscape.
- Install fencing to exclude stock and vehicle access from areas of priority habitat outside the mine footprint.
- Undertake pest control for foxes and cats.

Harm minimisation

- Remove habitat sequentially towards retained areas of habitat to prevent fauna becoming trapped.
- Undertake vegetation clearance outside of fauna breeding months where practicable.
- Undertake pre-clearance surveys of all fauna habitats immediately prior to clearing.
- Do not use barbed wire for any fencing activities within the project area as this may injure birds. Use plain wire as a substitute and fix colourful flagging tape to the top row to minimise bird strike.

Monitoring

Undertake biannual diurnal monitoring (morning and afternoon) for birds in late autumn / winter and spring using Birdlife Australia's 20 min / 2 ha systematic bird survey method over a minimum of two days. Searches should be undertaken in forest, woodland and grassland habitats across all domains. Transects should be set up in areas that are representative of the habitat to be surveyed and not a mix of two habitat types.

Undertake spotlight surveys for nocturnal birds over a minimum of two nights biannually at any time of year. Survey effort should consist of a minimum 20-minute search along a defined transect in forest and woodland habitats across all domains. Transects should be set up in areas that are representative of the habitat to be surveyed and not a mix of two habitat types.

Undertake annual hollow monitoring in translocated and retained trees / stags during spring using a camera-mounted pole to inspect hollows for occupancy.

Black Falcon *Falco subniger*



Description: Brown to sooty black body. Legs partly feathered. Grey feet. Tail folded when gliding and fanned with notched corners when soaring (as above).

Habitat types: Tree-line watercourses, wetlands and grassland.

Structures: Trees, shrubs, grass and waterbodies.

Food resources: Small mammals, frogs, insects and reptiles.

Photo credit: [https://commons.wikimedia.org/wiki/File:Black_Falcon_\(Falco_subniger\)_\(8079589113\).jpg](https://commons.wikimedia.org/wiki/File:Black_Falcon_(Falco_subniger)_(8079589113).jpg)

Brown Treecreeper *Climacteris picumnus*



Description: Light to mid brown body above, lighter underparts with fine lines on throat and belly. Long pale brown. Horizontal dark barring under tail.

Habitat types: Forests and woodland.

Structures: Trees particularly with bark, shrubs and grass.

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/kookr/3332628126>

Chestnut-rumped Heathwren *Hylacola pyrrhopygia*



Description: Small bird with long brown tail. Upper body grey brown. Dull white breast and throat with brown streaks. White brown line. Chestnut feather at base of tail.

Habitat types: Heath and shrubland with dense low understorey.

Structures: Dense low vegetation (shrubs).

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/37577693@N04/3607224352/>

Diamond Firetail *Stagonopleura guttata*



Description: Distinct red beak, black breast band with white spots in adult males. Both juvenile and adult have smoky grey head, brown back and red patch near rump.

Habitat types: Grassland and open woodland.

Structures: Trees, shrubs and grass.

Food resources: Grass seeds.

Photo credit: <https://www.flickr.com/photos/kookr/8618938676>

Grey Goshawk *Accipiter novaehollandiae*



Description: White and grey colour morphs. Both with red eye, yellow on beak and legs. Grey morph in photo.

Habitat types: Forest and woodland with open understorey.

Structures: Trees, shrubs and grass.

Food resources: Possums, rabbits and occasionally bats.

Photo credit: [https://commons.wikimedia.org/wiki/File:Grey_Goshawk_\(Accipiter_novaehollandiae\)_2370.jpg](https://commons.wikimedia.org/wiki/File:Grey_Goshawk_(Accipiter_novaehollandiae)_2370.jpg)

Hooded Robin *Melanodryas cucullata*



Description: Small bird. Male has black hood over head and top of breast with white underparts. Bold white wing bar. Female has grey-brown body with lighter underparts and white wing bar and margins.

Habitat types: Forest and woodland.

Structures: Trees and shrubs particularly, *Acacia* and *Eucalyptus*.

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/brisbanecitycouncil/6811147158>

Masked Owl *Tyto novaehollandiae*



Description: Large owl with strong legs and talons. Distinctive heart shaped face. Pale underparts and darker back. Colouring may vary depending on the morph.

Habitat types: Dense forest for roosting. Open woodland and farmland for hunting.

Structures: Trees, large tree hollows, shrubs and grass.

Food resources: Possums, rabbits, lizards, birds and insects.

Photo credit: https://commons.wikimedia.org/wiki/File:Tyto_novaehollandiae_castanops_male_1_-_Port_Arthur.jpg

Painted Honeyeater *Grantiella picta*



Description: Deep pink bill, blackish upper body with bright yellow and white wing edges. White underparts.

Habitat types: Forest and woodland.

Structures: Trees with abundant mistletoe.

Food resources: Mistletoe.

Photo credit: <https://www.flickr.com/photos/50364443@N00/5041711896>

Powerful Owl *Ninox strenua*



Description: Large bird with golden eyes and dark eye patches. Dark grey to grey brown body with white flecks or white barring in juveniles. Yellow feet.

Habitat types: Forest, woodland and tree lined watercourses.

Structures: Trees, dense riparian vegetation, creeks and large tree hollows.

Food resources: Possums and rabbits.

Photo credit: <https://www.flickr.com/photos/dlochlin/37327622110>

Rufous Fantail *Rhipidura rufifrons*



Description: Small bird with distinctive tail with rufous colour at the base and lower back. Rufous streak extending from beak to just behind eye. White throat band. Female dull rufous colour on back and buffy brown underparts.

Habitat types: Dense wet forest.

Structures: Trees and a dense understorey.

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/gregbm/3178575055/>

Speckled Warbler *Chthonicola sagittata*



Description: Deep pink bill, blackish upper body with bright yellow and white wing edges. White underparts.

Habitat types: Dry forest and woodland dominated by *Eucalyptus*.

Structures: Trees, shrubs, leaf litter and logs.

Food resources: Insects.

Photo credit: <https://www.flickr.com/photos/kookr/6626430385/>

Spotted Quail-thrush *Cinclosoma punctatum*



Description: Black throat and face with white brow and patch below cheek in male, rufous patch in females. Mostly sandy or rufous brown body with black streaks.

Habitat types: Rocky ridges and slopes in open forest and woodland.

Structures: Rocky slopes with trees, shrubs, leaf litter and logs.

Food resources: Insects.

Photo credit: https://commons.wikimedia.org/wiki/File:Spotted_Quail-thrush_male_-_Blackheath.jpg

Swift Parrot *Lathamus discolor*



Description: Emerald green body with a blue crown and crimson forehead and throat. Scarlet red patch on shoulder and under tail.

Habitat types: Woodland (migrates to the mainland during autumn / winter).

Structures: *Eucalyptus* trees.

Food resources: Nectar from *eucalyptus* and lerps.

Photo credit: <https://www.flickr.com/photos/birdsaspoetry/42555876861/>

Other non-threatened species recorded in the project area

Species: Australasian Pipit, Australian Hobby, Australian King-Parrot, Australian Magpie, Australian Owlet-nightjar, Australian Raven, Barn Owl, Black-faced Cuckoo-shrike, Brown Falcon, Brown Goshawk, Brown Thornbill, Brown-headed Honeyeater, Buff-rumped Thornbill, Chestnut-rumped Heathwren, Common Bronzewing, Crescent Honeyeater, Crested Pigeon, Crimson Rosella, Dusky Woodswallow, Eastern Rosella, Eastern Spinebill, Eastern Yellow Robin, Fan-tailed Cuckoo, Flame Robin, Galah, Golden Whistler, Grey Butcherbird, Grey Currawong, Grey Fantail, Grey Shrike-thrush, Horsfield's Bronze-cuckoo, Jacky Winter, Laughing Kookaburra, Little Raven, Magpie-lark, Masked Lapwing, Mistletoebird, Musk Lorikeet, Nankeen Kestrel, Noisy Miner, Olive-back Oriole, Pied Currawong, Rainbow Lorikeet, Red Wattlebird, Red-browed Finch, Red-capped Robin, Rufous Whistler, Sacred Kingfisher, Scarlet Robin, Silvereye, Southern Boobook, Spotted Pardalote, Striated Pardalote, Striated Thornbill, Sulphur Crested Cockatoo, Superb Fairy-wren, Tawny Frogmouth, Tree Martin, Varied Sitella, Wedge-tailed Eagle, Weebill, Whistling Kite, White-browed Scrubwren, White-eared Honeyeater, White-naped Honeyeater, White-throated Treecreeper, White-winged Chough, Willie Wagtail, Wonga Pigeon, Yellow-faced Honeyeater, Yellow-rumped Thornbill and Yellow-tailed Black Cockatoo.

Recoloniser species

Barking Owl *Ninox connivens*



Description: Grey-brown owl with pale underparts streaked brown. Medium size. Large yellow eyes.

Habitat types: Woodland and edges of forests. Roosts near creeklines and wetlands.

Structures: Large trees (particularly Red Gum), tree hollows and riparian vegetation.

Food resources: Small to medium sized mammals (e.g. gliders and possums), birds, reptiles and insects.

Photo credit: https://commons.wikimedia.org/wiki/File:The_Barking_Owl.jpg

Gang-gang Cockatoo *Callocephalon fimbriatum*



Description: Distinctive grey cockatoo. Male has a bright red head with wispy up-curved crest. Female has a grey head and crest, with red-grey barring on underparts.

Habitat types: Open forest, woodland and roadsides during autumn/winter.

Structures: Trees and shrubs, particularly *Eucalyptus* and *Acacia*.

Food resources: Seeds of native and exotic trees and shrubs. Particularly *Eucalyptus* and *Acacia*. Also, berries, fruits, nuts and insects.

Photo credit: <https://www.flickr.com/photos/sbittinger/32979125645>

Little Eagle *Hieraaetus morphnoides*



Description: Large bird with strong legs and talons. Colour variable from light brown to dark brown. Square cut at the tip of tail when closed. Distinctive 'M' shaped band on underwing.

Habitat types: Open forest and woodland; and farmland.

Structures: Trees, shrubs, grass and woody debris.

Food resources: Small to medium sized mammals, birds, reptiles and insects.

Photo credit: <https://www.flickr.com/photos/birdsaspoetry/8450438310>

Rose Robin *Petroica rosea*



Description: Small bird. Male grey back with rose upper breast and white underneath. Female duller in colour with slight pink tint on breast.

Habitat types: Woodland in autumn / winter.

Structures: Trees and shrubs.

Food resources: Insects.

Photo credit: https://commons.wikimedia.org/wiki/File:Rose_Robin_1_-_Woodford.jpg

Square-tailed Kite *Lophoictinia isura*



Description: Large bird with long distinctive square tail.

Habitat types: Open forest and woodland.

Structures: Trees, shrubs, grass and woody debris.

Food resources: Small to medium sized mammals, birds, reptiles and insects.

Photo credit: [https://commons.wikimedia.org/wiki/File:Square-tailed_Kite_\(49799789883\).jpg](https://commons.wikimedia.org/wiki/File:Square-tailed_Kite_(49799789883).jpg)

