# Appendix 4

# Biodiversity Development Assessment Report

## prepared by GeoLINK Consulting Pty Ltd

(Total No. of pages including blank pages = 467)

# Biodiversity Development Assessment Report

## Taronga Tin Project

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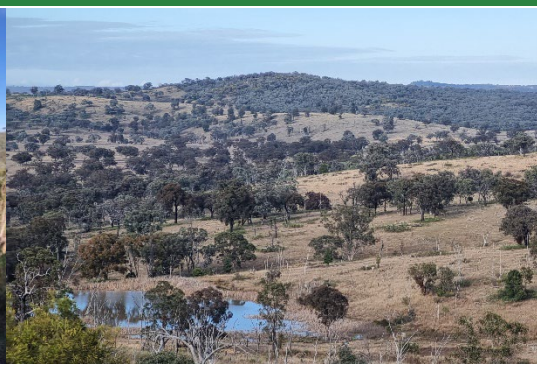

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**Certification**

I certify this BDAR (Case 00040540) has been prepared in accordance with the requirements of (and information provided under) the Biodiversity Assessment Method 2020 as at 28 April 2026.

Grant McLean

Biodiversity Accredited Assessor (BAAS #19055)

**Date**: 29/04/2026

***NOTE: This BDAR must be submitted must be within 14 days of the date shown on the finalised credit report generated using the BAM Calculator (refer to Appendix F).***

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# Executive Summary

**The Project**

Taronga Mines Pty Ltd ("the Applicant") proposes to develop the Taronga Tin Project ("the Project") that would extract and process tin ore to produce a saleable tin concentrate. All mining, processing and associated infrastructure would be largely situated within a Mine Site that would be located approximately 7.5 kilometres (km) north-west of Emmaville in northern NSW. The proposed Mine Site would be situated within the Glen Innes Severn LGA on land zoned RU1 – Primary Production under the Glen Innes Severn Local Environment Plan 2012. The proposed Mine Camp, approximately 10 km north-west of Glen Innes township, is an ancillary Project component separate to the Mine Site, this is also situated within the Glen Innes Severn LGA. Collectively, the Mine Site, Mine Camp and areas of upgrades to local roads to improve safety for all users are referred to as the "Project Site".

The Mine Site comprises an area of approximately 708 ha within which all mining, processing and dispatch of produced concentrate would occur. Ancillary infrastructure necessary to support mining operations, such as maintenance facilities, onsite power generation, administration, magazine, internal roads, water management works and suitably designed landforms for the storage of waste rock and processing residues would also be situated within the Mine Site.

Following the public exhibition of the EIS, Conservation Programs, Heritage and Regulation (CPHR) of the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) provided thirteen (13) key recommendations on the BDAR. Amendments to the Biodiversity Assessment Method Calculator (BAMC) and additional information were developed in consultation with CPHR on 11 March 2026 and with the Consent Authority, Department Planning, Housing and Infrastructure (DPHI) on 13 March 2026. The recommendations have been incorporated in this amended BDAR. A response log is attached as **Appendix L**.

**Native Vegetation Overview**

A total of four native Plant Community Types (PCTs) were recorded within the Project Site:

- PCT 3722 – Western New England Box-Tumbledown Gum Grassy Forest.
- PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest.
- PCT 4080 – Northwest River Oak-Apple Forest.
- PCT 3339 – Guyra Basalt Snow Gum Woodland.

The above PCTs were recorded in several different vegetation condition states and classified into the following condition categories: 'poor', 'moderate' and 'intact' condition.

One threatened ecological community (TEC) listed under both the *Biodiversity Conservation Act 2016* (BC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) has been recorded within the proposed disturbance footprint of the Project Site, being:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered (under both BC Act and EPBC Act) – associated with PCT 3363.

**Threatened Species Overview**

In accordance with the Biodiversity Assessment Methodology (BAM) threatened species have been assessed as predicted ecosystem credit species and/ or candidate species credit species.

- Predicted species (ecosystem credit species):
  - A total of 29 threatened fauna species threatened fauna species have been identified as predicted ecosystem credit species associated with the disturbance footprint.

- Candidate species (species credit species):
  - A total of 11 threatened flora species were identified as candidate flora species, credit species associated with the disturbance footprint and were subject to targeted surveys. Of these, two are considered affected by the Project, being:
    - *Acacia pubifolia* (Velvet Wattle) is listed as Endangered under the BC Act and Vulnerable under the EPBC Act.
    - *Dichanthium setosum* (Bluegrass) is listed as Vulnerable under the BC Act and EPBC Act.
  - A total of 16 threatened fauna species were identified as candidate fauna species, credit species associated with the disturbance footprint and were subject to targeted surveys. Of these, four are considered affected by the proposal, being:
    - Barking Owl (*Ninox connivens*) is listed as Vulnerable under the BC Act.
    - Squirrel Glider (*Petaurus norfolcensis*) listed as Vulnerable under the BC Act.
    - Koala (*Phascolarctos cinereus*) is listed as Endangered under the BC Act and EPBC Act.
    - Border Thick-tailed Gecko (*Uvidicolus sphyrurus*) listed as Vulnerable under the BC Act and EPBC Act.

**Impact Summary**

Impacts unable to be avoided by the Project have been assessed in accordance with Stage 2 of the BAM (2020).

The following direct impacts on PCTs would occur as a result of the proposed disturbance within the Project Site:

- Direct impact on 315.2 ha of native vegetation, which includes:
  - 313.42 ha of PCT 3722 (includes all condition states).
  - 1.03 ha of PCT 3363 (includes all condition states of 'poor' and 'intact').
  - 0.11 ha of PCT 4080 'moderate' condition state.
  - 0.64 of PCT 3339 'poor' condition state.
- Direct impact on 1.03 ha of White Box, Yellow Box, Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed as Critically Endangered under the BC Act.

The Project would not significantly impact groundwater and is considered unlikely to lead to any adverse impact on the groundwater availability or status for groundwater dependent ecosystems.

The following impacts on threatened species in accordance with BAM, based on ecosystem credits and species credit species, include:

- Loss of habitat for 29 threatened fauna species identified as predicted ecosystem credit species.
- 15 ha of suitable habitat for *Acacia pubifolia* (Velvet Wattle) – listed as Endangered under the BC Act and Vulnerable under the EPBC Act. (8.28 ha of known area of occupancy and 300.4 ha of potential habitat).
- 260.63 ha of habitat for Barking Owl (*Ninox connivens*) listed as Vulnerable under the BC Act.
- 257.99 ha of habitat for Squirrel Glider (*Petaurus norfolcensis*) listed as Vulnerable under the BC Act.
- 257.99 ha of habitat for Koala (*Phascolarctos cinereus*) listed as Endangered under the BC Act and EPBC Act.
- 257.99 ha of habitat for Border Thick-tailed Gecko (*Uvidicolus sphyrurus*) listed as Vulnerable under the BC Act and EPBC Act.

**Other Statutory Matters**

Other relevant statutory matters addressed in this BDAR include:

- *Fisheries Management Act 1994* (FM Act): The Project is considered unlikely to lead to a significant impact on any threatened aquatic species, ecological communities or their habitats.
- EPBC Act and Matters of National Environmental Significance (MNES): the Project would impact the following MNES matters:
  - Impact on known habitat for one TEC being *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*
  - Impact on known habitat for two threatened flora species listed under the EPBC Act being *Acacia pubifolia* (Velvet Wattle) and Bluegrass (*Dichanthium setosum*).
  - Impact on known or potential habitat for 14 threatened fauna species comprising eight birds, five mammals and one reptile listed under the EPBC Act.
  - Impact on potential habitat for three migratory species listed under the EPBC Act.

The impact assessment outcomes for Matters of National Environmental Significance conclude that:

- The Project is likely to lead to a significant impact on one threatened flora and one threatened fauna species and/ or their habitat listed under the EPBC Act being *Acacia pubifolia* (Velvet Wattle) and Border Thick-tailed Gecko (*Uvidicolus sphyrurus*) and as such a referral under the provisions of the EPBC Act is recommended for these species.
- The Project is considered unlikely to substantially modify, destroy or isolate an area of important habitat for any EPBC Act listed migratory species and is unlikely to seriously disrupt the lifecycle of an ecologically significant proportion of a population of migratory birds.
- The Project would not impact on any wetlands of national or international importance.

**Credit Requirements**

Residual impacts that are not able to be managed through mitigation would be offset in accordance with BAM calculations for both ecosystem and species credits. The Project's offset obligation based on the disturbance area has been calculated to require the following biodiversity credits:

- 8,216 ecosystem credits.
- 35,489 species credits.

The Project offset obligations would be met through implementing a combination of the following offset delivery options, in order of priority, being:

1. Establishing a biodiversity stewardship site (BSA) on lands with like for like biodiversity values to those impacted by the Project.
2. Purchase and retirement of existing biodiversity credits currently available on the biodiversity credit register.
3. Making a payment into the Biodiversity Conservation Fund (BCF) for residual credits not sourced from the preferred approach to established BSA.

# 1. Introduction

## 1.1 Overview

This BDAR has been prepared by GeoLINK on behalf of Taronga Mines Pty Ltd (the "Applicant") to quantify the potential impacts to biodiversity values of the Taronga Tin Project ("the Project"). The Project has been entered into the Biodiversity Accredited Assessor System (BAAS) as Case 40540.

All mining, processing and associated infrastructure for the Project would be largely situated within the Mine Site that would be located approximately 7.5 kilometres (km) north-west of Emmaville in northern NSW. The proposed Mine Site and the Mine Camp, an ancillary Project component separate to the Mine Site, are situated within the Glen Innes Severn Local Government Area (LGA). Collectively, the Mine Site, Mine Camp and areas of upgrades to local roads to improve safety for all users are referred to as the "Project Site".

The Project is considered State Significant Development (SSD) as the estimated capital investment value exceeds the $30M threshold identified in Schedule 1, Clause 5(1c) of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP). The EP&A Act sets out the process for the assessment of SSD applications, with an Environmental Impact Statement (EIS) being a mandatory requirement. The Project's EIS must also comply with the requirements of Division 5 of the *Environmental Planning & Assessment Regulation 2021* (EP&A Regulation).

SSD projects are required to prepare a Biodiversity Development Assessment Report (BDAR) to identify and assess biodiversity impacts under the provisions of the BC Act and offset those impacts by retiring biodiversity credits, determined using the Biodiversity Assessment Method 2020 (BAM), through the Biodiversity Offsets Scheme (BOS). The purpose of this BDAR is to identify and assess the potential impacts of the Project in relation to biodiversity. It responds directly to the BAM 2020 and Secretary's Environmental Assessment Requirements (SEARs).

Details of the Project are summarised in **Table 1.1**.

**Table 1.1 Project Details**

| **Site Details** | |
|---|---|
| **LGA** | Glen Innes Severn Shire Council |
| **Subject lots** | ■ Lot 12 DP1292270<br>■ Lot 7001 DP92662<br>■ Lot 167 DP 753314<br>■ Lot 83 DP753314<br>■ Lot 288 DP753314<br>■ Lot 7317 DP1166299<br>■ Lot 1 DP1008294<br>■ Lot 2 DP1008294<br>■ Lot 167 DP753314 (ancillary)<br>■ Lot 158 DP820202 (ancillary)<br>■ Lot 1 DP1187809 (Mine Camp)<br>■ Crown Road Reserve |
| **Site** | ~ 721.95 ha |
| **Zoning** | RU1 – Primary Production |
| **Development type** | Extractive industries – Mining |

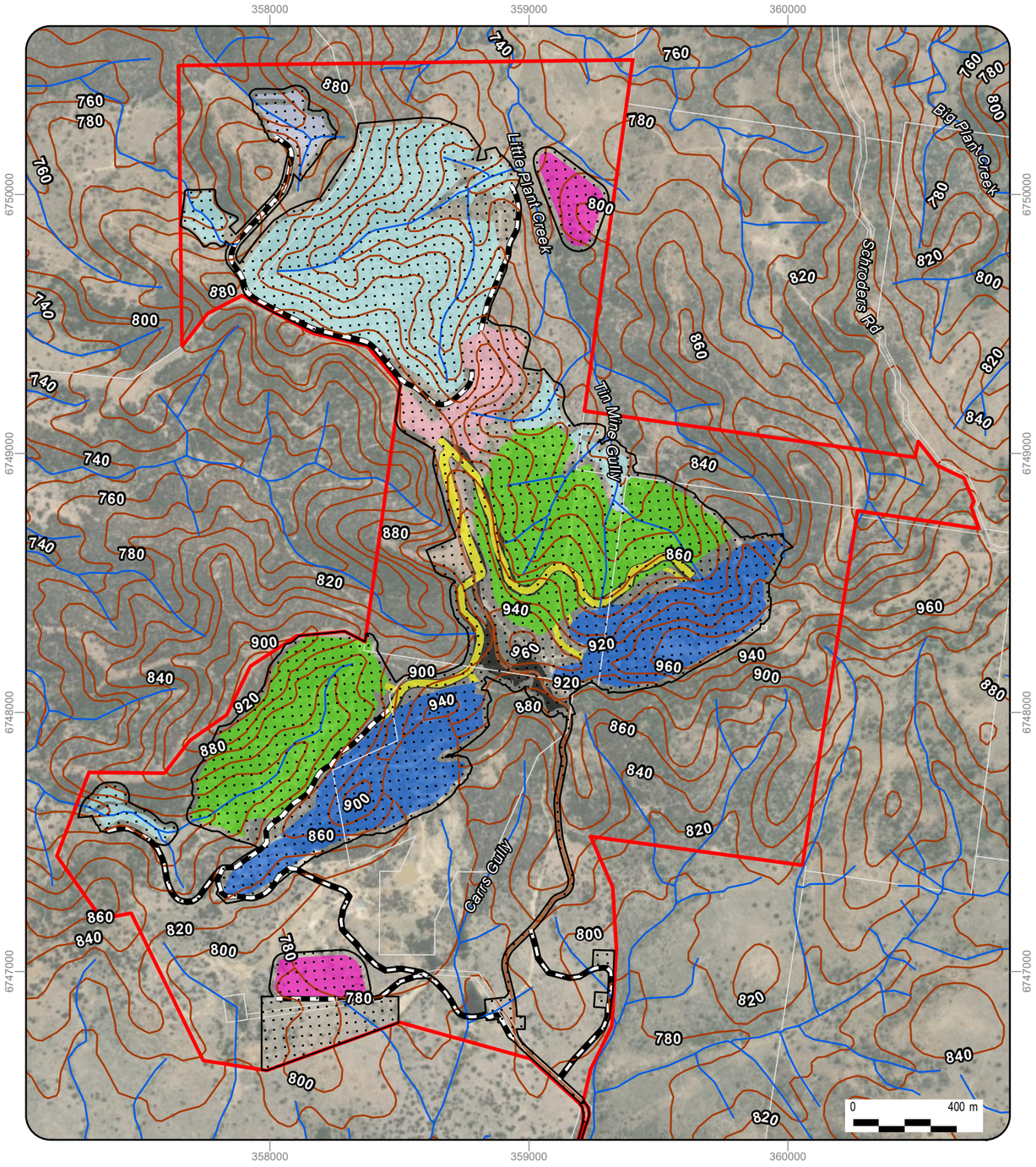
**Illustration 1.1** shows the Site location and **Illustration 1.2** shows the Site itself.

0 5 km

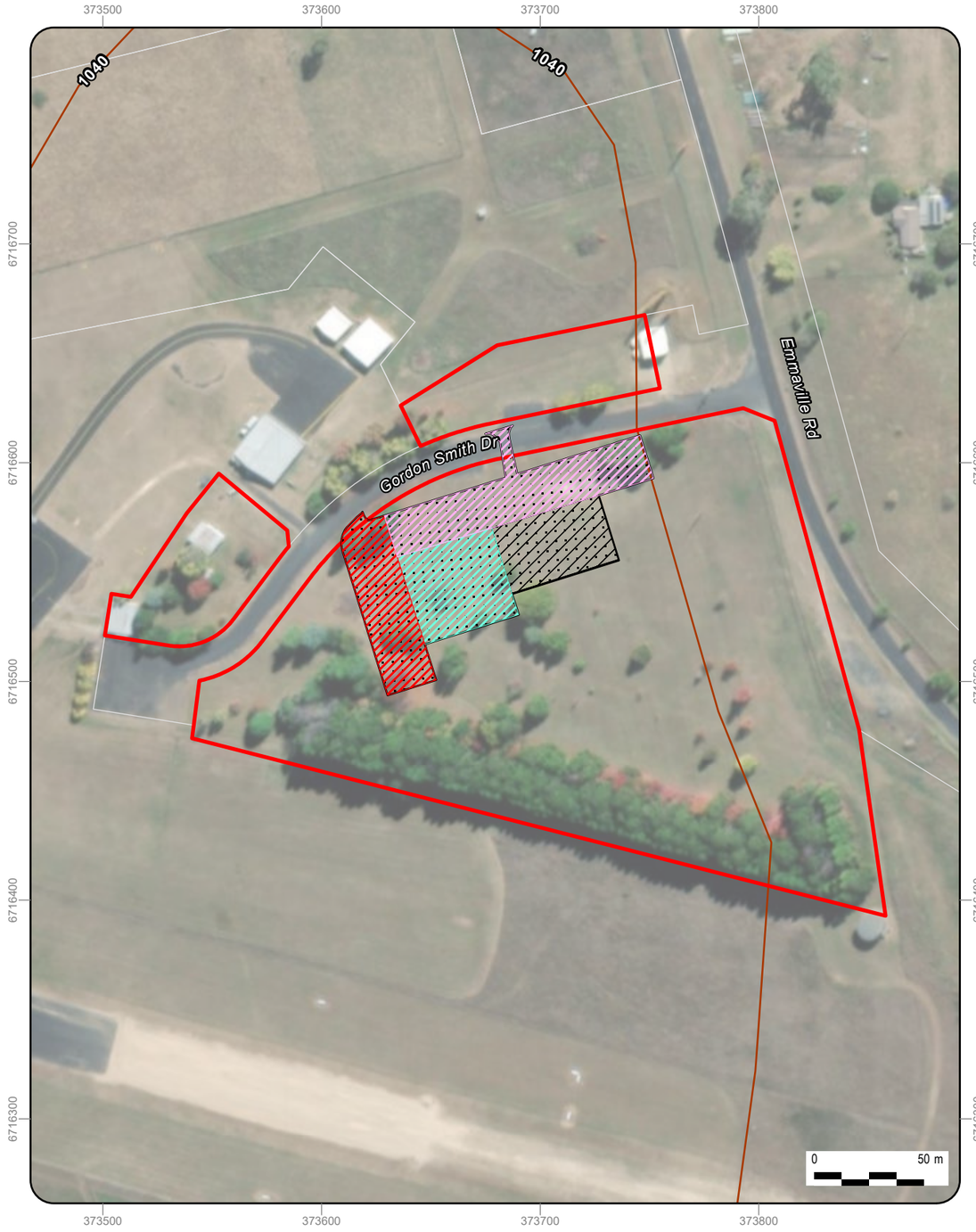
## Site Locality - Illustration 1.1



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: Department of Customer Services*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*




Mine Site




Mine Camp

**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre

**Mine Site Layout**

- Cut and fill
- Haul road
- Main access road
- Mine-affected water management
- Open cut pits
- Processing
- Processing residue emplacement
- Soil stockpile
- Waste rock emplacement

**Indicative Mining Camp Layout**

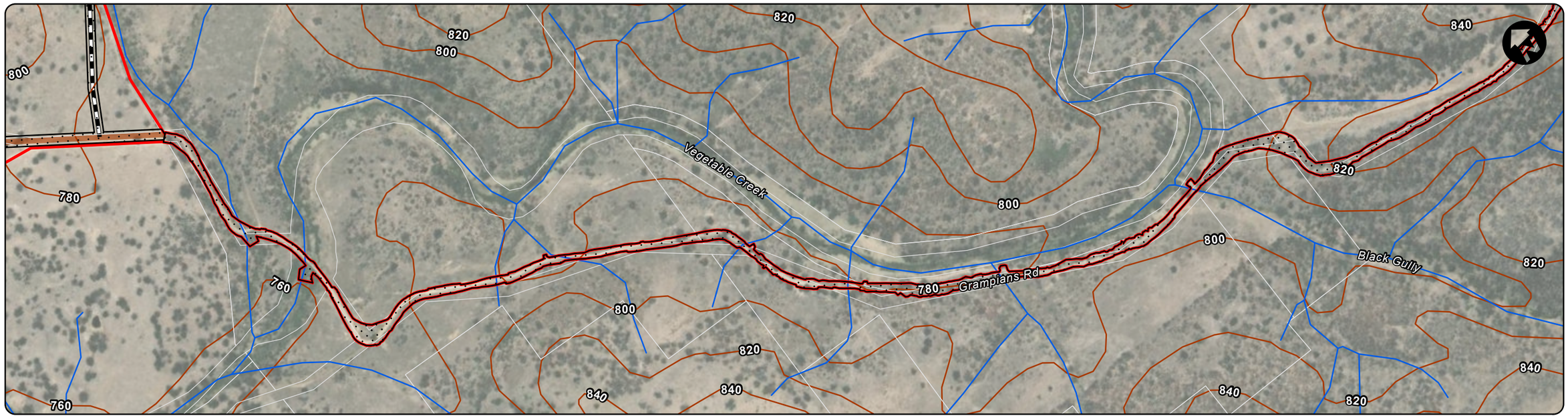
- Accomodation
- Ancillary facilities
- Bus bay/heavy vehicle movements
- Light vehicle parking

- Watercourse
- Internal road
- Contours at 10 m intervals

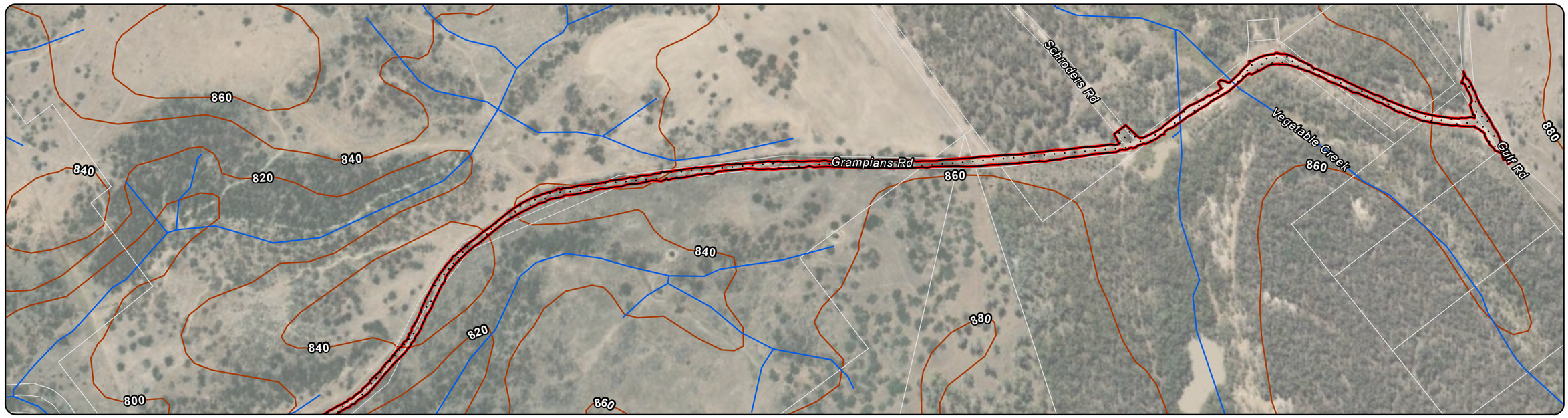
Project Site - Illustration 1.2 - Sheet 1 of 2



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*




Grampians Road Upgrade North




Grampians Road Upgrade South

**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre
- Main access road
- Internal road
- Watercourse

0 160 m

Project Site - Illustration 1.2 - Sheet 2 of 2



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

## 1.2 The Project

Taronga Mines Pty Ltd (Taronga Mines) proposes to develop the Taronga Tin Project ("the Project") that would extract and process tin ore to produce a saleable tin concentrate. All mining, processing and associated infrastructure would be largely situated within a Mine Site that would be located approximately 7.5 km north-west of Emmaville in northern NSW. The proposed Mine Site would be situated within the Glen Innes Severn LGA on land zoned RU1 – Primary Production under the Glen Innes Severn Local Environment Plan 2012. The proposed Mine Camp, approximately 10 km north-west of Glen Innes township, is an ancillary Project component separate to the Mine Site, this is also situated within the Glen Innes Severn LGA. Collectively, the Mine Site, Mine Camp and areas of upgrades to local roads to improve safety for all users are referred to as the "Project Site".

The Project occurs within an area of approximately 708 ha within which all mining, processing and despatch of produced concentrate would occur. Ancillary infrastructure necessary to support mining operations, such as maintenance facilities, onsite power generation, administration, magazine, internal roads, water management works and suitably designed landforms for the storage of waste rock and processing residues would also be situated within the Mine Site. The Mine Site also includes the upgraded sections of Grampians Road from the site access point to the intersection of Gulf Road.

The proposed action involves extraction of tin ore using conventional drill, blast, load and haul from two open cut pits. Tin deposit comprises two separate zones along an approximately 2.6 km long strike and up to 260 m wide.

A Project summary is outlined in **Table 1.2** below. The Project component plans are provided in **Appendix A**.

**Table 1.2 Project Summary**

| Project Element | Summary of the Project |
|---|---|
| Mining Method | ■ Conventional drill, blast, load and haul methods for the development of two separate open cut pits (Northern and Southern) that would be situated on Grampians Ridge.<br>■ Mining operations would commence with a starter pit in the central section of the Northern open cut pit with development of the Southern open cut commencing with a starter pit, also in its central section, approximately six months after that.<br>■ Both starter pits would then be progressively developed to the north, east, south and west until reaching full development, whereby:<br>– the Northern open cut pit would be approximately 1,000 m (north-east/ south-west), 300 m (north-west/ south-east) and 190 m deep; and<br>– the Southern open cut pit would be approximately 1,250 m (north-east/ south-west), 360 m (north-west/ south-east) and 150 m deep.<br>■ Mobile fleet would be utilised for the load and haul of blasted waste rock and run of mine (ROM) ore.<br>■ ROM ore would be hauled to the ROM pad for stockpiling or direct feed into the crushing circuit.<br>■ Waste rock would be hauled for storage in either the Northern or Southern waste rock emplacements (WRE) that would be positioned immediately adjacent to the respective open cut pit.<br>■ Near surface material (i.e. soil, colluvium) would be removed using conventional free dig, load and haul techniques and stockpiled for use in rehabilitation activities.<br>■ Haulage of ROM ore and waste rock would initially occur via temporary haul roads at natural surface until the establishment of permanent haul roads as part of the progressive development of each open cut pit. |
| Mineral Resource | ■ Tin deposit comprising two separate zones along an approximately 2.6 km long strike and up to 260 m wide.<br>■ Proved and Probable Ore Reserve Estimate (March 2024) prepared in accordance with the 2012 JORC Code & Guidelines.<br>– 40 million tonnes (Mt) at 0.13% tin. |

| Project Element | Summary of the Project |
|---|---|
| | ■ Indicated and Inferred Resource (September 2023) prepared in accordance with the 2012 JORC Code & Guidelines.<br>– 133 Mt at 0.10% tin. |
| Annual Production | ■ Up to 10 million tonnes per annum (Mtpa) comprising:<br>– up to 5.1 Mtpa of ore; and<br>– up to 5.8 Mtpa of waste rock. |
| Mine Life | ■ Project life - approximately 21 years, comprising<br>– Site establishment and construction – approximately 2 years.<br>– Mining and processing operations – approximately 10 years.<br>– Decommissioning, landform establishment and revegetation – approximately 2 years.<br>– Post-mining Rehabilitation monitoring – approximately 7 years post mining.<br>**Note**: Site establishment and mining operations would be partially undertaken concurrently |
| Total Resource Recovered | ■ Ore mined – up to 39.7Mt. |
| Processing | ■ Processing operations would involve the following:<br>– three stage (tertiary) crushing and screening of up to 5.0 Mtpa of ROM ore to produce crushed ore;<br>– pre-concentration via screening, vertical shaft impact crushing followed by jigging;<br>– concentration via ball milling, re-grind, screening and desliming prior to gravity separation using cyclones, spirals and shaker tables, with re-grind and re-circulation of oversize, to produce tin concentrate;<br>– batch dressing of tin concentrate via low intensity magnetic separation, sulphide flotation and final cleaning with shaker tables; and<br>– concentrate thickening, filtration and bagging to produce up to 7,300 tpa of tin concentrate at 60% tin. |
| Management of Mining Waste and Processing Residues | ■ **Waste Rock:**<br>– Extracted using drill, blast, load and haul to produce up to 40.5 Mt of waste rock (~5 Mtpa at full scale operation), of which:<br>• 74% (30.0 Mt) is considered non-acid forming (NAF);<br>• 20% (8.1 Mt) is considered potentially acid forming (PAF); and<br>• 6% (2.4 Mt) is considered uncertain.<br>– Where required, NAF waste rock would initially be used during site establishment to construct infrastructure within the Mine Site.<br>– Subsequently, waste rock would be transported to either the:<br>• Northern WRE for storage of NAF, PAF and uncertain material; or<br>• Southern WRE for storage of NAF material.<br>– Both the Northern and Southern WRE would remain in the final landform.<br>■ **Processing Residues:**<br>– Pre-concentration and concentration operations would produce up to (approximately):<br>• 2.31 Mtpa of coarse reject;<br>• 1.34 Mtpa of coarse tailings; and<br>• 1.31 Mtpa of fine tailings.<br>– Coarse reject, dewatered coarse tailings and dewatered, thickened, and filtered fine tailings would be mixed and transferred via overland conveyor for placement in the Co-disposal Area (CDA) that would be located immediately north of the Processing Plant.<br>– The CDA would be progressively developed over the project life and remain in the final landform.<br>– Flotation operations would produce up to (approximately) 30,000 tpa of wet tailings that would be transferred (pumped) as a slurry to the Residue Storage Facility (RSF).<br>– The RSF would be located approximately 1.5 km north-north-west of the Processing Plant. |

| Project Element | Summary of the Project |
|---|---|
| | – Following the cessation of processing operations, material deposited in the RSF would be allowed to consolidate prior to rehabilitation and revegetation for retention in the final landform.<br>■ **General waste and recyclables:**<br>– Collected from the Mine Site and transferred to a licensed waste management facility. |
| Transportation Operations | ■ **Internal transportation:**<br>– Main Access Road (approximately 3.5 km) – would be constructed from the terminus of Grampians Road at the Mine Site boundary to the Processing Plant.<br>– Roads for the mobile mining fleet to haul waste rock from the open cut pits to the waste rock emplacements and ROM ore to the ROM pad would be constructed within the proposed area of disturbance and relocated as required.<br>– Other light and heavy vehicle internal roads would be constructed within the proposed area of disturbance and relocated as required.<br>■ **Mine Site Access:**<br>– Primary (heavy and light vehicles): Grampians Road and the southern section of Gulf Road to Emmaville.<br>– Secondary (light vehicles only, emergency access/ egress): Schroders Road, Grampians Road and the southern section of Gulf Road to Emmaville.<br>■ **Transportation routes:**<br>– Concentrate Transport Route (to Port of Brisbane): Grampians Road, Gulf Road, Moore Street, Irby Street, Wellington Vale Road and the New England Highway.<br>– Southern Route (to Glen Innes and Mine Camp): Grampians Road, Gulf Road, Moore Street and Emmaville Road.<br>■ **Public road upgrades to accommodate Project generated traffic:**<br>– Upgraded sections of Grampians Road from the Main Access Road to the intersection of Gulf Road.<br>– Upgraded Grampians Road crossing of Vegetable Creek.<br>– Upgraded intersection of Schroders Road and Grampians Road.<br>– Upgraded intersection of Gulf Road and Grampians Road.<br>■ **Concentrate transportation:**<br>– Method: Containerised (22t) for transport via road registered heavy vehicle.<br>– Vehicle type: B-Double.<br>– Traffic level: up to 2 laden vehicle movements per day.<br>■ **All other deliveries/ consumables:**<br>– Route: Grampians Road and Gulf Road via Emmaville.<br>– Vehicle type: up to B-double.<br>– Traffic level up to 2 laden movements per day.<br>■ **Personnel transportation (Company provided bus charter):**<br>– Route: Grampians Road, Gulf Road and Emmaville Road (from Glen Innes).<br>– Vehicle type: Bus.<br>– Traffic level up to 12 movements per day. |
| General Infrastructure | ■ **On-site infrastructure not addressed above would include the following:**<br>– Offices and Administration Area.<br>– Magazine.<br>– Workshops, Stores and Laydown Areas.<br>■ **Off-site infrastructure not addressed above would include the following:**<br>– Mine Camp and associated infrastructure for up to 50 personnel located near Glen Innes.<br>– Exploration office and core-shed located in Emmaville.<br>– Both the Mine Camp and Exploration office would be used as transportation hubs, with car parking, for pick-up/ drop-off of personnel travelling to the Mine Site via bus. |

<table>
<tr><th>Project Element</th><th>Summary of the Project</th></tr>
<tr><td>Power</td><td>■ Power for the Mine Site would be provided by an onsite power generation facility with a combination of:<br>– A 10 megawatt (MW) Solar Farm with an inverter and 2MW battery energy storage system (BESS).<br>– Four 2MW capacity gas generators supported by three 30t capacity gas storage tanks.<br>– One 2MW capacity diesel generator for back-up power supply.<br>– Power distribution infrastructure, including substations and overhead or buried transmission lines.</td></tr>
<tr><td>Water Management</td><td>■ Mine-affected water, including runoff from the RSF, WRE, CDA, open cut pit sumps, ROM pad and Processing Plant areas, would be retained on site and used for mining and processing operations.<br>■ Production bores, installed within the regional fractured rock groundwater system, would be used to provide water for site establishment and construction activities as well as make-up water for mining and processing operations.<br>■ Sediment-laden water, including runoff from areas of Project-related surface disturbance, would be collected and treated and discharged, provided water quality meets the specific requirements of the EPL or development consent.<br>■ Water from undisturbed sections of the Mine Site (clean water) would be prevented from entering disturbed sections of the Mine Site. This water would be either discharged or collected under the harvestable rights provisions of the Water Management Act 2000 and used for Project-related activities.<br>■ Runoff collected from the Applicant's landholding immediately adjacent to the Mine Site (clean water) would be collected under the harvestable rights provisions of the Water Management Act 2000 and used for site establishment and construction activities as well as make-up water for mining and processing operations.</td></tr>
<tr><td>Workforce</td><td>■ Site establishment and construction stage – up to 150 personnel.<br>■ Operations – approximately 129 personnel.</td></tr>
<tr><td>Hours of Operation</td><td>
<table>
<tr><th>Activity</th><th>Days</th><th>Hours</th></tr>
<tr><td colspan="3">Pre-construction and Offsite Roadworks</td></tr>
<tr><td rowspan="2">These activities are described in EIS documentation.</td><td>Monday to Friday</td><td>7:00 am to 6:00 pm</td></tr>
<tr><td>Saturday</td><td>8:00 am to 1:00 pm</td></tr>
<tr><td colspan="3">Site Establishment and Construction</td></tr>
<tr><td rowspan="2">Noise generating (i.e. vegetation clearing, soil stripping and stockpiling, pre-strip, bulk earthworks, onsite construction, deliveries, offsite roadworks and intersection upgrades).</td><td>Monday to Friday</td><td>7:00 am to 6:00 pm</td></tr>
<tr><td>Saturday</td><td>8:00 am to 1:00 pm</td></tr>
<tr><td>Low noise generating (i.e. electrical installation/ wiring, plumbing, plant installation, assembly and commissioning).</td><td>7 days</td><td>24 hours</td></tr>
<tr><td colspan="3">Operations</td></tr>
<tr><td>Crushing (primary, secondary and tertiary)</td><td>7 days</td><td>6:00 am to 6:00 pm</td></tr>
<tr><td>Blasting</td><td>Monday to Saturday</td><td>9:00 am to 5:00 pm</td></tr>
<tr><td>All other</td><td>7 days</td><td>24 hours</td></tr>
<tr><td colspan="3">■ Notes: Public Holidays excluded.</td></tr>
</table>
</td></tr>
<tr><td>Estimated Development Cost</td><td>■ $214 million (AU).</td></tr>
<tr><td>Final Landform</td><td>■ All infrastructure not required for the final land use would be removed, and areas revegetated.<br>■ Stabilised, shaped, capped and revegetated WRE, CDA and RSF.<br>■ Two final voids.</td></tr>
</table>

| Project Element | Summary of the Project |
|---|---|
| Final Land Use | ■ Mine Site:<br>– Native ecosystem and low-intensity grazing with further investigation of alternative post-mining land uses, including renewable energy generation.<br>■ Mine Camp:<br>– Following the cessation of mining and processing operations, Mine Camp infrastructure and services would be retained or removed according to the requirements of the landowner (Glen Innes Severn Council). |
| Rehabilitation | Where practical, rehabilitation would occur progressively throughout the project life. |

## 1.3 Purpose of this technical report

This technical report is one of a number of technical papers that form part of the EIS for the Project. The purpose of this technical report is to identify and assess the potential impacts of the Project in relation to biodiversity. It responds directly to the Secretary's environmental assessment requirements (SEARs) (refer to **Section 1.4**) and has been prepared with consideration of:

- NSW *Biodiversity Conservation Act 2016* (BC Act).
- NSW Biodiversity Regulation 2017 (BC Reg).
- NSW Biodiversity Assessment Method 2020 (BAM) (NSW Department of Planning and Environment 2020a).
- NSW Biodiversity Assessment Method Operational Manual – Stage 1 (NSW Department of Planning and Environment 2022a).
- NSW Biodiversity Assessment Method Operational Manual – Stage 2 (NSW Department of Planning and Environment 2023).
- *NSW Fisheries Management Act 1994* (FM Act).
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This report has the following objectives:

- To provide an assessment of biodiversity values within the Site and the disturbance area in accordance with the BAM.
- Demonstrate the Project's effort to avoid and minimise impacts on biodiversity values.
- Mitigate and manage impacts on biodiversity values.
- Calculate the offset requirement for impacts on biodiversity values that are unable to be avoided.
- Provide an assessment of significance on threatened species, ecological communities or their habitats listed under the FM Act and EPBC Act.

## 1.4 Secretary's Environmental Assessment Requirements

The NSW Department of Planning, Housing and Infrastructure (DPHI) and Department of Climate Change, Energy, the Environment and Water (DCCEEW) have provided the SEARs (SSD-74389710) for the EIS. The requirements specific to this assessment and where these aspects are addressed in this technical report are outlined in **Table 1.3**.

**Table 1.3 Secretary's environmental assessment requirements – Biodiversity**

| Reference | SEARs | Where addressed |
|---|---|---|
| **Department of Planning, Housing and Infrastructure** | | |
| Key issues - Biodiversity | *An assessment of the likely biodiversity impacts of the development in accordance with the Biodiversity Assessment Method (BAM), and documented in a Biodiversity Development Assessment Report (BDAR).* | This report is a BDAR that has been prepared in accordance with the BC Act and BAM. |
| | *a strategy to offset any residual impacts of the development in accordance with the offset rules under the Biodiversity Offsets Scheme, including details of any potential biodiversity stewardship sites for retiring biodiversity credits.* | Refer to **Section 13**. |
| **DCCEEW Environmental Assessment Requirements (EARs) - Biodiversity** | | |
| **1** | *The EIS must assess biodiversity impacts related to the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2017 using the Biodiversity Assessment Method (BAM) and must document this assessment in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and the BAM, unless BCS and the Department of Planning, Housing and Infrastructure determine that the project is not likely to have any significant impacts on biodiversity values.* | This report is a BDAR that has been prepared in accordance with the BC Act and BAM. |
| **2** | *The BDAR must document the application of the avoid, minimise and offset framework, including assessing all direct, indirect and prescribed impacts in accordance with the BAM.* | Refer to **Section 9** and **Section 10**. |
| **3** | *The BDAR must include details of the measures proposed to address the offset obligation as follows:*<br>■ *The total number and classes of biodiversity credits required to be retired for the project;*<br>■ *The number and classes of like-for-like biodiversity credits proposed to be retired;*<br>■ *The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules;*<br>■ *Any proposal to fund a biodiversity conservation action;*<br>■ *Any proposal to conduct ecological rehabilitation (if a mining project);*<br>■ *Any proposal to make a payment to the Biodiversity Conservation Fund.*<br>■ *If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain the requisite like-for-like biodiversity credits.* | Refer to **Section 12**. |
| **4** | *The BDAR must be submitted with all spatial data associated with the survey and assessment as per Appendix 11 of the BAM.* | Submitted via BOAMs (BAM-C). |
| **5** | *The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the Biodiversity Conservation Act 2016.* | Certification provided in BDAR and accredited persons provided **Section 1.5**. |

**Matters of National Environmental Significance**

The Project will be referred under the EPBC Act. Refer to **Section 8 f**or Matters of National Environmental Significance (MNES).

## 1.5 Personnel

The contributors to the preparation of this BDAR, their qualifications and roles are listed in **Table 1.4**.

All assessors involved with the Project have extensive experience in assessing native vegetation and threatened species within the northern tablelands region including all candidate threatened species identified by the BAM Calculator (BAM-C) for the Site. All content and fieldwork are in accordance with the BAM 2020 (NSW Department of Planning and Environment 2020a).

**Table 1.4 Personnel**

| Name | Qualifications | Position and role |
|---|---|---|
| Grant McLean | ■ Bachelor Environmental Science<br>■ BAM Accredited Assessor (BAAS 19055) | Senior Ecologist – reporting, field survey, technical internal review |
| Troy Jennings | ■ Master of Wildlife Management.<br>■ Bachelor of Biodiversity and Conservation.<br>■ Certificate 3 Conservation and Land Management.<br>■ BAM Accredited Assessor (BAAS 18172). | Senior Ecologist – field survey, report preparation, BAM calculations. |
| David Andrighetto | ■ Bachelor of Applied Science.<br>■ BAM Accredited Assessor (BAAS 20015). | Senior Ecologist – field survey. |
| Gemma Quick | ■ Bachelor of Environmental Science and Management (Honours).<br>■ Accredited BAM Assessor (BAAS 24056). | Ecologist – field survey. |
| Ben Millan | ■ Bachelor of Zoology. | Ecologist – field survey. |
| Quinn Green | ■ Bachelor of Zoology. | Ecologist – field survey. |
| Jack Hastings | ■ Bachelor of Environmental Science.<br>■ Accredited BAM Assessor (BAAS 24040). | Ecologist – field survey. |
| Sam Smith | ■ Bachelor of Environmental Science Major Resource Management. | Ecologist – field survey. |
| Heidi Lunn | ■ Bachelor of Plant Science.<br>■ Cert IV in Bush Regeneration. | Botanist – field survey. |
| Jessica O'Leary | ■ Bachelor of Environmental Science.<br>■ Accredited BAM Assessor (BAAS 19056). | Senior Ecologist – field survey. |
| Anna Barca | ■ Associate Degree of Spatial Science Major Geographic Information Systems. | GIS specialist – data management and illustration preparation. |
| **Specialist and subconsultants** | | |
| Alex Dudley (Faunaverse) | ■ Reptile Specialist (30 years' experience) – recognised as a Border Thick-tailed Gecko specialist by herpetology experts such as Glenn Shea (Sydney University). | Herpetology expert/ specialist.<br>Border Thick-tailed Gecko Report. |

| Name | Qualifications | Position and role |
|---|---|---|
| Greg Ford<br>(Balance Environmental) | ■ Bachelor of Applied Science, Biology (Zoology and Botany).<br>■ Graduate Diploma Resource Management and Planning.<br>■ Member of Australasian Bat Society. | Bat expert/ specialist.<br>Anabat data analysis.<br>Threatened Subterranean Bat Report. |
| David Havilah<br>(Cedar Ecology) | ■ Bachelor of Science.<br>■ Accredited BAM Assessor (BAAS 18129). | Senior Ecologist – technical peer review. |

## 1.6 Report Terminology

The following terms are discussed throughout this report and are defined as:

- **Locality**: the area within 10 km of the Project Site.
- **The Project:** incorporates all activities that are the subject of SSD application.
- **The Project Site**: land within which the Project occurs; generally, comprises all land utilised in support of the Project, including:
  - The **'Mine Site'** comprising all land within which the mining, processing and management of waste rock and processing residues would occur, and the Grampians Road upgrade.
  - The **'Mine Camp'** comprising Lot 1 DP 1187809 that would be utilised for an ancillary Project component to accommodate non-resident mine personnel during rostered work periods.
- **Disturbance footprint**: the area of land that is directly impacted by the Project, including access roads, ancillary areas, Mine Camp etc.
- **Mine-life:** the approximately 12-year period comprising the site establishment and construction stage (approximately 2 years) and the mining and processing operations stage (approximately 10 years) to the end of tin concentrate production.
- **Project-life** the approximately 21-year period comprising the site establishment and construction stage, mining and processing operations stage, decommissioning, landform establishment and revegetation stage (approximately 2 years) and the post-mining rehabilitation monitoring stage (approximately 7 years).

# 2. Legislation and policy context

This section provides an outline of the key biodiversity legislative requirements and policy guidelines relating to the Project.

## 2.1 Federal government

### 2.1.1 Environment Protection and Biodiversity Conservation Act 1999

In February 2015, the Australian and NSW Governments entered a bilateral agreement under section 45 of the EPBC Act. Under Section 45 of the EPBC Act allows for the Minister for Agriculture, Water and the Environment to enter into a bilateral agreement on behalf of the Australian Government. A bilateral agreement under section 45 of the EPBC Act is a written agreement that provides for 'minimising duplication in the environmental assessment and approval process through Commonwealth accreditation of the processes of the State or Territory (or vice versa)'.Since entering that agreement, the NSW Government has amended the accredited process through the repealing of the *Threatened Species Conservation Act 1995* and the commencement of the BC Act and the *Environmental Planning and Assessment Amendment Act 2017*. The current bilateral agreement provides for certain actions that are State significant development or State significant infrastructure within the meaning of the EP&A Act to be accredited for the purposes of meeting the requirements for assessment and public exhibition of an action under the provisions of the EPBC Act.

The Project would be referred to the Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW), and it is anticipated that the Project would be subject to the bilateral assessment process that has been established between the Australian and NSW governments.

## 2.2 State Government

### 2.2.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

The EP&A Act provides the statutory controls that establish a framework governing what development is permitted or prohibited, and the processes for how assessment and gaining approval for development is undertaken in NSW. It is supported by the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation), which provides additional detail and gives effect to the legislation.

The Project is considered SSD as the estimated capital investment value exceeds the $30M threshold identified in Schedule 1, Clause 5(1c) of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP).

The EP&A Act sets out the process for the assessment of SSD applications, with an Environmental Impact Statement (EIS) being a mandatory requirement. The Project's EIS must also comply with the requirements of Division 5 of *the Environmental Planning & Assessment Regulation 2021* (EP&A Regulation).

### 2.2.2 Biodiversity Conservation Act 2016 (BC Act)

The BC Act, together with the *Biodiversity Conservation Regulation 2017* (BC Reg), outlines the framework for assessment and approval of biodiversity impacts associated with developments that require consent under the EP&A Act.

The Biodiversity Offset Scheme (BOS) is a framework to avoid, minimise and offset impacts on biodiversity from development and clearing. The proponent for a development to which the BOS applies is required to prepare a BDAR in support of an application for approval to undertake that development. The BDAR uses the BAM 2020 established under these biodiversity reforms to provide a methodology for determining the number and type of biodiversity credits required to offset biodiversity impacts.

SSD projects are required to prepare a BDAR to identify and assess biodiversity impacts under the provisions of the BC Act and offset those impacts by retiring biodiversity credits, determined using the BAM, through the BOS.

This BDAR has been specifically prepared to address the BAM and associated guidance documents to enable development approval under Part 5 of the EP&A Act.

### 2.2.3 Biosecurity Act 2015 (BS Act)

The BS Act provides for risk-based management of biosecurity in NSW. It provides a statutory framework to protect the NSW economy, environment and community from the negative impact of pests, diseases and weeds.

The primary object of the BS Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter.

In NSW, all plants are regulated with a general biosecurity duty aimed to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Priority weeds recorded in the Project Site and their control measures are detailed in **Section 5.3**.

### 2.2.4 Fisheries Management Act 1994 (FM Act)

The FM Act was introduced to conserve, develop and share the fishery resources of the State for the benefit of present and future generations, and applies to all waters within the area occupied by the Project. Part 7 of the FM Act relates to the protection of fish and aquatic habitats with the objective of conserving the biodiversity of fish and aquatic vegetation. It provides for the management of certain works located on land that is permanently or intermittently submerged by water.

Pursuant to sections 201, 205 and 219 of the FM Act, works and activities such as those required for the Project may be undertaken under the authority of a permit.

However, as the Project has been declared as SSD under the Planning Systems SEPP (see Section 2.2.1 above), a permit under section 201, 205 or 219 of the FM Act is not required in accordance with section 4.41(1b) of the EP&A Act. Nevertheless, this report addresses biodiversity matters relating to threatened aquatic entities listed under the FM Act.

### 2.2.5 Local Land Services Act 2013 (LLS Act)

The LLS Act was introduced to provide direction around programs and services associated with agricultural production, biosecurity, natural resource management and emergency management. It aims to ensure the proper management of natural resources in the social, economic and environmental interests of the State, consistent with the principles of ecologically sustainable development. One of the ways that it intends to achieve this is through the regulation of the clearing of native vegetation.

Part 5A of the LLS Act sets out the ways in which the regulating of activities (in connection with land management) would occur and the areas of the State to which it would apply. Section 60A applies Part 5A to rural areas, including lands associated with the Project Site. Although Section 60O of the LLS Act excludes clearing that is authorised under other legislation. Furthermore, under the provisions of Section 60O of the LLS Act, the clearing of native vegetation is authorised if the clearing was authorised by an SSD approval under Part 4 of the EP&A Act.

Under the BC Act, section 6.8(3) regulates that the BAM is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on category 1-exempt land (within the meaning of Part 5A of the LLS Act).

Category 1-exempt land is defined under the LLS Act (Part 5A Division 2 Section 60H) as:

*Land is to be designated as category 1-exempt land if the Environment Agency Head reasonably believes that:*

- *the land was cleared of native vegetation as at 1 January 1990, or*
- *the land was lawfully cleared of native vegetation between 1 January 1990 and the commencement of this Part.*

*Land is to be designated as category 1-exempt land if the Environment Agency Head reasonably believes that:*

- *the land contains low conservation value grasslands, or*
- *the land contains native vegetation that was identified as regrowth in a property vegetation plan referred to in section 9 (2) (b) of the Native Vegetation Act 2003, or*
- *the land is of a kind prescribed by the regulations as category 1-exempt land.*

All other rural lands that do not meet the category 1 definition form part of the assessment area subject to this BDAR.

#### 2.2.5.1 Assessment of Category 1 exempt land

In accordance with section 6.8 (3) of the BC Act, when applying the BAM, the assessor is to exclude the assessment of impacts of any clearing of native vegetation and loss of habitat on Category 1 – exempt land, other than any impacts prescribed by the regulations under section 6.3.

Although clearing of native vegetation on land that meets the definition of Category 1-exempt land, as defined under the LLS Act, does not require assessment or offsetting under the BC Act, the following must still be considered:

- Prescribed impacts, as outlined in Chapter 6 of the BAM 2020. For example, there are threatened fauna species whose habitat may include land which meets Category 1- exempt criteria. A fauna survey on Category 1 land may be necessary to meet the requirements of the BAM.
- Potential impacts to MNES under the EPBC Act on Category 1 – exempt land.

Section 60F of the LLS Act provides the transitional arrangements that are in place until a comprehensive Native Vegetation Regulatory (NVR) Map is published. During the 'transitional period', assessors can make a reasonable approximation of land categorisation. For SSD proposals that affect rural land as defined under Part 5A of the LLS Act, a draft NVR Map is available for review. A review of the draft NVR map identified mapped category 1-exempt land associated with the Project Site (**Illustration 2.1**).

Where the draft map indicates that Category 1 – exempt land is present on a site, a site-scale refinement is needed for accurate application of NVR map criteria.

In defining the area Category 1 – exempt land, an initial analysis of the following spatial datasets has been undertaken

- NVR: Transitional Native Vegetation Regulatory Map, version 3.0, published 26 March 2021.
- Land use: NSW Land Use 2017 v1.2, published June 2020.
- Woody vegetation: NSW Woody Vegetation Extent 2011, published 2015.
- State Vegetation Type Map.
- Aerial photos (to determine areas that were/ are obviously under cultivation or improved pasture or otherwise disturbed).

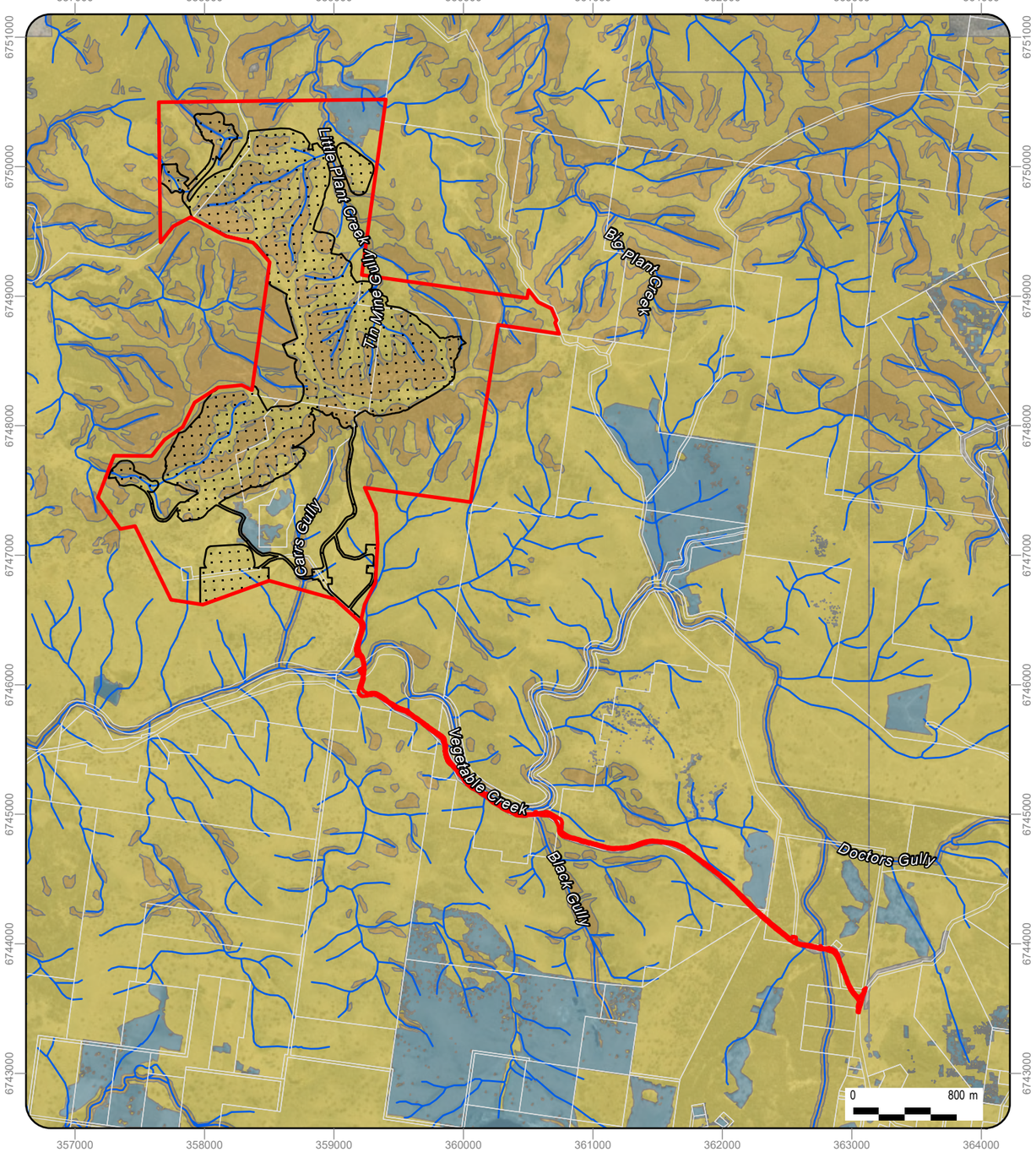
Each of these datasets was used to determine whether native vegetation has been significantly disturbed or modified (and therefore cleared) in accordance with 60J of the LLS Act.

The steps in identifying Category 1 – exempt land included the following:

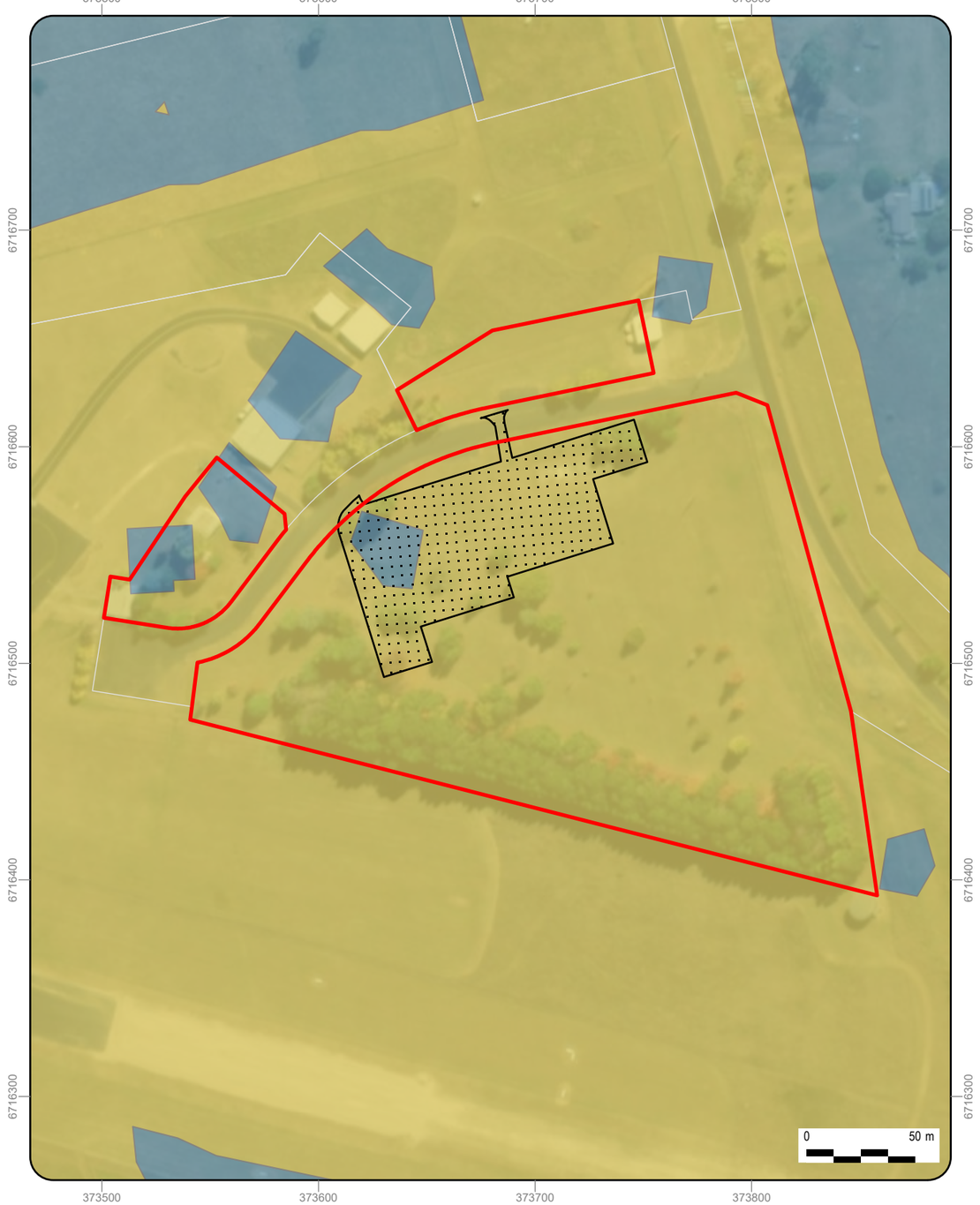
1. Review and exclusion of areas of Category 2- regulated land as mapped within the draft NVR map.
2. Review and exclusion of areas of all woody vegetation as mapped by NSW Woody vegetation Extent 2011
3. Inclusion of all intensive agricultural and industrial land use zones as mapped in NSW Land Use 2017 v1.2.
4. For remaining areas of derived grassland, review of historical evidence of intensive agriculture and significant disturbance in accordance with LLS Act 60H 1a-b for significantly disturbed or modified land in accordance with LLS Act 60J; **OR**
5. Where available, field validation confirming 'low conservation value grasslands' in accordance with LLS Act section 60h 2a-b.

A draft Category 1 map, including refinement of Category 1 – exempt land, was supplied to the Biodiversity Conservation Science (BCS) of NSW DCCEEW on 8 October 2024, and a response received on 11 November 2024 supporting the approach used and the proposed changes of mapped Category 1 exempt land to mapped Category 2 regulated land. BCS also supported the extent of mapped Category 1 exempt land proposed to be retained as Category 1 exempt land on site.

All category 1 lands identified within the Project Site are exempt from BAM assessment and are not considered further in this BDAR (refer to **Illustration 2.1**).




Mine Site




Mine Camp

**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre
- Category 1 Land (BAM does not apply)
- Category 2 - regulated land
- Category 2 - vulnerable regulated land
- Watercourse

Overview of Native Vegetation Regulatory Mapping - Illustration 2.1



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

# 3. Methodology

This section provides a detailed description of the methodologies used in the preparation of this BDAR. Methodologies used included a combination of desk-based searches of relevant databases and historical records, as well as a field inspection of the Site to identify and assess biodiversity values in accordance with Stage 1 and Stage 2 of the BAM (2020).

## 3.1 Information Sources

Data and resources used or consulted in this assessment include:

- The Biodiversity Assessment Method (NSW Department of Planning and Environment 2020a).
- The Biodiversity Assessment Method Operational Manual – Stage 1 (NSW Department of Planning and Environment 2022a).
- Threatened entity surveys guidelines (amphibians, microchiropteran bats, mammals and flora and their habitat).
- BioNet Vegetation Classification (NSW Department of Planning and Environment 2025a).
- BioNet Threatened Biodiversity Data Collection (TBDC)(NSW Department of Planning and Environment 2025b).
- Biodiversity Assessment Method Calculator (BAM-C).
- BioNet Threatened Species Profiles.
- PlantNET NSW (Royal Botanic Gardens 2025).
- Biodiversity Offsets and Agreement Management System (BOAMS).

Spatial data used in this report includes data from the following sources:

- NSW Department of Finance and Services (via Six Maps).
- IBRA Regions and Subregions (Thackway & Cresswell 1995).
- NSW (Mitchell) Landscapes - Version 3.1 (Planning Industry and Environment 2016).
- Directory of Important Wetlands in Australia (Department of Climate Change Energy the Environment and Water 2025a).
- Fauna Corridors for North East NSW (Department of Planning Industry and Environment 2010).
- Important Habitat Map (BOAMS).
- Acid Sulphate Soils Map.

## 3.2 Nomenclature

Names of vegetation communities used in this report are based on the Plant Community Types (PCT) used in the NSW BioNet Vegetation Classification Database (NSW DCCEEW 2025a).

These names are cross-referenced with those used for threatened ecological communities listed under the BC Act and/ or the EPBC Act.

Names of plants used in this document follow PlantNet (Royal Botanic Gardens 2025). Scientific names are used in this report for species of plants. The names of introduced species are denoted with an asterisk (*).

For threatened species of plants, the names used in the BioNet Atlas of NSW Wildlife (NSW DCCEEW 2025c) are also provided where these differ from the names used in the PlantNet database.

Names of vertebrate fauna follow the Australian Faunal Directory maintained by the Commonwealth DCCEEW (Department of Climate Change Energy the Environment and Water 2025b). Common names are used in the report for species of animals. Both common and scientific names are provided in appendices (**Appendix C** and **Appendix D**).

For threatened species of animals, the names used in the BioNet Atlas of NSW Wildlife (NSW DCCEEW 2025c) and DPI Spatial Data Portal (Department of Primary Industries 2025a) are provided.

## 3.3 Database Searches

The aim of the background research was to identify threatened flora and fauna species, populations and ecological communities, Commonwealth listed migratory species or critical habitats recorded previously or predicted to occur in the locality of the Site.

This allowed for known habitat characteristics to be compared with those present in the Project Site to determine the habitat suitability of each species or population. It further enabled justification for inclusion of any additional predicted or candidate threatened flora and fauna species not identified by the BAM-C.

Records of threatened species, populations and ecological communities known or predicted to occur in the locality of the Site were obtained from a range of databases as detailed in **Table 3.1**.

**Table 3.1 Database Searches**

| Database | Search date | Area searched | Reference |
|---|---|---|---|
| PlantNet Spatial search | 21/02/2025 | 10 km search on suburb | (Royal Botanic Gardens 2025) |
| BioNet Atlas of NSW Wildlife search tool | 21/02/2025 | 15 km x 15 km centred on the Site | (NSW DCCEEW 2025c) |
| EPBC Act Protected Matters Search Tool (PMST) | 10/09/2024 and 30/01/2025 | 10 km x 10 km centred on the Site | (Department of Climate Change, Energy, the Environment and Water 2025c) |
| Biodiversity Assessment Calculator (BAM-C) | 21/02/2025 | Based on IBRA Bioregion/ Subregions and PCT VI plot data collected and imported. | (NSW Government 2025) |
| NSW Department of Primary Industries – Fisheries Spatial Data Portal | 16/09/2024 | 5 km x 5 km centred on the Site | (Department of Primary Industries 2025a) |

## 3.4 Likelihood of Occurrence Assessment

An assessment was completed to assess the likelihood of occurrence of each threatened species, population and community (threatened biodiversity) identified with the potential to occur in the Site. All threatened biodiversity identified during background research conducted (refer to **Table 3.1**) were considered in this assessment. This likelihood of occurrence assessment was utilised to inform the identification of appropriate targeted surveys. The assessment was based on the habitat profile for the species and other habitat information in the TBDC and the *Species Profile and Threats Database* (Department of Climate Change, Energy, the Environment and Water 2025d). The assessment also

included consideration of the dates and locations of nearby records and information about species populations in the locality.

For this assessment, the likelihood of occurrence of threatened and migratory species and populations was determined based on the criteria shown in **Appendix C** and **Appendix D**.

## 3.5 Identification of Relevant Threatened Species

Relevant threatened species are those that have been assessed as having a moderate to high likelihood of occurring in the Site based on desktop assessment and field assessment. Threatened species can fall under either the ecosystem credit species or species credit species as defined under the BAM:

- **Ecosystem credit species**: are threatened species whose occurrence can generally be predicted by vegetation surrogates and/ or landscape features, or that have a low probability of detection using targeted surveys.
- **Species credit species (candidate species)**: are threatened species for which vegetation surrogates and/ or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. A targeted survey or an expert report is required to confirm the presence of these species on the subject land. Targeted surveys were undertaken for candidate species as outlined in **Section 6.4.1.3** and **6.4.2.3**.

As stated in the BAM (2020) subsection 5.2.3.2, a candidate species credit species will be considered unlikely to occur on the Project Site if:

- after carrying out a field assessment of the habitat constraints or microhabitats on the Site, the assessor determines that the habitat is substantially degraded such that the species is unlikely to utilise the Site; or
- an expert report that is prepared in accordance with subsection 6.5.2 states that the species is unlikely to be present on the Site or specific vegetation zones.

A candidate species credit species that is not considered to have suitable habitat on the Project Site does not require further assessment (NSW Department of Planning and Environment 2020a). A likelihood of occurrence assessment has been undertaken for all identified threatened species in **Appendix C** and **Appendix D**.

## 3.6 Survey Dates and Weather Conditions

Weather conditions during the field surveys were conducted over a variety of conditions from cool to warm and dry to wet conditions. A summary of the weather conditions during the survey periods is provided in **Table 3.2**.

**Table 3.2 Weather conditions during survey periods**

| Date | Temperate (C°) | | Rain (mm) | Wind (direction/ speed (km/hr)) | |
|---|---|---|---|---|---|
| | Minimum | Maximum | | 9 am | 3 pm |
| 05/09/2022 | 2.1 | 15.3 | 0 | SE / 26 | ESE / 13 |
| 06/09/2022 | 1.7 | 14.7 | 0 | SE / 13 | SW / 11 |
| 07/09/2022 | 5.4 | 16.2 | 0 | ESE / 19 | NNE / 20 |
| 21/11/2022 | 1.8 | 21.5 | 0 | W / 30 | W / 41 |
| 22/11/2022 | 4.9 | 17.4 | 0 | WSW / 26 | W / 24 |
| 23/11/2022 | 4.8 | 21.2 | 0 | WSW / 19 | WSW /19 |
| 24/11/2022 | 4.4 | 24.5 | 0 | SE / 9 | W / 13 |
| 25/11/2022 | 6.6 | 24.1 | 0 | WSW / 9 | WNW / 15 |
| 26/11/2022 | 4.7 | 25.6 | 0.2 | SW / 15 | SW /19 |
| 19/12/2022 | 8.7 | 23.9 | 0 | SE / 19 | ESE /13 |
| 10/01/2023 | 10.8 | 31.3 | 0 | SE / 19 | SSE / 22 |
| 06/02/2023 | 12.7 | 30.4 | 0 | ESE / 15 | SSW / 13 |
| 07/02/2023 | 14.2 | 29.1 | 0 | ESE / 13 | E /17 |
| 08/02/2023 | 14.0 | 25.3 | 0 | ESE / 26 | E / 20 |
| 17/04/2023 | 5.5 | 23.9 | 0 | SSE / 6 | E / 17 |
| 18/04/2023 | 8.7 | 19.2 | 0 | E /26 | E / 20 |
| 19/04/2023 | 6.1 | 21.0 | 0 | E / 22 | SSE / 13 |
| 20/04/2023 | 5.5 | 17.8 | 0 | SE / 33 | ESE / 19 |
| 19/06/2023 | -6.1 | 13.3 | 0 | W / 9 | WNW / 24 |
| 20/06/2023 | -0.4 | 9.3 | 0 | WSW / 33 | W / 15 |
| 21/06/2023 | -5.8 | 13.9 | 0 | ESE / 13 | WNW / 6 |
| 22/06/2023 | 0.5 | 12.5 | 0 | SE / 7 | WNW / 7 |
| 23/06/2023 | 6.8 | 13.1 | 15.8 | NW / 31 | WNW / 41 |
| 17/07/2023 | -0.3 | 15.1 | 0 | ESE / 19 | E / 20 |
| 18/07/2023 | 3.7 | 15.4 | 0 | ESE / 11 | WSW / 20 |
| 21/08/2023 | -2.7 | 17.7 | 0 | ENE / 2 | W / 20 |
| 22/08/2023 | -2.1 | - | 0 | NW / 19 | NNW / 24 |
| 23/08/2023 | - | 18.9 | 0 | NW / 20 | W / 31 |
| 09/10/2023 | 5.8 | 21.5 | 0 | SE / 15 | SWW / 13 |
| 10/10/2023 | 6.5 | 21.6 | 0 | W / 15 | WSW / 19 |

| Date | Temperate (C°) | | Rain (mm) | Wind (direction/ speed (km/hr)) | |
|---|---|---|---|---|---|
| | Minimum | Maximum | | 9 am | 3 pm |
| 11/10/2023 | 5.9 | 24.4 | 0 | E / 9 | SSW / 11 |
| 16/11/2023 | 15.4 | 29 | 1.6 | WNW / 11 | W / 26 |
| 22/01/2024 | 16 | 32.8 | 3.4 | NW / 20 | WSW / 22 |
| 23/01/2024 | 15 | 22.8 | 0 | ESE / 22 | E / 19 |
| 24/01/2024 | 14.4 | 30.4 | 0 | SE / 17 | SSW / 11 |
| 22/08/2024 | 5.6 | 18.4 | 0 | NW / 20 | WNW / 19 |
| 19/09/2024 | 0.4 | 19.9 | 0 | NW / 24 | WNW / 43 |
| 20/09/2024 | -3.2 | 19.7 | 0 | NW / 17 | W / 35 |
| 08/01/2025 | 10.4 | 26.9 | 1.4 | WNW / 20 | W / 28 |
| 21/01/2025 | 11.4 | 28.8 | 0 | NW / 11 | SW / 17 |

Source: Bureau of Meteorology – Automatic Weather Station (AWS) 056243– Glen Innes Airport (Bureau of Meteorology 2025a)

## 3.7 Vegetation Surveys

The following flora and vegetation mapping methods were undertaken for the Project Site.

### 3.7.1 Mapping of native vegetation

The vegetation within the Project Site was firstly assessed to a PCT level and then aligned to a vegetation zone, which is defined in the BAM as '*an area of native vegetation on the site that is the same PCT and has a similar broad condition state*' (NSW Department of Planning and Environment 2020a). A broad condition state infers that the vegetation has a similar tree cover, shrub cover, ground cover, weediness or combinations of these attributes which determine vegetation condition.

Broad condition state is used for stratifying areas of the same PCT into a vegetation zone for determining the vegetation integrity score. Broad condition states used for this report are outlined in **Table 3.3**.

**Table 3.3 Native vegetation broad condition states**

| Broad condition state | Description |
|---|---|
| **Intact** | Native vegetation is relatively intact with all structural layers present. Exotic weed cover is generally less than 30%. Vegetation integrity scores are generally greater than 60. |
| **Modified** | Native vegetation where one or more structural understorey components of the vegetation is entirely removed or severely reduced. Vegetation integrity scores are generally less than 60, and exotic cover is generally greater than 30%. |
| **Poor** | Over-storey structural components have either been removed or are severely reduced (i.e. derived native grasslands with or without scatted paddock trees). Some native canopy cover is showing signs of regeneration. The understorey and groundcover layers are generally |

| Broad condition state | Description |
|---|---|
| | dominated or co-dominated by exotic species. Native species diversity is generally relatively low, and the mid and low stratums have been structurally modified due to weed incursions, clearing, agricultural practices such as cropping, direct seeding or pastoral use. Derived grassland was assigned to patches of vegetation where native perennial cover was greater than 50%. Vegetation integrity scores are generally greater than 20. |
| **Cleared** | Areas that have changed to an alternative stable state because of land management practices since European settlement. Over-storey structural components of these areas have either been entirely removed or are severely reduced. Vegetation integrity scores are generally less than 17. |

### 3.7.2 Vegetation integrity plots

Vegetation integrity plots were completed in accordance with BAM (2020) and BAM Operational Manual – 1 (NSW Department of Planning and Environment 2022a) and as described below. A schematic diagram illustrating the layout of each vegetation integrity plot is provided in **Figure 3.1**.

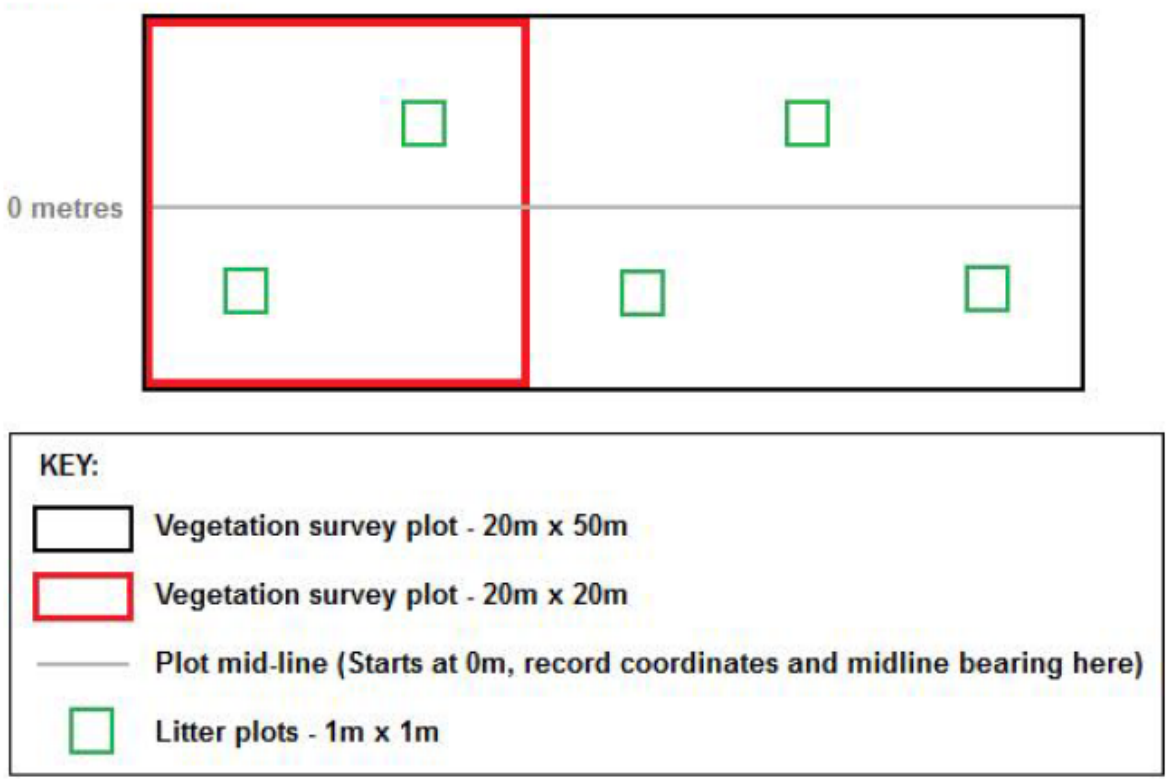



**Figure 3.1 Vegetation integrity plot layout**

The following site attributes were recorded at each vegetation integrity plot location:

- Location (easting – northing grid type MGA 94, Zone 56).
- Vegetation structure and dominant species, and vegetation condition. Vegetation structure was recorded through estimates of percentage foliage cover, average height, and height range for each vegetation layer.
- Native and exotic species richness (within a 400-m² quadrat): This consisted of recording all species by systematically walking through each 20 m x 20 m plot. The cover and abundance

(percentage of area of quadrat covered) of each species were estimated. The growth form, stratum/ layer and whether each species was native/ exotic/ high threat weed were also recorded.

- Number of trees with hollows (1000 m squared quadrat): This was the frequency of hollows within living and dead trees within each 50 m x 20 m plot. A hollow was only recorded if (a) the entrance could be seen, (b) the estimated entrance width was at least 5 cm across, (c) the hollow appeared to have depth, (d) the hollow was at least 1 m above ground, and (e) the centre of the tree was located within the sampled quadrat.
- Number of large trees and stem size diversity (1000 m squared quadrat): tree stem size diversity was calculated by measuring the diameter at breast height (DBH) (i.e. 1.3 m from the ground) of all living trees (>5 cm DBH) within each 50 m x 20 m plot. For multi-stemmed living trees, only the largest stem was included in the count. The number of large trees was determined by comparing living tree stem DBH against the PCTs benchmarks.
- Total length of fallen logs (1000 m squared quadrat): This was the cumulative total of logs within each 50 m x 20 m plot with a diameter of at least 10 cm and a length of at least 0.5 m.
- Litter cover: This comprised estimating the average percentage groundcover of litter (i.e. leaves, seeds, twigs, branchlets and branches with a diameter <10 cm which is detached from a living plant) from within five 1 m x 1 m sub-plots spaced evenly on either side of the 50 m central transect.
- Evaluation of regeneration: This was estimated as the presence/ absence of overstorey species present at the site that was regenerating (i.e. saplings with a diameter at breast height ≤5 cm).

Prior to establishing plot survey locations, vegetation stratification was undertaken to provide a representative vegetation zone for sampling. Stratification involved marking waypoints and bearings randomly to provide a representative assessment of the vegetation integrity of the vegetation zone in the site and establishing the required number of plots at some of these waypoints.

### 3.7.3 Native vegetation survey effort

A total of 23 vegetation integrity plots were undertaken as outlined in the methodology contained within the BAM (2020) as described above. The location of these vegetation integrity plots is presented in **Illustration 5.1**.

The coordinates, orientations and vegetation type sampled at each plot are summarised in **Table 3.4** whilst a comparison of the plots completed against BAM plot requirements is provided in **Table 3.5**. Full vegetation integrity plot data is presented in **Appendix B**.

**Table 3.4 Location and orientation of vegetation integrity plots completed**

| Plot ID | PCT and zone | IBRA Subregion | Easting[1] | Northing[1] | Orientation |
|---|---|---|---|---|---|
| 001 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Intact** | Beardy River Hills | 359585 | 6748356 | 287° |
| 002 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Derived** | Beardy River Hills | 359597 | 6748230 | 103° |
| 003 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Intact** | Beardy River Hills | 358738 | 6748011 | 178° |
| 004 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Modified** | Beardy River Hills | 358459 | 6747265 | 106° |

| Plot ID | PCT and zone | IBRA Subregion | Easting[1] | Northing[1] | Orientation |
|---|---|---|---|---|---|
| 005 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Modified** | Beardy River Hills | 359016 | 6746767 | 129° |
| 006 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Derived** | Beardy River Hills | 359140 | 6747405 | 22° |
| 007 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Cleared** | Beardy River Hills | 358362 | 6747118 | 322° |
| 008 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Intact** | Beardy River Hills | 358857 | 6748510 | 144° |
| 009 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Modified** | Beardy River Hills | 358766 | 6749309 | 341° |
| 010 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Derived** | Beardy River Hills | 358868 | 6749741 | 249° |
| 011 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Modified** | Beardy River Hills | 358932 | 6747315 | 170° |
| 012 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Derived** | Beardy River Hills | 358923 | 6746837 | 53° |
| 013 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Derived** | Beardy River Hills | 358228 | 6746942 | 312° |
| 014 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Modified** | Beardy River Hills | 358474 | 6749496 | 68° |
| 015 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Intact** | Beardy River Hills | 358058 | 6749817 | 97° |
| 016 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Intact** | Beardy River Hills | 359023 | 6748939 | 178° |
| 017 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Modified** | Beardy River Hills | 357932 | 6747315 | 31° |
| 018 | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest: **Intact** | Beardy River Hills | 358157 | 6748262 | 221° |
| 019 | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest: **Intact** | Beardy River Hills | 359146 | 6746207 | 233° |

| Plot ID | PCT and zone | IBRA Subregion | Easting[1] | Northing[1] | Orientation |
|---|---|---|---|---|---|
| 020 | PCT 4080 – Northwest River Oak-Apple Forest: **Modified** | Beardy River Hills | 359293 | 6746221 | 190° |
| 021 | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest: **Poor** | Beardy River Hills | 359246 | 6746225 | 332° |
| 022 | PCT 3339 – Guyra Basalt Snow Gum Woodland: **Poor** | Glenn Innes-Guyra Basalts | 373744 | 6716548 | 66° |
| 023 | PCT 3339 – Guyra Basalt Snow Gum Woodland: **Poor** | Glenn Innes-Guyra Basalts | 373644 | 6716563 | 17° |

(1) GPS Co-ordinates – Zone 56.

**Table 3.5 Minimum number of vegetation integrity plots required per vegetation zone for Beardy River Hills IBRA subregion**

| Plant Community Type | Vegetation zone | Extent in disturbance footprint (ha) | BAM minimum plot requirement | Plots completed |
|---|---|---|---|---|
| PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 | 6 (>100-250 ha) | 001; 003; 008; 015; 016; 018 |
| | Modified | 97.37 | 5 (>50-100 ha) | 004; 005; 009; 011; 014; 017 |
| | Poor | 55.73 | 5 (>50-100 ha) | 002; 006; 010; 012; 013 |
| | Cleared | 0.44 | 1 (<2 ha) | 007 |
| PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 | 1 (<2 ha) | 019 |
| | Poor | 0.41 | 1 (<2 ha) | 021 |
| PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 | 1 (<2 ha) | 020 |
| | **Total** | **314.57** | **20** | **21** |

**Table 3.6 Minimum number of vegetation integrity plots required per vegetation zone for Glenn Innes-Guyra Basalts IBRA subregion**

| Plant Community Type | Vegetation zone | Extent in disturbance footprint (ha) | BAM minimum plot requirement | Plots completed |
|---|---|---|---|---|
| PCT 3339 – Guyra Basalt Snow Gum Woodland | Poor | 0.64 | 1 (<2 ha) | 022; 023 |
| | **Total** | **0.64** | **1** | **2** |

## 3.8 Threatened Flora Surveys

This section outlines the flora survey effort completed for candidate threatened flora species that were predicted to have a moderate to high likelihood of occurrence within the Site, based on the BAM-C, database searches and habitat assessments provided in **Appendix C**.

### 3.8.1 Vegetation integrity plots

Thirty-minute searches were conducted at each vegetation integrity plot location. Across the Project Site (focusing within the disturbance footprint), a total of 23 vegetation integrity plots were undertaken, equating to 30 hours of searches for threatened flora species at vegetation integrity plot locations.

### 3.8.2 Two-phase grid-based systematic survey

The two-phase grid-based systematic survey methods have been developed for large areas of suitable potential threatened species habitat that generally exceed 50 hectares in area. The method involves phase one, establishing a grid spaced at 100 square metres that is nested within a one-square-kilometre grid. Surveys are then conducted at each survey location (100 metre grid intersect or greater if open woodland structure occurred), where a 40-metre diameter search area is undertaken (1256-square-metre circular area). If a target threatened species is located, finer-scale grid surveys (phase two) are used to locate population extent, which allows a species polygon to be defined. This subsequent phase ensures a greater intensity of survey effort in locations where the target threatened species occurs (NSW Department of Planning and Environment 2020b).

Detailed locations and effort of the two-phase grid-based systematic survey method within the Biodiversity Project Site are presented in **Illustration 6.1**.

### 3.8.3 Parallel Transects

Targeted threatened species surveys employed parallel line traverses where known or potential habitat for candidate threatened flora species occurred within the disturbance footprint and surrounding areas associated with road upgrades along Grampians Road. This survey technique involved ecologists walking parallel line traverses with approximately 5 metres distance between team members. This methodology is consistent with the guidelines for NSW threatened plant surveys (NSW Department of Planning and Environment 2020b).

### 3.8.4 Herbarium sampling and vouchering

Threatened flora species located during surveys were tentatively identified in the field to enable finer-scale grid surveys to locate population extent and allow species polygons to be defined. Plant samples

of each threatened species were collected and placed in a field plant press for further analysis and herbarium sampling. Each sample was located with GPS coordinates, and field notes were recorded, including unique code, date of recording, genus and tentative species name, associated plant species, PCT, soils, landform, and any other relevant information to assist with herbarium vouchering. Collected plant samples were examined under a microscope before being processed and forwarded to the National Herbarium of NSW for positive verification. All plant samples were collected under NSW scientific licence number SL100152.

### 3.8.5 Flora microhabitat and habitat constraint assessments

Microhabitat assessments were undertaken for each candidate threatened flora species. This included a review of the habitat constraints listed in the Threatened Biodiversity Data Collection (NSW DCCEEW 2025b) and comparison to the attributes recorded during the field survey.

Habitat constraint assessments included a review of vegetation integrity scores of associated vegetation and observations during field surveys to determine if the potential habitat is degraded to the point where the species is unlikely to be present.

## 3.9 Threatened Fauna Surveys

This section outlines the fauna survey effort completed for candidate species that were predicted to have a moderate to high likelihood of occurrence within the Project Site based on database searches outlined in **Section 3.3**. Threatened fauna surveys completed within the Project Site were carried out as described below, and where applicable, considering the methodology detailed in:

- Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities – Working Draft 2004 (Department of Environment and Conservation 2004).
- Survey Guidelines for Australia's Threatened Birds (Magrath et al. 2010)(Department of Environment Water Heritage and the Arts 2010).
- Threatened Species survey and assessment guidelines: field survey and methods for fauna-Amphibians (Department of Environment and Climate Change 2009).
- Survey guidelines for Australia's threatened frogs (Department of the Environment Water Heritage and the Arts 2010).
- NSW Survey Guide for Threatened Frogs and their habitats- NSW survey guide for the BAM (NSW Department of Planning and Environment 2020c).
- Koala (*Phascolarctos cinereus*) – Biodiversity Assessment Method Survey Guide (Department of Planning and Environment 2022).
- 'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method (Office of Environment & Heritage 2018).
- Threatened reptiles – Biodiversity Assessment Method survey guide (NSW Department of Planning and Environment 2022b).
- Threatened Species Profile Database (NSW Department of Planning and Environment 2025b).

### 3.9.1 Fauna habitat stratification

Three PCTs identified across the Project Site contain various types of habitats for fauna. PCT 3722, 3363 and 4080 and can broadly be categorised into two fauna habitat stratification units, being:

- Dry sclerophyll forest.
- Riverine Forest.

Fauna habitat stratification units were identified to ensure that fauna surveys were undertaken within the representative habitat type for the target threatened fauna species. The fauna habitat stratification unit is outlined in **Table 3.7**.

**Table 3.7 Vegetation zone and PCTs as they correspond to fauna habitat stratification types**

| Fauna stratification units and related PCTs | Indicative disturbance footprint (ha) |
|---|---|
| **Dry Sclerophyll Forest** | |
| PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | 257 (excluding poor condition) |
| PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | 0.62 (excluding poor condition) |
| **Riverine Forest** | |
| PCT 4080 – Northwest River Oak-Apple Forest | 0.11 |

### 3.9.2 Fauna habitat assessments

Fauna habitat assessments were undertaken to assess the likelihood of threatened species of animal (those species known or predicted to occur within the locality from the literature and database review) occurring within the Project Site. Fauna habitat assessments were used to assess whether threatened species were likely to occur within the Project Site. Fauna habitat characteristics assessed included:

- structure and floristics of the canopy, understorey and ground vegetation, including the presence of flowering and fruiting trees providing potential foraging resources;
- presence of hollow-bearing trees providing roosting and breeding habitat for arboreal mammals, forest owls, birds and reptiles;
- presence of the ground cover vegetation, leaf litter, rock outcrops and fallen timber and potential to provide protection for ground-dwelling mammals, reptiles and amphibians;
- presence of waterways (ephemeral or permanent) and water bodies; and
- presence of man-made structures (e.g. culverts) for roosting/ breeding microchiropteran bats.

**Table 3.8 Fauna habitat assessment criteria**

| Habitat condition | Evaluation criteria |
|---|---|
| **Good** | A full range of fauna habitat components are usually present (for example, old growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact. |
| **Moderate** | Some fauna habitat components are missing or greatly reduced (for example, old-growth trees and fallen timber), although linkages with other remnant habitats in the landscape are usually intact but sometimes degraded. |
| **Poor** | Many fauna habitat elements in low quality remnants have been lost, including old growth trees (for example, due to past timber harvesting or land clearing) and fallen timber, and tree canopies are often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive clearing in the past. |

### 3.9.3 Diurnal bird surveys

Formal 20-minute diurnal bird searches were completed in multiple areas within the Project Site. Bird surveys were completed by actively walking through the Project Site over a period of 20 minutes. All birds were identified to the species level, either through direct observation or identification of calls. Bird

surveys were completed during different times of the day but generally occurred during morning hours (5 am-10 am) or late afternoon (4 pm-6 pm). Birds were also recorded opportunistically during all other surveys.

Wherever threatened bird species were absent from the Project Site, habitat assessments were conducted to determine the likelihood that the Project Site might support those species that are known to occur in the region.

### 3.9.4 Anabat detection

Passive Ultrasonic Anabat Bat detection devices (Anabat Express unit [Titley Scientific, Brendale, QLD]) were used to record and identify the echolocation calls of microchiropteran bats foraging within the Project Site, where potential habitat was identified. Passive monitoring of survey sites was achieved by setting Anabat Bat detectors to record throughout the night.

Anabat Bat detectors recorded bat vocalisations throughout the full night, with the recording starting before dusk. Bat activity throughout the night does vary ((Department of Environment and Conservation, 2004);(Taylor & Oneill 1988)), but the peak in activity is usually within a few hours of dusk. Bat activity is used as a substitute for abundance and is based on the number of microchiropteran bat calls recorded during the survey period, including those calls assigned to a species complex (i.e. not positively attributable to an individual species). Calls were analysed using Anabat Insight (Version 2.0.1) software and Decision Tree Analysis with reference to 'Bat Calls of NSW: Region Based Guide to the Echolocation Calls of Microchiropteran Bats'(Pennay et al. 2004) and other published call descriptions. Refer to **Appendix G** for Anabat Analysis.

### 3.9.5 Harp trapping and thermal visual surveys

Harp traps are excellent for the capture and release of microchiropteran bats, and they are well suited to the capture of microbat species that are difficult to identify by vocalisations (i.e. Long-eared Bats) and also useful to determine population demographics and breeding status. Harp traps involve using a 4.2 $m^2$ catch area harp trap strung with 3kg (or less) monofilament nylon line. Harp traps are set before sunset and left open overnight, to be checked at least once during the night and then at or just before dawn. Harp traps were set at each location over a single night period. Captured bats were identified to species level, sexed, measured and weighed. Bats were released immediately after processing during dark conditions.

Thermal imagery visual surveys involved the use of a thermal camera (Hikmicro G40) to directly inspect and conduct microbat flyout surveillance of abandoned adits identified within the Project Site.

### 3.9.6 Remote cameras

Remote cameras were employed for observations of fauna using the habitats associated with the Project Site. Thirty arboreal cameras were used for a minimum of 30 days. For arboreal cameras, baits consisted of honey, peanut butter & oat bars and trees sprayed with a strong honey water mixture.

### 3.9.7 Koala detection dogs

Koala detection dogs were used for the Project Site due to the large amount of suitable habitat (i.e. ≥50 ha). A detection dog is trained to identify koala scats and is an indirect method for detecting koala presence. Koala scats were previously recorded opportunistically onsite, and therefore Koala detection dog surveys were not done in accordance with the Koala BAM survey guideline (Department of Planning and Environment 2022), instead, dog detection surveys were undertaken to gain a better understanding of the density and distribution of Koala occurrence across the Project Site. Detection

dog surveys were conducted over 3 days (October) with approximately 34 km of transects undertaken across multiple areas.

### 3.9.8 Herpetological searches

Herpetofauna active searches were undertaken during the midday of the day (turtles), late afternoon and at night (geckos). These involved looking for active specimens and eye shine, turning over suitable ground shelter, such as fallen timber, sheets of iron and exposed rocks, raking debris, and peeling decorticating bark. For reptiles, this mostly consisted of targeted searches of areas containing suitable substrate such as leaf litter, logs, hollows and rocky areas. For frogs (i.e. Tusk Frog), the surveys were done in accordance with the NSW Survey Guide for Threatened Frogs (NSW Department of Planning and Environment 2020c) and specifically targeted dams and inundated areas. Specimens were either identified visually, by aural recognition of call (frogs only) or were collected and identified. Herpetofauna surveys were completed over a 30-minute to 60-minute period over numerous surveys, with all ground shelters returned to their original position.

### 3.9.9 Spotlighting

Spotlighting was used to target arboreal, flying and ground-dwelling mammals, as well as nocturnal birds, reptiles and amphibians. Spotlighting was completed after dusk and completed on foot using high-powered headlamps and hand torches. Sighted animals were identified to the species level.

### 3.9.10 Call playback

Call playback was used to survey for nocturnal birds (i.e., Powerful Owl), arboreal mammals (i.e., Koala) and amphibians (i.e., Tusk Frog), using standard methods (Debus 1995). Call playback was completed after dusk within the Project Site around key fauna habitat such as ephemeral creek lines, wetlands or large hollow-bearing trees.

For each survey, an initial listening period of 10 to 15 minutes was undertaken, followed by a spotlight search for 10 minutes to detect any animals in the immediate vicinity. The calls of the target species were then played intermittently for five minutes, followed by a 10-minute listening period. Calls from Nature Sound (Steward 2016) were broadcast using a portable media player and a megaphone.

### 3.9.11 Nocturnal Stag watches and Hollow-bearing tree assessments

A total of 564 large hollow-bearing trees (trees with hollows >15 cm diameter) were recorded within the Project Site. Due to the large amount of large hollow-bearings trees within the Project Site, expert advice was sought from Dr Steve Debus (species expert for threatened owls and raptors of the NSW tablelands and University of New England lecturer) to eliminate and prioritize large hollow-bearing tree preference based on suitable criteria for potential threatened owl usage. The following hollow-bearing tree classes were derived:

- Owl stag watch tree = Hollows >20 cm diameter and tree DBH >100 cm, a total of 18 identified trees.
- Owl inspection tree = Hollows >20 cm diameter present, a total of 349 identified trees.
- Other hollow-bearing tree = Hollows ≥15 cm but < 20 cm diameter, a total of 215 identified trees.

All of the above hollow-bearing tree classes were either stag watched or visually inspected during the day for any signs of usage (i.e. white-wash, scats, or prey remains at the base of trees). Both visual inspections and stag watches were undertaken during the optimal survey months of May – August.

Stag watches were undertaken to survey for threatened owls at potential breeding/ nest trees (i.e. living or dead trees with hollows >20 cm diameter and DBH > 100 cm). A total of 18 hollow-bearing

trees ('Owl stag watch trees') were targeted for stag watches. Stag watches were undertaken for a minimum of two nights per tree. Stag watches involved observing potentially occupied hollow-bearing trees 15-30 minutes prior to sunset and continued until 30-60 minutes after sunset for nocturnal species. The observer positioned themselves to allow a good view of the tree, with the tree silhouetted against the sky. Animals leaving hollows were either heard or observed, and their identity confirmed with a spotlight as necessary.

## 3.10 Report Scope and Limitations

This BDAR has been prepared based on field assessment and use of the BAM-C and is based on vegetation clearing impacts associated with the Project as described in **Section 1.2**. Biodiversity credits were generated by utilising the BAM-C, which is established and managed by the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), GeoLINK has entered data in the BAM-C in good faith, and any errors or deficiencies in the calculator results are attributed to NSW DCCEEW.

While comprehensive surveys have been completed more broadly across the Project Site, the focus of high-level survey effort for target threatened flora and fauna occurred mainly within the disturbance footprint and areas of native vegetation, which would be directly and indirectly impacted by the Project.

**Field survey limitations**

No sampling technique can eliminate the possibility that a species is present within the Project Site. For example, some species of plant may be present in the soil seed bank, and some fauna species use habitats on a sporadic or seasonal basis and may not be present within the Project Site during surveys. The conclusions in this report are based upon data acquired for the Project and the environmental field surveys; therefore, they are merely indicative of the environmental condition of the Project Site at the time of preparing the report, including the presence or otherwise of species. It should be recognised that Project Site conditions, including the presence of threatened species, can change with time.

Targeted surveys have been conducted to detect target sedentary animal species and threatened flora species that are considered likely to occur within the Site based on habitat characteristics and previous records. As the actual distribution and the range of habitat utilised by some species is not fully understood, there is always a small possibility that other species could occur on the Project Site despite being considered to have a low likelihood of occurrence based on their known range and known habitats.

# BAM STAGE 1 – BIODIVERSITY ASSESSMENT

# 4. Landscape context

This section addresses the landscape context in accordance with Section 3 of the BAM and provides information on a range of landscape features that occur in the Project site and surrounding areas.

The landscape features outlined below are used to inform the habitat suitability of the Project site for threatened species and the potential movement of species across the landscape.

The Project occurs with one IBRA region, New England Tablelands, which comprises two IBRA subregions:

- Beardy River Hills (associated with the Mine Site and Grampians Road upgrade), and
- Glen Innes-Guyra Basalts (associated with the Mine Camp).

Biodiversity values associated with the Project for each IBRA subregion are outlined throughout both Stage 1 and Stage 2 of this BDAR.

## 4.1 Landscape Features

**Table 4.1 Summary of the landscape features for Beardy River Hills IBRA subregion**

| Landscape feature | Occurrence in the Site |
|---|---|
| **IBRA bioregion** | New England Tablelands |
| **IBRA subregion** | Beardy River Hills |
| **NSW landscape regions (Mitchell landscapes)** | Inverell Plateau Granites |
| **Local Government Area (LGA)** | Glen Innes Severn Shire Council |
| **Local Land Service (LLS) region** | Northern Tablelands |
| **Botanical subregion** | Northern Tablelands (NNT) |
| **Rivers, streams and estuaries** | Numerous small 1st and 2nd order streams and channels occur within the Site along with artificial farm dams. The major waterbodies associated with the Project Site include:<br>▪ Vegetable Creek (4th order stream).<br>▪ Little Plant Creek (3rd order stream).<br>Beardy River (5th order major river) does not occur within the Project Site, but to the north, where Vegetable and Little Plant Creeks flow into. Both Beardy River and Vegetable Creek are associated as Key Fish Habitat (KFH) and threatened fish habitat for species listed under the *Fisheries Management Act 1994* (FM Act). |
| **Important and local wetlands** | No important mapped or listed important wetlands occur within the Project Site. |
| **Connectivity features** | The following regional wildlife corridors (Department of Planning Industry and Environment 2010), are associated with the Project Site:<br>▪ Taronga.<br>▪ Grampian-range.<br>▪ Beardy River.<br>▪ Witherdine.<br>Overall, the Project Site does provide connectivity to reserve systems to the north in association with Torrington Nature Reserve. |

| Landscape feature | Occurrence in the Site |
|---|---|
| **Areas containing karst, caves, crevices, cliffs, rocks or other geological features of significance** | No listed areas containing karst, caves, crevices, cliffs, rocks or other geological features of significance occur within the Project Site. However, several disused adits (mine shafts) were identified within the Project Site along with areas of steep terrain that provide some crevices, cliffs, and rocky habitat for threatened entities. |
| **Areas of soil hazard features** | A land and soil capability assessment (Landloch 2025) identified most of the Project Site as Class 7 (very low capability, severe limitations). The soils of the Project Site have been investigated via a test pit program, which identified rudosols, tenosols and dermosols present. Topsoils are relatively shallow (i.e. <0.2 m), and the sparse occurrence of subsoils is also relatively shallow, where present. |
| **Areas of outstanding biodiversity value** | No areas of outstanding biodiversity value have been declared in the Glen Innes Severn Shire Council LGA. |

**Table 4.2 Summary of the landscape features for Glen Innes-Guyra Basalts IBRA subregion**

| Landscape feature | Occurrence in the Site |
|---|---|
| **IBRA bioregion** | New England Tablelands |
| **IBRA subregion** | Glen Innes-Guyra Basalts |
| **NSW landscape regions (Mitchell landscapes)** | Inverell Plateau Granites |
| **Local Government Area (LGA)** | Glen Innes Severn Shire Council |
| **Local Land Service (LLS) region** | Northern Tablelands |
| **Botanical subregion** | Northern Tablelands (NNT) |
| **Rivers, streams and estuaries** | No rivers, streams or estuaries are mapped within the Site. |
| **Important and local wetlands** | No important mapped or listed important wetlands occur within the site. |
| **Connectivity features** | The site is not mapped within any regional wildlife corridors. |
| **Areas containing karst, caves, crevices, cliffs, rocks or other geological features of significance** | No areas containing karst, caves, crevices, cliffs, rocks or other geological features of significance occur within the Project Site. |
| **Areas of soil hazard features** | Land and soil capability mapping identifies most of the Project Site as Class 3 (moderate limitations). The Project Site occurs on the mapped 'vertosol' soil group, which is classified as clay-rich fertile soil. No soil hazard features are mapped at the Project Site. |
| **Areas of outstanding biodiversity value** | No areas of outstanding biodiversity value have been declared in the Glen Innes Severn Shire Council LGA. |

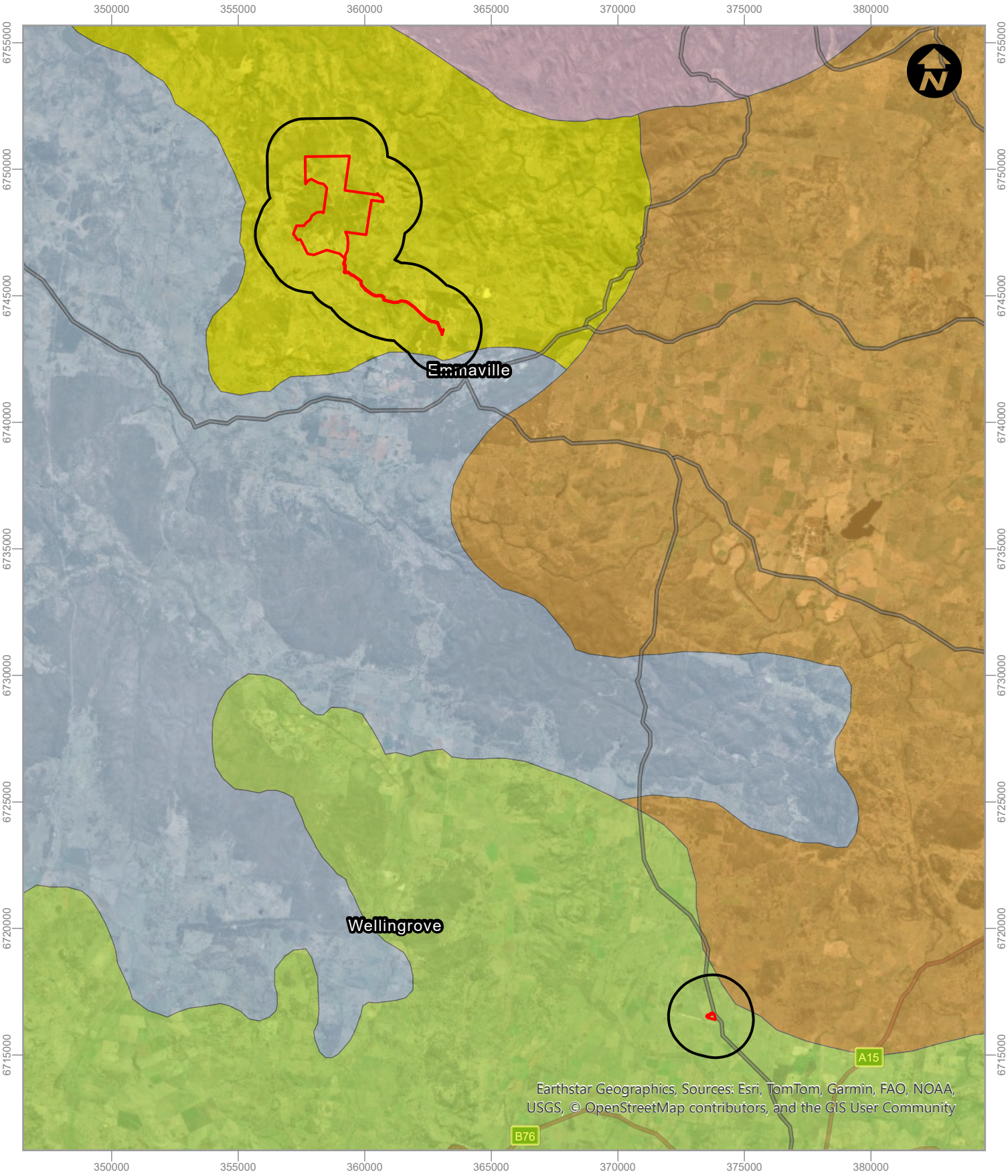
## 4.2 Native Vegetation Extent

As per the BAM methodology (Section 3.2), a buffer of 1500 m was established around the Project Site, and a calculation of native vegetation cover was derived using native vegetation mapping (Department of Planning Industry and Environment 2021) summing values of 'tree cover' and 'tree cover matrix' values.

Native vegetation cover has been calculated for each IBRA subregion and assigned to cover classes range from 0–10%, >10–30%, >30–70% and >70% within BAM-C. A summary of native vegetation cover is presented in **Table 4.3**. Native vegetation extent is shown in **Illustration 4.3**.

**Table 4.3 Native vegetation cover assessment**

| IBRA Subregion | Assessment area | Total assessment area (ha) | Area of native vegetation cover (ha) | | Native vegetation percentage cover (%) | Native vegetation cover class |
|---|---|---|---|---|---|---|
| | | | Non-woody | Woody | | |
| Beardy River Hills (Mine Site) | Buffer area – 1500 m around the Site | 5,096 | 1,719 | 3,202 | 97% | >70% |
| Glenn Innes-Guyra Basalts (Mine Camp) | | 862 | 73 | 82 | 18% | >10-30% |




**LEGEND**

Site boundary

1500 m assessment area

**IBRA Subregion (Region)**

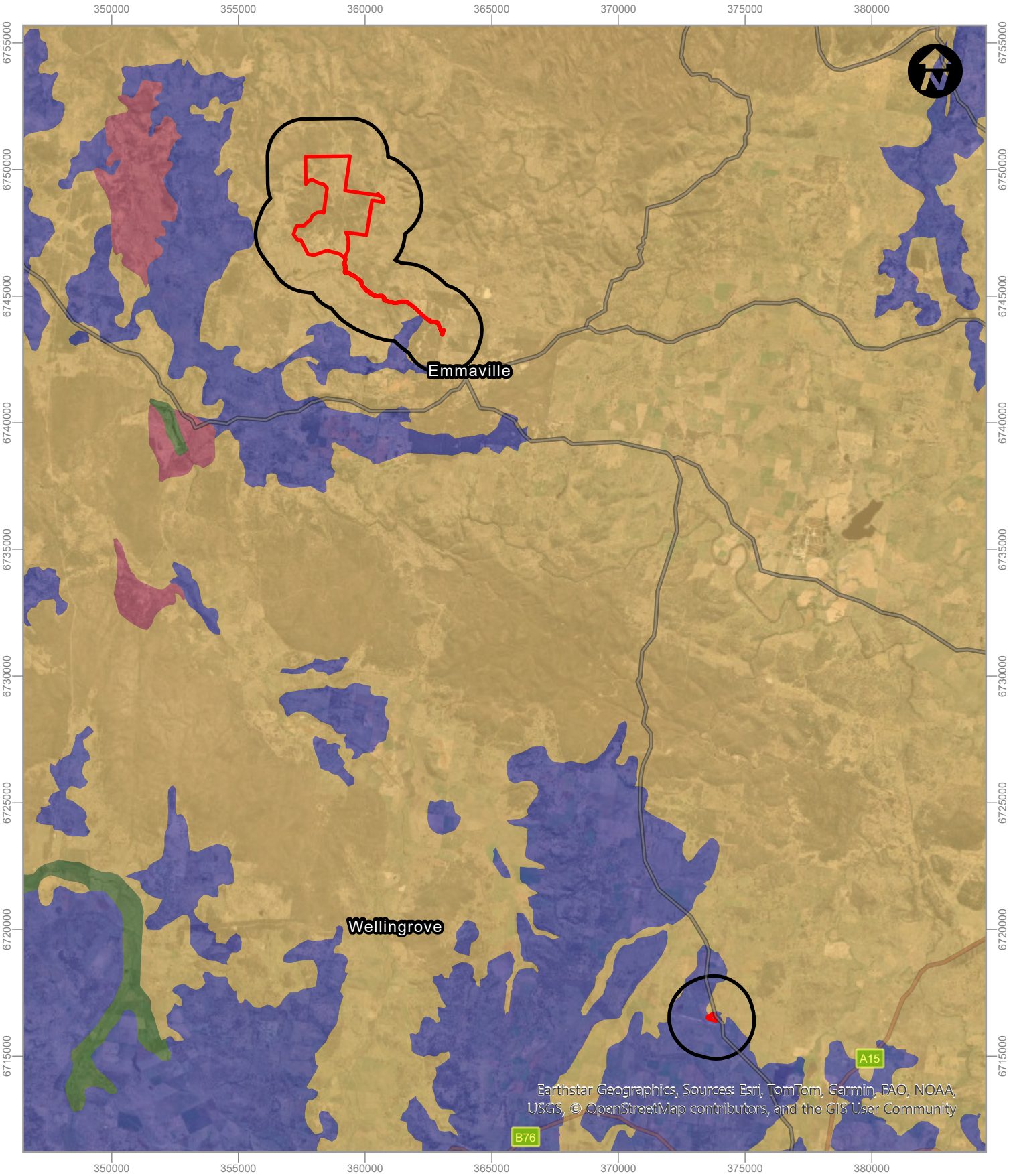
- Beardy River Hills (New England Tablelands)
- Binghi Plateau (New England Tablelands)
- Deepwater Downs (New England Tablelands)
- Glenn Innes-Guyra Basalts (New England Tablelands)
- Severn River Volcanics (New England Tablelands)

0 4 km

## IBRA Landscape - Illustration 3.1



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, OEH*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*




**LEGEND**

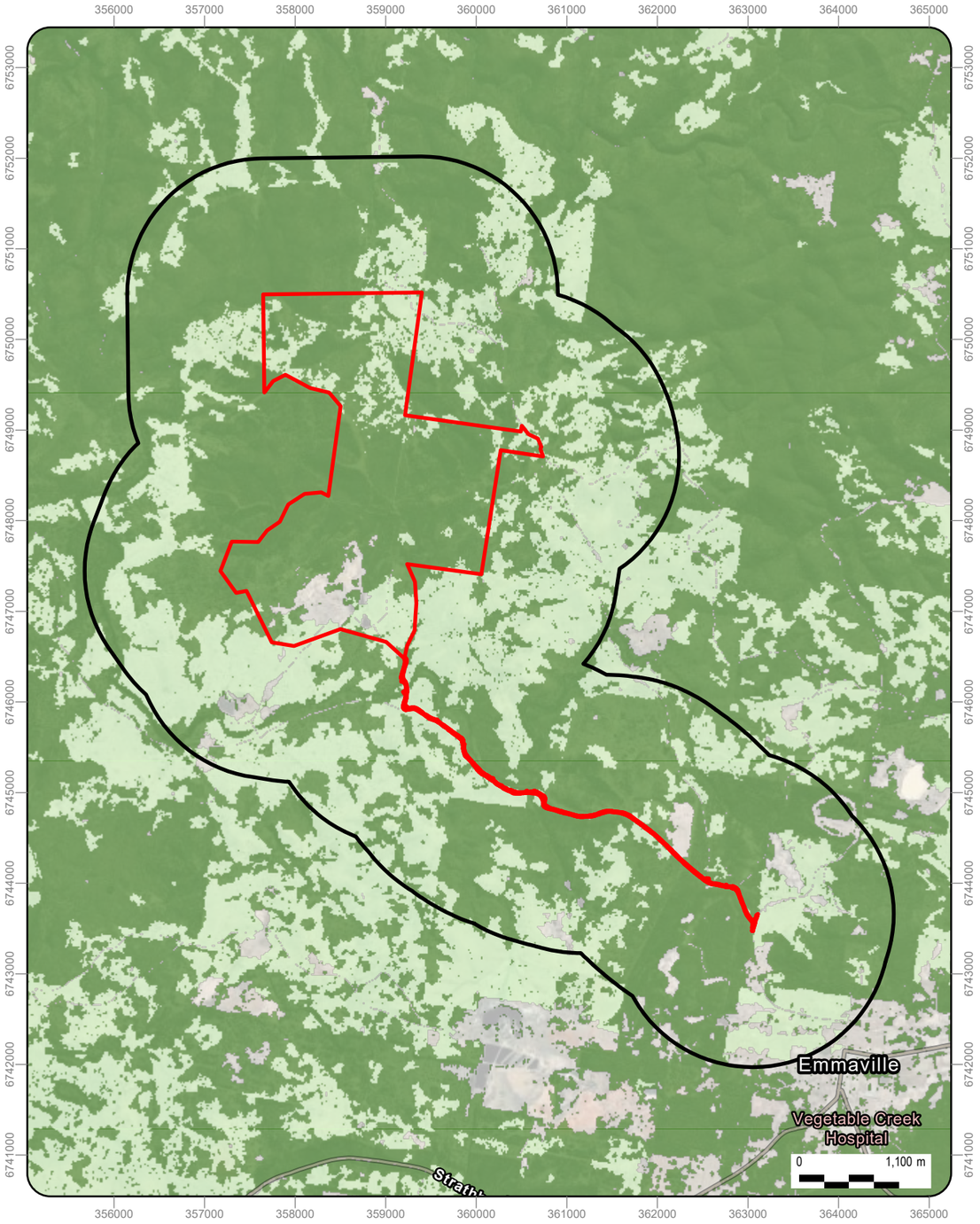
- Site boundary
- 1500 m assessment area
- Ashford Mole Valleys
- Dumaresq Channels
- Glenn Innes - Guyra Basalts
- Inverell Plateau Granites

0 4 km

Michell Landscapes - Illustration 3.2



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, State Government of NSW and Department of Planning and Environment 2016*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*




Mine Site

Mine Camp

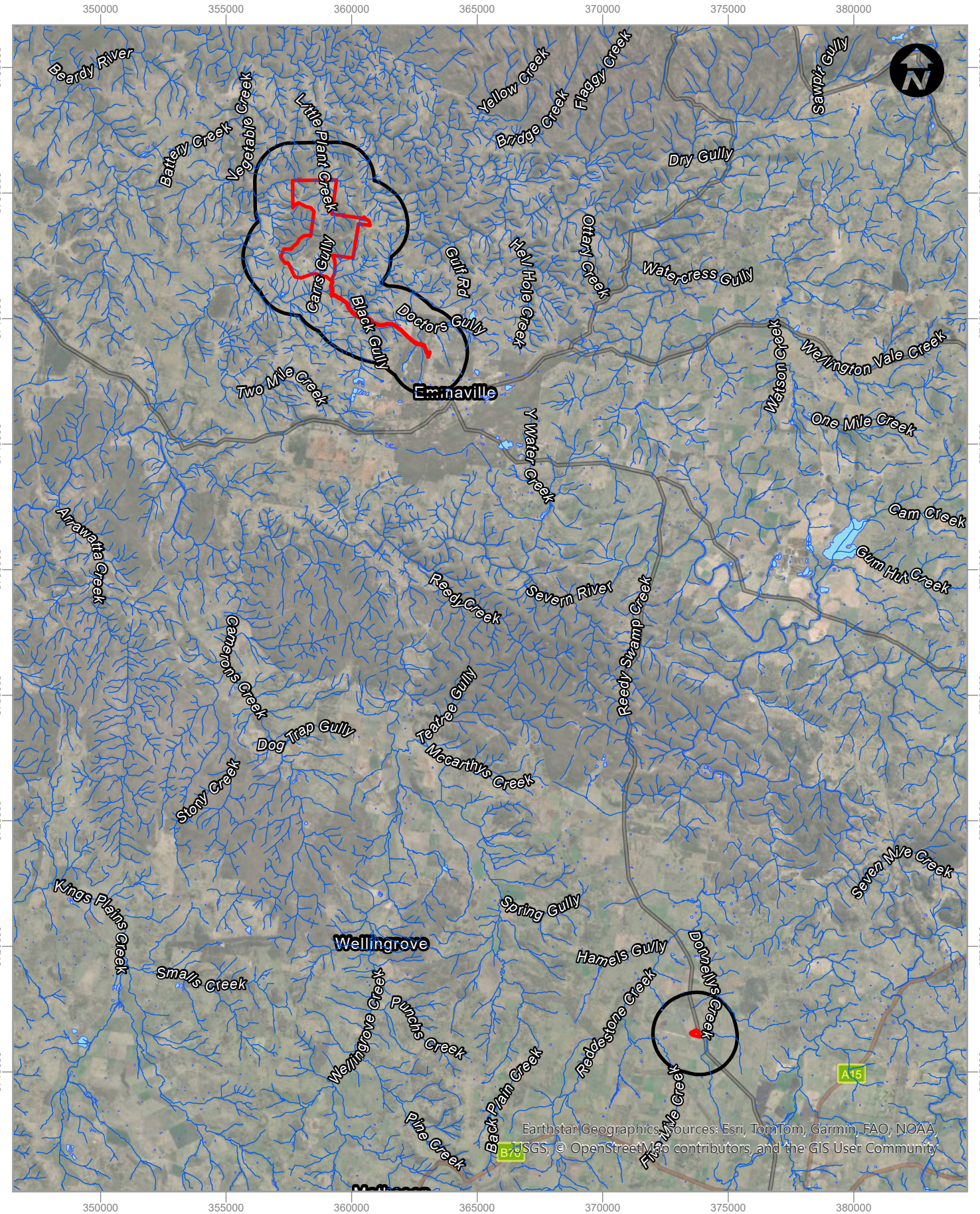
**LEGEND**

- Site boundary
- 1500 m assessment area
- Woody native vegetation extent
- Candidate native grassland

Native Vegetation Extent - Illustration 4.3



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery, OEH*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*




**LEGEND**

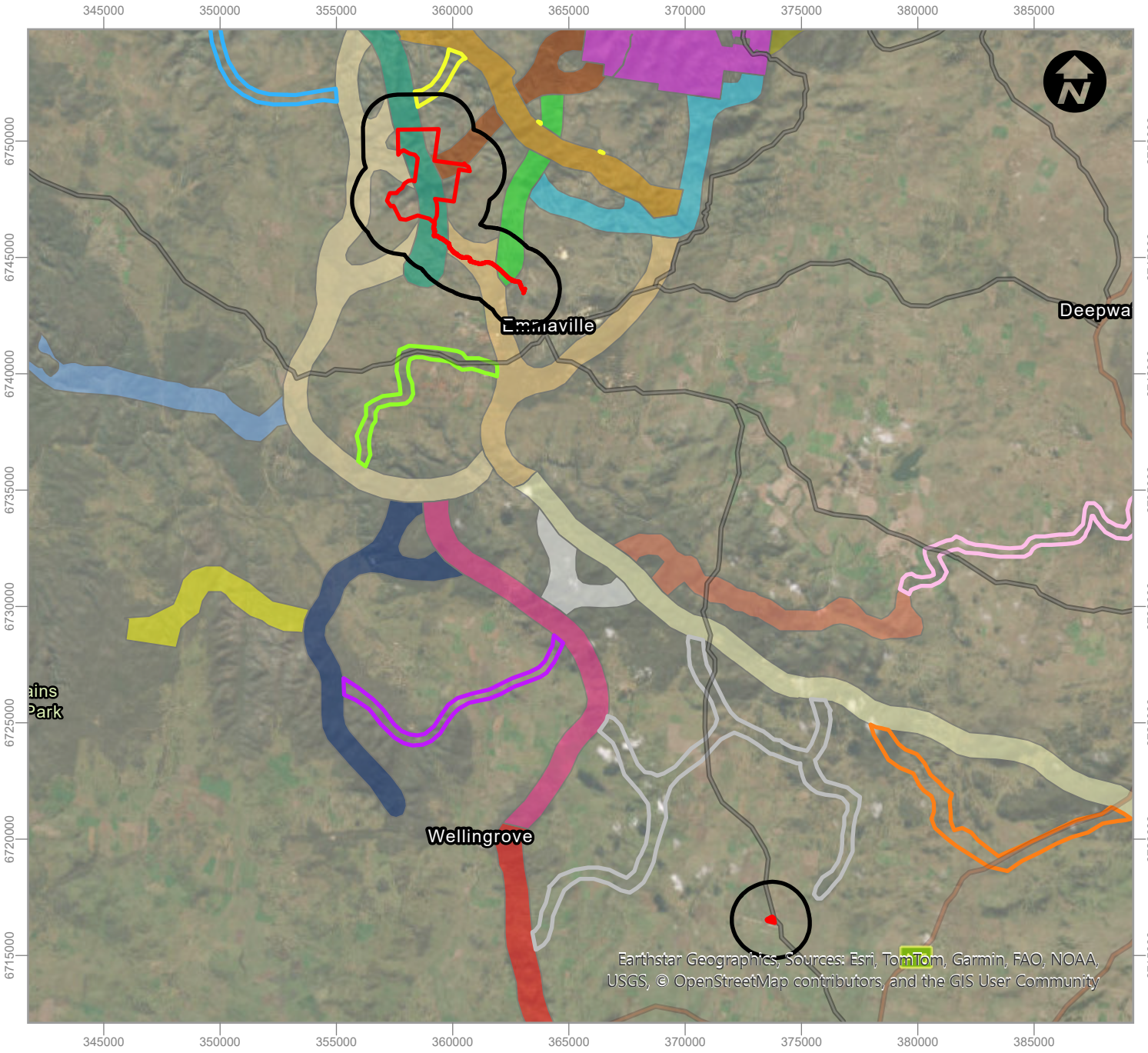
- Site boundary
- 1500 m assessment area
- Waterbody
- Watercourse or drainage

0 4 km

## Water Features - Illustration 3.4



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, NSW Spatial Services*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*




**LEGEND**

- Site boundary
- 1500 m assessment area

**Subregional Fauna Corridor**

- Back Spring, habitat for Turquoise Parrot/Grey-crow
- Beardy Waters, habitat for Turquoise Parrot/Grey-crow
- Beardy-river
- DWT link, habitat for DWT assemblage
- Gordons-Falls
- Lirabends
- Manbundi, habitat for Grey-crowned Babbler/Turquoise Parrot

**Regional Fauna Corridor**

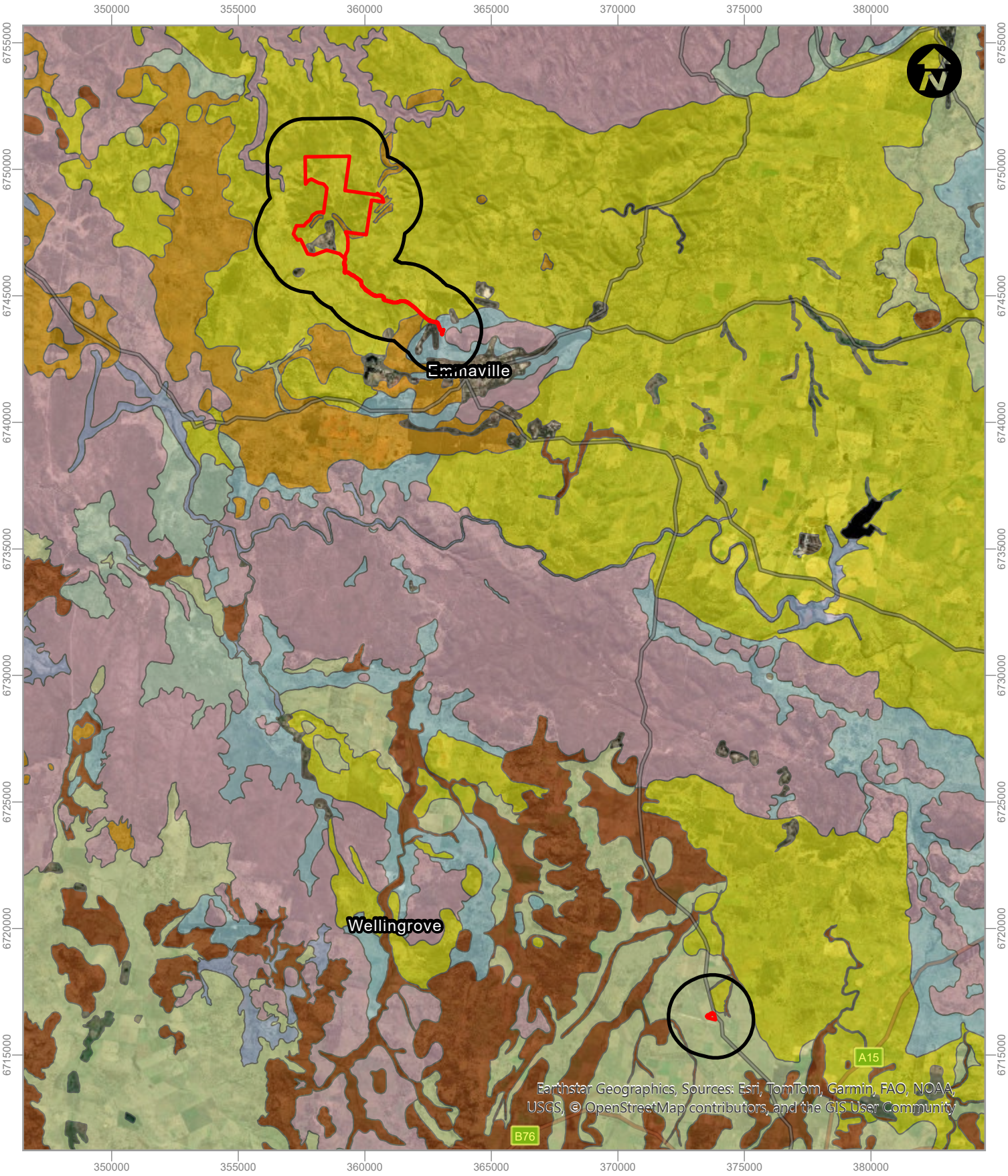
- Beardy Creek,Habitat for Turquoise Parrot
- Emmaville
- Grampian-rang
- Happy-Valley-creek
- Hazeldine
- Heatherdene
- Kings Plain
- Mann-Emmaville, Brush-tailed Phas/Brush-tailed RW/Koala habitat
- Mt-Marble
- Severn River
- Stony-creek
- Taronga
- Torrington, habitat for DWT assemblage
- Torrington SRA
- Waterloo Range, habitat for Turquoise Parrot/Grey-crowned babbler
- Waterloo Range, habitat for Turquoise Parrot
- Witherdine
- Woodville

0 5 km

## Connectivity - Illustration 3.5



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, State Government of NSW and Department of Planning and Environment 2010*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*




**LEGEND**

- Site boundary
- 1500 m assessment area
- Dermosols
- Ferrosols
- Kurosols
- Kurosols (natric)
- Rudosols
- Sodosols
- Tenosols
- Vertosols

0 4 km

## Geology and Soils - Illustration 4.6



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, State Government of NSW and Department of Planning and Environment 2010*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

# 5. Native Vegetation

This section addresses native vegetation in accordance with Chapter 4 of the BAM (2020) and matters relating to the BC Act. Specifically, this section maps and identifies all native and non-native vegetation types within the Project Site and provides an assessment of vegetation integrity and whether any recorded vegetation types correspond to threatened ecological communities listed under the BC Act.

## 5.1 Overview of Vegetation Recorded in the Site

Native vegetation has been recorded by vegetation formation, class and associated PCT in accordance with the NSW BioNet Vegetation Classification System (NSW DCCEEW 2025a). The mapping of vegetation zones was based on the sampling of native vegetation broad conditions states as described in **Section 3.7.1**.

Vegetation assessment was completed over multiple days during September 2022, October 2023, January 2024 & 2025 with 23 integrity plots completed (refer to **Illustration 6.1**).

All plot data relevant to native vegetation being removed for the Project was entered into the BAM-C (Case 40541) in accordance with the BAM. Native vegetation not affected by the Project was not entered into the BAM-C.

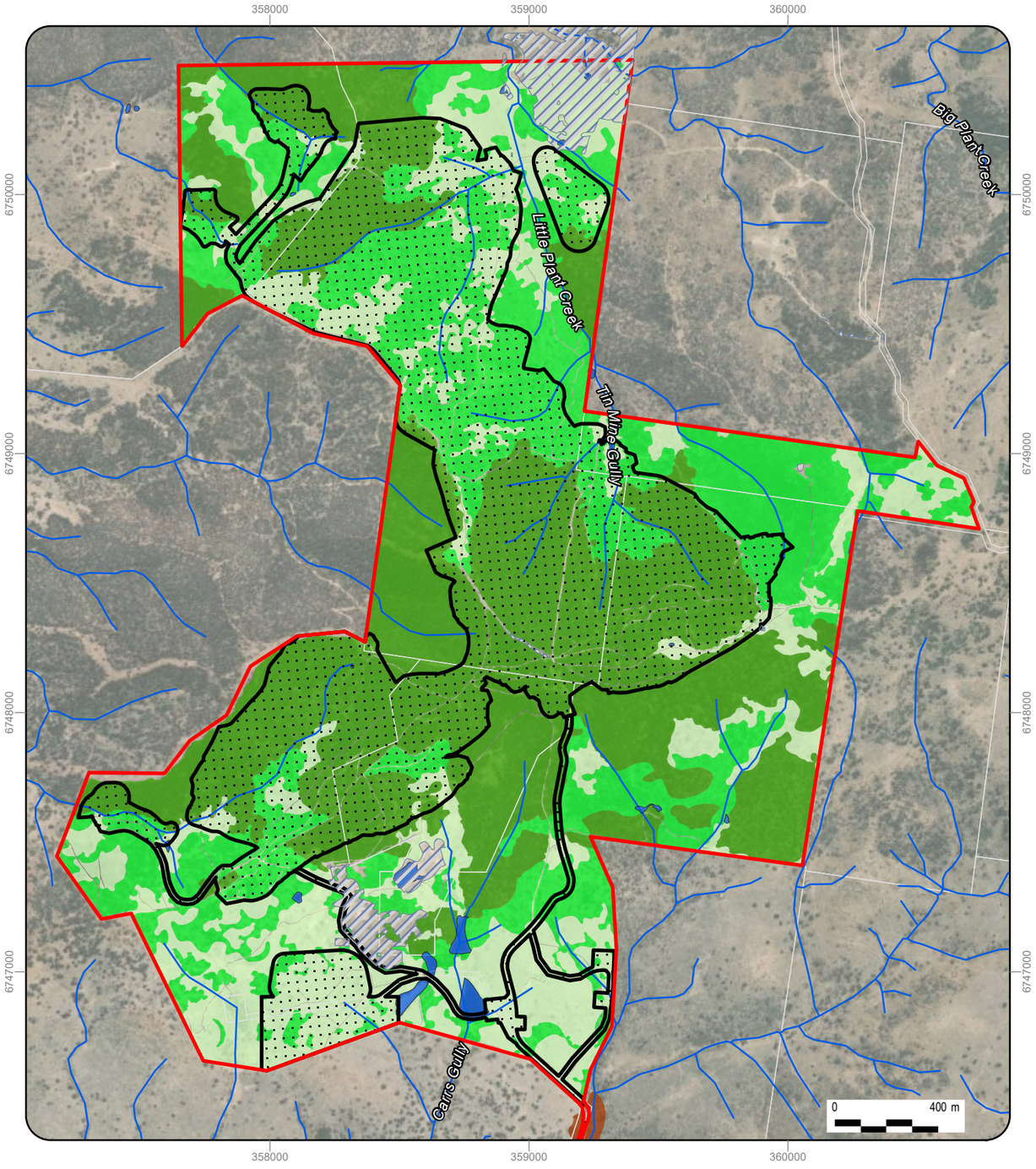
A total of four native PCT were recorded within the Project Site (**Table 5.1**). The extent of each PCT and zone is shown in **Illustration 5.1** with plot data provided in **Appendix B**.

**Table 5.1 Vegetation communities and vegetation zones within the Beardy River Hills IBRA subregion**

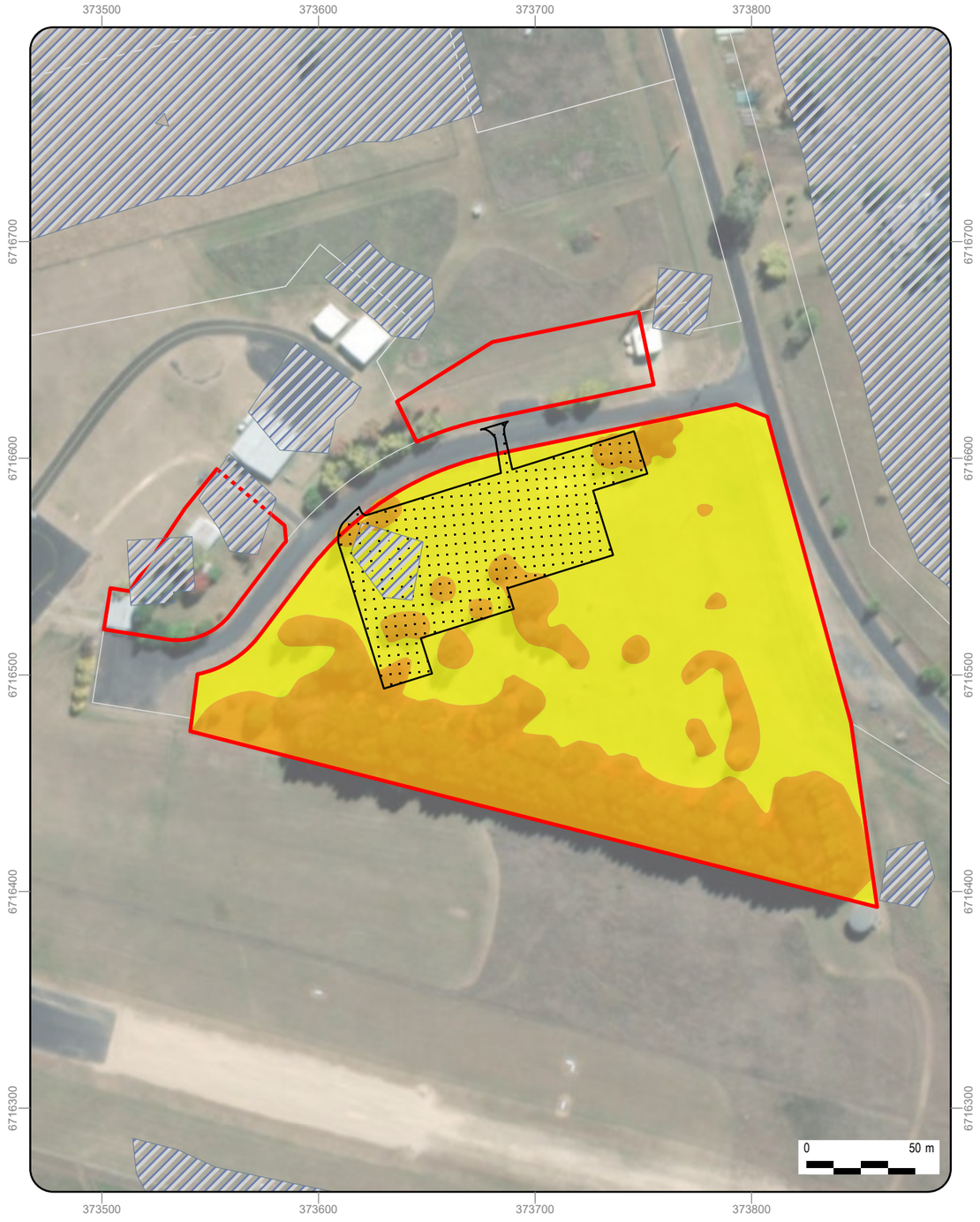
| Plant Community Type | Vegetation class | PCT % cleared | Associated TEC | Patch size | Vegetation zone | Project Site (ha) | Disturbance footprint (ha) | Composition score | Structure condition score | Function score | Vegetation integrity score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dry Sclerophyll Forests (shrubby sub-formation)** | | | | | | | | | | | |
| PCT 3722 – Western New England Box-Tumbledown Gum Grassy Forest | Northern Tableland Dry Sclerophyll Forests | 63% | Not associated | ≥100 ha | 3722_Intact | 294.34 | 159.89 | 64.5 | 57.9 | 97.4 | **71.4** |
| | | | | | 3722_Modified | 224.19 | 97.37 | 74.8 | 35.2 | 85.9 | **60.9** |
| | | | | | 3722_Poor | 165.17 | 55.73 | 39.7 | 38.5 | 9.1 | **24** |
| | | | | | 3722_Cleared | 8.78 | 0.44 | 0.6 | 0 | 15 | **2.5** |
| **New England Grassy Woodlands** | | | | | | | | | | | |
| PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | New England Grassy Woodlands | 72% | White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland | 5–<25 ha | 3363_Intact | 0.62 | 0.62 | 70.1 | 53.7 | 93.9 | **70.7** |
| | | | | 5–<25 ha | 3363_Poor | 0.41 | 0.41 | 63.6 | 54.6 | 30.9 | **47.6** |
| **Eastern Riverine Forests** | | | | | | | | | | | |
| PCT 4080 – Northwest River Oak-Apple Forest | Eastern Riverine Forests | 63% | Not associated | ≥100 ha | 4080_Modified | 0.11 | 0.11 | 78.7 | 34.8 | 80.7 | **60.4** |

**Table 5.2 Vegetation communities and vegetation zones within the Glenn Innes-Guyra Basalts IBRA subregion**

| Plant Community Type | Vegetation class | PCT % cleared | Associated TEC | Patch size | Vegetation zone | Project Site (ha) | Disturbance footprint (ha) | Composition score | Structure condition score | Function score | Vegetation integrity score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Grassy Woodlands** | | | | | | | | | | | |
| PCT 3339 – Guyra Basalt Snow Gum Woodland | Tableland Clay Grassy Woodlands | 82% | Not associated | 5–<25 ha | 3339_Poor | 2.74 | 0.64 | 27.1 | 67.5 | 0.1 | **12.2** |




Mine Site




Mine Camp

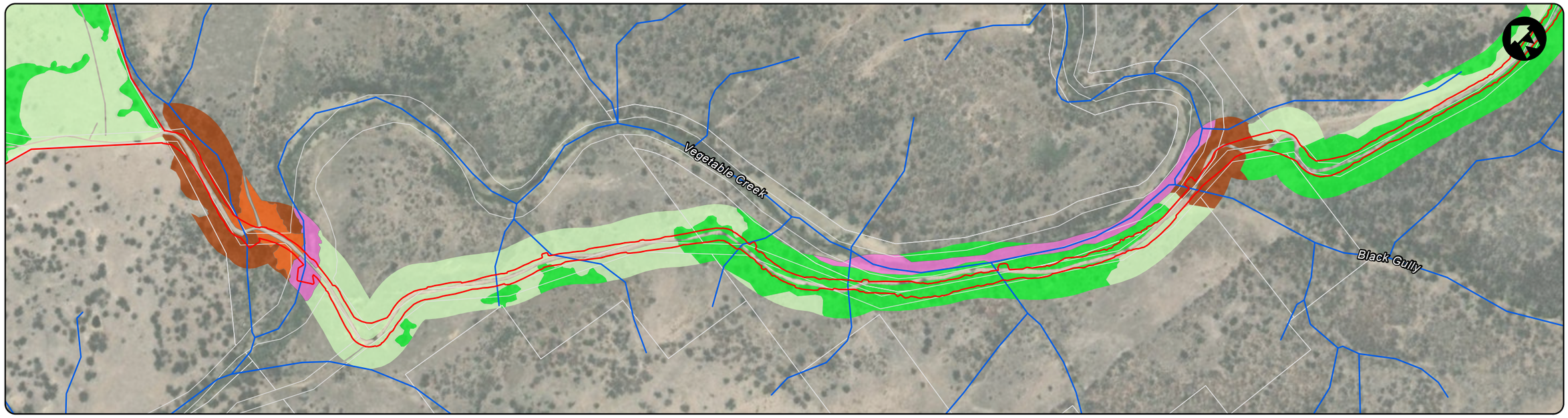
**LEGEND**

- Site boundary
- Limit of disturbance
- Cadastre
- Category 1 Land (BAM does not apply)
- PCT: 3722 - Intact condition
- PCT: 3722 - Modified condition
- PCT: 3722 - Poor condition
- PCT: 3339 - Poor condition
- PCT: 3363 - Intact condition
- PCT: 4080 - Modified condition
- Miscellaneous ecosystems - ornamental planting
- Dam
- Watercourse or drainage

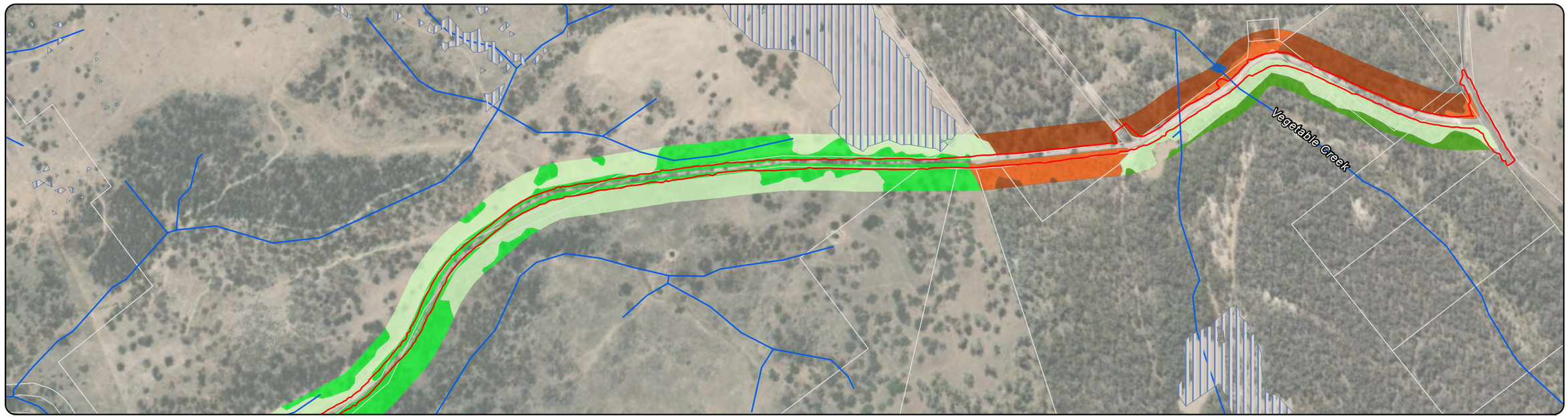
Vegetation Within The Project Site - Illustration 5.1 - Sheet 1 of 2



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*




Grampians Road Upgrade North




Grampians Road Upgrade South

**LEGEND**

- Site boundary
- Category 1 Land (BAM does not apply)
- Watercourse or drainage
- Cadastre
- PCT: 3722 - Intact condition
- PCT: 3722 - Modified condition
- PCT: 3722 - Poor condition
- PCT: 3363 - Intact condition
- PCT: 3363 - Poor condition
- PCT: 3944 - Intact condition
- PCT: 4080 - Modified condition

0 160 m

Vegetation Within The Project Site - Illustration 5.1 - Sheet 2 of 2



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

### 5.1.1 PCT 3722 – Western New England Box-Tumbledown Gum Grassy Forest

Field surveys confirmed the presence of PCT 3722 occurring within the Project Site. A summary of PCT 3722 is provided in **Table 5.3** and shown in **Plate 5.1** to **Plate 5.6**. The extent of PCT 3722 within the Project Site is shown in **Illustration 5.1**. A comparison of recorded vegetation integrity data against community condition benchmark data is presented in **Table 5.4**.

**Table 5.3 Summary of PCT 3722 – Western New England Box-Tumbledown Gum Grassy Forest**

| **Description** | | |
|---|---|---|
| **Vegetation class** | Northern Tableland Dry Sclerophyll Forests | |
| **Vegetation formation** | Dry Sclerophyll Forests (Shrubby sub-formation) | |
| **Conservation status** | Not associated with a threatened ecological community | |
| **SAII entity** | N/A | |
| **% cleared** | 63.24% | |
| **Description** | The canopy was dominated by Silver-top Stringybark (*Eucalyptus laevopinea*), Caley's Ironbark (*Eucalyptus caleyi*) and Tumbledown Red Gum (*Eucalyptus dealbata*). In less steep and flatter terrain areas, co-dominance of Rough-barked Apple (*Angophora floribunda*) and Yellow Box (*Eucalyptus melliodora*) also occurred. The mid-storey was dominant with Native Olive (*Notelaea microcarpa*), Sticky Daisy Bush (*Olearia elliptica* subsp. *elliptica*) and Poison Pimelea (*Pimelea neo-anglica*). Some patches also displayed a midstorey of Straight Wattle (*Acacia stricta*), Silver Wattle (*Acacia neriifolia*) and Velvet Wattle (*Acacia pubifolia*). The groundcover generally consisted of a forbs and grasses, including Purple Wiregrass (*Aristida ramosa),* Slender Bamboo Grass *(Austrostipa verticillate),* Barbed Wire Grass *(Cymbopogon refractus),*Couch *(Cynodon dactylon),* Kidney Weed *(Dichondra repens),* Hedgehog Grass *(Echinopogon* spp.*)* & Wallaby Grass *(Rytidosperma* spp.*).* | |
| **PCT Justification** | **Search Term** | **Selection** |
| | *IBRA Bioregion* | New England Tablelands |
| | *IBBRA Subregion* | Beardy River Hills |
| | *Tree Growth Form Group Species* | *Eucalyptus laevopinea, Eucalyptus caleyi, Eucalyptus dealbata & Angophora floribunda* |
| | *Shrub growth form group species* | *Notelaea microcarpa*, *Olearia elliptica* subsp. *elliptica & Pimelea neo-anglica* |
| | *Grass & grass-like growth form group species* | *Aristida ramosa, Austrostipa verticillata, Cymbopogon refractus, Cynodon dactylon, Dichondra repens, Echinopogon caespitosus & Rytidosperma setaceum* |
| | *Other growth form group species* | *Amyema pendula* |
| | *Shortlist* | Returned a shortlist of six PCTs: 3722, 3518, 3711, 3363, 4151, 4075 & 3854 |
| | ■ PCT 3518 discarded as it has a high frequency of *Callitris glaucophylla* and ironbark's such as *Eucalyptus melanophloia* and occurs as woodland to open forest with a sparse mid-stratum.<br>■ PCT 4151 discarded as it has a high frequency of *Callitris* spp and ironbark's *i.e. Eucalyptus melanophloia,* and often red gums, commonly *Eucalyptus dealbata.* This PCT was recorded in the locality. | |

| Description | |
|---|---|
| | ■ PCT 3711 discarded as it has a canopy which very frequently includes *Eucalyptus prava* (Orange Gum), additionally it has a sparse mid-stratum of Acacia and shrub layer which frequently includes *Melichrus urceolatus, commonly Leptospermum brevipes, Xanthorrhoea johnsonii* and *Brachyloma daphnoides.*<br>■ PCT 4075 discarded as it occurs as a tall sclerophyll and Casuarina open forest with a high cover of *Eucalyptus camaldulensis*, very frequently with *Casuarina cunninghamiana* subsp. *cunninghamiana* and *Angophora floribunda.*<br>■ PCT 3854 discarded as it is a tall open shrubland with occasional taller pines and eucalypts and a very sparse ground layer. The canopy has scattered *Callitris endlicheri,* almost always present, and *Eucalyptus prava* is common.<br>■ PCT 3363, discarded as it has a canopy with a diverse suite of eucalypts all of which are present at <u>less than 40%</u> of sites. The most notable difference of PCT 3363 is *E.blakelyi* is the dominant red gum and is very frequent. Additionally, PCT 3363 has a sparse mid-stratum in which Acacias are occasional and *Notelaea microcarpa* and *Olearia elliptica* subsp. *elliptica* are considered infrequent.<br><br>Based on floristics, geographic and geological characteristics, vegetation on the Project Site is considered to be consistent with the scientific description and distribution information outlined for PCT 3722 within the BioNet Vegetation Classification, and based on this was deemed the 'best fit' PCT.<br><br>As stated under the PCT 3722 profile, '*Collectively, red gums and box eucalypts are both commonly present; however, the primary characteristic of the canopy is that no species is clearly dominant and that all trees known from this PCT are individually occasional to rare. Other species comprising the canopy are Angophora floribunda, stringybarks (Eucalyptus macrorhyncha, Eucalyptus laevopinea) and ironbarks (Eucalyptus sideroxylon, Eucalyptus caleyi). The sparse mid-stratum is layered with the small trees, almost always featuring Acacia species, usually Acacia implexa or Acacia neriifolia, commonly with scattered Notelaea microcarpa.* Based on surrounding less disturbed areas (i.e. 'intact' condition), the vegetation displayed a relatively shrubby understorey with dominance of Acacias and *Olearia elliptica*. The dominant red gum was *E.dealbata.* Based on field surveys across the Project Site, PCT 3722 was the best fit across the majority of the Project Site despite patches of relatively minor canopy variation.<br><br>The closest related vegetation was PCT 3363 (Western New England Blakely's Red Gum-Box Grassy Forest), which occurs in similar environments and is known to be floristically related. PCT 3363 canopy and mid-stratum differ in that *Eucalyptus blakelyi* is very frequent, Acacias are occasional and *Notelaea microcarpa* and *Olearia elliptica* subsp. *elliptica* are both rare. In the case of the Project Site, the dominant red gum was *E.dealbata* and there was regular presence of Acacias and *Notelaea microcarpa* & *Olearia elliptica* subsp. *elliptica.* In areas where disturbance has occurred, and the shrubby understorey was diminished or absent it was considered that these areas are likely disturbed states of PCT 3722 than the presence of PCT 3363.<br><br>Section 4.2 (3) of the BAM states that: "*Assessors must not identify native vegetation as a derived PCT in the BioNet Vegetation Classification. Assessors must identify the original PCT from which the derived PCT has developed*". Within highly disturbed areas of the Project Site, a 'poor' (aka derived) condition state of PCT 3722 was applied based on surrounding vegetation and landscape position. Whilst these areas were disturbed and lacked floristic diversity and structure, they are likely a derived state of PCT 3722. |
| **Vegetation zone & condition** | **Zone: 3722_Intact –** Native vegetation was relatively intact with all structural layers present and relatively low weed incursions. Some areas displayed higher levels of rocky ground cover depending on the location on hillslopes or flat terrain.<br><br>**Zone: 3722_Modified** – Modified disjunct areas with varying canopy cover. The canopy contained mature trees; however, canopy cover often was less dense and more open, likely due to disturbance history. The mid-storey and ground layer have been subject to livestock disturbance (grazing and soil compression). Moderate level of environmental weeds/ pasture species present within the groundcover. Native species diversity was moderate to low. |

| Description | |
|---|---|
| | **Zone: 3722_Poor** – This zone consists of areas in a highly degraded form of PCT 3722, with the majority of woody vegetation having been historically cleared. These patches often occurred as grassland with some shrub presence.<br><br>**Zone: 3722_Cleared** – This zone was highly disturbed, lacking any structural layers and minimal occurrence of groundcover of forbs and grasses. Majority of these areas consisted of rocky substrates, likely due to historical disturbance from past mining practices. |
| **Extent within the Project Site** | **Zone: 3722_Intact =** 294.34 ha.<br><br>**Zone: 3722_Modified =** 224.19 ha.<br><br>**Zone: 3722_Poor =** 165.17 ha.<br><br>**Zone: 3722_Cleared =** 8.78 ha. |

**Plate 5.1 PCT 3722 Intact condition on steeper slopes**

**Plate 5.2 PCT 3722 Intact Plot 003**

**Plate 5.3 PCT 3722 Modified condition on lower slopes**

**Plate 5.4 PCT 3722 Modified condition**

**Plate 5.5 PCT 3722 Poor condition**

**Plate 5.6 PCT 3722 Poor condition open grasslands**

**Table 5.4 Comparison of PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest vegetation integrity plot data against PCT condition benchmark data**

| Plot | Tree Richness | Shrub Richness | Grass Richness | Forb Richness | Fern Richness | Other Richness | Tree Cover | Shrub Cover | Grass Cover | Forb Cover | Fern Cover | Other Cover | Length Timber | Leaf Litter | Large Tree | HT[2] | HTW Cover[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BM[1]** | **5** | **12** | **10** | **12** | **1** | **3** | **53** | **32** | **43** | **7** | **1** | **1** | **59** | **34** | **3 (50)** | **-** | **-** |
| 001 | 4 | 4 | 9 | 7 | 0 | 2 | 18.3 | 32.7 | 6.9 | 0.8 | 0 | 0.4 | 48 | 22 | 2 | 6 | 0.6 |
| 002 | 2 | 4 | 7 | 11 | 0 | 1 | 5.2 | 28.4 | 21.1 | 10.3 | 0 | 0.1 | 41 | 2.2 | 0 | 0 | 5.2 |
| 003 | 3 | 3 | 8 | 8 | 0 | 4 | 32 | 10 | 4.2 | 0.9 | 0 | 0.4 | 308 | 69 | 9 | 9 | 0.2 |
| 004 | 3 | 8 | 9 | 12 | 0 | 2 | 20 | 2.8 | 9.7 | 1.6 | 0 | 0.2 | 109 | 54 | 5 | 0 | 0.1 |
| 005 | 2 | 4 | 6 | 12 | 1 | 1 | 22.1 | 20.6 | 36.7 | 2.4 | 0.1 | 0.1 | 77 | 17 | 3 | 4 | 0 |
| 006 | 1 | 2 | 2 | 3 | 1 | 0 | 10 | 10.2 | 52 | 0.4 | 0.1 | 0 | 25 | 4.8 | 2 | 3 | 0 |
| 007 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0 |
| 008 | 5 | 4 | 4 | 2 | 0 | 1 | 45.1 | 41.6 | 30.8 | 0.2 | 0 | 0.2 | 72 | 59 | 2 | 1 | 0 |
| 009 | 1 | 4 | 9 | 2 | 0 | 2 | 25 | 23.1 | 4.1 | 0.6 | 0 | 0.3 | 127 | 15.6 | 1 | 0 | 40 |
| 010 | 0 | 1 | 7 | 2 | 0 | 0 | 0 | 1 | 62.6 | 0.2 | 0 | 0 | 38 | 0 | 0 | 0 | 0 |
| 011 | 3 | 3 | 11 | 14 | 1 | 1 | 26 | 1.6 | 14.8 | 2.6 | 0.1 | 0.5 | 41 | 8 | 0 | 0 | 0 |
| 012 | 0 | 1 | 9 | 7 | 1 | 0 | 0 | 0.2 | 84 | 4.1 | 0.1 | 0 | 0 | 0.2 | 0 | 0 | 0 |
| 013 | 0 | 1 | 11 | 6 | 1 | 0 | 0 | 4 | 74 | 1.7 | 0.1 | 0 | 3 | 0 | 0 | 0 | 0 |
| 014 | 3 | 4 | 15 | 13 | 1 | 2 | 25.2 | 25 | 12.7 | 1.6 | 0.1 | 0.4 | 36 | 38 | 0 | 0 | 1.1 |
| 015 | 5 | 3 | 7 | 4 | 0 | 1 | 27.1 | 33 | 16.5 | 0.4 | 0 | 0.1 | 55 | 34 | 2 | 0 | 1 |
| 016 | 4 | 6 | 8 | 9 | 0 | 2 | 33 | 16.4 | 7.6 | 5.8 | 0 | 0.2 | 68 | 35 | 1 | 0 | 0.1 |
| 017 | 1 | 6 | 7 | 13 | 1 | 3 | 15 | 2.4 | 3.1 | 3.5 | 0.1 | 2.2 | 58 | 33 | 2 | 0 | 0.2 |
| 018 | 3 | 7 | 6 | 8 | 0 | 1 | 40.1 | 5.4 | 7.4 | 0.9 | 0 | 0.1 | 110 | 58 | 1 | 1 | 0.1 |

1. Benchmark data for equivalent community in NSW New England Tablelands IBRA Bioregion; Vegetation Type - PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest; Keith Formation: Dry Sclerophyll Forests (shrubby sub-formation); Keith Class: Northern Tableland Dry Sclerophyll Forests; source (NSW BioNet Vegetation Classification database accessed January 2025 and cross referenced with BAM-C)
2. Hollow-bearing Tree
3. High Threat Weed

### 5.1.2 PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest

Field surveys confirmed the presence of PCT 3363 occurring within the Project Site. A summary of PCT 3363 is provided in **Table 5.5** and shown in **Plate 5.7** to **Plate 5.10**. The extent of PCT 3363 within the Project Site is shown in **Illustration 5.1**. A comparison of recorded vegetation integrity data against community condition benchmark data is presented in **Table 5.6**.

**Table 5.5 Summary of PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest**

| **Description** | | |
|---|---|---|
| **Vegetation class** | New England Grassy Woodlands | |
| **Vegetation formation** | Dry Sclerophyll Forests (Shrubby sub-formation) | |
| **Conservation status** | *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* – Critically Endangered (BC Act)<br>*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* – Critically Endangered (EPBC Act) | |
| **SAll entity** | Yes | |
| **% cleared** | 72% | |
| **Description** | The vegetation occurred more prominently as a grassy woodland with an infrequent to sparse midstorey. The canopy was dominated by Blakey's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*), with Yellow Box (*Eucalyptus melliodora*) and White Box (*Eucalyptus albens*) observed in some patches. The mid-storey was sparse with infrequent occurrence of Native Olive (*Notelaea microcarpa*), Sticky Daisy Bush (*Olearia elliptica* subsp. *elliptica*) and Poison Pimelea (*Pimelea neo-anglica*). Infrequent occurrences in the midstorey of Hickory Wattle (*Acacia implexa*), Fringed Wattle (*Acacia fimbriata*) were also observed. The groundcover generally consisted of a forbs and grasses, including Threeawn Speargrass (*Aristida vagans),* Hairy Panic *(Panicum effusum),* Barbed Wire Grass *(Cymbopogon refractus), S*piny-headed Mat-rush *(Lomandra longifolia),* Paddock Lovegrass *(Eragrostis leptostachya),* Kidney Weed *(Dichondra repens),* Short-stem Sedge *(Carex breviculmis)* & Hoary Guinea Flower *(Hibbertia obtusifolia).* | |
| **PCT Justification** | **Search Term** | **Selection** |
| | *IBRA Bioregion* | New England Tablelands |
| | *IBBRA Subregion* | Beardy River Hills |
| | *Tree Growth Form Group Species* | *Eucalyptus blakelyi, Angophora floribunda* |
| | *Shrub growth form group species* | *Notelaea microcarpa*, *Pimelea neo-anglica, Acacia implexa, Acacia fimbriata & Melichrus urceolatus* |
| | *Grass & grass-like growth form group species* | *Austrostipa spp., Aristida vagans, Cymbopogon refractus, Lomandra longifolia, Panicum effusum, Eragrostis leptostachya, Themeda triandra, Carex breviculmis & Echinopogon caespitosus.* |
| | *Shortlist* | Returned a shortlist of seven PCTs – all associated with Beardy River sub-region: 3363, 3518, 3722, 3711, 4151, 4075 & 3854 |
| | ■ PCT 3518 discarded as it has a high cover of *Callitris glaucophylla* and ironbarks such as *Eucalyptus melanophloia.* | |

| Description | |
|---|---|
| | ■ PCT 3711 discarded as it has a canopy which very frequently includes *Eucalyptus prava* (Orange Gum).<br>■ PCT 4151 discarded as it has a high frequency of *Callitris* spp and ironbark's *i.e. Eucalyptus melanophloia,* and often red gums, commonly *Eucalyptus dealbata.* This PCT was recorded in the locality.<br>■ PCT 4075 discarded as it occurs as a tall sclerophyll and Casuarina open forest with a high cover of *Eucalyptus camaldulensis*, very frequently with *Casuarina cunninghamiana* subsp. *cunninghamiana* and *Angophora floribunda.*<br>■ PCT 3854 discarded as it is a tall open shrubland with occasional taller pines and eucalypts and a very sparse ground layer. The canopy has scattered *Callitris endlicheri,* almost always present, and *Eucalyptus prava* is common.<br>■ PCT 3722 is floristically similar to PCT 3363, and PCT 3722 is dominant in the locality and the Project Site; however, it has been discarded as the dominant red gum in PCT 3722 is *E.dealbata* and the PCT has a shrubbier understorey with a higher frequency of Acacias, *Notelaea microcarpa* and *Olearia elliptica* subsp. *elliptica*.<br><br>Based on floristics, geographic and geological characteristics, vegetation on the Project Site is considered to be consistent with the scientific description and distribution information outlined for PCT 3363 within the BioNet Vegetation Classification, and based on this was deemed the 'best fit' PCT.<br><br>As stated under the PCT 3363 profile: '*The canopy very frequently includes Eucalyptus blakelyi and box eucalypts (Eucalyptus melliodora or Eucalyptus bridgesiana), commonly associated with Angophora floribunda and stringybarks (Eucalyptus macrorhyncha or Eucalyptus laevopinea). The shrub layer is sparse, commonly including scattered individuals of Hibbertia obtusifolia or Melichrus urceolatus. The mid-dense ground layer is mainly comprised of grasses, forbs, twiners, hardy ferns and graminoid. This PCT is weakly related floristically to PCT 3722, in which Eucalyptus blakelyi is rarely present in PCT 3722, and it has a more prominent mid-stratum in which Acacias are almost always present and Notelaea microcarpa and Olearia elliptica subsp. elliptica are common.'*<br><br>PCT 3363 occurs at the interface between naturally vegetated land on shallower soils and more fertile soils that have been cleared for agriculture. Within the Project Site, this PCT occurred in lower portions of undulating hills on more fertile soils, more associated with drainage lines such as Vegetable Creek. As such it predominantly occurred outside the proposed mining operations along access roads. |
| **Vegetation zone & condition** | **Zone: 3722_Intact –** Native vegetation was relatively intact with all structural layers present and relatively low weed incursions.<br><br>**Zone: 3363_Poor** – This zone consists of areas in a highly degraded form of PCT 3363, with the majority of woody vegetation having been historically cleared. These patches often occurred as grassland with some shrub presence or regenerating canopy. |
| **Extent within the Project Site** | **Zone: 3363_Intact =** 0.62 ha<br><br>**Zone: 3363_Poor =** 0.41 ha |

Plate 5.7 PCT 3363 Plot 019

Plate 5.8 PCT 3363 Intact condition

Plate 5.9 PCT 3363 Plot 021

Plate 5.10 PCT 3363 Poor condition

**Table 5.6 Comparison of PCT 3363 Western New England Blakely's Red Gum-Box Grassy Forest vegetation integrity plot data against PCT condition benchmark data**

| Plot | Tree Richness | Shrub Richness | Grass Richness | Forb Richness | Fern Richness | Other Richness | Tree Cover | Shrub Cover | Grass Cover | Forb Cover | Fern Cover | Other Cover | Length Timber | Leaf Litter | Large Tree | HT[2] | HTW Cover[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BM[1]** | **4** | **6** | **10** | **15** | **1** | **3** | **48** | **6** | **71** | **12** | **0** | **1** | **26** | **30** | **3 (50)** | **-** | **-** |
| 019 | 3 | 7 | 11 | 5 | 1 | 2 | 26 | 3 | 33.7 | 0.5 | 0.1 | 0.2 | 44 | 32 | 3 | 1 | 1 |
| 021 | 1 | 0 | 15 | 12 | 0 | 0 | 0.1 | 0 | 79.8 | 4.6 | 0 | 0 | 4 | 43 | 0 | 0 | 5 |

1. Benchmark data for equivalent community in NSW New England Tablelands IBRA Bioregion; Vegetation Type - PCT 3363 Western New England Blakely's Red Gum-Box Grassy Forest; Keith Formation: Grassy Woodlands; Keith Class: New England Grassy Woodlands; source (NSW BioNet Vegetation Classification database accessed January 2025 and cross referenced with BAM-C)
2. Hollow-bearing Tree
3. High Threat Weed

### 5.1.3 PCT 4080 – Northwest River Oak-Apple Forest

Field surveys confirmed the presence of PCT 4080 occurring within the Project Site. A summary of PCT 4080 is provided in **Table 5.7** and shown in **Plate 5.11** and **Plate 5.12**. The extent of PCT 4080 within the Project Site is shown in **Illustration 5.1.** A comparison of recorded vegetation integrity data against community condition benchmark data is presented in **Table 5.8**.

**Table 5.7 Summary of PCT 4080 – North-west River Oak-Apple Forest**

| **Description** | | |
|---|---|---|
| **Vegetation class** | Eastern Riverine Forests | |
| **Vegetation formation** | Forested Wetlands | |
| **Conservation status** | Not associated with a threatened ecological community | |
| **SAII entity** | N/A | |
| **% cleared** | 63% | |
| **Description** | This vegetation occurred along the riparian zone of Vegetable Creek. The canopy was dominated by Weeping Bottlebrush (*Callistemon viminalis*) with Rough-barked Apple (*Angophora floribunda*) and Blakely's Red Gum (*Eucalyptus blakelyi*) on higher portions of the creek banks. The mid-storey was dominant with Native Olive (*Notelaea microcarpa*), Poison Pimelea (*Pimelea neo-anglica*) and Fringed Wattle (*Acacia fimbriata*). The groundcover generally consisted of a forbs and grasses including Short-stem Sedge (*Carex breviculmis),* Weeping Grass *(Microlaena stipoides),* Common Sedge *(Juncus usitatus), S*piny-headed Mat-rush *(Lomandra longifolia),* Kidney Weed *(Dichondra repens),* Swamp Dock *(Rumex brownii)* & Variable Swordsedge *(Lepidosperma laterale).* | |
| **PCT Justification** | **Search Term** | **Selection** |
| | *IBRA Bioregion* | New England Tablelands |
| | *IBBRA Subregion* | Beardy River Hills |
| | *Vegetation Formation* | Forested Wetlands |
| | *Tree Growth Form Group Species* | *Callistemon viminalis, Angophora floribunda& Eucalyptus blakelyi* |
| | *Shrub growth form group species* | *Notelaea microcarpa*, *Pimelea neo-anglica & Acacia fimbriata* |
| | *Grass & grass-like growth form group species* | *Microlaena stipoides, Juncus usitatus, Lomandra longifolia, Dichondra repens, Rumex brownii, Lepidosperma laterale & Carex breviculmis.* |
| | *Other growth form group species* | *Glycine clandestina* |
| | *Shortlist* | Returned a shortlist of two PCTs associated with the IBRA region and Forested Wetland formation: 4080 & 4075 |
| | ■ PCT 4075 occurs as a tall sclerophyll and Casuarina open forest with a high cover of *Eucalyptus camaldulensis*, very frequently with *Casuarina cunninghamiana* subsp. *cunninghamiana* and *Angophora floribunda.* The mid-stratum is sparse and is comprised of shrubs and small trees, very frequently including include *Callistemon viminalis, Notelaea microcarpa and Leptospermum brachyandrum.* The mid-dense ground layer is mainly comprised of graminoids, forbs, twiners and vines. This PCT is only defined from seven plots and the assemblage and environment of any new plots | |

| Description | |
|---|---|
| | should be carefully evaluated before they are assigned to it. It is not closely related floristically to other PCTs in eastern New South Wales. This PCT was discarded as *Eucalyptus camaldulensis* is the dominant red gum and *Eucalyptus blakelyi* is not associated with the PCT. The Eastern NSW Plot to PCT Assignment Tool analysis of the vegetation plot data did not output a plausible or good match based on key characteristics with a centroid score of 0.77.<br>■ PCT 4080 occurs as a tall Casuarina open forest with a sparse mid-stratum of soft-leaved species and a mid-dense ground layer of grasses and graminoids that occurs on stream flats. It includes a high cover of *Casuarina cunninghamiana subsp. cunninghamiana*, commonly associated with more scattered *Angophora floribunda* and occasionally with *Eucalyptus blakelyi.* The mid-stratum is sparse and very frequently includes scattered individuals of *Notelaea microcarpa.* The mid-dense ground layer contributes much of the species' richness in this PCT and is primarily comprised of graminoids and forbs. *Microlaena stipoides* and *Rumex brownii* are almost always present, *Urtica incisa* and *Lomandra longifolia* very frequently occur, including *Dichondra repens. Callistemon viminalis* frequently occurs with a high cover. The Eastern NSW Plot to PCT Assignment Tool analysis of the vegetation plot data output provided a key characteristic score of 71% with a centroid score of 0.72.<br>Based on floristics, geographic and geological characteristics, vegetation on the Project Site is considered to be consistent with the scientific description and distribution information outlined for PCT 4080 within the BioNet Vegetation Classification, and based on this was deemed the 'best fit' PCT. |
| **Vegetation zone & condition** | **Zone: 4080_Modified** – Modified disjunct areas with varying canopy cover. The canopy contained mature trees; however, canopy cover often was less dense and more open, likely due to disturbance history. The mid-storey and ground layer has been subject to livestock disturbance (grazing and soil compression). Moderate level of environmental weeds/ pasture species present within the groundcover. Native species diversity was moderate to low. |
| **Extent within the Project Site** | **Zone: 4080_Modified =** 0.11 ha |

**Plate 5.11 PCT 4080 Plot 020**

**Plate 5.12 PCT 4080 along Vegetable Creek**

**Table 5.8 Comparison of PCT 4080 Northwest River Oak-Apple Forest vegetation integrity plot data against PCT condition benchmark data**

| Plot | Tree Richness | Shrub Richness | Grass Richness | Forb Richness | Fern Richness | Other Richness | Tree Cover | Shrub Cover | Grass Cover | Forb Cover | Fern Cover | Other Cover | Length Timber | Leaf Litter | Large Tree | HT | HTW Cover[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BM[1]** | **4** | **6** | **9** | **11** | **2** | **3** | **37** | **4** | **70** | **8** | **0** | **1** | **36** | **24** | **4 (50)** | **-** | **-** |
| 020 | 4 | 3 | 7 | 6 | 1 | 4 | 45.2 | 14.1 | 3.9 | 0.6 | 0.1 | 0.4 | 23 | 29 | 2 | 0 | 0.2 |

1. Benchmark data for equivalent community in NSW New England Tablelands IBRA Bioregion; Vegetation Type - PCT 4080 Northwest River Oak-Apple Forest; Keith Formation: Forested Wetlands; Keith Class: Eastern Riverine Forests; source (NSW BioNet Vegetation Classification database accessed January 2025 and cross referenced with BAM-C)
2. Hollow-bearing Tree
3. High Threat Weed

### 5.1.4 PCT 3339 – Guyra Basalt Snow Gum Woodland

Field surveys determined the presence of PCT 3339 occurring within the area of the proposed Mine Camp adjacent to Glenn Innes Airport in the Glenn Innes-Guyra Basalts IBRA subregion. A summary of PCT 3339 is provided in **Table 5.9** and shown in **Plate 5.13** and **Plate 5.14**. The extent of PCT 3339 associated with the site is shown in **Illustration 5.1**. A comparison of recorded vegetation integrity data against community condition benchmark data is presented in **Table 5.10**.

**Table 5.9 Summary of PCT 3339 – Guyra Basalt Snow Gum Woodland**

| Description | |
|---|---|
| **Vegetation class** | Tableland Clay Grassy Woodlands |
| **Vegetation formation** | Grassy Woodlands |
| **Conservation status** | *Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/ Woodland of the New England Tableland Bioregion* – Endangered (BC Act)<br>New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion – Critically Endangered (BC Act)<br>*New England Peppermint (Eucalyptus nova-anglica) Grassy Woodlands – Critically Endangered (EPBC Act)*<br>**Derived condition patches do not meet a threatened ecological community criteria.** |
| **SAll entity** | N/A |
| **% cleared** | 81.84 % |
| **Description** | This vegetation occurred within a disturbed lot adjacent to Glenn Innes Airport and is in association with the proposed Mine Camp for the Project. No native canopy or midstorey was present, with canopy species in the site is associated with ornamental plantings. The native groundcover generally consisted of a forbs and grasses, including Swamp Dock (*Rumex brownii),* Bluebell *(Wahlenbergia gracilis),* Daisy *(Brachyscome aculeata),* Western Rat-tail Grass *(Sporobolus creber),* Paddock Lovegrass *(Eragrostis leptostachya),* Kidney Weed (*Dichondra repens)* and Red Grass *(Bothriochloa macra).* |
| **PCT Justification** | The occurrence of this PCT is associated with a disturbed lot adjacent to Glenn Innes Airport and is in association with the proposed Mine Camp for the Project. The surrounding landscape is heavily disturbed due to historical agricultural practices and residential development, with few native remnant patches. The vegetation within the site lacks an overstorey of native species, nor were any regenerating native canopy species present. However, the ground layer (grasses and forbs) still retained >50% native cover, as such it was deemed that the vegetation on site is a derived state of a local PCT within the locality of the site. Based on the NSW State Vegetation Type Map (NSW DCCEEW 2025d), 'pre-clearing' mapping of the site indicates that the site may have been associated with PCT 3339 Guyra Basalt Snow Gum Woodland. A small intact patch of PCT 3339 is located 1 km north of the site, and the site occurs on mapped 'vertosol' soil group, which is classified as clay-rich fertile soil. The groundcover consists of native grasses and forbs including *Rumex brownii, Wahlenbergia gracilis, Sporobolus creber, Eragrostis leptostachya, Dichondra repens* and *Bothriochloa macra* (refer to plot 022-023).<br>Based on available floristics, geographic & geological characteristics and state vegetation mapping, the vegetation on the site was deemed the 'best fit' with PCT 3339. |
| **Vegetation zone and condition** | **Zone: 3339_Poor** – This zone consists of areas in a degraded form of PCT 3339 with the woody vegetation having been historically cleared. The vegetation patch occurred as native grassland. |

| Description | |
|---|---|
| **Extent within the Project Site** | **Zone: 3339_Poor** = 2.74 ha |

**Plate 5.13 PCT 3339 Plot 021**

**Plate 5.14 PCT 3339 – poor condition grassland**

**Table 5.10 Comparison of PCT 3339 Guyra Basalt Snow Gum Woodland vegetation integrity plot data against PCT condition benchmark data**

| Plot | Tree Richness | Shrub Richness | Grass Richness | Forb Richness | Fern Richness | Other Richness | Tree Cover | Shrub Cover | Grass Cover | Forb Cover | Fern Cover | Other Cover | Length Timber | Leaf Litter | Large Tree | HT | HTW Cover[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BM[1]** | **4** | **5** | **10** | **18** | **1** | **2** | **29** | **3** | **102** | **15** | **0** | **1** | **33** | **31** | **3(50)** | **-** | **-** |
| 022 | 0 | 0 | 3 | 7 | 0 | 0 | 0 | 0 | 98 | 1.1 | 0 | 0 | 0 | 2.4 | 0 | 0 | 0.2 |
| 023 | 0 | 0 | 4 | 8 | 0 | 0 | 0 | 0 | 93.1 | 0.9 | 0 | 0 | 0 | 2.4 | 0 | 0 | 1 |

1. Benchmark data for equivalent community in NSW New England Tablelands IBRA Bioregion; Vegetation Type - PCT 3339 Guyra Basalt Snow Gum Woodland; Keith Formation: Grassy Woodlands; Keith Class: Tableland Clay Grassy Woodlands; source (NSW BioNet Vegetation Classification database accessed January 2025 and cross referenced with BAM-C)
2. Hollow-bearing Tree
3. High Threat Weed

## 5.2 Threatened Ecological Communities

Two PCTs identified with the Project Site corresponded to listed BC Act listed threatened ecological communities (TECs), these are discussed below.

### 5.2.1 Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/ Woodland of the New England Tableland Bioregion

PCT 3339 – Guyra Basalt Snow Gum Woodland is associated with the following BC Act listed TECs:

- *Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/ Woodland of the New England Tableland Bioregion* – Endangered (BC Act).
- *New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion* – Critically Endangered (BC Act).

To be considered consistent with either listing under the BC Act, the vegetation must be consistent with the final determination for each TEC. A comparison of PCT 3339 recorded in poor condition state and assessed against the final determination is provided in **Table 5.11** and **Table 5.12**.

The assessment concluded that the PCT 3339 poor condition state does not meet the BC Act listing for either TEC.

**Table 5.11 Criteria for TEC Ribbon Gum—Mountain Gum—Snow Gum Grassy Forest/ Woodland of the New England Tableland Bioregion**

| Final Determination Listing Criteria | PCT 3339 – Poor condition |
|---|---|
| **Location:** *occurs within the New England Tablelands bioregion.* | **Yes** – the Project Site occurs within the New England Tableland Bioregion. |
| **Altitude**: *generally, occurs between 700–1500 m ASL; however can occur at elevations to 1200 m in northern tableland region.* | **Yes** – the Project Site occurs at approximately 1050 m ASL within the elevation range for this community (700-1500 m). |
| **Topography and geology:** *mainly confined to high undulating plateau with deep basalt soils (chocolate or krasnozem) loam soils.* | **Partially** – occurs on undulating landscape associated with vertosol soil, a clay soil associated with weathered sedimentary rocks (e.g. shales, mudstones) and weathered basalt. |
| **Structure**: *open forest 20 – 30 m tall, may assume the structure of woodland, sometimes less than 12 m tall, in exposed sites or where subject to past clearing or thinning.* | **No –** occurs as derived native grassland. No native canopy present. |
| **Floristic canopy composition**: *typically dominated by Ribbon Gum (Eucalyptus viminalis), Mountain Gum (Eucalyptus dalrympleana subsp. heptantha), Snow Gum (E. pauciflora) and occasionally Black Sallee (E. stellulata)* | **No –** canopy is absent; the site contains does not contain any floristic species. |
| **Floristic composition as detailed in Part 1 of the Scientific Determination.** | **No –** only two of the characteristic species identified in the scientific determination were recorded from vegetation within the Project Site. |
| **Meet TEC determination** | **No, does not meet TEC determination** |

**Table 5.12 Criteria for TEC New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion**

| Final Determination Listing Criteria | PCT 3339 – Poor condition |
|---|---|
| **Location:** *within the New England Tablelands bioregion* | **Yes** – occurs within New England Tablelands bioregion. |
| **Topography and geology**: *occurs primarily in valley flats subject to cold air drainage. Occurs within basalt derived soils and along a creekline depressions.* | **No** – occurs on undulating landscape but does not occur on valley flat associated with creek link depression. Site is associated with vertosol soil; a clay soil associated with weathered sedimentary rocks (e.g. shales mudstones) and weathered basalt. |
| **Structure**: *occurs as a woodland. The tree layer is usually 8-20 m tall with a sparse cover up to 30%. There are few shrub species present, and none are abundant within the community. Ground cover is usually dense* | **No –** occurs as derived native grassland. No native canopy present. |
| **Floristic canopy composition**: *characterised by the assemblage of species outlined in Paragraph 2 of the scientific determination.*<br><br>*Floristic composition dominated by trees of Eucalyptus nova-anglica and occasionally with E. dalrympleana subsp. heptantha, as a co-dominant. Few shrub species are present. Ground cover is usually dense with Asperula conferta, Poa sieberiana, Themeda australis, Juncus filicaulis, Dichondra repens, Carex inversa, Rumex brownii, Acaena ovina and Desmodium varians is common.* | **No –** canopy is absent and does not contain any floristic canopy species. Only four of the characteristic groundcover species identified in the scientific determination were recorded from vegetation within the Project Site. |
| **Meet TEC determination** | **No, does not meet TEC determination** |

### 5.2.2 White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland

PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest is associated with the BC Act listed *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*

To be considered consistent with the Critically Endangered listing under the BC Act, the vegetation must be consistent with the final determination for *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020). A comparison of PCT 3363 recorded in all condition states and assessed against the final determination for the threatened *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* TEC is provided in **Table 5.13**.

The assessment concluded that the following vegetation types and zones meet the BC Act listing for Grassy Woodland and Derived Native Grassland:

- PCT 3363 – Intact condition.
- PCT 3363 – Poor condition.

**Table 5.13 Correlation of PCT 3363 against scientific determination criteria for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland threatened ecological community**

| Final Determination Listing Criteria | PCT 3363 – Intact condition | PCT 3363 – Poor condition |
|---|---|---|
| **Location:** *occurs within the Brigalow Belt South, Nandewar, New England Tableland, Sydney Basin, North Coast, South Eastern Highlands, South East Corner, South Western Slopes and Riverina IBRA Bioregions in NSW.* | **Yes** – the Project Site occurs within the New England Tableland Bioregion. | |
| **Altitude**: *generally occurs below 600–700 m ASL however can occur at elevations to 1200 m in northern tableland region*. | **Yes** – the Project Site occurs at approximately 765 m ASL within the elevation range for this community (600-1200 m). | |
| **Topography and geology:** *known to occur on hilly to undulating landscapes in areas with soils of moderate fertility derived from a range of lithologies, including alkaline and acid volcanics, granites, sediments, serpentinites and metamorphics.* | **Yes** – occurs on flats and hilly undulating landscapes on soils of moderate fertility derived from a range of lithologies listed in the scientific determination for this TEC. | |
| **Structure**: *occurs as either a grassy open woodland or as derived native grasslands*. | **Yes –** occurs as open grassy woodlands. | **Yes –** occurs as derived native grasslands. |
| **Floristic canopy composition**: *typically dominated by E. melliodora (Yellow Box) and E. blakelyi (Blakely's Red Gum) in the eastern parts of its range (generally the tablelands above 600m ASL). In the north-east, species include Angophora floribunda (Rough-Barked Apple), E. bridgesiana (Apple Box) and occasionally E. caliginosa (Broad-Leaved Stringybark) or E. youmanii (Youman's Stringybark)*. | **Yes –** is dominated by *E. blakelyi* (Blakely's Red Gum) and *Angophora floribunda (Rough-Barked Apple)*. Occurrence of *E. melliodora* (Yellow Box) and *E. albens* (White Box) also observed in locality. | **Partly** – canopy predominately removed from this zone, however, regenerative canopy species of *Angophora floribunda observed.* Occurrence of *Eucalyptus melliodora & Eucalyptus blakelyi* also observed in locality. |
| *Floristic composition as detailed in Part 1 of the Scientific Determination.* | **Yes –** several of the characteristic species identified in the scientific determination were recorded from Plot 019. | **Yes**, several of the characteristic species identified in the scientific determination were recorded from Plot 021 |
| **Meet TEC criteria?** | **Yes, meets TEC** | **Yes, meets TEC** |

**Table 5.14 Summary of White Box – Yellow Box – Blakely's Red Gum grassy woodlands within the Project Site and Disturbance footprint**

| Threatened Ecological Community | Plant Community Type | Zone | BC Act | IBRA Subregion | | Project Site (ha) | Disturbance footprint (ha) |
|---|---|---|---|---|---|---|---|
| | | | | BRH[1] | GIGB[2] | | |
| White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | 3363_Intact | CE | 0.62 | 0 | 0.62 | 0.62 |
| | | 3363_Poor | | 0.41 | 0 | 0.41 | 0.41 |
| **Total extent of threatened ecological communities** | | | | | | **1.03** | **1.03** |

CE = Critically Endangered

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

## 5.3 Priority weeds and Weeds of National Significance recorded

Twenty-three (23) exotic flora species were recorded within the Project Site during field surveys. Of these, three species are listed under the *NSW Biosecurity Act 2015* (BA Act) as priority weeds for the Northern Tablelands region (Department of Primary Industries 2025b). These species are also listed as Weeds of National Significance (WONS) (Department of Primary Industries 2024). All priority weeds and WONS are outlined below in **Table 5.15**.

**Table 5.15 Priority weeds and WoNS identified in Project Site**

| Species Name | Priority Weeds | WONS |
|---|---|---|
| Velvet Prickly Pear *(O.tomentosa)* | **Prohibition on certain dealings**<br>Must not be imported into the state, sold, bartered, exchanged or offered for sale. | Yes |
| Common Pear (*Opuntia stricta)* | **Prohibition on certain dealings**<br>Must not be imported into the state, sold, bartered, exchanged or offered for sale. | Yes |
| Blackberry (*Rubus fruticosus* species aggregate) | **Prohibition on certain dealings**<br>Must not be imported into the state, sold, bartered, exchanged or offered for sale.<br>All species in the *Rubus fruiticosus* species aggregate have this requirement, except for the varietals Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree. | Yes |

In addition to priority weeds and weeds of National Significance, the following high threat weeds were also recorded:

- *Bidens pilosa* (Cobbler's Pegs).
- *Eragrostis curvula* (African Love Grass).
- *Hypericum perforatum* (St. John's Wort).
- *Hyparrhenia hirta* (Coolatai Grass).
- *Opuntia tomentosa* (Velvet Tree Pear).
- *Paspalum dilatatum* (Paspalum).

A full inventory of weed species recorded within each BAM vegetation integrity plots, including high threat weeds, is provided in **Appendix B**.

## 5.4 Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDEs) are communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater (NSW DCCEEW 2025e). GDEs include a broad range of environments and can be highly specialised, possessing unique characteristics that 'separate' them from other ecosystems. The dependence of GDEs on groundwater varies from seasonal or sporadic, to continual. GDEs can range in size from a few metres to many square kilometres. GDEs require groundwater to maintain their composition and functioning, as such the removal or change in groundwater availability or quality will influence the composition, structure and function of these ecosystems (Eamus et al. 2006). Groundwater dependent vegetation do not rely on the surface expression of water to maintain ecosystem function. Instead, the vegetation depends on the sub-surface presence of groundwater, often accessed via the capillary fringe or vadose zone (i.e. the subsurface water just above the water table that is not completely saturated). Plant species within a community may exhibit differing degrees of groundwater dependency and can range from

obligate (total/ entire) to facultative (partial and infrequent (i.e. seasonal/ sporadic)(Kuginis et al. 2016).

As the protection of GDEs in water sharing plans needs to be balanced with the demands of licenced water users, protection is legislatively restricted to high priority GDEs (NSW DCCEEW 2025e). Publicly available location data available through the NSW SEED portal for the new water sharing plans that were enacted on 1 July 2020, including information on high priority GDEs detailed in the 2020 water sharing plans. Each water sharing plan for groundwater includes a map that locates potential high-priority GDEs (NSW DCCEEW 2024). Their ecological value is then determined using the High Ecological Value Aquatic Ecosystems (HEVAE) framework. Those determined to have 'very high' and 'high' ecological value are recorded as high priority GDEs on the maps included in water sharing plans.

A desktop assessment of the Project Site using the GDE Ecological Value (HEVAE) Spatial Database (NSW DCCEEW 2024) and GDE data from the National Groundwater Information System (NGIS) database (Bureau of Meteorology 2025b) was reviewed to assess the occurrence of any potential GDEs associated within the Project Site. GDEs type there associated PCTs, and GDE potential are listed in **Table 5.16**. Mapped GDE locations, including low and moderate potential GDEs, shown in **Illustration 5.2**.

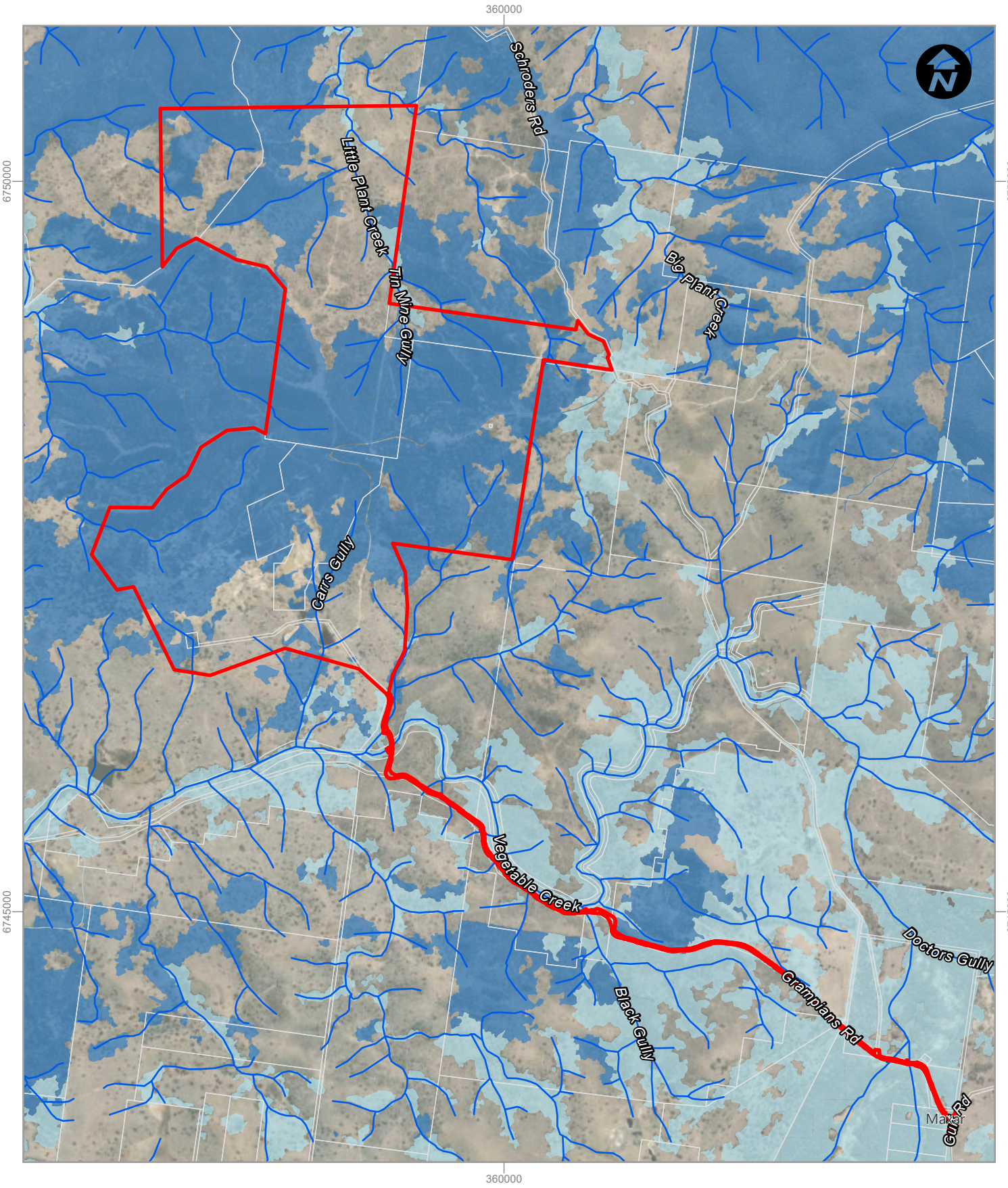
**Table 5.16 Mapped GDEs associated with the Project Site**

| GDE Type | GDE Name | Associated PCT | River Region | GDE Potential |
|---|---|---|---|---|
| **NGIS database (Bureau of Meteorology)** | | | | |
| Terrestrial | Rough-Barked Apple - Blakely's Red Gum Open Forest of The Nandewar Bioregion And Western New England | PCT 538 (decommissioned) | Border Rivers | High |
| Terrestrial | Black Cypress Pine - Tumbledown Red Gum - Narrow-Leaved Ironbark - Stringybark She Oak Open Forest | PCT 505 (decommissioned) | Border Rivers | Low |
| Terrestrial | Black Cypress Pine - Rough-Barked Apple - Round-Leaved Gum Shrubby Riparian Forest in The Torrington | PCT 514 (decommissioned) | Border Rivers | Moderate |
| Terrestrial | Tumbledown Red Gum - Black Cypress Pine - Caley's Ironbark shrubby open forest of the Nandewar Bioregion and western New England Tableland Bioregion | 578 (decommissioned) | Border Rivers | Low |
| Terrestrial | Blakely's Red Gum - Yellow Box grassy woodland of the New England Tablelands Bioregion | PCT 510 (decommissioned) | Border Rivers | High |
| **GDE Ecological Value (HEVAE) Spatial Database** | | | | |
| Terrestrial | Blakely's Red Gum - Yellow Box grassy woodland of the New England Tablelands Bioregion | PCT 510 (decommissioned) | Border Rivers | Medium |
| Terrestrial | Rough-barked Apple - Blakely's Red Gum open forest of the Nandewar Bioregion and western New England Tableland Bioregion | PCT 538 (decommissioned) | Border Rivers | Medium |
| Terrestrial | Black Cypress Pine - Rough-barked Apple - Round-leaved Gum shrubby riparian forest in the | PCT 514 (decommissioned) | Border Rivers | Low |

| GDE Type | GDE Name | Associated PCT | River Region | GDE Potential |
|---|---|---|---|---|
| | Torrington area of the New England Tableland Bioregion | | | |

The majority of the Project Site is associated with low potential GDE mapping, with relatively small areas of moderate – high potential GDEs associated with existing mapped watercourses. A Groundwater Impact Assessment, undertaken in accordance with the NSW Aquifer Interference Policy, has assessed the impacts of the Project on the identified GDEs and, through the proposed mitigation and management measures, is anticipated to have a low impact on the groundwater environment.

All groundwater would be extracted under the Applicant's existing WAL (44962), that provides for up to 636 megalitres per year from the New England Fold Belt Groundwater Source that is managed under the Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020.




**LEGEND**

Site boundary
Cadastre

**GDE Probability**
High
Low

Watercourse

0 700 Metres

# Groundwater Dependent Ecosystems - Illustration 5.2



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, OEH*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

# 6. Threatened Species

## 6.1 Identification of Threatened Species

This section addresses threatened species in accordance with Chapter 5 of the BAM (2020) and matters relating to the BC Act.

Following input of all plot data into the BAM Calculator, a list of threatened species with potential to occur at the Project Site was generated. The BAM Calculator sorts threatened species biodiversity credit classes as follows:

- **Ecosystem credit species**: are threatened species whose occurrence can generally be predicted by vegetation surrogates and/ or landscape features, or that have a low probability of detection using targeted surveys. These are identified in the Threatened Biodiversity Data Collection (TBDC) as ecosystem credit species. Targeted survey is not required for these species.
- **Species credit species**: are threatened species for which vegetation surrogates and/ or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. A targeted survey or an expert report is required to confirm the presence of these species on the subject land. Threatened species or specific components of species habitat are identified in the TBDC and BAM-C.
- **Dual credit species**: are those threatened species where part of the habitat is assessed as an ecosystem credit (e.g. foraging habitat) and part as a species credit (e.g. breeding habitat). In this report, dual credit species will be included in both the ecosystem and species credit assessment.

## 6.2 Recorded Threatened Species

A total of 160 fauna species and 128 flora species were identified during field surveys. Of these, 20 threatened species listed under the BC and/ or EPBC Act were recorded within the Project Site (**Table 6.1**).

**Table 6.1 Recorded threatened species within the Project Site**

| Scientific Name | Common Name | BC Act | EPBC Act | Credit type | IBRA Subregion BRH[1] | IBRA Subregion GIGB[2] |
|---|---|---|---|---|---|---|
| **Flora (2)** | | | | | | |
| *Acacia pubifolia* | Velvet Wattle | E | V | Species | ✓ | - |
| *Dichanthium setosum* | Bluegrass | V | V | Species | - | ✓ |
| **Birds (10)** | | | | | | |
| *Artamus cyanopterus cyanopterus* | Dusky Woodswallow | V | - | Ecosystem | ✓ | - |
| *Chthonicola sagittata* | Speckled Warbler | V | - | Ecosystem | ✓ | - |
| *Climacteris picumnus victoriae* | Brown Treecreeper | V | V | Ecosystem | ✓ | - |

| Scientific Name | Common Name | BC Act | EPBC Act | Credit type | IBRA Subregion BRH[1] | IBRA Subregion GIGB[2] |
|---|---|---|---|---|---|---|
| *Daphoenositta chrysoptera* | Varied Sittella | V | - | Ecosystem | ✓ | - |
| *Glossopsitta pusilla* | Little Lorikeet | V | - | Ecosystem | ✓ | - |
| *Lophoictinia isura* | Square-tailed Kite | V | - | Dual | ✓ | - |
| *Melanodryas cucullata cucullata* | Hooded Robin | V | E | Ecosystem | ✓ | - |
| *Neophema pulchella* | Turquoise Parrot | V | - | Ecosystem | ✓ | - |
| *Ninox connivens* | Barking Owl | V | - | Species | ✓ | - |
| *Stagonopleura guttata* | Diamond Firetail | V | V | Ecosystem | ✓ | - |
| **Mammals (7)** | | | | | | |
| *Chalinolobus picatus* | Little Pied Bat | V | - | Ecosystem | ✓ | - |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | - | Ecosystem | ✓ | - |
| *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V | - | Dual | ✓ | - |
| *Petaurus norfolcensis* | Squirrel Glider | V | - | Species | ✓ | - |
| *Phascolarctos cinereus* | Koala | E | E | Species | ✓ | - |
| *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | V | - | Ecosystem | ✓ | - |
| *Scoteanax rueppellii* | Greater Broad-nosed Bat | V | - | Ecosystem | ✓ | - |
| **Reptiles (1)** | | | | | | |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | V | Species | ✓ | - |

V = Vulnerable; E = Endangered

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

## 6.3 Ecosystem Credit Species

Ecosystem credit species are those that can be predicted by vegetation surrogates and landscape features or are those species for which a targeted survey has a low probability of detection. Targeted survey is not required for ecosystem credit species. Ecosystem credit threatened species were assessed using information about Project Site context, PCTs and vegetation integrity attributes collected during the field surveys, and data from the TBDC as required by subsections **6.3.1** and **6.3.2** of the BAM.

An overview of the process for determining predicted ecosystem credit species is as follows:

- **Step 1**: All PCTs, associated vegetation zones and plot data are loaded into the calculator (refer to **Section 5** of this report).
- **Step 2**: A list of predicted ecosystem credit species is generated from the BAM Calculator (refer to **Section 6.3.1** and **Table 6.2**).
- **Step 3**: Justification for inclusion of any additional predicted ecosystem credit species based on the outcome from other database searches, local data sources and likelihood of occurrence assessments (refer to **Section 6.3.2** and **Appendix C** and **Appendix D**).
- **Step 4**: Justification for exclusion of any predicted ecosystem credit species based on the specific geographic and/ or habitat constraints listed in the BAM-C (refer to **Section 6.3.3** and **Appendix C** and **Appendix D**).
- **Step 5**: Finalise predicted ecosystem credit species associated with each vegetation zone within the Project Site (refer to **Section 10.1.3** and **12.2.2.1** and **Appendix F**).

### 6.3.1 Predicted ecosystem credit species generated from BAM Calculator

A list of predicted ecosystem credit species was generated from the BAM-C based on associated plant community types within the Project Site (refer to **Table 6.2**).

**Table 6.2 List of BAM-C predicted ecosystem species**

| Scientific Name | Common Name | BC Act | Dual credit species? | Associated PCTs | IBRA Subregion | |
|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] |
| **Birds** | | | | | | |
| *Anthochaera phrygia* | Regent Honeyeater | CE | Yes | PCT 3722, 3363, 4080 | ✓ | - |
| *Artamus cyanopterus cyanopterus* | Dusky Woodswallow | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Calyptorhynchus lathami lathami* | South-eastern Glossy Black-Cockatoo | V | Yes | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Chthonicola sagittata* | Speckled Warbler | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Circus assimilis* | Spotted Harrier | V | No | PCT 3339 | - | ✓ |
| *Climacteris picumnus victoriae* | Brown Treecreeper (eastern subspecies) | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |

| Scientific Name | Common Name | BC Act | Dual credit species? | Associated PCTs | IBRA Subregion | |
|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] |
| *Daphoenositta chrysoptera* | Varied Sittella | V | No | PCT 3722, 3363, 4080 | ✓ | - |
| *Ephippiorhynchus asiaticus* | Black-necked Stork | V | No | PCT 3339 | - | ✓ |
| *Falco subniger* | Black Falcon | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Glossopsitta pusilla* | Little Lorikeet | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Grantiella picta* | Painted Honeyeater | V | Yes | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | V | Yes | PCT 3722, 3363, 4080, 3369 | ✓ | ✓ |
| *Hieraaetus morphnoides* | Little Eagle | V | Yes | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Hirundapus caudacutus* | White-throated Needletail | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Lathamus discolor* | Swift Parrot | E | Yes | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Lophoictinia isura* | Square-tailed Kite | V | Yes | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Melanodryas cucullata cucullata* | Hooded Robin (south-eastern form) | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Melithreptus gularis gularis* | Black-chinned Honeyeater (eastern subspecies) | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Neophema pulchella* | Turquoise Parrot | V | No | PCT 3722, 3363, 4080 | ✓ | - |
| *Petroica boodang* | Scarlet Robin | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Petroica phoenicea* | Flame Robin | V | No | PCT 3339 | - | ✓ |
| *Pomatostomus temporalis temporalis* | Grey-crowned Babbler | V | No | PCT 3722, 3363, 4080 | ✓ | - |

| Scientific Name | Common Name | BC Act | Dual credit species? | Associated PCTs | IBRA Subregion | |
|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] |
| | (eastern subspecies) | | | | | |
| *Stagonopleura guttata* | Diamond Firetail | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| **Mammals** | | | | | | |
| *Chalinolobus picatus* | Little Pied Bat | V | No | PCT 3722, 3363, 4080 | ✓ | - |
| *Dasyurus maculatus* | Spotted-tailed Quoll | V | No | PCT 3722, 3363, 4080 | ✓ | - |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | No | PCT 3722, 3363, 4080 | ✓ | - |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | No | PCT 3722, 3363, 4080 | ✓ | - |
| *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V | Yes | PCT 3722, 3363, 4080 | ✓ | - |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | V | Yes | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | V | No | PCT 3722, 3363, 4080 | ✓ | - |
| *Scoteanax rueppellii* | Greater Broad-nosed Bat | V | No | PCT 3722, 3363, 4080 | ✓ | - |

V = Vulnerable; E = Endangered; CE = Critically Endangered

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

### 6.3.2 Justification for inclusion of any additional predicted ecosystem credit species

Six additional predicted ecosystem credit species were included in the BAM-C predicted list (refer to **Table 6.3**).

**Table 6.3 Justification for Inclusion of any additional predicted ecosystem credit species**

| Scientific Name | Common Name | BC Act | Justification for Inclusion | Associated PCTs | IBRA Subregion | |
|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] |
| *Chalinolobus picatus* | Little Pied Bat | V | **Recorded** – during targeted surveys (Anabat) | PCT 3722, 3363, 4080 | ✓ | - |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | **Recorded** – during targeted surveys (Anabat) | PCT 3722, 3363, 4080 | ✓ | - |
| *Grantiella picta* | Painted Honeyeater | V | Potential habitat in the form of dry | PCT 3722, 3363, 4080 | ✓ | - |

| Scientific Name | Common Name | BC Act | Justification for Inclusion | Associated PCTs | IBRA Subregion | |
|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] |
| | | | sclerophyll woodland with high density of mistletoes. | | | |
| *Neophema pulchella* | Turquoise Parrot | V | **Recorded** – during targeted surveys (bird survey) | PCT 3722, 3363, 4080 | ✓ | - |
| *Pomatostomus temporalis temporalis* | Grey-crowned Babbler (eastern subspecies) | V | Potential habitat associated with dry sclerophyll woodland | PCT 3722, 3363, 4080 | ✓ | - |
| *Scoteanax rueppellii* | Greater Broad-nosed Bat | V | **Recorded** – during targeted surveys (Anabat) | PCT 3722, 3363, 4080 | ✓ | - |

V = Vulnerable

1) Beardy River Hills

2) Glen Innes-Guyra Basalts

### 6.3.3 Justification for exclusion of any predicted ecosystem credit species

In determining the predicted ecosystem credit species list for the Project Site, three species exclusions to the BAM-C predicted list were excluded from the BAM-C. A summary of the justification for these exclusions is provided in **Table 6.4**, these are largely associated with the proposed Mine Camp adjacent to Glen Innes Airport in Glen Innes-Guyra Basalts IBRA sub-region.

**Table 6.4 Justification for exclusion of any predicted ecosystem credit species**

| Scientific Name | Common Name | BC Act | Associated PCTs | Justification for exclusion | IBRA Subregion | |
|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] |
| *Grantiella picta* | Painted Honeyeater | V | PCT 3339 | **Habitat constraints –** *Mistletoes present at a density of greater than five mistletoes per hectare.*<br><br>The Project Site (Mine Camp) does not provide Mistletoes at a density of greater than five mistletoes per hectare. | - | ✓ |
| *Ephippiorhynchus asiaticus* | Black-necked Stork | V | PCT 3339 | **Habitat constraints –** *Swamps/ waterbodies, shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300 m of these.*<br><br>The Project Site (Mine Camp) does not provide swamps or waterbodies *within 300 m*. | - | ✓ |
| *Calyptorhynchus lathami lathami* | South-eastern Glossy Black-Cockatoo | V | PCT 3339 | **Habitat constraints –** *Presence of Allocasuarina and casuarina species.*<br><br>The Project Site (Mine Camp) does not provide presence of Allocasuarina and casuarina species. | - | ✓ |

## 6.4 Species Credit Species

Species credit species are those species that cannot be confidently predicted to occur based on habitat surrogates and landscape features. These species can also be reliably detected by survey. Species credit species were assessed using information about site context, PCTs and vegetation integrity attributes collected during the field surveys, and data from the TBDC as required by Section 5.2.3 of the BAM (2020) in conjunction with a habitat assessment.

An overview of the process for determining candidate species credit species is presented below:

- **Step 1**: All PCTs, associated vegetation zones and plot data are loaded into the BAM-C (refer to **Section 5.1**).
- **Step 2**: A list of candidate species credit species is generated from the BAM-C (refer to **Section 6.4.1** and **6.4.2**).
- **Step 3**: Justification for inclusion of any additional species credit species based on the outcome from other database searches, local data sources and habitat suitability assessments (refer to **Section 6.4.1.1** and **6.4.2.1**, **Appendix C** and **Appendix D**).
- **Step 4**: Justification for exclusion of any species credit species identified in the steps above (refer to **Section 6.4.1.2** and **Section 6.4.2.2**, **Appendix C** and **Appendix D**).
- **Step 5**: Finalise candidate species credit species associated with each vegetation zone for the Project Site.
- **Step 6**: Undertake target surveys for candidate threatened species or prepare an expert report or assume presence (refer to **Section 6.4.1.3** and **6.4.2.3**).
- **Step 7**: Assessment of candidate threatened species to determine the proposed affected species list (refer to **Section 6.4.1.3** and **6.4.2.3**).
- **Step 8**: Define threatened species impact (individual count or species polygon area count) (refer to **Section 10.1.4**).
- **Step 9**: Calculate threatened species impact using BAM-C (see **Section 12.2.2** and **Appendix F**).

### 6.4.1 Threatened flora species credit species

A list of candidate threatened flora species, credit species, was generated from the BAM-C based on associated vegetation types recorded within the Project Site. Candidate threatened flora species are presented in **Table 6.5**.

**Table 6.5 List of BAM-C threatened flora species credit species**

| Scientific Name | Common Name | BC Act | SAII | Associated PCTs | IBRA Subregion | |
|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] |
| *Acacia macnuttiana* | MacNutt's Wattle | V | No | PCT 3363 | ✓ | - |
| *Acacia pubifolia* | Velvet Wattle | E | Yes | PCT 3722, 3363 | ✓ | - |
| *Astrotricha roddii* | Rodd's Star Hair | E | No | PCT 3363 | ✓ | - |
| *Dichanthium setosum* | Bluegrass | V | No | PCT 3339 | - | ✓ |
| *Diuris pedunculata* | Small Snake Orchid | E | No | PCT 3339 | - | ✓ |

| Scientific Name | Common Name | BC Act | SAII | Associated PCTs | IBRA Subregion | |
|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] |
| *Eucalyptus caleyi subsp. ovendenii* | Ovenden's Ironbark | V | No | PCT 3722 | ✓ | - |
| *Eucalyptus mckieana* | McKie's Stringybark | V | No | PCT 3722 | ✓ | - |
| *Eucalyptus nicholii* | Narrow-leaved Black Peppermint | V | No | PCT 3363 | ✓ | - |
| *Eucalyptus rubida subsp. barbigerorum* | Blackbutt Candlebark | V | No | PCT 3339 | - | ✓ |
| *Polygala linariifolia* | Native Milkwort | E | No | PCT 3722 | ✓ | - |
| *Rutidosis heterogama* | Heath Wrinklewort | V | No | PCT 3722, 3363 | ✓ | - |
| *Thesium australe* | Austral Toadflax | V | No | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Zieria ingramii* | Keith's Zieria | E | No | PCT 3722, 3363 | ✓ | - |

V = Vulnerable; E = Endangered; CE = Critically Endangered

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

#### 6.4.1.1 Justification for inclusion of any additional threatened flora species credit species

In identifying a candidate threatened flora species list for further assessment, one additional threatened flora species credit species were included as a species credit species as outlined in **Table 6.6**.

**Table 6.6 Justification for inclusion of any additional threatened flora species credit species**

| Scientific Name | Common Name | BC Act | SAII | Associated PCTs | Justification for inclusion | IBRA Subregion | |
|---|---|---|---|---|---|---|---|
| | | | | | | BRH[1] | GIGB[2] |
| *Zieria ingramii* | Keith's Zieria | E | No | PCT 3722, 3363 | Potential habitat in associated with dry sclerophyll woodland | ✓ | - |

V = Vulnerable; E = Endangered; CE = Critically Endangered

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

#### 6.4.1.2 Justification for exclusion of any threatened flora species credit species

One candidate threatened flora species credit species, *Diuris pedunculata* (Small Snake Orchid), was identified to be excluded from the BAM-C candidate species credit list based on degraded habitat at the proposed Mine Camp adjacent to Glen Innes Airport in Glen Innes-Guyra Basalts IBRA sub-region. The justification for exclusion is presented in **Table 6.7**.

**Table 6.7 Justification for exclusion of any additional threatened flora species credit species**

| Scientific Name | Common Name | BC Act | SAII | Associated PCTs | Justification for exclusion | IBRA Subregion | |
|---|---|---|---|---|---|---|---|
| | | | | | | BRH[1] | GIGB[2] |
| *Diuris pedunculata* | Small Snake Orchid | E | No | PCT 3339 | **Degraded habitat** – Small Snake Orchid grows in grassy areas in sclerophyll forest, often on peaty soils in moist areas on the New England Tablelands, around Armidale, Uralla, Guyra and Ebor (NSW DCCEEW 2025b).<br><br>The proposed Mine Camp at Glen Innes Airport within the Glenn Innes-Guyra Basalts IBRA subregion occurs in a degraded stated and has been aligned with a derived form of PCT 3339. The site has historically been utilised as a residential lot and has been regularly mown and maintained. The site does not provide a preferred microhabitat in the form of moist peaty soils associated with grassy dry sclerophyll forest. | - | ✓ |

E = Endangered

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

#### 6.4.1.3 Assessment of candidate threatened flora to determine affected species

A total of 12 candidate threatened flora species were considered to have potential associated habitat within the Project Site and were the subject of targeted surveys. Of these, two threatened flora species were recorded:

- *Acacia pubifolia* (Velvet Wattle) listed as Endangered under the BC Act and Vulnerable under the EPBC Act.
- *Dichanthium setosum* (Bluegrass) listed as Vulnerable under the BC Act and EPBC Act.

A summary of survey results for all candidate threatened flora species, to determine those species that are considered affected by the Project, are presented in **Table 6.8**. A discussion of each recorded threatened flora species is also provided below.

**Table 6.8 Assessment of candidate threatened flora to determine affected species**

| Scientific Name | Common Name | BC Act | SAII | Associated PCTs | Optimal survey period | Species presence | Survey effort | IBRA Subregion | | Affected? |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Beardy River Hills | Glenn Innes-Guyra Basalts | |
| *Acacia pubifolia* | Velvet Wattle | E | Yes | PCT 3722 | All year | **Yes (surveyed)** | 21st – 26th Nov 2022;<br>22nd – 24th Jan 2024;<br>19th – 20th Sep 2024:<br>■ Two-phase grid-based systematic survey.<br>■ Random meanders.<br>■ Parallel traverses. | ✓ | - | **Yes**. This species was recorded within the Project Site associated with the Mine Site disturbance footprint. |
| *Acacia macnuttiana* | MacNutt's Wattle | V | No | PCT 3363 | Aug – Sep | No (surveyed) | 21st – 26th Nov 2022;<br>22nd – 24th Jan 2024;<br>19th – 20th Sep 2024:<br>■ Two-phase grid-based systematic survey.<br>■ Random meanders.<br>■ Parallel traverses. | ✓ | - | No. Targeted surveys within the Project Site did not record this species. |
| *Eucalyptus rubida subsp. barbigerorum* | Blackbutt Candlebark | V | No | PCT 3339 | All year | No (surveyed) | 21st Jan 2025:<br>■ Parallel traverses. | - | ✓ | No. Targeted surveys within the Project Site did not record this species. |
| *Dichanthium setosum* | Bluegrass | V | No | PCT 3339 | Nov – May | **Yes (surveyed)** | 21st Jan 2025:<br>■ Parallel traverses. | - | ✓ | **Yes**. This species was recorded within the Project Site associated with Mine Camp. |
| *Astrotricha roddii* | Rodd's Star Hair | E | No | PCT 3363 | All year | No (surveyed) | 21st – 26th Nov 2022;<br>22nd – 24th Jan 2024;<br>19th – 20th Sep 2024:<br>■ Two-phase grid-based systematic survey.<br>■ Random meanders.<br>■ Parallel traverses. | ✓ | - | No. Targeted surveys within the Project Site did not record this species. |
| *Eucalyptus caleyi subsp. ovendenii* | Ovenden's Ironbark | V | No | PCT 3722 | All year | No (surveyed) | 21st – 26th Nov 2022;<br>22nd – 24th Jan 2024;<br>19th – 20th Sep 2024:<br>■ Two-phase grid-based systematic survey.<br>■ Random meanders.<br>■ Parallel traverses. | ✓ | - | No. Targeted surveys within the Project Site did not record this species. |
| *Eucalyptus mckieana* | McKie's Stringybark | V | No | PCT 3722 | All year | No (surveyed) | 21st – 26th Nov 2022;<br>22nd – 24th Jan 2024;<br>19th – 20th Sep 2024:<br>■ Two-phase grid-based systematic survey.<br>■ Random meanders.<br>■ Parallel traverses. | ✓ | - | No. Targeted surveys within the Project Site did not record this species. |
| *Eucalyptus nicholii* | Narrow-leaved Black Peppermint | V | No | PCT 3363 | All year | No (surveyed) | 21st – 26th Nov 2022;<br>22nd – 24th Jan 2024;<br>19th – 20th Sep 2024:<br>■ Two-phase grid-based systematic survey.<br>■ Random meanders.<br>■ Parallel traverses. | ✓ | - | No. Targeted surveys within the Project Site did not record this species. |
| *Polygala linariifolia* | Native Milkwort | E | No | PCT 3722 | Oct – Feb | No (surveyed) | 21st – 26th Nov 2022;<br>22nd – 24th Jan 2024;<br>19th – 20th Sep 2024:<br>■ Two-phase grid-based systematic survey.<br>■ Random meanders. | ✓ | - | No. Targeted surveys within the Project Site did not record this species. |

| Scientific Name | Common Name | BC Act | SAII | Associated PCTs | Optimal survey period | Species presence | Survey effort | IBRA Subregion | | Affected? |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Beardy River Hills | Glenn Innes-Guyra Basalts | |
| *Rutidosis heterogama* | Heath Wrinklewort | V | No | PCT 3722 | All year | No (surveyed) | 21st – 26th Nov 2022;<br>22nd – 24th Jan 2024;<br>19th – 20th Sep 2024:<br>■ Two-phase grid-based systematic survey.<br>■ Random meanders.<br>■ Parallel traverses. | ✓ | - | No. Targeted surveys within the Project Site did not record this species. |
| *Thesium australe* | Austral Toadflax | V | No | PCT 3722, 3339 | Nov – Feb | No (surveyed) | 21st – 26th Nov 2022;<br>22nd – 24th Jan 2024;<br>19th – 20th Sep 2024;<br>21st Jan 2025:<br>■ Two-phase grid-based systematic survey.<br>■ Random meanders.<br>■ Parallel traverses. | ✓ | ✓ | No. Targeted surveys within the Project Site did not record this species. |
| *Zieria ingramii* | Keith's Zieria | E | No | PCT 3722 | Sep – Feb | No (surveyed) | 21st – 26th Nov 2022;<br>22nd – 24th Jan 2024;<br>19th – 20th Sep 2024:<br>■ Two-phase grid-based systematic survey.<br>■ Random meanders.<br>■ Parallel traverses. | ✓ | - | No. Targeted surveys within the Project Site did not record this species. |

V = Vulnerable; E = Endangered

***Acacia pubifolia* (Velvet Wattle)**

Velvet Wattle is listed as Endangered under the BC Act and Vulnerable under the EPBC Act. Velvet Wattle is a low shrub or small tree growing to 8 m high, with dark fibrous bark. Branches are angular and covered with velvety hairs. The adult leaves are straight or slightly curved, 2 - 10 cm long and 8 - 30 mm wide, with prominent veins and a rounded tip. Its flowers are clustered together in a long tube or spike, 2-5 cm long. Flowering occurs during September and October (NSW DCCEEW 2025b). The species is known from two sites in NSW, one north of Emmaville in the Torrington State Recreation Area and the other on private property near Warrabah National Park, and from near Wyberba in Queensland (DEWHA 2008). It grows in dry scrubby woodland on granite, sandy, stony, loam and metasediment soils (DEWHA 2008).

Velvet Wattle was recorded during targeted surveys across the Project Site (shown in **Illustration 6.2**) in multiple patches, some of which were dense with numerous individuals coppicing off mature individuals or as regrowth due to disturbance (likely from livestock and storm damage). Velvet Wattle is listed as an 'area' species credit species (as shown in TBDC); as such, species polygons for the species were associated with PCT 3722 and 3363 (poor, modified and intact condition zones) throughout the Project Site.

In response to CPHR's recommendations, the Species Polygon for Velvet Wattle has been revised to reflect the clonal nature of the species and guidance provided in the Threatened Biodiversity Data Collection (TBDC) and the Survey Guide for Threatened Plants and Their Habitats (DPIE 2020). Specifically, the updated Species Polygon has been derived by applying a 50m buffer on all valid recorded occurrences of Velvet Wattle within the Development Footprint and merging these buffered areas to form a consolidated Species Polygon.

This approach replaces the previous precautionary method, which incorporated all Vegetation Zones associated with PCT 3722 and PCT 3363. The revised Species Polygon (15 ha) will replace the current Species Polygon (314.03 ha) and is considered to more accurately represent the distribution of the Species Credit Species within the Development Footprint.

Velvet Wattle species polygons are shown in **Illustration 6.2**. Large patches of Velvet Wattle were also recorded outside the Project Site within offset areas (**Illustration 6.3**).

**Plate 6.1 Velvet Wattle (*Acacia pubifolia*) recorded within the Project Site**

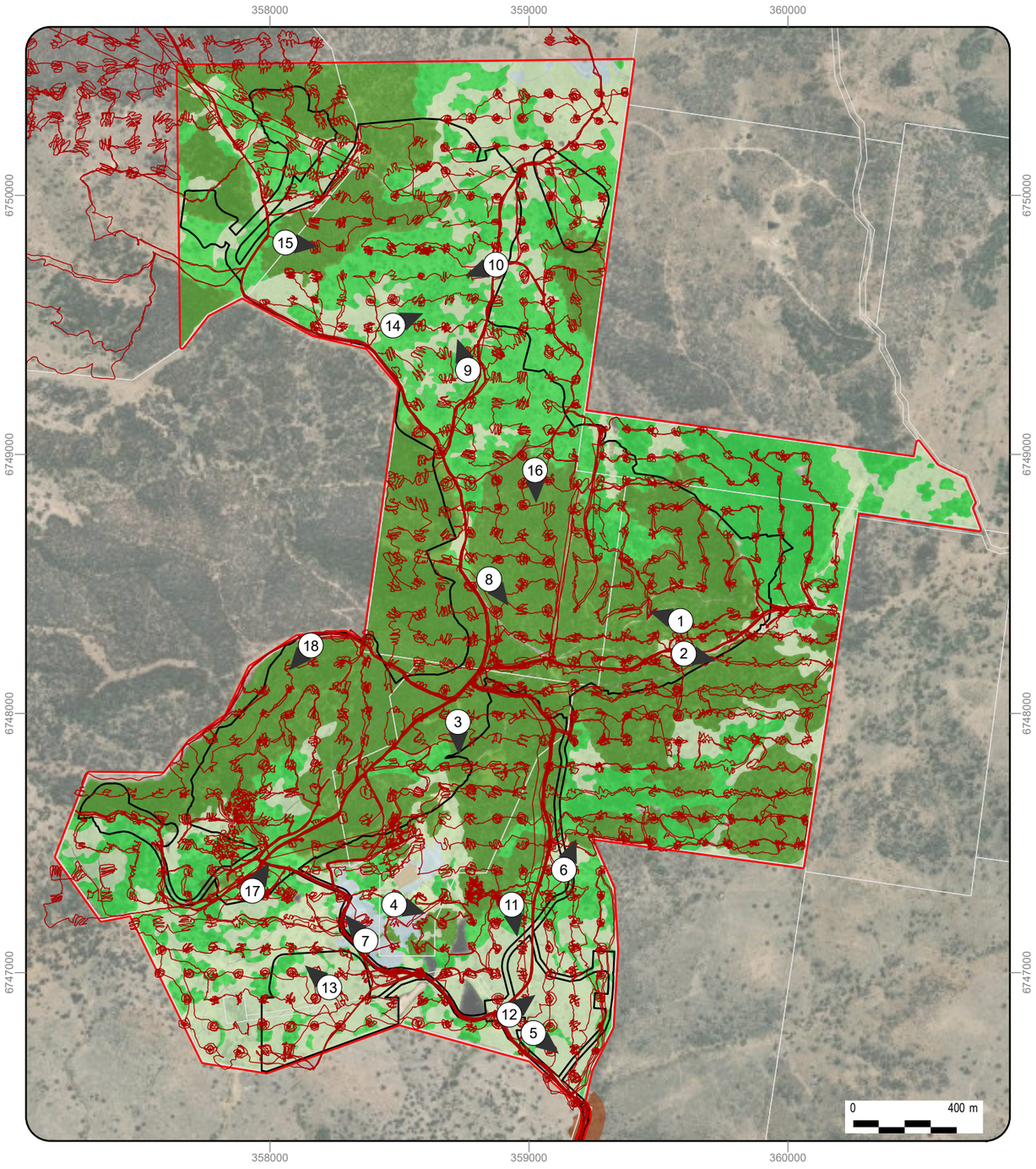
***Dichanthium setosum (Bluegrass)***

*Dichanthium setosum* (Bluegrass) is listed as Vulnerable under the BC Act and EPBC Act. Bluegrass occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, extending to northern Queensland. It occurs widely on private property, including in the Inverell, Guyra, Armidale and Glen Innes areas (NSW DCCEEW 2025b).

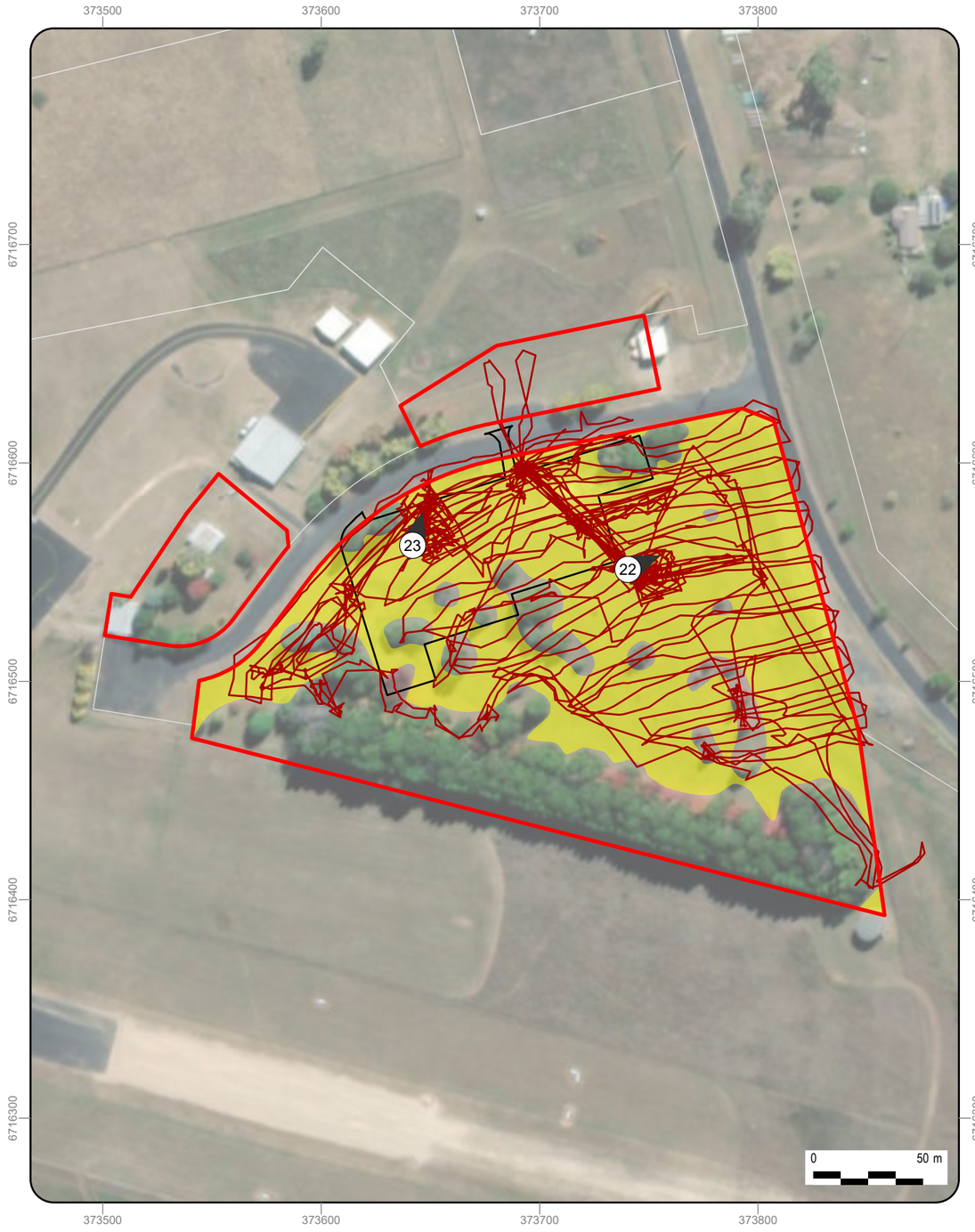
Bluegrass was recorded during targeted surveys within the Project Site associated with the Mine Camp at Glen Innes Airport (shown in **Illustration 6.2** and **Plate 6.2**). Bluegrass was recorded within grassland areas associated with poor condition PCT 3339. Sample specimens were collected and sent to the Royal Botanic Gardens Identification Service for confirmation. Multiple patches of *Dichanthium* spp. were recorded, and samples collected. Not all samples were confirmed as *Dichanthium setosum,* some patches were verified as the non-threatened *Dichanthium sericeum* (Queensland Bluegrass) a native pasture grass widely used for pastoral use for livestock.

Bluegrass is listed as an 'area' species credit species (as shown in TBDC); as such, species polygons were associated with PCT 3339 (poor condition) habitat throughout the Mine Camp at Glen Innes. Bluegrass species polygons are shown in **Illustration 6.2**.

**Plate 6.2 Bluegrass recorded within Project Site at the Mine Camp**




Mine Site




Mine Camp

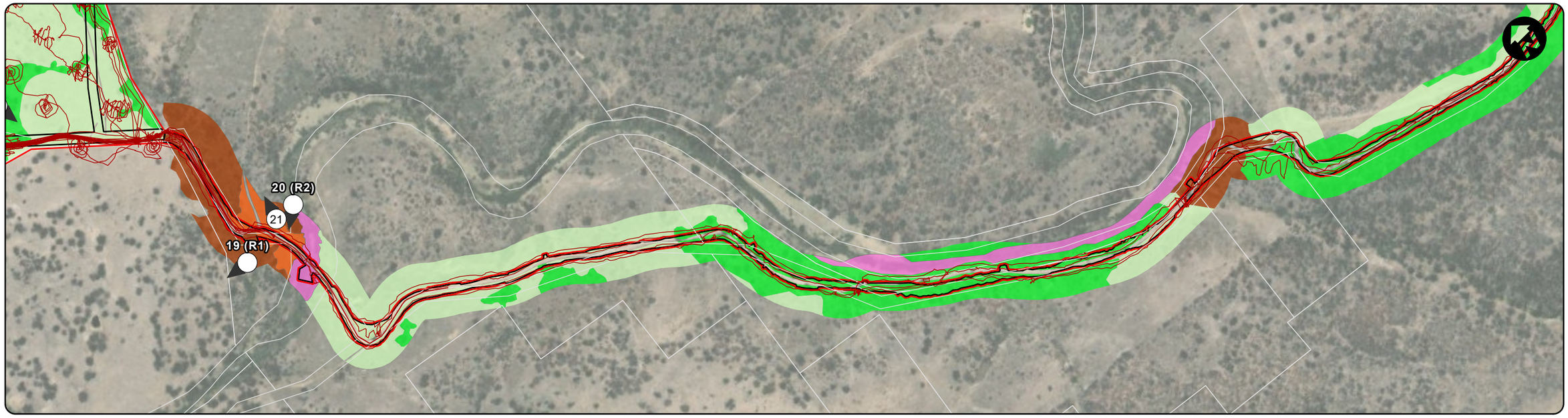
**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre
- PCT: 3722 - Intact condition
- PCT: 3722 - Modified condition
- PCT: 3722 - Poor condition
- PCT: 3722 - Cleared condition
- PCT: 3339 - Poor condition
- PCT: 3363 - Intact condition
- PCT: 3363 - Poor condition
- PCT: 4080 - Modified condition
- Threatened flora survey transects
- BAM plot

Threatened Flora Survey Effort - Illustration 6.1 - Sheet 1 of 2



***Information shown is for illustrative purposes only***
*Drawn by: AB Reviewed by: GJM*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 29/04/2026 / Revision: C*




Grampians Road Upgrade North

Grampians Road Upgrade South

**LEGEND**

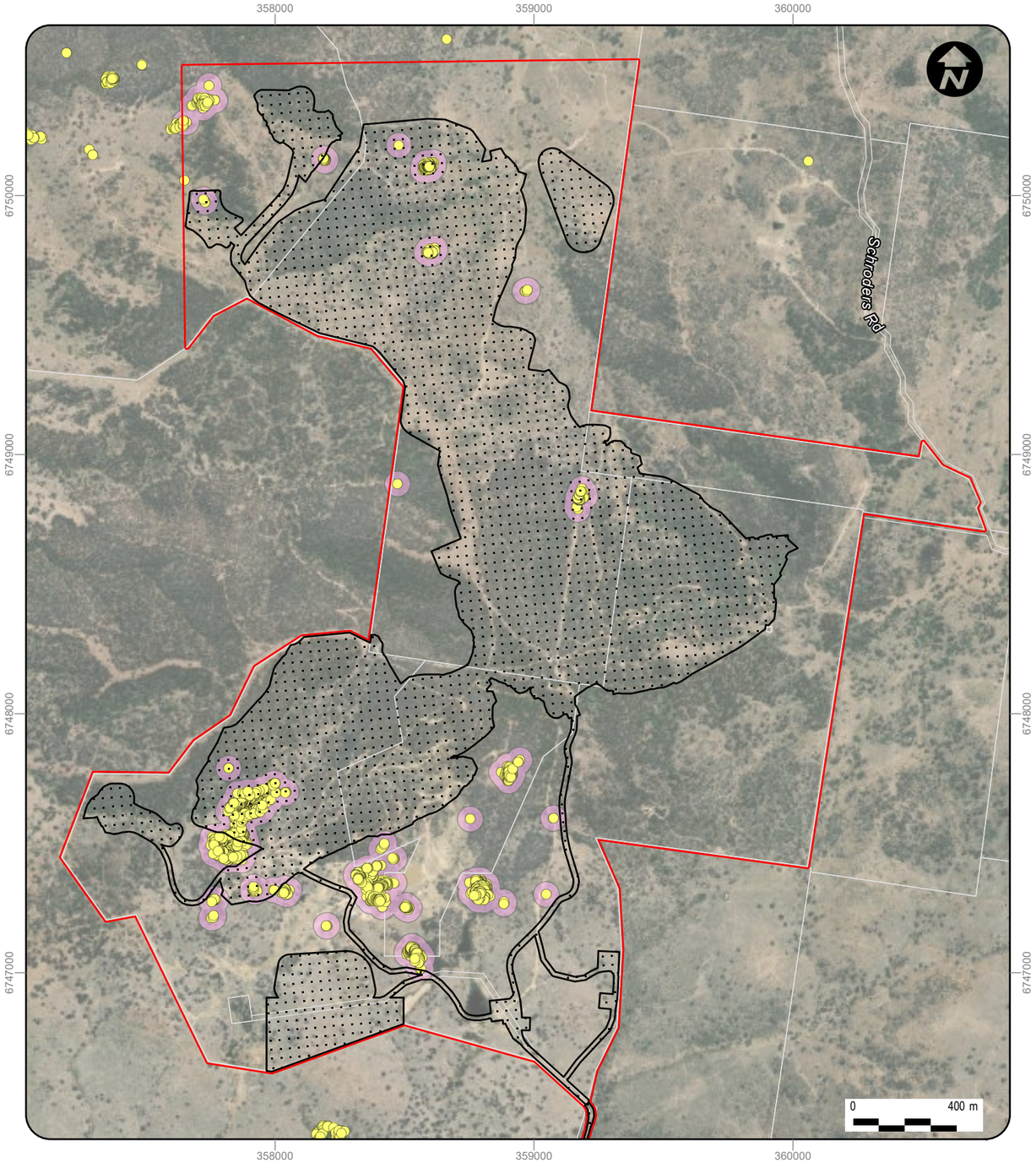
- Site boundary
- Limit of distubance
- PCT: 3722 - Modified condition
- PCT: 3722 - Poor condition
- PCT: 3363 - Intact condition
- PCT: 3363 - Poor condition
- PCT: 4080 - Modified condition
- Threatened flora survey transects
- Cadastre
- BAM plot

0 160 m

Threatened Flora Survey Effort - Illustration 6.1 - Sheet 2 of 2



***Information shown is for illustrative purposes only***
*Drawn by: AB Reviewed by: GJM*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 29/04/2026 / Revision: C*




Mine Site

Mine Camp

LEGEND

- Site boundary
- Limit of disturbance
- Cadastre

Flora Species Polygon

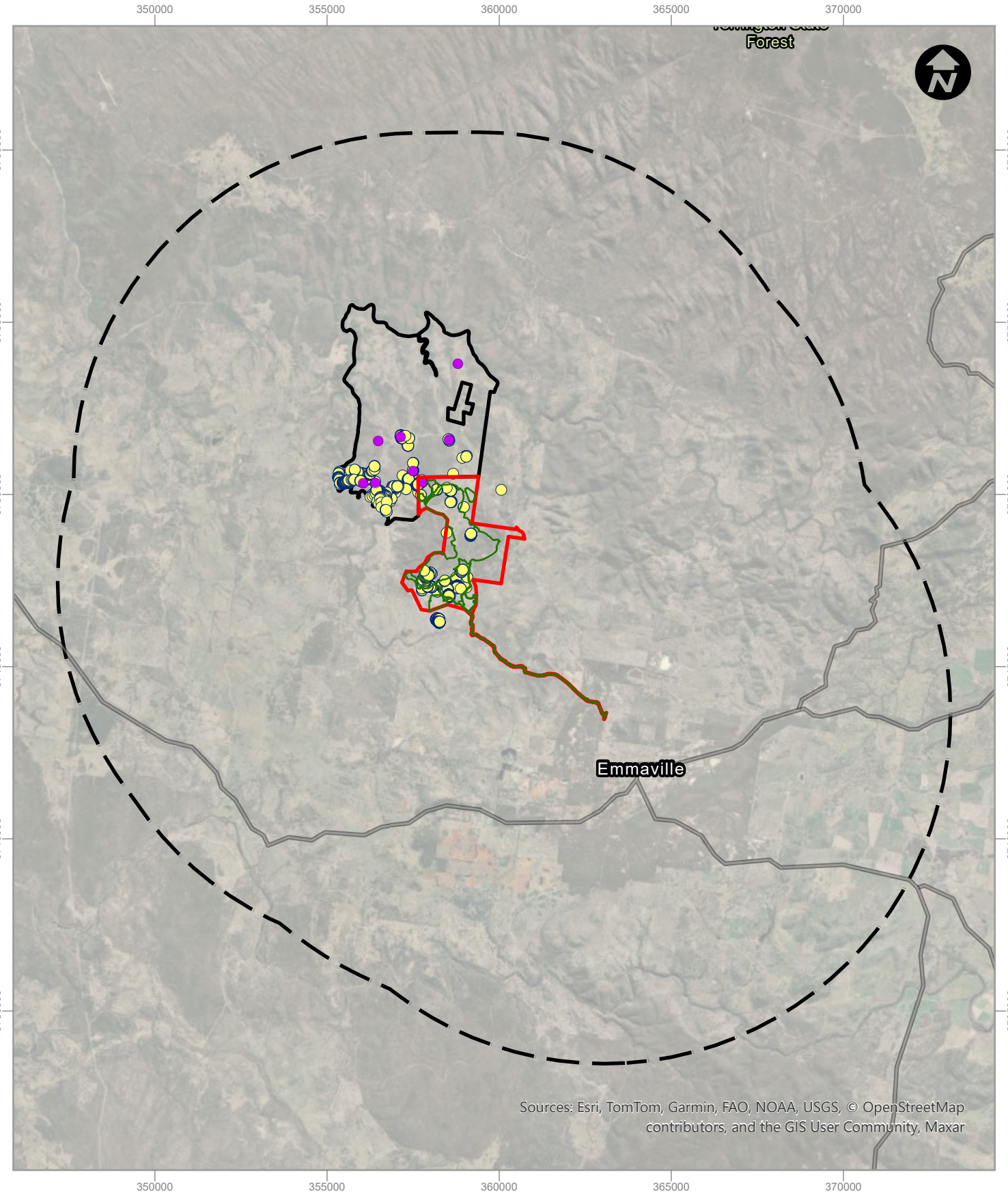
- Acacia pubifolia (Velvet Wattle)
- Dichanthium setosum (Bluegrass)

- Bluegrass *(Dichanthium setosum)*
- Velvet Wattle *(Acacia pubifolia)*

## Recorded Threatened Flora And Species Polygons - Illustration 6.2



***Information shown is for illustrative purposes only***
*Drawn by: AB Reviewed by: GJM*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 29/04/2026 / Revision: C*




**LEGEND**

- Site boundary
- 10 km buffer from site
- Offset site boundary
- Limit of disturbance
- Velvet Wattle (GeoLINK)
- Velvet Wattle (First Tin)

0 3 km

## Velvet Wattle Occurrence Within the Locality - Illustration 6.3



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

### 6.4.2 Threatened fauna species credit species

A list of candidate threatened fauna species credit species was generated from the BAM-C based on associated habitat features recorded within the Project Site. Candidate threatened fauna species are presented in **Table 6.9**.

**Table 6.9 List of BAM-C threatened fauna species credit species**

| Scientific Name | Common Name | BC Act | SAII | Habitat features | IBRA Subregion | |
|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] |
| **Amphibians** | | | | | | |
| *Adelotus brevis* - endangered population Tusked Frog population in the Nandewar and New England Tableland Bioregions | | E2 | Yes | N/A | ✓ | ✓ |
| *Litoria booroolongensis* | Booroolong Frog | E | No | N/A | - | ✓ |
| **Birds** | | | | | | |
| *Anthochaera phrygia* | Regent Honeyeater | CE | Yes | Mapped in important areas | ✓ | - |
| *Burhinus grallarius* | Bush Stone-curlew | E | No | Fallen/ standing dead timber including logs | - | ✓ |
| *Calyptorhynchus lathami* | Glossy Black-Cockatoo | V | No | Living or dead tree with hollows greater than 15 cm diameter and greater than 8 m above ground. | ✓ | ✓ |
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | V | No | Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines. | ✓ | ✓ |
| *Hieraaetus morphnoides* | Little Eagle | V | No | Nest trees - live (occasionally dead) large old trees within vegetation). | ✓ | ✓ |
| *Lathamus discolor* | Swift Parrot | E | Yes | Mapped in important areas. | ✓ | ✓ |
| *Lophoictinia isura* | Square-tailed Kite | V | No | Nest trees. | ✓ | ✓ |
| *Ninox connivens* | Barking Owl | V | No | Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground. | ✓ | ✓ |
| *Ninox strenua* | Powerful Owl | V | No | Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground. | ✓ | - |
| *Tyto novaehollandiae* | Masked Owl | V | No | Living or dead trees with hollows greater than 20 cm diameter. | ✓ | ✓ |
| **Mammals** | | | | | | |

| Scientific Name | Common Name | BC Act | SAII | Habitat features | IBRA Subregion | |
|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] |
| *Cercartetus nanus* | Eastern Pygmy-possum | V | No | N/A | - | ✓ |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | V | Yes | Cliffs or Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. | ✓ | - |
| *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V | Yes | Caves or Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave. | ✓ | - |
| *Myotis macropus* | Southern Myotis | V | No | Waterbodies with permanent pools/ stretches 3 m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site. | - | ✓ |
| *Petauroides volans* | Southern Greater Glider | E | No | N/A | ✓ | - |
| *Petaurus norfolcensis* | Squirrel Glider | V | No | N/A | ✓ | - |
| *Phascolarctos cinereus* | Koala | E | No | Presence of koala use trees. | ✓ | ✓ |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | V | Yes | Breeding camps. | ✓ | ✓ |
| *Vespadelus troughtoni* | Eastern Cave Bat | V | Yes | Caves or Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds. | ✓ | - |
| **Reptiles** | | | | | | |
| *Myuchelys bellii* | Western Saw-shelled Turtle | E | No | N/A | ✓ | - |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | No | N/A | ✓ | - |

V = Vulnerable; E = Endangered; E2 = Endangered Population

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

#### 6.4.2.1 Justification for inclusion of any additional threatened fauna species credit species

In identifying a candidate threatened fauna species list for further assessment, five additional threatened fauna species credit species were included (**Table 6.10**).

**Table 6.10 Justification for inclusion of any additional threatened fauna species credit species**

| Scientific Name | Common Name | BC Act | SAII | Associated PCTs and habitat features | Justification | IBRA Subregion | |
|---|---|---|---|---|---|---|---|
| | | | | | | BRH[1] | GIGB[2] |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | V | Yes | Cliffs or Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. | Potential habitat in association with cave-like structures (i.e. adits) and cliffs areas within 2 km. | ✓ | - |
| *Myuchelys bellii* | Western Saw-shelled Turtle | E | No | N/A | Potential habitat associated with creeks. Records in greater locality. | ✓ | - |
| *Ninox strenua* | Powerful Owl | V | No | Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground. | Potential habitat associated with dry sclerophyll woodland (PCT 3722). | ✓ | - |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | No | N/A | **Recorded** during targeted surveys. | ✓ | - |
| *Vespadelus troughtoni* | Eastern Cave Bat | V | Yes | Caves or Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds. | Potential habitat in association with cave-like structures (i.e. adits) and cliffs areas within 2 km. | ✓ | - |

V = Vulnerable; E = Endangered

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

#### 6.4.2.2 Justification for exclusion of any additional threatened fauna species credit species

In refining the candidate threatened fauna species list for further assessment, 15 threatened fauna species predicted by the BAM-C were excluded from the BAM-C candidate species credit list. The majority of exclusions are associated with the proposed Mine Camp due to the lack of habitat constraints and its degraded condition. A summary of the justification for this exclusion is provided in **Table 6.11**.

**Table 6.11 Justification for exclusion of any threatened fauna species credit species**

| Scientific Name | Common Name | BC Act | SAII | Habitat features | Justification for exclusion | IBRA Subregion BRH[1] | IBRA Subregion GIGB[2] |
|---|---|---|---|---|---|---|---|
| **Amphibians** | | | | | | | |
| *Adelotus brevis* - endangered population | Tusked Frog | E2 | Yes | N/A | **Habitat degraded** – Tusked Frog within the Nandewar and New England Tableland Bioregions are usually found near creeks, ditches and ponds, associated with rainforests, wet forests and flooded grassland and pasture (NSW DCCEEW 2025b). The proposed Mine Camp at Glen Innes Airport within the Glenn Innes-Guyra Basalts IBRA subregion occurs in a degraded and disturbed state, it has been aligned with a derived form of PCT 3339. The Mine Camp does not have any mapped waterbodies or wet soaks/ wet pastureland either within or in close proximity to the site. Overall, the Mine Camp does not provide habitat for amphibian species; it has historically been utilised as a residential lot and has been regularly mown and maintained. | - | ✓ |
| *Litoria booroolongensis* | Booroolong Frog | E | No | N/A | **Habitat degraded** – Booroolong Frog live along permanent streams, near cobble banks and other rock structures within stream margins. Individuals shelter under rocks or amongst vegetation near the ground on the stream edge (NSW DCCEEW 2025b). The proposed Mine Camp at Glen Innes Airport within the Glenn Innes-Guyra Basalts IBRA subregion occurs in a degraded and disturbed state, it has been aligned with a derived form of PCT 3339. The Mine Camp does not have any mapped waterbodies or wet soaks/ wet pastureland either within or in close proximity to the site. Overall, the Mine Camp does not provide habitat for amphibian species; it has historically been utilised as a residential lot and has been regularly mown and maintained. | - | ✓ |
| **Birds** | | | | | | | |
| *Anthochaera phrygia* | Regent Honeyeater | CE | Yes | Mapped in important areas | **Habitat constraint** – The Project Site does not occur within mapped important areas as defined by NSW DCCEEW. These areas are considered essential to support critical life stages of the species, e.g. breeding areas or locations important for foraging/ over-wintering for migratory species. As a result, the species was excluded from being further considered as a species credit species. | ✓ | - |
| *Burhinus grallarius* | Bush Stone-curlew | E | No | Fallen/ standing dead timber including logs | **Habitat constraint** – The Mine Camp does not provide fallen/ standing dead timber including logs. | - | ✓ |

| Scientific Name | Common Name | BC Act | SAII | Habitat features | Justification for exclusion | IBRA Subregion | |
|---|---|---|---|---|---|---|---|
| | | | | | | BRH[1] | GIGB[2] |
| *Calyptorhynchus lathami* | Glossy Black-Cockatoo | V | No | Living or dead tree with hollows greater than 15 cm diameter and greater than 8 m above ground. | **Habitat constraint** – The Mine Camp does not provide living or dead trees with hollows greater than 15 cm diameter and greater than 8 m above ground. | - | ✓ |
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | V | No | Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines. | **Habitat constraint** – The Mine Camp does not provide living or dead trees with within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands. | - | ✓ |
| *Hieraaetus morphnoides* | Little Eagle | V | No | Nest trees - live (occasionally dead) large old trees within vegetation). | **Habitat constraint** – The Mine Camp did not record any raptor nest trees. | - | ✓ |
| *Lathamus discolor* | Swift Parrot | E | Yes | Mapped in important areas. | **Habitat constraint** – The Project Site does not occur within mapped important areas as defined by NSW DCCEEW. These areas are considered essential to support critical life stages of the species, e.g. locations important for foraging/ over-wintering for migratory species. As a result, the species was excluded from being further considered as a species credit species. | ✓ | ✓ |
| *Lophoictinia isura* | Square-tailed Kite | V | No | Nest trees. | **Habitat constraint** – The Mine Camp did not record any raptor nest trees. | - | ✓ |
| *Ninox connivens* | Barking Owl | V | No | Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground. | **Habitat constraint** – The Mine Camp does not provide does not provided the living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above ground. | - | ✓ |
| *Tyto novaehollandiae* | Masked Owl | V | No | Living or dead trees with hollows greater than 20 cm diameter. | **Habitat constraint** – The Mine Camp does not provide does not provided the living or dead trees with hollows greater than 20 cm diameter. | - | ✓ |

| Scientific Name | Common Name | BC Act | SAII | Habitat features | Justification for exclusion | IBRA Subregion BRH[1] | IBRA Subregion GIGB[2] |
|---|---|---|---|---|---|---|---|
| **Mammals** | | | | | | | |
| *Cercartetus nanus* | Eastern Pygmy-possum | V | No | N/A | **Habitat degraded** – Eastern Pygmy-possum are found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands (NSW DCCEEW 2025b). The proposed Mine Camp at Glen Innes Airport within Glenn Innes-Guyra Basalts IBRA subregion, occurs in a degraded and disturbed stated, it has been aligned with a derived form of PCT 3339. The Mine Camp does not a rich native shrub understory nor were any canopy species (i.e. eucalyptus trees) recorded within the Mine Camp. The site is also fragmented from any surrounding intact woodland patches, reducing the likelihood of the species occurring at the site. Overall, the Mine Camp does not provided habitat for Eastern Pygmy-possum, it has historically been utilised as a residential lot and has been regularly mown and maintained. | - | ✓ |
| *Myotis macropus* | Southern Myotis | V | No | Waterbodies with permanent pools/ stretches 3 m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site. | **Habitat constraint** – The Mine Camp does not provide waterbodies with permanent pools/ stretches 3 m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site. | - | ✓ |
| *Phascolarctos cinereus* | Koala | E | No | Presence of koala use trees. | **Habitat constraint** – The Mine Camp does not provide the presence of koala use trees. | - | ✓ |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | V | Yes | Breeding camps. | **Habitat constraint** – The species occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. A key habitat feature for the species to be considered as a species credit is the presence of a breeding camp within the Project | ✓ | ✓ |

| Scientific Name | Common Name | BC Act | SAII | Habitat features | Justification for exclusion | IBRA Subregion | |
|---|---|---|---|---|---|---|---|
| | | | | | | BRH[1] | GIGB[2] |
| | | | | | Site. Based on field investigations no breeding camps occur within the Project Site or in close proximity to the Project Site, as such, the species was excluded from being further considered as a species credit species. | | |

V = Vulnerable; E = Endangered; CE = Critically Endangered

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

#### 6.4.2.3 Assessment of candidate threatened fauna to determine affected species

A total of 16 candidate threatened fauna species were considered to have potential habitat within the Project Site and were subject to targeted surveys. Targeted threatened fauna surveys have been undertaken in accordance with the methods outlined in **Section 3.9** to determine the presence or absence of candidate threatened fauna species in accordance with Section 5.2.4 of the BAM (2020). A summary of the survey effort for all candidate threatened fauna species and those that are considered affected by the Project is presented in **Table 6.12**.

**Table 6.12 Assessment of candidate threatened fauna species credit species to determine affected species**

| Scientific Name | Common Name | BC Act | SAII | Habitat features | Optimal survey period | Species presence | Survey effort | IBRA Subregion BRH[1] | IBRA Subregion GIGB[2] | Affected? |
|---|---|---|---|---|---|---|---|---|---|---|
| **Amphibians** | | | | | | | | | | |
| *Adelotus brevis* - endangered population Tusked Frog population in the Nandewar and New England Tableland Bioregions | | E2 | Yes | N/A | Oct - Feb | No (surveyed) | 9th – 11th Oct 2023;<br>16th Nov 2023:<br>■ 4 nights - walking transects of suitable habitat - spotlighting, call playback and active searches within the waterbodies.<br>■ 56 person hours.<br>■ Opportunistic surveys over 35 days. | ✓ | - | No. This species was not recorded. |
| **Birds** | | | | | | | | | | |
| *Calyptorhynchus lathami* | Glossy Black-Cockatoo | V | No | Living or dead tree with hollows greater than 15 cm diameter and greater than 8 m above ground. | Jan - Sep | No (surveyed) | 11th – 13th Jan 2023;<br>23rd – 26th Jan 2023;<br>6th – 8th Feb 2023;<br>22nd – 24th Feb 2023;<br>19th – 22nd Jun 2023;<br>17th – 18th Jul 2023;<br>21st – 23rd Aug 2023;<br>9th – 11th Oct 2023;<br>22nd – 24th Jan 2024:<br>■ 12 x diurnal bird surveys.<br>■ Hollow-bearing tree surveys.<br>■ Opportunistic surveys over 35 days. | ✓ | - | No. This species was not recorded. |
| *Ninox strenua* | Powerful Owl | V | No | Living or dead trees with hollows greater than 20 cm diameter. | May - Aug | No (surveyed) | 19th – 22nd Jun 2023;<br>17th – 18th Jul 2023;<br>21st – 23rd Aug 2023:<br>■ 8 x nights Owl call playback.<br>■ 6 x nights Stag watches (18 x high potential trees).<br>■ 564 x suitable hollow-bearing trees inspected for usage. | ✓ | - | No. This species was not recorded. |
| *Ninox connivens* | Barking Owl | V | No | Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground. | May - Dec | **Yes (surveyed)** | 17th – 21st April 2023;<br>19th – 22nd June 2023;<br>17th – 18th Jul 2023;<br>21st – 23rd Aug 2023:<br>■ 8 x nights Owl call playback.<br>■ 6 x nights Stag watches (18 x high potential trees).<br>■ 564 x suitable hollow-bearing trees inspected for usage. | ✓ | - | **Yes**. Species was recorded foraging in habitat associated with disturbance footprint. Species further discussed below. |
| *Hieraaetus morphnoides* | Little Eagle | V | No | Nest trees - live (occasionally dead) large old trees within vegetation). | Aug - Oct | No (surveyed) | 21st – 26th Nov 2022;<br>25th Jan 2023;<br>9th – 11th Oct 2023;<br>22nd – 24th Jan 2024:<br>■ Raptor nests surveys (18 x potential stick nests surveyed).<br>■ Opportunistic surveys over 35 days. | ✓ | - | No. This species was not recorded. |
| *Tyto novaehollandiae* | Masked Owl | V | No | Living or dead trees with hollows greater than 20 cm diameter. | May - Aug | No (surveyed) | 19th – 22nd Jun 2023;<br>17th – 18th Jul 2023;<br>21st – 23rd Aug 2023:<br>■ 8 x nights Owl call playback.<br>■ 6 x nights Stag watches (18 x high potential trees).<br>■ 564 x suitable hollow-bearing trees inspected for usage. | ✓ | - | No. This species was not recorded. |
| *Lophoictinia isura* | Square-tailed Kite | V | No | Nest trees. | Sep - Jan | No (surveyed) | 21st – 26th Nov 2022;<br>25th Jan 2023;<br>9th – 11th Oct 2023;<br>22nd – 24th Jan 2024:<br>■ Raptor nests surveys (18 x potential stick nests surveyed).<br>■ Opportunistic surveys over 35 days. | ✓ | - | No. Species was recorded foraging in habitat associated with Project Site, however no breeding behaviour (i.e. use of stick nests) was observed. |

| Scientific Name | Common Name | BC Act | SAII | Habitat features | Optimal survey period | Species presence | Survey effort | IBRA Subregion BRH[1] | IBRA Subregion GIGB[2] | Affected? |
|---|---|---|---|---|---|---|---|---|---|---|
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | V | No | Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines. | Jul - Dec | No (surveyed) | 21st – 26th Nov 2022;<br>25th Jan 2023;<br>9th – 11th Oct 2023;<br>22nd – 24th Jan 2024:<br>■ Raptor nests surveys (18 x potential stick nests surveyed).<br>■ Opportunistic surveys over 35 days. | ✓ | - | No. This species was not recorded. |
| **Mammals** | | | | | | | | | | |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | V | Yes | Cliffs or within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. | Nov - Jan | No (surveyed) | 24th Jan 2023;<br>17th – 19th Apr 2023:<br>■ 23 x Anabat nights (18th Dec 2022 – 9th Jan 2023).<br>■ Adit thermal & harp trap surveys (10th – 11th Jan 2023; 17th – 19th April; 17th – 18th July 2023). | ✓ | - | No. Species not recorded. Targeted surveys at potential breeding habitat and analysis by bat specialist undertaken (see **Appendix G**). |
| *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V | Yes | Caves, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave | Dec - Feb | No (surveyed) | 24th Jan 2023;<br>17th – 19th Apr 2023:<br>■ 23 x Anabat nights (18th Dec 2022 – 9th Jan 2023).<br>■ Adit thermal & harp trap surveys (10th – 11th Jan 2023; 17th – 19th April; 17th – 18th July 2023). | ✓ | - | No. Species recorded using abandoned mining adit – however, adit not identified as being used for breeding (see **Appendix G**). |
| *Petaurus norfolcensis* | Squirrel Glider | V | No | N/A | All year | **Yes (surveyed)** | 19th Jun – 18th Jul 2023;<br>17th – 21st Apr 2023:<br>■ 20 x arboreal camera traps – 638 trap nights.<br>■ 4 nights spotlighting | ✓ | - | **Yes**. Recorded within habitat associated with the disturbance footprint. |
| *Petauroides volans* | Southern Greater Glider | E | No | N/A | All year | No (surveyed) | 19th Jun – 18th Jul 2023;<br>17th – 21st Apr 2023:<br>■ 20 x arboreal camera traps – 638 trap nights<br>■ 4 nights spotlighting. | ✓ | - | No. This species was not recorded. |
| *Phascolarctos cinereus* | Koala | E | No | Presence of koala use trees | All year | **Yes (surveyed)** | 9th – 11th Oct 2023:<br>■ Dog survey detection.<br>Sept 2022 – Jan 2024:<br>■ Opportunistic surveys over 35 days. | ✓ | - | **Yes**. Species is known to occur within the locality and utilise PCTs within the disturbance footprint. 2 X scats was identified during opportunistic surveys. |
| *Vespadelus troughtoni* | Eastern Cave Bat | V | Yes | Caves or within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds." | Nov - Jan | No (surveyed) | 24th Jan 2023;<br>17th – 19th Apr 2023:<br>■ 23 x Anabat nights (18th Dec 2022 – 9th Jan 2023).<br>■ Adit thermal & harp trap surveys (10th – 11th Jan 2023; 17th – 19th April; 17th – 18th July 2023). | ✓ | - | No. Species not recorded. Targeted surveys at potential breeding habitat and analysis by bat specialist undertaken (see **Appendix G**). |
| **Reptiles** | | | | | | | | | | |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | No | N/A | Nov - Mar | **Yes (surveyed)** | 24th Jan 2023;<br>21st – 24th Feb 2023;<br>17th – 19th Apr 2023:<br>■ 7 x nights – active searches and spotlighting within suitable habitat. | ✓ | - | **Yes**. Recorded within habitat associated with disturbance footprint. |

| Scientific Name | Common Name | BC Act | SAII | Habitat features | Optimal survey period | Species presence | Survey effort | IBRA Subregion | | Affected? |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | BRH[1] | GIGB[2] | |
| *Myuchelys bellii* | Western Saw-shelled Turtle | E | No | N/A | Oct - Mar | No (surveyed) | 21st – 24th Feb 2023;<br>23rd Mar 2023:<br>■ 30 hrs active searches along suitable habitat (Vegetable Creek). | ✓ | - | No. This species was not recorded. |

V = Vulnerable; E = Endangered; E2 = Endangered Population

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

**Barking Owl (*Ninox connivens*)**

The Barking Owl is listed as Vulnerable under the BC Act. The species is found throughout continental Australia except for the central arid regions. Although still common in parts of northern Australia, the species has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. The species inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend into closed forest and more open areas. The species often requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats. Nesting occurs during mid-winter and spring, being variable between pairs and among years. Laying usually occurs during August and fledging in November. Nesting usually associated with living eucalypts, though dead trees are also used. Nest sites are used repeatedly over years by a pair, but they may switch sites if disturbed by predators (e.g. goannas) (NSW DCCEEW 2025b).

A Barking Owl was recorded during nocturnal surveys involving call playback in April 2023; however, the individual was not observed utilising any hollow-bearing tree or demonstrating behaviour focused on any particular tree during April 2023 surveys. Due to the presence of a Barking Owl on the Project Site, all potential nest trees (i.e. living or dead trees with hollows > 20 cm diameter and > 4 m above the ground) were recorded within the Project Site. A total of 564 potential nest trees were inspected for signs of usage (i.e. white-wash on tree trunks and remains of prey at base of tree). Of the 564 potential nest trees inspected, 18 trees displayed preferred hollow characteristics used for breeding (i.e. hollows >20 cm diameter and tree DBH >100 cm) (per.comm. Dr. Steve Debus; 4th Apr 2023). These hollow-bearing trees were stag watched for a minimum of 2 nights to detect the presence of owl usage and breeding utilisation. Stag watches were undertaken in June – August 2023 during breeding period (May – Dec). No owls were recorded utilising any of the identified hollow-bearing trees for breeding purposes. From 14 March 2024, NSW DCCEEW changed the credit class of threatened forest owls from dual credit species to just a species credit species. With this update, the survey methodology and approach changed to detect the presence of owls within suitable habitat rather than detecting breeding individuals. As a result of these changes, despite targeted surveys not recording breeding individuals within the Project Site, the Barking Owl is considered a species credit species based on presence of the species and suitable hollow-bearing trees within the Project Site. The species polygon includes all vegetation zones within 800 m (being the approximate home range) from the location of a detected owl, which contains a living or dead tree with a hollow >20 cm diameter that occurs >4 m above the ground. In addition, the species polygon includes all intact and modified PCTs within the Project Site, as shown in **Illustration 6.8**. Areas of poor condition PCTs, outside the 800 m buffer, were excluded from species polygons within the Project Site, as these areas do not provide habitat essential for breeding and would only be utilised opportunistically for foraging.

**Large Bent-winged Bat (*Miniopterus orianae oceanensis*)**

Large Bent-winged Bat occurs along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, stormwater tunnels, buildings and other man-made structures. The species forms discrete populations centred on a maternity cave that are used annually in spring and summer for the birth and rearing of young. At other times of the year, populations disperse within about 300 km range of maternity caves. The species hunts in forested areas, catching moths and other flying insects above the tree tops (NSW DCCEEW 2025b).

Active roost searches and monitoring during the summer maternity season (December 2022 to February 2023) discovered fewer than 20 Large Bent-winged Bat's using the Project Site and associated adits. Greg Ford (bat expert) was engaged to undertake site assessments in April 2023 for threatened bats associated with the Project and analysis of subterranean bat habitat both within the Project Site and the surrounding landscape. A post-maternity season search on 17 April 2023 discovered approximately 200 individuals in "South adit 2" but none in "South adit 1" (refer to

**Illustration 6.9**). Up to 60 individuals were then observed in “South adit 1” on 19 April 2023, although it is likely these animals were a subset of the ~200 in “South adit 2”, which moved from the latter adit after being disturbed by the search on 17 April 2023 (Balance Environmental 2023). The few individuals captured at the adits during summer were all non-breeding adults of both sexes (see **Appendix G**). Furthermore, no evidence of recent breeding was observed in any of the 99 individuals (33 male, 66 female) that were captured at “South adit 2” on 17 April 2023.

Further winter surveys (17-18 July 2023) were undertaken on both adit 1 and 2, this involved direct inspection, thermal surveys and harp trapping. Both adit 1 and 2 observed < 40 individuals utilising the adits, the majority of which were adult males. Winter surveys further indicate that these adits are unlikely to provide significant over-wintering roosts for the Large Bent-winged Bat population in the region.

A Habitat Suitability Assessment (Balance Environmental 2023) of surveyed adits concluded that it is unlikely they are used for breeding purposes by the Large Bent-winged Bat population. In addition to the absence of breeding individuals observed during this study, the physical structure of the adits does not appear to include domed ceiling features that are preferred by maternity colonies (Dwyer & Hamilton-Smith 1965). The impact on these adits and the local (and broader regional) Large Bent-winged Bat population is likely to be minor, due to the following:

- The surveyed adits are not used for maternity purposes, so breeding success is unlikely to be affected.
- There are likely to be other adits or cave-like habitats in the Emmaville area that offer similar roosting opportunities for non-breeding individuals.
- The ~200 individuals roosting in “South adit 2” during the autumn 2023 surveys probably represent only a small proportion of the total regional population. Even if upwards of 1000 individuals overwinter at Project Site, that number would likely represent no more than 1% of the regional population, based on the known maternity colony size of >30,000 breeding females that occupies Riverton Bat Cave each summer (G. Ford per. obs.).

Based on the Habitat Suitability Assessment (Balance Environmental 2023), the Project Site adits are not considered to be breeding habitat for the Large Bent-winged Bat, and as such, the species is not considered as an affected species, credit species or considered to be a Serious and Irreversible Impact candidate. Large Bent-winged Bat is still considered an ecosystem credit species.

**Squirrel Glider (*Petaurus norfolcensis*)**

The Squirrel Glider is listed as Vulnerable under the BC Act. The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. The species inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. The species requires abundant tree hollows for refuge and nest sites (NSW DCCEEW 2025b).

Squirrel Gliders were recorded at several locations within the Project Site during both nocturnal spotlight surveys and on arboreal cameras (**Photo 6.1**). As such, the Squirrel Glider is considered as a species credit species as determined by on-site survey. Species polygons for Squirrel Glider were associated with all intact PCTs within the Project Site, as shown in **Illustration 6.9**. Poor condition PCTs have not been included in species polygons for Squirrel Glider, as these areas lack suitable microhabitat features (i.e. shrub and canopy layers) for the species.

**Photo 6.1 Squirrel Glider captured on arboreal camera**

**Koala (*Phascolarctos cinereus*)**

The Koala is listed as Endangered under both the BC and EPBC Act. In New South Wales, Koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range. The species inhabits eucalypt woodlands and forests, in which it feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Home range size varies with the quality of habitat, ranging from less than two hectares to several hundred hectares in size (NSW DCCEEW 2025b).

Whilst no koalas were actively recorded within the Project Site, faecal pellets were identified within the Project Site. Faecal pellets were sent off for analysis (analysis undertaken by ScatsAbout) and confirmed to be from a Koala. Subsequent Koala dog detection surveys were undertaken in September 2023, both within the Project Site and the offset site. Koala dog detection surveys did not record any additional Koala scats either within the Project Site or offset site, indicating that the presence of the species is likely to be a low densities and unlikely to provide core Koala habitat. The site provides predominately secondary food tree species listed for the northern tablelands region, including Tumbledown Gum (*E. dealbata*), Blakely's Red Gum (*E. blakelyi*) and Yellow Box (*E. melliodora*). Supplementary tree species for northern tablelands region were also observed, which included Silver-topped stringybark (*E. laevopinea*).

Due to the presence of Koala within the Project Site, the species is considered a species credit species as determined by on-site survey and habitat quality (as stated in TBDC). Species polygons for Koala were associated with PCT 3722, 3363 and 4080 and all zones that contain Koala food trees, as shown in **Illustration 6.9**.

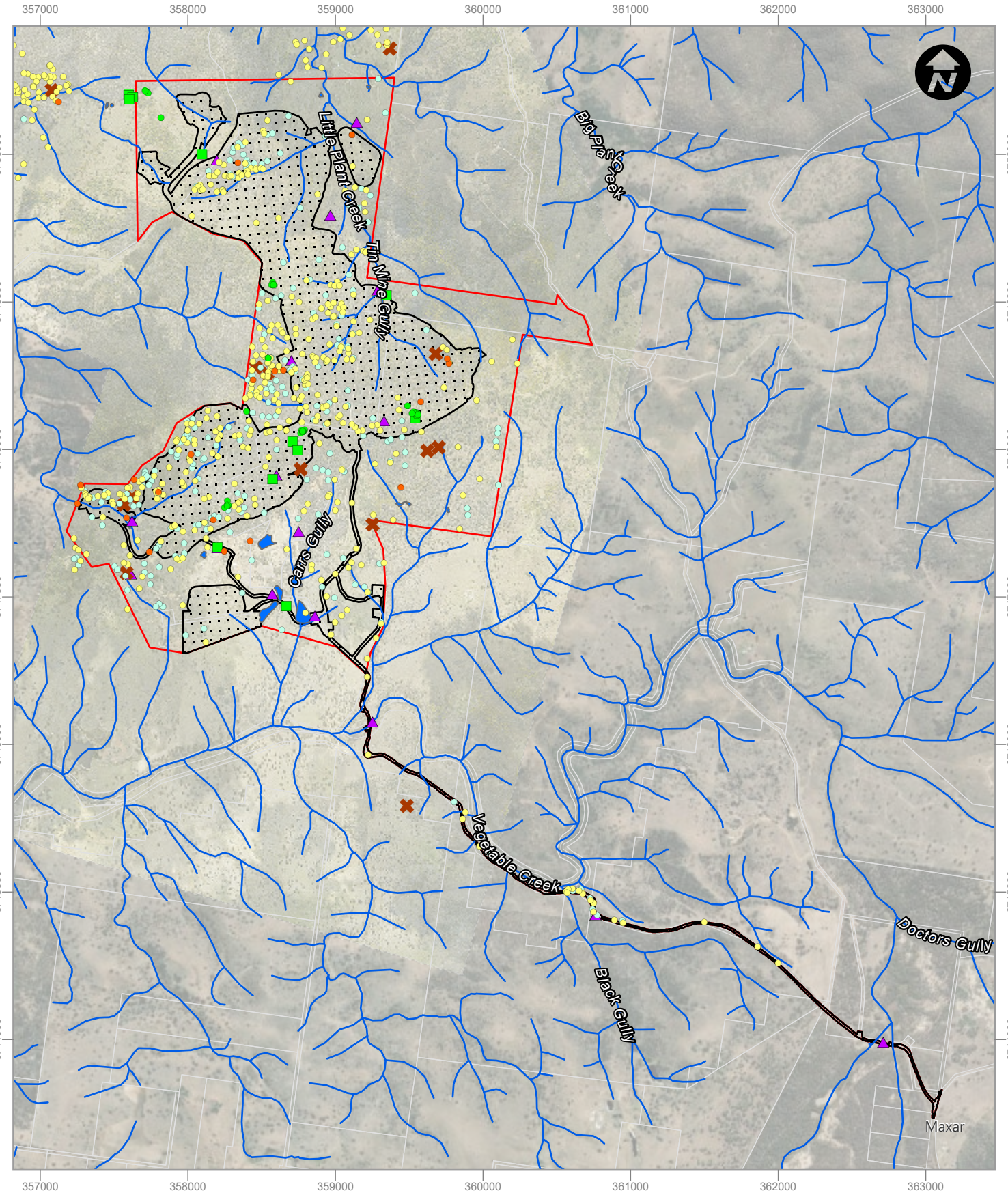
**Border Thick-tailed Gecko (*Uvidicolus sphyrurus*)**

The Border Thick-tailed Gecko is listed as Vulnerable under both the BC and EPBC Act. Found only on the tablelands and slopes of northern NSW and southern Queensland, reaching south to Tamworth and west to Moree. Most common in the granite country of the New England Tablelands. Occurs at sites ranging from 500 to 1100 m elevation. It prefers habitat with a fairly dense tree canopy with an open understorey over rocky ground, including crevices, slabs, leaf litter and heavy woody debris. During the day, Border Thick-tailed Geckos shelter in hollow logs, crevices in logs, beneath log fragments, rocks or in crevices between embedded rocks. In the evening, these geckos emerge and will actively forage in open areas or ambush prey from an elevated position on rocks and logs in areas where the lizards have an increased visual field. As this species is a terrestrial predator hunting by sight, relatively open ground is important for these geckos to locate prey.

Targeted surveys involving nocturnal searches within the Project Site identified several Border Thick-tailed Geckos associated with the disturbance footprint (**Photo 6.2**). The Project Site contains low, medium and high-quality habitat for this species associated with PCT 3722. Herpetological expert Alex Dudley has identified suitable habitat areas for the Border Thick-tailed Gecko within the Project Site (refer to **Appendix H**). However, historical disturbances, such as mining activities, tree clearing, grazing, and the introduction of invasive species like Coolatai Grass (*Hyparrhenia hirta*), have degraded habitat quality. These activities have reduced the geckos' visual range, removed cover, increased predation risk, and diminished the thermal buffering provided by tree cover after nightfall, ultimately limiting their foraging time.

While the Border Thick-tailed Geckos are unlikely to be present in detectable densities in some of the degraded habitats, it is likely that they occasionally disperse through these areas. Only the lowest-quality habitats (i.e. poor condition grassland) are consistently avoided by the species; these areas have been excluded from the species polygons. The species polygons for the Border Thick-tailed Gecko correspond to all condition states of PCT 3722, 3363 and 4080, excluding poor condition zones, as shown in **Illustration 6.10**.

**Photo 6.2 Border Thick-tailed Gecko recorded within the Project Site**




**LEGEND**

- Site boundary
- Limit of disturbance
- Cadastre
- Dam
- Watercourse or drainage
- Glossy-Black Cockatoo survey
- Bird survey
- Sticknest
- Owl call playback
- Owl Stag Watch Tree (hollows >20cm & DBH 100cm+)
- Owl HBT Inspection (hollows >20cm)
- Other HBT Inspection (hollows >15cm <20cm)

0 710 Metres

# Threatened Fauna Survey Effort (Birds) - Illustration 6.4



***Information shown is for illustrative purposes only***
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*Source of base data: RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
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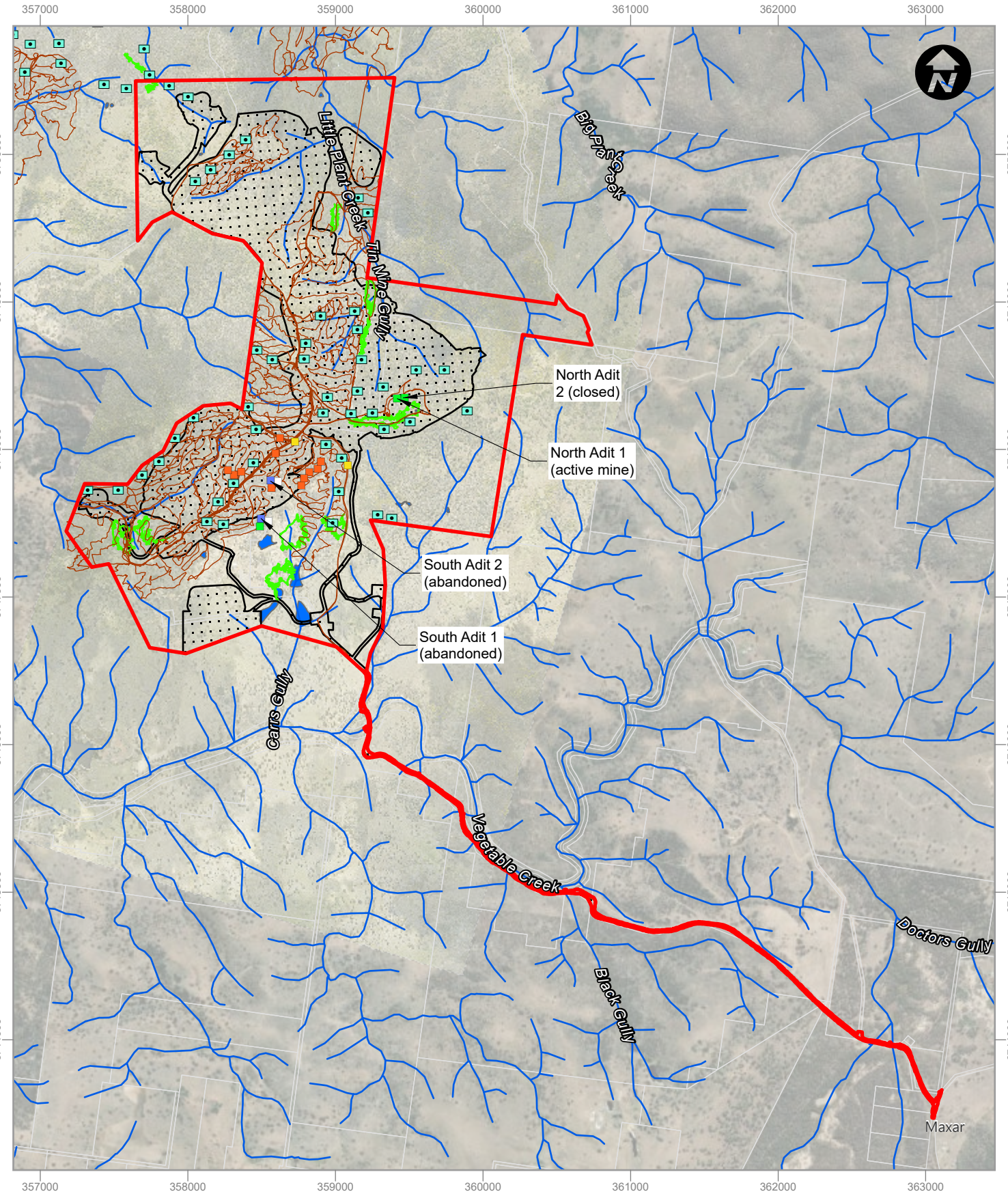


**LEGEND**

- Site boundary
- Limit of disturbance
- Cadastre
- Dam
- Spotlighting track
- Koala detection tracks
- Watercourse or drainage
- Anabat
- Harp Trap
- Mist Nets
- Roost search
- Thermal camera flyout
- Remote camera

0 710 Metres

## Threatened Fauna Survey Effort (Mammals) - Illustration 6.5



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*Source of base data: RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
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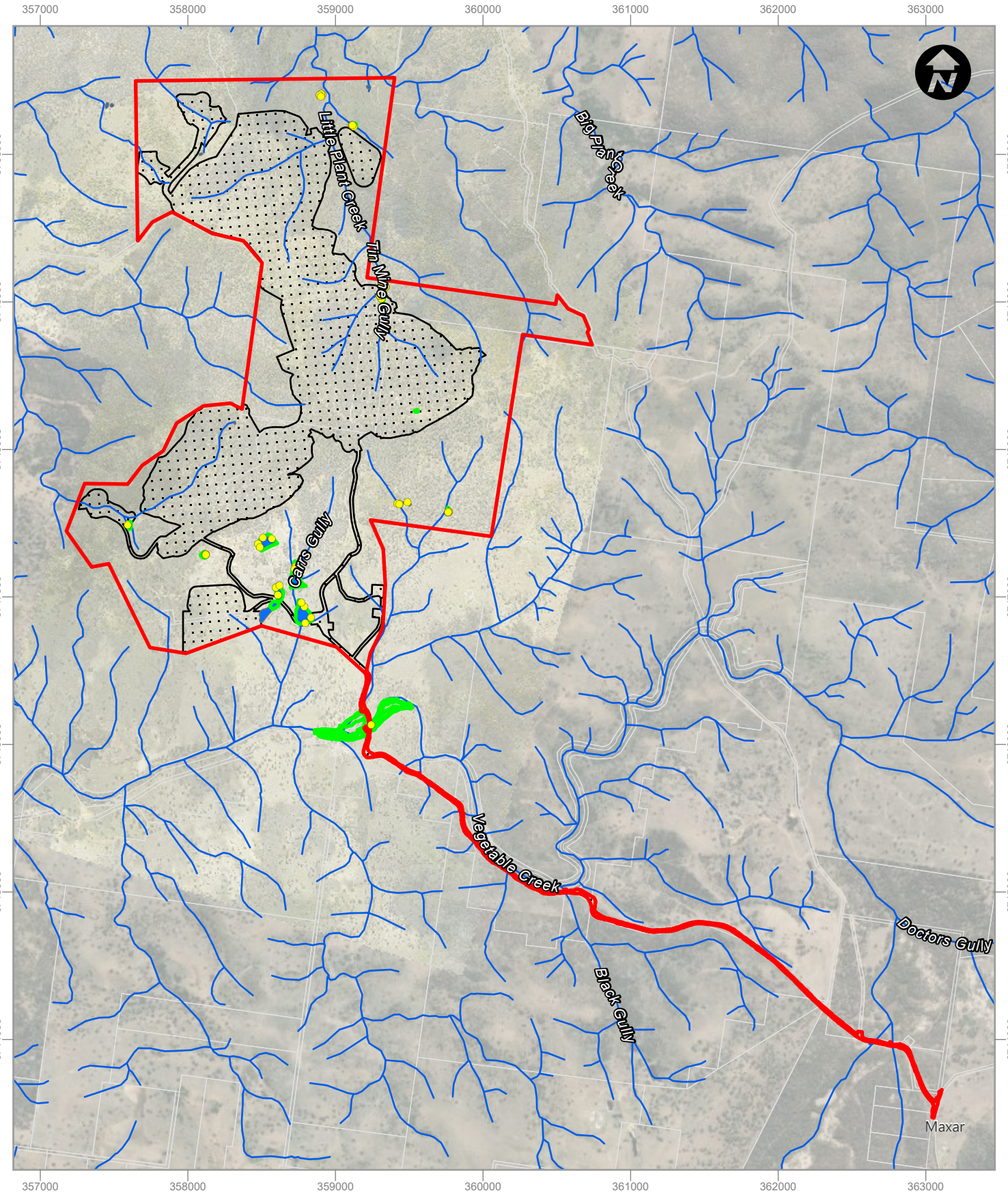


**LEGEND**

- Site boundary
- Limit of disturbance
- Cadastre
- Dam
- Watercourse or drainage
- Frog active search transect
- Frog call playback

0 710 Metres

## Threatened Fauna Survey Effort (Amphibians) - Illustration 6.6

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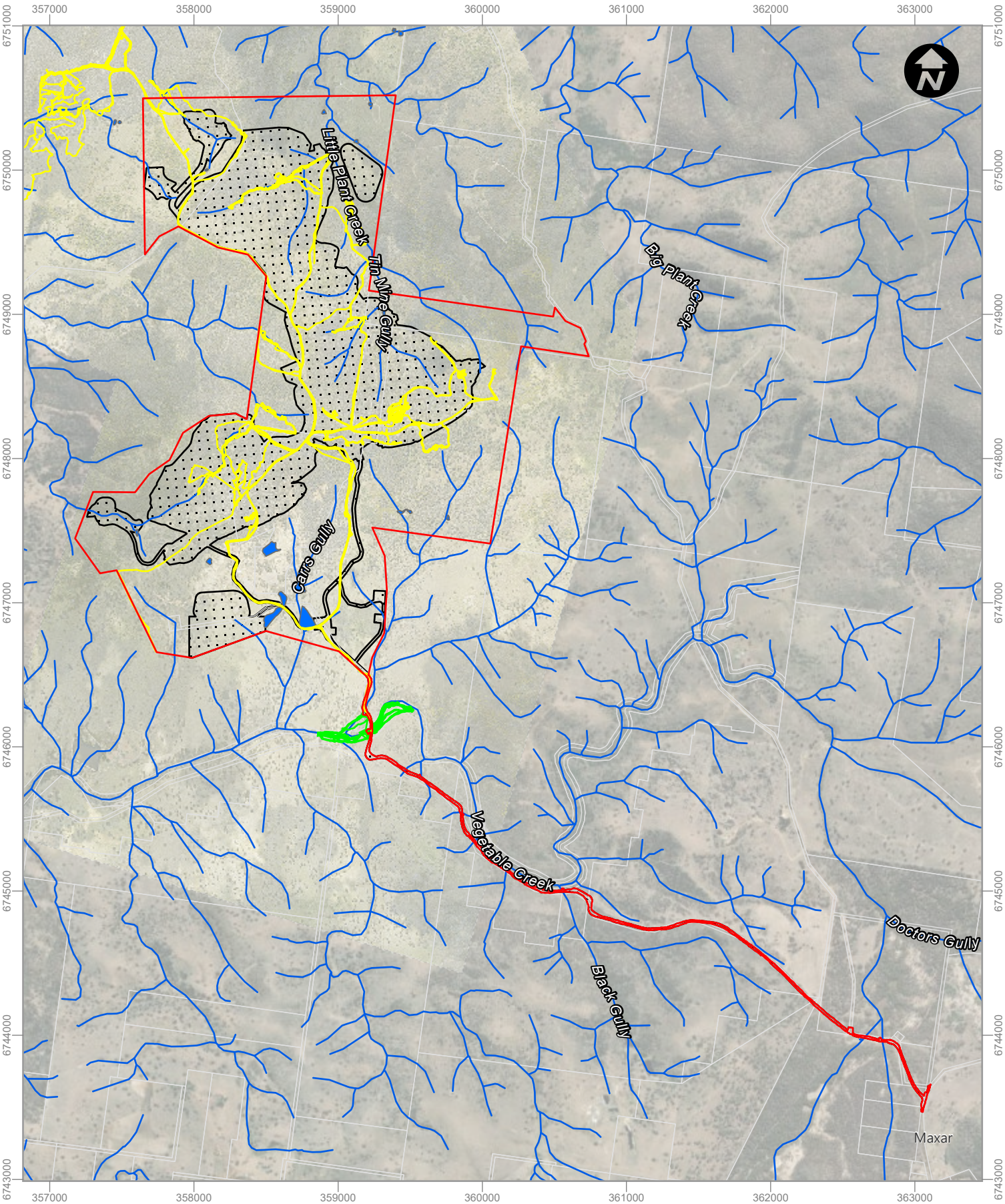


**LEGEND**

- Site boundary
- Limit of disturbance
- Cadastre
- Dam
- Watercourse or drainage
- Reptile active search tracks
- Turtle active search tracks

0 700 Metres

## Threatened Fauna Survey Effort (Reptiles) - Illustration 6.7



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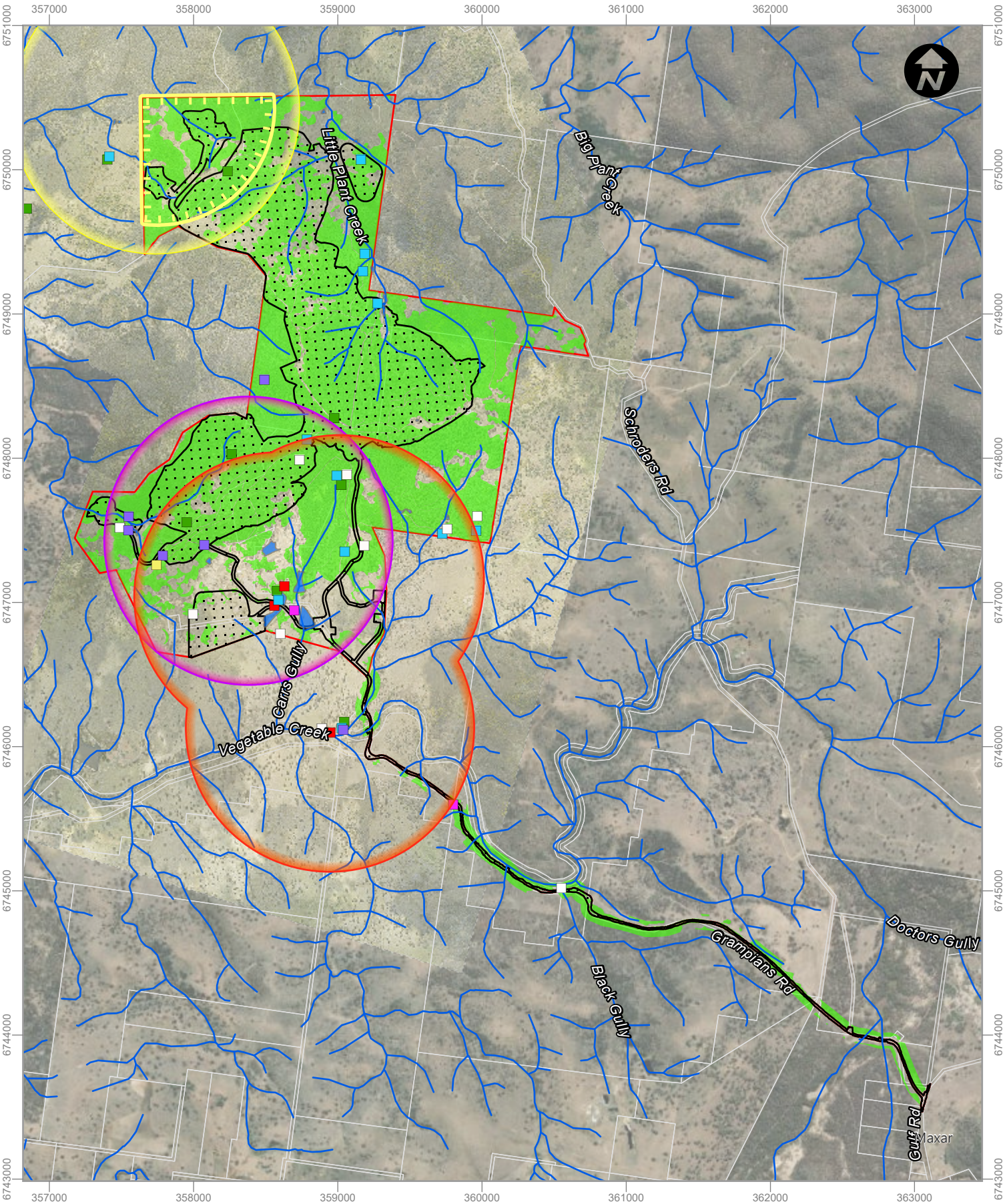


**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre
- Dam
- Barking Owl species polygon
- 800 m Barking Owl buffer
- Barking Owl (generalised to 1 km)
- Square-tailed Kite (generalised to 1 km)
- Turquoise Parrot (generalised to 1 km)
- Watercourse or drainage
- Brown Treecreeper
- Diamond Firetail
- Dusky Woodswallow
- Hooded Robin
- Little Lorikeet
- Speckled Warbler
- Varied Sitella

0 700 Metres

## Recorded Threatened Fauna and Species Polygons (Birds) - Illustration 6.8



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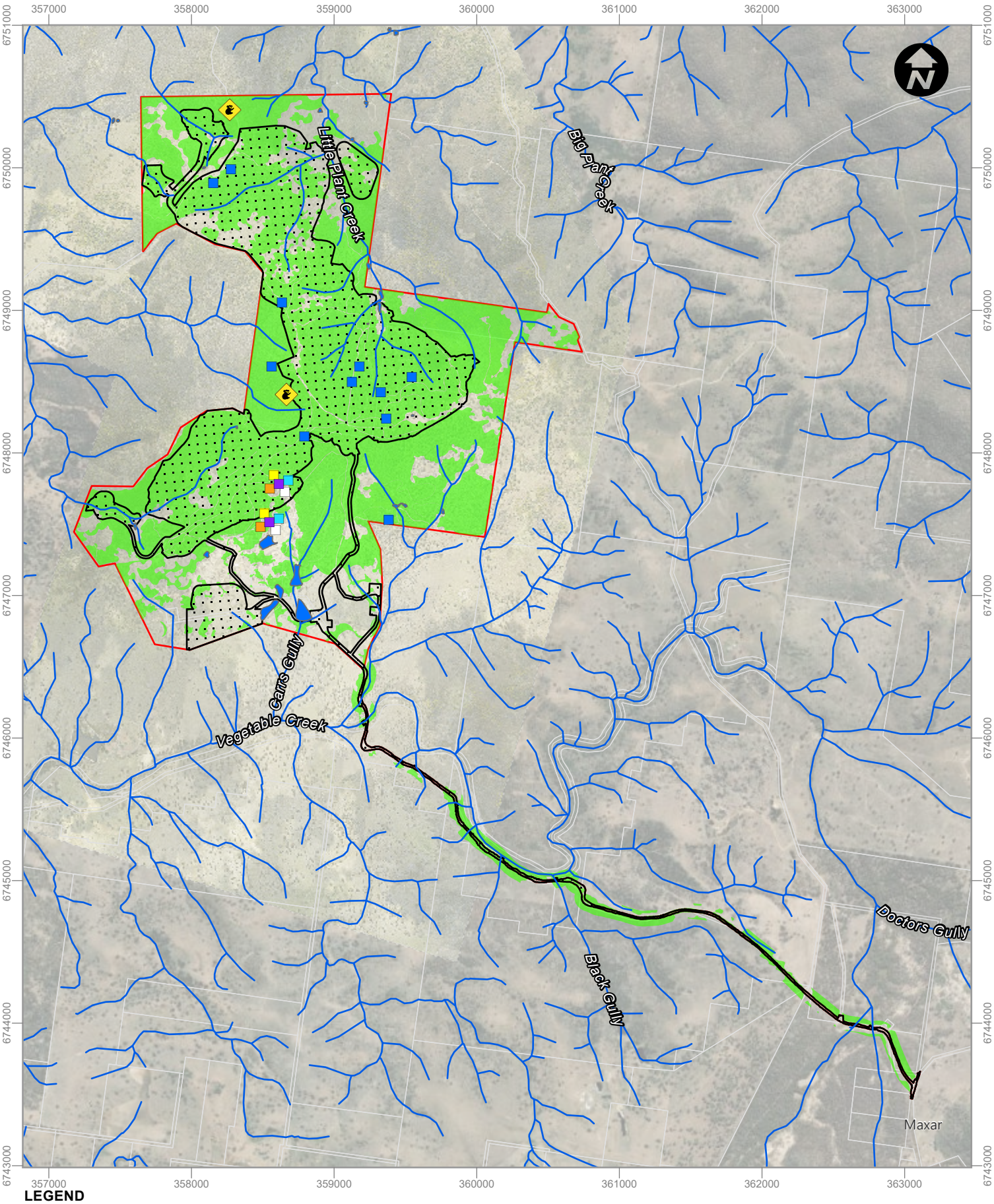


**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre
- Dam
- Squirrel Glider and Koala species polygon
- Watercourse or drainage
- Koala scat
- Eastern False Pipistrelle
- Greater Broad-nosed Bat
- Large Bent-winged Bat
- Little Pied Bat
- Squirrel Glider
- Yellow-bellied Sheathtail Bat

0 700 Metres

## Recorded Threatened Fauna and Species Polygons (Mammals) - Illustration 6.9



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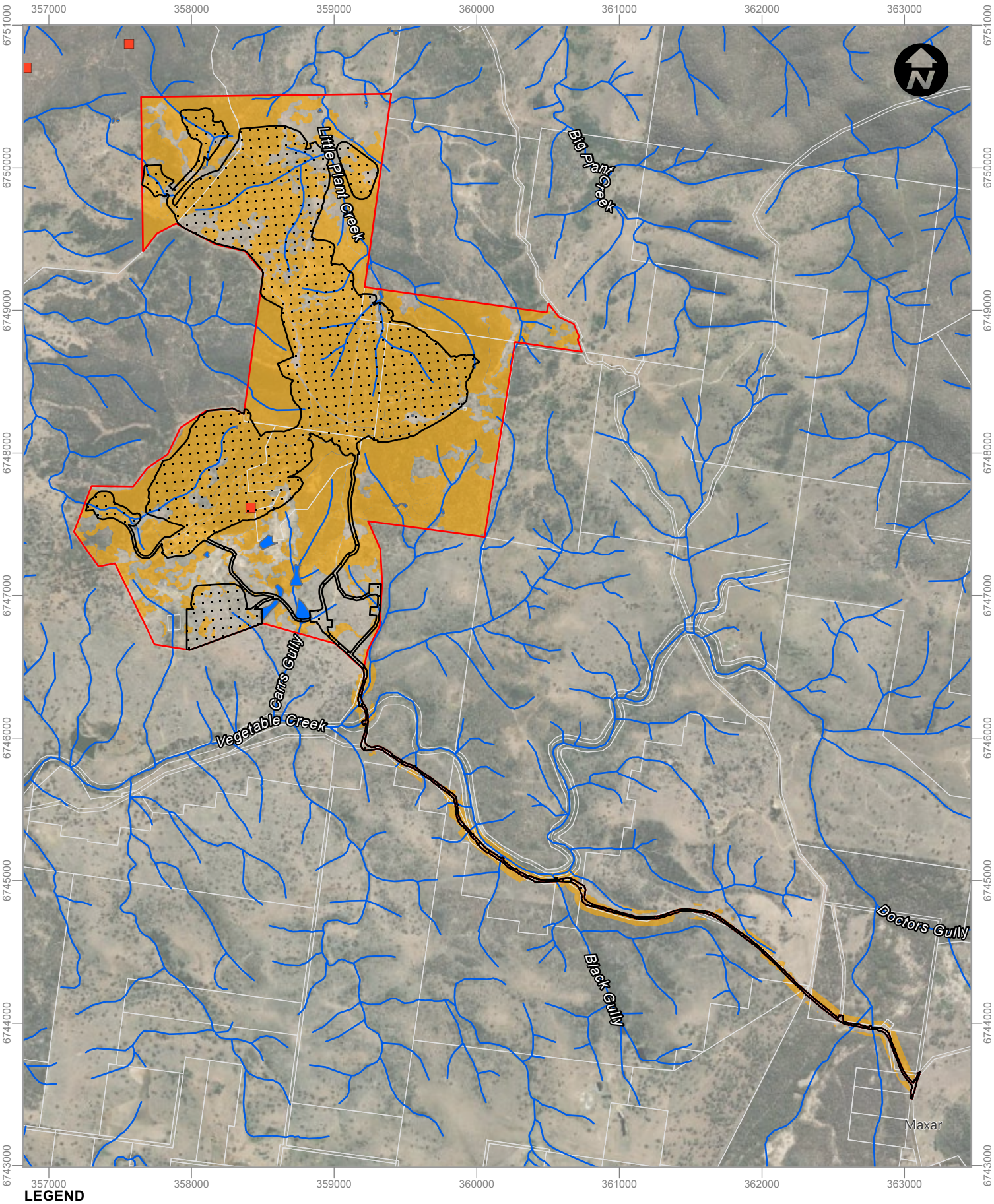


**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre
- Dam
- Border Thick-tailed Gecko species polygon
- Watercourse or drainage
- Border Thick-tailed Gecko

0 700 Metres

# Recorded Threatened Fauna and Species Polygons (Reptiles) - Illustration 6.10

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## 6.5 Threatened aquatic species

### 6.5.1 FM Act listed threatened species

Within the Project Site, threatened aquatic habitat occurs in the form of freshwater creeks that contain mapped Key Fish Habitats (KFH) (Strahler 3rd & 4th Order streams) and other open water bodies such as agricultural dams and low depressions that periodically pond water.

Areas of mapped KFH have been considered to provide a moderate likelihood of occurrence for one threatened species listed under the FM Act:

- Southern Purple Spotted Gudgeon (*Mogurnda adspersa*) listed as Endangered under the FM Act.

Further assessment of these threatened aquatic species is provided in Stage 2 of this report.

### 6.5.2 FM Act listed endangered ecological communities

No FM Act listed endangered ecological communities are associated with the Project Site.

# 7. Prescribed Impacts

This section identifies prescribed biodiversity impacts which may be difficult to quantify, replace or offset, making avoiding and minimising impacts important in accordance with Chapter 6 of BAM (2020). Prescribed biodiversity impacts relevant to the Project have been identified in **Table 7.1**.

Further consideration and assessment of the identified potential prescribed impacts are provided in Stage 2 of this BDAR.

## 7.1 Disused Mine Adits

The Mine Site contains four mine adits, two of which (North Adit 1 & 2) are active and currently used by the Applicant. The northern adits are caged at the entrance, preventing access by fauna, and are not considered to provide habitat for threatened species. The southern adits (South Adit 1 & 2) are abandoned, representing historic mining activities on the Project Site. Photographs of these adits are shown in **Plate 7.1** and **Plate 7.2**. All mine adits are located within the disturbance footprint and will be affected by the Project.

As noted in **Section 6.4.2.3**, the abandoned southern mine adits have been observed to be used by microbat species and were included in targeted fauna surveys for species credit species. According to the Habitat Suitability Assessment (Balance Environmental 2023), the southern adits are not considered breeding habitats for threatened microbat species. However, these adits are classified as prescribed impact features associated with the Project. Further details on the prescribed impact features are provided in **Table 7.1** and **Table 10.8**.

**Plate 7.1 South Adit 1 (abandoned)**

**Plate 7.2 South Adit 2 (abandoned)**

## 7.2 Non-native vegetation

### 7.2.1 Miscellaneous ecosystem – Ornamental plantings

This vegetation type does not align to any recognised PCTs in NSW due to its limited native vegetation. As such, it has been aligned to miscellaneous ecosystems - ornamental plantings. This vegetation type was typically recorded as planted exotic species that have been planted for ornamental purpose and have limited ecological function. The occurrence of ornamental plantings are in association with the proposed Mine Camp. This non-native vegetation type occupies 1.72 ha within the Project Site. No native trees or shrubs were recorded within the Mine Camp, ornamental plantings consisted of the following species, Monterey Cypress* (*Cupressus macrocarpa*), Maple (*Acer spp.*), Crab Apple* (*Malus pumila*), Narrow-leaf Ash* (*Fraxinus angustifolia*), Cherry Plum* (*Prunus spp.*),

Oak* (*Quercus spp.),* Common Elm* *(Ulmus spp.)* and Cotoneaster* *(Cotoneaster coriaceus)*. Photographic representation is provided in **Plate 7.3** and **Plate 7.4**.

**Plate 7.3 Misc. Ecosystems – Ornamental plantings**

**Plate 7.4 Misc. Ecosystems – Ornamental plantings**

Field investigations were undertaken for the suitability of the planted vegetation for use by threatened species and recorded any incidental sightings or evidence of threatened species credit species using, inhabiting or being part of the planted vegetation. Results of field investigations found that the ornamental plantings had very limited ecological value and are not being utilised by threatened species and are not considered threatened flora species. No important habitat features (i.e. hollow-bearing trees or nest trees) were recorded within the area associated with ornamental plantings. Therefore, these ornamental plantings were not considered further in the BDAR.

### 7.2.2 Miscellaneous ecosystem – Artificial waterbodies

This vegetation type does not align with any recognised PCT in NSW due to its artificial nature and relatively limited native vegetation. As such, it has been aligned to miscellaneous ecosystems – artificial waterbodies. Artificial waterbodies associated with the Project Site were in the form of artificial farm dams; these were likely installed as part of historic mining and pastural practices. Some of these aquatic habitats were in low condition, likely due to historic mining and pastural practices. Some waterbodies have the presence of emergent vegetation, including Broadleaf Cumbungi (*Typha orientalis*) and *Eleocharis* sp.(sedges) (**Plate 7.5**). This non-native vegetation type occupies about 4.22 ha within the Project Site (Mine Site).

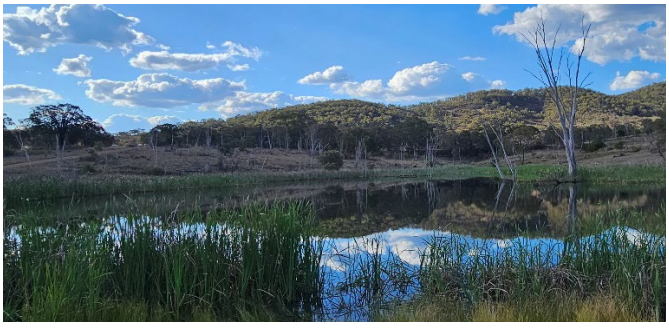


**Plate 7.5 Artificial dams**

### 7.2.3 Miscellaneous ecosystem – Drainage lines and creeks

This vegetation type does not align to any recognised PCT in NSW; as such, it has been aligned to miscellaneous ecosystem – drainage lines and creeks. Numerous small 1st and 2nd order streams and channels occur within the Project Site, most of which are ephemeral in nature. The higher ordered (>3rd order) drainage lines and creeks associated with the Project Site include:

- Vegetable Creek (4th order stream).
- Little Plant Creek (3rd order stream).

The Beardy River (5th order major river) does not occur within the Project Site, but to the north of the Mine Site, where Vegetable and Little Plant Creeks flow into. Vegetable Creek is associated as KFH and threatened fish habitat for species listed under the *Fisheries Management Act 1994* (FM Act).

Proposed upgraded sections of Grampians Road from the Main Access Road to the intersection of Gulf Road cross multiple sections of Vegetable Creek (Plate 7.6 to Plate 7.9). Existing culverts and causeways would be upgraded as part of the Project; culvert and causeway design will incorporate fish friendly passage where KFH occurs. Further details on the prescribed impact features are provided in **Table 7.1** and **Table 10.8**.

**Plate 7.6 Vegetable Creek causeway crossing**

**Plate 7.7 Vegetable Creek**

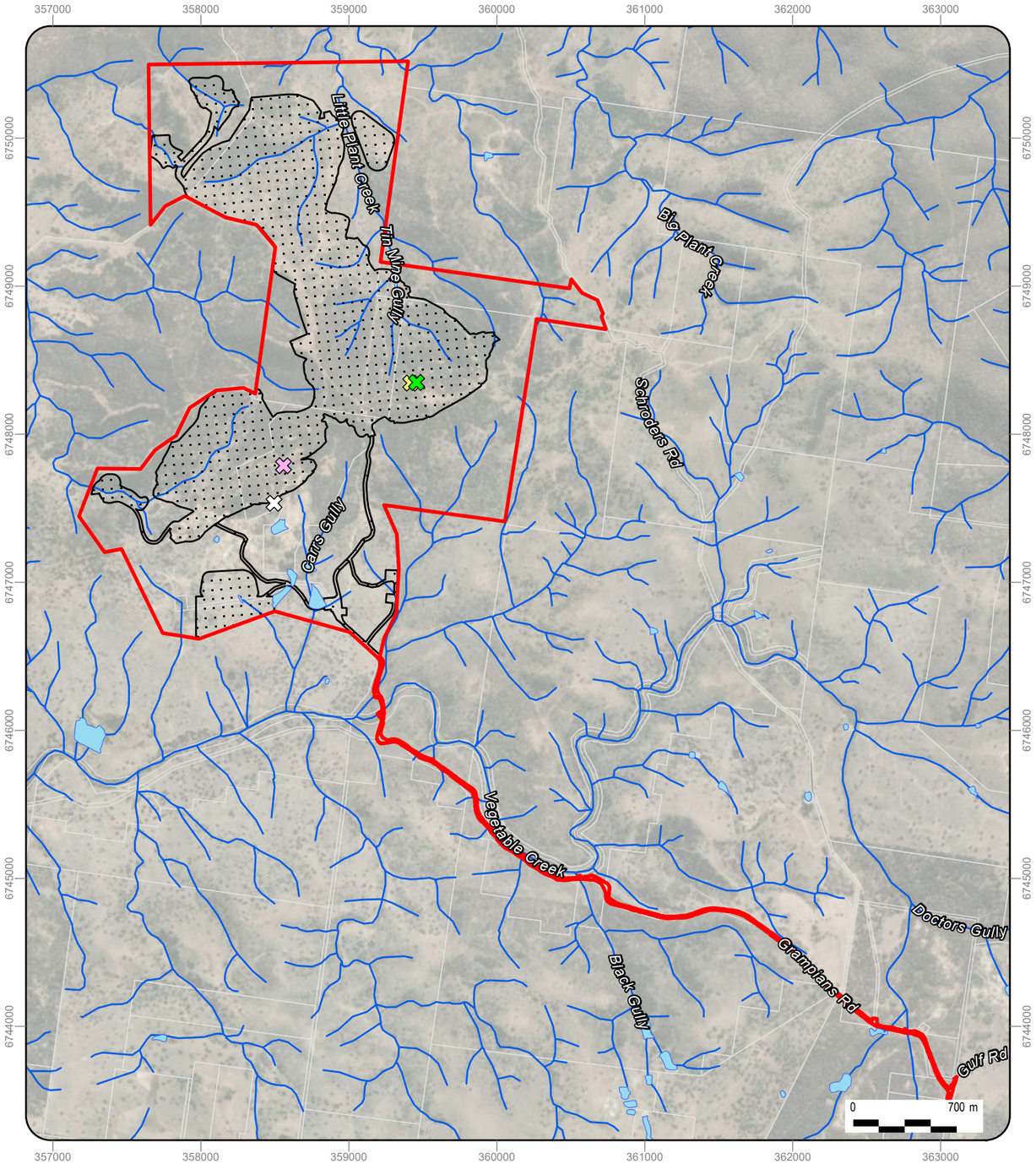
**Plate 7.8 Vegetable Creek causeway on Grampians Road**

**Plate 7.9 Vegetable Creek causeway crossing near Mine Site entrance**

**Table 7.1 Prescribed biodiversity impacts relevant to the Project**

| Prescribed biodiversity impact | Present | Relevance to the Project | Threatened species or community dependant on feature | Section of BDAR where prescribed impact is addressed |
|---|---|---|---|---|
| **a) Habitat of threatened entities including:**<br>**i. karst, caves, crevices, cliffs, rocks and other geological features of significance, or**<br>**ii. human made structures, or**<br>**iii. non-native vegetation** | **Yes** | i) No karst, caves, crevices, cliffs, rocks and other geological features of significance are present.<br>ii) Two human made structures (southern disused mine adits) relevant to prescribed impacts are present.<br>iii) A total of 1.72 ha of non-native vegetation (miscellaneous ecosystems) was recorded within the Mine Camp (Glenn Innes-Guyra Basalts IBRA subregion). This included Miscellaneous ecosystem – ornamental plantings. | ■ Microbats (i.e. Large Bentwing Bat).<br>■ Although some threatened species may utilise non-native vegetation for foraging purposes (i.e. raptors), no threatened entity was identified to be dependent on non-native vegetation for part of their life cycle. | Implementation of mitigation measures are addressed in **Section 10.3** and **Section 11**. |
| **b) Areas connecting threatened species habitat, such as movement corridors** | **Yes** | The Project has the potential to impact connectivity for the habitat of threatened species that facilitates movement across species' range. | ■ Koala.<br>■ Squirrel Glider.<br>■ Border Thick-tailed Gecko. | Implementation of mitigation measures are addressed in **Section 10.3** and **Section 11**. |
| **c) Affect water quality, water bodies and hydrological processes that sustain threatened entities** | **Yes** | The Project will result in the disturbance and adjustment of hydrological processes (i.e. creeks, drainage lines and artificial dams) within the Project Site.<br>The Project will require the removal and/ or disturbance of:<br>■ Artificial dams (0.39 ha).<br>■ 1st order streams.<br>■ 3rd order streams.<br>Grampians Road upgrade crosses Vegetable Creek and will impact drainage lines due to instream works required for access road upgrades and replacement of existing culverts. | Aquatic dependent fauna – Purple Spotted Gudgeon. | Implementation of mitigation measures are addressed in **Section 10.3** and **Section 11**. |
| **d) Threatened and protected animals from turbine strikes from a wind farm** | No | N/A | N/A | N/A |
| **e) Threatened species or fauna that are part of a TEC from vehicle strikes** | Yes | The Project is likely to generate additional vehicular movements, particularly during construction, but also during operation. An increase in vehicular traffic in the locality will cause an increase in potential for roadkill of fauna. | Koala and other native terrestrial fauna | Implementation of mitigation measures are addressed in **Section 10.3** and **Section 11**. |

**Illustration 7.1 Prescribed impact features**




Mine Site

Mine Camp

**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre
- Miscellaneous ecosytem - ornamental planting
- Waterbody / artificial dam
- Watercourse
- North Adit 1 (active mine)
- North Adit 2 (closed)
- South Adit 1 (abandoned)
- South Adit 2 (abandoned)

Prescribed Impact Features - Illustration 7.1



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# 8. Matters of National Significance

This section describes Matters of National Environmental Significance (MNES) relating to Commonwealth legislation under the EPBC Act. The following biodiversity MNES protected under the EPBC Act were considered for their relevance to the Project:

- Listed threatened species and communities.
- Listed migratory species.
- Critical habitat.
- Wetlands of national and international importance.

This BDAR provides an assessment of all EPBC Act listed threatened species and communities that may be impacted. This list of species and communities for assessment has also been supplemented and refined with database searches (i.e. BioNet, BAM-C, PMST, and NSW Fisheries databases) to provide a thorough assessment.

## 8.1 EPBC Act Listed Threatened Species and Communities

### 8.1.1 Nationally threatened ecological communities

Based on broad-scale state vegetation mapping and database searches, a total of four threatened ecological communities listed under the EPBC Act were predicted to occur in the locality. Potential threatened communities in the locality include:

- Weeping Myall Woodlands.
- New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands.
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.
- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland.

PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest is associated with the EPBC Act TEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Determining this community is subject to meeting both key diagnostic characteristics (refer **Table 8.1**) and condition thresholds (refer **Table 8.2**) listed under the approved conservation advice for the subject TEC.

**Table 8.1 Key Diagnostic Characteristics for TEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland***

| Key Diagnostic Characteristic | PCT 3363 – Intact condition | PCT 3363 – Poor condition |
|---|---|---|
| **Location***: occurs in the following bioregions: Brigalow Belt South, Murray Darling Depression, Nandewar, New England Tableland, NSW North Coast, NSW South Western Slopes, Riverina, South Eastern Queensland, South East Corner, South East Coastal Plain, South Eastern Highlands, Southern Volcanic Plain, Sydney Basin and Victorian Midlands.* | **Yes** – the Project Site occurs within the New England Tableland Bioregion. | |
| **Canopy***: it has, or previously had, an overstorey dominated or co-dominated, by Eucalyptus albens (white box) and/ or E. melliodora (yellow box) and/ or E. blakelyi (Blakely's red gum) (applicable across the entire range of the ecological community).* | **Yes –** overstorey is dominated by Blakely's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*) with Yellow Box (*Eucalyptus melliodora*) interspersed. | **Yes –** occurs as derived grassland, without a canopy; however, regenerating Blakely's Red Gum and Yellow Box were observed. Patch would have been dominated or co-dominated, by Yellow Box and/ or Blakely's Red Gum. |
| **Ground layer***: it has a predominantly native ground layer (at least 50% of the perennial vegetation cover in the ground layer is made up of native species).* | **Yes** – at least 50% of the perennial vegetation cover in the ground layer is made up of native species (understorey recorded to be 52% native). | **Yes** – at least 50% of the perennial vegetation cover in the ground layer is made up of native species (understorey recorded to be 79% native). |
| **Tussock composition***: tussock grasses are conspicuous in the ground layer (except in some situations, such as under dense groves of shrubs or regenerating trees), usually with several native species from some the following genera: Austrostipa, Bothriochloa, Chloris, Cymbopogon, Dichanthium, Microlaena, Poa, Themeda, Rytidosperma or Sorghum.* | **Yes –** tussock grasses of the genus *Cymbopogon, Themeda, Austrostipa* are present. | **Yes –** tussock grasses of the genus *Austrostipa, Microlaena, Bothriochloa, Rytidosperma* are present. |
| **Forb composition***: amongst the grass tussocks and sometimes in swathes, a range of broad-leaved forbs and petaloid monocots (e.g. lilies sens. lat.) may be a major component of the plant diversity.* | **Yes –** presence of a range of broad-leaved forbs and petaloid monocots are a relatively significant portion (~20%) of plant diversity. | **Yes –** presence of a range of broad-leaved forbs and petaloid monocots are a relatively significant portion (~40%) of plant diversity. |
| **Shrub composition:** *occurs as grassy woodland with average shrub cover < 30% cover. Shrubs may be dominant locally within areas of the ecological community, areas of native vegetation with a more continuous shrub layer, in which the average shrub cover of the whole patch is greater than 30%, is considered to be a shrubby woodland and so is not part of the listed ecological community* | **Yes** – occurs as grassy woodland with shrubs <30% cover on average. | **Yes** – occurs as derived grassland with shrubs <30% cover on average. |
| **Meet TEC criteria?** | **Yes, meets TEC** | **Yes, meets TEC** |

**Table 8.2 Condition Class and Thresholds for TEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland***

| Condition class and threshold | PCT 3363 – Intact | PCT 3363 – Poor |
|---|---|---|
| ***For patches of high quality (Class A & B), including those without an existing canopy:***<br>■ *1a. Is the patch > 0.1 ha in size?*<br>*AND*<br>■ *1b. Does the patch contain at least 12 native, non-grass understorey species?*<br>*AND*<br>■ *1c. Does the patch contain at least one listed important understorey species (i.e. grazing-sensitive, regionally significant or uncommon species)?*<br>*AND*<br>■ *1d (Class A only). Does the patch contain 10 or more mature trees per hectare, consistent with the key diagnostics for the ecological community* | **Yes**<br>■ 1a. patch size >0.1 ha (patch size about 16 ha).<br>■ 1b. does meet criteria. Patch contains 15 native, non-grass understorey species.<br>■ 1c. patch has several listed important understorey species, including, *Aristida vagans*, *Cymbopogon refractus*, *Panicum effusum, Themeda triandra*.<br>■ 1d. patch contains 10 or more mature trees (>40 cm DBH) per hectare. | **Yes**<br>■ 1a. patch size >0.1 ha (patch size about 0.8 ha).<br>■ 1b. does meet criteria. Patch contains 12 native, non-grass understorey species.<br>■ 1c. patch has several listed important understorey species including *Dichelachne crinite, Haloragis heterophylla, Tricoryne elatior, Daucus glochidiatus*, *Plantago debilis*.<br><br>Would meet Class B condition class, due to lack of mature overstorey. |
| ***For patches of lower quality (Class C) that have retained an overstorey:***<br>■ *2a. Is the patch size >2 ha in size?*<br>*AND*<br>■ 2b. Is the ground layer predominantly native (>50% cover)<br>*AND*<br>■ *2c. 20 or more mature trees/ hectare?*<br>*AND/ OR*<br>■ *2d. Does the patch have either natural regeneration of dominant overstorey species?* | Meets criteria above. | Meets criteria above. |
| **Meet TEC criteria?** | **Yes, meets key characteristics and condition threshold – forms part of the ecological community** | **Yes, meets key characteristics and condition threshold – forms part of the ecological community** |

### 8.1.2 Nationally threatened flora

Twenty-eight (28) EPBC Act listed threatened flora species are known to occur or are predicted to occur within the locality of the Project Site (**Appendix C**). Of these, two species was identified to occur within the Project Site (**Table 8.3**). As such, the species was considered further as a candidate species with potential to be impacted and were subjected to further assessment. An assessment of significance have been completed for these species in accordance with the EPBC Act *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment 2013). This EPBC significance assessment is provided in **Appendix I**.

**Table 8.3 EPBC Act threatened flora species considered for assessment**

| Scientific Name | Common Name | EPBC Act | Likelihood occurrence | Affected? |
|---|---|---|---|---|
| *Acacia pubifolia* | Velvet Wattle | V | Recorded | Yes |
| *Dichanthium setosum* | Bluegrass | V | Recorded | Yes |

V = Vulnerable

The assessment of significance for Velvet Wattle concluded that the Project is likely to have a residual adverse impact on the species, and as such, a referral under the provisions of the EPBC Act is recommended for this species (refer to **Appendix I**).

### 8.1.3 Nationally threatened fauna

Thirty-five (35) EPBC Act listed threatened fauna species are known to occur or are predicted to occur within the locality of the Project Site. Of these, 14 were identified to have a moderate or higher likelihood of occurrence based on previous records and availability of potential habitat (**Appendix D**).

An assessment of significance has been completed for these species in accordance with the EPBC Act *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment 2013). The assessment of significance for Border Thick-tailed Gecko concluded that the Project is likely to have a residual adverse impact on the species, and as such, a referral under the provisions of the EPBC Act is recommended for this species. In regard to other fauna species assessed, the assessments of significance concluded that the Project is considered unlikely have a significant impact on the species or their habitat. EPBC significance assessment is provided in **Appendix I**.

**Table 8.4 EPBC Act threatened fauna species considered for assessment**

| Scientific Name | Common Name | EPBC Act | Likelihood occurrence | Affected? |
|---|---|---|---|---|
| **Birds (8)** | | | | |
| *Anthochaera phrygia* | Regent Honeyeater | CE | Moderate | Yes - assessment of significance undertaken |
| *Aphelocephala leucopsis* | Southern Whiteface | V | Moderate | |
| *Climacteris picumnus victoriae* | Brown Treecreeper | V | **Recorded** | |
| *Grantiella picta* | Painted Honeyeater | V | High | |

| Scientific Name | Common Name | EPBC Act | Likelihood occurrence | Affected? |
|---|---|---|---|---|
| *Hirundapus caudacutus* | White-throated Needletail | V | High | |
| *Lathamus discolor* | Swift Parrot | CE | Moderate | |
| *Melanodryas cucullata cucullata* | Hooded Robin | E | **Recorded** | |
| *Stagonopleura guttata* | Diamond Firetail | V | **Recorded** | |
| **Mammals (5)** | | | | |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | E | Moderate | Yes - assessment of significance undertaken |
| *Dasyurus maculatus* | Spotted-tailed Quoll | E | High | |
| *Nyctophilus corbeni* | Corben's Long-eared Bat | V | High | |
| *Phascolarctos cinereus* | Koala | E | **Recorded** | |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | V | Moderate | |
| **Reptiles (1)** | | | | |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | **Recorded** | Yes - assessment of significance undertaken |

V = Vulnerable; E = Endangered; CE = Critically Endangered

#### 8.1.3.1 Aquatic habitat and threatened aquatic species

The Mine Site is situated in the Border Rivers Catchment. The main waterways within or adjacent to the Mine Site are Vegetable Creek and Little Plant Creek, which discharge into the Beardy River. The Mine Site incorporates several first order and one second order watercourses, which ultimately drain to Vegetable Creek or Little Plant Creek. Surface water is only present in these watercourses after a significant rainfall event. The largest sub-catchments within the Mine Site are as follows:

- Little Plant Creek: a northward draining sub-catchment whose principal drainage feature is a 3rd order watercourse that receives flow from multiple unnamed 1st and 2nd order watercourses before discharging into the Beardy River approximately 5 km north of the Mine Site. This sub-catchment contains historic dams that were constructed to support agricultural or mining activities.
- Carrs Gully: a sub-catchment draining toward the south which contains the 2nd order Carrs Gully and other unnamed 1st and 2nd order watercourses that separately discharge into the fourth order Vegetable Creek. This sub-catchment also contains historic dams that were constructed to support agricultural or mining activities.

There are a series of artificial dams in the Mine Site, which have been historically constructed to support agricultural or mining activities.

Two (2) EPBC Act listed threatened aquatic fauna species are either known to occur or are predicted to occur within the locality of the Mine Site based on PMST search, these include:

- Silver Perch (*Bidyanus bidyanus*) listed as Endangered under the EPBC Act.
- Murray Cod (*Maccullochella peelii*) listed as Vulnerable under the EPBC Act.

Both species were determined to have a low likelihood of occurrence due to unsuitable habitat within the Mine Site; this is largely due to the ephemeral nature of several first order and second order watercourses associated with the Mine Site and artificial dams historically constructed to support agricultural or mining activities. Both above species prefer larger free flowing waters with complex aquatic structures (i.e. large rocks, large snags and smaller structural woody habitat, undercut banks and over-hanging vegetation). These characteristics do not occur with the Mine Site associated with the ephemeral waterways. However, there is potential for these habitat characteristics to be associated with the Beardy River further downstream from the Project. Detailed design and mitigation measures would be undertaken to reduce indirect impacts associated with hydrology and downstream aquatic habitats associated with the Beardy River. The proposed water management system would manage mine-affected runoff via the construction and operation of suitably designed infrastructure. Captured runoff would be used in processing operations to reduce the risk of discharge to the receiving environment and to reduce competition for water resources with existing users. The following water management measures would be undertaken:

- Sediment-laden water runoff from catchments with surface disturbance due to Project-related activities such as internal access roads, soil stockpiles and those under rehabilitation/ revegetation. Runoff collected from these catchments would be treated to remove sediment and discharged, provided water quality meets the specific requirements of the environmental protection licence or development consent.
- Mine-affected water runoff, seepage and/ or groundwater that has potentially interacted with mineralised material, processing residues or waste rock, haul roads, hardstand areas (i.e. ROM pad) and the processing plant. Runoff from these catchments would be collected for recycling and/ or re-use in Project-related activities.
- Clean water runoff from catchments unaffected by project-related activities, including runoff from undisturbed and/ or fully rehabilitated areas. Runoff from these catchments would be allowed to either freely discharge or, where collected under the harvestable rights provisions of the *Water Management Act 2000*, used for Project-related activities.

Surface water would be managed in accordance with a Water Management Plan, with the implementation of water management strategies, it is unlikely the proposed action would have any indirect adverse impact on EPBC Act listed entities downstream of the Mine Site.

### 8.1.4 Offsets for EPBC Act listed entities

Any offsets proposed for impacts to EPBC Act listed threatened species would be done in accordance with the NSW BOS, the NSW Assessment Bilateral Agreement – Amending Agreement No. 1, and NSW BC Regulation. Further details on required offsets are provided in Sections 12 and 13.

## 8.2 Migratory Species

Migratory species are protected under international agreements to which Australia is a signatory, including JAMBA, CAMBA, RoKAMBA and the Bonn Convention on the Conservation of Migratory species of Wild Animals. Migratory species are considered MNES and are protected under the EPBC Act.

A total of 12 EPBC Act listed migratory species are known or predicted to occur within the locality of the Project Site based on the results of database searches. No migratory species were recorded during surveys completed; however, the Project Site provides foraging habitat for three of these species (**Table 8.5**).

**Table 8.5 Migratory species with suitable habitat within the Project Site**

| Scientific Name | Common Name | EPBC Act | Likelihood occurrence |
|---|---|---|---|
| *Apus pacificus* | Fork-tailed Swift | M | **High.** Potential habitat within Project Site. May occur during seasonal movements. |
| *Hirundapus caudacutus* | White-throated Needletail | V; M | **High.** Potential habitat within Project Site. May occur during seasonal movements. |
| *Myiagra cyanoleuca* | Satin Flycatcher | M | **Moderate**. Potential habitat within Project Site. May occur during seasonal movements. |

M = Migratory; Ma = Marine; V = Vulnerable

While terrestrial migratory species of bird may potentially use the Project Site, the Project Site would not be classed as 'important habitat' as defined by the '*Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*' (Department of the Environment 2013), 'important habitat' is defined as:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/ or
- habitat that is of critical importance to the species at particular life-cycle stages, and/ or
- habitat utilised by a migratory species which is at the limit of the species range; and/ or
- habitat within an area where the species is declining.

While some migratory species of bird are likely to use the Project Site and locality, it would not be classed as an 'important habitat' for the following reasons:

- No nationally or internationally important habitats for migratory wetland species are present in the Project Site according to the definition provided in the *EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird specie*s (Commonwealth of Australia 2017).
- There are no important habitats for the stated species in the Project Site as outlined in the *Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act* (Commonwealth of Australia 2017).
- A nationally significant proportion of a listed Migratory bird population would not be supported by the habitats in the Project Site.
- The Project Site does not contain any known important foraging grounds for listed migratory species, and the Project would not impact on any significant foraging habitats.
- The Project Site does not contain any known important staging grounds for migration.
- The Project Site does not contain habitat that is at the limit of a listed Migratory species' range.
- The Project Site is not located within an area where a listed Migratory species is known to be declining.

Despite the Project Site not considered as 'important habitat' for migratory species, assessment of significance were completed for species stated above. Assessment of significance were completed in accordance with the EPBC Act *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment 2013) (refer to **Appendix I**).

The assessment of significance concluded that the Project would not substantially modify, destroy or isolate an area of important habitat for any EPBC Act listed Migratory species, and it would not seriously disrupt the lifecycle of an ecologically significant proportion of a population of migratory birds. As such, it is not likely that the Project would significantly affect migratory species and therefore migratory species have not been considered further.

## 8.3 Critical Habitat

No EPBC Act listed critical habitat has been recorded or is considered likely to occur within the Project Site.

## 8.4 Wetlands of National and International Importance

Wetlands are valuable for the environment, food production, our culture and recreation. A healthy wetland has a rich natural diversity of plants and animals. Wetlands may support threatened species and migratory species. Wetlands are important provide strategic refuge during drought and frequently support threatened species. Most of the migratory bird species listed under international convention agreements with Australia may be found in these wetlands.

### 8.4.1 Nationally important wetlands

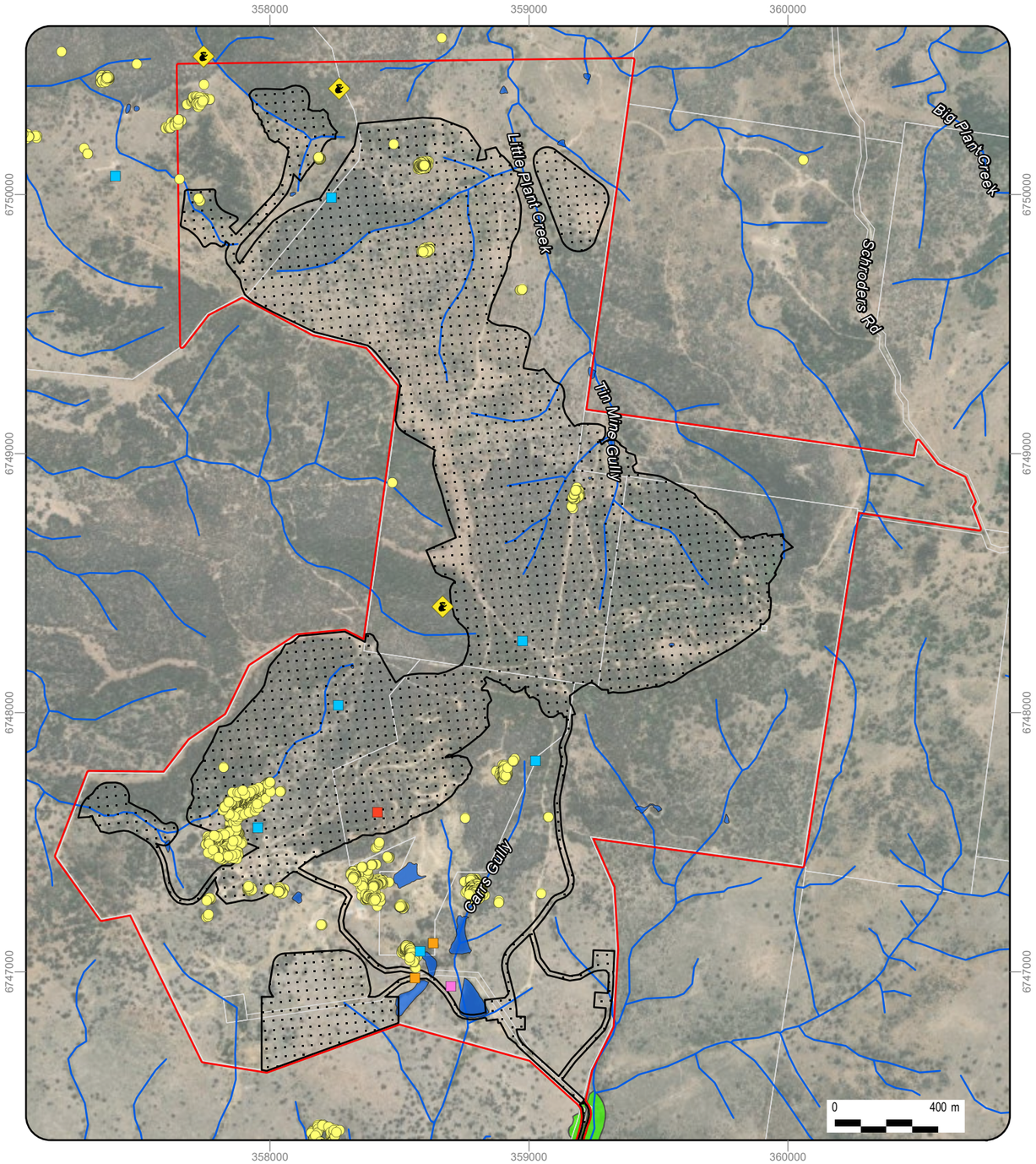
No nationally important wetlands were identified by the PMST as occurring within or in proximity to the Project Site. As such, the Project is unlikely to impact on nationally important wetlands.

### 8.4.2 Wetlands of international importance

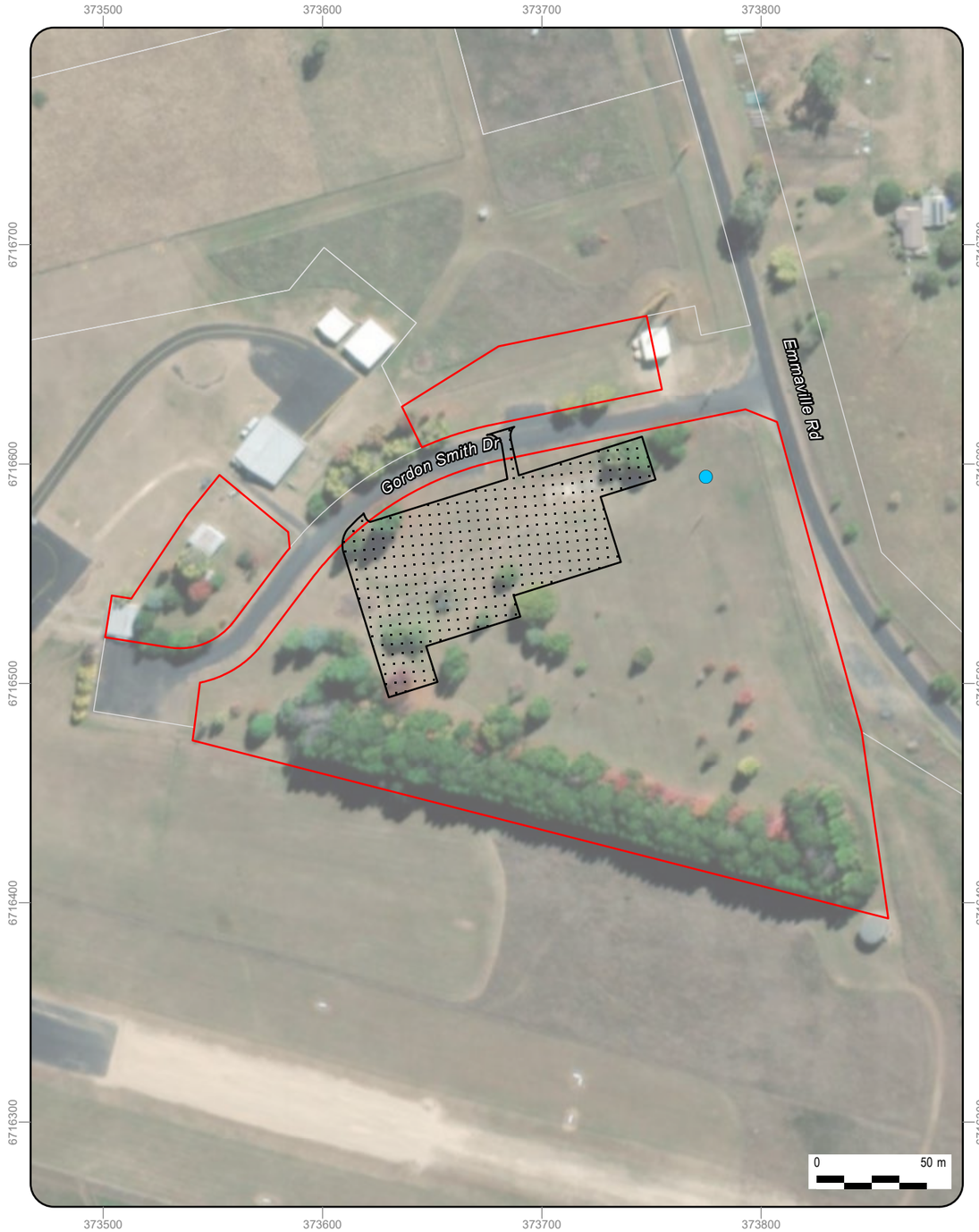
Three Wetlands of International importance were identified by database searches. These include:

- Riverland.
- The Coorong, and Lakes Alexandrina and Albert Wetland.
- Banrock Station Wetland Complex.

All these Wetlands of International Significance are located more than 1000 km from the Project Site and are unlikely to be directly or indirectly impacted by the Project.




Mine Site




Mine Camp

**LEGEND**

- Site boundary
- Cadastre
- Dam
- Watercourse or drainage

**EPBC Act Vegetation and Flora**

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Bluegrass *(Dichanthium setosum)* record
- Velvet Wattle *(Acacia pubifolia)* record

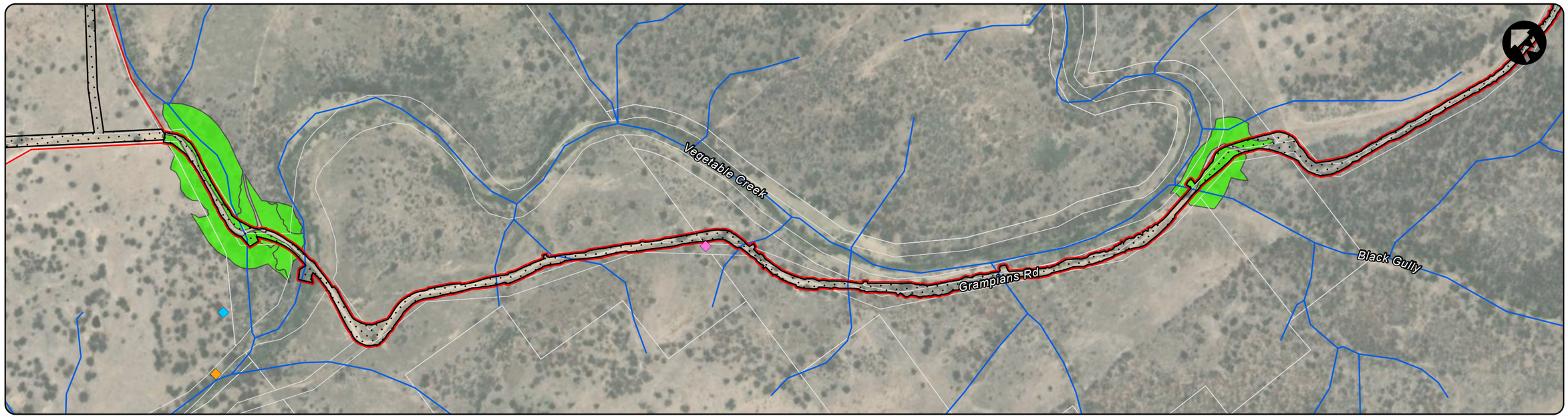
**EPBC Act Fauna Recorded**

- Border Thick-tailed Gecko
- Brown Treecreeper
- Diamond Firetail
- Koala
- Hooded Robin

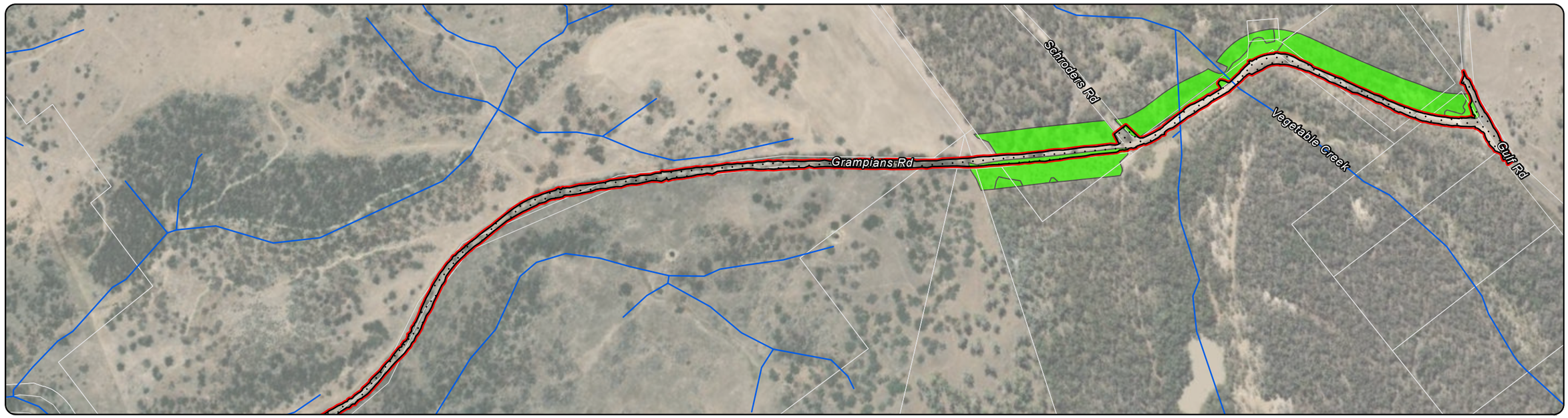
Matters of National Significance - Illustration 8.1 - Sheet 1 of 2



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*




Grampians Road Upgrade North




Grampians Road Upgrade South

**LEGEND**

- Site boundary
- Limit of disturbance
- Cadastre
- Watercourse or drainage

**EPBC Act Vegetation and Flora**

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

**EPBC Act Fauna Recorded**

- Brown Treecreeper
- Diamond Firetail
- Hooded Robin

0 160 m

Matters of National Significance - Illustration 8.1 - Sheet 2 of 2



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

# BAM STAGE 2 – IMPACT ASSESSMENT

# 9. Avoid and Minimise

The following provides information on avoiding and minimising impacts on biodiversity values through the planning and design phase of the Project. This information is provided to directly address Chapter 7 of the BAM (2020).

## 9.1 Avoiding and Minimise Biodiversity Impacts

### 9.1.1 Principles of avoid and minimise on native vegetation and habitat

In accordance with Section 7.1.1 of the BAM (2020), efforts to avoid and minimise direct impacts on native vegetation and habitat through the location and design of the Project are addressed in **Table 9.1**.

Following efforts to avoid and minimise direct impacts on vegetation and habitat, any residual impacts to native biodiversity are both mitigated (refer to **Section 11**) and offset (refer to **Section 13**).

**Table 9.1 Efforts to avoid and minimise direct impacts on native vegetation and habitat during Project location and design**

| Principles to avoid and minimise impact through location | Project's consistency |
|---|---|
| **Locating the Project to avoid minimise impacts (section 7.1.1 of BAM)** | |
| **a) Locating the Project in areas lacking biodiversity values** | The Project, being focused on the extraction of a mineral deposit, has constraints regarding the placement of its disturbance footprint due to the requirement of mineral occurrence within the Mine Site. However, efforts were made to avoid and minimise biodiversity impacts through careful placement of infrastructure components (e.g., roads, stockpile sites, office buildings, etc.).<br><br>The methodology for selecting the disturbance footprint (where practical) involved a focus on minimising environmental and social impacts while maximising the use of previously disturbed areas. Key principles included:<br><br>– Preferencing areas of existing disturbance.<br>– Preferencing lower condition vegetation patches.<br>– Avoiding and/ or minimising known habitat features (i.e. hollow-bearing trees).<br>– Avoiding and/ or minimising threatened species, communities and/ or habitats.<br><br>The Mine Site layout was designed to place proposed infrastructure in areas with low biodiversity value, where possible. For example, key project components such as the Onsite Power Generation, Solar Farm, Administration Area, Magazine, and Soil Stockpile were deliberately situated in the southern part of the site. This area was chosen for its historically disturbed land and poor-condition vegetation. However, these components were also placed to avoid, to the greatest extent possible, high-density stands of Velvet Wattle. In total, 23.22 ha of Velvet Wattle were recorded (defined by a 30-meter buffer around each tree). The Applicant has minimised, as far as practicable, the disturbance footprint and avoided 64% of the recorded Velvet Wattle habitat within the site.<br><br>In the northern part of the Mine Site, disturbance footprints for key project components (Balanced Storage Dam, Residue Storage Facility, Co-disposal Area, Soil Stockpile, and Processing Plant) were minimised and carefully located to avoid Velvet Wattle habitat where possible. Though these areas are not historically disturbed, they were selected to preserve social amenity, minimising noise, air quality, and visual impacts on local residents.<br><br>Additionally, the Applicant considered the extent of disturbance related to road upgrades for the primary access route to the Mine Site (e.g., Grampians Road). Field survey results and vegetation mapping informed the preliminary road design to minimise the impact on mapped TECs, including White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, without compromising road safety or access to the Mine Site. The impact on TECs is mostly confined to |
| **b) Locating where native vegetation or threatened species habitat is in the poorest condition** | |
| **c) Avoid habitat for species with high biodiversity risk weighting or native vegetation that is a TEC or a highly cleared PCT** | |
| **d) Outside of the buffer area around breeding habitat features such as nest trees or caves** | |

| Principles to avoid and minimise impact through location | Project's consistency |
|---|---|
| | previously disturbed areas within the road reserve of Grampians Road, resulting from necessary road improvements and widening to enhance safety and accessibility for all road users. |
| **Considerations of alternatives** | |
| **a) Alternative modes or technologies that would avoid or minimise impacts on biodiversity values** | Exterior lighting, such as floodlights, will be designed in accordance with 'soft lighting' principles to minimise light penetration into adjacent retained vegetation. This will help reduce potential impacts on nocturnal fauna, as far as practicable. |
| **b) Alternative routes that would avoid or minimise impacts on biodiversity values** | The geological conditions that led to the formation of the Project's target resource also limit the Applicant's ability to consider alternative, economically feasible locations. As such, the Project, which includes several access tracks, modifications to an existing road corridor (Grampians Road), and a Mine Camp, has been designed to avoid the need for new locations nearby, wherever feasible. |
| **c) Alternative locations that would avoid or minimise impacts on biodiversity values** | In relation to upgrades to public roads, particularly those forming the primary access route to the Mine Site (e.g., Grampians Road), the Applicant has prioritised safety improvements for all road users. While upgrading these roads, the Applicant has sought to minimise, avoid, and reduce the Project's biodiversity impacts both within the Mine Site and in the surrounding areas, as much as possible. |
| **d) Alternative sites within a property on which the Project is located that would avoid or minimise impacts on biodiversity values.** | The Mine Site's topography presents significant constraints, offering limited opportunities to concentrate all disturbances within areas of historically disturbed land or poor-condition vegetation. To address this, the locations for waste rock emplacements were identified adjacent to the open cut pits, minimising segregated disturbance areas. This approach allows for the "compression" of the disturbance footprint into the smallest practical area, leaving remnant vegetation outside the footprint intact, contiguous, and connected. Additionally, the placement of waste rock emplacements was chosen to reduce haul distances, which indirectly minimises biodiversity impacts by decreasing the generation of noise, dust, and greenhouse gas emissions. Similarly, soil stockpiles were positioned in areas of historically disturbed land or lower-condition vegetation. |
| **Principles to avoid and minimise impact through design (section 7.1.2 of BAM)** | |
| **a) Reducing the Project's disturbance footprint by minimising the number and type of facilities** | The overall disturbance footprint of the Southern Waste Rock Emplacement has been designed to avoid Velvet Wattle habitats to the greatest extent practicable. While the Applicant has made efforts to further reduce this footprint, the area selected represents the minimum required for the volumetric storage of waste rock materials. This design ensures that the landform remains geotechnically and geochemically stable throughout the Project's life and post-closure. |
| **b) Locating ancillary facilities in areas that have no biodiversity values** | |

| Principles to avoid and minimise impact through location | Project's consistency |
|---|---|
| **c) Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition** | As mentioned previously, key Project components – such as the Onsite Power Generation, Solar Farm, Administration Area, Magazine, and Soil Stockpile – were strategically placed in the southern part of the Mine Site to utilise areas of historically disturbed land and poor-condition vegetation. These areas were also chosen to avoid, or minimise as much as possible, high-density stands of Velvet Wattle.<br><br>Furthermore, the Applicant carefully considered the disturbance footprint for upgrades to public roads forming the primary access route to the Mine Site, such as Grampians Road. Modifications to the existing road corridor and the Mine Camp were designed to avoid, where practicable, the need for new infrastructure locations in the vicinity. Field surveys and vegetation mapping informed the preliminary road design, helping to reduce, as much as possible, impacts on mapped Threatened Ecological Communities (TECs) like White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, without compromising road safety or the need to improve access for all road users. |
| **d) Locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g. an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAII)** | |
| **e) Actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.** | The Applicant is committed to engaging local Aboriginal stakeholders in the collection of the soil seedbank, including Velvet Wattle seeds. The collected seeds will be used to develop effective techniques for propagating tubestock and/ or seedstock. These techniques, along with the tubestock and seedstock, will then be applied to the revegetation of rehabilitated mining landforms.<br><br>The rehabilitation outcomes for the Project, including all required steps, studies, trials, and timelines, will be documented in an approved Rehabilitation Management Plan. This plan will be prepared in accordance with the conditions outlined in any Mining Lease granted under the NSW *Mining Act (1992)*. |

## 9.2 Avoid or Minimise Prescribed Impacts

### 9.2.1 Principles of avoid and minimise on prescribed impacts

In accordance with Sections 7.2.1 and 7.2.2 of the BAM (2020), efforts to avoid and minimise prescribed biodiversity impacts through location and design of the Project have been addressed in **Table 9.2**.

**Table 9.2 Efforts to avoid and minimise impacts on prescribed biodiversity during Project location**

| Principles to avoid and minimise prescribed impacts | Project's consistency |
|---|---|
| **Locating the Project to avoid minimise on prescribed impacts (section 7.2.1 of BAM)** | |
| **a) Locate surface works to avoid direct impacts on the habitat features** | The Project's principal subsurface works would be the development of two open cut pits, both situated on Grampians Ridge. Tin mineralisation within these open cut pits occurs as sub-vertical, sheeted veins. This means that works associated with ore and waste rock extraction does not require laterally extensive subsurface works.<br>The Project would also install and utilise production bores for the purpose of providing make-up water supply. However, these bores would be constructed to target the deeper, regional hard-rock aquifer, thus avoiding impacts to shallow groundwater and surface water resources.<br>The disused and active mine adits are located directly on Grampians Ridge, and due to the Project's target resource, avoidance of these prescribed features is not feasible. To address this, a bat eviction and exclusion plan will be implemented to ensure that no bats or other fauna species are present in the adits during their removal or demolition. These measures are detailed in **Section 11**. |
| **b) Locate subsurface works, in both the horizontal and vertical planes, to avoid and minimise operations beneath the habitat features** | |
| **c) Locate the Project to avoid severing or interfering with corridors connecting different areas of habitat and migratory flight paths, to important habitat or local movement pathways** | A key aspect of the Applicant's approach to locating Project-related components within the Mine Site has been the strategic concentration of disturbance. This deliberate strategy aims to minimise the creation of disconnected or isolated areas of retained vegetation within the site. As a result, the disturbance footprint has been designed to, as far as practicable, preserve a connected and contiguous area of retained vegetation surrounding the disturbed areas. |
| **d) Optimise the Project layout to minimise interactions with threatened entities** | As stated above, the Applicant's approach to locating Project-related components within the Mine Site involves the strategic concentration of disturbance, with the goal of minimising interactions with threatened species and TECs as much as practicable. Some key strategies employed include:<br>■ **Prioritising low biodiversity areas**: The focus is on selecting areas with lower ecological value or previously disturbed lands to minimise the impact on intact, high-value habitats.<br>■ **Avoiding key ecological features**: Infrastructure and disturbance footprints were designed, as far as practicable, to avoid areas of high-quality vegetation and ecologically significant features, such as 3rd order streams or higher. |

| Principles to avoid and minimise prescribed impacts | Project's consistency |
|---|---|
| | ■ **Aligning linear infrastructure with existing corridors**: Roads and other linear infrastructure are aligned to follow existing corridors (e.g., roads or fence lines), minimising the need for additional clearing and fragmentation of habitat.<br>■ **Establishing buffer zones**: Buffer zones would be created around key habitats of threatened species (i.e. Velvet Wattle) to ensure that infrastructure or disturbance remains outside these critical areas.<br>By integrating these strategies into the project planning and design phase, the Applicant aims to minimise the impact on threatened species and their habitats while ensuring the Project's overall viability. |
| **e) Locate the Project to avoid impacts on water bodies or hydrological processes** | The Applicant acknowledges that the proposed water management system and infrastructure will disrupt the prevailing hydrological regime. However, this system is a critical mitigation measure to prevent adverse impacts on the receiving environment.<br>To minimise these impacts, the Applicant has strategically located water management infrastructure in the headwaters of minor streams (i.e., 1st and 2nd order watercourses), taking advantage of the topographic attributes of the Mine Site. This approach localises potential hydrological impacts while preserving, to the extent practicable, the hydrological function of higher-order systems, such as Vegetable Creek, Little Plant Creek, and the Beardy River. Mitigation measures incorporating sedimentation and hydrology controls are outlined in **Section 11**. |
| **Considerations of alternatives** | |
| **a) Alternative modes or technologies that would avoid or minimise prescribed impacts** | As stated above, the Applicant acknowledges that the proposed water management system and infrastructure will disrupt the prevailing hydrological regime. The Applicant has strategically located water management infrastructure in the headwaters of minor streams (i.e., 1st and 2nd order watercourses), taking advantage of the topographic constraints of the Mine Site. This design placement was undertaken to minimise and prevent adverse impacts on the receiving environment, including prescribed features such as Vegetable Creek, Little Plant Creek, and the Beardy River.<br>The proposed upgrades to Grampians Road include the construction of culverts designed to improve hydrological function by incorporating 'fish-friendly' features, facilitating better passage for fish and other aquatic species. Notably, the Applicant's proposed Vegetable Creek crossing would replace existing infrastructure with 'fish friendly' culverts, that currently provides limited or no conveyance or habitat connectivity within this higher-order watercourse. |
| **b) Alternative routes that would avoid or minimise prescribed impacts** | |
| **c) Alternative locations that would avoid or minimise prescribed impacts** | |
| **d) Alternative sites within a property on which the Project is located that would avoid or minimise prescribed impacts** | |

| Principles to avoid and minimise prescribed impacts | Project's consistency |
|---|---|
| **Designing a project location to avoid and minimise impact on prescribed biodiversity (section 7.2.2 of BAM)** | |
| **a) Engineering solutions, such as proven techniques to:**<br>**i) minimise fracturing of bedrock underlying features of geological significance, or groundwater-dependent communities and their supporting aquifers**<br>**e) restore connectivity and movement corridors** | Where required, the Applicant proposes to implement fauna-friendly fencing to prevent animals entering mining operations and/ or access routes to ensure the safety of personnel and wildlife.<br>All culverts in areas mapped as Key Fish Habitat (KFH) would be designed to account for fish passage.<br>The Applicant is committed to engaging stakeholders in the collection of the soil seedbank, including seeds from threatened flora species. Collected topsoil, along with tubestock and seedstock utilising endemic flora species, will be used in the revegetation of rehabilitated mining landforms. Rehabilitating land with endemic native species will support local wildlife, particularly species at risk of habitat loss. These plantings will help improve biodiversity by providing food, shelter, and corridors for threatened species. |
| **b) design elements that minimise interactions with threatened entities, such as:**<br>**i) designing turbines to dissuade perching and minimise the diameter of the rotor swept area**<br>**ii) designing fencing to prevent animal entry to transport corridors**<br>**f) providing vegetated buffers rehabilitated with native species** | |
| **g) maintaining environmental processes that are critical to the formation and persistence of habitat features not associated with native vegetation** | The proposed Grampians Road upgrades include the construction of culverts that would improve hydrological function. Importantly, the Applicant's proposed Vegetable Creek crossing(s) would replace existing infrastructure, which currently provides little to no conveyance or habitat connectivity, with 'fish friendly' culverts. |
| **h) maintaining hydrological processes that sustain threatened entities** | |
| **i) controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities** | The proposed water management infrastructure has been designed to reduce, to the extent practical, the frequency and magnitude of potentially mining-affected runoff being discharged from the Mine Site. Mitigation measures incorporating sedimentation and hydrology controls are outlined in **Section 11**. |

# 10. Impact Assessment

## 10.1 Assessment of Direct Impacts

Assessment of direct impacts unable to be avoided is prepared in accordance with Chapter 8 of the BAM (2020).

### 10.1.1 Impacts on native vegetation

The impacts of the disturbance footprint on native vegetation, including each PCT, broad condition state and area to be impacted within the disturbance footprint, are shown below in **Table 10.1** and **Table 10.2**.

**Table 10.1 Direct impacts on native vegetation within Beardy River Hills IBRA subregion**

| Plant Community Type | Vegetation zone | Current vegetation integrity | Change in vegetation integrity | Future vegetation integrity | Direct impact (ha) |
|---|---|---|---|---|---|
| PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | 3722_Intact | 71.4 | -71.4 | 0 | 159.89 |
| | 3722_Modified | 60.9 | -60.9 | 0 | 97.37 |
| | 3722_Poor | 24 | -24 | 0 | 55.73 |
| | 3722_Cleared | 2.5 | -2.5 | 0 | 0.44 |
| PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | 3363_Intact | 70.7 | -70.7 | 0 | 0.62 |
| | 3363_Poor | 47.6 | -47.6 | 0 | 0.41 |
| PCT 4080 – Northwest River Oak-Apple Forest | 4080_Modified | 60.4 | -60.4 | 0 | 0.11 |
| **Total direct impact on native vegetation** | | | | | **314.57** |

**Table 10.2 Direct impacts on native vegetation within Glenn Innes-Guyra Basalts IBRA subregion**

| Plant Community Type | Vegetation zone | Current vegetation integrity | Change in vegetation integrity | Future vegetation integrity | Direct impact (ha) |
|---|---|---|---|---|---|
| PCT 3339 – Guyra Basalt Snow Gum Woodland | 3339_Poor | 12.2 | -12.2 | 0 | 0.64 |
| **Total direct impact on native vegetation** | | | | | **0.64** |

### 10.1.2 Direct impacts on threatened ecological communities

One TEC was identified associated with the Project Site; the occurrence of this TEC is predominantly along Grampians Road to the Mine Site. Condition state and area to be impacted associated with TECs within the disturbance footprint are shown below in **Table 10.3**.

**Table 10.3 Direct impacts on threatened ecological communities within Beardy River Hills IBRA subregion**

| Threatened Ecological Community | Vegetation zone | BC Act | SAII | Direct impact (ha) |
|---|---|---|---|---|
| White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland | 3363_Intact | CE | Yes | 0.62 |
| | 3363_Poor | | | 0.41 |
| **Total direct impact on threatened ecological communities** | | | | **1.03** |

### 10.1.3 Direct impacts on threatened species and habitat

Direct impacts on predicted ecosystem credit species due to the Project are outlined in **Table 10.4**.

**Table 10.4 Direct impacts on predicted ecosystem credit species**

| Scientific Name | Common Name | BC Act | Predicted habitat to be impacted | IBRA Subregion | |
|---|---|---|---|---|---|
| | | | | BRH[1] | GIGB[2] |
| **Birds (22)** | | | | | |
| *Anthochaera phrygia* | Regent Honeyeater | CE | PCT 3722, 3363, 4080 | ✓ | - |
| *Artamus cyanopterus cyanopterus* | Dusky Woodswallow | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Calyptorhynchus lathami lathami* | South-eastern Glossy Black-Cockatoo | V | PCT 3722, 3363, 4080 | ✓ | - |
| *Chthonicola sagittata* | Speckled Warbler | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Circus assimilis* | Spotted Harrier | V | PCT 3339 | - | ✓ |
| *Climacteris picumnus victoriae* | Brown Treecreeper | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Daphoenositta chrysoptera* | Varied Sittella | V | PCT 3722, 3363, 4080 | ✓ | - |
| *Falco subniger* | Black Falcon | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Glossopsitta pusilla* | Little Lorikeet | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Grantiella picta* | Painted Honeyeater | V | PCT 3722, 3363, 4080 | ✓ | - |
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | V | PCT 3722, 3363, 4080 | ✓ | ✓ |
| *Hieraaetus morphnoides* | Little Eagle | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |

| Scientific Name | Common Name | BC Act | Predicted habitat to be impacted | IBRA Subregion | |
|---|---|---|---|---|---|
| | | | | BRH[1] | GIGB[2] |
| *Hirundapus caudacutus* | White-throated Needletail | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Lathamus discolor* | Swift Parrot | E | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Lophoictinia isura* | Square-tailed Kite | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Melanodryas cucullata cucullata* | Hooded Robin | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Melithreptus gularis gularis* | Black-chinned Honeyeater | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Neophema pulchella* | Turquoise Parrot | V | PCT 3722, 3363, 4080 | ✓ | - |
| *Petroica boodang* | Scarlet Robin | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Petroica phoenicea* | Flame Robin | V | PCT 3339 | - | ✓ |
| *Pomatostomus temporalis temporalis* | Grey-crowned Babbler | V | PCT 3722, 3363, 4080 | ✓ | - |
| *Stagonopleura guttata* | Diamond Firetail | V | PCT 3722, 3363, 4080 | ✓ | - |
| **Mammals (7)** | | | | | |
| *Chalinolobus picatus* | Little Pied Bat | V | PCT 3722, 3363, 4080 | ✓ | - |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | PCT 3722, 3363, 4080 | ✓ | - |
| *Scoteanax rueppellii* | Greater Broad-nosed Bat | V | PCT 3722, 3363, 4080 | ✓ | - |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | V | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V | PCT 3722, 3363, 4080 | ✓ | - |
| *Dasyurus maculatus* | Spotted-tailed Quoll | E | PCT 3722, 3363, 4080, 3339 | ✓ | ✓ |
| *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | V | PCT 3722, 3363, 4080 | ✓ | - |

V = Vulnerable; E = Endangered; CE = Critically Endangered

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

### 10.1.4 Direct impacts on threatened species credit species

Direct impacts on candidate species and credit species due to the Project are outlined in **Table 10.5** and **Table 10.6**.

**Table 10.5 Direct impacts on candidate species credit species within Beardy River Hills IBRA subregion**

| Scientific Name | Common Name | BC Act | Vegetation Zone and/ or habitat features | Direct impact (area/ individuals) |
|---|---|---|---|---|
| **Flora** | | | | |
| *Acacia pubifolia* | Velvet Wattle | E | 3722_Intact | 6.70 ha |
| | | | 3722_Modified | 5.73 ha |
| | | | 3722_Poor | 2.61 ha |
| | | | 3722_Cleared | 0.01 ha |
| | | | **Subtotal** | **15.04 ha** |
| **Fauna** | | | | |
| *Ninox connivens* | Barking Owl | V | 3722_Intact | 159.89 ha |
| | | | 3722_Modified | 97.37 ha |
| | | | 3722_Poor | 2.64 ha |
| | | | 3363_Intact | 0.62 ha |
| | | | 4080_Modified | 0.11 ha |
| | | | **Subtotal** | **260.63 ha** |
| *Petaurus norfolcensis* | Squirrel Glider | V | 3722_Intact | 159.89 ha |
| | | | 3722_Modified | 97.37 ha |
| | | | 3363_Intact | 0.62 ha |
| | | | 4080_Modified | 0.11 ha |
| | | | **Subtotal** | **257.99 ha** |
| *Phascolarctos cinereus* | Koala | E | 3722_Intact | 159.89 ha |
| | | | 3722_Modified | 97.37 ha |
| | | | 3363_Intact | 0.62 ha |
| | | | 4080_Modified | 0.11 ha |
| | | | **Subtotal** | **257.99 ha** |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | 3722_Intact | 159.89 ha |
| | | | 3722_Modified | 97.37 ha |
| | | | 3363_Intact | 0.62 ha |
| | | | 4080_Modified | 0.11 ha |
| | | | **Subtotal** | **257.99 ha** |

V = Vulnerable; E = Endangered

**Table 10.6 Direct impacts on candidate species credit species within Glenn Innes-Guyra Basalts IBRA subregion**

| Scientific Name | Common Name | BC Act | Vegetation Zone and/ or habitat features | Direct impact (area/ individuals) |
|---|---|---|---|---|
| **Flora** | | | | |
| *Dichanthium setosum* | Bluegrass | V | 3339_poor | 0.64 ha |
| V = Vulnerable | | | | |

## 10.2 Assessment of Indirect Impacts

The assessment of indirect impacts has been prepared in accordance with Section 8.2 of the BAM (2020). Indirect impacts have been considered in terms of the nature, extent and duration of impacts on native vegetation, threatened ecological communities and threatened species habitats likely to be affected. The assessment of indirect impacts is presented in **Table 10.7**.

In response to CPHR recommendations, the assessment of Indirect Impacts has been expanded to evaluate dust accumulation from all operational activities, including haulage, drilling, blasting, crushing and wind erosion of exposed surfaces with consideration of the duration, frequency and spatial extent of deposition. Relevant literature, including Turner (2013) informs the evaluation of physiological and ecological impacts on vegetation including reduced stomatal conductance, impaired gas exchange, decreased photosynthesis and potential cumulative stress leading to vegetation decline. These effects may reduce habitat quality and resource availability for dependent fauna species.

The assessment also evaluates potential exposure pathways associated from dust, soil, and surface water, including deposition of contaminated dust onto vegetation and soils, uptake by plants, ingestion by herbivores and omnivores, and use of surface water by resident and highly mobile fauna. The evaluation considered potential physiological and ecological effects on vegetation (e.g., reduced growth, stress responses, and declines in condition) and potential bioaccumulation and chronic toxicity effects on fauna.

In addition, the assessment also considered potential impacts of air blast from blasting activities on retained vegetation and dependent fauna. Blasts associated with mining have the potential to impact flora and fauna through direct physical trauma, habitat disturbance and noise and vibration effects which may lead to short-term behavioural responses, disturbance or displacement of fauna.

The assessment further considers potential impacts of fauna displacement resulting from vegetation clearing. This includes the evaluation of the extent of habitat loss (including approximately 258 ha of habitat for species such as the squirrel glider) and identification of species most likely to be affected based on habitat specificity, mobility, and territorial behaviour. Species with strong site fidelity and reliance on hollow-bearing trees and connected canopy habitat (e.g., arboreal mammals) are recognised as being particularly vulnerable to displacement and associated competition pressures in adjacent habitats.

**Table 10.7 Assessment of indirect impacts**

| Indirect Impact | Construction/ operation | Nature | Extent | Duration | Consequence |
|---|---|---|---|---|---|
| **Inadvertent impacts on adjacent habitat or vegetation** | Construction | Native vegetation<br><br>Threatened species habitat | All PCTs | Short term | **Low**. Inadvertent impacts on adjacent vegetation can include a range of indirect impacts including soil disturbance, introduction of weeds, erosion, sedimentation, enriched runoff and water quality.<br>Construction of the Project has the potential to result in sedimentation and erosion and mobilisation of contaminants within the disturbance footprint and into adjoining native vegetation and ephemeral drainage lines, through soil disturbance and construction activities. Sediment laden runoff and spills affect water quality and adversely affect aquatic life particularly during construction near creek lines. The Project will be carefully designed to minimise impact to these sensitive environmental receivers. The mobilisation of sediments would be contained within the disturbance area as sediment containment measures would be implemented as part of mitigation measures during construction. |
| **Inadvertent impacts on hydrology and GDEs** | Construction/ operation | Hydrology | Aquatic habitats associated with creeklines | Long term | **Low**. Inadvertent impacts on surface water within proximity to disturbance footprint can include enriched run-off, decreased in water quality and/ or minor alterations to hydrology. The Project would be carefully designed to minimise impacts on these sensitive environmental features, such as creeklines. Sediment mobilisation would be contained within the disturbance footprint through the implementation of sediment control measures. A comprehensive water management plan will be put in place to manage and mitigate potential hydrological impacts resulting from the Project.<br>Mine-affected water, including runoff from the RSF, WRE, CDA, open cut pit sumps, ROM pad and Processing Plant areas would be retained on site and used for mining and processing operations. During construction, where required, sediment-laden water, including runoff from areas of Project-related surface disturbance would be collected and treated and discharged, provided water quality meets the specific requirements of the EPL or development consent. Water from undisturbed sections of the Mine Site (clean water) would be prevented from entering disturbed sections of the Mine Site. This water would be either discharged or collected under the harvestable rights provisions of the *Water Management Act 2000* and used for Project-related activities.<br>Regarding Groundwater Dependent Ecosystems (GDEs), the Mine Site is mapped with a low potential for GDEs, with relatively small areas of moderate to high potential near existing watercourses. A Groundwater Impact Assessment has evaluated the potential effects of the project on these identified GDEs. With the proposed mitigation and management strategies, the impact on the groundwater environment is expected to be low. Groundwater extraction will occur under the Applicant's existing Water Access Licence (WAL 44962), which permits up to 636 megalitres per year from the New England Fold Belt Groundwater Source, managed under the Water Sharing Plan for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources 2020. |
| **Reduced viability of adjacent habitat due to edge effects** | Construction/ operation | Native vegetation | All PCTs | Long term | **Low.** Although the Project involves clearing intact vegetation, which may impact adjacent vegetation integrity and introduce weed issues and/ or exacerbated weed incursions that already occur in the Project Site, the site is currently impacted by edge effects associated with adjacent historic mining operations and existing access tracks. Mitigation measures will ensure biosecurity is managed during construction to reduce the chance of novel weeds becoming established in the Project Site. During operational phase, all maintenance and associated works will be subject to biosecurity protocols and comprehensive Biodiversity Management Plan (BMP), which will ensure any residual indirect impact is unlikely to reduce the viability of adjacent habitat due to edge effects during both the construction and operational phases of the Project. |
| **Reduced viability of adjacent habitat due to noise, dust or light spill** | Construction/ operation | Native vegetation<br><br>Threatened species habitat | All PCTs | Short and long-term | **Low - moderate**. Noise, dust and contaminant pollution are potential indirect impacts from activities associated with the disturbance footprint. These impacts are likely to have cumulative effects. Noise, dust and contaminant pollution are likely to occur from both construction and operational phases, although the intensity will be greatest where activities take place near vegetated areas.<br>During construction, increased levels of noise and dust are likely, however, these will be short-term and mostly associated with vehicle movements, vegetation clearing and construction of Project components. A short-term increase in construction noise will be mostly limited to daylight hours and unlikely to have long-term adverse effects on the viability of adjacent habitats.<br>Indirect impacts of dust deposition on retained vegetation and dependent fauna have been further considered. Dust accumulation on foliage can reduce photosynthesis by limiting light penetration and clogging stomata which restricts gas exchange. This can impair transpiration, carbon uptake, and plant water balance which can potentially lead to reduced growth, increased stress, and in severe or prolonged cases, vegetation decline or death. These effects may in turn reduce habitat quality and resource availability for dependant fauna species. To mitigate and manage these impacts an Air Quality Management Plan (AQMP), has been incorporated, including Trigger Action Response Plans (TARPs), proactive dust suppression (e.g. watering of haul roads, dust suppressants, management of exposed surfaces), and adaptive management in response to meteorological conditions. Monitoring of weather conditions and adaptive management responses during period of increased dust generation risk will also be included.<br>Monitoring of vegetation, particularly threatened species outside the development footprint and within 600 m will evaluate the penetration of dust into surrounding retained vegetation. Monitoring of dust and dust-generating activities will also assess whether deposition levels (including those approaching or exceeding 4g/$m^2$/month at the site boundary) result in localised exceedances, particularly in proximity to dust-generating activities, and the implications of this for sensitive vegetation and habitat.<br>The Applicant has established a dust deposition monitoring network to support this assessment. Monitoring requirements were developed in consultation with the NSW EPA and Northstar Air Quality Pty Ltd (Northstar). Based on EPA advice and draft consent conditions, Northstar recommended the installation of four dust deposition gauges across the Mine Site. The dispersion model previously developed by Northstar was used to inform the selection of monitoring locations, with a focus on areas of predicted arsenic deposition, and locations were refined based on site access and operational constraints.<br>Significant levels of noise and vibration from human activities (i.e. machinery) are known to potentially disturb fauna and disrupt foraging, reproductive, or movement behaviours, especially over continuous and prolonged timeframes (Newport et al. 2014). The safe limit of noise (continuous noise) on humans is understood to be ≤70 dB (Newport et al. 2014). Van der Toorn et al (Van Der Toorn et al. 1996) studied the effects of human-made noise levels on wildlife and domestic livestock in America and were able to establish minimum sound exposure |

| Indirect Impact | Construction/ operation | Nature | Extent | Duration | Consequence |
|---|---|---|---|---|---|
| | | | | | levels that induced specific behavioural and physiological effects in different species. The study concluded that the minimum threshold of response for disturbance from noise levels was approximately 77 dB, and this initiated behavioural or physiological responses from animals ranging from the 'startle effect', changes in hormones (93-120 dB in pigs), accelerated hatchling rates (80 dB), and even hearing loss in some birds (95-100 dB). Some studies report levels in the vicinity of 100 dB as associated with an observable effect.<br><br>As outlined in **Section 1.2**, the most operational noise impacts are expected to stem from vehicles (e.g., haul trucks and mining machinery), crushing operations, and blasting activities. These noise impacts are expected to be scheduled, primarily occurring during daylight hours, and predominantly temporary (i.e., not continuous). While the construction and operational phases of the Project (along with its ancillary activities) may cause temporary disturbance to animals, the impacts from noise emissions are likely to be localised close to the mining void (up to 100 m) and are not likely to have a significant, long-term impact on either wildlife populations. It is likely most animal species will habituate to the periodic noise disturbance (Larkin et al. 1996). The Noise Impact Assessment for the Project concluded that, under a conservative operational scenario and with the implementation of noise mitigation measures, compliance with relevant criteria across all assessment periods would be maintained, and significant noise impacts are unlikely. Regarding impacts on fauna, the species most likely to be sensitive to noise and reliant on adjacent vegetation are primarily nocturnal species (e.g., arboreal and terrestrial mammals), which are typically more active during night-time. Since the most significant noise levels (e.g., blasting) are expected to occur during daylight hours and will be temporary, the potential impacts on nocturnal fauna are considered minimal. Noise mitigation and management measures would be implemented in accordance with the requirements of any development consent and/or Environmental Protection License. Overall, operational noise levels are not anticipated to be at significant levels to result in detrimental impacts to species or their habitats. Residual noise impacts are likely to be localised to the Mine Site and are periodic in nature (fixed intervals rather than continuous) and not considered likely to have a significant, long-term impact on wildlife populations outside the Mine Site. Noise and blasting will be mitigated and managed in accordance with a Noise and Blast Management Plan.<br><br>Elevated dust levels may be deposited onto the foliage of vegetation adjacent to the disturbance footprint, particularly along haul roads and access routes. This has the potential to reduce photosynthesis and transpiration, as well as cause abrasion and heating of leaves, leading to reduced growth rates and a decline in the overall health of the vegetation. Dust pollution is expected to be most significant during periods of heavy earthworks, vegetation clearing, or vehicle movements. However, dust deposition on foliage is likely to be highly localised (restricted to the disturbance footprint and roads), intermittent, and temporary, making it unlikely to have a major long-term impact on the retained vegetation in the Project site.<br><br>The Air Quality Assessment concluded that the operational phase of the Project would have the greatest potential for dust emissions. However, all assessed air pollutants generated by the Project are predicted to comply with the applicable criteria at the assessed receptors, meaning they are unlikely to cause unacceptable environmental harm or impacts in the surrounding area. Nevertheless, dust reduction measures would be implemented throughout both the construction and operational phases to minimise any residual impacts. These measures would include dust suppression along access roads during both phases. Overall, the Air Quality Assessment found that the Project is unlikely to cause significant air quality impacts at sensitive receptors. Given the implementation of dust management measures, indirect impacts on adjacent vegetation are not expected to result in significant effects on vegetation integrity or composition. Currently, the roads and access tracks experience some dust impacts due to vehicle movements and exploration activities. With the introduction of dust management measures, these impacts will be further reduced. Additionally, the vegetation adjacent to access roads consists of dry sclerophyll woodland, which is more resilient to the effects of dust than other more sensitive vegetation types, such as wet sclerophyll or rainforest with dense mesic understorey. In conclusion, with the implementation of dust reduction measures throughout the construction and operational phases, it is unlikely that the Project would cause significant indirect impacts on adjacent vegetation. Air quality would be mitigated and managed in accordance with an Air Quality Management Plan.<br><br>Ecological light pollution is the descriptive term for light pollution that includes direct glare, chronic or periodic increased illumination, and temporary unexpected fluctuations in lighting (including lights from a passing vehicles), that can have potentially adverse effects on wildlife (Longcore & Rich 2004). While the construction and operational phases of the Project (along with its ancillary activities) have the potential to affect the surrounding environment, the impacts from ecological light pollution are likely to be localised close to the immediate disturbance boundary. During construction, significant night works would not be required, and light pollution is considered negligible during this phase. In regard to operational phase, lighting would be required around Project infrastructure and mining operations. Due to the rural setting and location of the Project, changes to light regimes during nocturnal periods within the Mine Site and adjacent habitat are considered as significant changes from current conditions. To mitigate light pollution as a result of the Project, exterior lighting associated with the Project would be designed to minimise 'light spill' (i.e. use of light shields on external lights to direct light away from remnant vegetation) to adjacent habitat by incorporating 'soft lighting' principles, reducing the potential residual impacts on adjacent habitat and local fauna populations. With the implementation of mitigation measures prescribed in **Section 11** it is unlikely that the light pollution from the Project during operations would have a significant, long-term impact on wildlife populations outside the disturbance footprint.<br><br>During the Project's construction and operational phases, the accidental release of contaminants (i.e. hydraulic fluids, oils, fluids, etc.) into the surrounding environment (including drainage lines) may occur. However, the most likely result of such contaminant discharge would be the localised contamination of soil with a low-potential for direct physical trauma to flora and fauna that may come into contact with contaminants. Such an accidental release of contaminants is likely to be localised and would be unlikely to have a significant effect on the environments of the Project Site, particularly due to the implementation of mitigation measures to immediately address any spills. |
| **Transport of weeds and pathogens from the site to adjacent vegetation** | Construction/ operation | Native vegetation | All PCTs | Long term | **Low**. The Project has the potential to increase the spread of pathogens that threaten native biodiversity values, such as the soil-borne pathogen *Phytophthora cinnamomi* (Phytophthora) and *Austropuccinia psidii* (Myrtle rust). Phytophthora infects root systems, whereas Myrtle Rust deforms leaves and leads to heavy defoliation. Both pathogens are associated with damage and death to native plants and may be dispersed over large distances. Phytophthora can be spread through flowing water, such as storm runoff, or may be spread within a site via mycelial growth from infected roots to roots of healthy plants. Propagules of Phytophthora may also be dispersed by vehicles (e.g. cars and earth moving equipment), animals, walkers and movement of soil. Myrtle rust spores can be spread easily via contaminated clothing, hair, skin and personal items, infected plant material, equipment, as well as by insect/ animal movement and wind dispersal. |

| Indirect Impact | Construction/ operation | Nature | Extent | Duration | Consequence |
|---|---|---|---|---|---|
| | | | | | Whilst this type of indirect impact has the potential to lead to a reduction of native vegetation integrity in surrounding habitats, management measures would be developed during construction to maintain the integrity of native vegetation in adjoining habitats. During the construction and operational phase, all maintenance and associated works would be subject to biosecurity protocols and a comprehensive Biodiversity Management Plan. |
| **Increased risk of starvation, exposure and loss of shade or shelter** | Construction | All fauna species | All PCTs | Short term | **Low**. Displacement of resident fauna species during native vegetation clearing is considered relatively low due to the extensive vegetation adjacent to the disturbance footprint and locality. Given the relative mobile nature of most potential resident fauna species, the increased risk of starvation, exposure and loss of shade or shelter due to the Project is likely to be low.<br>The loss of up to 258 ha of woodland habitat is expected to result in indirect impacts to fauna species, particularly those most sensitive based on habitat specificity, mobility, and territorial behaviour. Species with strong site fidelity and reliance on hollow-bearing trees and connected canopy habitat (e.g., arboreal mammals) are recognised as being particularly vulnerable to displacement and increased competition pressures in adjacent habitats. Displacement may lead to increased inter- and intra-specific competition, reduced access to resources, disruption to social structures (e.g., family groups and territories), and potential declines in survival and reproductive success. As such, these impacts are not considered negligible.<br>Fauna displacement resulting from vegetation clearing can force individuals into already occupied habitats, increasing competition for limited resources. This may reduce food availability, increase physiological stress, and heighten susceptibility to disease and predation, particularly for species with small home ranges or specialised habitat requirements. The removal of key habitat features, including hollow-bearing trees and ground cover such as leaf litter, further reduces the availability of shelter and breeding sites.<br>Avoidance and mitigation measures will be outlined in the Biodiversity Management Plan (BMP) to minimise these impacts. While vegetation within operational areas will be progressively cleared in accordance with the Development Footprint, native vegetation will be retained within the broader Subject Land outside of operational areas, providing ongoing habitat and connectivity opportunities. In addition, the adjoining biodiversity offset area will be enhanced and managed to support habitat availability and long-term conservation outcomes for affected species.<br>Additional measures include staged clearing to facilitate gradual fauna movement, and strategic timing of clearing, where practicable. Pre-clearing inspections and the use of suitably qualified fauna spotter-catchers will be implemented to manage and relocate affected individuals where necessary. |
| **Loss of breeding habitats** | Construction | All fauna species | All PCTs | Long term | **Moderate**. The loss of breeding habitat, such as hollow-bearing trees and fallen timber, has the potential to affect native animals such as:<br>■ Hollow-dependent bats<br>■ Hollow-nesting and canopy-nesting birds<br>■ Arboreal mammal<br>■ Reptiles.<br>The loss of breeding habitats is unlikely to extend beyond the disturbance footprint. Impacts beyond this area would be avoided through mitigation and management measures. |
| **Trampling of threatened flora species** | Construction/ operation | Native vegetation<br>Threatened flora species (Velvet Wattle) | All PCTs | Short and long term | **Low**. A reduction in the population extent and available habitat of threatened flora species occurring in the ground or mid-stratum could result from trampling or unauthorised storage of materials, as well as vehicle and plant equipment activity. All populations and associated habitat for threatened flora species will be available in GIS files for all contractors and would be designated no-go areas during construction. Mitigation measures would include protection for these areas, and inadvertent impacts such as trampling is considered unlikely.<br>During the operational phase, any maintenance would be subject to the Applicant's environmental operational protocols and have a low risk of any inadvertent impacts to any threatened flora species. |
| **Wood collection** | Construction | Terrestrial fauna species | All PCTs | Short term | **Low**. Removal of dead wood is listed as a key threatening process under the BC Act and will occur during the construction phase of the Project within the disturbance footprint. Wood collection in adjacent habitat is unlikely to occur and is unlikely that a decrease in the integrity of available habitat for species of animal, such as reptiles and small ground-dwelling mammals and woodland birds, which depend on these resources for shelter and foraging substrates. Any significant dead wood to be removed during construction would be retained and reused in adjacent habitat, mine rehabilitation areas, or biodiversity offset areas, in accordance with the Biodiversity Management Plan. |
| **Bush rock removal and disturbance** | Construction | Terrestrial fauna species | All PCTs | Short term | **Low.** Removal of bush rock is listed as a key threatening process under the BC Act. Bush rock was observed in the Project Site during field survey, informing this report. During construction of the Project, bush rock is be retained and reused in adjacent habitat, mine rehabilitation areas, or biodiversity offset areas in accordance with Biodiversity Management Plan. |
| **Increase in predatory species populations** | Construction/ operation | All fauna species | All PCTs | Long term | **Low.** Predation by feral cats and the Fox are listed as key threatening processes under the BC Act and have the potential to impact local fauna populations in adjacent habitat. It is unlikely that the Project would further exacerbate the impact predator species populations than what currently exists within the Project Site. Management of pest animal and predatory species will be managed within the Biodiversity Management Plan and would continue to be undertaken post-construction. |
| **Increased risk of fire** | Construction/ operation | Native vegetation | All PCTs | Long term | **Low**. Bushfire risk assessment has been considered as part of the Project. During construction and operation, the Project would implement the required bushfire management measures to manage any increased risk of bushfire. The proposed access roads would provide addition opportunity for fire breaks across the regional landscape to enable better management of fire and reduce the potential for inappropriate regular fire intervals |
| **Heavy Metals and Metalloids** | Construction / Operation | Native vegetation<br>Fauna species | All PCTs | Short and long term | **Low.** Indirect impacts relating to site contamination from heavy metals and metalloids (including arsenic) have been further considered. These contaminants are derived from dust, soil and surface water, and may enter the ecological pathways via deposition of contaminated dust onto vegetation and soils, uptake by plants, ingestion by herbivores and omnivores, and use of surface water by resident and highly mobile fauna. Elevated concentrations may adversely affect plant health, resulting in reduced growth, physiological stress, and declines in |

| Indirect Impact | Construction/ operation | Nature | Extent | Duration | Consequence |
|---|---|---|---|---|---|
| | | | | | vegetation condition, which in turn may reduce habitat quality and resource availability for fauna. Fauna may be exposed through ingestion of contaminated food sources, soil, water or direct contact with potential sub-lethal and lethal effects depending on exposure levels and duration.<br><br>The revised assessment also considered the potential for off-site impacts, noting that highly mobile fauna may access water sources and forage within the subject land and extending potential contamination beyond the project boundary.<br><br>The findings of the Air Quality Impact Assessment (AQIA), which predict no exceedances of relevant criteria for toxic metals (including arsenic, lead, cadmium and copper), are acknowledged. Additional validation and adaptive management measures have been incorporated including dust deposition monitoring. To mitigate and manage these potential impacts an Air Quality Management Plan (AQMP), will be implemented, including Trigger Action Response Plans (TARPs), proactive dust suppression (e.g. watering of haul roads, dust suppressants, management of exposed surfaces), and adaptive management in response to meteorological conditions.<br><br>Air, Soil and Water Quality monitoring will be undertaken to determine whether levels of heavy metals exceed acceptable thresholds. Where monitoring identifies elevated metal deposition with the potential to pose ecological risk, additional management measures will be implemented through a Pollution Reduction Program (PRP). These may include enhanced dust suppression, source control measures, and operational adjustments to minimise contaminant generation and dispersion. The Applicant has already established a dust deposition monitoring network to support this assessment, with locations selected focusing on areas of predicted heavy metal deposition. |
| **Airblast** | Construction / Operation | Native vegetation<br><br>Fauna species | All PCTs | Short and long-term | Potential indirect impacts of airblast from blasting activities on retained vegetation and dependent fauna have been assessed and evaluated. Airblast, caused by rapid air displacement from explosive detonation, can impact flora and fauna through direct physical trauma, habitat disturbance, and noise and vibration effects. The assessment considered both the magnitude and frequency of airblast events across the development footprint, including potential effects on sensitive vegetation communities and fauna habitats.<br><br>Blasting will occur within areas that are progressively cleared and devoid of trees and habitat, thereby minimising the risk of direct impacts such as branch breakage or defoliation. These areas will have been subject to pre-clearing surveys in accordance with the Biodiversity Management Plan (BMP) prior to clearing, including the identification and management of fauna and habitat features. Potential indirect impacts are therefore primarily limited to adjacent retained habitats. These may include short-term disturbance or behavioural responses in fauna, temporary displacement, and localised avoidance of affected areas. Associated noise and vibration may also disrupt foraging and breeding behaviours in nearby habitats, and if repeated, may contribute to a temporary reduction in habitat utilisation.<br><br>The spatial extent of effects has been considered, recognising that highly mobile fauna may temporarily avoid affected areas and move into adjacent habitats. While this may reduce immediate exposure to airblast, it may result in short-term displacement, increased energy expenditure, and minor increases in competition within surrounding habitats. These effects are expected to be localised and transient.<br><br>Mitigation and management measures will focus on minimising potential impacts to adjacent retained habitats. This will include the identification of sensitive fauna habitat (including potential breeding habitat) **in proximity** to blasting areas, and the application of avoidance measures where practicable. Additional measures include the establishment of buffer zones around key habitat areas, and monitoring of airblast intensity and frequency at representative locations to validate predicted impacts and inform adaptive management. Existing monitoring infrastructure (e.g. dust monitoring stations) will support ongoing environmental performance monitoring. |

## 10.3 Assessment of Prescribed Impacts

Assessment of prescribed impacts is prepared in accordance with Section 8.3 of the BAM (2020) and outlined in **Table 10.8**.

**Table 10.8 Assessment of prescribed impacts**

| Prescribed impacts | Nature | Extent | Duration | Consequence |
|---|---|---|---|---|
| **Karst, caves, crevices, cliffs, rocks and other geological features of significance** | No karst, caves, crevices, cliffs or other features of geological significance will be impacted by the Project. | | | |
| **Human-made structures or non-native vegetation** | Human-made structures - Threatened microbats | In regard to non-native vegetation, small areas of ornamental plantings at the Mine Camp will be impacted; however, this area provides minimal value for the native species and communities within the site. No important habitat features (i.e. hollow-bearing trees or nest trees) were recorded within the area associated with ornamental plantings.<br>Two human made structures (disused mine adits) relevant to prescribed impacts are present. The abandoned southern mine adits have been observed to be used by microbat species. The disused and active mine adits are located directly on Grampians Ridge, and due to the Project's target resource, avoidance of these prescribed features is not feasible. | Long term | **Low**. Small areas of non-native vegetation in the form of ornamental plantings will be impacted. This area provides minimal value for the native species and communities within the site, and the consequence of the of impacts is considered negligible.<br>As discussed in **Section 6.4.2**, the disused mine adits are not used for maternity purposes for microbat species. A bat eviction and exclusion plan will be prepared under an approved Biodiversity Management Plan. The plan will be implemented to ensure that no bats or other fauna species are present in the adits during their removal or demolition. These measures are detailed in **Section 11**. With the implementation of mitigation measures, the consequence of the impacts to mine adits is low and expected to be able to be appropriately managed. |
| **Habitat connectivity** | Terrestrial fauna and threatened species (i.e. Koala, Squirrel Glider) | The Project has the potential to impact on connectivity for habitat of fauna and associated threatened species that facilitates movement across species' ranges. Generally, aerial connectivity would not be substantially affected. A key aspect of the Applicant's approach to locating Project-related components within the Mine Site has been the strategic concentration of disturbance. This strategy aims to minimise the creation of disconnected or isolated areas of retained vegetation within the site. As a result, the disturbance footprint has been designed to, as far as practicable, preserve connected and contiguous area of retained vegetation surrounding the disturbed areas. Contiguous areas of vegetation outside the disturbance footprint would still persist allowing connectivity within the landscape. | Long term however are likely to reduce over time as rehabilitation occurs post operation. | **Low - Moderate.** The Mine Site has been designed to concentrate disturbance and, where practicable, preserve a connected and contiguous area of retained vegetation surrounding the disturbed zones. This approach aims to maintain connectivity for a variety of birds, reptiles, and mammals that rely on this habitat as a movement corridor, particularly in a north-south direction. The Project's rehabilitation outcomes, including all necessary steps, studies, trials, and timelines, will be documented in an approved Rehabilitation Management Plan, which will be prepared in accordance with the conditions of any Mining Lease granted under the NSW *Mining Act 1992*.<br>In the short term, the impact of habitat loss and connectivity disruption is expected to be moderate. However, with the implementation of rehabilitation measures, this impact is anticipated to decrease over time as rehabilitation progresses post-operation. |
| **Waterbodies, water quality and hydrological processes** | Aquatic dependant fauna and associated PCTs | The Project will result in the disturbance and adjustment of hydrological processes (i.e. creek and drainage lines) within the Mine Site. The Applicant has strategically located water management infrastructure in the headwaters of minor streams (i.e., 1st and 2nd order watercourses), taking advantage of the topographic constraints of the Mine Site. This design placement was undertaken to minimise and prevent adverse impacts on the receiving environment including prescribed features such as Vegetable Creek, Little Plant Creek, and the Beardy River. The Project will require the disturbance of small artificial dams (0.39 ha of farm dams).<br>Waterway crossings could modify the natural hydrology of creeks within the Project Site, which could affect the aquatic assemblages that use these areas. The proposed upgrades to Grampians Road will require traversing Vegetable Creek and these upgrades will result in improvements to existing culverts and road crossings. | Long term | **Low.** The proposed water management infrastructure has been designed to reduce, to the extent practical, the frequency and magnitude of potentially mining-affected runoff being discharged from the Mine Site. A comprehensive water management plan will be put in place to manage and mitigate potential hydrological impacts resulting from the Project. Mitigation measures incorporating sedimentation and hydrology controls are outlined in **Section 11**.<br>The proposed Grampians Road upgrades include the construction of culverts that would improve hydrological function. Importantly, the Applicant's proposed Vegetable Creek crossing(s) would replace existing infrastructure with 'fish friendly' culverts, which currently provides little to no conveyance or habitat connectivity.<br>With the implementation of mitigation and management measures, the consequence of the predicted impact to water values is low and expected to be able to be appropriately managed. |
| **Wind turbine strikes** | No wind turbines are proposed as part of this Project | | | |
| **Vehicle strikes** | Terrestrial fauna and threatened species (i.e. Koala) | The Project will generate additional vehicular movements within the site, during construction and operation. Fauna injury or death could occur as a result of the Project's construction phase, when vegetation and habitats are being cleared. They also have the potential to occur during the operation of the Project as a result of collision with vehicles entering and leaving the site along the transport and haul routes. Threatened fauna that may be affected by vehicle strikes include the Koala, but also other non-threatened species such as macropods. It is likely that speed limits would be relatively slow (i.e. 40 km) due to the local road speeds. Despite this, the Project would increase vehicle movements within the site and have an incremental increase in the potential of vehicle strike to fauna than what is currently experienced on site. Whilst the Project will cause higher levels of vehicle traffic and therefore increase the potential of vehicle strike to native fauna, it is possible to minimise vehicle strike through:<br>Low speeds (≤40 km/hr).<br>■ Improved visibility (i.e. clear vegetation along road verge) where applicable.<br>■ Signage of wildlife within the area.<br>■ Fauna friendly fencing to prevent animals entering transport routes | Long term | **Low.** While some mobile species, such as birds, may be able to avoid traffic, less mobile species face a greater risk. The Project may increase the potential for vehicle strike on native fauna, while it is not possible to eliminate the risk of roadkill occurring with the implementation of the following mitigation measures:<br>Low speed limits along main access routes within the site (≤40 km/hr).<br>■ Improved visibility (i.e. clear vegetation along road verge) where applicable.<br>■ Signage of wildlife within the area along Grampians Road.<br>■ Fauna friendly fencing to prevent animals entering areas of mining operations<br>With the implementation of the above mitigation measures the potential for vehicle strike is reduced and the likely consequence of significant impacts to fauna due to vehicle strike is low. |

## 10.4 Assessment of impacts on Matters of National Environmental Significance

Section 8 outlines the MNES considered to be relevant to the Project. Assessment for each MNES was done in accordance with the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment 2013). Relevant Commonwealth Recovery Plans, Approved Conservation Advice and Policy Statements that were in force (or in draft) as of September 2025 were considered (**Table 10.9**). International conventions, management plans and principles have been considered, where relevant, in regard to listed threatened species and ecological communities.

**Table 10.9 Relevant Conservation Advice, Recovery Plans and Threat Abatement Plans**

| Matter | Conservation Advice, Recovery Plans and Threat Abatement Plans |
|---|---|
| **Ecological Communities** | |
| *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* | ■ Conservation Advice for the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DCCEEW, 2023a).<br>■ National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DCCEEW, 2010).<br>■ Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (DSEWPC, 2011e).<br>■ Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*) (2017) (DEE, 2017).<br>■ Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* (DEE, 2018) |
| **Flora** | |
| *Acacia pubifolia* (Velvet Wattle) | ■ Approved Conservation Advice for *Acacia pubifolia* (DEWHA, 2008a).<br>■ There is no adopted or made Recovery Plan for this species.<br>■ No Threat Abatement Plan has been identified as being relevant for this species. |
| *Dichanthium setosum* (Bluegrass) | ■ Approved Conservation Advice for *Dichanthium setosum* (DEWHA, 2008b).<br>■ There is no adopted or made Recovery Plan for this species<br>■ Threat abatement plan for competition and land degradation by rabbits (DEE, 2016). |
| **Birds** | |
| *Anthochaera phrygia* (Regent Honeyeater) | ■ Conservation Advice *Anthochaera phrygia* (Regent Honeyeater) (DoE 2015a).<br>■ National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (DoE 2016).<br>■ Threat abatement plan for competition and land degradation by rabbits (DEE 2016). |
| *Aphelocephala leucopsis* (Southern Whiteface) | ■ Conservation Advice for *Aphelocephala leucopsis* (Southern Whiteface) (DCCEEW, 2023b).<br>■ There is no adopted or made Recovery Plan for this species.<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a). |
| *Climacteris picumnus victoriae* (Brown Treecreeper) | ■ Conservation Advice for *Climacteris picumnus victoriae* (brown treecreeper (south-eastern)) (DCCEEW, 2023c).<br>■ There is no adopted or made Recovery Plan for this species<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a). |
| *Grantiella picta* (Painted Honeyeater) | ■ Conservation Advice *Grantiella picta* (Painted Honeyeater) (DoE, 2015b).<br>■ National Recovery Plan for the Painted Honeyeater *(Grantiella picta*) (DAWE, 2021a). |

| Matter | Conservation Advice, Recovery Plans and Threat Abatement Plans |
|---|---|
| | ■ No Threat Abatement Plan has been identified as being relevant for this species. |
| *Hirundapus caudacutus* (White-throated Needletail) | ■ Conservation Advice *Hirundapus caudacutus* (White-throated Needletail) (TSSC, 2019).<br>■ There is no adopted or made Recovery Plan for this species.<br>■ No Threat Abatement Plan has been identified as being relevant for this species. |
| *Lathamus discolor* (Swift Parrot) | ■ Conservation Advice *Lathamus discolor* (Swift Parrot) (TSSC, 2016a).<br>■ National Recovery Plan for the Swift Parrot (*Lathamus discolor*) (DCCEEW, 2024b).<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a). |
| *Melanodryas cucullata cucullata* (Hooded Robin) | ■ Conservation Advice for *Melanodryas cucullata cucullata* (Hooded Robin) (south-eastern)) (DCCEEW, 2023e).<br>■ There is no adopted or made Recovery Plan for this species.<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a). |
| *Stagonopleura guttata* (Diamond Firetail) | ■ Conservation Advice for *Stagonopleura guttata* (Diamond Firetail) (DCCEEW, 2023f).<br>■ There is no adopted or made Recovery Plan for this species.<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a). |
| **Mammals** | |
| *Chalinolobus dwyeri* (Large-eared Pied Bat) | ■ Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (DCCEEW, 2023g).<br>■ National recovery plan for the Large-eared Pied Bat *Chalinolobus dwyeri* (Department of Environment and Resource Management, 2011).<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a). |
| *Dasyurus maculatus* (Spotted-tailed Quoll) | ■ Conservation Advice *Dasyurus maculatus maculatus* (southeastern mainland population) Spotted-tailed Quoll, south-eastern mainland (Threatened Species Scientific Committee, 2020).<br>■ National Recovery Plan for the Spotted-tailed Quoll (*Dasyurus maculatus*) (Department of Environment, Land, Water and Planning, 2016).<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a).<br>■ Threat abatement plan for predation by the European red fox (Department of the Environment, Water, Heritage and the Arts, 2008b). |
| *Nyctophilus corbeni* (Corben's Long-eared Bat) | ■ Conservation Advice *Nyctophilus corbeni* (South-eastern long-eared Bat) (TSSC, 2015).<br>■ There is no adopted or made Recovery Plan for this species.<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a). |
| *Phascolarctos cinereus* (Koala) | ■ Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory (DAWE, 2022a).<br>■ National Recovery Plan for the Koala *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DAWE, 2022b).<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a). |
| *Pteropus poliocephalus* (Grey-headed Flying-fox) | ■ There is no approved Conservation Advice for this species.<br>■ National Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus* (Department of Agriculture, Water and the Environment, 2021b).<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a). |

| Matter | Conservation Advice, Recovery Plans and Threat Abatement Plans |
|---|---|
| **Reptiles** | |
| *Uvidicolus sphyrurus* (Border Thick-tailed Gecko) | ■ Conservation Advice for *Uvidicolus sphyrurus* (border thick-tailed gecko) (Department of Climate Change, Energy, the Environment and Water, 2024).<br>■ There is no adopted or made Recovery Plan for this species.<br>■ Threat abatement plan for predation by feral cats 2024 (DCCEEW, 2024a). |

### 10.4.1 Impacts on EPBC Act Threatened Ecological Communities

The Project will have an impact on one TEC listed under the EPBC Act. A summary of impacts is presented in **Table 10.10**. The significance assessments for this TEC are provided in detail in **Appendix I**.

**Table 10.10 Listed EPBC Act TEC summary of significance of impact**

| Threatened Ecological Community | PCT | Zone | EPBC Act | Direct Impact (ha) | Significant Impact? |
|---|---|---|---|---|---|
| *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* | 3363 | Intact | CE | 0.62 | **No** – the Project is considered unlikely to have a significant impact on the threatened ecological community. |
| | | Poor | | 0.41 | |
| CE = Critically Endangered | | | | | |

### 10.4.2 Impacts on EPBC Act Flora

The Project will have an impact on two threatened flora species listed under the EPBC Act. A summary of impacts is presented in **Table 10.11**. The significance assessments for these threatened flora species are provided in detail in **Appendix I**.

**Table 10.11 Listed EPBC Act threatened flora species summary of significance of impact**

| Scientific Name | Common Name | EPBC Act | Direct Impact (ha) | Significant Impact? |
|---|---|---|---|---|
| *Acacia pubifolia* | Velvet Wattle | V | 15 ha | *Acacia pubifolia* was recorded within the Project Site associated with the Mine Site. The species was associated with PCT 3722. Direct impacts are associated with Velvet Wattle records within the disturbance footprint and a 50 m buffer applied to each record, which accounts for 15 ha. A total of 1,967 individuals occur within the disturbance footprint. Potential Velvet Wattle habitat associated with the disturbance footprint equates to 314.02 ha.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**Yes** – the Project is considered to have a significant impact on the species. EPBC referral undertaken. |
| *Dichanthium setosum* | Bluegrass | V | 0.64 ha | *Dichanthium setosum* was recorded within the Project Site associated with the Mine Camp. The species is associated with PCT 3339. No individuals would be directly |

| Scientific Name | Common Name | EPBC Act | Direct Impact (ha) | Significant Impact? |
|---|---|---|---|---|
| | | | | impacted; however potential habitat within the mine camp would be impacted.<br><br>The EPBC Act significance assessment for this species<br>is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |

V = Vulnerable

### 10.4.3 Impacts on EPBC Act Fauna

The Project will have an impact on the potential habitat for 14 threatened fauna species listed under the EPBC Act. A summary of these species is presented in **Table 10.12**. The significance assessments for these threatened fauna species are provided in detail in **Appendix I**.

**Table 10.12 Listed EPBC Act threatened fauna species summary of significance of impact**

| Scientific Name | Common Name | EPBC Act | Significant Impact? |
|---|---|---|---|
| **Birds** | | | |
| *Anthochaera phrygia* | Regent Honeyeater | CE | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| *Aphelocephala leucopsis* | Southern Whiteface | V | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| *Climacteris picumnus victoriae* | Brown Treecreeper | V | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| *Grantiella picta* | Painted Honeyeater | V | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| *Hirundapus caudacutus* | White-throated Needletail | V | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**. |

| Scientific Name | Common Name | EPBC Act | Significant Impact? |
|---|---|---|---|
| | | | **No** – the Project is considered unlikely to have a significant impact on the species. |
| *Lathamus discolor* | Swift Parrot | CE | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| *Melanodryas cucullata cucullata* | Hooded Robin | E | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| *Stagonopleura guttata* | Diamond Firetail | V | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| **Mammals** | | | |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | E | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| *Dasyurus maculatus* | Spotted-tailed Quoll | E | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| *Nyctophilus corbeni* | Corben's Long-eared Bat | V | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| *Phascolarctos cinereus* | Koala | E | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | V | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080. |

| Scientific Name | Common Name | EPBC Act | Significant Impact? |
|---|---|---|---|
| | | | The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**No** – the Project is considered unlikely to have a significant impact on the species. |
| **Reptiles** | | | |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | Suitable habitat recorded in the form of is associated with PCT 3722, 3363, 4080.<br><br>The EPBC Act significance assessment for this species is detailed in **Appendix I**.<br><br>**Yes** – the Project is considered to have a significant impact on the species. |
| V = Vulnerable; E = Endangered; CE = Critically Endangered | | | |

## 10.5 Assessment of impacts on aquatic species and habitat

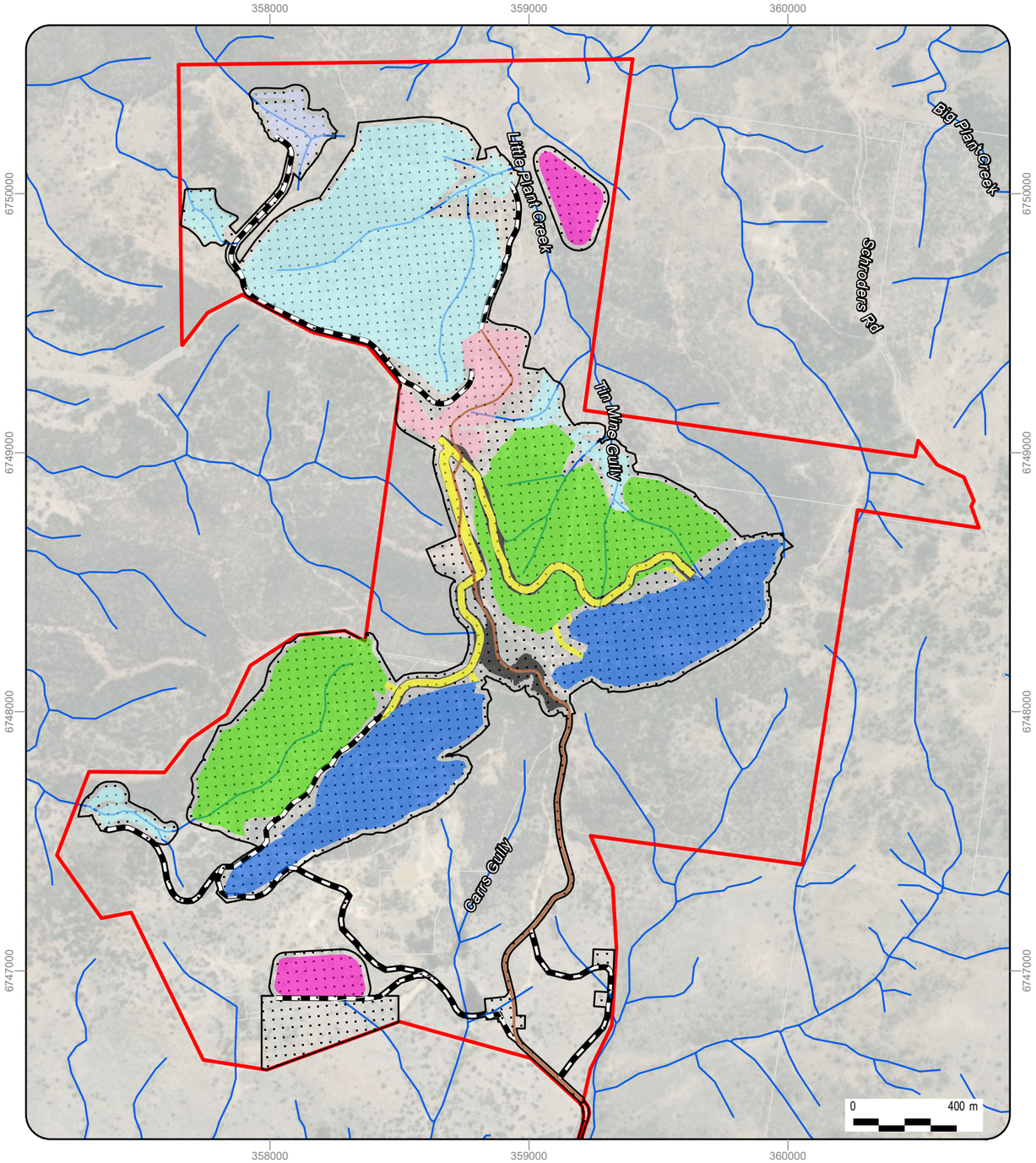
### 10.5.1 FM Act Threatened species

Areas of mapped key fish habitat (Strahler 3rd & 4th order streams) have been considered to provide a moderate likelihood of occurrence for one threatened species listed under the FM Act, being:

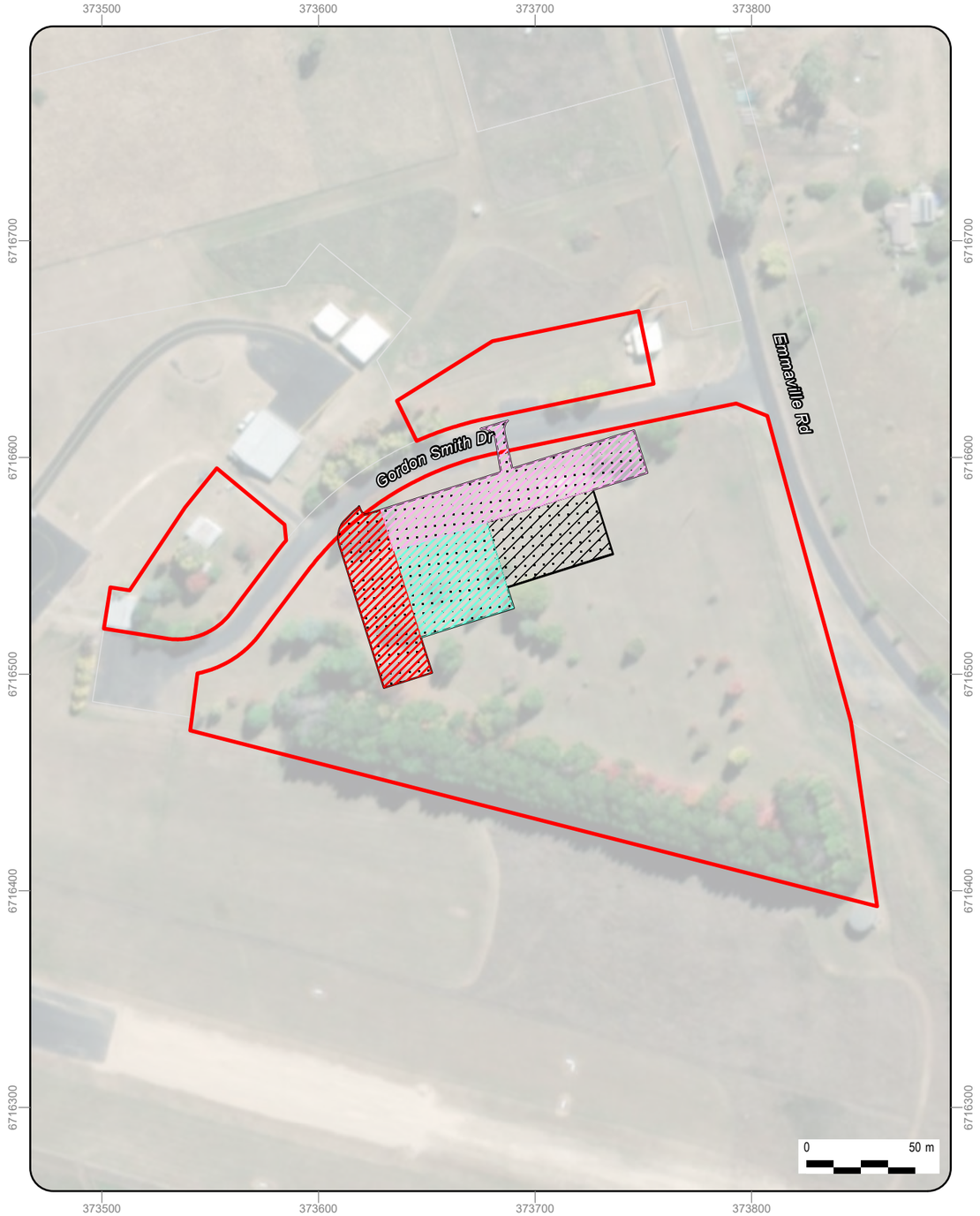
- Southern Purple Spotted Gudgeon (*Mogurnda adspersa*) listed as Endangered under the FM Act.

Under the FM Act, a '7-part test' is carried out to assess the likelihood of significant impact upon threatened species, populations or ecological communities listed under the FM Act. **Appendix J** contains detailed 7-part tests for these species, which conclude that due to the predicted negligible aquatic impact, a significant impact is unlikely to occur.

Impacts from the Project on aquatic habitats, particularly mapped KFH (Strahler 3rd & 4th Order streams), are considered likely to be negligible. Avoiding and minimising impacts on aquatic habitats would be a priority of detailed design, and any residual indirect impacts would be subject to mitigation measures. Safeguards and mitigation measures associated with works within Vegetable Creek are provided in **Section 11**.




Mine Site




Mine Camp

**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre

**Mine Site Layout**

- Cut and fill
- Haul road
- Main access road
- Mine-affected water management
- Open cut pits
- Processing
- Processing residue emplacement
- Soil stockpile
- Waste rock emplacement

**Indicative Mining Camp Layout**

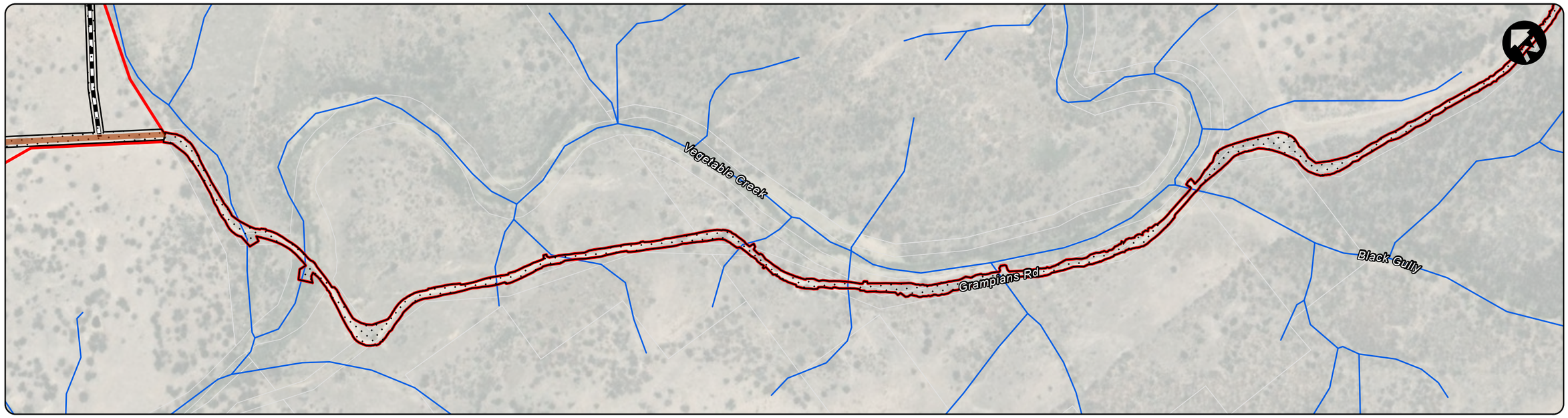
- **Accomodation**
- **Ancillary facilities**
- **Bus bay/heavy vehicle movements**
- **Light vehicle parking**

- Watercourse

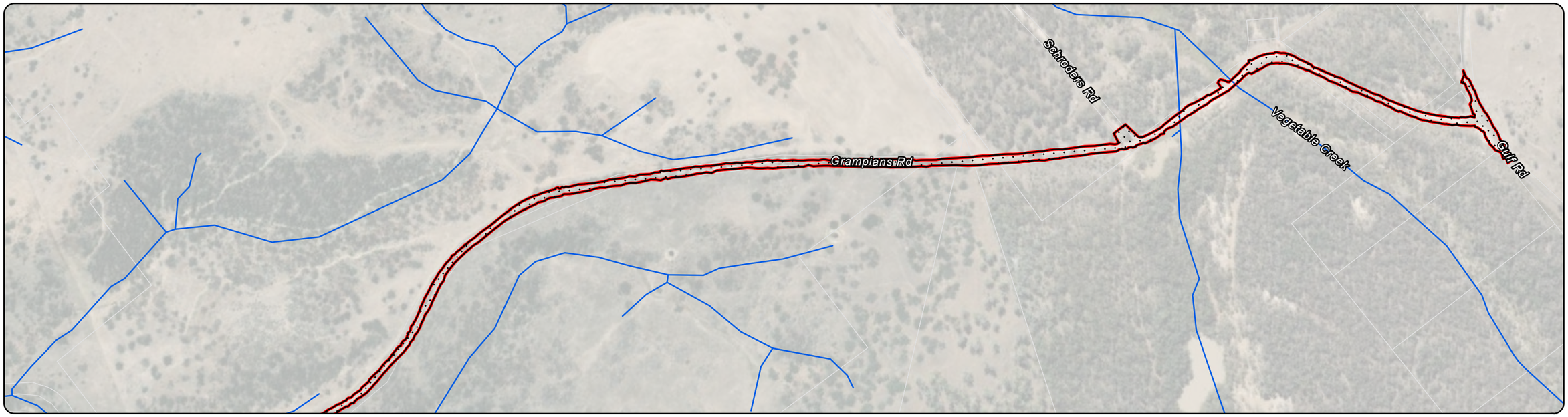
Disturbance Footprint - Illustration 10.1 - Sheet 1 of 2



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*




Grampians Road Upgrade North




Grampians Road Upgrade South

**LEGEND**

Site boundary
Limit of distubance
Cadastre
Internal road
Watercourse

0 160 m

Disturbance Footprint - Illustration 10.1 - Sheet 2 of 2



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

# 11. Mitigation and Management

## 11.1 Mitigation and Compensation Measures Required

Mitigation measures have been prepared in accordance with Section 8.4 of the BAM (2020). Mitigation and management measures have prepared to address and minimise the biodiversity impacts associated with the Project. **Table 11.1** outlines the proposed mitigation measures for the Project.

**Table 11.1 Biodiversity mitigation measures**

| Reference ID | Mitigation measure | Reason | Responsibility |
|---|---|---|---|
| **Pre-construction** | | | |
| B1 | Limit disturbance of vegetation to the minimum necessary for construction and operational works through detailed design followed by survey and installation of clearly defined and markers and/ or barriers to identify exclusion zones. Exclusion zones would be recorded in the Applicant's GIS records. The GIS information will be reviewed during the planning of all maintenance or other future activities that could cause disturbance. | Protection of flora and fauna in outside the disturbance footprint. | Project manager/ Project Engineer |
| B2 | Prior to construction detailed designs will incorporate within the Project Site the following strategies along access routes:<br>Internal speed limits to be maintained as ≤40 km/hr.<br>■ Improved visibility (i.e. clear vegetation along road verge) where applicable.<br>■ Signage of wildlife within the area along Grampians Road.<br>■ Fauna friendly fencing to prevent animals entering mining operations.<br>■ Implementation of speed bumps or other vehicle control measures at potential wildlife crossing points. | Reduce potential of vehicle strike and direct mortality. | Project manager/ Project Engineer/ Environmental manager |
| B3 | Exterior lighting must be designed in accordance with 'soft lighting' principles and limit, as far as practicable, light penetration within adjacent retained vegetation. Artificial lighting associated with the Project will incorporate best practice lighting design as prescribed in *National Light Pollution Guidelines for Wildlife* (Department of the Environment and Energy 2020) - *Appendix A – Best Practice Lighting Design* – lighting mitigation measures (i.e. light shields) will focus on exterior lighting to limit light spill within adjacent habitat. | Protection of nocturnal fauna and preservation of dark habitats. | Project manager/ Project Engineer |
| B4 | Where the Project traverses Key Fish Habitat, incorporate fish-friendly culvert and causeway designs as per Fish Passage Requirements for Waterway Crossings (Fairfull & Witheridge 2003). Avoid and minimise impacts to remnant trees where possible. | Protection of riparian areas and continuation of fish passage along Key Fish Habitat. | Project manager/ Project Engineer |
| B5 | A Biodiversity Management Plan (BMP) would be produced to set out measures to minimise and manage impacts on biodiversity. It would include (as a minimum):<br>■ Measures to minimise impacts to biodiversity, including measures to reduce disturbance to sensitive flora and fauna. | Protection of flora and fauna through a clear management strategy and monitoring framework. | Project manager/ Environmental manager/ Bat Specialist |

| Reference ID | Mitigation measure | Reason | Responsibility |
|---|---|---|---|
| | ■ Procedures for clearing of vegetation (via a two-staged approach), including pre-clearing inspections and procedures for the relocation of flora and fauna and salvage of timber/ logs/ hollows as habitat.<br>■ Procedures for the demarcation and protection of retained vegetation, including vegetation adjacent to construction areas.<br>■ Pest and weed management.<br>■ Habitat supplementation measures such as nest boxes, hollow re-use/ creation and re-use of timber/ logs as habitat in broader area if practicable.<br>■ Rehabilitation strategies, including progressive rehabilitation, and measures for the management and maintenance of rehabilitated areas (including duration). Rehabilitation and revegetation will utilise local endemic native species.<br>■ Procedures for unexpected, threatened flora and fauna during construction, including stop work procedures.<br>■ Collection of native seed prior to clearing, for use in the revegetation of disturbed areas.<br>■ Velvet Wattle seed collection and rehabilitation strategy.<br>■ Monitoring requirements and compliance management both during and post construction.<br>As part of BMP, a bat management and mitigation plan will be undertaken, which will include, but not limited to:<br>■ An informational/ education program to ensure staff and contractors are aware of the presence and conservation significance of the bats in the existing disused adits.<br>■ A bat eviction and exclusion plan to ensure no bats are present in the existing disused adits should the demolition of the adits proceed.<br>■ A bat monitoring program during pre and post demolition, to determine the movements of bats evicted from the existing adits.<br>Implementation of bat management and mitigation plan and exclusion will occur before the construction phase. | | |

| Reference ID | Mitigation measure | Reason | Responsibility |
|---|---|---|---|
| B6 | Biodiversity exclusion zones for retained vegetation would be confirmed by a suitably qualified ecologist/ environmental manager and identified as 'No disturbance' zones prior to the commencement of clearing or any site activity that could damage the vegetation within the exclusion zone.<br>Biodiversity exclusion zones would be surveyed, physically marked and demarcated, and included on sensitive area maps, prior to clearing. Regular checks of biodiversity exclusion zones will be undertaken the project team to ensure boundaries remain intact. | Protection of flora and fauna by preventing accidental encroachment into sensitive areas. | Project manager/ Environmental manager |
| | Where impacts to native vegetation and fauna cannot be accurately determined at this stage, Section 8.5 of the Biodiversity Assessment Method (BAM) 2020 requires the application of adaptive management. Accordingly, Adaptive Management Plans will be developed during the post-approval phase, informed by the mitigation measures. These will include Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) measures and Trigger Action Response Plans (TARPs), which will be incorporated into relevant environmental management plans.<br>In relation to dust deposition, additional measures will be included to minimise impacts on retained native vegetation, particularly areas of high conservation value and threatened species such as Velvet Wattle. These measures may include targeted dust suppression in proximity to sensitive species, progressive rehabilitation of disturbed areas, management of exposed surfaces to limit wind erosion, and the application of buffer distances around high-value vegetation. Dust control measures outlined in the Air Quality Management Plan (AQMP), including watering, use of dust suppressants, and TARPs, will be explicitly linked to biodiversity protection outcomes.<br>For site contamination, mitigation measures will be implemented to reduce fauna exposure to heavy metals and metalloids. This may include the use of physical controls such as fauna exclusion fencing around high-risk areas and netting or other deterrents to limit fauna access to mine-affected water bodies, where appropriate. These measures will be supported by targeted monitoring of air, soil, and water quality, with adaptive management responses implemented where contamination risks are identified.<br>In relation to airblast, blast design and scheduling will be implemented to minimise potential impacts on biodiversity. This includes consideration of blast timing, charge size, frequency, and spatial controls to reduce peak airblast overpressure. Where sensitive fauna retained habitat has been identified in proximity to blasting areas, | Protection of flora and fauna where impacts cannot be accurately determined Adaptive Management Plans and TARPs will provide a structured management and monitoring framework to address potential indirect impacts on biodiversity. | Project manager/ Environmental manager |

| Reference ID | Mitigation measure | Reason | Responsibility |
|---|---|---|---|
| | consideration will be given to scheduling blasting activities, where practicable, to avoid key breeding periods.<br>Mitigation measures across dust, contamination, and airblast pathways will be integrated into project design and environmental management frameworks to avoid or minimise indirect impacts on biodiversity values | | |
| | | | |
| **Construction** | | | |
| B7 | All relevant project personnel, including relevant sub-contractors would be trained on biodiversity management protocols and the requirements for the project, through inductions, toolbox talks and targeted training, and provided with sensitive area maps (showing clearing boundaries, marker identification and exclusion zones) and updates as required. | Ensure personnel are informed and compliant with biodiversity management protocols. | Project manager/ Environmental manager |
| B8 | Timing of vegetation clearing works will be undertaken to avoid important life cycle events such as breeding or nursing during important seasonal periods (i.e. spring – early summer (Sep – Jan)). Habitat removal will be undertaken in accordance with clearing and fauna management procedure as stated in BMP. | Protection of fauna likely to utilise the development site for breeding (including threatened species) and reduced mortality rates of fauna during clearing. | Project manager/ Environmental manager |
| B9 | Install and maintain erosion and sediment control measures, ensuring they are checked regularly and kept in good condition. | Prevent sediment runoff into adjacent habitats and waterways. | Project manager/ Environmental manager |
| B10 | Implement clearing protocols and procedures that would be outlined in BMP including:<br>■ Ensure a suitably qualified wildlife spotter, catcher and handler is present during vegetation clearing to relocate displaced fauna to nearby habitat.<br>■ Pre-clearing surveys.<br>■ Vegetation clearing undertaken via a two-staged approach.<br>■ Salvage of timber/ logs/ hollows as habitat for rehabilitation areas.<br>■ Identify vegetation to be retained to prevent inadvertent damage or over-clearing. | Protection of fauna within the disturbance footprint.<br>Minimise indirect habitat impacts and ensure habitat preservation where possible. | Project manager/ Environmental manager/ Project Ecologist |

| Reference ID | Mitigation measure | Reason | Responsibility |
|---|---|---|---|
| B11 | Relocation of habitat features (fallen timber, hollow logs) from the disturbance footprint into areas identified for retention or rehabilitation in accordance with BMP. | Enhance habitat in retained or rehabilitated areas. | Environmental manager/ Project Ecologist |
| B12 | Use high-visibility fencing or similar barriers around the disturbance footprint to prevent inadvertent damage to adjacent habitats during clearing. | Prevent inadvertent damage or over-clearing. | Project manager/ Environmental manager |
| B13 | Confine temporary infrastructure (compounds, parking, storage) to designated cleared or disturbed areas to minimise disturbance to adjacent habitat. | Protect adjacent vegetation and habitat from unnecessary disturbance. | Project manager/ Project Engineer/ Environmental manager |
| B14 | Activities within vegetated riparian zones would be managed to minimise impacts to aquatic environments. Riparian areas subject to disturbance would be progressively stabilised and rehabilitated using suitable native species. | Protection of riparian vegetation and aquatic habitats | Project manager/ Project Engineer/ Environmental manager |
| B15 | Ensure pest species are managed according to weed and pest management protocols, procedures and clearances outlined in the BMP. Biosecurity risk weeds are to be managed according to requirements under the *Biosecurity Act 2015*.<br>Measures must be implemented during construction works so that machinery and plant do not introduce weed seed or propagules to the site (e.g. by adoption and implementation of the 'Arrive Clean, Leave Clean' guidelines)(Department of the Environment 2015). | Protection of flora and fauna, from invasive species. | Project manager/ Environmental manager |
| **Operation** | | | |
| B16 | Features of high biodiversity conservation significance within the Project Site, including biodiversity exclusion zones identified during pre-construction (mitigation reference #B1), will be reviewed during the planning of all maintenance or future activities that could cause disturbance. | Ensure ongoing protection of important biodiversity features during the operational phase. | Project manager/ Environmental manager |
| B17 | Implement a flora and fauna monitoring program as outlined in the BMP, including monitoring for invasive species, with an adaptive management approach including an emergency response plan for dealing with unforeseen environmental impacts, such as a sudden infestation of pests or the discovery of an unlisted species. | Monitoring the long-term health of flora and fauna and adaptive management to mitigate impacts. | Project manager/ Environmental manager |

| Reference ID | Mitigation measure | Reason | Responsibility |
|---|---|---|---|
| B18 | Ensure ongoing ecological restoration and maintenance of native vegetation/ habitats, including continued rehabilitation efforts in accordance with the approved rehabilitation management plan. | Restoration and enhancement of biodiversity on-site and adjacent areas. | Project manager/ Environmental manager |

### 11.1.1 Adaptive Management Plan Framework (indicative)

An Adaptive Management Plan will be prepared during the post-approval phase and incorporated into relevant environmental management plans. These plans will ensure that monitoring outcomes are regularly reviewed and that management measures are refined in response to observed impacts, thereby providing an effective mechanism to avoid or minimise indirect impacts on biodiversity arising from dust, site contamination and airblast.

An indicative Framework is provided below. This framework will incorporate monitoring, trigger levels, and contingency measures to manage impacts that are infrequent, uncertain, or difficult to quantify at the current stage of assessment. Monitoring programs will be established to assess dust deposition, airblast intensity, and potential contamination of soil and surface water, as well as the response of vegetation and fauna to these stressors. Trigger Action Response Plans (TARPs) will define threshold levels (triggers) at which management actions are required and outline clear response measures where monitoring indicates that impacts exceed predicted levels or pose a risk to biodiversity values.

Contingency measures may include increased dust suppression, modification of blasting practices (e.g., timing, charge size, or frequency), implementation of additional exclusion measures to limit fauna exposure to contaminated areas, and targeted habitat management or rehabilitation.

An adaptive management framework has been adopted to address uncertainty associated with indirect impacts from dust deposition, site contamination, and airblast. This includes defined monitoring programs, trigger thresholds, and corresponding management actions, as outlined in **Table 11.2**. Locations of potential monitoring sites are shown in **Figure 11.1**.

Additional mitigation measures for Velvet Wattle are outlined in **Table 11.3**

**Table 11.2 Additional Mitigation Measures**

| Impact | Monitoring | Trigger level | Management/ Response | Responsibility |
|---|---|---|---|---|
| Dust deposition | Dust deposition rates at sensitive receptors (eg threatened species habitat) | Dust deposition approaching or exceeding 4 g/m2/month | Management actions may include but are not limited to: Increase dust suppression (watering/ | Environmental Manager |

| Impact | Monitoring | Trigger level | Management/ Response | Responsibility |
|---|---|---|---|---|
| | | | suppressants), reduce vehicle speeds, stabilise exposed areas, implement additional buffers | |
| Vegetation condition (dust related) | Visual assessment of vegetation health (leaf dust loading, stress indicators) | Observable decline in vegetation condition attributable to dust | Management actions may include but are not limited to: Increase dust controls, implement targeted mitigation near sensitive vegetation, review operations | Environmental Manager |
| Site Contamination (soil / water) | Soil and surface water quality monitoring (heavy metals / metalloids) | Concentrations exceed baseline or guideline values | Management actions may include but are not limited to: Isolate affected areas, implement fauna exclusion zones (fencing/ netting) review containment and operational practices. | Environmental Manager |
| Fauna exposure to contamination | Fauna monitoring (activity, mortality, use of water sources) | Evidence of fauna assessing contaminated areas or adverse effects. | Management actions may include but are not limited to: Restrict access (fencing/ netting) provide alternative water sources, enhance habitat. | Environmental Manager |
| Airblast | Airblast pressure and vibration monitoring | Exceedance of predicted approval limits | Management actions may include but are not limited to: Modify blast design (charge size, delay timing), reschedule blasts, increase buffers | Project Manager/ Environmental Manager |
| Fauna disturbance (airblast) | Fauna observations per and post blast | Repeated disturbance or displacement observed | Management actions may include but are not limited to: Adjustment of blast timing (avoid breeding) reduce frequency, implement exclusion zones | Environmental Manager |

**Table 11.3 Additional Mitigation Measures for Velvet Wattle**

| Impact Pathway | Avoidance Measure | Mitigation Measure | Monitoring/ Adaptive Management | Responsibility |
|---|---|---|---|---|
| Dust Deposition on Velvet Wattle | Infrastructure and access roads contained within existing corridor. Design refinements | May include but not limited to: | Dust deposition monitoring in areas containing Velvet Wattle - Trigger Action Response | Project Environmental Manager |

| Impact Pathway | Avoidance Measure | Mitigation Measure | Monitoring/ Adaptive Management | Responsibility |
|---|---|---|---|---|
| | to reduce footprint near known Velvet Wattle occurrences. | Targeted dust suppression actions.<br>Progressive rehabilitation of disturbed areas<br>Managed exposed surfaces to reduce wind erosion<br>Buffer distances around sensitive stands. | Plans linked to biodiversity outcomes<br>- Adaptive Management Plan to implement additional measures if dust exceeds thresholds | |
| Indirect physiological / biochemical stress on Velvet Wattle | Avoidance of sensitive stands where feasible | May include but not limited to:<br>Minimise dust exposure through operational controls (haul road traffic, scheduling)<br>- Staged clearing to reduce sudden exposure<br>Germination trials to propagate seed for restoration<br>Translocation trials | Periodic health assessments of Velvet Wattle (foliage condition, growth)<br>- Adaptive Management Plan to adjust mitigation if stress indicators are observed.<br>Evaluate success of germination and translocation trials and refine method as required. | Project Environmental Manager |
| Indirect impact on surrounding box-gum woodland | Maximise avoidance along Grampians Road corridor<br>- Minimise clearing outside existing road footprint | May include but not limited to:<br>Dust suppression and rehabilitation measures<br>- Limit exposed surfaces and maintain vegetated buffers. | Monitoring of vegetation condition along woodland edges<br>- AMP to implement further control if decline observed | Project Environmental Manager |

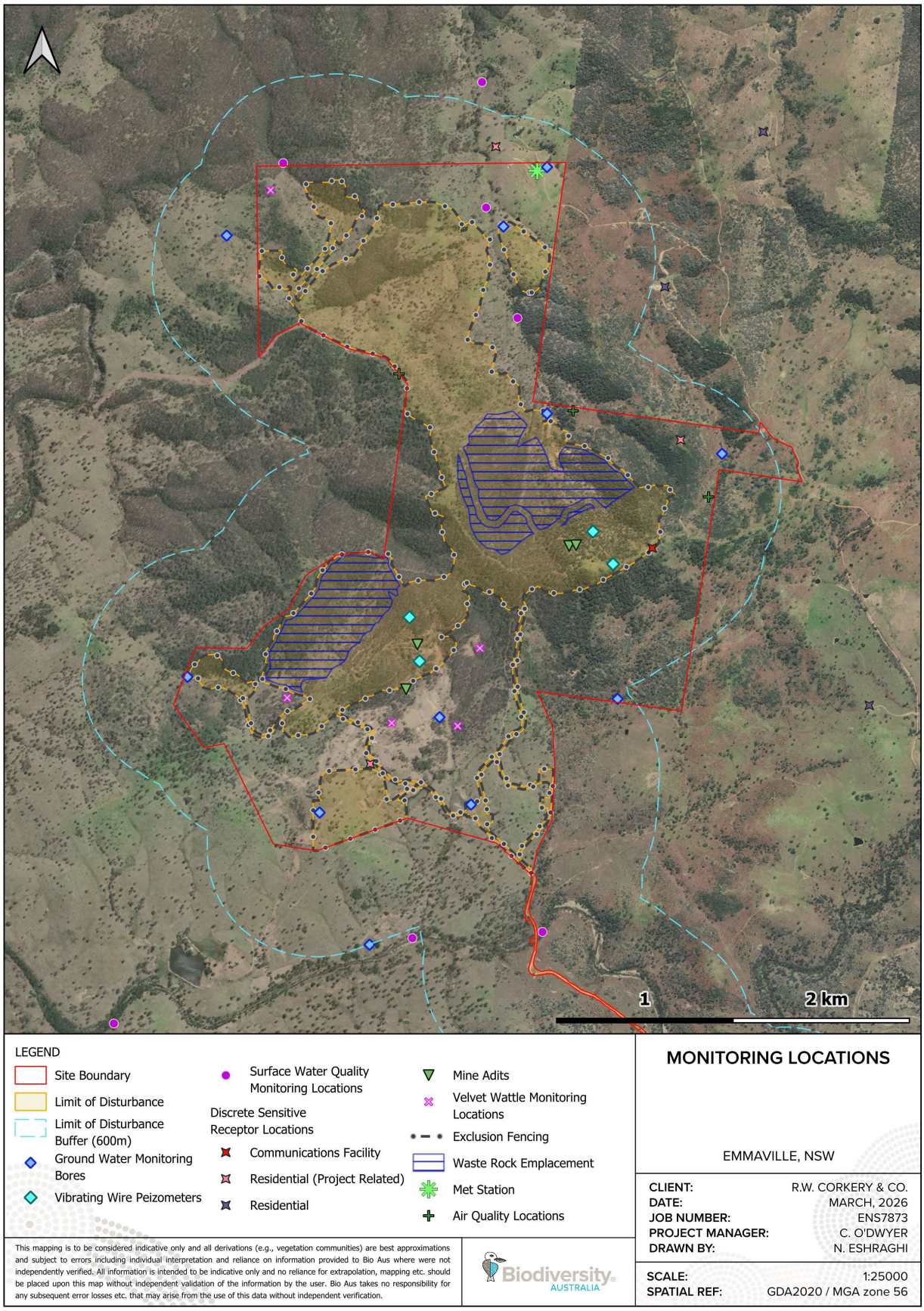



**Figure 11.1 Monitoring Locations**

# 12. Impact Summary

This section sets out the impact thresholds for residual impacts to biodiversity values after avoid, minimise and mitigate measures have been applied. Thresholds for assessment and offsetting impacts are outlined in Chapter 9 of the BAM and include:

- Impacts on biodiversity values at risk of a serious and irreversible impact (SAII).
- Impacts that require offsetting.
- Impacts which do not require offsetting.
- Impacts that do not require further assessment.

## 12.1 Serious and Irreversible Impacts (SAII)

This section identifies every potential serious and irreversible impact (SAII) entity that is listed in the Guidance to assist a decision-maker to determine a serious and irreversible impact that would be impacted by the disturbance footprint.

Impact assessment of potential entities of SAII impacts on biodiversity values is outlined under Section 9.1 of the BAM (2020) and addressed below.

### 12.1.1 Box Gum Woodland TEC SAII Assessment

The following SAII threatened ecological communities are considered to be affected by the Project:

- *White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland.*

White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland is identified as a candidate SAII entity. The extent to which this Project impacts this SAII TEC is provided in **Table 12.1** and shown in **Illustration 12.1**.

**Table 12.1 Extent of the SAII threatened ecological community White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland within the Project site**

| TEC | PCT | Zone | BC Act | SAII | IBRA subregion | | Direct Impact (ha) |
|---|---|---|---|---|---|---|---|
| | | | | | BRH[1] | GIGB[2] | |
| White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland | 3363 | Intact | CE | Yes | 0.62 | 0 | 0.62 |
| | | Poor | | | 0.41 | 0 | 0.41 |
| **Total direct impact on threatened ecological communities** | | | | | | | **1.03** |

CE = Critically Endangered

1) Beardy River Hills

2) Glenn Innes-Guyra Basalts

An assessment of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland was assessed against the serious and irreversible impacts on biodiversity values in accordance with Chapter 9.1.1 of the BAM and is provided in **Table 12.2**.

**Table 12.2 SAII assessment for the threatened ecological community White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland**

| Assessment Requirements | White Box Yellow Box Blakey's Red Gum Woodland and Derived Native Grassland |
|---|---|
| ***1. The action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII*** | **1)** The direct impacts on White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland (Box Gum Woodland) have been avoided where possible through design refinement. The occurrence of this community is predominately along the existing roadway of Grampians Road, and limitations to avoid disturbance to this community is limited due to constraints associated with the existing road corridor. Where possible impacts to Box Gum Woodland were minimised as far as practical, whilst still achieving contemporary safety standards for all road users.<br><br>Direct impact may be further avoided through design refinement, the clear delineation of construction zones and the placement of construction compounds/ laydown areas outside of this TEC. Indirect impacts will be managed through mitigation measures, which are outlined in **Section 10**. |
| ***2. The assessor must consult the TBDC and/ or other sources to report on the current status of the TEC including:***<br><br>***a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)***<br><br>***b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by:***<br>***i. change in community structure***<br>***ii. change in species composition***<br>***iii. disruption of ecological processes***<br>***iv. invasion and establishment of exotic species*** | **2a)** The scientific determination for Box Gum Woodland lists the community as Critically Endangered with an estimated reduction in geographic distribution of 90%.<br><br>The estimated reduction in geographic extent of the TEC since 1970 is unknown, although the scientific determination for Box Gum Woodland estimates that the annual rate of loss for the TEC between the period 2009–2018 for the NSW South Western Slopes was 545 hectares.<br><br>**2.b)** Within the disturbance area, this community currently occurs in a range of conditions, including intact and poor. Vegetation integrity scores (VI) for each condition class can be viewed in **Section 5** and **Section 10.1.2**.<br><br>The Project would impact a total of 1.03 of Box Gum Woodland. In terms of floristic composition and structural changes to Box Gum Woodland, the Project would impact the entire 1.03 as all vegetation would be removed to ground level, thereby substantially changing the vegetation structure and composition. Change in VI score per vegetation zone and total VI loss can be viewed in **Table 10.1**.<br><br>In relation to disruption of ecological processes, weed invasion, degradation of habitat and habitat fragmentation, the nature of the impact involves minor widening of the existing public road and as such, impacts would be limited to the road edges. The Project would not result in |

| Assessment Requirements | White Box Yellow Box Blakey's Red Gum Woodland and Derived Native Grassland |
|---|---|
| ***v. degradation of habitat, and vi. fragmentation of habitat.*** | further fragmentation of larger habitat patches and thus is unlikely to significantly degrade or increase fragmentation of this community within the region. |
| ***3. Where the TBDC indicates data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Subsection 9.1.1(2.), the assessor must record this in the BDAR.*** | **3)** Box Gum Woodland is not listed in the TBDC as a data deficient entity. |
| ***4. a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:***<br>***i. in hectares, and***<br>***ii. as a percentage of the current geographic extent of the TEC in NSW.*** | **4a)** The direct impacts to this SAII entity is:<br>■ PCT 3363 – Intact = 0.62 ha.<br>■ PCT 3363 – Poor = 0.41 ha.<br>Total impact on Box Gum Woodland is 1.03. Indirect impact would be managed through mitigation measures outlined in **Section 11**.<br><br>In NSW, the current geographic extent of Box Gum Woodland has been estimated to have an Extent of Occurrence (EOO) of 702,800 km$^2$ and an Area of Occupancy (AOO) of 151,100 km$^2$ (NSW Threatened Species Scientific Committee, 2020). The loss of 1.03 as a result of the Project would constitute an additional loss of less than 0.001% to the current geographic EOO of the TEC in NSW. |
| ***4 a. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:***<br>***i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals;***<br>***ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:***<br>■ ***distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed; and***<br>■ ***estimated maximum dispersal distance for native flora species characteristic of the TEC; and***<br>■ ***other information relevant to describing the impact on connectivity and fragmentation, such as the area to*** | In NSW, the current geographic extent of Box Gum Woodland has been estimated to be 702,800 km$^2$ (or 70,280,000 ha) (NSW Threatened Species Scientific Committee, 2020). The loss of 1.03 as a result of the Project would constitute an additional loss of less than 0.001% to the current geographic extent of the TEC in NSW.<br><br>**4b)** The extent of Box Gum Woodland within 500 meters of the Project is mostly highly fragmented, with patches occurring in an agricultural landscape. Most patches are degraded from sheep and other domestic stock grazing practices, with many remnant elements reduced to scattered trees in pastural land.<br><br>In terms of threats, the Project is considered unlikely to result in substantial alteration of surface water flows or groundwater levels, fire or flooding regimes. This will continue to be monitored during the operational phase. The Project would not include use of fertilisers or other pollutants, which would inhibit or impact the community. Mitigation measures have been provided (**Section 11**) to minimise any potential indirect impacts to remaining areas of the community.<br><br>In terms of the condition of the TEC according to the vegetation integrity score for Box Gum Woodland, the Project will impact a total extent area of 1.03. This impact includes a complete |

| Assessment Requirements | White Box Yellow Box Blakey's Red Gum Woodland and Derived Native Grassland |
|---|---|
| ***perimeter ratio for remaining areas of the TEC as a result of the development.***<br>***iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s).*** | vegetation integrity loss. Vegetation integrity loss can be viewed for each vegetation zone in **Table 10.1**. |
| ***5. The assessor may also provide new information that demonstrates that the principle identifying that the TEC is at risk of an SAII is not accurate.*** | 5. This BDAR does not provide any new information that demonstrates that the principle identifying that the TEC is at risk of an SAII is not accurate. |

### 12.1.2 *Acacia pubifolia* (Velvet Wattle) SAII Assessment

- **Status**: Endangered (BC Act) & Vulnerable (EPBC Act).
- **Impact threshold (TBDC):** No threshold listed in TBDC.
- **SAII principle applicable:** Principle 4 - the species being unlikely to respond to management and unlikely to respond to management at a stewardship site. Principle 4 applies because; (1) known reproductive characteristics (clonality or sterility) severely limit the ability of the species to increase the existing population or occupy new habitat; or (2) the species is reliant on abiotic habitats which cannot be restored or replaced; or (3) life history traits and/ or ecology is known but the ability to control key threatening processes is currently negligible.
- **Distribution:** Velvet Wattle occurs in NSW and Qld. In NSW, it is known from two main populations, one north of Emmaville and the other near Warrabah National Park.
- **Habitat:** Velvet Wattle generally grows in dry shrubby woodland on granite and metasediment soils. This species grows on rocky granite hillsides, in sandy, stony or loamy soil in eucalypt-scrub woodland or Eucalyptus-Callitris forest (Orchard & Wilson 2001a).
- **Reproduction:** Flowers are borne between Sept. and Nov. Clarke et al. (1998) reported that, in the Torrington area of NSW, this species is killed by fire and appears to be an obligate seeder. However, in the Wyberba district in Qld, *A. pubifolia* has been recorded as suckering after fire (BRI undated).
- **BioNet records:** Bionet records across the whole state identified approximately 7,936 records (as of 24/02/2025) – this includes records from Project Site and the proposed offset site. BioNet records of individuals within greater locality (50 km radius) of the Mine Site identify 7,771 individuals ((NSW DCCEEW 2025c). The species is known to be locally abundant where it is found; this is consistent with observations of the species on the Mine Site and further abroad.

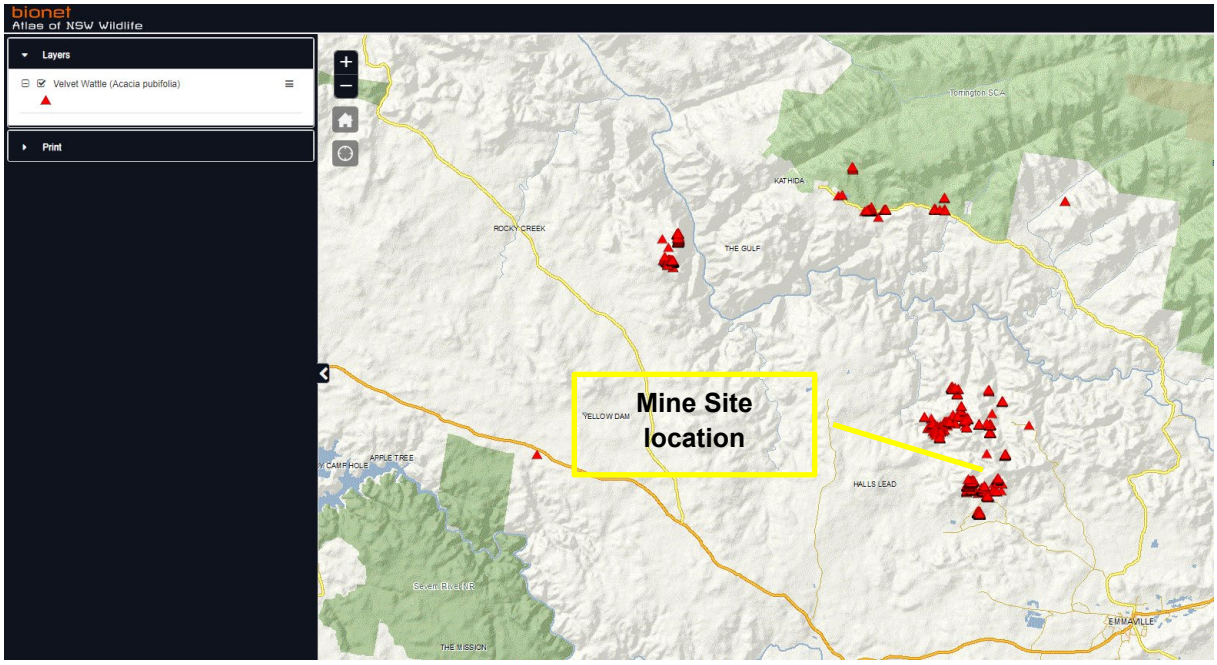



**Figure 12.1 Velvet Wattle BioNet records in locality of Project Site (Feb 2025)**

- **Local Population:** The local population is defined as individuals identified in BioNet searches within a 50 km radius of the Mine Site, totalling approximately 7,771 records (as of 25/02/2025). Of these, 4,296 individuals were recorded during surveys for the Project and have since been added to the BioNet database. It is important to note that this region is likely under-surveyed, particularly in areas outside known occurrences. As a result, there is a high likelihood of additional plants existing in suitable habitats around nearby BioNet records. During surveys, substantial areas of

Velvet Wattle were observed outside the Mine Site, and as previously mentioned, the species was found to be locally abundant in areas where it occurs.

- **SPRAT profile – Population:**

In NSW, it is known from two disjunct localities:

1. Torrington State Recreation Area, north-west of Emmaville in the south-western portion of the reserve. There is one dense but small population along Gulf Rd and scattered mature plants along the lower portion of Carpet Snake Fire Trail (Clarke et al. 1998; Copeland & Hunter 1999).
2. On private property near Warrabah NP, about 60 km west of Armidale. In consultation with the landholder, the NSW NPWS has fenced off the population and is monitoring its progress (Creamer 1999; NSW undated). This population consists of 95 plants (P.Metcalfe 1999, pers.comm. in Copeland & Hunter 1999).

- **Impacts:** The Project would result in the direct impact to approximately 1,967 individuals, which comprises both juveniles (occur predominately as regrowth) and mature individuals. The impact area equates to approximately 15 ha of habitat that the species is distributed across within the Project Site. This impact equates to the loss of 25.3% of the recorded population within the greater locality (50 km), which currently totals 7,771 individuals (BioNet records).

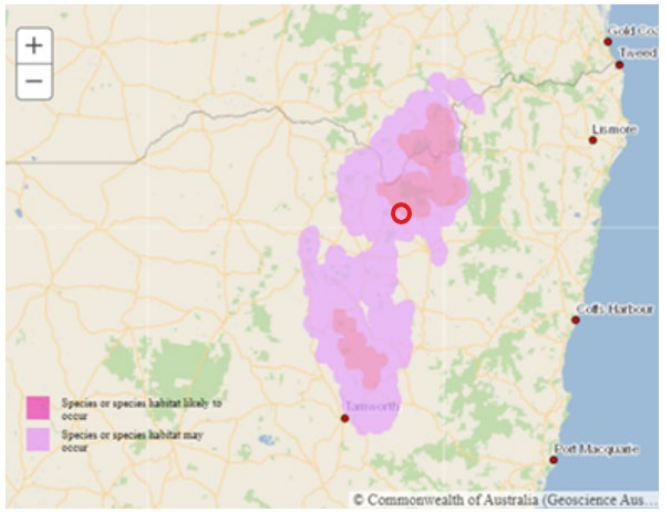
**Table 12.3 SAII Assessment for candidate threatened flora species *Acacia pubifolia* (Velvet Wattle)**

| ***Assessment Requirements*** | ***Acacia pubifolia* (Velvet Wattle)** |
|---|---|
| ***1. The action and measures taken to avoid the direct and indirect impact on a species at risk of an SAII*** | Direct impacts on *Acacia pubifolia* will be avoided where possible through design refinement. To date, the following actions/ measures have been undertaken to avoid impact on the species:<br>Placement of infrastructure outside known occurrences of Velvet Wattle (where possible).<br>Design refinement and reduction in design footprint in known occurrences of Velvet Wattle (i.e. Southern Waste Rock Emplacement).<br>Indirect impacts would be managed through mitigation measures, which are outlined in **Section 11**. |
| ***2. The assessor must consult the TBDC and/or other sources to report on the current population of the species, including:***<br><br>***a) evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:***<br>***i. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or***<br>***ii. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/ or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites***<br><br>***b) evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by:***<br>***i. an estimate of the species' current population size in NSW, and***<br>***ii. an estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and***<br>***iii. where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations***<br><br>***c) evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:***<br>***i. extent of occurrence***<br>***ii. area of occupancy***<br>***iii. number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and*** | 2.a) *A. pubifolia* has suffered a population reduction in the past due to the combined effects of increased frequency and duration of drought due to climate change and clearing of habitat for agricultural and infrastructure developments. Within the three-generation timeframe of 43.8-55.2 years, reductions in the overall number of individuals of approximately 28% in the Warrabah subpopulation and 15% in the Gulf Rd subpopulations have been recorded.<br><br>2.b) (i) The population of *A. pubifolia* is estimated to contain a minimum of 3,539−4,609 mature individuals across its entire range, with approximately 3000 mature individuals occurring within NSW. However, the population across NSW may have increased with many more records on BioNet indicating the population may be reaching 8000. Additional survey effort across NSW have increased records in the greater locality to 7,771 records (as of 25/02/2025). Bionet records across the whole state identified approximately 7,936 records (as of 24/02/2025) – this includes records from subject site.<br>*A. pubifolia* is known from three locations in NSW, one north of Emmaville in the Torrington State Recreation Area, Spring Hill west of the Beardy River, and the other on private property near Warrabah National Park. The species also occurs near Wyberba in Queensland (Tindale & Kodela, 2001; DECC, 2005a).<br>(ii) When the threat of increased frequency and duration of drought due to climate change is considered, the eleven subpopulations of *A. pubifolia* can be considered to occur across three threat-defined locations, as per the IUCN definition (Appendix 2; IUCN 2022). This is due to increased frequency and duration of drought being the most serious plausible threat that results in the lowest number of locations for the taxon, and the effects of this threat are likely to differ in magnitude and effect across the three major regions of the Granite Belt, Emmaville and Warrabah in all but the most significant drought events. Droughts are likely |

| *Assessment Requirements* | *Acacia pubifolia* (Velvet Wattle) |
|---|---|
| ***iv. whether the species' population is likely to undergo extreme fluctuations*** | to become a more frequent occurrence with predicted intensity and duration due to climate change. |
| ***d) evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:*** | The only long-term demographic monitoring of the species in the Warrabah subpopulation shows a steady decline in the overall number of plants over the past 24 years (Eco Logical Australia 2021b), with other subpopulations also showing contemporary evidence of similar declines as a result of drought (Eco Logical 2021a; ALA 2023). |
| ***i. known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site*** | (iii) Based on TSSC (Phillips 2024) the population size in 2024 in NSW is presented in the Table below. However, given the increase in survey effort across NSW the total population may be approaching 8000 individuals. |
| ***ii. the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or*** | |
| ***iii. life history traits and/ or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).*** | |

| Region | Subpopulation | Time since last fire | Minimum estimate of all individuals | Minimum estimate of mature individuals | References |
|---|---|---|---|---|---|
| Emmaville NSW | Flagstone Creek | 2019 | 2 | Unknown | Copeland 1997 |
| Emmaville NSW | Gulf Road | 2019 | 1159-1409 | 564 | ELA 2023 |
| Emmaville NSW | Spring Hill | 2009 | 2439 | 2074 | Copeland et al 2018 |
| Warrabah NSW | Warrabah | 2018 | 295 | 221 | Hunter and Copeland 2027. ELA 2021b |
| Total | | | 4145 | 2859 | |
| Percentage | | | | 70% | |

2.c) (i) *A. pubifolia* is an uncommon species with a wide but patchy distribution along the western edge of the New England Tableland in northern New South Wales (NSW) to west

| Assessment Requirements | *Acacia pubifolia* (Velvet Wattle) |
|---|---|
| | of Stanthorpe in the Darling Downs of southeast Queensland (DCCEEW 2023). This area is within the New England Tablelands Bioregion (DAWE 2012) and on the traditional lands of the Kamilaroi, Ngarabul and Kambuwal People (Horton 1996; NPWS 2003a, 2003b; QPWS 2010).<br>The Area of Occupancy (AOO) of *A. pubifolia* is highly restricted and was estimated to be 100 km2 using 2 x 2 km grid cells, the scale recommended by IUCN (2022). The Extent of Occurrence (EOO) was estimated to be 3,672 km2 and is based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2022). Both EOO and AOO were calculated using ArcGIS (Esri 2015), enclosing all confirmed survey records and cleaned spatial datasets. Based on these estimates, *A. pubifolia* has a highly restricted AOO and EOO.<br>Area of Occupancy (AOO) of 100 km2 and,<br>Extent of Occurrence (EOO) of 3,672 km2.<br>  <br>**Figure 12.2 Distribution of Velvet Wattle (mine site location indicated by red circle** |

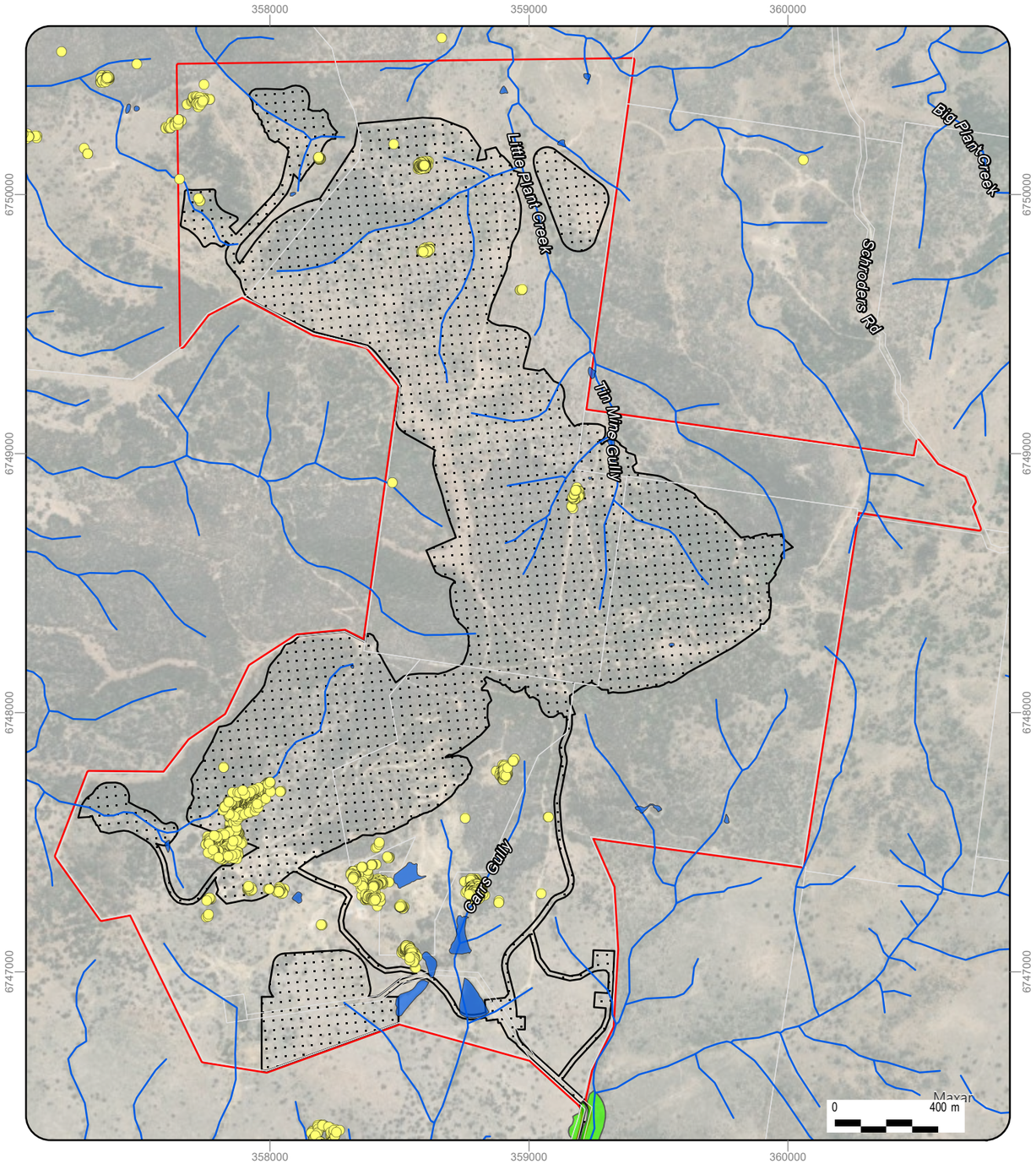
| Assessment Requirements | *Acacia pubifolia* (Velvet Wattle) |
|---|---|
| | (iii) *A. pubifolia* is known from three threat-defined locations, Emmaville, Spring Hill and Warrabah. A significant threat to the species is an inappropriate fire regime where fires are too frequent (less than 5 years), the duration between fires is too long (greater than 30 years), or not hot enough for seed germination.<br>The NSW portion of the *A. pubifolia* population is split across two major areas and has been much more comprehensively surveyed, with population monitoring undertaken yearly from 2018-2021 and again in 2023 (Eco Logical Australia 2021b, 2023). Northwest of Emmaville on the western edge of the Mole Tableland are three subpopulations. The largest of these is the Spring Hill subpopulation, which is within a single private property to the west of the Beardy River containing 2,439 plants after the last census in 2018 (Copeland et al 2018).<br>To the east of the Beardy River lies the Gulf Rd subpopulation, spanning an area along the southern boundary of Torrington State Conservation Area and consisting of several discrete stands with a total of 1,159–1,409 plants including 564 mature plants counted by census (Eco Logical Australia 2023; Hunter 2022). This subpopulation also includes a large, recently discovered stand that consists mostly of juveniles recovering post-fire (Hunter 2022). The third subpopulation at Flagstone Creek consists of a small, isolated stand on private land south of Torrington State Conservation Area (Copeland 1997). This subpopulation, recorded as having only two plants (Copeland 1997), has not been surveyed again since 1997, but likely persists given the area remains uncleared and fire-stimulated recruitment may have occurred following fire at the site in 2019 as seen in the recently discovered stand to the west.<br>(iv) *A. pubifolia* is a relatively long-lived species and is unlikely to undergo extreme fluctuations. However, given that droughts are predicted to increase in frequency, intensity and duration under climate change conditions, impacts to this species may be significant. Impacts of severe drought adversely affect *A. pubifolia* and drought may be the greatest driver of decline. Changes in fire regimes, grazing and vegetation clearing are also key threats.<br><br>2.d) (i) *A. pubifolia* has been considered an obligate seeder, reliant on seedling recruitment alone for post-disturbance recovery (Clarke et al. 1997). However, records of the species reshooting post-fire in the Wyberba subpopulation and recent observations of extensive suckering in the NSW subpopulations mean that the species more likely has a variable response to disturbances such as fire, depending on the intensity and severity of past disturbance events. *A. pubifolia* is known to produce new stems via suckering from the |

| *Assessment Requirements* | *Acacia pubifolia* (Velvet Wattle) |
|---|---|
| | rootstock, with this appearing to be the main regenerative response to fire and other disturbance in the NSW subpopulations. Thus, a dependence on suckering for the majority of reproduction is theorised to have become apparent in stands of *A. pubifolia* to allow them to persist within fragmented and modified landscapes (Hunter and Copeland 2007). Clonality may also be naturally derived due to limitations in soil nutrients and regular fire frequencies in open, shrubby ecosystems to enable persistence in harsh ambient conditions<br><br>Flowers are borne between September to November with fruit maturing from December to January. and Nov. There is evidence the species appears to be an obligate seeder although sporadic with the potential that reproductive characteristics may limit the ability to increase the existing population on a site. It is assumed that *A. pubifolia* has similar generation lengths to other large wattles which live up to 35 years.<br><br>(ii) This species grows on rocky granite hillsides, with course sandy, stony or loamy soils in eucalypt-scrub woodland or Eucalyptus-Callitris dominated forests and woodlands. There is a single record of this species growing on metamorphic rocks (BRI undated). These abiotic features (soil type & rocky habitat) currently occur within the 'offset site'. There is potential to restore similar on a biodiversity stewardship site.<br><br>(iii) Increased frequency and duration of drought is contributing to continuing decline in the *A. pubifolia* population and is strongly inferred to do so into the future. In the Warrabah subpopulation, significant numbers of older, large individuals of *A. pubifolia* were observed to die off along with a stalling of recruitment and flowering/fruiting through both the Millennium Drought of 1997–2009 and the 2017–2019 drought (Table 3; Hunter and Copeland 2007; Eco Logical Australia 2019, 2020, 2021b), with subsequent numbers never appearing to recover back to pre-drought estimates. Over a 24-year period encompassing these two major drought events, the abundance within an experimental enclosure set up to protect an intact stand of *A. pubifolia* on the 'Romani' property saw the numbers of *A. pubifolia* drop from 95 in 1999 to 83 in 2006 during the Millennium Drought. By 2018, as the 2017-2019 drought took hold, the number had again dropped to 48, with this trend continuing throughout the drought with only 29 plants recorded in 2019 and 2020. By 2021, after the drought had abated, the number had slightly recovered back to 33 (Eco Logical Australia 2021b).<br><br>While it is thought that some of the trees may recover through resprouting in time and this is already underway in some stands (Eco Logical Australia 2021a, 2021b, 2023), the survey |

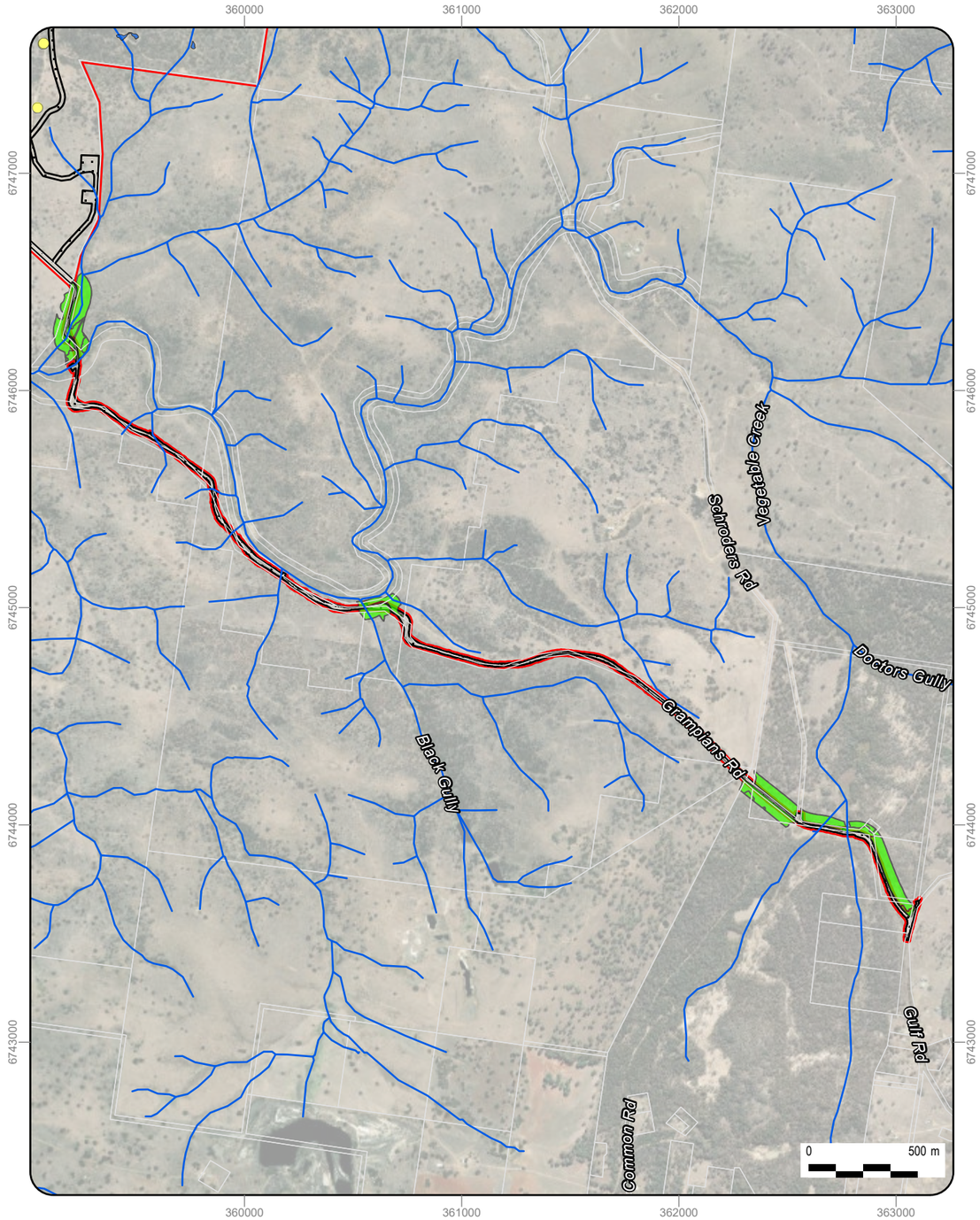
| Assessment Requirements | *Acacia pubifolia* (Velvet Wattle) |
|---|---|
| | data from 2006 and 2018 shows a still sizeable decline in total abundance. This is despite the intervening years having favourable climatic conditions, the plants remaining protected within the fenced enclosure and being unaffected by fire throughout this time. Drought is likely to increase in frequency and magnitude in the future due to widely accepted projections of increased air temperatures.<br><br>OEH Threats relevant to this species include:<br>Inappropriate fire regime. Fire events may occur too frequently (less than five years) or too seldom (greater than 30 years) between events, and/ or fires may not be hot enough to promote seed germination.<br>Grazing by domestic stock.<br>Clearing and fragmentation of Central Hunter Grey Box - Ironbark Woodland for agriculture, development and mining.<br>Destruction and disturbance of habitat for roadworks.<br>Suitable habitat exists, but a sufficient survey has not occurred in order to sufficiently establish baseline population data.<br>Browsing by feral browsers damages/ removes adults and recruits from the population.<br>Small population size.<br>Key threatening process relevant to the species:<br>Ecological consequences of high frequency fires.<br>Clearing of native vegetation.<br>The ability to control the above threats on a biodiversity stewardship site is not considered to be negligible. Control to fire regime, herbivory due to feral/ stock animals and clearing can be managed. |
| ***3. Where the TBDC indicates data is 'unknown' or 'data deficient' for a species for a criterion listed in Subsection 9.1.1(2.), the assessor must record this in the BDAR.*** | The TBDC does not provide information relevant to SAII principles for this species. |
| ***4. In relation to the impacts from the proposal on the species at risk of an SAII, the assessor must include data and information on:***<br><br>***a) the impact on the species' population (Principles 1 and 2) presented by:***<br>***i. an estimate of the number of individuals (mature and immature) present in the subpopulation on the subject land (the site may*** | 4.a) (i)<br>Approximately 3,619 *A. pubifolia* individuals have been recorded within the Project Site.<br>BioNet records across the whole state identified approximately 7,936 records (as of 24/02/2025) – this includes records from Project Site and offset site. |

| Assessment Requirements | *Acacia pubifolia* (Velvet Wattle) |
|---|---|
| ***intersect or encompass the subpopulation) and as a percentage of the total NSW population, and***<br>***ii. an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or***<br>***iii. if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal***<br><br>***b) impact on geographic range (Principles 1 and 3) presented by:***<br>***i. the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW***<br>***ii. the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted***<br>***iii. to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g. seed dispersal) and pollination distance for the species***<br>***iv. to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors, including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR.*** | Based on known BioNet records, the recorded individuals within the Project Site account for 45.6% of the known BioNet recorded NSW population.<br><br>The local population is considered to be individuals recorded within the Project Site as well as any other individuals occurring within the greater locality (50 km radius). Although only small areas have been surveyed outside the Project Site (i.e. proposed offset site) there is a high likelihood of additional plants occurring in the greater locality on adjoining properties based on suitable habitat and nearby BioNet records. The subpopulation occurring on the Project Site and adjoining areas may account for a smaller proportion of the total NSW population than what is stated in species profiles.<br><br>Based on BioNet records, the species is observed to be reasonably abundant where it occurs; this may be based on its reproductive ability as an obligate seeder. Overall, due to the deficient data and lack of records of the species across is predicted range, it is difficult to accurately state what population proportion the Project Site accommodates with respect to the NSW population as a whole, as the species is likely under surveyed.<br><br>(ii) Approximately 1,967 *A. pubifolia* individuals would be impacted as a result of the Project. This would represent 24.8% of the total known recorded NSW population given the New BioNet recordings.<br><br>(iii) Approximately 1,967 *A. pubifolia* individuals would be impacted as a result of the Project. Approximately 15 ha of habitat associated with Velvet Wattle would be impacted by the Project.<br><br>4.b) (i) AOO is estimated to be 100 km2 (10000 ha) with an EOO of 3672 kmskm2 (367200 ha). Removing 15 ha equates to a reduction in 0.15 % of AOO and 0.004% of EOO.<br><br>(ii) The Project would directly impact 1,967 individuals (15 ha). The Project would avoid 1,652 individuals and avoid impacting 379.48 ha of suitable habitat within the Project Site.<br><br>Additionally, the Applicant is proposing to establish a Biodiversity Stewardship Agreement (BSA) (offset site) immediately adjacent to the Mine Site. This BSA would conserve 677 individuals (recorded to date) and conserve approximately 1,800 ha of suitable habitat in perpetuity, resulting in a net positive outcome. The establishment of the BSA would result in a long-term conservation site for the species. |

| Assessment Requirements | *Acacia pubifolia* (Velvet Wattle) |
|---|---|
| | Targeted translocation of individuals from the Development Footprint into the Stewardship Site may be undertaken on a trial basis as part of an adaptive management framework. This would be supported by germination trials and propagation studies to improve understanding of the species' reproductive ecology, establishment success and response to management. Outcomes of these trials would be monitored and used to inform ongoing management actions, with methods refined over time to maximise conservation outcomes for the species.<br>(iii) Acacia species predominantly rely on insects for the bulk of pollination with the most important of these being bees and wasps, with flies, beetles, and to a lesser extent, birds also involved (Bernhardt 1987; Stone et al. 2003; Gibson et al. 2011). Insects are drawn to the flowers to forage on the large pollen loads, with the pollen packaged into compounds consisting of multiple grains called polyads, which are particularly attractive to smaller native bee species and introduced honeybees (Apis mellifera) (Stone et al. 2003; Gibson et al. 2011). Pollination by birds such as honeyeaters, enabling occasional long-distance pollination, has also been postulated for some Acacia species (Vanstone and Paton 1998; Stone et al. 2003) This pollination mode is possible in *A. pubifolia* given the presence of a small gland on the phyllode which may act as an extrafloral nectary attractive to birds (Stone et al. 2003). In Acacia pycnantha, the exclusion of honeyeaters from these extrafloral nectaries resulted in much lowered production of fruit (Vanstone and Paton 1988) and so these birds may also affect pollination in *A. pubifolia* in a similar manner.<br>(iv) Indirect impacts on the local population occurring on Project Site would be reduced by:<br>Implementing management measures including, weed control, herbivore control (i.e. goat, cattle removal) and appropriate fire management. |
| ***5. The assessor may also provide new information that demonstrates that the principle identifying that the species is at risk of an SAII is not accurate.*** | This BDAR does not provide any new information that demonstrates that the principle identifying that the species is at risk of an SAII is not accurate. |




Mine Site




Grampians Road

**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre
- Dam
- Watercourse or drainage

**EPBC Act Vegetation and Flora**

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Velvet Wattle *(Acacia pubifolia)* record

SAII Entities - Illustration 12.1



***Information shown is for illustrative purposes only***
*Drawn by: AB Checked by: RE Reviewed by: TLJ*
*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

## 12.2 Biodiversity Offset Requirements

No net loss in biodiversity value is the standard that underpins the BAM. The standard is attained through ensuring that the amount of biodiversity offset credit required from an impact is proportional to the amount of credit generated through improvements in the condition of native vegetation or threatened species habitat at a biodiversity stewardship site. Biodiversity offsetting for residual impacts on biodiversity values listed under the BC Act is mandatory for SSD developments being assessed under Part 7 of the BC Act and subject to a BDAR.

Biodiversity offset obligations have been determined using the BAM-C. The required ecosystem and species credit obligations are outlined below.

### 12.2.1 Impacts Not Requiring Offset

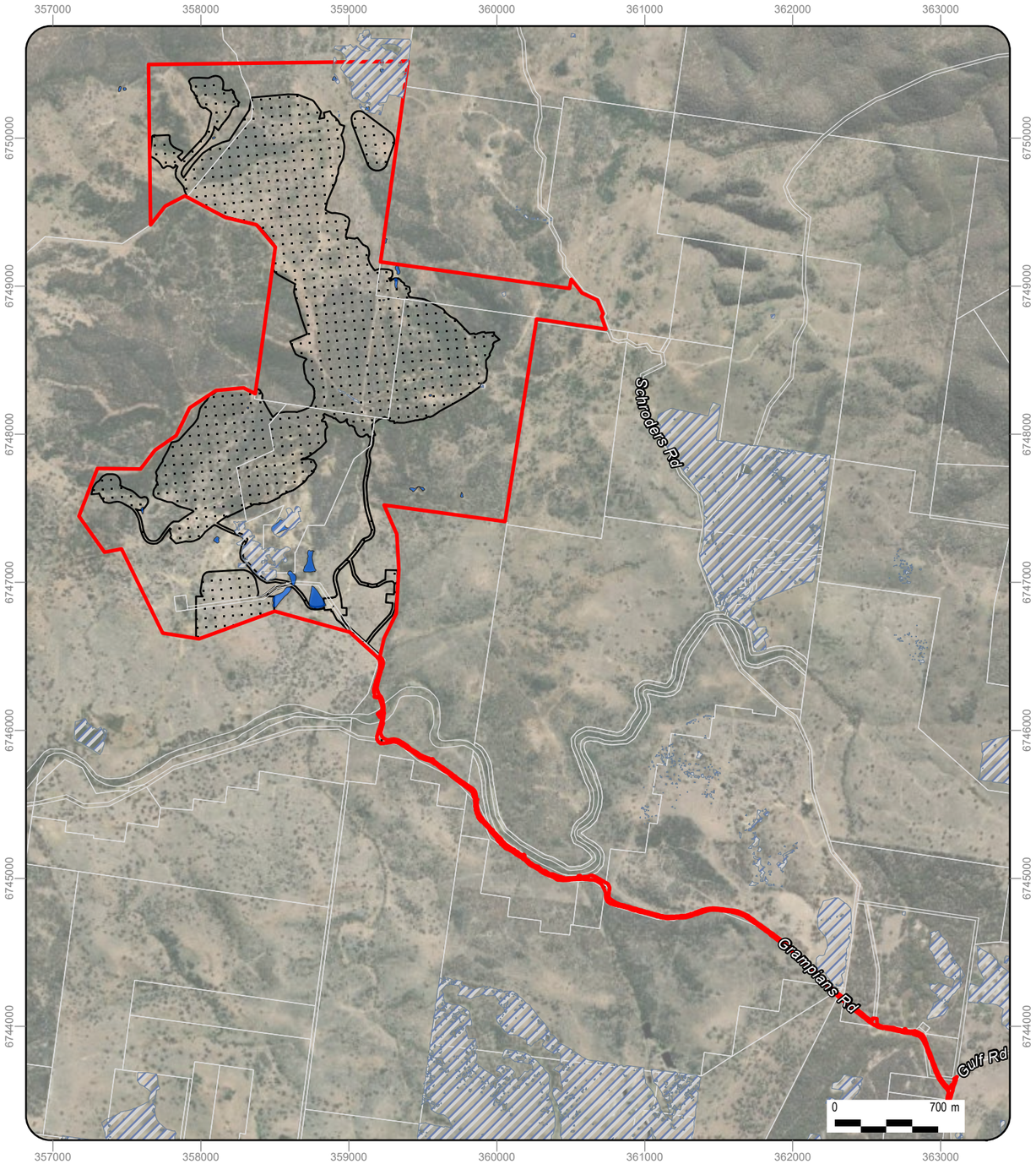
In accordance with section 9.2 of BAM (2020), an offset is required for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

- ≥15, where the PCT is representative of an EEC or a CEEC.
- ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community.
- ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

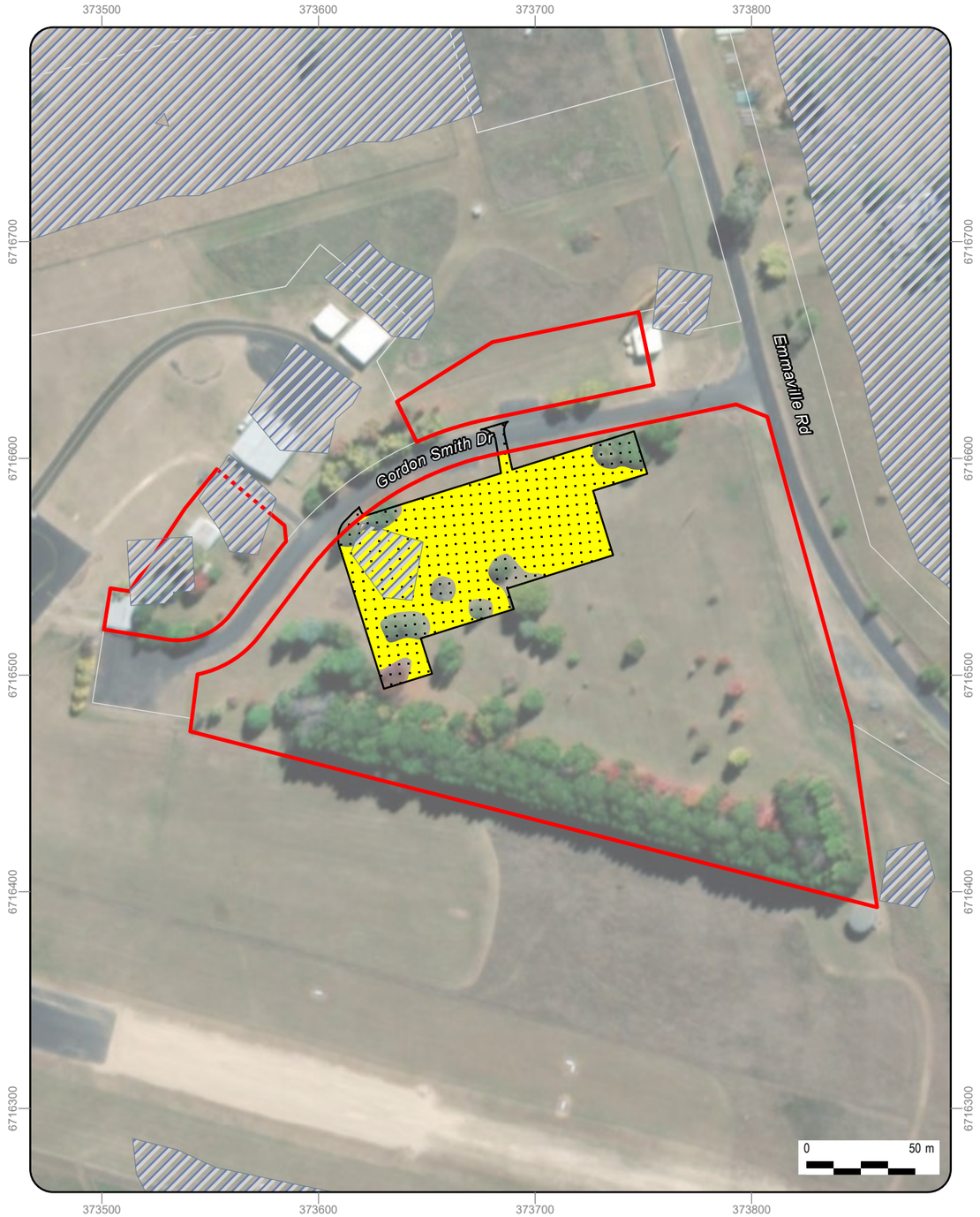
Offsets are not required for impacts on threatened species habitat where a vegetation integrity score is below the above thresholds. The following PCTs do not require biodiversity offsets as they recorded a vegetation integrity score of ≤17:

- PCT 3722 – Western New England Box-Tumbledown Gum Grassy Forest – Cleared (associated with Exempt 1 land).
- PCT 3339 – Guyra Basalt Snow Gum Woodland – Poor.

All biodiversity values that do not require offsets are shown in **Illustration 12.1**.




Mine Site




Mine Camp

**LEGEND**

- Site boundary
- Limit of distubance
- Category 1 Land (BAM does not apply)
- Cadastre
- PCT: 3339 - Poor condition
- Dam

## Impacts Not Requiring Offsets - Illustration 12.2



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*Source of base data: ESRI World Imagery, RW Corkery*
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*Date: 21/08/2025 / Revision: B*

### 12.2.2 Impacts Requiring Offset

The vegetation zones recorded within the disturbance footprint that generated a vegetation integrity score of ≥17 require biodiversity offsets.

Biodiversity offset obligations have been determined using the BAM-C. The required ecosystem and species credit obligations are outlined for each IBRA subregion below.

Impacts requiring offset are shown in **Illustration 12.2**.

Full BAM-C credit report, including like for like trading options, provided in **Appendix F**.

#### 12.2.2.1 Ecosystem credits

The required ecosystem credit obligation, as determined using the BAM-C for the Project, is detailed in **Table 12.4** and **Table 12.5**.

**Table 12.4 Ecosystem credits requirement for Beardy River IBRA Subregion**

| Plant Community Type | Vegetation zone | TEC | SAII | BRW | Vegetation Integrity Loss | Contains hollow bearing trees | Area of impact (ha) | Ecosystem credit obligation |
|---|---|---|---|---|---|---|---|---|
| PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | 3722_Intact | Not listed | No | 1.75 | -71.4 | Yes | 159.89 | 4,992 |
| | 3722_Modified | | | | -60.9 | Yes | 97.37 | 2,596 |
| | 3722_Poor | | | | -24 | Yes | 55.73 | 586 |
| | 3722_Cleared | | | | -2.5 | No | 0.44 | 0 |
| PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | 3363_Intact | CE | Yes | 2.5 | -70.7 | Yes | 0.62 | 27 |
| | 3363_Poor | | | | -47.6 | No | 0.41 | 12 |
| PCT 4080 – Northwest River Oak-Apple Forest | 4080_Modified | Not listed | No | 1.75 | -60.4 | No | 0.11 | 3 |
| **Total ecosystem credit obligation for Beardy River IBRA Subregion** | | | | | | | | **8,216** |

CE = Critically Endangered

**Table 12.5 Ecosystem credits requirement for Glenn Innes-Guyra Basalts IBRA Subregion**

| Plant Community Type | Vegetation zone | TEC | SAII | BRW | Vegetation Integrity Loss | Contains hollow bearing trees | Area of impact (ha) | Ecosystem credit obligation |
|---|---|---|---|---|---|---|---|---|
| PCT 3339 – Guyra Basalt Snow Gum Woodland | 3339_Poor | Not listed | No | 2 | -12.2 | No | 0.64 | 0 |
| **Total ecosystem credit obligation for Glenn Innes-Guyra Basalts Subregion** | | | | | | | | **0** |

#### 12.2.2.2 Species credits

The required species credit obligation, as determined using the BAM-C, for the Project is provided in **Table 12.6** and **Table 12.7**.

**Table 12.6 Species credits requirement for Beardy River IBRA Subregion**

| Scientific Name | Common Name | BC Act | SAII | Vegetation zone | Habitat Condition Loss | BRW | Area / count | Species credits |
|---|---|---|---|---|---|---|---|---|
| *Acacia pubifolia* | Velvet Wattle | E | Yes | 3722_Intact | -71.4 | 3 | 6.7 ha | 359 |
| | | | | 3722_Modified | -60.9 | | 5.7 ha | 262 |
| | | | | 3722_Poor | -24 | | 2.6 ha | 47 |
| | | | | 3722_Cleared_ | -2.5 | | 0 ha | 1 |
| | | | | | | | **Subtotal** | **669** |
| *Ninox connivens* | Barking Owl | V | No | 3722_Intact | -71.4 | 2 | 159.89 ha | 5,706 |
| | | | | 3722_Modified | -60.9 | | 97.37 ha | 2,966 |
| | | | | 3722_Poor | -24 | | 2.64 ha | 32 |
| | | | | 3363_Intact | -70.7 | | 0.62 ha | 22 |
| | | | | 4080_Modified | -60.4 | | 0.11 ha | 3 |
| | | | | | | | **Subtotal** | **8,729** |
| *Petaurus norfolcensis* | Squirrel Glider | V | No | 3722_Intact | -71.4 | 2 | 159.89 ha | 5,706 |
| | | | | 3722_Modified | -60.9 | | 97.37 ha | 2,966 |
| | | | | 3363_Intact | -70.7 | | 0.62 ha | 22 |
| | | | | 4080_Modified | -60.4 | | 0.11 ha | 3 |
| | | | | | | | **Subtotal** | **8,697** |

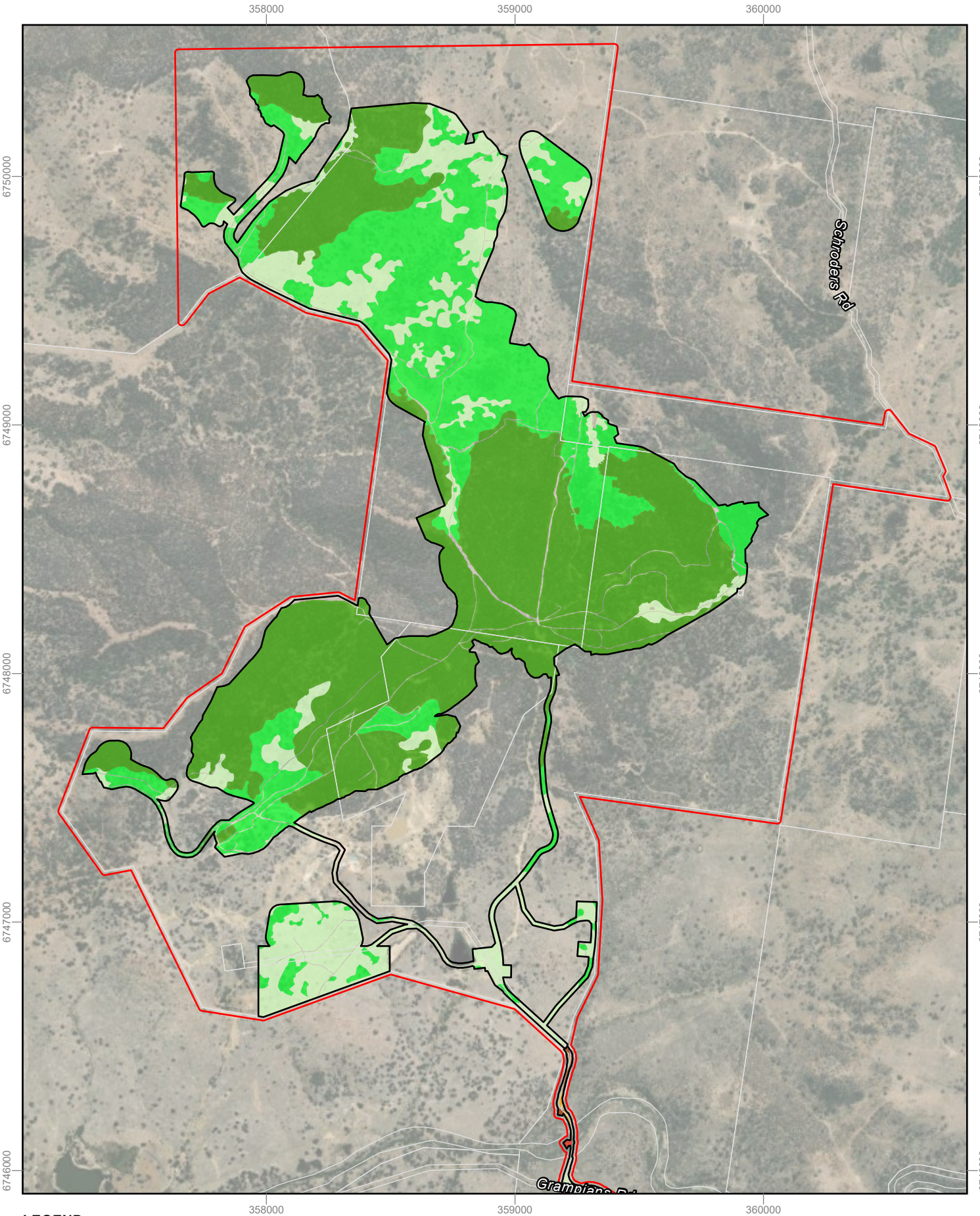
| Scientific Name | Common Name | BC Act | SAII | Vegetation zone | Habitat Condition Loss | BRW | Area / count | Species credits |
|---|---|---|---|---|---|---|---|---|
| *Phascolarctos cinereus* | Koala | E | No | 3722_Intact | -71.4 | 2 | 159.89 ha | 5,706 |
| | | | | 3722_Modified | -60.9 | | 97.37 ha | 2,966 |
| | | | | 3363_Intact | -70.7 | | 0.62 ha | 22 |
| | | | | 4080_Modified | -60.4 | | 0.11 ha | 3 |
| | | | | | | | **Subtotal** | **8,697** |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | No | 3722_Intact | -71.4 | 2 | 159.89 ha | 5,706 |
| | | | | 3722_Modified | -60.9 | | 97.37 ha | 2,966 |
| | | | | 3363_Intact | -70.7 | | 0.62 ha | 22 |
| | | | | 4080_Modified | -60.4 | | 0.11 ha | 3 |
| | | | | | | | **Subtotal** | **8,697** |
| | | | | | | | **Total species credit obligation for Beardy River IBRA Subregion** | **35,489** |

V = Vulnerable; E = Endangered

**Table 12.7 Species credits requirement for Glenn Innes-Guyra Basalts IBRA Subregion**

| Scientific Name | Common Name | BC Act | SAII | Vegetation zone | Habitat Condition Loss | BRW | Area / count | Species credits |
|---|---|---|---|---|---|---|---|---|
| *Dichanthium setosum* | Bluegrass | V | No | 3339_Poor | -12.2 | 2 | 0.64 | 4 |
| | | | | | | | **Total species credit obligation for Glenn Innes-Guyra Basalts IBRA Subregion** | **4** |

V = Vulnerable




**LEGEND**

- Site boundary
- Limit of distubance
- Cadastre
- PCT: 3722 - Intact condition
- PCT: 3722 - Modified condition
- PCT: 3722 - Poor condition
- PCT: 3363 - Intact condition
- PCT: 3363 - Poor condition
- PCT: 4080 - Modified condition

0 400 m

# Impacts Requiring Offset - Mine Site - Illustration 12.3 - Sheet 1 of 2

GeoLINK environment | engineering | planning | design

Biodiversity Development Assessment Report - Taronga Tin Project
4312-1094

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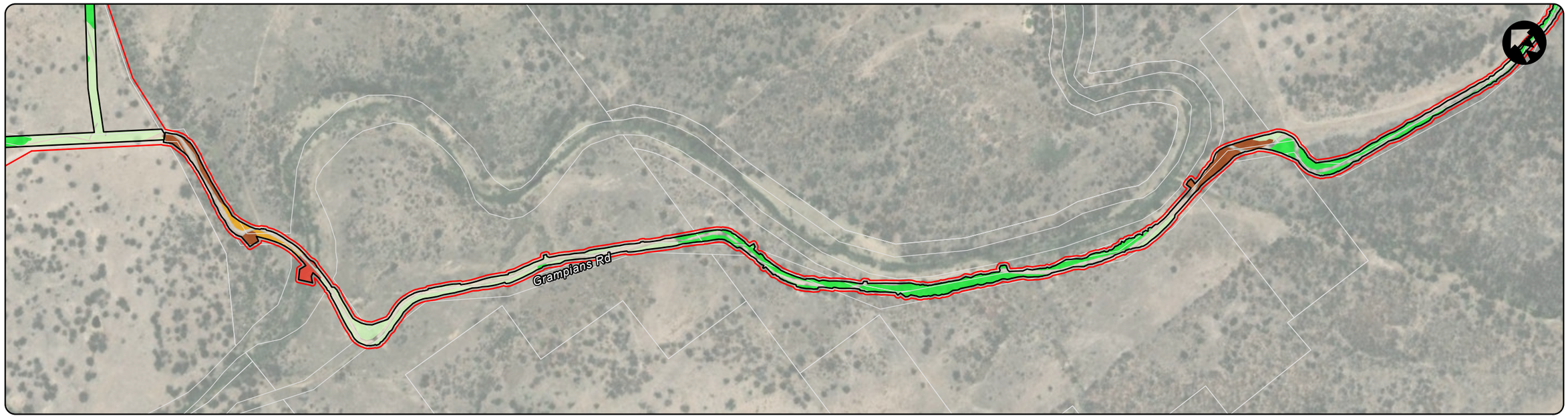
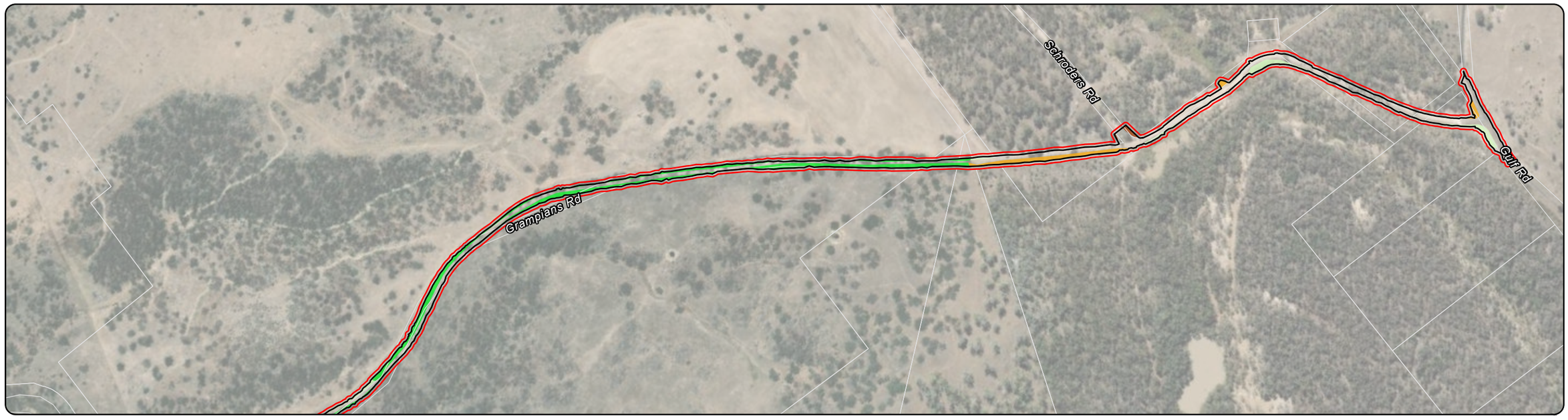



Grampians Road Upgrade North




Grampians Road Upgrade South

**LEGEND**

- Site boundary
- Limit of distubance
- PCT: 3722 - Modified condition
- PCT: 3722 - Poor condition
- PCT: 3363 - Intact condition
- PCT: 3363 - Poor condition
- PCT: 4080 - Modified condition
- Cadastre

0 160 m

Impacts Requiring Offset - Illustration 12.3 - Sheet 2 of 2



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*Source of base data: ESRI World Imagery, RW Corkery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

# 13. Offsetting Strategy

The Biodiversity Offset Strategy (BOS) for this Project, which will enable the credit obligations to be met, comprises three options. These options are:

- Establishment of Biodiversity Stewardship Agreements.
- The purchase and retirement of existing biodiversity credits currently available on the biodiversity credit register.
- Making a payment into the Biodiversity Conservation Fund (BCF).

The proposed BOS will deliver the like for like retirement of the Project credit obligation, through the establishment of a Biodiversity Stewardship Agreement (BSA) and/ or purchase of existing credits from the market. The purchase and retirement of existing biodiversity credits on the market is required to be undertaken based on like for like trading rules as outlined under the BC Regulation and as identified by the BAM-C output for the Project (refer to **Appendix F**).

Any residual credit liability not met through these offset strategies will be met through the payment into the BCF.

## 13.1 Biodiversity Stewardship Agreement (BSA)

Under the BC Act, land with biodiversity values can be established under a BSA to allow for in-perpetuity conservation and management. BSAs allow the landholder to create biodiversity credits that can be traded to offset development impacts. The Applicant is actively progressing the establishment of a BSA that has been identified to contain like for like biodiversity values to those identified within the principal area of Project-related disturbance, the Mine Site. The BSA is located immediately adjacent to the Mine Site and is under the Applicant's ownership.

At present, the assessment process lies between Stage 1 and 3 in accordance with the BAM. There has been field validation of the PCTs and some candidate species within the BSA site. A summary of the BSA is provided below.

### 13.1.1 Offset Subject Land

Given the lack of available biodiversity credits on the market for the PCTs that are required to offset the impacts of the Project, development of a Biodiversity Stewardship Site (via BSA) is the preferred option. Most of the offset liability for impacts to non-threatened vegetation and candidate species can be met with the establishment of a BSA on the subject land.

Detailed field assessments of the subject land, incorporating field validation of PCTs, general habitat observations and recording of locally occurring threatened species has been undertaken since 2022. This programme of field inspections has covered the majority of the subject land and remains ongoing. Preliminary discussions have been held with CPHR and will be held with the Assurance & Biodiversity Stewardship Branch (ABSB) on the suitability of the subject land being used for the creation of a BSA for this Project.

**Vegetation and PCTs**

The field assessment confirmed the presence of at least two PCTs across the subject land, consistent with PCTs recorded within the Mine Site (refer to **Table 13.1**). The vegetation was in several condition states, including intact, modified and poor condition. The general condition of the PCTs inspected were characterised by a relatively intact understorey with high native species diversity. The distribution of PCTs within the subject land is shown in the **Illustration 13.1** below.

**Table 13.1 Plant Community Types present within BSA site (subject land)**

| Plant Community Type | Project Offset Requirement | Estimated area in BSA (ha)[1] | Potential Credit Generation[1,2] |
|---|---|---|---|
| PCT 3722 – Western New England Box-Tumbledown Gum Grassy Forest | **Yes** | 1,304 | 10,100 |
| PCT 3518 – Northwest Pine-Ironbark Grassy Woodland | No | 461 | 2,857 |
| PCT 4080 – Northwest River Oak-Apple Forest | **Yes** | 2 | 11 |
| PCT 4143 – Northwest Ranges Alectryon Dry Rainforest | No | 4.5 | 26 |

1) Approximate area, credit number may change based on vegetation mapping refinement, changes to the BSA exclusion areas with preparation of the reports required for the BSA.
2) Potential credits generated is based on no active management measures. If active management measures are implemented, additional credits could be generated

The initial combined credit generation potential of the BSA is 12,994 ecosystem credits that will satisfy 100% of like for like credit requirement of the Project's ecosystem credit liability. Thus, the subject land and its proposed use as a BSA would be a net positive offset in terms of both area and ecosystem credits.

**Habitat values for threatened flora**

Two locally occurring-threatened species were observed and confirmed in several locations and condition zones within the subject land, these include:

- Velvet Wattle (*Acacia pubifolia*).
- Ooline (*Cadellia pentastylis*).

Based on the known occurrence of Velvet Wattle within the subject land, it is anticipated that a majority (>70%) of the Project's species credit obligation for Velvet Wattle would be met through the establishment of the BSA. Additionally, the establishment of the BSA would enable an enduring in-perpetuity local conservation outcome for this species, which has limited representation with locally occurring conservation reserves.

The distribution of currently known locations of threatened flora within the offset site is shown in the **Illustration 13.1** below.

**Habitat values for threatened fauna**

The subject land is known to contain intact vegetation with valuable habitat features, such as hollow-bearing trees, large fallen timber, creek lines, and rocky habitats, all of which are important for the breeding and shelter needs of a variety of threatened species. The general condition of the PCTs observed during field inspections is likely to support habitat values for numerous threatened fauna species. The presence of threatened fauna species has already been identified within the proposed BSA. To date, eight threatened fauna species have been identified in the subject land, including:

- Border Thick-tailed Gecko*
- Barking Owl*
- Brown Treecreeper
- Diamond Firetail
- Dusky Woodswallow
- Koala*
- Speckled Warbler
- Turquoise Parrot.

**(*) Note**: required species credit for the Project.

Threatened fauna recorded within the subject land is shown in the **Illustration 13.1** below. Further targeted fauna surveys may record additional threatened species.

**Presence of relevant biodiversity values**

Offsets must address the required impacts on a "like-for-like" or "better" basis. The proposed BSA on the subject land would provide a suitable offset for the range of threatened species, habitats, and associated vegetation offset requirements. These values have already been observed within the proposed BSA site.

**Distance from the Project**

Ideally, offsets and associated habitat areas should be located within the same region as a development to suitably offset impacts upon biodiversity values. As the subject land is located immediately adjacent to the Mine Site, it represents an excellent opportunity to achieve a like-for-like offsetting outcome.

**Current condition and potential for improvement**

Whilst the subject land is really extensive (approximately 1800 ha), it has been subject to a long history of farming, pastoral use and mining operations. This notwithstanding, remnant vegetation is generally still high quality, although there are varying levels of disturbance and weed and pest incursion. The implementation of both passive and active management practices (i.e. infill planting, weed and pest control) would improve biodiversity outcomes.

The establishment of a BSA would enable an enduring in-perpetuity conservation outcome within the local area that will directly benefit the impacted biodiversity values of the Project.

**Connectivity**

A BSA on the subject land would provide a strategic benefit via its proximity to the regional reserves in the north (i.e. Torrington). This would assist in the creation of a regional wildlife corridor with consolidated habitat linkages to improve the overall biodiversity values of the area. This would facilitate intra-regional movement of threatened species and conserve large, consolidated areas of threatened species habitat within the northern tablelands region.

As surveys to date have recorded large patches of Velvet Wattle with mature individuals within the subject land, establishing a BSA would enable an enduring in-perpetuity conservation outcome for this species. It is noted that this species currently has limited occupancy within established conservation lands within its distribution.

**Timing of Biodiversity Offset provision**

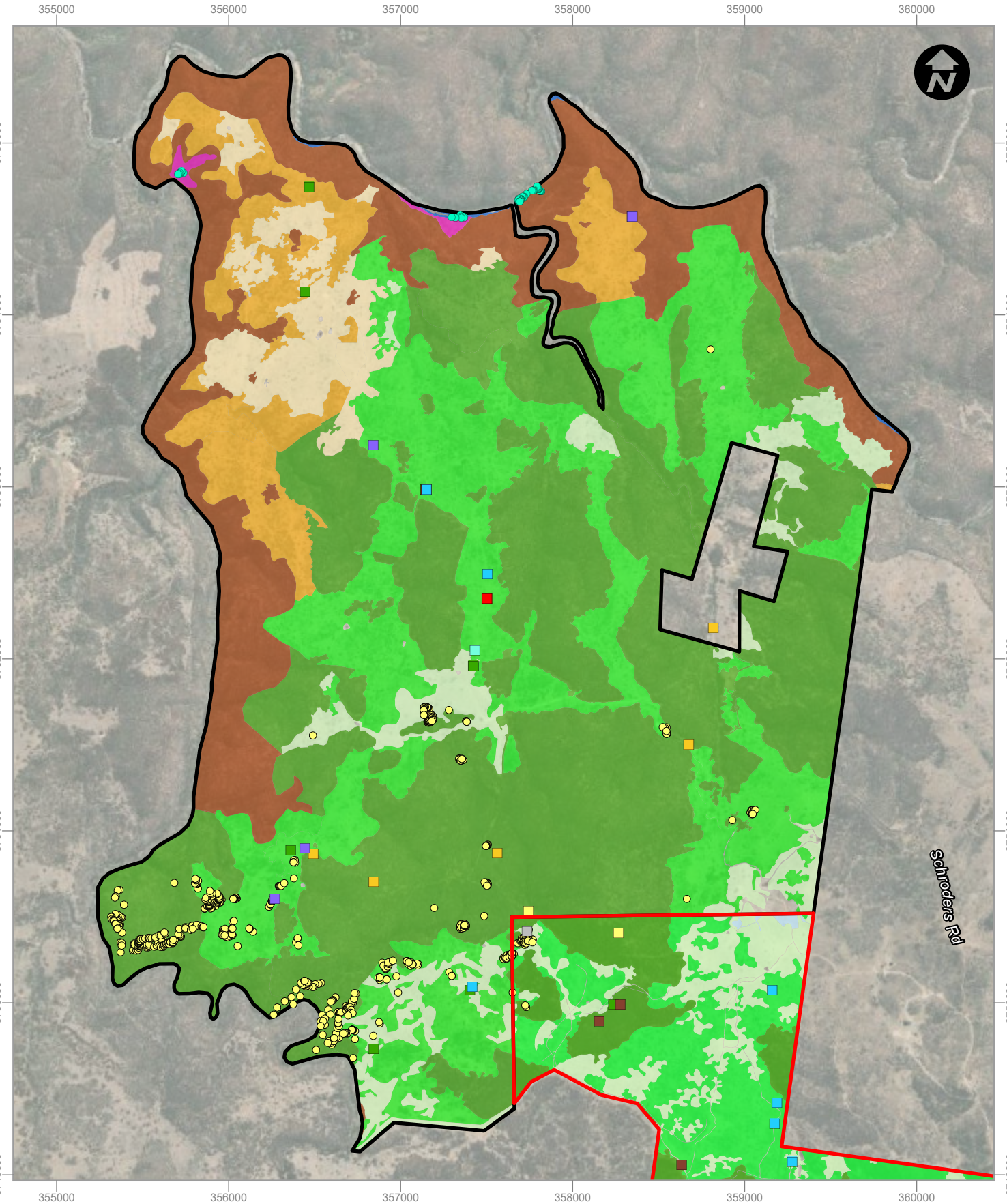
The proposed BOS would deliver retirement of the Project's credit liability, through the establishment of a BSA and/ or purchase of existing credits from the market. Any residual credit liability not met through these offset strategies would be met through the payment into the BCF.

**Note**: Payments for the Project's offset obligations paid into the BCF are subject to change, and the credit payment prices are reviewed quarterly.

The credits necessary to retire the credit obligation for the Project:

- will preferentially be sourced from BSA already proposed for consideration, which will likely provide the majority of the credits required; and/ or
- remaining credit liability would be sourced from available credits on the market now (limited availability at present for some credit types). Any use of variation and trading rules would be in accordance with trading rules; and/ or
- the residual credit obligation not satisfied by the above mechanisms would be met by paying into the BCF.

Whilst it remains the Applicant's objective to establish a BSA on the subject land, the time required to finalise and establish a biodiversity stewardship site means that full retirement of the Project's offset credit liability may not occur prior to the commencement of construction. However, the Applicant anticipates that the complete retirement of the Project's full credit liability could occur by the end of 2027 (depending on Project determination).




**LEGEND**

- Mine site boundary
- Offset property boundary
- PCT 3722 - Zone 1 - Intact
- PCT 3722 - Zone 2 - Modified
- PCT 3722 - Zone 3 - Poor
- PCT 3518 - Zone 4 - Intact
- PCT 3518 - Zone 5 - Modified
- PCT 3518 - Zone 6 - Poor
- PCT 4080 - Zone 7 - Intact
- PCT 4143 - Zone 8 - Intact

**Threatened Fauna Records**

- Barking Owl
- Border Thick-tailed Gecko
- Brown Treecreeper
- Diamond Firetail
- Dusky Woodswallow
- Koala
- Speckled Warbler
- Squirrel Glider
- Turquoise Parrot

**Threatened Flora Records**

- Cadellia pentastylis
- Velvet Wattle

0 600 Metres

## Offset Subject Land – Biodiversity Values - Illustration 13.1



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*Source of base data: ESRI World Imagery*
*Spatial Reference: GDA2020 MGA Zone 56*
*Date: 21/08/2025 / Revision: B*

# Glossary of Terms and Acronyms

| Term or acronym | Meaning |
|---|---|
| ABSB | Assurance & Biodiversity Stewardship Branch |
| BAM | Biodiversity Assessment Method 2020 |
| BAM-C | BAM Calculator |
| BC Act | *Biodiversity Conservation Act 2016* |
| BC Regulation | Biodiversity Conservation Regulation 2017 |
| BCD | Biodiversity Conservation Division (now CPHR) |
| BCS | Biodiversity Conservation and Science (now CPHR) |
| BDAR | Biodiversity Development Assessment Report |
| BMP | Biodiversity Management Plan |
| BOAMS | Biodiversity Offsets and Agreement Management System |
| BOS | Biodiversity Offsets Scheme |
| Concentrate Transport Route | Comprising the public roads that would be used to transport tin concentrate from the Mine Site. |
| CPHR | Conservation Programs, Heritage and Regulation |
| DCCEEW | Department of Climate Change, Energy, the Environment and Water |
| Disturbance footprint | The area of land that is directly impacted by the Project, including access roads, ancillary areas, Mine Camp etc |
| DPE | Department of Planning and Environment (now DCCEEW) |
| DPHI | Department of Planning, Housing and Infrastructure |
| EP&A Act | *Environmental Planning and Assessment Act 1979* |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999* |
| IBRA | Interim Biogeographic Regionalisation for Australia |
| LEP | Local Environmental Plan |
| LGA | Local Government Area |
| Locality | The area within 10 km of the Project Site |
| Mine Camp | Comprising Lot 1 DP 1187809 that would be utilised for an ancillary Project component to accommodate non-resident mine personnel. |
| Mine Site | Comprising all land within which the mining, processing and management of waste rock and processing residues would occur. |
| OEH | Office of Environment and Heritage |
| PCT | Plant Community Type |

| Term or acronym | Meaning |
|---|---|
| Project Site | Land within which the Project occurs; generally comprises all land utilised in support of the Project, including Mine Site, Grampians Road upgrade and Mine Camp. |
| SAII | Serious and Irreversible Impact |
| SEPP | State Environmental Planning Policy |
| TBDC | Threatened Biodiversity Data Collection |
| TEC | Threatened Ecological Community listed in the BC Act and/ or EPBC Act |
| The Project | Incorporates all activities that are the subject of SSD application |
| VI | Vegetation Integrity |
| VIS | Vegetation Information System |

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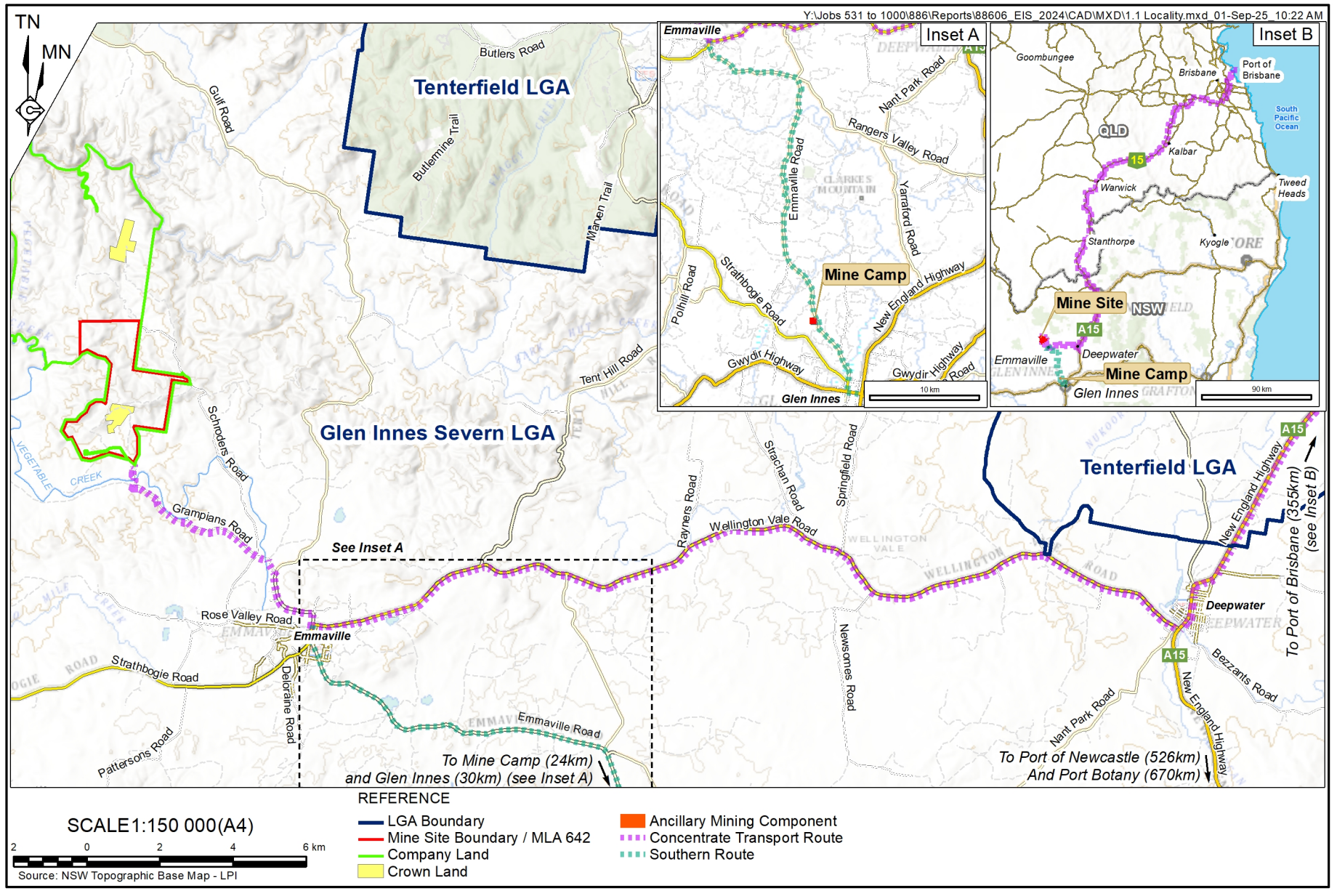
# Appendix A

# Concept Design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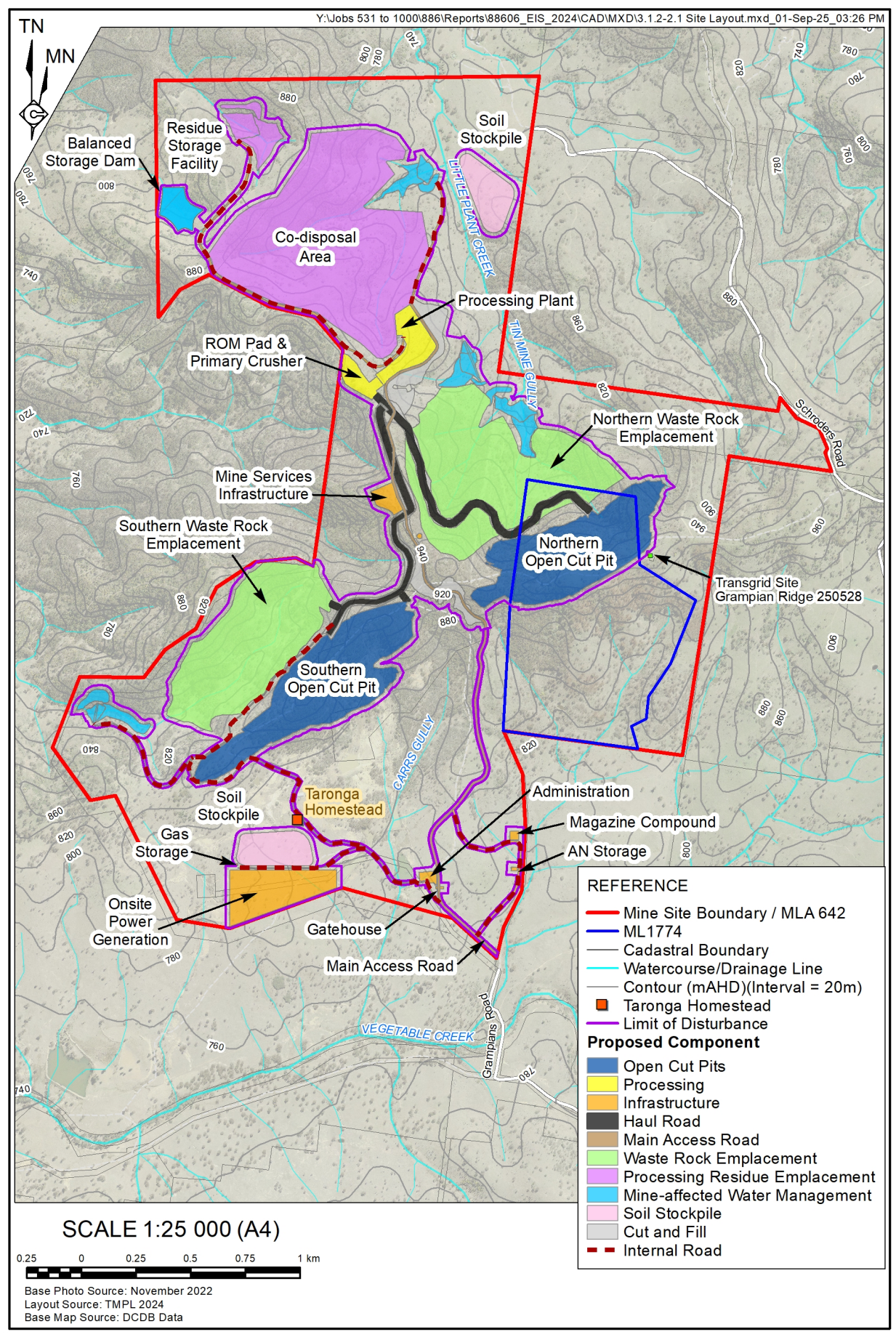
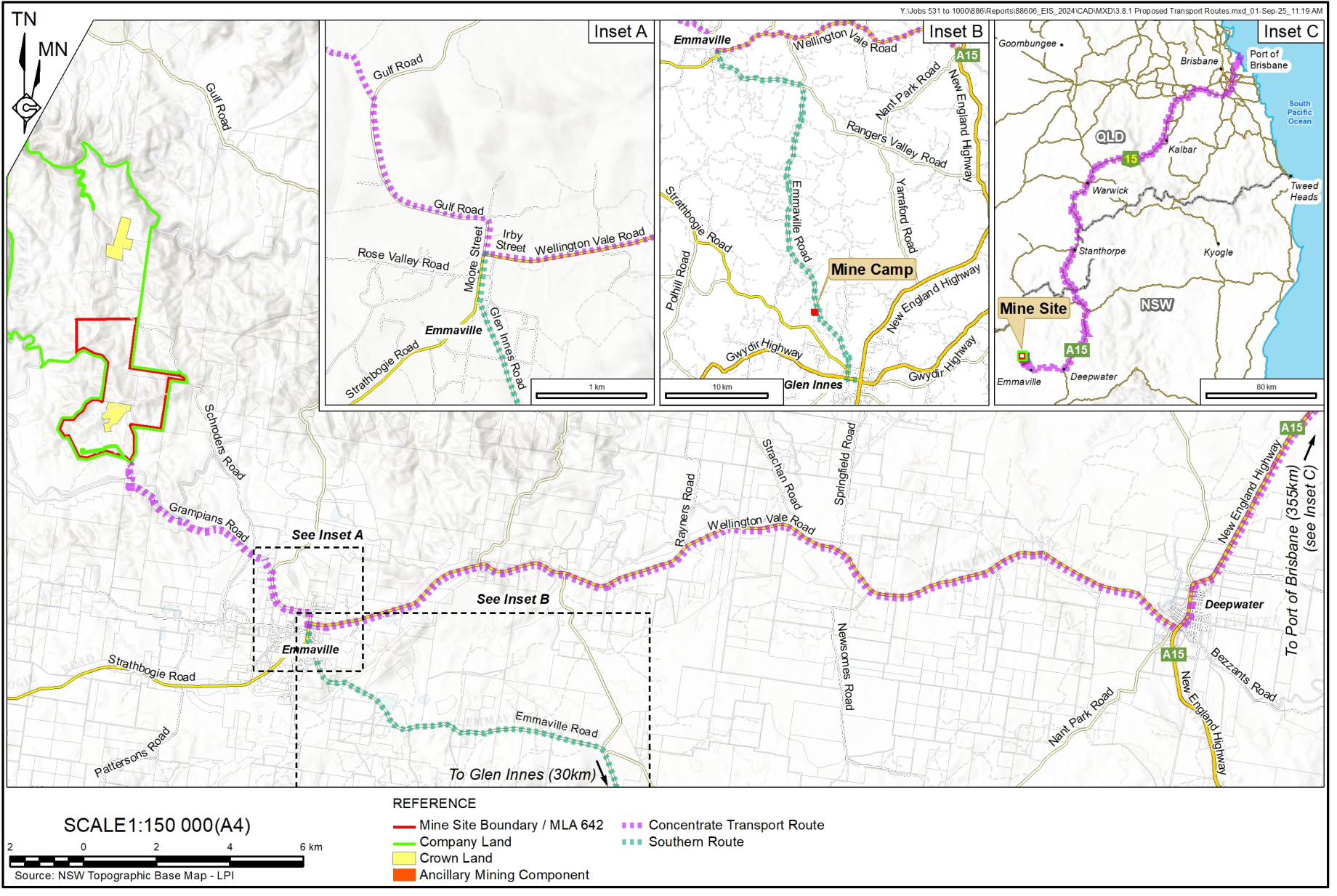
TN
MN
Tenterfield LGA
Glen Innes Severn LGA
Tenterfield LGA
Butlers Road
Gulf Road
Butlermine Trail
Mahen Trail
Tent Hill Road
Schroders Road
Grampians Road
Rose Valley Road
Strathbogie Road
Pattersons Road
Delorraine Road
Emmaville Road
Rayners Road
Strachan Road
Springfield Road
Wellington Vale Road
Newsomes Road
Nant Park Road
Bezzants Road
New England Highway
A15
See Inset A
Emmaville
Deepwater
To Mine Camp (24km) and Glen Innes (30km) (see Inset A)
To Port of Newcastle (526km) And Port Botany (670km)
To Port of Brisbane (355km) (see Inset B)
Inset A
Emmaville
Nant Park Road
Rangers Valley Road
Emmaville Road
Yarraford Road
Polhill Road
Strathbogie Road
Mine Camp
New England Highway
Gwydir Highway
Glen Innes
10 km
Inset B
Goombungee
Brisbane
Port of Brisbane
South Pacific Ocean
QLD
15
Kalbar
Warwick
Tweed Heads
Stanthorpe
Kyogle
Mine Site
NSW
A15
Deepwater
Emmaville
Mine Camp
Glen Innes
90 km
REFERENCE
LGA Boundary
Mine Site Boundary / MLA 642
Company Land
Crown Land
Ancillary Mining Component
Concentrate Transport Route
Southern Route
SCALE 1:150 000 (A4)
2 0 2 4 6 km
Source: NSW Topographic Base Map - LPI


Y:\Jobs 531 to 1000\886\Reports\88606_EIS_2024\CAD\MXD\3.1.2-2.1 Site Layout.mxd_01-Sep-25_03:26 PM
TN
MN
Balanced Storage Dam
Residue Storage Facility
Soil Stockpile
Co-disposal Area
LITTLE PLANT CREEK
Processing Plant
ROM Pad & Primary Crusher
TIN MINE GULLY
Schroders Road
Northern Waste Rock Emplacement
Mine Services Infrastructure
Southern Waste Rock Emplacement
Northern Open Cut Pit
Transgrid Site Grampian Ridge 250528
Southern Open Cut Pit
CARRS GULLY
Soil Stockpile
Taronga Homestead
Administration
Magazine Compound
AN Storage
Gas Storage
Onsite Power Generation
Gatehouse
Main Access Road
Grampians Road
VEGETABLE CREEK
REFERENCE
Mine Site Boundary / MLA 642
ML1774
Cadastral Boundary
Watercourse/Drainage Line
Contour (mAHD)(Interval = 20m)
Taronga Homestead
Limit of Disturbance
Proposed Component
Open Cut Pits
Processing
Infrastructure
Haul Road
Main Access Road
Waste Rock Emplacement
Processing Residue Emplacement
Mine-affected Water Management
Soil Stockpile
Cut and Fill
Internal Road
SCALE 1:25 000 (A4)
0.25 0 0.25 0.5 0.75 1 km
Base Photo Source: November 2022
Layout Source: TMPL 2024
Base Map Source: DCDB Data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TN
MN
Inset A
Inset B
Inset C
Gulf Road
Rose Valley Road
Irby Street
Wellington Vale Road
Moore Street
Glen Innes Road
Emmaville
Strathbogie Road
1 km
Nant Park Road
Rangers Valley Road
New England Highway
Yarraford Road
Emmaville Road
Polhill Road
Mine Camp
Gwydir Highway
Glen Innes
10 km
Goombungee
Brisbane
Port of Brisbane
South Pacific Ocean
QLD
Kalbar
Warwick
Tweed Heads
Stanthorpe
Kyogle
NSW
Mine Site
Deepwater
80 km
Schroders Road
Grampians Road
See Inset A
See Inset B
Rayners Road
Strachan Road
Springfield Road
Newsomes Road
Bezzants Road
To Port of Brisbane (355km)
(see Inset C)
Pattersons Road
Emmaville Road
To Glen Innes (30km)
SCALE 1:150 000(A4)
2 0 2 4 6 km
Source: NSW Topographic Base Map - LPI
REFERENCE
Mine Site Boundary / MLA 642
Company Land
Crown Land
Ancillary Mining Component
Concentrate Transport Route
Southern Route

Y:\Jobs 531 to 1000\886\CAD\MiningCamp.dwg_3.1.3-11.02.2025-10:25 AM

TN
MN

Lot 3
DP1187809

General
Aviation
Apron

Lot 2
DP1187809

Lot 1
DP1187809

Mine Site
34km

Glen Innes
Airport

Hanger

Gordon Smith Drive

Emmaville Road

Aero
Club

Lot 1
DP1187809

1

4

3

2

Lot 1
DP1187809

Glen Innes
8km

REFERENCE

Lot 1/DP 1187809 Boundary

Cadastral Boundary

Indicative Disturbance (7 915 $m^2$)

**Nominal Areas**

1 Light Vehicle Parking (2 510 $m^2$)

2 Bus bay/heavy vehicle movement area (1 840 $m^2$)

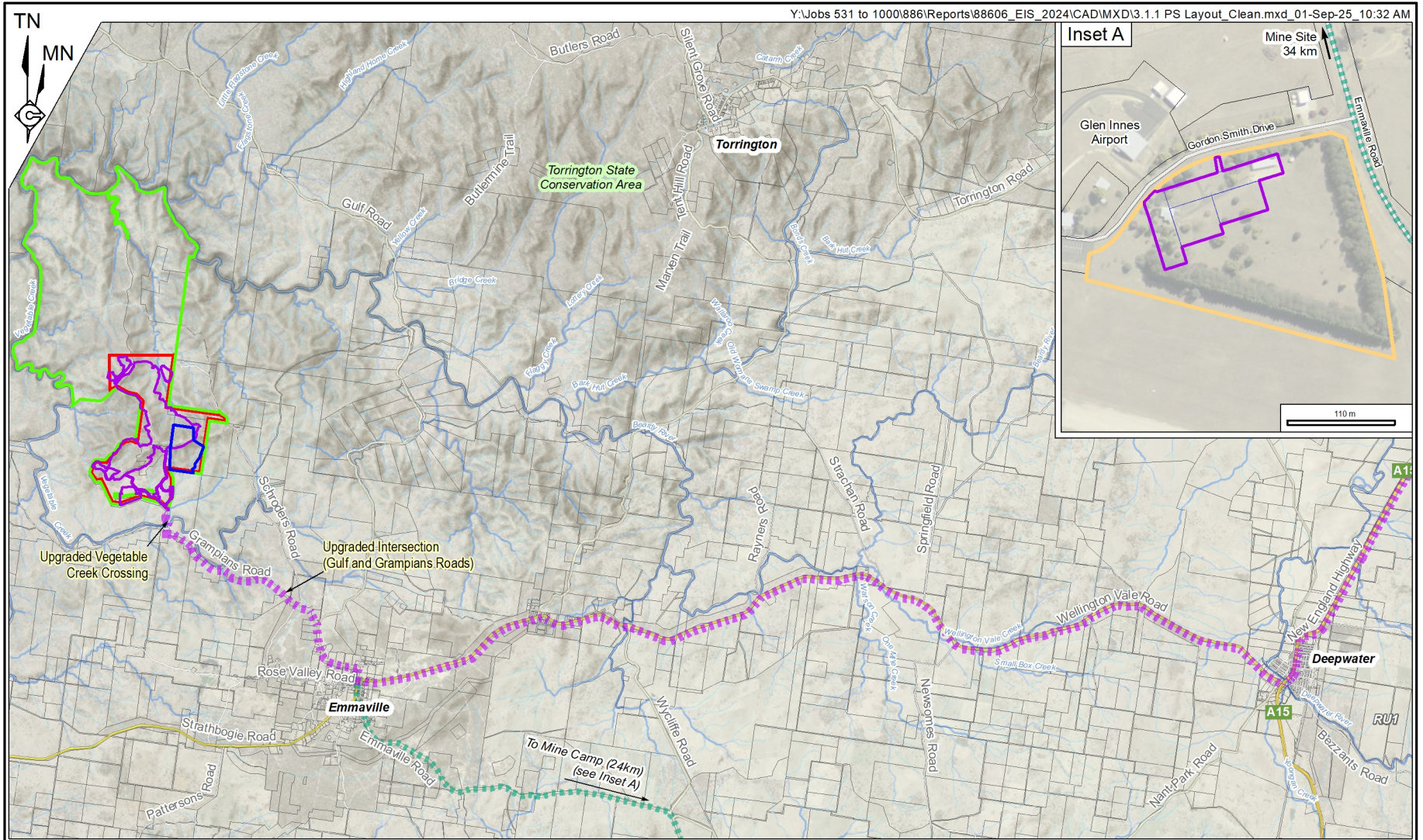
3 Ancillary Facilities (1 850 $m^2$)

4 Accommodation (1 595 $m^2$)

SCALE 1:1 300 (A4)

20 0 20 40 60 m

Photo Source: Nearmap 13 February 2024


Y:\Jobs 531 to 1000\886\Reports\88606_EIS_2024\CAD\MXD\3.1.1 PS Layout_Clean.mxd_01-Sep-25_10:32 AM
TN
MN
Inset A
Mine Site
34 km
Glen Innes
Airport
Gordon Smith Drive
Emmaville Road
110 m
Butlers Road
Silent Grove Road
Torrington
Torrington State
Conservation Area
Gulf Road
Butlermire Trail
Tent Hill Road
Torrington Road
Marken Trail
Upgraded Vegetable
Creek Crossing
Upgraded Intersection
(Gulf and Grampians Roads)
Schroders Road
Grampians Road
Rayners Road
Strachan Road
Springfield Road
Wellington Vale Road
New England Highway
Deepwater
A15
A1
RU1
Rose Valley Road
Emmaville
Strathbogie Road
Emmaville Road
To Mine Camp (24km)
(see Inset A)
Wyclitte Road
Newsomes Road
Nant Park Road
Bezzants Road
Pattersons Road
SCALE1:150 000(A4)
2 0 2 4 km
Base Photo Source: Google Earth
Base Map Source: DCDB Data
REFERENCE
Mine Site Boundary / MLA 642
ML1774
Mine Camp Boundary
Company Land
Limit of Disturbance
Concentrate Transport Route
Southern Route
Cadastral Boundary
Watercourse / Drainage Line

# Appendix B

# Plot Data

**Table B 1 Overview of vegetation plot data**

| Plot Number | PCT | Condition class[1] | Comp Tree | Comp Shrub | Comp Grass | Comp Forbs | Comp Ferns | Comp Other | Struc Tree | Struc Shrub | Struc Grass | Struc Forbs | Struc Ferns | Struc Other | Large Trees | Hollows | Litter Cover | Length Fallen Logs | Tree Stem 5 to 9 | Tree Stem 10t o 19 | Tree Stem 20 to 29 | Tree Stem 30 to 49 | Tree Stem 50 to 79 | Tree Regeneration | High Threat Exotic Cover |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001 | 3722 | I | 4 | 4 | 9 | 7 | 0 | 2 | 18.3 | 32.7 | 6.9 | 0.8 | 0 | 0.4 | 2 | 6 | 22 | 48 | ✓ | ✓ | ✓ | ✓ | ✓ | | 0.6 |
| 002 | 3722 | P | 2 | 4 | 7 | 11 | 0 | 1 | 5.2 | 28.4 | 21.1 | 10.3 | 0 | 0.1 | 0 | 0 | 2.2 | 41 | | ✓ | | | | | 5.2 |
| 003 | 3722 | I | 3 | 3 | 8 | 8 | 0 | 4 | 32 | 10 | 4.2 | 0.9 | 0 | 0.4 | 9 | 9 | 69 | 308 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 0.2 |
| 004 | 3722 | M | 3 | 8 | 9 | 12 | 0 | 2 | 20 | 2.8 | 9.7 | 1.6 | 0 | 0.2 | 5 | 0 | 54 | 109 | | | | ✓ | ✓ | | 0.1 |
| 005 | 3722 | M | 2 | 4 | 6 | 12 | 1 | 1 | 22.1 | 20.6 | 36.7 | 2.4 | 0.1 | 0.1 | 3 | 4 | 17 | 77 | | ✓ | ✓ | ✓ | ✓ | | 0 |
| 006 | 3722 | P | 1 | 2 | 2 | 3 | 1 | 0 | 10 | 10.2 | 52 | 0.4 | 0.1 | 0 | 2 | 3 | 4.8 | 25 | | | | | ✓ | | 0 |
| 007 | 3722 | C | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | | | | | | ✓ | 0 |

| Plot Number | PCT | Condition class[1] | Comp Tree | Comp Shrub | Comp Grass | Comp Forbs | Comp Ferns | Comp Other | Struc Tree | Struc Shrub | Struc Grass | Struc Forbs | Struc Ferns | Struc Other | Large Trees | Hollows | Litter Cover | Length Fallen Logs | Tree Stem 5 to 9 | Tree Stem 10t o 19 | Tree Stem 20 to 29 | Tree Stem 30 to 49 | Tree Stem 50 to 79 | Tree Regeneration | High Threat Exotic Cover |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 008 | 3722 | I | 5 | 4 | 4 | 2 | 0 | 1 | 45.1 | 41.6 | 30.8 | 0.2 | 0 | 0.2 | 2 | 1 | 59 | 72 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 0 |
| 009 | 3722 | M | 1 | 4 | 9 | 2 | 0 | 2 | 25 | 23.1 | 4.1 | 0.6 | 0 | 0.3 | 1 | 0 | 15.6 | 127 | ✓ | ✓ | | | ✓ | ✓ | 40 |
| 010 | 3722 | P | 0 | 1 | 7 | 2 | 0 | 0 | 0 | 1 | 62.6 | 0.2 | 0 | 0 | 0 | 0 | 0 | 38 | | | | | | ✓ | 0 |
| 011 | 3722 | M | 3 | 3 | 11 | 14 | 1 | 1 | 26 | 1.6 | 14.8 | 2.6 | 0.1 | 0.5 | 0 | 0 | 8 | 41 | ✓ | ✓ | ✓ | ✓ | | ✓ | 0 |
| 012 | 3722 | P | 0 | 1 | 9 | 7 | 1 | 0 | 0 | 0.2 | 84 | 4.1 | 0.1 | 0 | 0 | 0 | 0.2 | 0 | | | | | | | 0 |
| 013 | 3722 | P | 0 | 1 | 11 | 6 | 1 | 0 | 0 | 4 | 74 | 1.7 | 0.1 | 0 | 0 | 0 | 0 | 3 | | | | | | | 0 |
| 014 | 3722 | M | 3 | 4 | 15 | 13 | 1 | 2 | 25.2 | 25 | 12.7 | 1.6 | 0.1 | 0.4 | 0 | 0 | 38 | 36 | ✓ | ✓ | | ✓ | | ✓ | 1.1 |
| 015 | 3722 | I | 5 | 3 | 7 | 4 | 0 | 1 | 27.1 | 33 | 16.5 | 0.4 | 0 | 0.1 | 2 | 0 | 34 | 55 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 1 |

| Plot Number | PCT | Condition class[1] | Comp Tree | Comp Shrub | Comp Grass | Comp Forbs | Comp Ferns | Comp Other | Struc Tree | Struc Shrub | Struc Grass | Struc Forbs | Struc Ferns | Struc Other | Large Trees | Hollows | Litter Cover | Length Fallen Logs | Tree Stem 5 to 9 | Tree Stem 10t o 19 | Tree Stem 20 to 29 | Tree Stem 30 to 49 | Tree Stem 50 to 79 | Tree Regeneration | High Threat Exotic Cover |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 016 | 3722 | I | 4 | 6 | 8 | 9 | 0 | 2 | 33 | 16.4 | 7.6 | 5.8 | 0 | 0.2 | 1 | 0 | 35 | 68 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 0.1 |
| 017 | 3722 | M | 1 | 6 | 7 | 13 | 1 | 3 | 15 | 2.4 | 3.1 | 3.5 | 0.1 | 2.2 | 2 | 0 | 33 | 58 | ✓ | | ✓ | | ✓ | ✓ | 0.2 |
| 018 | 3722 | I | 3 | 7 | 6 | 8 | 0 | 1 | 40.1 | 5.4 | 7.4 | 0.9 | 0 | 0.1 | 1 | 1 | 58 | 110 | | ✓ | ✓ | ✓ | ✓ | ✓ | 0.1 |
| 019 | 3363 | I | 3 | 7 | 11 | 5 | 1 | 2 | 26 | 3 | 33.7 | 0.5 | 0.1 | 0.2 | 3 | 1 | 32 | 44 | ✓ | ✓ | | | ✓ | ✓ | 1 |
| 020 | 4080 | M | 4 | 3 | 7 | 6 | 1 | 4 | 45.2 | 14.1 | 3.9 | 0.6 | 0.1 | 0.4 | 2 | 0 | 29 | 23 | ✓ | ✓ | | ✓ | ✓ | ✓ | 0.2 |
| 021 | 3363 | P | 1 | 0 | 15 | 12 | 0 | 0 | 0.1 | 0 | 79.8 | 4.6 | 0 | 0 | 0 | 0 | 43 | 4 | | | | | | ✓ | 5 |
| 022 | 3339 | P | 0 | 0 | 3 | 7 | 0 | 0 | 0 | 0 | 98 | 1.1 | 0 | 0 | 0 | 0 | 2.4 | 0 | | | | | | | 0.2 |
| 023 | 3339 | P | 0 | 0 | 4 | 8 | 0 | 0 | 0 | 0 | 93.1 | 0.9 | 0 | 0 | 0 | 0 | 2.4 | 0 | | | | | | | 1 |

1) Vegetation / condition class: I = Intact; M = Modified; P = Poor; C = Cleared

# Appendix C

# Assessment of Habitat Suitability – Flora

**Potential of Occurrence and Habitat Assessment**

A potential of occurrence assessment was completed to assess the likelihood of occurrence of each threatened species or population identified within the site. All threatened biodiversity identified in the background research were considered. The assessment is based on the habitat profile for the species and other habitat information in the Threatened Species Profile Database (Environment, Energy and Science Group). The assessment also takes into consideration the dates and locations of nearby records and information about species populations in the locality.

**Threatened Flora Potential Occurrence Assessment**

For this proposed activity, the likelihood of occurrence of threatened and migratory species and populations was determined based on the criteria shown in **Table C 1**.

**Table C 1 Potential of occurrence criteria for threatened species and populations of flora**

| Potential of occurrence | Criteria |
|---|---|
| **Known** | The species was observed in the site either during the current survey or during another survey less than one year prior. |
| **High** | A species has a high likelihood of occurrence if:<br>• the site contains or forms part of a large area of high-quality suitable habitat that has not been subject to recent disturbance (e.g. fire), the species is known to form a persistent soil seedbank and the species has been recorded recently (within 10 years) in the locality<br>• the species is a cryptic flowering species that has been recorded recently (within 10 years) in the locality and has a large area of high-quality potential habitat within the disturbance footprint that was not seasonally targeted by surveys. |
| **Moderate** | A species has a moderate likelihood of occurrence if:<br>• the species:<br>o has a large area of high-quality suitable habitat in the site that has not been subject to recent disturbance (e.g. fire)<br>o the species is known to form a persistent soil seedbank, but<br>o the species has not been recorded recently (within 10 years) in the locality<br>• the species:<br>o has a small area of high-quality suitable habitat or a large area of marginal habitat in the site That has not been subject to recent disturbance (e.g. fire)<br>o the species is known to form a persistent soil seedbank<br>o the species has been recorded recently (within 10 years) in the locality<br>o the species is a cryptic flowering species, with a small area of high-quality potential habitat or a large area of marginal habitat within the development site, that was not seasonally targeted by surveys. |
| **Low** | A species has a low likelihood of occurrence if:<br>• it is not a cryptic species, nor a species known to have a persistent soil seedbank species and was not detected despite targeted searches<br>• the species is a cryptic flowering species, with a small area of high-quality potential habitat or a large area of marginal habitat within the development site, that was not seasonally targeted by surveys as the species has not been recorded within 50 years in the locality. |
| **None** | Suitable habitat is absent from the site. |

**Table C 2 Threatened flora potential of occurrence assessment**

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| *Acacia macnuttiana* | McNutt's Wattle | V | V | BioNet<br>PMST | Sandy soils on acid granite substrates, often among boulders, in riparian situations near streams and in gorges. | Low. Species more associated with acid granite substrates. Targeted surveys did not record species within the site.<br>**Candidate Species Credit Species** |
| *Acacia pubifolia* | Velvet Wattle | E | V | BioNet<br>PMST<br>BAM-C | Rocky granite hillsides, in sandy, stony or loamy soil in eucalypt-scrub woodland or Eucalyptus-Callitris forest, and shrubby woodland on granite (Hunter Catchment only). | **Recorded**. Species recorded during targeted surveys within the site<br>**Candidate Species Credit Species** |
| *Acacia ruppii* | Rupp's Wattle | E | E | PMST | Banyabba Coaldale area north-west of Grafton between 50-150 m AHD. Dry open forest and shrubland in sandstone areas, often near creeks and on roadsides. | Low. Species more associated with sandstone substrates. Targeted surveys did not record species within the site. |
| *Almaleea cambagei* | Torrington Pea | E | V | BioNet<br>PMST | Mainly in Torrington State Conservation Area on the New England Tablelands, with a few populations potentially occurring in the adjacent agricultural lands. Usually grows in wet heath and acid swamp areas and along watercourses on granite, above 900 m altitude. | Low. Unsuitable habitat within the site. Species associated with wet heath and acid swamp areas. Targeted surveys did not record species within the site. |
| *Arthraxon hispidus* | Hairy Jointgrass | V | V | PMST | Moist shady places in or on the edges of rainforest and wet eucalypt forest, often near creeks or swamps. | Low. Unsuitable habitat within the site. Targeted surveys did not record species within the site. |
| *Astrotricha roddii* | Rodd's Star Hair | E | E | BioNet<br>PMST | Grows in low dry sclerophyll woodland on granite and porphyry outcrops in the Ashford area; rare | Low. Unsuitable habitat within the site. Species associated with granite outcrops. Targeted surveys did not record species within the site.<br>**Candidate Species Credit Species** |
| *Boronia granitica* | Granite Boronia | V | E | BioNet<br>PMST | Dry sclerophyll forest, dry sclerophyll woodland, heath and rocky crevices with an altitudinal range of 800–1270 m. In NSW occurs in scattered localities on the New England Tablelands and North West Slopes. | Low. Unsuitable habitat within the site. Species associated with granite outcrops and heath communities. Targeted surveys did not record species within the site. |
| *Boronia inflexa subsp. torringtonensis* | - | CE | CE | BioNet<br>PMST | Found in dry sclerophyll forest on granite-derived soils. | Low. Unsuitable habitat within the site. Species associated with granite outcrops and heath communities. Targeted surveys did not record species within the site. |
| *Cadellia pentastylis* | Ooline | V | V | PMST | Forms a closed or open canopy mixing with eucalypt and cypress pine species. There appears to be a strong | Low. Unsuitable habitat within the site. More associated with sandy clay or |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| | | | | | correlation between the presence of Ooline and low- to medium-nutrient soils of sandy clay or clayey consistencies, with a typical soil profile having a sandy loam surface layer, grading from a light clay to a medium clay with depth. | clayey consistencies and Brigalow vegetation. Targeted surveys did not record species within the site. |
| *Callistemon pungens* | | - | V | BioNet<br>PMST | In or near rocky watercourses, usually in sandy creek beds on granite or sometimes on basalt. | **Moderate**. Unsuitable habitat within the site. Targeted surveys did not record species within the site. |
| *Cassinia heleniae* | - | E | E | PMST | Grows in sandy podzols on granite in dry sclerophyll forest at 900-1160 m altitude. Is found in association with stringybark forest and/ or *Eucalyptus andrewsii* (New England blackbutt) shrubby forest, with a dense understory of *Acacia torringtonensis*, *Persoonia tenuifolia* (fine-leaf geebung), *Styphelia* sp., *Leucopogon melaleucoides*, *Leptospermum* sp., *Brachyloma saxicola*, *Mirbelia speciosa*, *Callitris* sp. and *Melichrus* sp. All records occur within and around the Torrington State Conservation Area (SCA). | Low. Unsuitable habitat within the site. Species associated with granite outcrops and heath communities. Targeted surveys did not record species within the site. |
| *Cryptostylis hunteriana* | Leafless Tongue-orchid | V | V | PMST | Does not have well defined habitat and is known from a range of communities, including swamp-heath and woodland. | Low. Marginal habitat within the site. No records within the locality. Targeted surveys did not record species within the site. |
| *Dichanthium setosum* | Bluegrass | V | V | PMST<br>BAM-C | In NSW, occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. | **Recorded.** Habitat within the site at Glen Innes Mining Camp (PCT 3339).<br>**Candidate Species Credit Species (PCT 3339)** |
| *Eucalyptus caleyi subsp. Ovendenii* | Ovenden's Ironbark | V | V | BioNet<br>PMST<br>BAM-C | Grows in grassy woodland on dry, shallow soils of moderate fertility. | **Moderate.** Potential habitat within the site, however, targeted surveys did not record species within the site.<br>**Candidate Species Credit Species** |
| *Eucalyptus mckieana* | McKie's Stringybark | V | V | BioNet<br>PMST<br>BAM-C | Eucalyptus mckieana is found in grassy open forest or woodland on poor sandy loams, most commonly on gently sloping or flat sites. | **Moderate.** Potential habitat within the site, however, targeted surveys did not record species within the site.<br>**Candidate Species Credit Species** |
| *Eucalyptus nicholii* | Narrow-leaved Peppermint | V | V | BioNet<br>PMST | Grassy or sclerophyllous woodland on shallow relatively infertile soils on shales and slates. | **Moderate.** Potential habitat within the site, however, targeted surveys did not record species within the site. |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| *Eucalyptus rubida subsp. barbigerorum* | Blackbutt Candlebark | V | V | BioNet<br>PMST<br>BAM-C | Woodland on medium or high fertility soils. Known from scattered populations on the New England Tablelands from Guyra to the Tenterfield area. | Low. Potential habitat within the Mine Site, however, targeted surveys did not record species within the site. |
| *Euphrasia orthocheila subsp. peraspera* | Tenterfield Eyebright | E | - | BioNet | Recorded from Dorrigo to Tenterfield and west to Torrington, in 'moist open situations' such as swamps. | Low. Unsuitable habitat within the site in the form of swamps. Targeted surveys did not record species within the site. |
| *Polygala linariifolia* | Native Milkwort | E | - | BAM-C | Sandy soils in dry eucalypt forest or woodland with sparse understorey. | Low. Marginal habitat within the site, prefer habitat in the form of sandy substrates and dry eucalypt forest. Targeted surveys did not record the species within the site.<br>**Candidate Species Credit Species** |
| *Grevillea beadleana* | Beadle's Grevillea | E | E | PMST | Open eucalypt forest with shrubby understorey, steep granitic slopes at high altitudes. | Low. Unsuitable habitat within the site. Species associated with granite outcrops and heath communities. Targeted surveys did not record species within the site. |
| *Haloragis exalata subsp. velutina* | Tall Velvet Sea-berry | V | V | PMST | Damp places near watercourses, also in woodland and steep rocky slopes of gorges. | Low. Marginal habitat within the site. No records within the locality. Targeted surveys did not record species within the site. |
| *Hakea macrorrhyncha* | - | E | E | PMST | Grows in heath in granite country north from the Torrington district. It's confined to shrubland heathland, layered open forest, and closed shrubby woodland on granite. Associated species/ vegetation includes Eucalyptus andrewsii (New England blackbutt), E. bancroftii (orange gum), and Callitris endlicheri (black cypress pine) low closed woodland. | Low. Unsuitable habitat within the site. Species associated with granite outcrops and heath communities. Targeted surveys did not record species within the site. |
| *Homoranthus lunatus* | Crescent-leaved Homoranthus | V | V | BioNet<br>PMST | Grows in heath, shrub and woodland communities in sandy soils on granite outcrops and slopes. | Low. Unsuitable habitat within the site. Species associated with granite outcrops and heath communities. Targeted surveys did not record species within the site. |
| *Lepidium peregrinum* | Wandering Pepper Cress | E | E | PMST | Only known from a limited number of sites. Known occurrences primarily recorded on sandy alluvium. | Low. Unsuitable habitat within the site. Targeted surveys did not record species within the site. |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| *Leucopogon confertus* | Torrington Beard-heath | E | E | PMST | Known from only one collection along Silent Grove Road, near Torrington, in the NSW Northern Tablelands. Little is known of the habitat of L. confertus, but it may occur in open forest or woodland in rocky granite areas. | Low. Unsuitable habitat within the site. Targeted surveys did not record species within the site. |
| *Phebalium glandulosum subsp. eglandulosum* | Rusty Desert Phebalium | E | V | BioNet<br>PMST | Grows in heath amongst granite outcrops in the Torrington district. | Low. Unsuitable habitat within the site. Species associated with granite outcrops and heath communities. Targeted surveys did not record species within the site. |
| *Picris evae* | Hawkweed | V | V | PMST | All recent collections appear to come from modified habitats such as weedy roadside vegetation and paddocks. Its main habitat is open Eucalypt forest including a canopy of *Eucalyptus melliodora*, *E. crebra, E. populnea, E. albens, Angophora subvelutina, Allocasuarina torulosa*, and/ or *Casuarina cunninghamiana* with a Dichanthium grassy understory. Soils are black, dark grey or red-brown (specified as shallow, stony soil over basalt for one collection) and reddish clay-loam or medium clay soils. | Low. Unsuitable habitat within the site. Targeted surveys did not record species within the site. |
| *Prasophyllum sp. Wybong* | - | - | CE | PMST | Known to occur in open eucalypt woodland and grassland. | Low**.** Potential habitat within the Mine site, however, targeted surveys did not record species within the site. |
| *Prostanthera staurophylla* | - | E | V | PMST | Only known from the Tenterfield district, Northern Tablelands, N.S.W. Grows in open and exposed areas, with *Kunzea opposita, Leptospermum novae-angliae and Leucopogon neo-anglicus* understorey, amongst granite outcrops. | Low. Unsuitable habitat within the site. Species associated with granite outcrops and heath communities. Targeted surveys did not record species within the site. |
| *Rutidosis heterogama* | Heath Wrinklewort | V | V | BioNet<br>PMST<br>BAM-C | Heaths in clay soils, disturbed roadsides. | **Moderate.** Potential habitat within the site, however, targeted surveys did not record species within the site.<br>**Candidate Species Credit Species** |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| *Swainsona murrayana* | Slender Darling-pea | V | V | PMST | Species occurs in the central western slopes, the Western Division, and the Riverina area. Slender Darling-pea is found in grassland, herbland, and open Black-box woodland, often in depressions. This species grows in heavy grey or brown clay, loam, or red cracking clays. It is often associated with low chenopod shrubs (*Maireana* spp.), wallaby-grass (*Austrodanthonia* spp), and spear grass (*Austrostipa* spp.). | Low. Unsuitable habitat within the site. Targeted surveys did not record species within the site. |
| *Thesium australe* | Austral Toadflax | V | V | BioNet<br>PMST<br>BAM-C | Grassland or grassy eucalypt woodland where *Themeda australis* is predominant, on grassy headlands. | **Moderate.** Potential habitat within the site, however, targeted surveys did not record species within the site.<br>**Candidate Species Credit Species** |
| *Tylophora linearis (syn. Vincetoxicum forsteri)* | | V | E | PMST | *Tylophora linearis* grows in dense shrublands occasionally overtopped by *Callitris glaucophylla* and various species of Eucalyptus. | Low. Marginal habitat within the site. No records in the locality. Targeted surveys did not record species within the site. |
| *Tylophora woollsii* | | E | E | PMST | Moist eucalypt forest, moist sites in dry eucalypt forest and rainforest margins. Known on the Tablelands from the Bald Rock and Boonoo Boonoo areas north of Tenterfield. | Low. Marginal habitat within the site. No records in the locality. Targeted surveys did not record species within the site. |
| *Zieria ingramii* | Kieth's Zieria | E | E | BAM-C | Grows in dry sclerophyll forest on light sandy soils. All known populations have been recorded in Eucalyptus-Callitris woodland or open forest with a shrubby to heathy understorey. | **Moderate.** Potential habitat within the site associated with Eucalyptus-Callitris woodland. Targeted surveys did not record species within the site.<br>**Candidate Species Credit Species** |

V = Vulnerable; E = Endangered; CE = Critically Endangered

# Appendix D

# Assessment of Habitat Suitability – Fauna

**Threatened Fauna Potential Occurrence Assessment**

For this proposed activity, the likelihood of occurrence of threatened and migratory species and populations was determined based on the criteria shown in **Table D 1**.

**Table D 1 Potential of occurrence criteria for threatened species and populations of fauna**

| Potential of occurrence | Criteria |
|---|---|
| **Known** | The species was observed in the site either during the current survey or during another survey less than one year prior. |
| **High** | A species has a high likelihood of occurrence if:<br>• the site contains or forms part of a large area of high-quality suitable habitat<br>• important habitat elements (i.e. for breeding or important life cycle periods such as winter foraging periods) are abundant within the site<br>• the species has been recorded recently in similar habitat in the locality<br>• the site is likely to support resident populations or to contain habitat that is visited by the species during regular seasonal movements or migration. |
| **Moderate** | A species has a moderate likelihood of occurrence if:<br>• the site contains or forms part of a small area of high-quality suitable habitat<br>• the site contains or forms part of a large area of marginal habitat<br>• important habitat elements (i.e. for breeding or important life cycle periods such as winter foraging periods) are sparse or absent within the site |
| **Low** | A species has a low likelihood of occurrence if:<br>• potentially suitable habitat exists but the species has not been recorded recently (previous 10 years) in the locality despite intensive survey (i.e. the species is considered to be locally extinct)<br>• the site is unlikely to support resident populations or to contain habitat that is visited by the species during regular seasonal movements or migration.<br>• the species is considered to be a rare vagrant, likely only to visit the site very rarely; e.g. during juvenile dispersal or exceptional climatic conditions (e.g. extreme drought conditions in typical habitat of inland birds). |
| **None** | Suitable habitat is absent from the site. |

## Table D 2 Threatened fauna potential of occurrence assessment

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| **Amphibians** | | | | | | |
| *Adelotus brevis* - endangered population Tusked Frog population in the Nandewar and New England Tableland Bioregions | | E2 | - | BAM-C | Distributed along the eastern coast and adjacent ranges from central Queensland to southern NSW, extending inland to the New England Tableland (New England Bioregion) and North West Slopes (Nandewar Bioregion). Rainforests, wet forests and flooded grassland and pasture. They are usually found near creeks, ditches and ponds, and call while hidden amongst vegetation or debris. The New England Tablelands and Nandewar population of Tusked Frog represents a distinct and disjunct high-elevation population that is at the western limit of the species' range in NSW. | **Moderate**. Potential habitat associated with ponds and creeklines.<br>**Candidate Species Credit Species** |
| **Birds** | | | | | | |
| *Actitis hypoleucos* | Common Sandpiper | - | M | PMST | Found along all coastlines of Australia and in many areas inland. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. | Low. Lack of preferred habitat in site. Vagrant occurrences within the site may occur during seasonal movements. |
| *Anthochaera phrygia* | Regent Honeyeater | CE | CE | BioNet<br>PMST<br>BAM-C | Dry open forest and woodland with an abundance of nectar-producing eucalypts, particularly box-ironbark woodland, swamp mahogany forests, and riverine sheoak woodlands. | **Moderate.** Potential habitat within site. May occur during seasonal movements when blossom resources are in abundance.<br>**Considered further as both a predicted ecosystem credit and candidate species credit.** |
| *Aphelocephala leucopsis* | Southern Whiteface | - | V | PMST | Open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains. Individuals may move into wetter areas outside of their normal range during drought years | **Moderate.** Potential habitat within site |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| *Apus pacificus* | Fork-tailed Swift | - | M | PMST | In NSW, the Fork-tailed Swift is recorded in all regions. Many records occur east of the Great Divide, however, a few populations have been found west of the Great Divide. It is almost exclusively aerial, flying from <1 m to at least 300 m above ground and probably much higher. They mostly occur over inland plains but sometimes above foothills or in coastal areas. | **High.** Potential habitat within site. May occur during seasonal movements. |
| *Artamus cyanopterus cyanopterus* | Dusky Woodswallow | V | - | BioNet<br>BAM-C | Woodlands and dry open sclerophyll forests, usually dominated by eucalypts; also recorded in shrublands, heathlands and various modified habitats. | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |
| *Botaurus poiciloptilus* | Australasian Bittern | E | E | PMST | Permanent freshwater wetlands with tall dense vegetation, particularly bullrushes and spikerushes. | Low. Marginal habitat within site. May occur during seasonal movements. |
| *Calidris acuminata* | Sharp-tailed Sandpiper | - | M | PMST | Widespread in most regions of NSW, especially in coastal areas, but they are sparse in the south-central Western Plain and east Lower Western Regions of NSW. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. | Low. Lack of preferred habitat in site. |
| *Calidris ferruginea* | Curlew Sandpiper | E | CE | PMST | Tidal mudflats, sandy ocean shores and occasionally inland freshwater or salt-lakes. | None. No preferred habitat within site. |
| *Calidris melanotos* | Pectoral Sandpiper | - | M | PMST | In NSW, it is widespread but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. Prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. | Low. Lack of preferred habitat in site. |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| *Calyptorhynchus lathami* | Glossy Black-Cockatoo | V | V | BioNet<br>BAM-C | Sheoaks in coastal forests and woodlands, timbered watercourses, and moist and dry eucalypt forests of the coast and the Great Divide up to 1,000 m. | Low. Lack of preferred habitat in the form of substantial stands of sheoaks within the site. May occur flying over site whilst foraging in greater locality.<br>**Considered further as both a predicted ecosystem credit and candidate species credit.** |
| *Chthonicola sagittata* | Speckled Warbler | V | - | BioNet<br>BAM-C | Eucalyptus dominated communities with sparse shrubs and grassy understorey. | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |
| *Climacteris picumnus victoriae* | Brown Treecreeper | V | V | BioNet<br>BAM-C | Eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range, and less commonly on coastal plains and ranges. | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |
| *Daphoenositta chrysoptera* | Varied Sittella | V | - | BioNet<br>BAM-C | Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. | **High.** Potential habitat within site. Has been recorded within greater locality.<br>**Predicted Ecosystem Credit Species** |
| *Ephippiorhynchus asiaticus* | Black-necked Stork | E | - | BioNet<br>BAM-C | Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries. Build large nests high in tall trees close to water. Trees usually provide clear observation of the surroundings and are at low elevation. | Low. Marginal habitat associated with the site. Known more to occur on floodplains. Vagrant occurrences during seasonal movements may occur.<br>**Predicted Ecosystem Credit Species** |
| *Erythrotriorchis radiatus* | Red Goshawk | CE | E | PMST | Open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water. Typically found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers. Population in NSW is naturally small (probably only one pair) and lies at extreme of the natural range of the species in Australia. | Low. Population in NSW is naturally small (probably only one pair in NE NSW) and lies at extreme of the natural range of the species in Australia. Lack of records within locality. |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| *Falco hypoleucos* | Grey Falcon | E | V | PMST | The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. | Low. Marginal habitat associated with the site. Known more to occur on lower slopes and plains. Vagrant occurrences during seasonal movements may occur. |
| *Falco subniger* | Black Falcon | V | - | BAM-C | The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. It is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas. | Low. Marginal habitat associated with the site. Known more to occur on lower slopes and plains. Vagrant occurrences during seasonal movements may occur.<br>**Predicted Ecosystem Credit Species** |
| *Gallinago hardwickii* | Latham's Snipe | - | V, M | PMST | Latham's Snipe is a non-breeding visitor to south-eastern Australia. The range extends inland over the eastern tablelands in south-eastern Queensland and to west of the Great Dividing Range in NSW. Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies. However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. | Low. Lack of preferred habitat in site. Vagrant occurrences within the site may occur during seasonal movements. |
| *Geophaps scripta scripta* | Squatter Pigeon | E | V | BioNet<br>PMST | Resident in open woodland near water in interior of eastern mainland. | Low. Species known to be rare in its southern distribution, lack of records within greater locality. |
| *Glossopsitta pusilla* | Little Lorikeet | V | - | BioNet<br>BAM-C | Forages in open Eucalyptus forest and woodland; also feeds on Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| *Grantiella picta* | Painted Honeyeater | V | V | BioNet<br>PMST<br>BAM-C | Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. Specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema. | **High**. Potential habitat within site. High density of mistletoes recorded.<br>**Predicted Ecosystem Credit Species** |
| *Haliaeetus leucogaster* | White-bellied Sea-eagle | V | - | BioNet<br>BAM-C | Coastal habitats and around terrestrial wetlands characterised by the presence of large areas of open water (larger rivers, swamps, lakes, ocean). Habitats may include freshwater swamps, lakes, reservoirs, billabongs, saltmarsh and sewage ponds in addition to bays and inlets, beaches, reefs, lagoons, estuaries and mangroves. | **Moderate.** Potential habitat associated with river system and larger waterbodies across the site.<br>**Considered further as both a predicted ecosystem credit and candidate species credit.** |
| *Hieraaetus morphnoides* | Little Eagle | V | - | BioNet<br>BAM-C | Open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. | **High.** Potential habitat associated with the site, in addition, potential breeding habitat (i.e. nest tree) may be present.<br>**Considered further as both a predicted ecosystem credit and candidate species credit.** |
| *Hirundapus caudacutus* | White-throated Needletail | - | V; M | BioNet<br>BAM-C | Most often recorded aerial foraging above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy. Breeding does not occur in Australia. | **High.** Potential habitat within site. May occur during seasonal movements.<br>**Predicted Ecosystem Credit Species** |
| *Lathamus discolor* | Swift Parrot | E | CE | BAM-C<br>PMST | On mainland Australia foraging occurs where eucalypts are flowering profusely or where abundant lerp infestations occur. Favoured feed trees include winter flowering species such as Swamp Mahogany (Eucalyptus robusta), Spotted Gum (Corymbia maculata), Red Bloodwood (C. gummifera), Forest Red Gum (E. tereticornis), Mugga Ironbark (E. sideroxylon), and White Box (E. albens). Commonly used lerp infested trees include Inland Grey Box E. microcarpa, Grey Box (E. moluccana), | **Moderate.** Potential habitat within site. May occur during seasonal movements when blossom resources are in abundance.<br>**Considered further as both a predicted ecosystem credit and candidate species credit.** |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| | | | | | Blackbutt (E. pilularis) and Yellow Box (E. melliodora). | |
| *Leipoa ocellata* | Malleefowl | E | V | BioNet | Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated by Mulga or native Cypress Pine species. | Low. Lack of preferred habitat in site. |
| *TroyLophoictinia isura* | Square-tailed Kite | V | - | BioNet<br>BAM-C | Dry woodland and open forest, particularly along major rivers and belts of trees in urban or semi-urban areas. Home ranges can extend over at least 100 km2. | **Known.** Recorded within site.<br>**Considered further as both a predicted ecosystem credit and candidate species credit.** |
| *Melanodryas cucullata cucullata* | Hooded Robin (south-eastern form) | V | E | BioNet<br>BAM-C | Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |
| *Melithreptus gularis gularis* | Black-chinned Honeyeater (eastern subspecies) | V | - | BioNet<br>BAM-C | Drier open forests or woodlands dominated by box and ironbark eucalypts, and open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees. | **Moderate.** Potential habitat within site<br>**Predicted Ecosystem Credit Species** |
| *Monarcha melanopsis* | Black-faced Monarch | - | M | PMST | Widespread in eastern Australia. In NSW and the ACT, the species occurs around the eastern slopes and tablelands of the Great Divide. It is rarely recorded farther inland. Mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical rainforest, subtropical rainforest, | Low. Lack of preferred habitat in site. Vagrant occurrences within the site may occur during seasonal movements. |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| | | | | | mesophyll thicket/ shrubland, warm temperate rainforest, dry rainforest and cool temperate rainforest | |
| *Myiagra cyanoleuca* | Satin Flycatcher | - | M | PMST | Widespread in eastern Australia. In NSW, they are widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. | **Moderate**. Potential habitat within site. May occur during seasonal movements |
| *Neophema chrysostoma* | Blue-winged Parrot | - | V | PMST | Blue-winged parrots breed in Tasmania, coastal south-eastern South Australia and southern Victoria. During the breeding season (spring and summer), birds occupy eucalypt forests and woodlands. Outside of the breeding range, habitat critical to the survival of this species includes foraging and staging habitats found from coastal, sub-coastal and inland areas, right through to semi-arid zones including grasslands, grassy woodlands and semi-arid chenopod shrubland with native and introduced grasses, herbs and shrubs; and wetlands both near the coast and in semi-arid zones used for foraging and staging. | Low. Species more known to occur in western New South Wales and eastern South Australia, extending to south-west Queensland. Rare vagrant may be possible. |
| *Neophema pulchella* | Turquoise Parrot | V | - | BioNet<br>BAM-C | Favours open, grassy woodland with dead trees near permanent water. Also inhabits coastal heaths and pastures with exotic grasses and weeds, along roadsides and in orchards. | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |
| *Ninox connivens* | Barking Owl | V | - | BioNet<br>BAM-C | Eucalypt woodland, open forest, swamp woodlands and timber along watercourses. | **Known.** Recorded within site.<br>**Candidate Species Credit Species** |
| *Ninox strenua* | Powerful Owl | V | - | BioNet<br>BAM-C | Woodland and open forest to tall moist forest and rainforest. Requires large tracts of forest or woodland habitat but | **Moderate.** Potential habitat associated with the site. Potential breeding habitat associated with larger hollow-bearing trees. |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| | | | | | may also occur in fragmented landscapes. | **Candidate Species Credit Species** |
| *Oxyura australis* | Blue-billed Duck | V | - | BioNet | Deep water in large permanent wetlands and swamps with dense aquatic vegetation. | Low. Marginal habitat within site. Lack of large permanent wetlands with dense aquatic vegetation. |
| *Petroica boodang* | Scarlet Robin | V | - | BioNet<br>BAM-C | Dry eucalypt forests and woodlands with an open and grassy understorey with few scattered shrubs. Both mature and regrowth vegetation are utilised; habitat usually contains abundant logs and fallen timber. | **High.** Potential habitat within the site. Records within greater locality.<br>**Predicted Ecosystem Credit Species** |
| *Pomatostomus temporalis temporalis* | Grey-crowned Babbler | V | - | BioNet<br>BAM-C | Open woodlands dominated by mature eucalypts, with regenerating trees, tall shrubs, and an intact ground cover of grass and forbs. | **High**. Potential habitat associated with the site. Recorded in greater locality.<br>**Predicted Ecosystem Credit Species** |
| *Rhipidura rufifrons* | Rufous Fantail | - | M | PMST | Occurs in coastal and near coastal districts of northern and eastern Australia. Mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts usually with a dense shrubby understorey often including ferns. They also occur in subtropical and temperate rainforests. | Low. Lack of preferred habitat in site. Vagrant occurrences within the site may occur during seasonal movements. |
| *Rostratula australis* | Australian Painted Snipe | E | E | PMST | Well-vegetated shallows and margins of wetlands, dams, sewage ponds, wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, and open timber. | Low. Marginal habitat within site. Lack of large permanent wetlands with dense aquatic vegetation. |
| *Stagonopleura guttata* | Diamond Firetail | V | V | BioNet<br>BAM-C | Grassy eucalypt woodlands, open forest, mallee, temperate grassland, and secondary grassland derived from other communities, riparian areas, and sometimes in lightly wooded farmland. | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |
| *Stictonetta naevosa* | Freckled Duck | V | - | BioNet | Permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. In drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. | Low. Marginal habitat within site. Lack of large permanent wetlands with dense aquatic vegetation. |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| *Tringa nebularia* | Common Greenshank, Greenshank | - | M | PMST | In NSW, the species has been recorded in most coastal regions. It is widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions. Found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. | Low. Lack of preferred habitat in site. Vagrant occurrences within the site may occur during seasonal movements. |
| *Tyto novaehollandiae* | Masked Owl | V | - | BAM-C | Extends from the coast where it is most abundant to the western plains. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. | **High.** Potential habitat associated with the site. Potential breeding habitat associated with larger hollow-bearing trees.<br>**Candidate Species Credit Species** |
| **Fish** | | | | | | |
| *Bidyanus bidyanus* | Silver Perch | V | E | PMST | Silver perch were once widespread and abundant throughout most of the Murray-Darling river system. They have now declined to low numbers or disappeared from most of their former range. Only one remaining secure and self-sustaining population occurs in NSW in the central Murray River downstream of Yarrawonga weir, as well as several anabranches and tributaries. | Low. No suitable habitat within the Site. However, potential habitat associated with larger more permanent creeks and rivers associated within the Beardy River. |
| *Maccullochella peelii* | Murray Cod | - | V | PMST | Warm water habitats that range from clear, rocky streams to slow flowing turbid rivers and billabongs. | Low. No suitable habitat within the site. However, potential habitat associated with larger more permanent creeks and rivers associated within the Beardy River. |
| *Mogurnda adspersa* | Southern Purple Spotted Gudgeon | E (FM Act) | - | DPI | Occurs in the Murray-Darling basin as well as parts of coastal northern NSW and Queensland. The species can be found in a variety of habitats such as rivers, creeks, streams and billabongs with slow-flowing or still waters. Cover | **Moderate**. Marginal habitat within the Site associated with Vegetable Creek. Higher quality habitat is associated with larger more permanent creeks and rivers associated within the Beardy River. |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| | | | | | in the form of aquatic vegetation, overhanging vegetation from river banks, leaf litter, rocks or snags are important for the species. | |
| *Tandanus tandanus* | Eel-tailed Catfish | E2 (FM Act) | - | DPI | Naturally distributed throughout the Murray-Darling Basin and in the Eastern drainages NSW north of Newcastle. They can be found in a diverse range of freshwater environments including rivers, creeks, lakes, billabongs and lagoons. They prefer clear, sluggish or still waters, but can also be found in flowing streams with turbid waters. Substrates range from mud to gravel and rock. | Low. No suitable habitat within the Site. However, potential habitat associated with larger more permanent creeks and rivers associated within the Beardy River. |
| **Mammals** | | | | | | |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | V | E | BAM-C PMST | Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Found in well-timbered areas containing gullies. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin. | **Moderate**. Potential habitat within site. Cliffs and rocky areas were identified in parts of the site (<2 km) associated with gorges of larger creek/ river systems.<br>**Considered further as both a predicted ecosystem credit and candidate species credit.** |
| *Chalinolobus nigrogriseus* | Hoary Wattled Bat | V | - | BioNet | Dry open eucalypt forest dominated by spotted gum, boxes and ironbarks. Also, healthy coastal forests where Red Bloodwood and Scribbly Gum are common. Naturally sparse understorey is favourable. | **Moderate.** Potential habitat associated with the site. |
| *Chalinolobus picatus* | Little Pied Bat | V | - | BAM-C | The Little-Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria. Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| | | | | | forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. | |
| *Dasyurus maculatus* | Spotted-tailed Quoll | V | E | BioNet<br>BAM-C<br>PMST | Dry and moist eucalypt forests and rainforests, fallen hollow logs, large rocky outcrops. | **High.** Potential habitat associated with the site. Previously recorded in greater locality.<br>**Predicted Ecosystem Credit Species** |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | - | BioNet<br>BAM-C | Moist and dry eucalypt forest and rainforest, particularly at high elevations. | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |
| *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V | - | BioNet<br>BAM-C | Forest or woodland, roost in caves, old mines and stormwater channels. | **Known.** Recorded within site.<br>**Considered further as both a predicted ecosystem credit and candidate species credit.** |
| *Nyctophilus corbeni* | Corben's Long-eared Bat | V | V | BioNet<br>PMST | Mallee, bulloke and box eucalypt dominated communities, more common in box/ ironbark/ cypress-pine vegetation, inhabiting tree hollows, crevices, and under loose bark. | **High.** Potential habitat associated with the site. Previously recorded in greater locality. |
| *Petauroides volans* | Southern Greater Glider | E | E | BioNet<br>PMST | Ranges and coastal plains of eastern Australia, where it inhabits a variety of eucalypt forests and woodlands. Feeds on Eucalyptus leaves, with some buds and flowers, favoured species vary regionally. Prefers large hollows in large old trees. | Low. More associated with tall forests on ranges and east of the ranges. |
| *Petaurus australis australis* | Yellow-bellied Glider (south-eastern) | V | V | PMST | Tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Dens in tree hollows of large trees, often in family groups. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. | Low. More associated with tall forests on ranges and east of the ranges. Lack of records within greater locality. |
| *Petaurus norfolcensis* | Squirrel Glider | V | - | BioNet<br>BAM-C | Blackbutt, bloodwood and ironbark eucalypt forest with heath understorey in coastal areas, and box-ironbark | **Known.** Recorded within site.<br>**Candidate Species Credit Species** |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| | | | | | woodlands and River Red Gum forest inland. | |
| *Petrogale penicillata* | Brush-tailed Rock Wallaby | E | V | PMST | North-facing cliffs and dry eucalypt forest and woodland, inhabiting rock crevices, caves, overhangs during the day, and foraging in grassy areas nearby at night. | Low. Minimal habitat associated with rocky cliff faces and rock crevices. May occur in greater region. Lack of records within locality. |
| *Phascolarctos cinereus* | Koala | E | E | BioNet<br>BAM-C<br>PMST | Appropriate food trees in forests and woodlands, and treed urban areas. | **Known.** Recorded within site.<br>**Candidate Species Credit Species** |
| *Potorous tridactylus* | Long-nosed Potoroo | V | V | PMST | Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. | Low. Lack of preferred habitat in site. |
| *Pseudomys novaehollandiae* | New Holland Mouse | V | V | BioNet<br>PMST | New Holland Mouse has been found to prefer habitats of open heathland, tall open forest with a grassy understorey, open woodland with a grassy or heathy understorey, and vegetated sand dunes. Sandy soils suitable for burrowing are common across most occupied habitats and soft sandy substrates, while deep topsoils are thought to be optimal. | Low.<br>■ PCTs on site are not listed in the PCTs associated with New Holland Mouse in the BioNet Threatened Biodiversity Profiles data collection (TBDC).<br>■ One historical record is within the locality (located on a ridge on the north side of the Beardy River, 12km north of Emmaville) and is dated 7/3/1997 (>20years old). This is a bone, teeth or shell record. This is also the most western record for the species.<br>■ New Holland Mouse is more known to occur east of the dividing range and in association with heathlands and sandy substrates.<br>■ It is acknowledged that the draft National Recovery Plan for the Pookila (New Holland Mouse) (DCCEEW, 2024) lists a broader array of habitat types than the TBDC, most notably including tall open forest with a grassy understorey and open woodland with a grassy understorey which could be considered applicable to PCTs on site. However, these habitats generally occur in conjunction with sandy soils/ soft sandy substrates and/ or deep |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| | | | | | | topsoils suitable for burrowing. The Soil and Land Capability Assessment Report (SLCAR) (Landloch, 2025) found a total of five soil landscapes (known as soil mapping units, SMU). SMUs are Conglomerate Soils – Gentle Slope (27.2 ha), Conglomerate Soils – Steep Slope (407.9 ha), Conglomerate Soils – Gentle Slope (27.2 ha), Fine Sedimentary Loams (8.7 ha), Sedimentary Soils (186.3 ha) and Volcanic Clays 38.1 ha).<br>■ Field texture (surface tests) (Table C2 of the SLCAR) identified clay loam (silty), silty clay loam, sandy clay loam, clay loam, fine sandy clay loam, and loam textures, none of which are deemed soft sandy substrates (e.g. sand, loamy sand or sandy loam). |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | V | V | BioNet<br>BAM-C<br>PMST | Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. | **Moderate.** Potential foraging habitat within site. Species may occur during seasonal high blossom and fruit occurrences.<br>**Considered further as both a predicted ecosystem credit and candidate species credit.** |
| *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | V | - | BAM-C | A wide-ranging species found across northern and eastern Australia. There are scattered records of this species across the New England Tablelands and North West Slopes. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Roosts singly or in groups of up to six, in tree hollows and buildings. | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |
| *Scoteanax rueppellii* | Greater Broad-nosed Bat | V | - | BioNet<br>BAM-C | Woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. | **Known.** Recorded within site.<br>**Predicted Ecosystem Credit Species** |
| *Vespadelus troughtoni* | Eastern Cave Bat | V | - | BAM-C | The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or | **Moderate**. Potential habitat within site. Cliffs and rocky areas were identified in parts of the site (<2 km) associated with gorges of larger creek/ river systems.<br>**Candidate Species Credit Species** |

| Scientific Name | Common Name | BC Act | EPBC Act | Source | Habitat | Potential Occurrence and Outcome |
|---|---|---|---|---|---|---|
| | | | | | rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. | |
| **Reptiles** | | | | | | |
| *Anomalopus mackayi* | Five-clawed Worm-skink | E | V | PMST | Close to or on the lower slopes of slight rises in grassy White Box woodland on moist black soils, and River Red Gum-Coolibah-Bimble Box woodland on deep cracking loose clay soils. May also occur in grassland areas and open paddocks with scattered trees. | Low. Species associated with deep cracking loose clay soils from the Ashford area west. Preferred habitat not associated with site. No records within locality. |
| *Aprasia parapulchella* | Pink-tailed Legless Lizard | V | V | PMST | Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass (*Themeda australis*). | Low. Lack of preferred habitat in site. |
| *Delma torquata* | Collared Delma | - | V | PMST | Usually inhabits eucalypt dominated woodland and open forest where it is associated with suitable micro-habitats i.e. exposed rocky outcrops. | Low. Species endemic to QLD with potential habitat extending into northern NSW ranges. No records within locality. |
| *Furina dunmalli* | Dunmall's Snake | - | V | PMST | Preferred habitat is Brigalow forest and woodland with fallen timber and ground litter, growing on cracking clay soils and clay loam soils. Also occurs in eucalypt and Callitris woodland with fallen timber and ground litter. | Low. Predominately occurs in QLD with potential occurrence and habitat within northern NSW. Lack of preferred habitat and lack of known records in locality. |
| *Myuchelys bellii* | Bells Turtle | E | V | BioNet<br>BAM-C | Upper reaches and smaller tributaries of major rivers flowing through granitic bedrock, preferring narrow stretches of river, 30 to 40 m wide, with pools up to 3 m deep, and sandy and rocky. Riverbeds, with small beds of weed. | Low. Marginal habitat within the Site. However, potential habitat associated with larger more permanent creeks and rivers associated within the Beardy River.<br>**Candidate Species Credit Species** |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | V | BioNet<br>BAM-C<br>PMST | Dry sclerophyll open forest and woodland associated with outcrops of granite, basalt, sandstone and metamorphic rocks. | **Known.** Recorded within site.<br>**Candidate Species Credit Species** |

V = Vulnerable; E = Endangered; E2 = Endangered Population; CE = Critically Endangered

**References**

Department of Climate Change, Energy, the Environment and Water, 2024, *National Recovery Plan for the Pookila (New Holland mouse)*, Department of Climate Change, Energy, the Environment and Water, Canberra.

Landloch, 2025. *Soil and Land Capability Assessment Report March 2025*, Landloch Pty Ltd 2025, prepared for R.W. Corkery & Co.

# Appendix E

# Fauna Inventory

## Table E1 Fauna Inventory

| Scientific Name | Common Name | BC Act | EPBC Act | Native (N) or Introduced (I) |
|---|---|---|---|---|
| **Amphibians (8)** | | | | |
| *Crinia parinsignifera* | Eastern Sign-bearing Froglet | | | N |
| *Crinia signifera* | Common Eastern Froglet | | | N |
| *Limnodynastes dumerili* | Eastern Banjo Frog | | | N |
| *Limnodynastes tasmaniensis* | Spotted Marsh Frog | | | N |
| *Litoria fallax* | Eastern Dwarf Tree Frog | | | N |
| *Litoria latopalmata* | Broad-palmed Rocket Frog | | | N |
| *Litoria peronii* | Peron's Tree Frog | | | N |
| *Uperoleia laevigata* | Smooth Toadlet | | | N |
| **Birds (94)** | | | | |
| *Tachybaptus novaehollandiae* | Australasian Grebe | | | N |
| *Anthus novaeseelandiae* | Australasian Pipit | | | N |
| *Cracticus tibicen* | Australian Magpie | | | N |
| *Corvus coronoides* | Australian Raven | | | N |
| *Acrocephalus australis* | Australian Reed-warbler | | | N |
| *Chenonetta jubata* | Australian Wood Duck | | | N |
| *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | | | N |
| *Elseyornis melanops* | Black-fronted Dotterel | | | N |
| *Northiella haematogaster* | Blue Bonnet | | | N |
| *Falco berigora* | Brown Falcon | | | N |
| *Accipiter fasciatus* | Brown Goshawk | | | N |
| *Acanthiza pusilla* | Brown Thornbill | | | N |
| *Climacteris picumnus* | Brown Treecreeper | V | V | N |
| *Melithreptus brevirostris* | Brown-headed Honey-eater | | | N |
| *Cacomantis variolosus* | Brush Cuckoo | | | N |
| *Acanthiza reguloides* | Buff-rumped Thornbill | | | N |
| *Scythrops novaehollandiae* | Channel-billed Cuckoo | | | N |
| *Edolisoma tenuirostre* | Cicadabird | | | N |
| *Accipiter cirrocephalus* | Collared Sparrowhawk | | | N |
| *Phaps chalcoptera* | Common Bronzewing | | | N |
| *Platycercus elegans* | Crimson Rosella | | | N |
| *Stagonopleura guttata* | Diamond Firetail | V | V | N |
| *Taeniopygia bichenovii* | Double-barred Finch | | | N |
| *Artamus cyanopterus* | Dusky Woodswallow | V | | N |
| *Platycercus eximius* | Eastern Rosella | | | N |
| *Falcunculus frontatus* | Eastern Shrike-tit | | | N |

| Scientific Name | Common Name | BC Act | EPBC Act | Native (N) or Introduced (I) |
|---|---|---|---|---|
| *Acanthorhynchus tenuirostris* | Eastern Spinebill | | | N |
| *Eopsaltria australis* | Eastern Yellow Robin | | | N |
| *Cacomantis flabelliformis* | Fan-tailed Cuckoo | | | N |
| *Lichenostomus fuscus* | Fuscous Honeyeater | | | N |
| *Pachycephala pectoralis* | Golden Whistler | | | N |
| *Cracticus torquatus* | Grey Butcherbird | | | N |
| *Rhipidura albiscapa* | Grey Fantail | | | N |
| *Colluricincla harmonica* | Grey Shrike-thrush | | | N |
| *Melanodryas cucullata* | Hooded Robin | V | E | N |
| *Microeca fascinans* | Jacky Winter | | | N |
| *Dacelo novaeguineae* | Laughing Kookaburra | | | N |
| *Myiagra rubecula* | Leaden Flycatcher | | | N |
| *Glossopsitta pusilla* | Little Lorikeet | V | | N |
| *Grallina cyanoleuca* | Magpie-lark | | | N |
| *Vanellus miles* | Masked Lapwing | | | N |
| *Dicaeum hirundinaceum* | Mistletoebird | | | N |
| *Glossopsitta concinna* | Musk Lorikeet | | | N |
| *Falco cenchroides* | Nankeen Kestrel | | | N |
| *Philemon corniculatus* | Noisy Friarbird | | | N |
| *Manorina melanocephala* | Noisy Miner | | | N |
| *Oriolus sagittatus* | Olive-backed Oriole | | | N |
| *Anas superciliosa* | Pacific Black Duck | | | N |
| *Eudynamys orientalis* | Pacific Koel | | | N |
| *Geopelia placida* | Peaceful Dove | | | N |
| *Strepera graculina* | Pied Currawong | | | N |
| *Trichoglossus moluccanus* | Rainbow Lorikeet | | | N |
| *Anthochaera carunculata* | Red Wattlebird | | | N |
| *Neochmia temporalis* | Red-browed Finch | | | N |
| *Psephotus haematonotus* | Red-rumped Parrot | | | N |
| *Aprosmictus erythropterus* | Red-winged Parrot | | | N |
| *Myiagra inquieta* | Restless Flycatcher | | | N |
| *Pachycephala rufiventris* | Rufous Whistler | | | N |
| *Todiramphus sanctus* | Sacred Kingfisher | | | N |
| *Myiagra cyanoleuca* | Satin Flycatcher | | | N |
| *Zosterops lateralis* | Silvereye | | | N |
| *Pyrrholaemus sagittatus* | Speckled Warbler | V | | N |

| Scientific Name | Common Name | BC Act | EPBC Act | Native (N) or Introduced (I) |
|---|---|---|---|---|
| *Acanthagenys rufogularis* | Spiny-cheeked Honeyeater | | | N |
| *Pardalotus punctatus* | Spotted Pardalote | | | N |
| *Lophoictinia isura* | Square-tailed Kite | V | | N |
| *Pardalotus striatus* | Striated Pardalote | | | N |
| *Acanthiza lineata* | Striated Thornbill | | | N |
| *Plectorhyncha lanceolata* | Striped Honeyeater | | | N |
| *Coturnix pectoralis* | Stubble Quail | | | N |
| *Cacatua galerita* | Sulphur-crested Cockatoo | | | N |
| *Malurus cyaneus* | Superb Fairy-wren | | | N |
| *Podargus strigoides* | Tawny Frogmouth | | | N |
| *Corvus orru* | Torresian Crow | | | N |
| *Neophema pulchella* | Turquoise Parrot | V | | N |
| *Malurus lamberti* | Variegated Fairy-wren | | | N |
| *Aquila audax* | Wedge-tailed Eagle | | | N |
| *Smicrornis brevirostris* | Weebill | | | N |
| *Hirundo neoxena* | Welcome Swallow | | | N |
| *Gerygone fusca* | Western Gerygone | | | N |
| *Pomatostomus superciliosus* | White-browed Babbler | | | N |
| *Lichenostomus leucotis* | White-eared Honeyeater | | | N |
| *Egretta novaehollandiae* | White-faced Heron | | | N |
| *Melithreptus lunatus* | White-naped Honeyeater | | | N |
| *Ardea pacifica* | White-necked Heron | | | N |
| *Ptilotula penicillata* | White-plumed Honeyeater | | | N |
| *Gerygone olivacea* | White-throated Gerygone | | | N |
| *Cormobates leucophaea* | White-throated Treecreeper | | | N |
| *Corcorax melanorhamphos* | White-winged Chough | | | N |
| *Rhipidura leucophrys* | Willie Wagtail | | | N |
| *Leucosarcia melanoleuca* | Wonga Pigeon | | | N |
| *Acanthiza nana* | Yellow Thornbill | | | N |
| *Lichenostomus chrysops* | Yellow-faced Honeyeater | | | N |
| *Acanthiza chrysorrhoa* | Yellow-rumped Thornbill | | | N |
| *Lichenostomus melanops* | Yellow-tufted Honeyeater | | | N |
| **Mammals (35)** | | | | |
| *Acrobates pygmaeus* | Feathertail Glider | | | N |
| *Antechinus sp.* | Antechinus | | | N |
| *Austronomus australis* | White-striped Free-tailed Bat | | | N |

| Scientific Name | Common Name | BC Act | EPBC Act | Native (N) or Introduced (I) |
|---|---|---|---|---|
| *Capra hircus* | Goat | | | I |
| *Cervus sp.* | Deer | | | I |
| *Chalinolobus gouldii* | Gould's Wattle Bat | | | N |
| *Chalinolobus morio* | Chocolate Wattle Bat | | | N |
| *Chalinolobus picatus* | Little Pied Bat | V | | N |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | | N |
| *Lepus europaeus* | Hare | | | I |
| *Macropus giganteus* | Eastern Grey Kangaroo | | | N |
| *Macropus robustus* | Common Wallaroo | | | N |
| *Macropus rufogriseus* | Red-necked Wallaby | | | N |
| *Miniopterus orianae oceanensis* | Eastern Bent-winged Bat | V | | N |
| *Nyctophilus sp.* | - | | | N |
| *Ovis aries* | Sheep | | | I |
| *Ozimops petersi* | Inland Freetail Bat | | | N |
| *Ozimops planiceps* | South-eastern Freetail Bat | | | N |
| *Ozimops ridei* | Ride's Free-tailed Bat | | | N |
| *Petaurus breviceps* | Sugar Glider | | | N |
| *Petaurus norfolcensis* | Squirrel Glider | V | | N |
| *Phascolarctos cinereus** | Koala* | E | E | N |
| *Pseudocheirus peregrinus* | Ringtail Possum | | | N |
| *Rattus rattus* | Black rat | | | I |
| *Rhinolophus megaphyllus* | Eastern Horseshoe Bat | | | N |
| *Saccolaimus flaviventris* | Yellow-bellied Sheath-tail Bat | V | | N |
| *Scoteanax rueppellii* | Greater Broad-nose Bat | V | | N |
| *Scotorepens balstoni* | Inland Broad-nose Bat | | | N |
| *Scotorepens orion* | South-eastern Broad-nosed Bat | | | N |
| *Sus scrofa* | Pig | | | I |
| *Tachyglossus aculeatus* | Echidna | | | N |
| *Trichosurus vulpecula* | Brushtail Possum | | | N |
| *Vespadelus vulturnus* | Little Forest Bat | | | N |
| *Vulpes vulpes* | Red Fox | | | I |
| *Wallabia bicolor* | Swamp Wallaby | | | N |
| **Reptiles (23)** | | | | |
| *Amphibolurus burnsi* | Burns' Dragon | | | N |
| *Amphibolurus muricatus* | Jacky Lizard | | | N |
| *Chelodina longicollis* | Eastern Snake-necked Turtle | | | N |

| Scientific Name | Common Name | BC Act | EPBC Act | Native (N) or Introduced (I) |
|---|---|---|---|---|
| *Cryptoblepharus virgatus* | Wall Skink | | | N |
| *Ctenotus robustus* | Eastern Striped Skink | | | N |
| *Ctenotus taeniolatus* | Copper-tailed Skink | | | N |
| *Delma tincta* | Delma Tincta | | | N |
| *Dendrelaphis punctulata* | Green Tree Snake | | | N |
| *Diplodactylus vittatus* | Eastern Stone Gecko | | | N |
| *Diporiphora nobbi* | Nobbi Dragon | | | N |
| *Egernia striolata* | Tree Skink | | | N |
| *Gehyra dubia* | Dubious Dtella | | | N |
| *Gehyra variegata* | Common Dtella | | | N |
| *Heteronotia binoei* | Bynoe's Gecko | | | N |
| *Intellagama lesueurii* | Eastern Water Dragon | | | N |
| *Lampropholis guichenoti* | Common Grass Skink | | | N |
| *Oedura tryoni* | Southern Spotted Velvet Gecko | | | N |
| *Pogona barbata* | Eastern Bearded Dragon | | | N |
| *Tiliqua scincoides scincoides* | Eastern Bluetongue Skink | | | N |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | V | N |
| *Varanus gouldii gouldii* | Sand Monitor | | | N |
| *Varanus varius* | Lace Monitor | | | N |
| *Vermicella annulata* | Bandy-Bandy | | | N |

V= Vulnerable; E = Endangered; CE = Critically Endangered

* **Note**: scat found in the site

# Appendix F

# BAM Calculator Outputs

# BAM Biodiversity Credit Report (Like for like)

## Proposal Details

Assessment Id
00040540/BAAS19055/25/00054194

Proposal Name
Taronga Tin Mine

BAM data last updated *
09/04/2026

Assessor Name
Cheryl O'Dwyer

Assessor Number
BAAS18153

BAM Data version *
Current classification (live - default) (94)

Proponent Names

Report Created
29/04/2026

BAM Case Status
Finalised

Assessment Revision
3

BOS entry trigger

Assessment Type
Major Projects

Date Finalised
29/04/2026

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Potential Serious and Irreversible Impacts

| Name of threatened ecological community | Listing status | Name of Plant Community Type/ID |
|---|---|---|
| **Nil** | | |

| Species |
|---|
| **Nil** |

## Additional Information for Approval

# BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

| PCT |
|---|
| No Changes |

Predicted Threatened Species Not On Site

| Name |
|---|
| **Calyptorhynchus lathami lathami /** South-eastern Glossy Black-Cockatoo |
| **Ephippiorhynchus asiaticus /** Black-necked Stork |
| **Grantiella picta /** Painted Honeyeater |

## Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

| Name of Plant Community Type/ID | Name of threatened ecological community | Area of impact | HBT Cr | No HBT Cr | Total credits to be retired |
|---|---|---|---|---|---|
| 3339-Guyra Basalt Snow Gum Woodland | Not a TEC | 0.6 | 0 | 0 | 0 |

# BAM Biodiversity Credit Report (Like for like)

**3339-Guyra Basalt Snow Gum Woodland**

**Like-for-like credit retirement options**

| Class | Trading group | Zone | HBT | Credits | IBRA region |
|---|---|---|---|---|---|
| Tableland Clay Grassy Woodlands This includes PCT's: 513, 534, 554, 606, 722, 921, 1099, 3338, 3339, 3341, 3344, 3345, 3348 | Tableland Clay Grassy Woodlands >=70% and <90% | 3339_Poor | No | 0 | Glenn Innes-Guyra Basalts, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

## Species Credit Summary

| Species | Vegetation Zone/s | Area / Count | Credits |
|---|---|---|---|
| **Dichanthium setosum** / Bluegrass | **3339_Poor** | 0.6 | 4.00 |

## Credit Retirement Options

Like-for-like credit retirement options

**Dichanthium setosum** / Bluegrass

| Spp | IBRA subregion |
|---|---|
| **Dichanthium setosum /** Bluegrass | Any in NSW |

# BAM Candidate Species Report

## Proposal Details

| | | |
|---|---|---|
| Assessment Id<br>00040540/BAAS19055/25/00054194 | Proposal Name<br>Taronga Tin Mine | BAM data last updated *<br>09/04/2026 |
| Assessor Name<br>Cheryl O'Dwyer | Report Created<br>29/04/2026 | BAM Data version *<br>Current classification (live - default) (94) |
| Assessor Number<br>BAAS18153 | Assessment Type<br>Major Projects | BAM Case Status<br>Finalised |
| Assessment Revision<br>3 | BOS entry trigger | Date Finalised<br>29/04/2026 |

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## List of Species Requiring Survey

| Name | Presence | Survey Months |
|---|---|---|
| ***Dichanthium setosum***<br>Bluegrass | Yes (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Eucalyptus rubida subsp. barbigerorum***<br>Blackbutt Candlebark | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Thesium australe***<br>Austral Toadflax | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |

# BAM Candidate Species Report

## Threatened species Manually Added

None added

## Threatened species assessed as not on site

Refer to BAR for detailed justification

| Common name | Scientific name | Justification in the BAM-C |
|---|---|---|
| Barking Owl | Ninox connivens | Habitat constraints |
| Booroolong Frog | Litoria booroolongensis | Habitat degraded |
| Bush Stone-curlew | Burhinus grallarius | Habitat constraints |
| Eastern Pygmy-possum | Cercartetus nanus | Habitat degraded |
| Grey-headed Flying-fox | Pteropus poliocephalus | Habitat constraints |
| Koala | Phascolarctos cinereus | Habitat constraints |
| Little Eagle | Hieraaetus morphnoides | Habitat constraints |
| Masked Owl | Tyto novaehollandiae | Habitat constraints |
| Small Snake Orchid | Diuris pedunculata | Habitat degraded |
| South-eastern Glossy Black-Cockatoo | Calyptorhynchus lathami lathami | Refer to BAR |
| Southern Myotis | Myotis macropus | Habitat constraints |
| Square-tailed Kite | Lophoictinia isura | Habitat constraints |
| Swift Parrot | Lathamus discolor | Habitat constraints |
| Tusked Frog population in the Nandewar and New England Tableland Bioregions | Adelotus brevis - endangered population | Habitat degraded |
| White-bellied Sea-Eagle | Haliaeetus leucogaster | Habitat constraints |

# BAM Credit Summary Report

## Proposal Details

Assessment Id
00040540/BAAS19055/25/00054194

Proposal Name
Taronga Tin Mine

BAM data last updated *
09/04/2026

Assessor Name
Cheryl O'Dwyer

Report Created
29/04/2026

BAM Data version *
Current classification (live - default) (94)

Assessor Number
BAAS18153

BAM Case Status
Finalised

Date Finalised
29/04/2026

Assessment Revision
3

BOS entry trigger

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

| Zone | Vegetation zone name | TEC name | Current Vegetation integrity score | Change in Vegetation integrity (loss / gain) | Area (ha) | Sensitivity to loss (Justification) | Species sensitivity to gain class | BC Act Listing status | EPBC Act listing status | Biodiversity risk weighting | Potential SAII | Ecosystem credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Guyra Basalt Snow Gum Woodland** | | | | | | | | | | | | |
| 1 | 3339_Poor | Not a TEC | 12.2 | 12.2 | 0.64 | PCT Cleared - 82% | High Sensitivity to Gain | | | 2.00 | | 0 |
| | | | | | | | | | | | **Subtotal** | **0** |
| | | | | | | | | | | | **Total** | **0** |

## Species credits for threatened species

| Vegetation zone name | Habitat condition (Vegetation Integrity) | Change in habitat condition | Area (ha)/Count (no. individuals) | Sensitivity to loss (Justification) | Sensitivity to gain (Justification) | BC Act Listing status | EPBC Act listing status | Potential SAII | Species credits |
|---|---|---|---|---|---|---|---|---|---|
| ***Dichanthium setosum / Bluegrass ( Flora )*** | | | | | | | | | |
| 3339_Poor | 12.2 | 12.2 | 0.64 | Biodiversity Conservation Act listing status | Effectiveness of management in controlling threats | Vulnerable | Vulnerable | False | 4 |
| | | | | | | | | **Subtotal** | **4** |

# BAM Predicted Species Report

## Proposal Details

| Assessment Id | Proposal Name | BAM data last updated * |
|---|---|---|
| 00040540/BAAS19055/25/00054194 | Taronga Tin Mine | 09/04/2026 |
| **Assessor Name** | **Report Created** | **BAM Data version *** |
| Cheryl O'Dwyer | 29/04/2026 | Current classification (live - default) (94) |
| **Assessor Number** | **Assessment Type** | **BAM Case Status** |
| BAAS18153 | Major Projects | Finalised |
| **Assessment Revision** | **BOS entry trigger** | **Date Finalised** |
| 3 | | 29/04/2026 |

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

| Common Name | Scientific Name | Vegetation Types(s) |
|---|---|---|
| Black Falcon | Falco subniger | 3339-Guyra Basalt Snow Gum Woodland |
| Black-chinned Honeyeater (eastern subspecies) | Melithreptus gularis gularis | 3339-Guyra Basalt Snow Gum Woodland |
| Brown Treecreeper (eastern subspecies) | Climacteris picumnus victoriae | 3339-Guyra Basalt Snow Gum Woodland |
| Diamond Firetail | Stagonopleura guttata | 3339-Guyra Basalt Snow Gum Woodland |
| Dusky Woodswallow | Artamus cyanopterus cyanopterus | 3339-Guyra Basalt Snow Gum Woodland |
| Flame Robin | Petroica phoenicea | 3339-Guyra Basalt Snow Gum Woodland |
| Grey-headed Flying-fox | Pteropus poliocephalus | 3339-Guyra Basalt Snow Gum Woodland |
| Latham's Snipe | Gallinago hardwickii | 3339-Guyra Basalt Snow Gum Woodland |
| Little Eagle | Hieraaetus morphnoides | 3339-Guyra Basalt Snow Gum Woodland |
| Little Lorikeet | Parvipsitta pusilla | 3339-Guyra Basalt Snow Gum Woodland |
| Scarlet Robin | Petroica boodang | 3339-Guyra Basalt Snow Gum Woodland |

| | | |
|---|---|---|
| South-eastern Hooded Robin | Melanodryas cucullata cucullata | 3339-Guyra Basalt Snow Gum Woodland |
| Speckled Warbler | Pyrrholaemus sagittatus | 3339-Guyra Basalt Snow Gum Woodland |
| Spotted Harrier | Circus assimilis | 3339-Guyra Basalt Snow Gum Woodland |
| Spotted-tailed Quoll | Dasyurus maculatus | 3339-Guyra Basalt Snow Gum Woodland |
| Square-tailed Kite | Lophoictinia isura | 3339-Guyra Basalt Snow Gum Woodland |
| Swift Parrot | Lathamus discolor | 3339-Guyra Basalt Snow Gum Woodland |
| Varied Sittella | Daphoenositta chrysoptera | 3339-Guyra Basalt Snow Gum Woodland |
| White-bellied Sea-Eagle | Haliaeetus leucogaster | 3339-Guyra Basalt Snow Gum Woodland |
| White-throated Needletail | Hirundapus caudacutus | 3339-Guyra Basalt Snow Gum Woodland |

## Threatened species Manually Added

None added

## Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

| Common Name | Scientific Name | Plant Community Type(s) |
|---|---|---|
| Black-necked Stork | Ephippiorhynchus asiaticus | 3339-Guyra Basalt Snow Gum Woodland |
| Painted Honeyeater | Grantiella picta | 3339-Guyra Basalt Snow Gum Woodland |
| South-eastern Glossy Black-Cockatoo | Calyptorhynchus lathami lathami | 3339-Guyra Basalt Snow Gum Woodland |

## Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

| Common Name | Scientific Name | Justification in the BAM-C |
|---|---|---|
| Black-necked Stork | Ephippiorhynchus asiaticus | Habitat constraints |
| Painted Honeyeater | Grantiella picta | Habitat constraints |
| South-eastern Glossy Black-Cockatoo | Calyptorhynchus lathami lathami | Habitat constraints |

# BAM Vegetation Zones Report

## Proposal Details

Assessment Id
00040540/BAAS19055/25/00054194

Assessment name
Taronga Tin Mine

BAM data last updated *
09/04/2026

Assessor Name
Cheryl O'Dwyer

Report Created
29/04/2026

BAM Data version *
Current classification (live - default) (94)

Assessor Number
BAAS18153

Assessment Type
Major Projects

BAM Case Status
Finalised

Assessment Revision
3

BOS entry trigger

Date Finalised
29/04/2026

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Vegetation Zones

| # | Name | PCT | Condition | Area | Minimum number of plots | Management zones |
|---|---|---|---|---|---|---|
| 1 | 3339_Poor | 3339-Guyra Basalt Snow Gum Woodland | Poor | 0.64 | 1 | |

# BAM Biodiversity Credit Report (Like for like)

## Proposal Details

Assessment Id
00040540/BAAS19055/23/00040541

Proposal Name
Taronga Tin Mine

BAM data last updated *
09/04/2026

Assessor Name
Cheryl O'Dwyer

Assessor Number
BAAS18153

BAM Data version *
Current classification (live - default) (94)

Proponent Names

Report Created
29/04/2026

BAM Case Status
Finalised

Assessment Revision
13

BOS entry trigger

Assessment Type
Major Projects

Date Finalised
29/04/2026

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Potential Serious and Irreversible Impacts

| Name of threatened ecological community | Listing status | Name of Plant Community Type/ID |
|---|---|---|
| White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Ri | Critically Endangered Ecological Community | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |

| Species |
|---|
| **Acacia pubifolia** / Velvet Wattle |

## Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

| PCT |
|---|
| No Changes |

Predicted Threatened Species Not On Site

| Name |
|---|
| No Changes |

## Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

# BAM Biodiversity Credit Report (Like for like)

| Name of Plant Community Type/ID | Name of threatened ecological community | Area of impact | HBT Cr | No HBT Cr | Total credits to be retired |
|---|---|---|---|---|---|
| 3722-Western New England Box-Tumbledown Gum Grassy Forest | Not a TEC | 313.4 | 8174 | 0 | 8174 |
| 3363-Western New England Blakelys Red Gum-Box Grassy Forest | White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Ri | 1.0 | 27 | 12 | 39 |
| 4080-Northwest River Oak-Apple Forest | Not a TEC | 0.1 | 0 | 3 | 3 |

**3363-Western New England Blakelys Red Gum-Box Grassy Forest**

**Like-for-like credit retirement options**

| Name of offset trading group | Trading group | Zone | HBT | Credits | IBRA region |
|---|---|---|---|---|---|
| White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern | - | 3363_Intact | Yes | 27 | Beardy River Hills,<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Highlands, NSW South Western Slopes, South East Corner and Ri<br>This includes PCT's:<br>74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 3406, 3415, 3533, 4147, 4149, 4150 | | | | | |
| | White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Ri<br>This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, | - | 3363_Poor | No | 12 | Beardy River Hills,<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150 | | | | | |
| **3722-Western New England Box-Tumbledown Gum Grassy Forest** | **Like-for-like credit retirement options** | | | | | |
| | Class | Trading group | Zone | HBT | Credits | IBRA region |
| | Northern Tableland Dry Sclerophyll Forests This includes PCT's: 502, 504, 505, 508, 512, 523, 528, 537, 558, 566, 584, 1116, 1341, 1382, 3698, 3701, 3703, 3706, 3707, 3708, 3714, 3716, 3722, 3723, 3725, 3726, 3728, 3729, 3855, 4125 | Northern Tableland Dry Sclerophyll Forests >=50% and <70% | 3722_Intact | Yes | 4992 | Beardy River Hills, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Northern Tableland Dry Sclerophyll Forests This includes PCT's: 502, 504, 505, 508, 512, 523, 528, 537, 558, 566, 584, 1116, 1341, 1382, 3698, 3701, 3703, 3706, 3707, 3708, 3714, 3716, 3722, 3723, 3725, 3726, 3728, 3729, 3855, 4125 | Northern Tableland Dry Sclerophyll Forests >=50% and <70% | 3722_Modified | Yes | 2596 | Beardy River Hills, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| | Northern Tableland Dry Sclerophyll Forests This includes PCT's: 502, 504, 505, 508, 512, 523, 528, 537, 558, 566, 584, 1116, 1341, 1382, 3698, 3701, 3703, 3706, 3707, 3708, 3714, 3716, 3722, 3723, 3725, 3726, 3728, 3729, 3855, 4125 | Northern Tableland Dry Sclerophyll Forests >=50% and <70% | 3722_Poor | Yes | 586 | Beardy River Hills, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Northern Tableland Dry Sclerophyll Forests This includes PCT's: 502, 504, 505, 508, 512, 523, 528, 537, 558, 566, 584, 1116, 1341, 1382, 3698, 3701, 3703, 3706, 3707, 3708, 3714, 3716, 3722, 3723, 3725, 3726, 3728, 3729, 3855, 4125 | Northern Tableland Dry Sclerophyll Forests >=50% and <70% | 3722_Cleared | No | 0 | Beardy River Hills, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

| **4080-Northwest River Oak-Apple Forest** | **Like-for-like credit retirement options** | | | | | |
|---|---|---|---|---|---|---|
| | Class | Trading group | Zone | HBT | Credits | IBRA region |
| | Eastern Riverine Forests This includes PCT's: 42, 85, 485, 1714, 3020, 4061, 4063, 4066, 4070, 4072, 4073, 4075, 4077, 4080, 4081, 4085 | Eastern Riverine Forests >=50% and <70% | 4080_Modified | No | 3 | Beardy River Hills, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

# BAM Biodiversity Credit Report (Like for like)

## Species Credit Summary

| Species | Vegetation Zone/s | Area / Count | Credits |
|---|---|---|---|
| **Acacia pubifolia** / Velvet Wattle | **3722_Intact, 3722_Poor, 3722_Cleared, 3722_Modified** | 15.0 | 669.00 |
| **Ninox connivens** / Barking Owl | **3722_Intact, 3722_Poor, 3363_Intact, 3722_Modified, 4080_Modified** | 260.6 | 8729.00 |
| **Petaurus norfolcensis** / Squirrel Glider | **3722_Intact, 3363_Intact, 3722_Modified, 4080_Modified** | 258.0 | 8697.00 |
| **Phascolarctos cinereus** / Koala | **3722_Intact, 3363_Intact, 3722_Modified, 4080_Modified** | 258.0 | 8697.00 |
| **Uvidicolus sphyrurus** / Border Thick-tailed Gecko | **3722_Intact, 3363_Intact, 3722_Modified, 4080_Modified** | 258.0 | 8697.00 |

## Credit Retirement Options

Like-for-like credit retirement options

| | | |
|---|---|---|
| **Acacia pubifolia** / Velvet Wattle | Spp | IBRA subregion |
| | **Acacia pubifolia /** Velvet Wattle | Any in NSW |
| **Ninox connivens** / Barking Owl | Spp | IBRA subregion |

| | | |
|---|---|---|
| | **Ninox connivens /** Barking Owl | Any in NSW |
| **Petaurus norfolcensis** / Squirrel Glider | Spp | IBRA subregion |
| | **Petaurus norfolcensis /** Squirrel Glider | Any in NSW |
| **Phascolarctos cinereus** / Koala | Spp | IBRA subregion |
| | **Phascolarctos cinereus /** Koala | Any in NSW |
| **Uvidicolus sphyrurus** / Border Thick-tailed Gecko | Spp | IBRA subregion |
| | **Uvidicolus sphyrurus /** Border Thick-tailed Gecko | Any in NSW |

# BAM Candidate Species Report

## Proposal Details

| | | |
|---|---|---|
| Assessment Id<br>00040540/BAAS19055/23/00040541 | Proposal Name<br>Taronga Tin Mine | BAM data last updated *<br>09/04/2026 |
| Assessor Name<br>Cheryl O'Dwyer | Report Created<br>29/04/2026 | BAM Data version *<br>Current classification (live - default) (94) |
| Assessor Number<br>BAAS18153 | Assessment Type<br>Major Projects | BAM Case Status<br>Finalised |
| Assessment Revision<br>13 | BOS entry trigger | Date Finalised<br>29/04/2026 |

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## List of Species Requiring Survey

| Name | Presence | Survey Months |
|---|---|---|
| ***Acacia macnuttiana***<br>MacNutt's Wattle | No (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☑ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Acacia pubifolia***<br>Velvet Wattle | Yes (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☑ Sep ☐ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Adelotus brevis - endangered population***<br>Tusked Frog population in the Nandewar and New England Tableland Bioregions | No (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☑ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |

| | | |
|---|---|---|
| ***Astrotricha roddii***<br>Rodd's Star Hair | No (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☑ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Calyptorhynchus lathami lathami***<br>South-eastern Glossy Black-Cockatoo | No (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☑ Jun ☑ Jul ☑ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Chalinolobus dwyeri***<br>Large-eared Pied Bat | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☑ Dec<br>☐ Survey month outside the specified months? |
| ***Eucalyptus caleyi subsp. ovendenii***<br>Ovenden's Ironbark | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Eucalyptus mckieana***<br>McKie's Stringybark | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Eucalyptus nicholii***<br>Narrow-leaved Black Peppermint | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☑ Sep ☐ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |

| | | |
|---|---|---|
| ***Haliaeetus leucogaster***<br>White-bellied Sea-Eagle | No (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☑ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Hieraaetus morphnoides***<br>Little Eagle | No (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☑ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Lophoictinia isura***<br>Square-tailed Kite | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☑ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Miniopterus orianae oceanensis***<br>Large Bent-winged Bat | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☑ Dec<br>☐ Survey month outside the specified months? |
| ***Myuchelys bellii***<br>Western Sawshelled Turtle, Bell's Turtle | No (surveyed) | ☐ Jan ☑ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☑ Dec<br>☐ Survey month outside the specified months? |
| ***Ninox connivens***<br>Barking Owl | Yes (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☑ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |

| | | |
|---|---|---|
| ***Ninox strenua***<br>Powerful Owl | No (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☑ Apr<br>☐ May ☑ Jun ☑ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Petauroides volans***<br>Southern Greater Glider | No (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☑ Apr<br>☐ May ☑ Jun ☑ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Petaurus norfolcensis***<br>Squirrel Glider | Yes (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☑ Apr<br>☐ May ☑ Jun ☑ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Phascolarctos cinereus***<br>Koala | Yes (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Polygala linariifolia***<br>Native Milkwort | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Rutidosis heterogama***<br>Heath Wrinklewort | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |

| | | |
|---|---|---|
| ***Thesium australe***<br>Austral Toadflax | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Tyto novaehollandiae***<br>Masked Owl | No (surveyed) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☑ Jun ☑ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Uvidicolus sphyrurus***<br>Border Thick-tailed Gecko | Yes (surveyed) | ☐ Jan ☑ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Vespadelus troughtoni***<br>Eastern Cave Bat | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☑ Dec<br>☐ Survey month outside the specified months? |
| ***Zieria ingramii***<br>Keith's Zieria | No (surveyed) | ☑ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☑ Nov ☐ Dec<br>☐ Survey month outside the specified months? |

## Threatened species Manually Added

| Common Name | Scientific Name |
|---|---|
| Border Thick-tailed Gecko | Uvidicolus sphyrurus |
| Western Sawshelled Turtle, Bell's Turtle | Myuchelys bellii |
| Eastern Cave Bat | Vespadelus troughtoni |
| Large-eared Pied Bat | Chalinolobus dwyeri |

| | |
|---|---|
| Powerful Owl | Ninox strenua |
| Keith's Zieria | Zieria ingramii |

## Threatened species assessed as not on site

Refer to BAR for detailed justification

| Common name | Scientific name | Justification in the BAM-C |
|---|---|---|
| Grey-headed Flying-fox | Pteropus poliocephalus | Habitat constraints |
| Regent Honeyeater | Anthochaera phrygia | Habitat constraints |
| Swift Parrot | Lathamus discolor | Habitat constraints |

# BAM Credit Summary Report

## Proposal Details

Assessment Id
00040540/BAAS19055/23/00040541

Proposal Name
Taronga Tin Mine

BAM data last updated *
09/04/2026

Assessor Name
Cheryl O'Dwyer

Report Created
29/04/2026

BAM Data version *
Current classification (live - default) (94)

Assessor Number
BAAS18153

BAM Case Status
Finalised

Date Finalised
29/04/2026

Assessment Revision
13

BOS entry trigger

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

| Zone | Vegetation zone name | TEC name | Current Vegetation integrity score | Change in Vegetation integrity (loss / gain) | Area (ha) | Sensitivity to loss (Justification) | Species sensitivity to gain class | BC Act Listing status | EPBC Act listing status | Biodiversity risk weighting | Potential SAII | Ecosystem credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Northwest River Oak-Apple Forest** | | | | | | | | | | | | |
| 6 | 4080_Modified | Not a TEC | 60.4 | 60.4 | 0.11 | PCT Cleared - 63% | High Sensitivity to Gain | | | 1.75 | | 3 |
| | | | | | | | | | | | **Subtotal** | **3** |

# BAM Predicted Species Report

## Proposal Details

| Assessment Id | Proposal Name | BAM data last updated * |
|---|---|---|
| 00040540/BAAS19055/23/00040541 | Taronga Tin Mine | 09/04/2026 |
| **Assessor Name** | **Report Created** | **BAM Data version *** |
| Cheryl O'Dwyer | 29/04/2026 | Current classification (live - default) (94) |
| **Assessor Number** | **Assessment Type** | **BAM Case Status** |
| BAAS18153 | Major Projects | Finalised |
| **Assessment Revision** | **BOS entry trigger** | **Date Finalised** |
| 13 | | 29/04/2026 |

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

| Common Name | Scientific Name | Vegetation Types(s) |
|---|---|---|
| Black Falcon | Falco subniger | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Black-chinned Honeyeater (eastern subspecies) | Melithreptus gularis gularis | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Brown Treecreeper (eastern subspecies) | Climacteris picumnus victoriae | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Diamond Firetail | Stagonopleura guttata | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |

| | | |
|---|---|---|
| Diamond Firetail | Stagonopleura gutta | 4080-Northwest River Oak-Apple Forest |
| Dusky Woodswallow | Artamus cyanopterus cyanopterus | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Grey-headed Flying-fox | Pteropus poliocephalus | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Large Bent-winged Bat | Miniopterus orianae oceanensis | 4080-Northwest River Oak-Apple Forest |
| Latham's Snipe | Gallinago hardwickii | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Little Eagle | Hieraaetus morphnoides | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Little Lorikeet | Parvipsitta pusilla | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Regent Honeyeater | Anthochaera phrygia | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Scarlet Robin | Petroica boodang | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |

| | | |
|---|---|---|
| South-eastern Glossy Black-Cockatoo | Calyptorhynchus lathami lathami | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| South-eastern Hooded Robin | Melanodryas cucullata cucullata | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| Speckled Warbler | Pyrrholaemus sagittatus | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Spotted-tailed Quoll | Dasyurus maculatus | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Square-tailed Kite | Lophoictinia isura | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Swift Parrot | Lathamus discolor | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Varied Sittella | Daphoenositta chrysoptera | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| White-bellied Sea-Eagle | Haliaeetus leucogaster | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |

| | | |
|---|---|---|
| White-throated Needletail | Hirundapus caudacutus | 3722-Western New England Box-Tumbledown Gum Grassy Forest |
| | | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |
| | | 4080-Northwest River Oak-Apple Forest |
| Yellow-bellied Sheathtail-bat | Saccolaimus flaviventris | 3363-Western New England Blakelys Red Gum-Box Grassy Forest |

## Threatened species Manually Added

None added

## Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

| Common Name | Scientific Name | Justification in the BAM-C |
|---|---|---|

| Western New England Blakelys Red Gum-Box Grassy Forest | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 3363_Intact | White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Ri | 70.7 | 70.7 | 0.62 | Population size | High Sensitivity to Gain | Critically Endangered Ecological Community | Not Listed | 2.50 | True | 27 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 3363_Poor | White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Ri | 47.6 | 47.6 | 0.41 | Population size | High Sensitivity to Gain | Critically Endangered Ecological Community | Not Listed | 2.50 | True | 12 |
| | | | | | | | | | | | **Subtotal** | **39** |
| **Western New England Box-Tumbledown Gum Grassy Forest** | | | | | | | | | | | | |
| 1 | 3722_Intact | Not a TEC | 71.4 | 71.4 | 159.9 | PCT Cleared - 63% | High Sensitivity to Gain | | | 1.75 | | 4992 |
| 2 | 3722_Modified | Not a TEC | 60.9 | 60.9 | 97.4 | PCT Cleared - 63% | High Sensitivity to Gain | | | 1.75 | | 2596 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 3722_Poor | Not a TEC | 24 | 24.0 | 55.7 | PCT Cleared - 63% | High Sensitivity to Gain | | | 1.75 | | 586 |
| 4 | 3722_Cleared | Not a TEC | 2.5 | 2.5 | 0.44 | PCT Cleared - 63% | High Sensitivity to Gain | | | 1.75 | | 0 |
| | | | | | | | | | | | **Subtotal** | **8174** |
| | | | | | | | | | | | **Total** | **8216** |

## Species credits for threatened species

| Vegetation zone name | Habitat condition (Vegetation Integrity) | Change in habitat condition | Area (ha)/Count (no. individuals) | Sensitivity to loss (Justification) | Sensitivity to gain (Justification) | BC Act Listing status | EPBC Act listing status | Potential SAII | Species credits |
|---|---|---|---|---|---|---|---|---|---|
| ***Acacia pubifolia / Velvet Wattle ( Flora )*** | | | | | | | | | |
| 3722_Intact | 71.4 | 71.4 | 6.7 | Biodiversity Conservation Act listing status | Reproductive Strategy | Endangered | Vulnerable | True | 359 |
| 3722_Poor | 24.0 | 24.0 | 2.6 | Biodiversity Conservation Act listing status | Reproductive Strategy | Endangered | Vulnerable | True | 47 |
| 3722_Cleared | 2.5 | 2.5 | 0.01 | Biodiversity Conservation Act listing status | Reproductive Strategy | Endangered | Vulnerable | True | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3722_Modified | 60.9 | 60.9 | 5.7 | Biodiversity Conservation Act listing status | Reproductive Strategy | Endangered | Vulnerable | True | 262 |
| | | | | | | | | **Subtotal** | **669** |
| ***Ninox connivens / Barking Owl ( Fauna )*** | | | | | | | | | |
| 3722_Intact | 71.4 | 71.4 | 159.9 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Not Listed | False | 5706 |
| 3722_Poor | 24.0 | 24.0 | 2.6 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Not Listed | False | 32 |
| 3363_Intact | 70.7 | 70.7 | 0.62 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Not Listed | False | 22 |
| 3722_Modified | 60.9 | 60.9 | 97.4 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Not Listed | False | 2966 |
| 4080_Modified | 60.4 | 60.4 | 0.11 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Not Listed | False | 3 |
| | | | | | | | | **Subtotal** | **8729** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ***Petaurus norfolcensis / Squirrel Glider ( Fauna )*** | | | | | | | | | |
| 3722_Intact | 71.4 | 71.4 | 159.9 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Not Listed | False | 5706 |
| 3363_Intact | 70.7 | 70.7 | 0.62 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Not Listed | False | 22 |
| 3722_Modified | 60.9 | 60.9 | 97.4 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Not Listed | False | 2966 |
| 4080_Modified | 60.4 | 60.4 | 0.11 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Not Listed | False | 3 |
| | | | | | | | | **Subtotal** | **8697** |
| ***Phascolarctos cinereus / Koala ( Fauna )*** | | | | | | | | | |
| 3722_Intact | 71.4 | 71.4 | 159.9 | Biodiversity Conservation Act listing status | Effectiveness of management in controlling threats | Endangered | Endangered | False | 5706 |
| 3363_Intact | 70.7 | 70.7 | 0.62 | Biodiversity Conservation Act listing status | Effectiveness of management in controlling threats | Endangered | Endangered | False | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3722_Modified | 60.9 | 60.9 | 97.4 | Biodiversity Conservation Act listing status | Effectiveness of management in controlling threats | Endangered | Endangered | False | 2966 |
| 4080_Modified | 60.4 | 60.4 | 0.11 | Biodiversity Conservation Act listing status | Effectiveness of management in controlling threats | Endangered | Endangered | False | 3 |
| | | | | | | | | **Subtotal** | **8697** |
| ***Uvidicolus sphyrurus / Border Thick-tailed Gecko ( Fauna )*** | | | | | | | | | |
| 3722_Intact | 71.4 | 71.4 | 159.9 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Vulnerable | False | 5706 |
| 3363_Intact | 70.7 | 70.7 | 0.62 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Vulnerable | False | 22 |
| 3722_Modified | 60.9 | 60.9 | 97.4 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Vulnerable | False | 2966 |
| 4080_Modified | 60.4 | 60.4 | 0.11 | Biodiversity Conservation Act listing status | Species dependent on habitat attributes | Vulnerable | Vulnerable | False | 3 |
| | | | | | | | | **Subtotal** | **8697** |

# BAM Vegetation Zones Report

## Proposal Details

Assessment Id
00040540/BAAS19055/23/00040541

Assessment name
Taronga Tin Mine

BAM data last updated *
09/04/2026

Assessor Name
Cheryl O'Dwyer

Report Created
29/04/2026

BAM Data version *
Current classification (live - default) (94)

Assessor Number
BAAS18153

Assessment Type
Major Projects

BAM Case Status
Finalised

Assessment Revision
13

BOS entry trigger

Date Finalised
29/04/2026

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Vegetation Zones

| # | Name | PCT | Condition | Area | Minimum number of plots | Management zones |
|---|---|---|---|---|---|---|
| 1 | 3722_Intact | 3722-Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 | 6 | |
| 2 | 3722_Modified | 3722-Western New England Box-Tumbledown Gum Grassy Forest | Modified | 97.37 | 5 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 3722_Poor | 3722-Western New England Box-Tumbledown Gum Grassy Forest | Poor | 55.73 | 5 | |
| 4 | 3722_Cleared | 3722-Western New England Box-Tumbledown Gum Grassy Forest | Cleared | 0.44 | 1 | |
| 5 | 3363_Intact | 3363-Western New England Blakelys Red Gum-Box Grassy Forest | Intact | 0.62 | 1 | |
| 6 | 4080_Modified | 4080-Northwest River Oak-Apple Forest | Modified | 0.11 | 1 | |
| 7 | 3363_Poor | 3363-Western New England Blakelys Red Gum-Box Grassy Forest | Poor | 0.41 | 1 | |

# Appendix G

# Threatened Bat Habitat Suitability Assessment and Anabat Analysis (Balance Environmental)

# Habitat suitability assessment for threatened subterranean-roosting bats

## Taronga Tin Project

## Emmaville, NSW

**Report prepared for**

**GeoLINK**

**29 May 2023**

Client project reference: 4312

Balance! Environmental Job no.: 2023-07

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# 1. INTRODUCTION

## 1.1 BACKGROUND

The Taronga Tin Mine is a proposed open-pit mining operation, with associated processing plant, situated on freehold land approximately 8km NW of Emmaville, New South Wales. Ecological studies undertaken in the mine impact area have found evidence of several subterranean-roosting microbat species utilising abandoned mine adits in the hillside where the new mining operations are to be undertaken. Those adits are destined for destruction during the open-pit mine development.

## 1.2 PURPOSE

*Balance! Environmental* was engaged by GeoLINK to assess the suitability of the adits and potential natural roosting sites in the surrounding landscape for roost-use by both breeding and non-breeding bats. It is understood the purpose of the assessment is to determine the degree of impact likely to be incurred to the local subterranean-roosting bat population currently using the adits, and to ascertain the availability of suitable alternative roosting habitat in nearby potential "offset" areas.

## 1.3 TARGET SPECIES

The subterranean-roosting species of primary interest in this investigation include:

- Eastern Bent-winged Bat (EBB) – *Miniopterus orianae oceanensis*
- Eastern Cave Bat (ECB) – *Vespadelus troughtoni*
- Large-eared Pied Bat (LEPB) – *Chalinolobus dwyeri*

The EBB is of primary concern because it is the main species found roosting in the Taronga mine adits. Neither LEPB nor ECB are confirmed as being present in the study area, but both are addressed here due to their "species credit" status under the BAM. The LEPB is also listed Vulnerable under the EPBC Act.

Two other subterranean-roosting species are of interest but less critical to the purpose of this report:

- Eastern Horseshoe Bat (EHB) – *Rhinolophus megaphyllus*
- Little Bent-winged Bat (LBB) – *Miniopterus australis*)

Echolocation calls from the EHB have been recorded near adits at Taronga. The LBB has not been detected at Taronga and the chance of it occurring in the local area is remote.

## 2. APPROACH

The habitat suitability assessment for subterranean bats was based on:

- Data and information provided by GeoLINK, obtained from primary surveys (roost searches, echolocation call detection, harp-trapping, mist-netting) on the Taronga mine project area and adjoining property between December 2022 and April 2023;
- Site visit to the study area on 19-20 April 2023 by Principal Ecologist, Greg Ford, accompanied by GeoLINK personnel, to investigate known and potential roost sites and conduct targeted live-capture surveys (harp traps and mist nets); and
- Desktop review of relevant resources, including
    - LiDAR -based modelling of cliff lines in the study area, provided by GeoLINK
    - Available literature pertaining to the ecology and reproductive biology of the target species.

**Appendix 1** shows an overview of survey effort and results from the primary surveys. The spatial distribution of survey effort in the study area is shown in **Figure 1**.

## 3. ROOST USAGE BY TARGET SPECIES

Roost searches, thermal camera flyout monitoring and echolocation call detection (see **Appendix 1**) have confirmed that at least one target species, the EBB, roosts in the two southern adits (**Figure 1**). Calls from the EHB were detected near both southern adits (Balance Environmental 2023), suggesting that species also roosts in the adits. None of the other target species have been confirmed as present or using roosts in the study area; however, calls potentially belonging to the ECB were recorded during the echolocation detection surveys between 19 December 2022 and 10 January 2023 (Balance Environmental 2023).

Roost usage by, roosting habitat availability for, and the likelihood of occurrence of each target species are discussed further below.

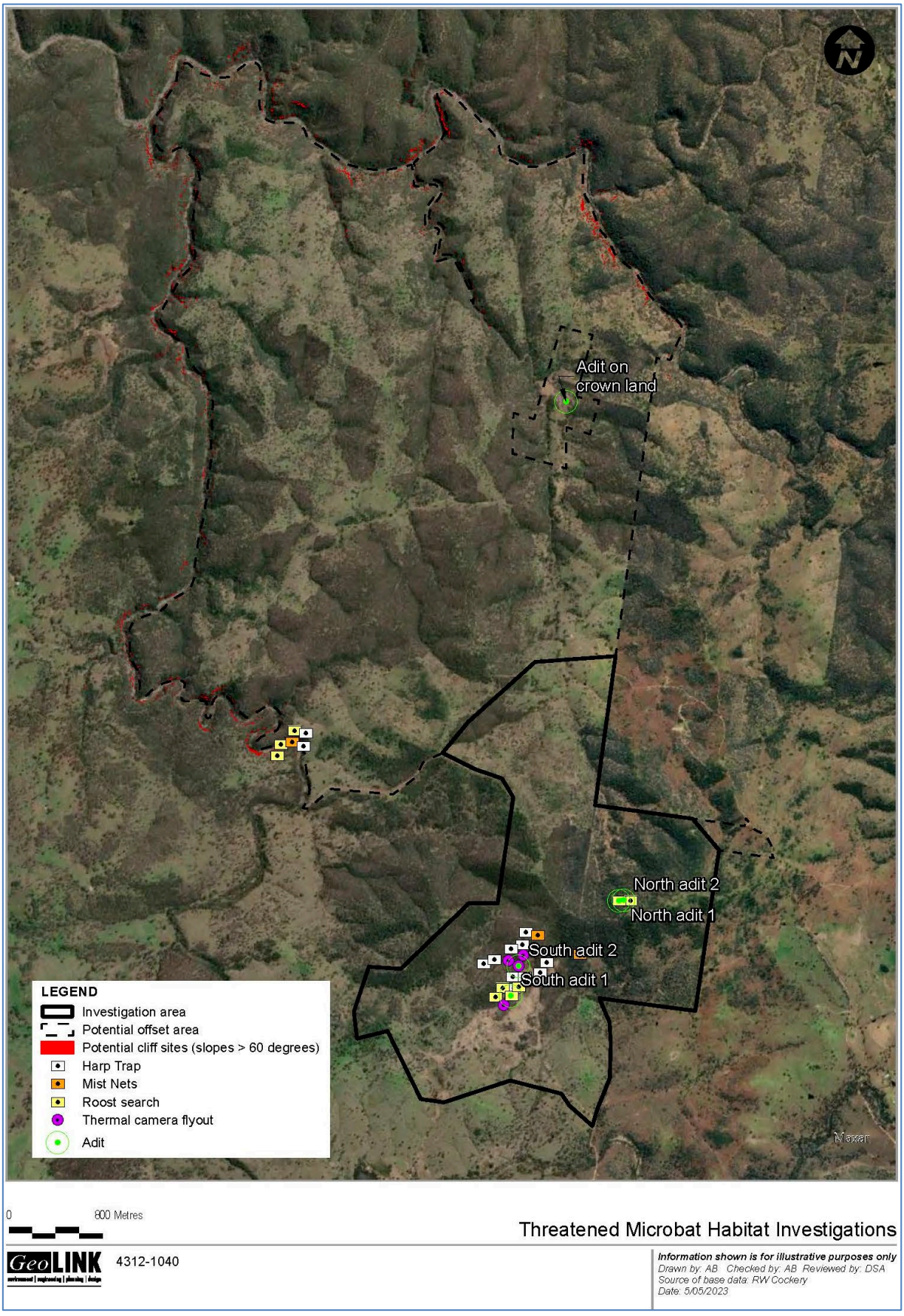


**Figure 1** Spatial distribution of survey effort for threatened subterranean-roosting bats at Taronga.

# 4. INDIVIDUAL SPECIES ASSESSMENTS

## 4.1 EASTERN BENT-WINGED BAT (EBB)

### 4.1.1 ROOST USE - ADITS

Active roost searches and monitoring during the summer maternity season (December 2022 to February 2023) discovered fewer than 20 EBB using the Taronga adits.

A post-maternity season search on 17 April 2023 discovered approximately 200 individuals in "South adit 2" but none in "South adit 1" (see **Figure 1**). Up to 60 individuals were then observed in "South adit 1" on 19 April, although it is likely these animals were a subset of the ~200 in "South adit 2", which moved from the latter adit after being disturbed by the search on 17 April.

Given the apparent increase in EBB colony size in autumn, it is possible that the Taronga adits are used as over-wintering roosts by the EBB. The species typically selects winter roosting sites with low ambient temperatures (but sheltered from outside extremes) to allow them to enter long periods of torpor and save energy when food resources are scarce (Hoye & Hall, 2008b; Dwyer, 1964). The short (~40m) adits at Taronga probably have sufficient exposure to outside weather conditions to allow the internal temperatures to drop to within the ~10-12°C range preferred by overwintering EBB (Dwyer 1964).

Dwyer (1966b) also describes "autumn transient colonies", where numbers increase temporarily as bats disperse from summer breeding sites; however, he noted that these are occupied primarily by juveniles. Since all autumn 2023 captures at "South adit 2" were deemed adults (see **Appendix 1**), it is considered unlikely this site represents an "autumn transient roost" per Dwyer's (1966b) definition.

### 4.1.2 BREEDING STATUS

The few individuals captured at the adits during summer were all non-breeding adults of both sexes (see **Appendix 1**). Furthermore, no evidence of recent breeding was observed in any of the 99 individuals (33 male, 66 female) that were captured at "South adit 2" on 17 April 2023.

It is unlikely, therefore, that the Taronga adits are used for breeding purposes by the EBB population. In addition to the absence of breeding individuals observed during this study, the physical structure of the adits does not appear to include domed ceiling features that are preferred by maternity colonies (Dwyer & Hamilton-Smith 1965).

The nearest known breeding roost is at Riverton Bat Cave, some 40km north of the Taronga site. Based on Dwyer's (1963, 1969) seminal research into EBB breeding and population biology, the EBB colonies that occupy roosts at Taronga form part of a regional metapopulation that breeds at Riverton and disperses widely over the New England and North-western Slopes regions and into the upper Clarence Valley (see **Figure 2**).

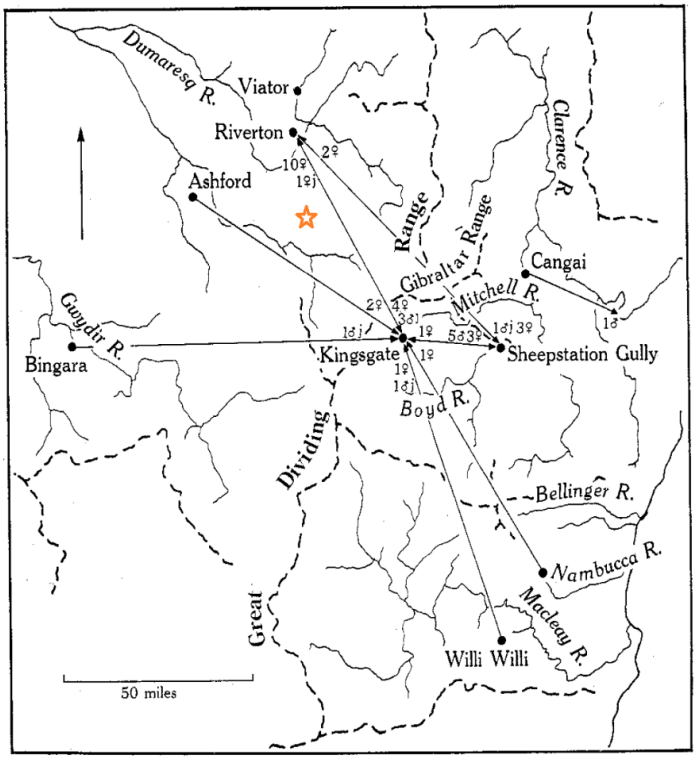


**Figure 2** Movement of Eastern Bent-winged Bats in relation to the Riverton breeding cave and other roost sites in northern New South Wales (reproduced from Dwyer, 1969; Fig. 2).
Orange star denotes approximate location of Taronga Tin Mine.

### 4.1.3 ALTERNATIVE ROOSTS

No suitable "man-made" alternative roost sites were observed during the present study, but given the mining history of the Emmaville area, it is probable that several additional adits occur within 10km of the impact zone (e.g., note the "adit on Crown land" shown on **Figure 1**).

Potential natural roost sites in the immediate vicinity consist largely of cracks and fault-cavities (e.g., see descriptions in **Appendix 1**) in low cliffs and rocky outcrops, principally adjacent to Vegetable Creek and the Beardy River, on the western and northern boundaries, respectively, of the study area (see **Figure 1**). None of the natural roost cavities investigated during the present study were occupied, or showed signs of occupation by bats, so the likelihood of them being suitable alternative roosts for EBB is inconclusive.

### 4.1.4 CONSEQUENCE OF ROOST LOSS

Destruction of the adits during open-pit development at Taronga mine will result in complete loss of those roosting sites; however, the impact on the local (and broader regional) EBB population is likely to be minor because:

- The Taronga adits are not used for maternity purposes, so breeding success is unlikely to be affected.
- There are likely to be other adits in the Emmaville area that offer similar roosting opportunities for non-breeding individuals.
- The ~200 individuals roosting in "South adit 2" during the autumn 2023 surveys probably represents only a small proportion of the total regional population. Even if upwards of 1000 individuals overwinter at Taronga (which seems unlikely but needs confirmation through further investigation), that number would likely represent no more than 1% of the regional population, based on the known maternity colony size of >30,000 breeding females that occupies Riverton Bat Cave each summer (G. Ford per. obs.).

## 4.2 EASTERN CAVE BAT (ECB)

### 4.2.1 ROOST SUITABILITY AND POTENTIAL FOR OCCURRENCE

The ECB typically roosts in well-lit areas in caves and overhangs (usually in sandstone, limestone and volcanic substrates), mine tunnels, culverts, bridges and buildings (Parnaby *et al.*, 2008). Within natural caves and overhangs, roosting bats are often found within small domes or pockets in the ceiling (G. Ford, pers. obs.). Maternity colonies of up to 500 adult females form in summer (Parnaby *et al.*, 2008). These breeding roosts may be in domes in the roofs of large, thermally-stable caves, but shift regularly and may include occupation of much warmer and less stable sites such as shed roofs (Law *et al.*, 2005). Law & Chidel (2007) postulated that maternal roosts in these hotter man-made sites may aid lactation, while (citing Kunz & Hood 2000) they suggest juvenile growth is probably improved by selecting more stable cave-based roosts. Based on these findings, it appears that a diverse range of roost environments in the breeding bats' home range is probably an important factor in the suitability of an area for occupation by ECB.

It is likely the Taronga adits provide suitable roosting habitat for ECB, although they are perhaps unsuitable for ECB maternity colonies since they may not provide dome-like roof cavities. Natural roosts appear scarce in the immediate vicinity of the Taronga adits and mine impact area; however, a range of fissures, cracks and fault-cavities are available in low cliffs and rocky outcrops along the Vegetable Creek gorge, about 3km north-west of the adits (see **Figure 1**). The proximity of these features to the Creek and associated riparian vegetation perhaps make this area more suitable to ECB than the drier, elevated hillsides around the mine impact area, due to their apparent preference for foraging along creek-lines (Law *et al.* 2005). It should be noted, however, that trapping and netting in the Vegetable Creek Gorge during April 2023 failed to capture any ECB.

The apparent absence of ECB from the Taronga study area is perhaps reflective of an apparent absence, indicated by Atlas of Living Australia records, from a broader region running to the south and south-east of the Emmaville area (see **Figure 3**). This could be related to a lack of suitable natural roosting sites due to local geology, although there are several records from the Mole River area, west of Tenterfield and north of the Torrington State Conservation Area, which has similar underlying geology and topography to that in the Taronga area. Several ECB records occur along the Severn River corridor, south-west of Strathbogie Station, and only about 12km from Taronga, but the geology there is volcanic,

rather than sedimentary, and the cliff lines adjacent to the river appear much more substantial than those along Vegetable Creek when viewed in available imagery on Google Earth. As such, it is likely the Severn River corridor provides significantly more roosting opportunities for ECB than Vegetable Creek and the Taronga area.

Based on the above observations, it is considered unlikely that the ECB roosts in the Taronga adits except, perhaps, on a transient basis. Furthermore, the drier, elevated woodlands in the mine area probably offer only marginal foraging habitat, compared with the more mesic environment of nearby riparian zones.

### 4.2.2 ABSENCE BASED ON SURVEY RESULTS

No ECB were observed roosting in the Taronga adits during summer and autumn investigations; and none were captured in harp traps deployed at the adits nor in harp traps and mist nets deployed in flyways through potential woodland foraging areas on the surrounding slopes.

Ultrasonic detectors placed near the adits between 19 December 2022 and 10 January 2023 recorded several echolocation calls that may have been from ECB (Balance Environmental 2023); however, a subsequent review of those calls (whilst preparing this report) found that most are from the Chocolate Wattled Bat (*Chalinolobus morio*; CWB). The few calls that remain unresolved also very likely belong to the CWB.

Both CWB and the Little Forest Bat (*Vespadelus vulturnus*; LFB), which also makes calls that could be confused with those of ECB, were captured in harp traps deployed in April 2023, and this further supports the contention that none of the echolocation calls detected in the summer survey belonged to ECB.

Observations of free-flying bats whilst using a hand-held detector on the night of 19 April 2023 (G. Ford, pers. obs.) confirmed only CWB and LFB were responsible for calls detected in the relevant frequency range (~47-53 kHz). Reference calls, recorded when captured individuals were released, further confirmed the identities of species (i.e. CWB and LFB) responsible for calls detected in December-January survey and by hand-held detection in April.

Based on the outcomes of these survey results, it seems the ECB was not present in the Taronga mine study area between December 2022 and April 2023.

### 4.2.3 CONSEQUENCE OF ROOST LOSS

Since it appears the ECB does not roost in the Taronga adits, it is unlikely the destruction of the adits will pose a significant risk to the local ECB population.

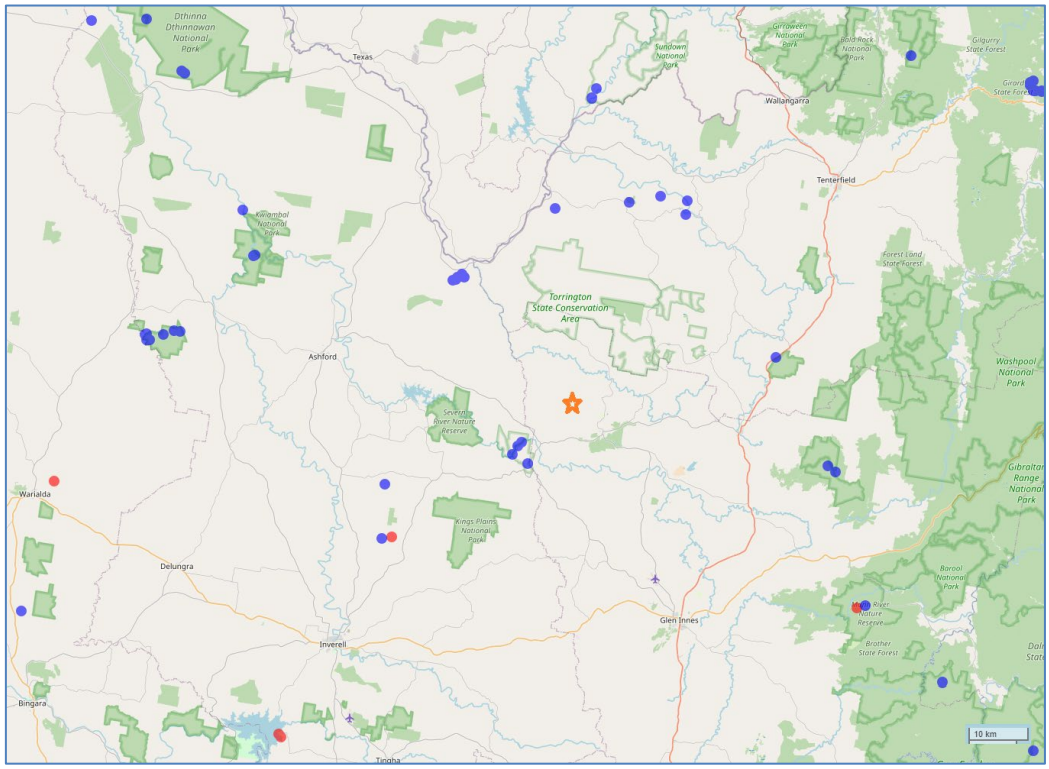


**Figure 3** Northern New England and Northern Slopes records of Eastern Cave Bat (blue dots) and Large-eared Pied Bat (red dots). Orange star indicates approximate location of the Taronga Tin Mine. Source: Atlas of Living Australia (https://spatial.ala.org.au/)

## 4.3 LARGE-EARED PIED BAT (LEPB)

### 4.3.1 ROOST SUITABILITY AND POTENTIAL FOR OCCURRENCE

Roost habitat requirements of the LEPB are very similar to those of the ECB, whereby it roosts mainly in the "twilight zone" of caves and overhangs, primarily in sandstone and volcanic escarpments, but also utilises abandoned mines (Hoye & Schulz, 2008; Department of Environment & Resource Management, 2011). It forms small (<50) maternity colonies in summer, with breeding roosts established deep inside abandoned tunnels (Dwyer 1966a) or in domed roof cavities of climatically stable natural caves (Pennay 2008). In the western Blue Mountains of NSW, LEPB typically roosts in west-facing cliffs and forages in woodlands on nearby foot-slopes and valley floors, mostly within 700m (up to ~2km) of those roosts (Williams & Thomson 2019).

The Taronga adits potentially offer roosting habitat for LEPB, although their southerly aspect may preclude suitability. In contrast, the cliffs and rock outcrops in the Vegetable Creek area include a range of potentially suitable roost cavities, many of which offer a westerly aspect. However, the local geology seems to offer little in terms of larger caves and overhangs, so there may be insufficient roost diversity in the local landscape to sustain a LEPB population.

Based on publicly available records (Atlas of Living Australia; see **Figure 3**), the LEPB does not appear to occur in the northern New England district. The nearest known records are approximately 40km south-south-west and 60km south-east of the Taronga study area. This apparent regional absence is probably reflective of the poor availability of suitable roosting habitat for the LEPB.

### 4.3.2 ABSENCE BASED ON SURVEY RESULTS

The LEPB was not detected in the Taronga mine study area between December 2022 and April 2023.

No LEPB were observed roosting in the Taronga adits during summer and autumn investigations; and none were captured in harp traps deployed at the adits nor in harp traps and mist nets deployed in flyways through potential woodland foraging areas on the surrounding slopes.

Ultrasonic detectors placed near the adits between 19 December 2022 and 10 January 2023 also failed to record any calls from the LEPB. Similarly, no calls were detected during mobile (hand-held) detector surveys on 19 April 2023 and there was no evidence of the species being present in any of the natural roosts that were investigated along Vegetable Creek.

### 4.3.3 CONSEQUENCE OF ROOST LOSS

Since it appears the LEPB does not roost in the Taronga adits, and probably does not occur in the study area, the destruction of the adits is unlikely to impact the LEPB population.

## 4.4 EASTERN HORSESHOE BAT (EHB)

### 4.4.1 ROOST USE - ADITS

The EHB generally roosts in complete darkness (Churchill 2008) and is a common inhabitant of tunnels, culverts, disused mines, and natural caves and boulder piles (Pavey & Young, 2008). They have specialist requirements for breeding caves, with maternity colonies generally occupying caves with very high (85-95%) humidity and little air circulation (Churchill 2008).

More than 400 EHB calls were recorded by detectors deployed near the two south adits (see **Figure 1**) between 19 December 2022 and 10 January 2023 (Balance Environmental 2023). Time-stamps on the EHB calls indicated a significant peak in detection rate (>50% of detected calls) in the first 45 minutes of recording, waning to only a few calls detected through the middle of the night, and then a minor activity peak in the two hours before dawn (**Figure 4**). This call-detection pattern clearly indicates the EHB were emerging from the adits after sunset and returning to roost there the following morning.

### 4.4.2 BREEDING STATUS

It is unlikely the adits provide the thermal and humidity conditions required by maternity colonies, so the bats roosting at Taronga are likely non-breeding individuals. As with the EBB, it is possible that the adits provide suitable overwintering roost habitat, but the presence of EHB in the adits during the colder months would need to be confirmed by additional surveys.

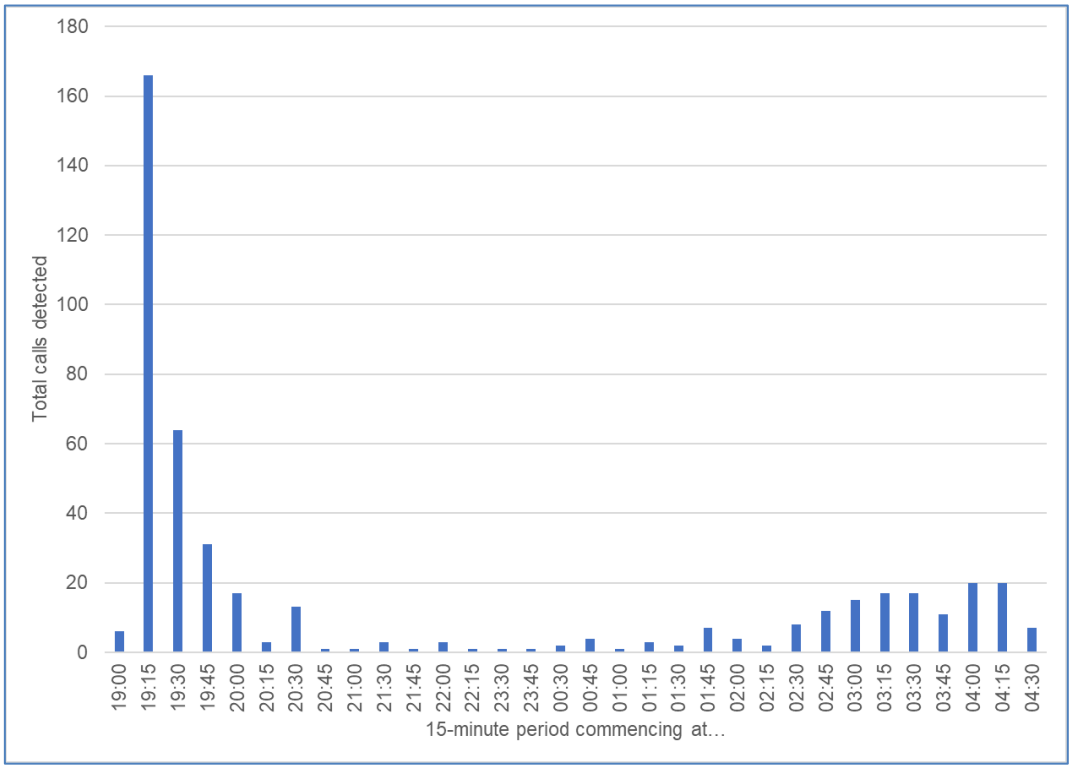


**Figure 4** Timing of Eastern Horseshoe Bat call detections during the Anabat deployment from 19 December 2022 – 10 January 2023. Aggregate call count across all detector-nights.

### 4.4.3 ALTERNATIVE ROOSTS

Given the mining history of the Emmaville area, it is probable that several additional adits occur within 10km of the Taronga adits, which may provide suitable roosting habitat for EHB (e.g., note the "adit on Crown land" shown on **Figure 1**). Cracks, fissures and fault cavities in the cliffs and rock outcrops associated with the Vegetable Creek gorge (see **Figure 1**) may also offer suitable EHB roosting sites.

### 4.4.4 CONSEQUENCE OF ROOST LOSS

Destruction of the adits during open-pit development at Taronga mine will result in complete loss of those roosting sites; however, the impact on the local (and broader regional) EHB population is likely to be minor because:

- The Taronga adits are not used for maternity purposes, so breeding success is unlikely to be affected.
- There are likely to be other adits in the Emmaville area that offer similar roosting opportunities for non-breeding individuals.
- It is likely that only a few individuals roost at Taronga, and these bats would represent a small proportion of the local/regional population of the species.

## 4.5 LITTLE BENT-WINGED BAT (LBB)

In its northern NSW range, the LBB occurs primarily on the coast and eastern fall of the Great Dividing Range. It is virtually absent from the Northern Slopes region, save for a couple of records in the Tenterfield district and one near Tingha (see **Figure 5**). The species is known to roost in caves, tunnels, abandoned mines and stormwater drains (Hoye & Hall, 2008a), so it is possible that the Taronga adits provide suitable habitat for non-breeding individuals. However, given its preference for "well timbered areas" (Churchill, 2008), in mesic habitats on and east of the ranges, it is considered highly improbable that the LBB would occur at Taronga, other than perhaps occasional transient individuals.

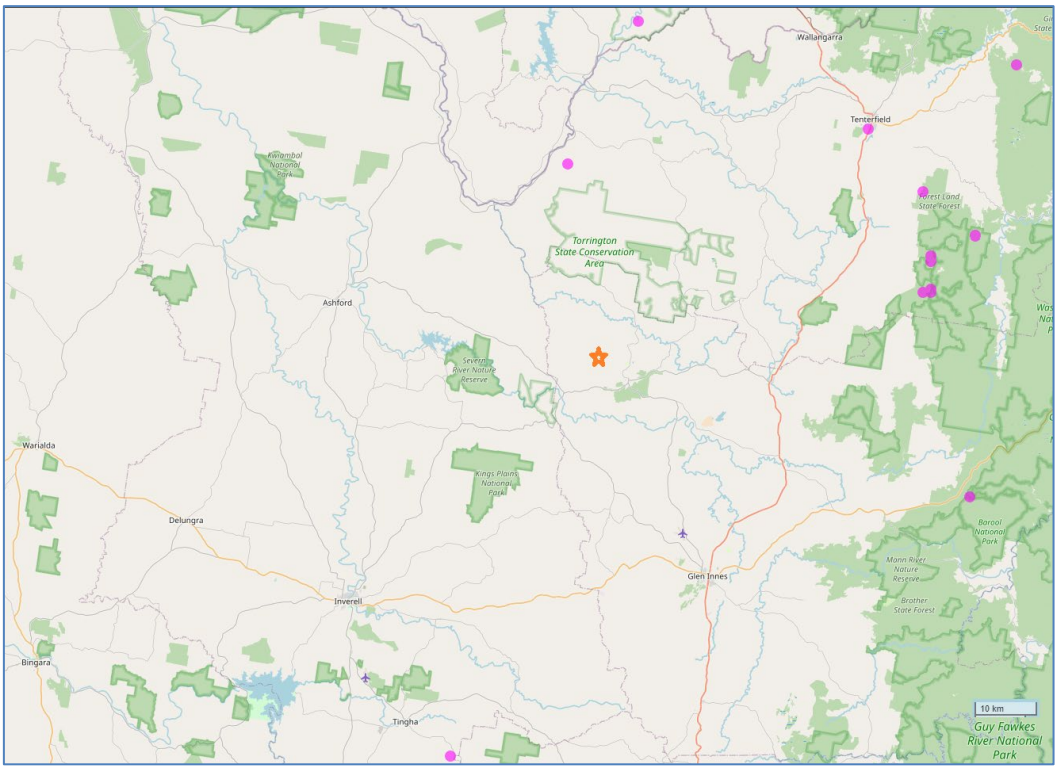


**Figure 5** Northern New England and Northern Slopes records of Little Bent-winged Bat. Orange star indicates approximate location of the Taronga Tin Mine. Source: Atlas of Living Australia (https://spatial.ala.org.au/)

# 5. SUMMARY

The two south adits at Taronga mine clearly provide habitat for two subterranean-roosting bat species – Eastern Bent-winged Bat (EBB) and Eastern Horseshoe Bat (EHB) – but it appears the adits are not inhabited by Large-eared Pied Bat (LEPB), Eastern Cave Bat (ECB) or Little Bent-winged Bat (LBB). Bats utilising the adits are likely to all be non-breeding individuals, as was the case with all EBB captured during the autumn 2023 surveys. Furthermore, it is considered unlikely the adits would provide a suitable microclimate for the formation of a maternity colony by any of the above-named species.

The significance of the adit roosts to the local and broader regional populations of EBB and EHB is unknown, but it is possible they offer overwintering habitat for both species and/or a transient roost for individuals moving to and from maternity colonies. Additional seasonal surveys would be required to gain a better understanding of the patterns of roost use, numbers of bats present, population demographics and potential importance of the site for both species.

Destruction of the adits during the development of the Taronga Tin Mine open-pit operation would constitute a permanent loss of roosting habitat to the two species that currently roost there. It is unlikely this loss would constitute a significant impact on either EBB or EHB, but it would be desirable to obtain further data, as mentioned above, to make a reliable determination of impact.

Direct impacts on individual roosting bats in the adits should be avoidable with careful planning of adit destruction and the implementation of suitable avoidance and mitigation measures. Adit demolition should be timed to occur when the roosting bat population is lowest, and a bat eviction and exclusion program should be implemented prior to commencement of any works that will disturb/destroy the adits.

# 6. RECOMMENDATIONS

To minimise impacts to the EBB and EHB due to adit destruction for the open-pit operation, it is recommended the following steps be undertaken:

- Conduct further seasonal surveys – notably winter and spring – to determine presence and numbers of EBB and EHB using the adits. Ideally this would include live capture to determine population demographics.
- Undertake a more thorough assessment of the availability of alternative roost sites for EBB and EHB within the local area (i.e. within 10-20km of the Taronga adits).
- Develop a bat management and mitigation plan that includes the following key components
    - A more detailed description of the pattern of roost usage by EBB and EHB and an evaluation of the significance of the population in the regional context.
    - An informational/education program to ensure First Tin staff and contractors are aware of the presence and conservation significance of the bats in the adits.
    - A bat eviction and exclusion plan to ensure no bats are present in the adits should the demolition of the adits proceed.
    - A bat monitoring program to determine the fate of bats evicted from the Taronga adits (e.g. population monitoring at nearby adits and/or mark-recapture and/or radio-telemetry of individuals to determine where they go once Taronga adits are no longer available)

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**Appendix 1** Summary of subterranean bat survey effort in the Taronga Tin Mine project area (provided by GeoLINK).

| Date | Location | Easting | Northing | Method | Results | Comments |
|---|---|---|---|---|---|---|
| 10/01/2023 | North Adit 1 | 359418 | 6748346.71 | Roost search | Not inspected. Active geological sample site. | |
| 10/01/2023 | North Adit 2 | 359457 | 6748348.23 | Roost search | Entrance completely blocked preventing access to microbats | |
| 19/12/2022-10/01/2023 | South Adit 1 | 358504 | 6747527.98 | Anabat survey, set approximately 10 m in front of adit entrance. | See Balance! Environmental report GEO-2301, dated 23 March 2023. | |
| 10/01/2023 | South Adit 1 | 358497 | 6747530.38 | Diurnal roost search. Thermal camera flyout (8.15-9pm) | No bats. Evidence of moderate to high usage indicated by guano, staining and bat bugs. | Survey time: 8.15-9pm |
| 6/02/2023 | South Adit 1 | 358502 | 6747536.66 | Diurnal roost search. | No bats, evidence as previously recorded. | Direct torch search. |
| 16/04/2023 | South Adit 1 | 358491 | 6747534.23 | Diurnal roost search. | No bats, evidence as previously recorded. | |
| 19/04/2023 | South Adit 1 | 358493 | 6747534.94 | Diurnal roost search. | Approx 40 to 60 Eastern Bent-winged Bats (*Miniopterus orianae oceanensis*), evidence as previously recorded. Likely to have switch from South Adit 2 as a result of disturbance from previous harp trapping. | |
| 19/12/2022-10/01/2023 | South Adit 2 | 358572 | 6747789.91 | Anabat survey, set approximately 10 m in front of adit entrance. | See Balance! Environmental report GEO-2301, dated 23 March 2023. | |
| 10/01/2023 | South Adit 2 | 358562 | 6747786.84 | Thermal camera flyout (8.15-9pm) Harp Trap | 2 Eastern Bent-winged Bats (*Miniopterus orianae oceanensis*) (harp trapping and inspection confirmed species); 1 male captured in harp trap. | |
| 7/02/2023 | South Adit 2 | 358559 | 6747788.36 | Thermal camera flyout Harp Trap | 15 Eastern Bent-winged Bats (*Miniopterus orianae oceanensis*) (2 male EBB caught in harp trap) | |
| 8/02/2023 | South Adit 2 | 358561 | 6747791.75 | Thermal camera flyout Harp Trap | 6 Eastern Bent-winged Bats (*Miniopterus orianae oceanensis*) (1 male and 1 female nonbreeding EBB caught in harp trap) | |
| 17/04/2023 | South Adit 2 | 358562 | 6747778.77 | Harp Trap | Approx. 200 Eastern Bent-winged Bats (*Miniopterus orianae oceanensis*); 99 caught in harp (33 male and 66 female; all adults; no evidence of recent breeding) | |
| 17/04/2023 | South pit locality | 358594 | 6747972.75 | Harp Trap | 1 Chocolate Wattle Bat (*Chalinolobus morio;* female non breeding,8g, Fa38mm. | double trap, 1 trap fallen down in morning, |
| 17/04/2023 | South pit locality | 358800 | 6747818.59 | Harp Trap | Nil | |
| 17/04/2023 | South pit locality | 358727 | 6748051.36 | Mist Nets | Nil | |
| 17/04/2023 | South pit locality | 358782 | 6747789.18 | Harp Trap | Nil | |
| 17/04/2023 | Vegetable Creek gorge (potential offset area) | 356573 | 6749678.29 | Roost search | Nil bats or evidence | Fault cavity 4m long by 0.3m wide and 6m high roof. |
| 17/04/2023 | Vegetable Creek gorge (potential offset area) | 356605 | 6749698.61 | Roost search | Nil bats or evidence | Fault cavity 3m long by 0.2m wide and 3m high roof. |
| 18/04/2023 | Vegetable Creek gorge (potential offset area) | 356613 | 6749719.15 | Roost search | Nil bats or evidence | Fault cavity 12m long by 2m wide and 5m high roof. |
| 18-19/04/2023 | South pit locality | 358313 | 6747828.58 | Harp Trap | 19/4 AM - nil, 20/4 AM - nil | Two trap nights |

| Date | Location | Easting | Northing | Method | Results | Comments |
|---|---|---|---|---|---|---|
| 18-19/04/2023 | South pit locality | 358356 | 6747845.37 | Harp Trap | 19/4 PM - 2 Little Forest Bat (*Vespadelus vulturnus*; 1male Fa29.4,4.5g; 1female Fa30.5, 3.2g not post lactation).<br>20/4 AM - nil | Two trap nights |
| 18-19/04/2023 | South pit locality | 358625 | 6748078.9 | Harp Trap | 19/4 AM - nil.<br>20/4 AM - 1 Little Forest Bat (*Vespadelus vulturnus*; male non breeding Fa 28). | Two trap nights |
| 18-19/04/2023 | Vegetable Creek gorge (potential offset area) | 356630 | 6749703.43 | Mist Nets | Nil | 9 m mist net. Two trap nights |
| 18-19/04/2023 | Vegetable Creek gorge (potential offset area) | 356672 | 6749687.65 | Harp Trap | 19/4 AM - nil | Anabat chorus also set up; two trap nights. |
| 18-19/04/2023 | Vegetable Creek gorge (potential offset area) | 356675 | 6749711.22 | Harp Trap | 18/4 – 1 Lesser Long-eared Bat (*Nyctophilus geoffroyi;* adult male non-breeding); 1 Little Forest Bat (*Vespadelus vulturnus*; adult male non breeding). | Two trap nights |
| 19/04/2023 | South pit locality | 358899 | 6747910.75 | Harp Trap | 19/4: 3 Little Forest Bat (*Vespadelus vulturnus*; adult male non-breeding).<br>20/4: 1 Lesser Long-eared Bat (*Nyctophilus geoffroyi;* epididymides swollen fa37.3 w6.5). 1 Chocolate Wattle Bat (*Chalinolobus morio*; male fa37.8 w6g non breeding). | Double trap |
| 19/04/2023 | South pit locality | 359084 | 6747890.13 | Mist Nets | No captures. | 6 m mist net along access road flyway. |
| 19-20/04/2023 | Vegetable Creek gorge and Beardy River gorge (potential offset area) | - | - | Microbat roost suitability assessment. | Discussed in this report. | Gorges inspected at several locations targeting steep banked areas. |

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# Appendix H

# Border Thick-tailed Gecko Assessment – Taronga Mine (Faunaverse)

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To: David Andrighetto
Geolink
PO Box 119
Lennox Head NSW 2478

4/5/2023

Dear David

Please find attached my report on the Border Thick-tailed Gecko at the Taronga Mine Project at Emmaville NSW:

# The Border Thick-tailed Gecko, *Uvidicolus sphyrurus* at the Taronga Mine Lease Emmaville

**Alexander Dudley**
**A.P and J.F Dudley T/A Faunaverse**
**24 Warialda Rd**
**Coolatai NSW**
Report prepared for Geolink May 2023

## Author credentials

The author is a consultant zoologist based on the north-west slopes of NSW with a specialty in herpetology. He has over 30 years of conducting fauna surveys and has to date found over 50 specimens of Border Thick-tailed Geckos through spotlighting and active searching, including looking under logs, ground debris and rocks. The great majority of these lizards were found by spotlighting. The author has a comprehensive understanding of the habitat requirements and ecology of the Border Thick-tailed Gecko. He is recognised as a Border Thick-tailed Gecko specialist by herpetology experts such as Glenn Shea (Sydney University).

# Border Thick-tailed Gecko

The Border Thick-tailed Gecko *Uvidicolus sphyrurus* was originally described by J.D. Ogilby 1892 as *Gymnodactylus sphyrurus* in *Records of the Australian Museum* **2**:6-11 [6] "Descriptions of three new Australian lizards" from "the interior of NSW". In 2011 it was split from *Underwoodisaurus* and placed into its own genus. It is a medium-sized ground-dwelling clawed gecko from the family Carphodactylidae, a family which includes the Australian Leaf-tailed and Knob-tailed Geckos. It is generally fawn with transverse bands made up of rows of pale tubercles. Original tails of the species are roughly rectangular, banded dorsally black and white covered with tubercles and with a blunt tip. Regenerated tails are brown, rounded at the end, usually with darker faint streaks and relatively smooth. Females grow larger than males, reaching 10cm from snout to base of tail, while males usually are about 7cm from snout to vent.

The Border Thick-tailed Gecko is listed as vulnerable under both state and Federal legislation.

Juvenile Border Thick-tailed Gecko from the Taronga site.

# Habitat requirements

This species appears to reach its highest densities in areas with fairly dense tree canopies with an open understorey over rocky ground including crevices, slabs, leaf litter and heavy woody debris. It is likely that heavy woody debris has become a more important component of this species' habitat as feral pigs have learned to flip rocks and logs while foraging for sleeping or torpid reptiles. During the day Border Thick-tailed Geckos shelter in hollow logs, crevices in logs, beneath log fragments, rocks or in crevices between embedded rocks. In the evening these geckos emerge and will actively forage in open areas or ambush prey from an elevated position on rocks and logs in areas where the lizards have an increased visual field. As this species is a terrestrial predator hunting by sight, relatively open ground is important for these geckos to locate prey. Surveys in Torrington SRA following severe drought and fires demonstrate this species can persists through severe stochastic events if microbabitat elements suitable for shelter are retained.

# Taronga Project Site

The Taronga project site contains  low, medium and high quality habitat for this species including PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest and PCT 4151 Northwest White Pine-Silver-leaved Ironbark Forest, comprising open and closed closed to open forest over rocky metasediment outcrops and large woody debris with open understorey and areas of deep leaf litter. In many areas historical disturbance including mining activities, tree-clearing, grazing and the introduction of weeds such as Coolatai grass has reduced the habitat quality through reducing the visual field of the gecko or by removing cover, increasing the risk of predation and loss of thermal buffer provided by tree cover after nightfall, reducing foraging time. While the Border Thick-tailed Geckos are unlikely to be at detectable densities in areas of degraded habitat, it is likely that they would disperse through them from time to time. Only the lowest quality of habitat (marked on the map) is likely to be avoided by the species at all times.

## Survey Methods and Results

A targeted survey was undertaken by the author with a Geolink staff member from 17- 19 April 2023 (see attached map).

General habitat assessment was carried out from vehicle tracks and through the use of aerial photography and areas that provided safe accessibility and the highest chance of success were targeted for spotlighting.

Spotlighting was undertaken on foot using a modified Wolf-eyes Lunar red LED head torch set on the ML (medium low) setting with a beam width of approximately 20°. Spotlight surveys were undertaken from 17:55 to 22:30 at temperatures between 23-14.5°C on the evening of the 17th and 21-13°C on the evening of the 18th. A total of 65 geckos were found through spotlighting during this survey, of which five were Border Thick-tailed Geckos. Other gecko species recorded included Eastern Stone Gecko *Diplodactylus vittatus* (25), Dubious Dtella *Gehyra dubia* (15), Southern Spotted Velvet Gecko *Oedura tryoni* (14), and Prickly Gecko *Heteronotia binoei* (7).

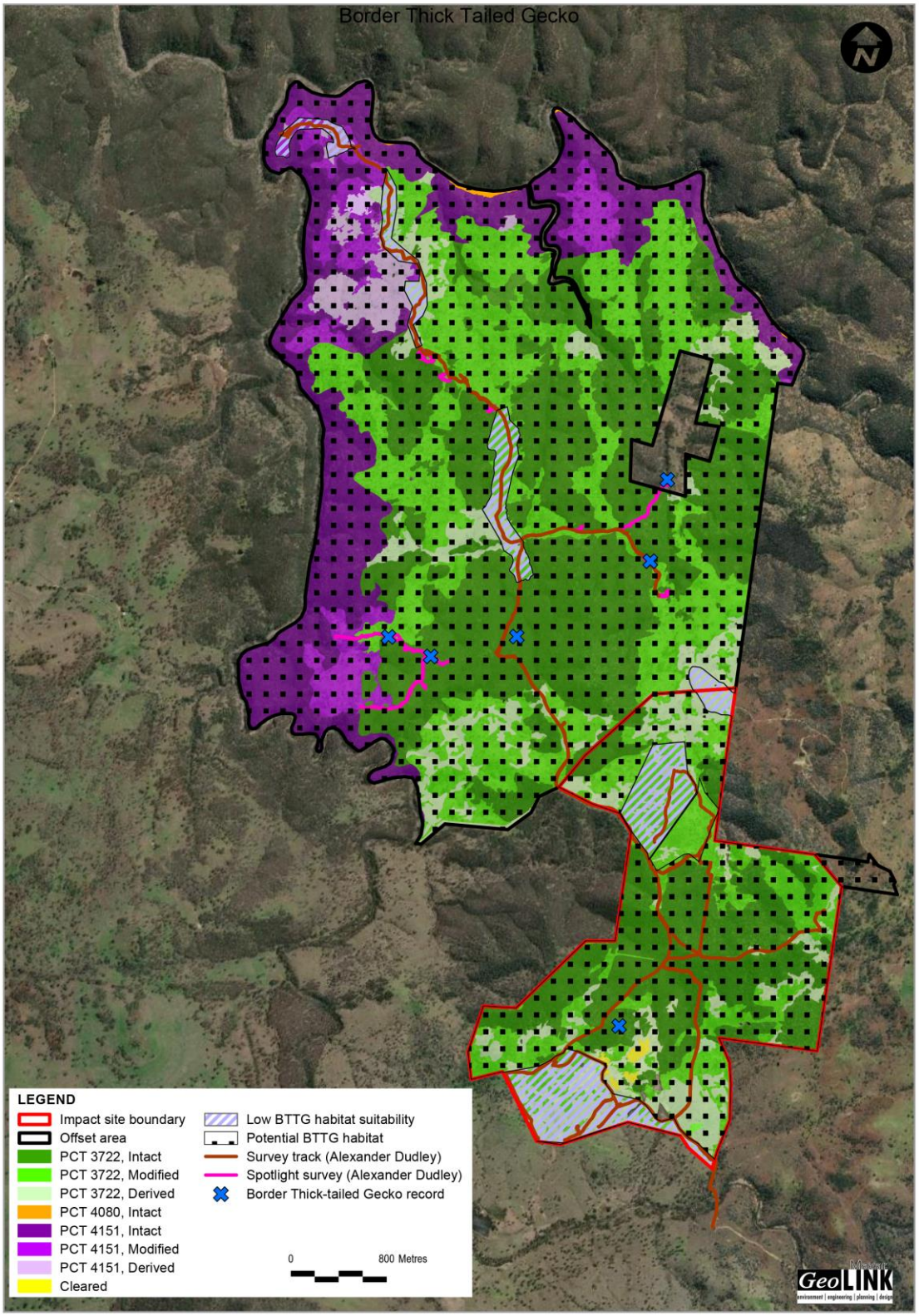
# Recommendations

It is recommended that:

- The project prioritises avoidance of 'intact' condition vegetation in the first instance then 'modified' condition vegetation as this provides the core habitat for the Border Thick-tailed Gecko on site (refer to map below).
- Any potential Border Thick-tailed Gecko habitat areas not impacted by the proposal on the impact site are protected and receive appropriate pest and weed management during the mine establishment, operation and post operation phases. These areas will act as refuges for the species to enable potential future recolonisation of the mine site post operation and rehabilitation.
- The project includes pre and during clearing phase protocols to capture Border Thick-tailed Geckos (along with other native fauna) and relocate fauna outside of the clearing area. Receiving sites would be pre planned given consideration to direct and indirect impact risk, likely carrying capacity, proximity to capture site and maximising the survival chances of the released animals.  The pre clearing phase should involve staff trained in spotlighting geckos to look for animals over at least four nights while air temperatures are above 19°C collecting and removing Border Thick-tailed Geckos. Collected lizards should be moved to areas where large woody debris has been scattered to increase the likelihood of recolonisation. Putting animals into high quality habitat is likely to apply population pressure to those already there and may be counterproductive. Creating and maintaining corridors of large woody debris collected from

mining operations between high quality habitat and areas to be rehabilitated (especially where this resource is presently limited) will increase the species' chances of successfully recolonising following cessation of mining operations. A ban on firewood collecting in these areas may well be necessary for this to occur.

- Management of the offset site includes an ongoing feral animal control program, including control of pigs, cats, foxes, deer and goats. Such a program would not only benefit the vulnerable Border Thick-tailed Gecko, but many other animal and plant species on the Taronga mining project. Control of Coolatai Grass (*Hyparrhenia hirta*) would also reduce the spread of fire into areas of high conservation significance.


Border Thick Tailed Gecko
LEGEND
Impact site boundary
Offset area
PCT 3722, Intact
PCT 3722, Modified
PCT 3722, Derived
PCT 4080, Intact
PCT 4151, Intact
PCT 4151, Modified
PCT 4151, Derived
Cleared
Low BTTG habitat suitability
Potential BTTG habitat
Survey track (Alexander Dudley)
Spotlight survey (Alexander Dudley)
Border Thick-tailed Gecko record
0
800 Metres
GeoLINK

# Appendix I

# EPBC Assessments of Significance

# 1. Introduction

The purpose of the *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (MNES Significant Impact Guidelines) is to assist any person who proposes to take an action (a project, a development, an undertaking, an activity or a series of activities) to decide whether or not they should submit a referral to the Australian Government Department of the Environment (the Department) for a decision by the Australian Government Environment Minister (the Minister) on whether assessment and approval is required under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The purpose of the significant impact assessments is to inform an EPBC Referral to the Department to assess the Proposal's eligibility as a controlled action under the EPBC Act. Under the EPBC Act an action will require approval from the Minister if the action has, will have, or is likely to have, a significant impact on an MNES.

Tests of significance have been conducted for threatened species and communities that were recorded in the Project Site during field surveys or were identified as having a moderate or higher potential to occur in the Project Site based on the presence of habitat. For threatened biodiversity listed under the EPBC Act, significance assessments have been completed following the Significant Impact Guidelines.

## 1.1 What is a significant impact?

The Significant Impact Guidelines state that a 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

## 1.2 When is a significant impact likely?

For a significant impact to be 'likely', it is not necessary for a significant impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility. If there is scientific uncertainty about the impacts of an action and potential impacts are serious or irreversible, the precautionary principle is applicable. Accordingly, a lack of scientific certainty about the potential impacts of an action will not itself justify a decision that the action is not likely to have a significant impact on the environment.

## 1.3 Significant Impact Guidelines Definitions

The Significant Impact Guidelines provide definitions for specific terms used throughout the significant impact assessment criteria contained in the Significant Impact Guidelines as follows:

- population of a species
- important population
- habitat critical to the survival of a species or ecological community
- important habitat for migratory species
- ecologically significant proportion (migratory species)
- population of a migratory species
- invasive species.

These definitions are key considerations when conducting a significant impact assessment for threatened and migratory species listed under the EPBC Act. The definition for each is presented below.

### 1.3.1 Population of a species

A '*population of a species'* is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- a geographically distinct regional population, or collection of local populations, or
- a population, or collection of local populations, that occurs within a particular bioregion.

### 1.3.2 Important population

An '*important population*' is defined by the Significant Impact Guidelines as" a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

### 1.3.3 Habitat critical to the survival of a species or ecological community

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.

### 1.3.4 Important habitat for migratory species

An area of 'important habitat' for a migratory species is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- habitat that is of critical importance to the species at particular life-cycle stages, and/or
- habitat utilised by a migratory species which is at the limit of the species range, and/or
- habitat within an area where the species is declining.

### 1.3.5 Ecologically significant proportion (migratory species)

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species-specific behavioural patterns (for example, site fidelity and dispersal rates).

**Population of a migratory species**

'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.

### 1.3.6 Invasive species

An 'invasive species' is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources, or which is a predator of native species. Introducing an invasive species into an area may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.

## 1.4 Threatened species and communities subject to assessment

For threatened biodiversity listed under the EPBC Act, significant impact assessments have been completed in accordance with MNES Significant Impact Guidelines. These significance assessments have been prepared for the following threatened species:

- **Flora**:
  - Velvet Wattle (*Acacia pubifolia*) listed as Vulnerable under the EPBC Act
  - Bluegrass (*Dichanthium setosum*) listed as Vulnerable under the EPBC Act
- **Birds**:
  - Regent Honeyeater (*Anthochaera phrygia*) listed as Critically Endangered under the EPBC Act.
  - Southern Whiteface (*Aphelocephala leucopsis*) listed as Vulnerable under the EPBC Act
  - Brown Treecreeper (*Climacteris picumnus victoriae*) listed as Vulnerable under the EPBC Act
  - Painted Honeyeater (*Grantiella picta*) listed as Vulnerable under the EPBC Act
  - White-throated Needletail (*Hirundapus caudacutus*) listed as Vulnerable under the EPBC Act.
  - Swift Parrot (*Lathamus discolor*) listed as Critically Endangered under the EPBC Act.
  - Hooded Robin (*Melanodryas cucullata cucullata*) listed as Endangered under the EPBC Act
  - Diamond Firetail (*Stagonopleura guttata*) listed as Vulnerable under the EPBC Act
- **Mammals:**
  - Large-eared Pied Bat (*Chalinolobus dwyeri*) listed as Endangered under the EPBC Act.
  - Spotted-tailed Quoll (*Dasyurus maculatus maculatus*) listed as Endangered under the EPBC Act.
  - Corben's Long-eared Bat (*Nyctophilus corbeni*) listed as Vulnerable under the EPBC Act.
  - Koala (*Phascolarctos cinereus*) listed as Endangered under the EPBC Act.
  - Grey-headed Flying-fox (*Pteropus poliocephalus*) listed as Vulnerable under the EPBC Act.
- **Reptiles:**
  - Border Thick-tailed Gecko (*Uvidicolus sphyrurus*) listed as Vulnerable under the EPBC Act.
- **Communities**
  - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- **Migratory***
  - Fork-tailed Swift (*Apus pacificu*s) listed as Migratory under the EPBC Act.
  - Satin Flycatcher (*Myiagra cyanoleuca*) listed as Migratory under the EPBC Act.

** In accordance with MNES Significant Impact Guidelines, the significance assessment for migratory species is relevant to migratory species that are not threatened. White-throated Needletail is not assessed with migratory species at **Section 2.5**, as it is listed as Vulnerable and assessed as such at **Section 2.3**.*

**Note: All aforementioned species have moderate or higher potential to occur at the Mine Site – except for Bluegrass. Bluegrass is only considered to have potential habitat at the Mine Camp at Glenn Innes Airport (PCT 3339).**

# 2. Significant Impact Assessments

## 2.1 Report Terminology

The following terms are discussed throughout the significant impact assessments and are defined as:

- **The Project Site**: land within which the Project occurs.
- **Biodiversity study area ('study area')**: the area of land in which biodiversity assessments and survey were undertaken on.
- **Disturbance footprint**: the area of land that is directly impacted by the Project, including access roads, ancillary areas, Mine Camp etc.
- **The Proposed Action**: As described at **Section 1.1** of the Referral Supplementary Information.

## 2.2 Critically Endangered and Endangered species listed under the EPBC Act

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

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

Assessments have been completed for the following endangered or critically endangered species listed at **Table 2.1**. **Table 2.1** provides a summary for the reader regarding the outcome of the assessment for each species. The detailed significant impact assessment for each species is provided within **Section 2.2**.

**Table 2.1. EPBC Act listed Critically Endangered and Endangered species considered for assessment**

| Scientific Name | Common Name | EPBC Act Status | Direct Impact (ha) to Potential Habitat | Significant Impact? |
|---|---|---|---|---|
| *Anthochaera phrygia* | Regent Honeyeater | CE | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | E | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |

| Scientific Name | Common Name | EPBC Act Status | Direct Impact (ha) to Potential Habitat | Significant Impact? |
|---|---|---|---|---|
| *Lathamus discolor* | Swift Parrot | CE | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| *Melanodryas cucullata cucullata* | Hooded Robin | E | 154.2 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| *Dasyurus maculatus maculatus* | Spotted-tailed Quoll | E | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| *Phascolarctos cinereus* | Koala | E | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |

E = Endangered; CE = Critically Endangered

### 2.2.1 Regent Honeyeater

#### 2.2.1.1 Status

Regent Honeyeater (*Anthochaera phrygia*) listed as Critically Endangered under the EPBC Act.

#### 2.2.1.2 Habitat and Ecology

The Regent Honeyeater has a patchy distribution which extends from south-east Queensland, through New South Wales (NSW) and the Australian Capital Territory (ACT), to central Victoria. Records are widely distributed across its range, but it is only found regularly at a few localities in NSW and Victoria where most of the sightings have been recorded. There are four known key breeding areas: three in NSW (Bundarra-Barraba, Capertee Valley and Hunter Valley districts) and one in Victoria (Chiltern area).

The species mostly inhabits inland slopes of the Great Dividing Range, in areas of low to moderate relief with moist, fertile soils. It is most commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest, but also inhabits riparian vegetation such as sheoak (*Casuarina spp*) where it feeds on needle-leaved mistletoe and sometimes breeds.

It sometimes utilises lowland coastal forest, which may act as a refuge when its usual habitat is affected by drought. It also uses a range of other habitats including remnant patches in farmland and urban areas, roadside reserves and travelling stock routes.

The Regent Honeyeater primarily feeds on nectar which it obtains from eucalyptus flowers and mistletoes, but also feeds on invertebrates and their exudates (lerp, honeydew), and occasionally fruit. This species roosts communally in small groups or large flocks, in trees with dense foliage, and foraging trees are rarely used for roosting (DoE, 2015).

The species' movement patterns are thought to be governed by the flowering of select eucalypt species. It is nomadic and partly migratory, with some predictable seasonal movements observed. The species is highly mobile and capable of travelling large distances, however the regularity and extent of long-distance movements are unknown.

The timing of breeding varies between regions and appears to correspond with the flowering of key eucalypt and mistletoe species. Breeding mostly occurs during spring and summer, from August to January. While there is some fidelity to nesting sites, pairs may nest 85 km from a nest site used the previous year, and some pairs change breeding sites between seasons.

Regent honeyeater nests are usually placed in the canopy of mature trees with rough bark. A cup-shaped nest is constructed in which two to three eggs are laid.

The decline of the Regent honeyeater is thought to be mainly due to the clearing, fragmentation and degradation of its habitat.

The information above on the habitat and ecology of the species is a partial extract from approved conservation advice for the species (Department of the Environment (DoE) (2015).

#### 2.2.1.3 Specific impacts

Regent Honeyeater has potential habitat associations within the New England Tablelands Interim Biogeographic Regionalisation for Australia (IBRA) Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of Plant Community Types (PCTs) identified at **Table 2.2**.

**Table 2.2. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

A total of 258 ha of habitat will be directly impacted (refer to **Table 2.2**). Poor condition vegetation zones were not included in impact areas as those areas provide no habitat opportunities for this species.

This species was not recorded within the biodiversity study area despite targeted surveys. The Project Site does not occur within mapped important areas as defined by NSW DCCEEW. These areas are considered essential to support critical life stages of the species, e.g. breeding areas or locations important for foraging/over-wintering for migratory species. Direct impacts to potential habitat have been avoided where possible through design refinement. Indirect impacts will be managed through mitigation measures.

#### 2.2.1.4 Defining the Population Subject to this Assessment

The population of this species subject to this assessment (as defined under the EPBC Act) is comprised of all individuals within the known range. The Regent Honeyeater comprises a single population, with some exchange of individuals between regularly used areas (DoE, 2016). The population is not severely fragmented, and the species occurs at >10 locations (DoE, 2015).

#### 2.2.1.5 Impact Assessment

**Table 2.3. Significant impact assessment – Regent Honeyeater – Critically Endangered**

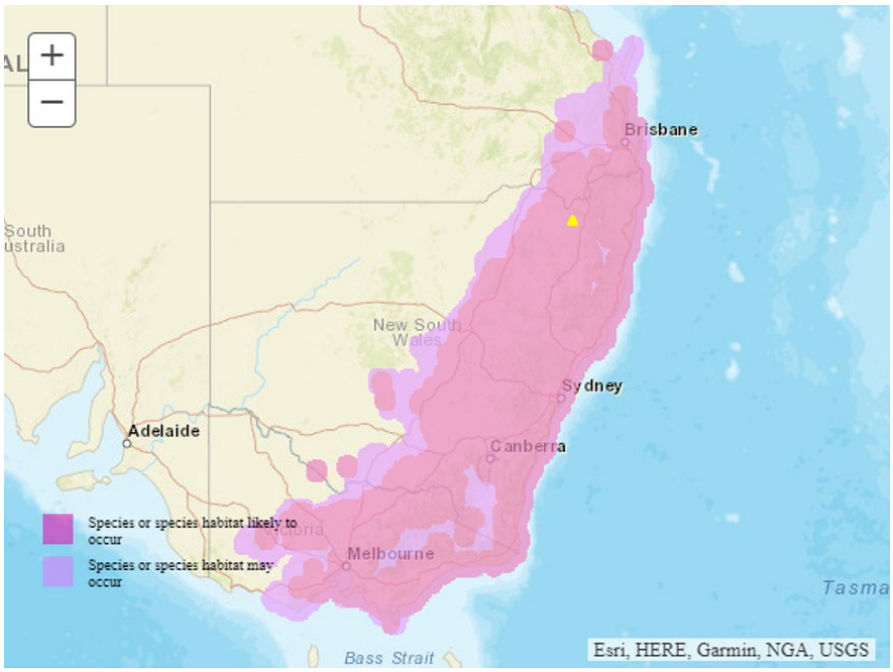
| **Significant Impact Assessment** |
|---|
| **Would the action lead to a long-term decrease in the size of a population?** |
| Approximately 258 ha of potential eucalypt woodland and sclerophyll forest habitat is likely to be affected by the Proposed Action.<br>In order to contextualise the impact to potential habitat for the species within the New England Tablelands IBRA Region - in which the species and Proposed Action occur, the table below identifies the amount (in ha) of each vegetation class impacted by the Proposed Action in the context of similarly available habitat within the IBRA Region. |

| Vegetation Class | Area (ha) within New England Tablelands IBRA Region | Area (ha) impacted by Proposed Action | Proportion Impacted by Proposed Action |
|---|---|---|---|

| | | | within IBRA Region (%) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | 506,298 | 257.26 | 0.05% |
| New England Grassy Woodlands | 18,382 | 0.62 | 0.005% |
| Eastern Riverine Forests | 258,433 | 0.11 | <0.001% |
| **Totals** | **783,113** | **257.99** | **0.03%** |

**Vegetation data obtained via NSW State Vegetation Type Map*

Regent Honeyeater in the locality would not be restricted to habitat within the Disturbance footprint or the Project Site - due to the species' large home range, nomadic nature and the occurrence of higher quality foraging habitat elsewhere in the locality and region. This species was not recorded within the biodiversity study area despite targeted surveys. The Project Site does not occur within mapped important areas as defined by NSW DCCEEW (2024).




**Distribution map for the species (via Species Profile and Threats Database (SPRAT) Profile (Commonwealth DCCEEW, 2024)). Site indicated by yellow triangle. Map not to scale.**

Across the species' entire range, the number of mature individuals is estimated at 350-400 and there is an inferred continuing decline, although there is no estimate as to the ongoing rate of decline. No individuals or known populations have been recorded within the Project Site, either historically (via BioNet Records) or during recent surveys for this assessment.

The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark (*Eucalyptus sideroxylon*), Yellow Box (*E. melliodora*), White Box (*E. albens*) and Swamp Mahogany (*E. robusta*). Other tree species may be regionally important (i.e Thin-leaved Stringybark (E. eugenioides) and Broad-leaved Ironbark (*E. fibrosa).* Nectar and fruit from the mistletoes *Amyema miquelii, A. pendula* and *A. cambagei* are also utilised. When nectar

is scarce lerp and honeydew can comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings (NSW TBDC, 2024).

The species prefers more fertile sites with higher soil water content, including creek flats, broad river valleys and lower slopes (DoE, 2016). It is expected that the Project Site has the potential to be used by the Regent Honeyeater, perhaps during regional movements, it is not likely to be of high importance to this species due to its lack of preferred foraging resources. Mugga Ironbark, White Box, Yellow Box and Broad-leaved Ironbark (preferred foraging resources) occur within the Project Site at relatively low density. PCT 3722 is primarily dominated by Silver-top Stringybark (*E.laevopinea*), Caley's Ironbark (*E.caleyi*) and Tumbledown Red Gum (*E.dealbata*). On the lower slopes of the Project Site within PCT 3722 and PCT 3363 preferred foraging resources – Yellow Box and White Box occur at a higher density thus providing potential habitat for the species.

Whilst the Proposed Action will represent the loss of potential habitat, the disturbance footprint is a relatively small component of locally occurring habitat that will be utilised by the species and the population when compared to potential habitat in the New England Tablelands IBRA Region. The Proposed Action is considered unlikely to significantly contribute to a long-term decline in the size of a population of this species.

**Would the action reduce the area of occupancy of the species?**

The Proposed Action would contribute to the loss of potential foraging habitat by approximately 258 ha which would reduce the area of habitat available. Though this is an incremental loss of suitable foraging resources available to the species. This area of potential foraging habitat represents a relatively small component of similar locally occurring resources accessible to the species.

The removal of approximately 258 ha of potential habitat is an incremental loss of suitable habitat locally and as such has the potential to incrementally reduce the area of occupancy for the Regent Honeyeater.

**Would the action fragment an existing population into two or more populations?**

Habitat connectivity is not likely to be affected by the Proposed Action, given that this species is highly mobile and nomadic. The Regent Honeyeater comprises a single population, with some exchange of individuals between regularly used areas (DoE, 2016). The population is not severely fragmented and the species occurs at >10 locations (DoE, 2015).

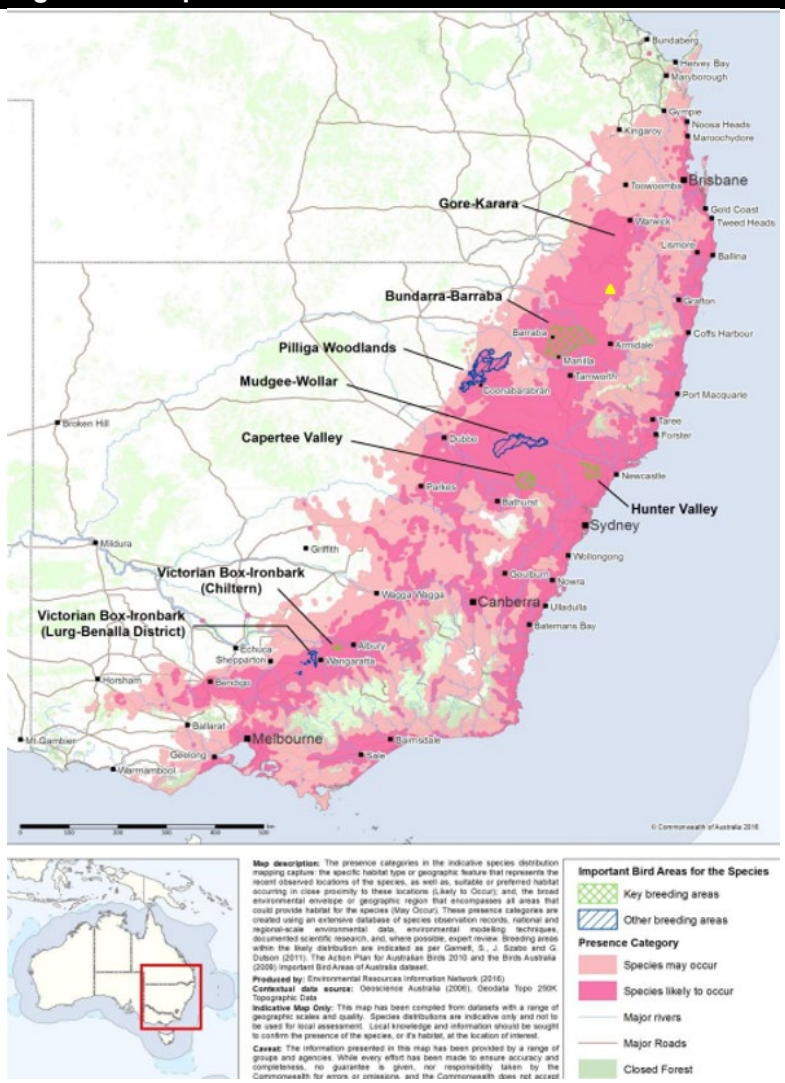
The species is known to occur from Northern Victoria to Southern Queensland – albeit subpopulations are scattered across this range at low density.

Whilst the Proposed Action will incrementally contribute to habitat loss, the Proposed Action would not present a significant barrier to this highly mobile and nomadic species. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing in the site.

**Would the action adversely affect habitat critical to the survival of a species?**

In accordance with DoE (2016), habitat critical to the survival of the Regent Honeyeater includes:

- Any breeding or foraging habitat in areas where the species is likely to occur (as defined by the distribution map provided in Figure 2).
- Any newly discovered breeding or foraging locations.




**Project Site indicated by yellow triangle – not to scale. Extract from DoE (2016).**

***Table 2:*** *Regular and subsidiary areas used by regent honeyeaters for foraging and breeding*

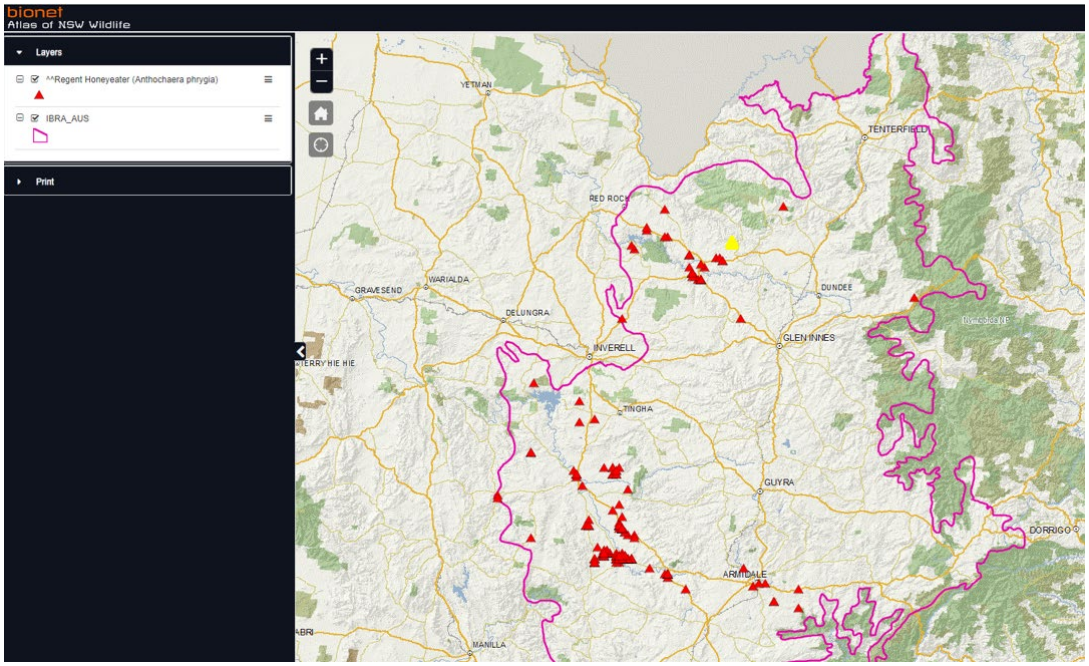
| Regularly used areas | Subsidiary areas |
|---|---|
| 1. Bundarra-Barraba | a. Inverell-Ashford-Emmaville<br>b. Pilliga<br>c. Warrumbungles |
| 2. Hunter Valley / Central Coast | a. Central Coast<br>b. Central Hunter Valley<br>c. Lower Hunter Valley<br>d. Upper Hunter Valley<br>e. Goulburn River<br>f . Widden Valley |
| 3. Capertee Valley | a. Mudgee-Munghorn Gap-Wollar<br>b. Burragorang River Valleys |
| 4. Chiltern | a. Albury-Thurgoona<br>b. Killawarra-Glenrowan<br>c. Bobinawarrah-Carboor<br>d. Lurg-Benalla district |

**Regular and subsidiary areas used by regent honeyeaters for foraging and breeding. Extract from DoE (2016).**

## Significant Impact Assessment

Key areas of critical habitat listed for the species (in the National Recovery Plan) includes the Bundarra-Barraba, Pilliga Woodlands, Mudgee-Wollar and the Capertee Valley and Hunter Valley areas in New South Wales, and the Chiltern and Lurg-Benalla regions of north-east Victoria, inclusive of a number of subsidiary areas within these regions.

There are no records of this species within the Project Site, records within the wider IBRA Region (total of 273 records via BioNet) are largely confined to the Wellingrove area (approx. 13 km southwest of the Project Site) adjacent to the Severn River and the Kingstown area (approx. 120 km south of the Project Site). Hence it is unlikely that this Proposal would adversely affect habitat critical to the survival of these species.




**Map displaying BioNet records of the species within the IBRA Region – Project Site indicated by yellow triangle – not to scale.**

The Project Site does not contain any breeding areas or important foraging areas for this species (see extracts from DoE above), as such it is unlikely that the Proposed Action will adversely affect habitat critical to the survival of this species.

### Would the action disrupt the breeding cycle of a population?

The removal of approximately 258 ha of potential habitat is unlikely to disrupt nomadic movements of the species. The Proposed Action does not impact upon the any of the known areas of critical habitat for this species. These are the Bundarra-Barraba, Capertee Valley and Hunter Valley districts in New South Wales, and the Chiltern area in north-east Victoria. The Project Site does not occur within these areas which are the only currently known breeding areas. As such the Proposed Action is unlikely to affect the Regent Honeyeater breeding cycle.

### Would the action modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The Project Site contains scatted occurrences of preferred foraging resources (Box and Ironbark species) – particularly on lower slopes and along creek lines. However, these tree species occur at relatively low densities across the Project Site. The Proposed Action will disturb approximately 258 ha of native vegetation considered to be foraging habitat for this nomadic blossom forager. The removal of approximately 258 ha of potential habitat is an incremental loss, decreasing the amount of suitable foraging habitat available locally.

As a proportion within the New England Tableland IBRA Region, the Proposed Action will impact approx. 0.05% of Northern Tableland Dry Sclerophyll Forests, 0.005% of New England Grassy Woodlands and <0.001% of Eastern Riverine Forests. These vegetation classes will remain unaffected by the Proposed Action beyond the Disturbance footprint and continue to provide

habitat for the species within the IBRA Region more broadly. The species is more likely to forage in higher quality habitat within the greater locality (i.e. adjacent to creek line or river flats with higher abundance of preferred foraging resources). Given the condition of habitat observed it is unlikely that the Proposed Action will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline.

**Would the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action.

**Would the action introduce disease that may cause the species to decline?**

The Proposed Action would be unlikely to introduce any disease that may cause the species to decline.

**Would the action interfere with the recovery of the species?**

Recovery strategies outlined in Regent Honeyeater Recovery Plan (DoE, 2016) include:

- improve the extent and quality of Regent Honeyeater habitat
- bolster the wild population with captive-bred birds until the wild population becomes self-sustaining
- increase understanding of the size, structure, trajectory and viability of the wild population
- maintain and increase community awareness, understanding and involvement in the recovery program.

The Proposed Action would be in conflict with the first objective above to a small extent, by not improving the extent of habitat for the Regent Honeyeater.

**Conclusion**

On consideration of the above criteria, the Proposed Action is unlikely to have a significant effect on the Regent Honeyeater given that:

- Whilst the Proposed Action will result in the loss of potential habitat, this loss represents a relatively small component of similar locally occurring resources accessible to the species.
- Vegetation to be removed (258 ha) comprises a relatively small proportion of potential foraging habitat present in surrounding areas and the broader locality. As a proportion within the IBRA Region, the Proposed Action will impact approximately.
  - 0.05% of Northern Tableland Dry Sclerophyll Forests
  - 0.005% of New England Grassy Woodlands
  - <0.001% of Eastern Riverine Forests.
- The Proposed Action would not form a barrier to the movement of this highly mobile species.
- No known breeding habitat or habitat critical to the survival of the species would be removed or adversely affected by the Proposed Action.

#### 2.2.1.6 References

Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024). Species Profile and Threats Database (SPRAT) Profile Regent Honeyeater (*Anthochaera Phrygia*).

Department of Environment (DoE) (2016). National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*).

Department of Environment (DoE) (2015). *Anthochaera phrygia* (regent honeyeater) Conservation Advice.

NSW Bionet Threatened Biodiversity Profile Data Collection (NSW TBDC) (2024). Profile: Regent Honeyeater (*Anthochaera Phrygia*).

NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024). Important Areas Map Viewer (Regent Honeyeater). Accessed via Biodiversity Offsets and Agreement Management System (BOAMS) 28.09.24.

### 2.2.2 Large-eared Pied Bat

#### 2.2.2.1 Status

Large-eared Pied Bat (*Chalinolobus dwyeri*) listed as Endangered under the EPBC Act.

#### 2.2.2.2 Habitat and Ecology

The Large-eared Pied Bat is patchily distributed in central-eastern New South Wales (NSW) and south-eastern and central Queensland (Qld), from the area bounded by Shoalwater Bay north of Rockhampton (Qld), south to Ulladulla, NSW (DERM 2011). The species' distribution is fragmented, as most individuals occur in small and relatively isolated subpopulations due to specific requirements for foraging and roosting habitat (Commonwealth DCCEEW, 2023).

Much of the known distribution of the Large-eared Pied Bat occurs in NSW. In NSW, the species occurs in the Sydney sandstone region, Pilliga region and in the north-east at Coolah Tops and Mt Kaputar. In Warrumbungle NP and Mount Kaputar NP, it is present in areas of volcanic strata. Additional records exist in the Scenic Rim near the NSW/Qld border, and a subpopulation in far North-east NSW (e.g., Mt Warning caldera, Whian Whian Special Conservation Area, Nightcap NP, Richmond Range NP & Toonumbar NP) may be connected to these records (Commonwealth DCCEEW, 2023).

In NSW, maternity roosts occur in Ukerbarley State Conservation Area near Coonabarabran (though this site has not been occupied since 2019, Woodsreef asbestos mine near Barraba, Pilliga National Park and Nature Reserve, Ophir reserve near Orange, and potentially near Ulan (Commonwealth DCCEEW, 2023).

Modelling of the distribution suggests that the Large-eared Pied Bat requires a combination of appropriate roosting and foraging habitat. It is usually found in areas with cliffs, escarpments or rocky outcrops for roosting (typically sandstone but also rhyolite), although the presence of suitable caves, overhangs and cracks is likely more important than the precise geology. This roosting habitat is in close association with foraging habitat. The Large-eared Pied Bat has been recorded foraging in fertile valleys and plains, as well as areas with moderately tall to taller trees in woodland along watercourses (Commonwealth DCCEEW, 2023).

The Large-eared Pied Bat is dependent on the presence of diurnal roosts in cliffs, escarpment, cracks or rocky outcrops for shelter. Roosts are also used at night when bats are not feeding, as well as for raising young. The species is known to roost in caves, overhangs, disused mine shafts, and has also been observed roosting in abandoned *Petrochelidon ariel* (fairy martin) nest. The value of mine shafts and disused fairy martin nests as roost sites has not been evaluated but may offer supplementary roost sites in areas containing other suitable habitat (Commonwealth DCCEEW, 2023).

The Large-eared Pied Bat has been recorded foraging in fertile (relative to surrounding landscape) valleys and plains, as well as areas with moderately tall to taller trees in woodland along water courses and upper slopes and crests of ranges. These include a range of vegetation types, such as box gum woodland, dry and wet sclerophyll forest, grassy woodland, Callitris dominated forest, tall open eucalypt forest with a rainforest sub-canopy, subtropical rainforest and small clearings adjacent to rainforest, sub-alpine woodland and sandstone outcrop country (Commonwealth DCCEEW, 2023).

#### 2.2.2.3 Specific impacts

Large-eared Pied Bat has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.4**.

**Table 2.4. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

A total of 519.25 ha of potential habitat is available for the species at the Project Site and 258 ha of habitat will be directly impacted (refer to **Table 2.4**). This species was not recorded within the biodiversity study area despite targeted surveys.

The Project Site and broader locality offer potential habitat. Two mine adits (shafts) occur within the Project Site and cliffs / rock outcrops along Vegetable Creek offer potential habitat. As such, targeted surveys at potential breeding habitat and analysis by bat specialist (Greg Ford – Balance Environmental) was undertaken. In a report produced by Balance Environmental (2023), which outlines findings from targeted surveys it was concluded that.

"*The Taronga adits [Project Site mine shafts] potentially offer roosting habitat for Large-eared Pied Bat, although their southerly aspect may preclude suitability. In contrast, the cliffs and rock outcrops in the Vegetable Creek area include a range of potentially suitable roost cavities, many of which offer a westerly aspect. However, the local geology seems to offer little in terms of larger caves and overhangs, so there may be insufficient roost diversity in the local landscape to sustain a Large-eared Pied Bat population*."

There is one BioNet record of the species within the New England Tablelands IBRA Region (Mann River Nature Reserve – 65 km south east of the site). Balance Environmental (2023), concluded that the apparent regional absence of the species is probably reflective of the poor availability of suitable roosting habitat for the Large-eared Pied Bat.

Regardless, the species has the potential to occur within the Project Site and within the New England Tablelands IBRA Region more broadly. It is expected that the Project Site has the potential to be used by the Large-eared Pied Bat, perhaps opportunistically.

#### 2.2.2.4 Defining the Population Subject to this Assessment

The population of this species subject to this assessment (as defined under the EPBC Act) is comprised of all individuals within the New England Tablelands IBRA Region. The species is highly mobile, and the occurrence of higher quality foraging habitat is available elsewhere in the locality and region where the species is known to occur.

#### 2.2.2.5 Impact Assessment

**Table 2.5. Significant impact assessment – Large-eared Pied Bat – Endangered**

| Significant Impact Assessment |
|---|
| **Would the action lead to a long-term decrease in the size of a population?** |

Approximately 258 ha of potential eucalypt woodland and sclerophyll forest habitat is likely to be affected by the Proposed Action.

In order to contextualise the impact to potential habitat for the species within the New England Tablelands IBRA Region - in which the species and Proposed Action occur, the table below identifies the amount (in ha) of each vegetation class impacted by the Proposed Action in the context of similarly available habitat within the IBRA Region.

| Vegetation Class | Area (ha) within New England Tablelands IBRA Region | Area (ha) impacted by Proposed Action | Proportion Impacted by Proposed Action within IBRA Region (%) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | 506,298 | 257.26 | 0.05% |
| New England Grassy Woodlands | 18,382 | 0.62 | 0.005% |
| Eastern Riverine Forests | 258,433 | 0.11 | <0.001% |
| **Totals** | **783,113** | **257.99** | **0.03%** |

**Vegetation data obtained via NSW State Vegetation Type Map*

Large-eared Pied Bat in the locality would not be restricted to habitat within the Disturbance footprint or the Project Site - due to the species' highly mobile nature. This species was not recorded within the biodiversity study area despite targeted surveys and analysis of the site a bat expert Balance Environmental (2023).

The Project Site area does not contain important geological features that may otherwise support maternity or diurnal roost sites for the Large-eared Pied Bat (Balance Environmental, 2023). There is one BioNet record of the species within the New England Tablelands IBRA Region (Mann River Nature Reserve – 65 km southeast of the site).

Whilst the Proposed Action represents the loss of potential habitat, the Disturbance footprint will only be a small component of locally occurring habitat that may be utilised by the species. The Proposed Action is considered unlikely to significantly contribute to a long-term decline in the size of a population of these species.

**Would the action reduce the area of occupancy of the species?**

The Proposed Action would contribute to the loss of potential foraging habitat by approximately 258 ha which would reduce the area of habitat available. This is an incremental loss of suitable foraging resources available to the species. This area of potential foraging habitat represents a small component of similar locally occurring resources accessible to these species.

The Project Site does not contain important geological features that may otherwise support maternity or diurnal roost sites for the Large-eared Pied Bat and the species was not recorded during field surveys (Balance Environmental (2023).

The removal of approximately 258 ha of potential habitat is considered to be a relatively small incremental loss of suitable habitat locally and as such has the potential to incrementally reduce the area of occupancy for the Large-eared Pied Bat.

**Would the action fragment an existing population into two or more populations?**

## Significant Impact Assessment

Habitat connectivity is not likely to be affected by the Proposed Action, given that this species is highly mobile. Whilst the Proposed Action will incrementally contribute to habitat loss, the Proposed Action would not present a significant barrier to this is highly mobile species. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing in the site.

### Would the action adversely affect habitat critical to the survival of a species?

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat. Approved conservation advice for the species (Commonwealth DCCEEW (2023)) defines habitat critical to the survival of a species as.

- *Necessary to support the recovery of this species through verification of the presence of habitat attributes… all habitat for the species either now or at some point in the near future is likely to be critical to the survival of the species.*
- *The species is dependent on the presence of diurnal roosts such as caves, overhangs, or other landscape features for shelter. Large-eared pied bat roosting habitat includes areas with cliffs, escarpments or rocky outcrops, typically sandstone but also rhyolite.*
- *Any known roost site, or caves that could be roost sites, are considered habitat critical to the survival of the species. These features need to be within reasonable proximity of foraging habitat, which often occurs along water courses in relatively fertile valleys and plains (particularly in NSW) with moderately tall to taller trees.*
- *Without both appropriate roosting and foraging habitat within close geographical distance, the species is unlikely to occur. Therefore, the presence of the above foraging and roosting habitat within close proximity (likely within a few kilometres, although this is an estimate that should not be relied on for management purposes) of each other should be considered habitat critical to the survival of the Large-eared Pied Bat.*

A detailed site investigation was undertaken (Balance Environmental, 2023) to determine the presence of Large-eared Pied Bat and suitable roosting habitats. The species was not detected in the Project Site during targeted surveys. Surveys involved direct inspection of mine adits and potential natural roosts that were investigated along Vegetable Creek, inspection of harp traps deployed at the adits and harp traps and mist nets deployed in flyways through potential woodland foraging areas, deployment of ultrasonic detectors.

Balance Environmental (2023) concluded the following

- *(With respect to the mine adits within the Project Site), their southerly aspect may preclude suitability (for roosting Large-eared Pied Bat).*
- *In contrast, the cliffs and rock outcrops in the Vegetable Creek area include a range of potentially suitable roost cavities, many of which offer a westerly aspect. However, the local geology seems to offer little in terms of larger caves and overhangs, so there may be insufficient roost diversity in the local landscape.*
- *The Large-eared Pied Bat does not roost in the mine adits, and probably does not occur in the study area, the destruction of the mine adits (at the Project Site) is unlikely to impact the Large-eared Pied Bat population.*

Owing to the lack of insufficient roost diversity in the local landscape (no sandstone caves or overhangs), it is unlikely that the species would occupy (or could occupy into the future) the mine adits within the Project Site or the cliffs and rock outcrops in the Vegetable Creek. For this reason, the Project Site is not considered ‘critical habitat’ and therefore to Proposed Action will not adversely affect habitat critical to the survival of a species.

### Would the action disrupt the breeding cycle of a population?

The Project Site does not contain important geological features that may otherwise support maternity or diurnal roost sites for the Large-eared Pied Bat and the species was not recorded during field surveys (Balance Environmental (2023).

The Proposed Action does not impact upon the any of the known breeding caves. As such the Proposed Action is unlikely to affect their breeding cycle.

## Significant Impact Assessment

**Would the action modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

The Project Site does not contain important geological features that may otherwise support maternity or diurnal roost sites for the Large-eared Pied Bat (Balance Environmental,2023). In addition, there is one BioNet record of the species within the New England Tablelands IBRA Region (Mann River Nature Reserve – 65 km southeast of the site).

Vegetation clearing for the Proposed Action will impact potentially suitable foraging habitat, however, it is unlikely that an impact to approximately 258 ha of potential foraging habitat will cause the species to decline.

**Would the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action.

**Would the action introduce disease that may cause the species to decline?**

The Proposed Action would be unlikely to introduce any disease that may cause the species to decline.

**Would the action interfere with the recovery of the species?**

Recovery strategies outlined in the *National recovery plan for the Large-eared Pied Bat* (Department of Environment and Resource Management (2011) include:

- Identify priority roost and maternity sites for protection.
- Implement conservation and management strategies for priority sites.
- Educate the community and industry to understand and participate in the conservation of the Large-eared Pied Bat.
- Research the Large-eared Pied Bat to augment biological and ecological data to enable conservation management.
- Determine the metapopulation dynamics throughout the distribution of the Large-eared Pied Bat.

Based on the potential ecological impacts of the Proposed Action on the Large-eared Pied Bat it is unlikely the Proposed Action would conflict with the recovery actions outlined above.

**Conclusion**

On consideration of the above criteria, the Proposed Action is unlikely to have a significant effect on the Large-eared Pied Bat given that:

- Whilst the Proposed Action will result in the loss of potential foraging habitat, this loss represents a relatively small component of similar locally occurring resources accessible to the species.
- Vegetation to be removed (258 ha) comprises a relatively small proportion of potential foraging habitat present in surrounding areas and the broader locality. As a proportion within the IBRA Region, the Proposed Action will impact approximately.
  - 0.05% of Northern Tableland Dry Sclerophyll Forests
  - 0.005% of New England Grassy Woodlands
  - <0.001% of Eastern Riverine Forests.
- The Proposed Action would not form a barrier to the movement of this highly mobile species
- Owing to the lack of insufficient roost diversity in the local landscape (no sandstone caves or overhangs), it is unlikely that the species would occupy (or could occupy into the future) the mine adits within the Project Site or the cliffs and rock outcrops in the Vegetable Creek.
- This species was not recorded within the biodiversity study area despite targeted surveys by a bat expert (Balance Environmental, 2023).

#### 2.2.2.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Large-eared Pied Bat (*Chalinolobus dwyeri*).

Department of Environment and Resource Management (2011). National recovery plan for the large-eared pied bat - *Chalinolobus dwyeri.*

Commonwealth DCCEEW (2023). *Chalinolobus dwyeri* (large-eared pied bat) Conservation Advice.

### 2.2.3 Swift Parrot

#### 2.2.3.1 Status

Swift Parrot (*Lathamus discolor*) listed as Critically Endangered under the EPBC Act.

#### 2.2.3.2 Habitat and Ecology

Swift Parrots are usually seen in small parties of up to 30 birds, or occasionally in larger flocks (of several hundred birds) around sources of abundant food. There have also been a few extraordinary reports of flocks numbering in excess of 1000 birds. Swift parrots are migratory. They breed in Tasmania and then move to mainland Australia in autumn for the non-breeding season. Most of the population winters in Victoria and New South Wales, before returning to Tasmania in spring (DoE, 2016).

On the mainland the species occurs in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum (*Corymbia maculata*), Red Bloodwood (*C. gummifera*), Forest Red Gum (*E. tereticornis*) Mugga Ironbark (*E. sideroxylon*) and White Box (*E. albens*). Commonly used lerp infested trees include Inland Grey Box (*E. macrocarpa*), Grey Box (*E. moluccana*) Blackbutt (*E. pilularis*) and Yellow Box (*E. melliodora*). The species may return to some foraging sites on a cyclic basis depending on food availability (NSW TBDC, 2024)

#### 2.2.3.3 Specific impacts

Swift Parrot has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.6**.

**Table 2.6. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

A total of 519.25 ha of potential habitat is available for the species at the Project Site and 258 ha of habitat will be directly impacted (refer to **Table 2.6**). Poor condition vegetation zones were not included in impact areas as those areas provide no habitat opportunities for this species.

This species was not recorded within the biodiversity study area despite targeted surveys. The Project Site does not occur within mapped important areas as defined by NSW DCCEEW. These areas are

considered essential to support critical life stages of the species, e.g. breeding areas or locations important for foraging/over-wintering for migratory species. Direct impacts to potential habitat have been avoided where possible through design refinement. Indirect impacts will be managed through mitigation measures.

#### 2.2.3.4 Defining the Population Subject to this Assessment

The population of this species subject to this assessment (as defined under the EPBC Act) is comprised of all individuals within the known range. The Swift Parrot occurs as a single, panmictic migratory population (Commonwealth DCCEEW, 2024). The species is known to occur from Tasmania to southern Queensland.

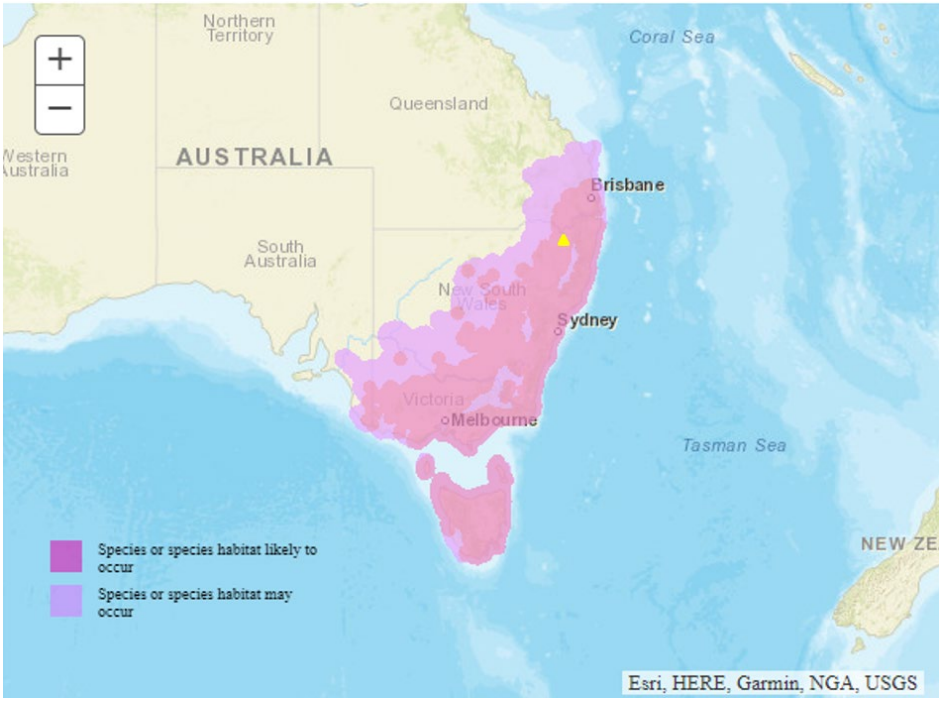
2.2.3.5 Impact Assessment

**Table 2.7. Significant impact assessment – Swift Parrot – Critically Endangered**

| **Significant Impact Assessment** |
|---|
| **Would the action lead to a long-term decrease in the size of a population?** |
| Approximately 258 ha of potential eucalypt woodland and sclerophyll forest habitat is likely to be affected by the Proposed Action.<br>In order to contextualise the impact to potential habitat for the species within the New England Tablelands IBRA Region - in which the species and Proposed Action occur, the table below identifies the amount (in ha) of each vegetation class impacted by the Proposed Action in the context of similarly available habitat within the IBRA Region. |

| **Vegetation Class** | **Area (ha) within New England Tablelands IBRA Region** | **Area (ha) impacted by Proposed Action** | **Proportion Impacted by Proposed Action within IBRA Region (%)** |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | 506,298 | 257.26 | 0.05% |
| New England Grassy Woodlands | 18,382 | 0.62 | 0.005% |
| Eastern Riverine Forests | 258,433 | 0.11 | <0.001% |
| **Totals** | **783,113** | **257.99** | **0.03%** |

Swift Parrot in the locality would not be restricted to habitat within the Disturbance footprint or the Project Site - due to the species large home range, nomadic nature and the occurrence of higher quality foraging habitat elsewhere in the locality and region. This species was not recorded within the biodiversity study area despite targeted surveys. The Project Site does not occur within mapped important areas as defined by NSW DCCEEW (2024).




**Distribution map for the species (via SPRAT Profile). Site indicated by yellow triangle. Map not to scale.**

There were approximately 2,000 mature individuals in the wild in 2010, but the species has declined since and the population was estimated to be 750 mature individuals in 2020 (Commonwealth DCCEEW, 2024). No individuals or known populations have been recorded within the Project Site either; historically (via BioNet Records) or during recent surveys for this assessment.

Key foraging species includes Yellow Gum (*E. leucoxylon*); Red Ironbark (*E. tricarpa*); Mugga Ironbark (*E. sideroxylon*); Grey Box (*E. macrocarpa*); White Box (*E. albens*); Yellow Box (*E. melliodora*); Swamp Mahogany (*E. robusta*); Forest Red Gum (*E. tereticornis*); Blackbutt (*E. pilularis)*; and Spotted Gum (*Corymbia maculata*) (Commonwealth DCCEEW, 2024).

It is expected that the Project Site has the potential to be used by the Swift Parrot, during seasonal movements, it is unlikely to be of high importance to this species due to a lack of key foraging species in high density. Mugga Ironbark, White Box and Yellow Box (key foraging species) occur within the Project Site at relatively low density. PCT 3722 (the majority of the site) is primarily dominated by Silver-top Stringybark (*E. laevopinea*), Caley's Ironbark (E. *caleyi*) and Tumbledown Red Gum (*E dealbata*).

Key foraging species Yellow Box and White Box occur at a higher density on the lower slopes of the Project Site within PCT 3722 and PCT 3363. These areas provide a higher density of preferred foraging species. The majority of these areas occur outside of the disturbance footprint. thus.

Whilst the Proposed Action will represent the loss of potential habitat, the Disturbance footprint will only be a small component of locally occurring habitat that will be utilised by the species. The Proposed Action is considered unlikely to significantly contribute to a long-term decline in the size of a population of these species.

### Would the action reduce the area of occupancy of the species?

The Proposed Action would contribute to the loss of potential foraging habitat by approximately 258 ha which would reduce the area of habitat available. Though this is an incremental loss of suitable foraging resources available to the species. This area of potential foraging habitat represents a small component of similar locally occurring resources accessible to these species.

The removal of approximately 258 ha of potential habitat is an incremental loss of suitable habitat locally and as such has the potential to incrementally reduce the area of occupancy for the Swift Parrot.

## Significant Impact Assessment

### Would the action fragment an existing population into two or more populations?

Habitat connectivity is not likely to be affected by the Project, given that this species is highly mobile and nomadic. The Swift Parrot occurs as a single, panmictic migratory population (Commonwealth DCCEEW, 2024). The species is known to occur from Tasmania to southern Queensland.

Whilst the Proposed Action will incrementally contribute to habitat loss, the Proposed Action would not present a significant barrier to this is highly mobile and nomadic species. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing in the site.

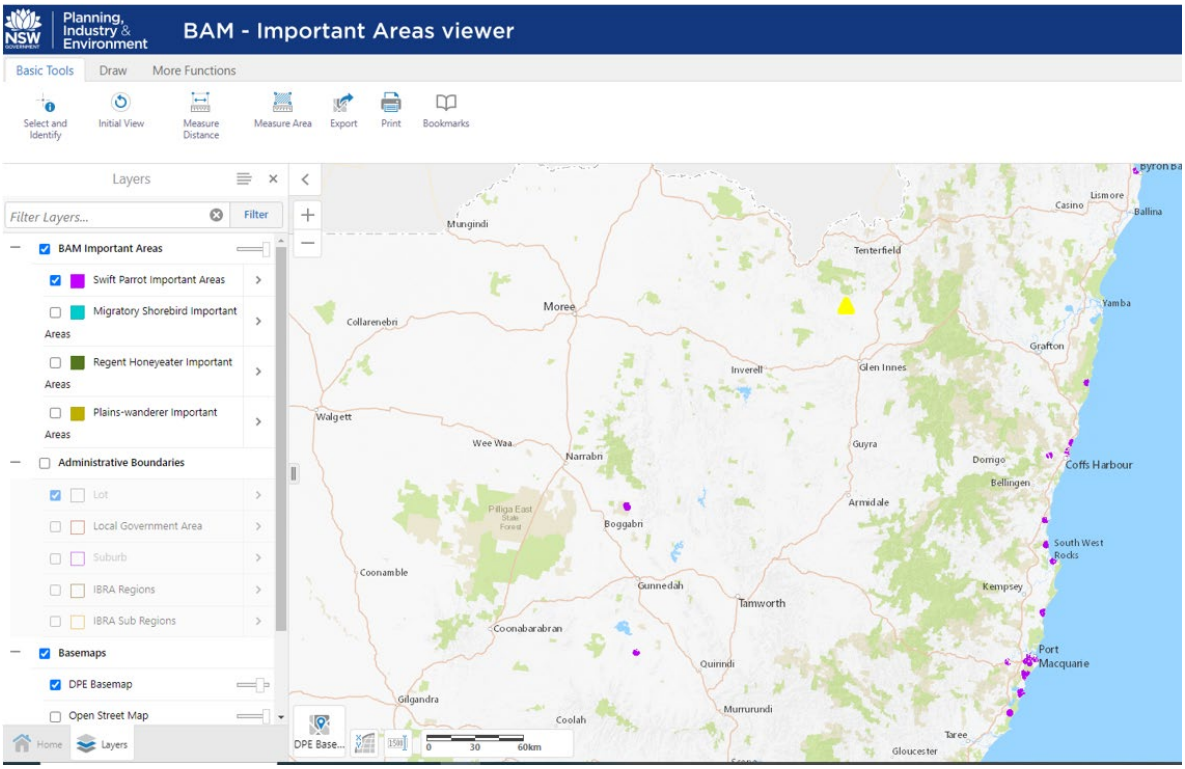
### Would the action adversely affect habitat critical to the survival of a species?

In accordance with Commonwealth DCCEEW (2024), Swift Parrot breed mostly on the east and south-east coast of Tasmania during summer and migrates to mainland Australia in autumn. Commonwealth DCCEEW (2024) notes that the species doesn't have breeding habitat critical to the survival on the mainland – hence the Proposed Action will not impact breeding habitat.

Commonwealth DCCEEW (2024) also notes that the species has foraging habitat on the Australian mainland, which is habitat critical to the survival of the species. This critical habitat is described as:

"All preferred foraging species within known and likely foraging habitat on the mainland including Yellow Gum (*E. leucoxylon*); Red Ironbark (*E. tricarpa*); Mugga Ironbark (*E. sideroxylon*); Grey Box (*E. macrocarpa*); White Box (*E. albens*); Yellow Box (*E. melliodora*); Swamp Mahogany (*E. robusta*); Forest Red Gum (*E. tereticornis*); Blackbutt (*E. pilularis*); and Spotted Gum (*Corymbia maculata*)."

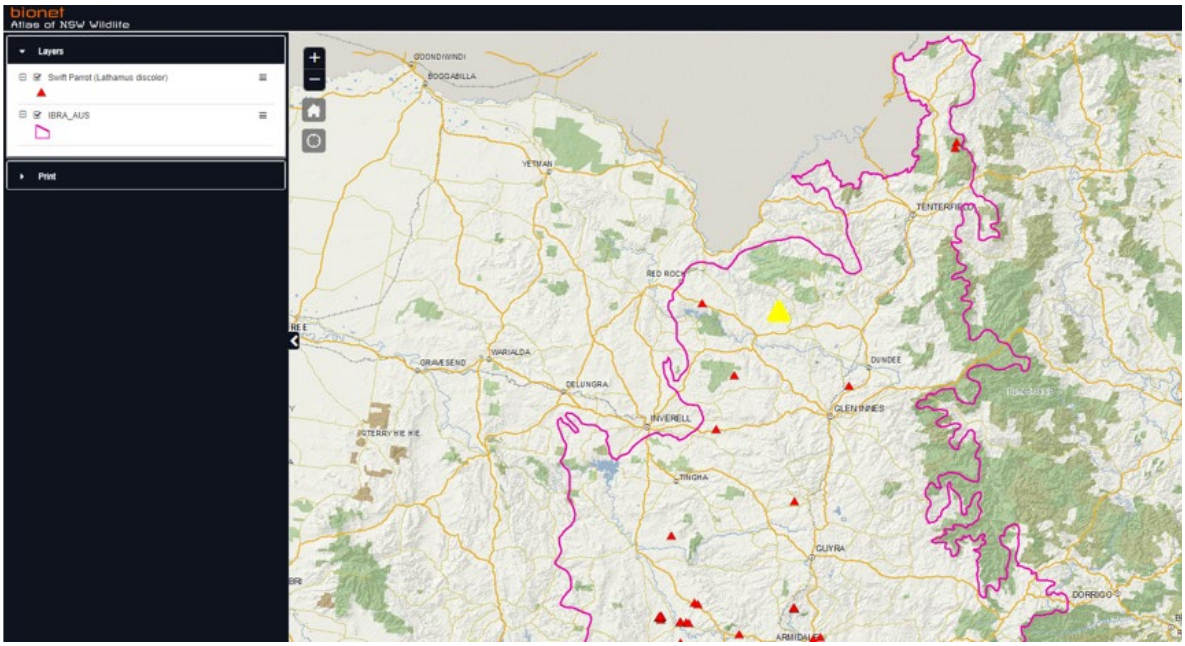
Mugga Ironbark, White Box and Yellow Box (key foraging species) occur within the Project Site at relatively low density. It is expected that the Project Site has the potential to be used by the Swift Parrot, perhaps during seasonal movements, however it is not considered to be of high importance due to a low density of key foraging species. The Project Site does not occur within mapped important areas as defined by NSW DCCEEW (2024), which are considered essential to support critical life stages of the species, e.g. breeding areas or locations important for foraging/over-wintering for migratory species.



## Significant Impact Assessment

**Map displaying 'mapped important areas' (NSW DCCEEW, 2024) for Swift Parrot – Project Site indicated by yellow triangle – not to scale.**

There are no records of this species within the Project Site, records within the wider New England Tablelands IBRA Region (total of 34 records via BioNet) are largely confined to the Armidale area (approx. 125 km south of the Project Site). There are several scattered occurrences recorded within approx. 50 km radius of the site.




**Map displaying BioNet records of the species within the New England Tablelands IBRA Region – Project Site indicated by yellow triangle – not to scale.**

It is unlikely that this Proposed Action would adversely affect habitat critical to the survival of the species given.

- There is a relatively low density of Mugga Ironbark, White Box and Yellow Box (key foraging species) within the Project Site.
- The Project Site does not contain any breeding areas or important foraging areas identified as critical habitat for this species.
- There are no records of this species within the Project Site.

### Would the action disrupt the breeding cycle of a population?

The removal of approximately 258 ha of potential habitat is unlikely to disrupt nomadic movements of the species. The Proposed Action does not impact upon the any of the known areas of critical habitat for this species (Commonwealth DCCEEW, 2024). Swift Parrot breeds mostly on the east and south-east coast of Tasmania during summer and migrates to mainland Australia in autumn (Commonwealth DCCEEW, 2024).

Swift Parrots are dependent on flowering resources across a wide range of habitats (woodlands and forests) within their NSW wintering grounds, the removal of approximately 258 ha of potential foraging habitat is unlikely to disrupt their movements to Tasmanian breeding grounds. As such the Proposed Action is unlikely to affect their breeding cycle.

### Would the action modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The Project Site contains scatted occurrences of Mugga Ironbark, White Box and Yellow Box (key foraging species) – particularly at lower slopes and along creek lines. However, these tree species occur at relatively low densities across the Project Site. The Proposed Action will disturb approximately 258 ha of native vegetation considered to be foraging habitat for this nomadic blossom forager. The removal of approximately of 258 ha potential habitat is an incremental loss, decreasing the amount of suitable foraging habitat available locally.

**Significant Impact Assessment**

As a proportion within the IBRA Region, the Proposed Action will impact approx. 0.05% of Northern Tableland Dry Sclerophyll Forests, 0.005% of New England Grassy Woodlands and <0.001% of Eastern Riverine Forests. These vegetation classes will remain unaffected by the Proposed Action beyond the Disturbance footprint and continue to provide habitat for the species within the New England Tablelands IBRA Region more broadly.

As a large-scale migrant, Swift Parrot has the ability to cover vast areas of its winter range, seeking suitable flowering eucalypt habitat. The species is an occasional visitor to the region and may utilise trees in the Project Site area for foraging intermittently – but the site does not contain any breeding areas or important foraging areas as defined by NSW DCCEEW (2024), which are considered essential to support critical life stages of the species.

Whilst there will be an incremental loss of potential habitat, due to the removal of approximately 258 ha of native vegetation, it appears to be of less importance to the species locally, it is unlikely that the Proposed Action will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline.

**Would the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action.

**Would the action introduce disease that may cause the species to decline?**

The Proposed Action would be unlikely to introduce any disease that may cause the species to decline.

**Would the action interfere with the recovery of the species?**

Recovery strategies outlined in Swift Parrot (Commonwealth DCCEEW, 2024) include:

- Maintain known Swift Parrot breeding and foraging habitat at the local, regional and landscape scales.
- Reduce impacts from Sugar Gliders at Swift Parrot breeding sites.
- Monitor and manage other sources of mortality.
- Develop and apply techniques to measure changes in population trajectory in order to measure the success of recovery actions.
- Improve understanding of foraging and breeding habitat use at a landscape scale in order to better target protection and restoration measures.
- Engage community and stakeholders in Swift Parrot conservation.
- Coordinate, review and report on recovery progress.

The Proposed Action is not in direct conflict with any objective above. The Project Site is not within mapped important areas as defined by NSW DCCEEW (2024), nor is the Project Site considered habitat critical to the survival of the species. The Proposed Action will result in the removal of approximately 258 ha of potential (as opposed to known) habitat. This is an incremental loss, decreasing the amount of suitable foraging habitat available locally.

Based on the potential ecological impacts of the Proposed Action on the Swift Parrot it is unlikely the Proposed Action would conflict with the recovery actions outlined above.

**Conclusion**

On consideration of the above criteria, the Proposed Action is unlikely to have a significant effect on the Swift Parrot given that:

- The Proposed Action will result in the loss of potential foraging habitat, this loss represents a relatively small component of similar locally occurring resources accessible to the species.
- Vegetation to be removed (258 ha) comprises a relatively small proportion of potential foraging habitat present in surrounding areas and the broader locality. As a proportion within the IBRA Region, the Proposed Action will impact approximately.
  - 0.05% of Northern Tableland Dry Sclerophyll Forests

  - 0.005% of New England Grassy Woodlands
  - <0.001% of Eastern Riverine Forests.
- The Proposed Action would not form a barrier to the movement of this highly mobile species
- No known breeding habitat, mapped important areas as defined by NSW DCCEEW (2024), or habitat critical to the survival of the species would be removed or adversely affected by the Proposed Action.

#### 2.2.3.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Swift Parrot (*Lathamus discolor*).

Commonwealth DCCEEW (2024). National Recovery Plan for the Swift Parrot (*Lathamus discolor*).

Department of Environment (DoE) (2016). *Lathamus discolor* (swift parrot) Conservation Advice.

NSW Bionet Threatened Biodiversity Profile Data Collection (NSW TBDC) (2024). Profile: Swift Parrot (*Lathamus discolor*).

NSW DCCEEW (2024). Important Areas Map Viewer (Swift Parrot). Accessed via BOAMS 28.09.24.

### 2.2.4 Hooded Robin (south-eastern species)

#### 2.2.4.1 Status

Hooded Robin (south-eastern species) (*Melanodryas cucullata cucullata*) listed as Endangered under the EPBC Act

#### 2.2.4.2 Habitat and Ecology

Hooded Robin (south-eastern species) prefers dry eucalypt and acacia woodlands and shrublands with an open understorey, some grassy areas and a complex ground layer. They avoid woodlands with tall trees or dense tree cover but sometimes occur in tall, dense heaths with scattered open areas. The species can occur in patches as small as 2.9 ha, in agricultural landscapes they prefer larger patches greater than 10 ha with moderately deep to deep soils.

The species may breed any time between July and November, often rearing several broods. The nest is a small, neat cup of bark and grasses bound with webs, in a tree fork or crevice, from less than 1 m to 5 m above the ground.

#### 2.2.4.3 Specific impacts

Hooded Robin (south-eastern species) has habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.8**.

**Table 2.8. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Modified | 97.37 |
| | | Poor | 55.73 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| | | Poor | 0.41 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **154.24** |

Within the Project Site 154.2 ha of suitable habitat will be directly impacted (refer to **Table 2.8**.). The Hooded Robin (south-eastern species) does not use shrubby habitat forms where the Proposed Action is located, it is found in very open grassy woodland habitats that occur outside of such forested habitats. The upslope densely forested vegetation (typically PCT 3722 – Intact condition) in which the Proposed Action is located is generally characterised by a dense understory shrub layer. Whilst 258 ha of native vegetation will be impacted by the Proposed Action, much of this habitat is characterised

as containing the non-preferred high understory shrub densities. This species was recorded within the biodiversity study area at two locations (PCT 3722 modified and PCT 3722 Poor), these locations are characterised by a sparse shrub layer, typical of the preferred habitat for the species, and comprise 154.2 ha of known habitat impacted by the Proposed Action. Direct impacts to potential habitat have been avoided where possible through design refinement. Indirect impacts will be managed through mitigation measures.

#### 2.2.4.4 Defining the Population Subject to this Assessment

The population of this species subject to this assessment (as defined under the EPBC Act) is comprised of all individuals within the New England Tablelands IBRA Region, given the species large home range and the occurrence of suitable habitat in the locality and region where the species is known to occur.

2.2.4.5 Impact Assessment

**Table 2.9. Significant impact assessment – Hooded Robin –Endangered**

| **Significant Impact Assessment** |
|---|
| **Would the action lead to a long-term decrease in the size of a population?** |

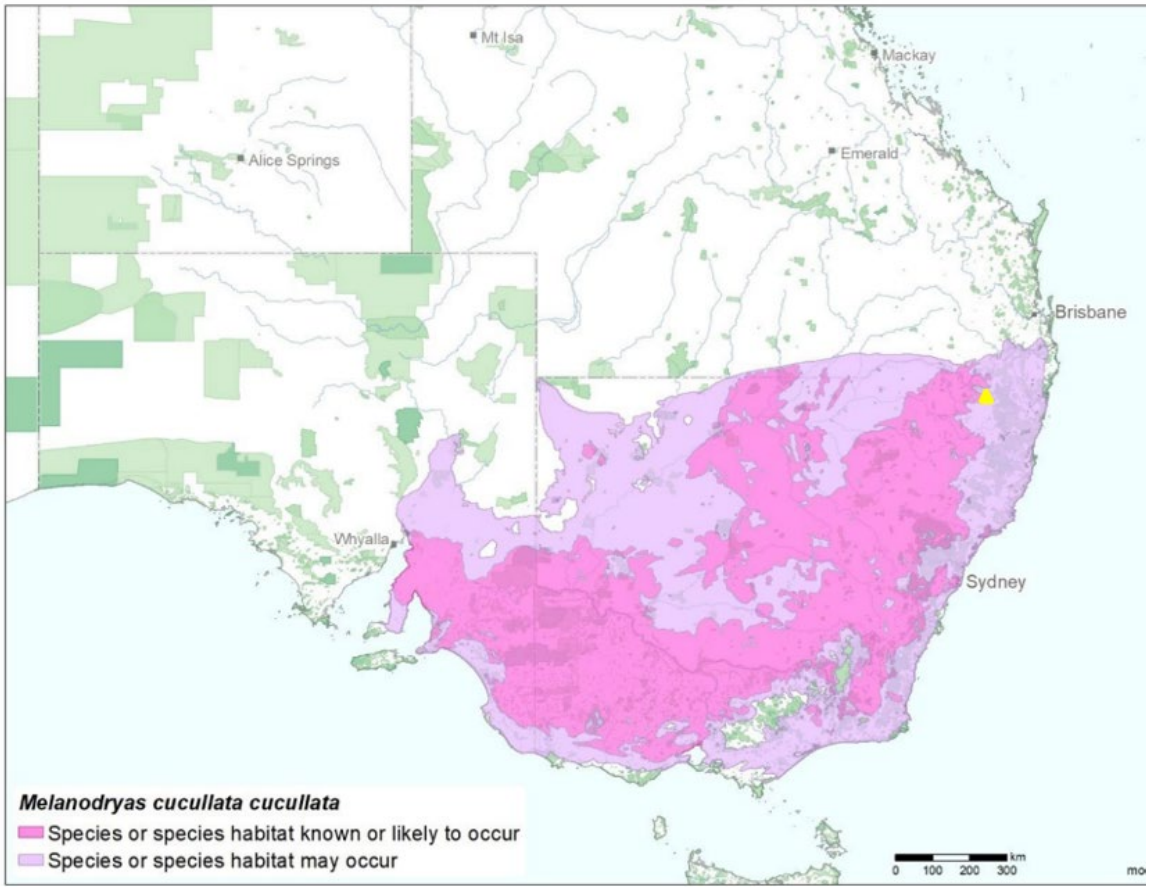
Approximately 154.2 ha of known eucalypt woodland and sclerophyll forest habitat is likely to be affected by the Proposed Action.

In order to contextualise the impact to potential habitat for the species within the New England Tablelands IBRA Region - in which the species and Proposed Action occur, the table below identifies the amount (in ha) of each vegetation class impacted by the Proposed Action in the context of similarly available habitat within the IBRA Region.

| **Vegetation Class** | **Area (ha) within New England Tablelands IBRA Region** | **Area (ha) impacted by Proposed Action** | **Proportion Impacted by Proposed Action within IBRA Region (%)** |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | 506,298 | 153.1 | 0.03% |
| New England Grassy Woodlands | 18,382 | 1.03 | 0.005% |
| Eastern Riverine Forests | 258,433 | 0.11 | <0.001% |
| **Totals** | **783,113** | 154.24 | 0.036% |
| **Vegetation data obtained via NSW State Vegetation Type Map* | | | |

Hooded Robins in the locality would not be restricted to habitat within the Disturbance footprint or the Project Site - due to the species large home range and geographic distribution (across NSW, QLD, SA, ACT and Vic) and the occurrence of higher quality habitat elsewhere in the locality and region.

**Map 1 Modelled distribution of Hooded Robin (south-eastern)**




**Distribution map for the species (via SPRAT Profile). Site indicated by yellow triangle. Map not to scale.**

The Hooded Robin (south-eastern species) does not use shrubby habitat forms where the Proposed Action is located, it is found in very open grassy woodland habitats that occur outside of such forested habitats. The upslope densely forested vegetation (typically PCT 3722) in which the Proposed Action is located is generally characterised by a dense understory shrub layer.

Whilst 258 ha of native vegetation will be impacted by the Proposed Action – a proportion of this habitat is characterised as containing the non-preferred high understory shrub densities. The Proposed Action will represent the loss of potential habitat, the Disturbance footprint will only be a small component of locally occurring habitat that will be utilised by the species. The Proposed Action is considered unlikely to significantly contribute to a long-term decline in the size of a population of these species.

**Would the action reduce the area of occupancy of the species?**

The Proposed Action would contribute to the loss of known foraging habitat by approximately 154.2 ha which would reduce the area of habitat available. The upslope, densely forested vegetation (typically PCT 3722 – Intact condition) in which the Proposed Action is located is generally characterised by a dense understory shrub layer. This is not characterised as being non-preferred habitat for the species, owing to high understory shrub densities.

The loss of known foraging habitat is an incremental loss of suitable foraging resources available to the species, and represents a contextually small component of similar locally and regionally occurring resources accessible to the subject species.

**Would the action fragment an existing population into two or more populations?**

## Significant Impact Assessment

Habitat connectivity is not likely to be affected by the Proposed Action, given that this species is highly mobile. The Proposed Action would not present a significant barrier to the species. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing at the site.

### Would the action adversely affect habitat critical to the survival of a species?

In accordance with Approved Conservation Advice for the species (Commonwealth DCCEEW (2023)), habitat critical to the survival of the Hooded Robin (south-eastern species) include areas of:

- *dry eucalypt and acacia woodlands and shrublands remnants with an open understorey,*
- *some grassy areas and a complex ground layer, often in or near clearings or open areas;*
- *structurally diverse habitats featuring: mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses;*
- *standing dead or live trees and tree stumps are also essential for nesting, roosting and foraging;*
- *moderately deep to deep soils, rocks and fallen timber which provides essential foraging habitat.*

*Habitat critical to the survival should not be cleared, fragmented or degraded. Any known or likely habitat should be considered as habitat critical to the survival of the subspecies. Additionally, areas that are not currently occupied by the species due to recent disturbance (e.g. fire, grazing or human activity), but should became suitable again in the future, should also be considered habitat critical to the survival of the species.*

*Hooded Robin (south-eastern species) habitat occurs across a wide range of land ownership arrangements, including on private land, travelling stock routes and reserves, state forests and state reserves, and National Parks. It is essential that the highest level of protection is provided to these areas and that enhancement and protection measures target these productive sites.*

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

It is acknowledged that the site contains habitat critical to the survival of the Hooded Robin as listed above, of which 154.2 ha will likely be impacted, however the Disturbance footprint will only be a contextually small component of locally occurring habitat that will be utilised by the import population of the subject species.

### Would the action disrupt the breeding cycle of a population?

Upslope densely forested vegetation (typically PCT 3722) in which the Proposed Action is located is generally characterised by a dense understory shrub layer. These habitat characteristics limit the species occupation of habitats associated with the Project Site. Whilst the species has been recorded within grassy open forested areas of the Project Site. The species is highly mobile and would be expected to disperse into other areas of potential habitat in the locality. Therefore, the direct impact to approximately 154.2 ha of potential dispersal habitat is unlikely to disrupt the breeding cycle of an important population of the Hooded Robin (south-eastern species).

### Would the action modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The Proposed Action will directly impact approximately 258 ha of native vegetation considered to be dispersal habitat for the species. The removal of approximately 154.2 ha of potential habitat is an incremental loss, decreasing the amount of suitable foraging habitat available locally. However, this species is likely to occupy higher quality habitat within greater locality (i.e. relatively undisturbed open woodlands and shrublands).

Considering the mobile nature of this species, the Proposed Action is unlikely to isolate the species habitat significantly. Given the marginal condition of habitat observed at the Project Site it is unlikely that the Proposed Action will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline.

| Significant Impact Assessment |
|---|
| **Would the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?** |
| It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action. |
| **Would the action introduce disease that may cause the species to decline?** |
| The Proposed Action would be unlikely to introduce any disease that may cause the species to decline. |
| **Would the action interfere with the recovery of the species?** |
| There is no adopted or made Recovery Plan for this species. |
| **Conclusion** |
| The Proposed Action will disturb approximately 154.2 ha of potential habitat considered to be marginal habitat, owing to composition of forested areas (shrubby understory) and disturbance history throughout the Project Site. The Proposed Action would incrementally reduce the amount of potential dispersal habitat for the Hooded Robin (south-eastern species), albeit by a contextually minor amount when considering available habitat for the subject population. The Proposed Action is unlikely to have a significant effect on the Hooded Robin (south-eastern species) given that:<br>■ If a population of the Hooded Robin (south-eastern species) is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger home range.<br>■ Any identified population of Hooded Robin (south-eastern species) in the locality will not be restricted to habitat within the Project Site.<br>■ The Proposed Action will not fragment or isolate potential habitat such that Hooded Robin (south-eastern species) movement in the locality will be impeded – areas of potential habitat and associated movement corridors in the locality which will remain unaffected by the Proposed Action.<br>Therefore, the Proposed action is not considered likely to significantly contribute to a long-term decline in the size of a population of the species. |

#### 2.2.4.6 References


Commonwealth DCCEEW (2023). *Melanodryas cucullata cucullata (hooded robin (south-eastern)) Conservation Advice*.

NSW Bionet Threatened Biodiversity Profile Data Collection (NSW TBDC) (2024). Profile: South-eastern Hooded Robin (*Melanodryas cucullata cucullata)*

### 2.2.5 Spotted-tailed Quoll

#### 2.2.5.1 Status

Spotted-tailed Quoll (*Dasyurus maculatus maculatus*) listed as Endangered under the EPBC Act.

#### 2.2.5.2 Habitat and Ecology

The Spotted-tailed Quoll (southeastern mainland population)) occurs in eastern Australia from south-eastern Queensland to western Victoria. Populations are now fragmented and isolated (TSSC, 2020).

The Spotted-tailed Quoll is carnivorous, feeding on a wide variety of prey such as small-medium sized (less than 5 kg) mammals, birds, reptiles, fish, amphibians, and invertebrates. Spotted-tailed Quolls are solitary animals that occur at low densities. Males have larger ranges of up to a few thousand hectares in size, while females have smaller ranges of several hundred hectares. Home range sizes may vary depending on the quality of habitat – ranges may be smaller in the higher quality habitat in northern New South Wales than in southern New South Wales and Victoria. The Spotted-tailed Quoll is a mainly forest dependent species but occurs in a variety of habitats including closed forests (including temperate and sub-tropical rainforest), tall eucalypt forests, open woodlands, open forests, drier rainshadow woodlands and coastal heathlands (TSSC, 2020).

#### 2.2.5.3 Specific impacts

Spotted-tailed Quoll has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.10**. The Proposed Action will remove up to 258 ha of potential habitat. Large areas of similar or higher quality habitat for the species occur in surrounding woodland/ forest in the locality.

**Table 2.10. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

The species has not been recorded at the Project Site during ecological investigations by GeoLINK, for the Proposed Action. A review of fauna records (BioNet) shows that the species has not been historically recorded at the Project Site. If a population of the Spotted-tailed Quoll is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger home range, when seeking prey or as dispersing subadults from breeding events.

#### 2.2.5.4 Defining the Population Subject to this Assessment

The population of this species subject to this assessment (as defined under the EPBC Act) is comprised of all individuals within the New England Tablelands IBRA Region. The species is relatively mobile (given their large home range size), and the occurrence of higher quality habitat is available elsewhere in the locality and region where the species is known to occur.

If a population of the Spotted-tailed Quoll is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger home range, when seeking prey or as dispersing subadults from breeding events.

#### 2.2.5.5 Impact Assessment

**Table 2.11. Significant impact assessment – Spotted-tailed Quoll –Endangered**

| **Significant Impact Assessment** |
|---|
| **Would the action lead to a long-term decrease in the size of a population?** |

Approximately 258 ha of potential eucalypt woodland and sclerophyll forest habitat is likely to be affected by the Proposed Action.

In order to contextualise the impact to potential habitat for the species within the New England Tablelands IBRA Region - in which the species and Proposed Action occur, the table below identifies the amount (in ha) of each vegetation class impacted by the Proposed Action in the context of similarly available habitat within the IBRA Region.

| Vegetation Class* | Area (ha) within New England Tablelands IBRA Region* | Area (ha) impacted by Proposed Action | Proportion Impacted by Proposed Action within IBRA Region (%) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | 506,298 | 257.26 | 0.05% |
| New England Grassy Woodlands | 18,382 | 0.62 | 0.005% |
| Eastern Riverine Forests | 258,433 | 0.11 | <0.001% |
| **Totals** | **783,113** | **257.99** | **0.03%** |
| **Vegetation data obtained via NSW State Vegetation Type Map* | | | |

Although the Proposed Action represents the loss of potential habitat, the Disturbance footprint will be relatively small component of locally occurring habitat that will be utilised by the species (0.03 %). The Proposed Action it is not likely lead to a long-term decrease in the size of a population given.

- Ecological investigations for the Proposed Action and a review of fauna records (BioNet) shows that the species has not been recorded at the Project Site.
  - If a population of the Spotted-tailed Quoll is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger home range, when seeking prey or as dispersing subadults from breeding events.
- The population of Spotted-tailed Quoll in the locality will not be restricted to habitat within the Project Site.

**Significant Impact Assessment**

- The Proposed Action will not fragment or isolate potential habitat such that Spotted-tailed Quoll movement in the locality will be impeded – areas of potential habitat and associated movement corridors in the locality which will remain unaffected by the Proposed Action.

Therefore, the Proposed action is not considered likely to significantly contribute to a long-term decline in the size of a population of the species.

**Would the action reduce the area of occupancy of the species?**

TSSC (2020) identifies the Spotted-tailed Quoll known Extent of Occurrence (EOO) as approximately 596,344 km$^2$. The Area of Occupancy (AOO) is estimated to be approximately 2,512 km$^2$. The Proposed Action would remove up to 258 ha of potential habitat and thus incrementally reducing the EOO and AOO by < 0.1% across the species range. As such the Proposed Action has the potential to incrementally reduce the area of occupancy for the Spotted-tailed Quoll – albeit by a minor amount.

**Would the action fragment an existing population into two or more populations?**

The documented home range for the Spotted-tailed Quoll is relatively large. Males have larger ranges of up to a few thousand hectares in size, while females have smaller ranges of several hundred hectares (TSSC, 2020). Potential habitat within the broader locality is highly fragmented and historically disturbed (due to agriculture), thereby limiting the potential for any substantial additional fragmentation to occur. Given the ability of this species to disperse over these cleared areas, is it considered unlikely that the proposed action would fragment an existing population into two or more populations.

**Would the action adversely affect habitat critical to the survival of a species?**

The National Recovery Plan for the Spotted-tailed Quoll stipulates that habitat critical to the survival of the Spotted-tailed Quoll occurs as large patches of forest with adequate denning / breeding resources and relatively high densities of medium-sized mammalian prey (DoELWP, 2016). There is relatively high abundance of medium sized mammalian prey within the site as revealed by field surveys (e.g. possums and birds).

The Project Site is smaller (site is 258 ha) than the documented home range for the species, 359–5512 ha for males and 88–1515 ha for females (DoELWP, 2016). Typically, such home ranges would only be supported by large contiguous patches of habitat, like that associated with National Parks and State Forests in the locality. The potential habitat within the Project Site is not likely to constitute habitat critical to the survival of the species, because:

- it is unlikely to support habitat for denning and breeding
- is unlikely to be important for the long-term maintenance of the species
- is unlikely to be important for maintaining genetic diversity
- it is unviable as a location for the reintroduction of the species, due to the absence of denning / breeding resources.

Therefore, the Project Site does not provide habitat critical to the survival of the species, due to it not being able to support all the species life cycle needs.

**Would the action disrupt the breeding cycle of a population?**

The Project Site does not support denning / breeding resources for this species. Therefore, the Proposed Action is unlikely to impact the breeding cycle of a local population (if present), as the species is unlikely to breed within the Proposed action Project Site.

**Would the action modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

There are a few historic records within the locality. This could suggest the species is already in decline within the locality and may not actually use habitats within the Project Site. The potential habitat which will be directly impacted within the Project Site is partially fragmented and disturbed (i.e. agriculture and mining) and is of a relatively smaller size in contrast to the availability of larger contiguous and better-quality habitats in locality (i.e. Torrington NP). It is therefore unlikely the

| Significant Impact Assessment |
|---|
| Proposed Action would modify, destroy, remove or isolate or decrease the availability or quality of potential foraging habitat to the extent that the species is likely to decline. |
| **Would the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?** |
| It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action. |
| **Would the action introduce disease that may cause the species to decline?** |
| The Proposed Action would be unlikely to introduce any disease that may cause the species to decline. |
| **Would the action interfere with the recovery of the species?** |
| The National Recovery Plan for the Spotted-tailed Quoll (DoELWP, 2016) identifies 11 specific objectives to guide the recovery of the Spotted-tailed Quoll. The Proposed Action would marginally interfere with recovery number 3 - *Reduce the rate of habitat loss and fragmentation on private land*. However, the Proposed Action would unlikely significantly interfere with the recovery of the species due to the relatively small size of the Disturbance footprint in contrast to the availability of larger contiguous and better-quality habitats in locality (i.e. Torrington NP). |
| **Conclusion** |
| The Proposed Action will disturb approximately 258 ha of potential habitat, which may be used by the species on an intermittent basis and thus incrementally reducing the EOO and AOO by < 0.1%. The Proposed Action is unlikely to have a significant effect on the Spotted-tailed Quoll given that:<br>■ Whilst the Proposed Action will result in the loss of potential habitat, this loss represents a relatively small component of similar locally occurring resources accessible to the species.<br>■ Potential habitat within the site and broader locality is highly fragmented and historically disturbed (agriculture), thereby limiting the potential for any substantial additional fragmentation to occur. Given the ability of this species to disperse over such cleared areas, it is considered unlikely that the Proposed Action would fragment an existing population into two or more populations.<br>■ The Proposed Action would not form a barrier to the movement of the species within the locality.<br>■ The Project Site does not support denning / breeding resources for this species.<br>■ The Project Site does not provide habitat critical to the survival of the species, due to it not being able to support all of the species life cycle needs. |

#### 2.2.5.6 References


Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Spot-tailed Quoll (*Dasyurus maculatus maculatus*) (SE mainland population).

Department of Environment, Land, Water and Planning. (DoELWP) 2016. *National Recovery Plan for the Spotted-tailed Quoll Dasyurus maculatus*. Australian Government, Canberra.

Threatened Species Scientific Committee (TSSC) (2020). *Conservation Advice* - Dasyurus maculatus maculatus -*(southeastern mainland population) Spotted-tailed Quoll, south eastern mainland*. Canberra: Department of Agriculture, Water and the Environment.

### 2.2.6 Koala

#### 2.2.6.1 Status

Koala (*Phascolarctos cinereus*) listed as Endangered under the EPBC Act.

#### 2.2.6.2 Habitat and Ecology

The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In New South Wales, koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range (NSW TBDC, 2024). The Koala is associated with trees of the genera *Eucalyptus*, *Corymbia*, and *Angophora*, on which it predominantly feeds, and is widely, but patchily, distributed across eastern and southern mainland Australia (DAWE, 2022).

On the New England Tablelands and other areas west of the Great Dividing Range in semi-arid environments. Koala occurs in relatively low-density populations (when compared to coastal regions in NSW). Habitat in these areas is fragmented and this has resulted in a patchy distribution of koalas across their range with significant numbers occurring on privately owned land. There are estimated to be approximately 2,771 individuals within the New England Tablelands IBRA Region, based on population modelling (DAWE, 2022).

Commonwealth DCCEEW (previously Department of Agriculture, Water and the Environment) via - *A review of koala habitat assessment criteria and methods* (Youngentob, Marsh, Skewes, 2021) – recognise locally important koala trees (LIKT) in the Koala management bioregions across the species distribution. The Project Site comprises several LIKT listed for the Northern Tablelands NSW bioregion including Silver-top Stringybark (*E. laevopinea*), Caley's Ironbark (*E. caleyi*), Tumbledown Gum (*E. dealbata*) and to a lesser extent Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*). Listed 'ancillary habitat trees' for the Northern Tablelands NSW bioregion noted by Youngentob, Marsh, Skewes (2021), include Rough-barked Apple (*Angophora floribunda*), Mugga Ironbark (*E. sideroxylon*) and Narrow-leaved Ironbark (*E. sideroxylon*).

The *Northern Tablelands Koala Recovery Strategy 2015-2025* (The Envirofactor, 2016), provides a list of 17 eucalypts which are considered preferred food trees, 14 eucalypts are considered occasional feed trees, and 6 species predominantly non-eucalypts are used for shade and shelter for the Koala population within the Northern Tablelands. The Project Site comprises several Koala use feed tree species listed in the *Northern Tablelands Koala Recovery Strategy 2015-2025*, preferred use feed tree species within the Project Site comprise: Yellow Box (*E. melliodora*) and Blakely's Red Gum (*E. blakelyi*) and Silver-top Stringybark (*E. laevopinea*). Occasional food tree species within the Project Site comprise Tumbledown Gum (*E. dealbata*).

With regard to Koala food tree species listed by NSW DCCEEW (2024) for the Northern Tablelands koala management area (KMA). The Project Site comprises secondary food tree including Tumbledown Gum (*E. dealbata*), Yellow Box (*E. melliodora*) and Blakely's Red Gum (E. *blakelyi*). Supplementary tree species for northern tablelands region were also observed which included Silver-topped stringybark (*E. laevopinea*).

Koala movement, known distribution and population trends are relatively poorly understood in the Northern Tablelands region (The Envirofactor, 2016) (USC, 2021).

#### 2.2.6.3 Specific impacts

Koala has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises known habitat for the species in the form of PCTs identified at **Table 2.12**. The Proposed Action will remove up to 258 ha of known habitat. Large areas of similar or higher quality habitat for the species occur in surrounding woodland/ forest in the locality.

**Table 2.12. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

Whilst no Koalas have been actively observed within the Project Site, as part of ecological investigations for the Proposed Activity or during prior ecological assessments by GeoLINK (2017) - faecal pellets were identified within the Project Site by GeoLINK in 2017 and 2022. Faecal pellets discovered in 2022 were sent off for analysis (analysis undertaken by ScatsAbout) and confirmed to be from a Koala.

During the previous ecological assessment (GeoLINK, 2017), Koala Spot Assessment Technique (SAT) surveys were undertaken at six sample sites as well as Koala 'call playback' over three nights within the Project Site. The 2017 GeoLINK assessment concluded that no Koalas were directly recorded (observed or heard) during the surveys, however Koala scats were detected at three of the six SAT sample sites. The levels of scats detected were indicative of low levels of Koala usage for populations on the western slopes and plains (Phillips and Callaghan 2011) (GeoLINK, 2017).

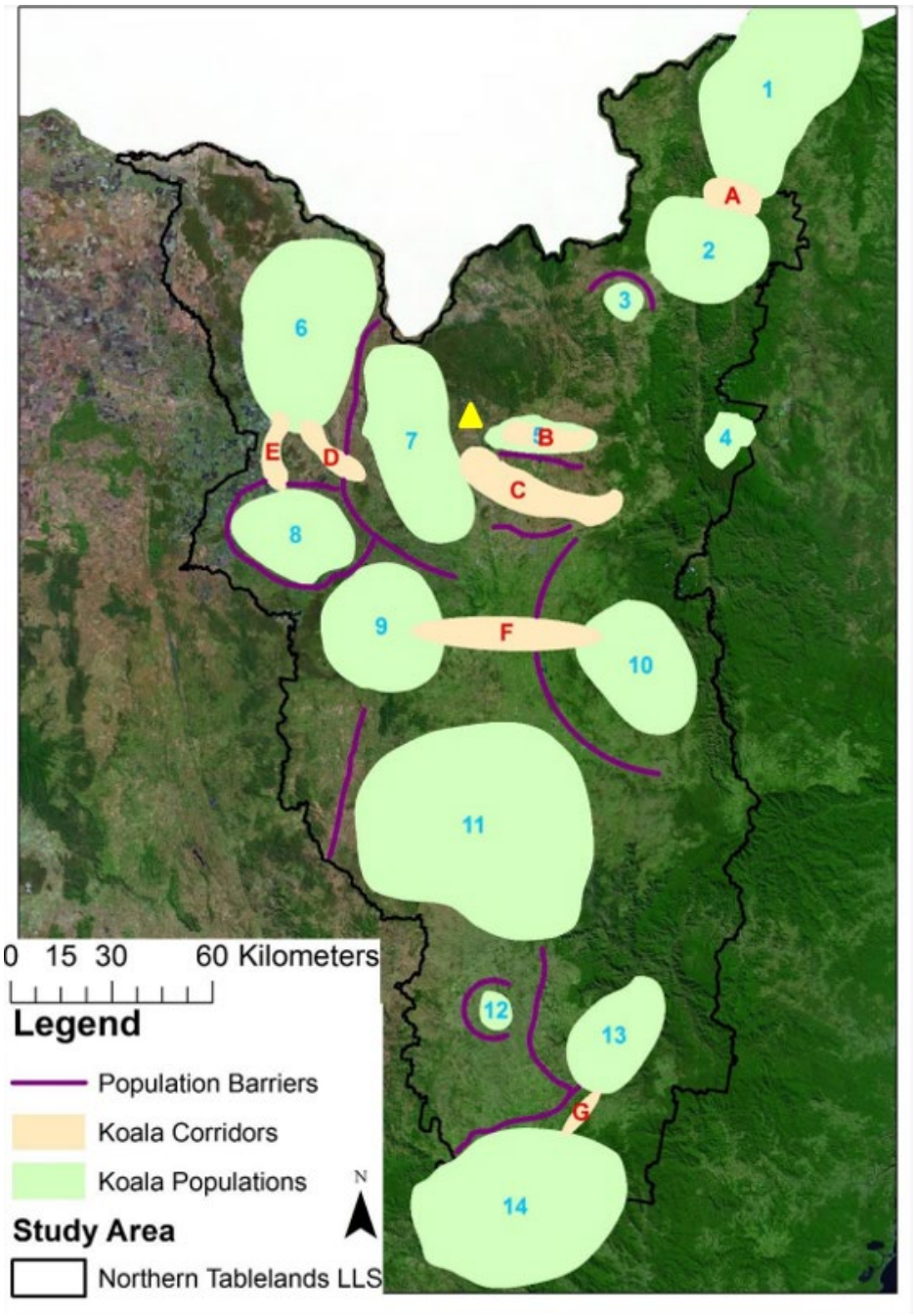
Koala dog detection surveys were undertaken in September 2023, within both the Project Site (and adjoining 'offset site'). Koala dog detection surveys did not record any additional Koala scats either within the Project Site (and adjoining 'offset site'), indicating that the presence of the species is likely to be at low densities and unlikely to provide core Koala habitat. It is possible that the Project Site may be used on an intermittent basis during local movements.

In addition, the Project Site contains LIKT (Youngentob, Marsh, Skewes, 2021) for the Northern Tablelands NSW bioregion including Silver-top Stringybark (*E. laevopinea*), Caley's Ironbark (*E. caleyi*), Tumbledown Gum (*E. dealbata*) and to a lesser extent Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*). Listed 'ancillary habitat trees' include Rough-barked Apple (*Angophora floribunda*), Mugga Ironbark (*E. sideroxylon*) and Narrow-leaved Ironbark (*E. sideroxylon*).

#### 2.2.6.4 Defining the Population Subject to this Assessment

The Koala population subject to this assessment (as defined under the EPBC Act) are individuals which occur within two local Koala populations identified by Enviro (2016): being '*5 (Emmaville to east of Deepwater areas')* and '*7 (Pindaroi and surrounds to the Qld border)'* (see below). These

populations were identified as a result of the Armidale koala expert forum (2015). They contribute to the viability of the broader Koala population within the New England Tablelands IBRA Region.




**Local koala populations, important movement corridors and movement barriers (Armidale koala expert forum, Nov 2015). Site (approximately) indicted by yellow triangle. Map not to scale.**

#### 2.2.6.5 Impact Assessment

**Table 2.13. Significant impact assessment – Koala –Endangered**

| Significant Impact Assessment |
| --- |
| **Would the action lead to a long-term decrease in the size of a population?** |

## Significant Impact Assessment

Approximately 258 ha of known habitat for the Koala would be affected by the Proposed Action, the majority of which is dominated by LIKT; Silver-top Stringybark (*E. laevopinea*), Caley's Ironbark (*E. caleyi*) and Tumbledown Red Gum (*E. dealbata*). In less steep and flatter terrain areas comprise a co-dominance of Rough-barked Apple (*A. floribunda*) and Yellow Box (*E. melliodora*).

In order to contextualise the impact to known habitat for the species within the New England Tablelands IBRA Region, in which the species and Proposed Action occurs, the table below identifies the amount (ha) of each vegetation class impacted by the Proposed Action in the context of similarly available habitat within the IBRA Region.

| **Vegetation Class*** | **Area (ha) within New England Tablelands IBRA Region*** | **Area (ha) impacted by Proposed Action** | **Proportion Impacted by Proposed Action within IBRA Region (%)** |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | 506,298 | 257.26 | 0.05% |
| New England Grassy Woodlands | 18,382 | 0.62 | 0.005% |
| Eastern Riverine Forests | 258,433 | 0.11 | <0.001% |
| **Totals** | **783,113** | **257.99** | **0.03%** |
| **Vegetation data obtained via NSW State Vegetation Type Map* | | | |

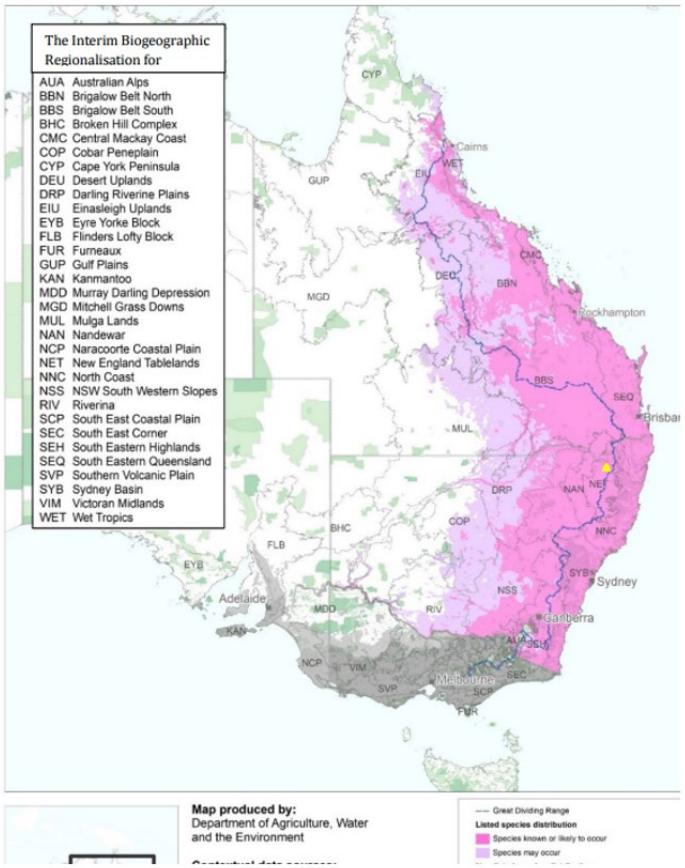
Whilst no Koala's were actively observed within the Project Site, faecal pellets were identified within the Project Site, in 2017 and 2022. The 2022 faecal pellets were sent off for analysis (undertaken by ScatsAbout) and confirmed to be from Koala.

Koala scats were detected at three of the six SAT sample sites during a 2017 GeoLINK ecological investigation. The levels of scats detected were indicative of low levels of Koala usage for populations on the western slopes and plains (Phillips and Callaghan 2011) (GeoLINK, 2017).

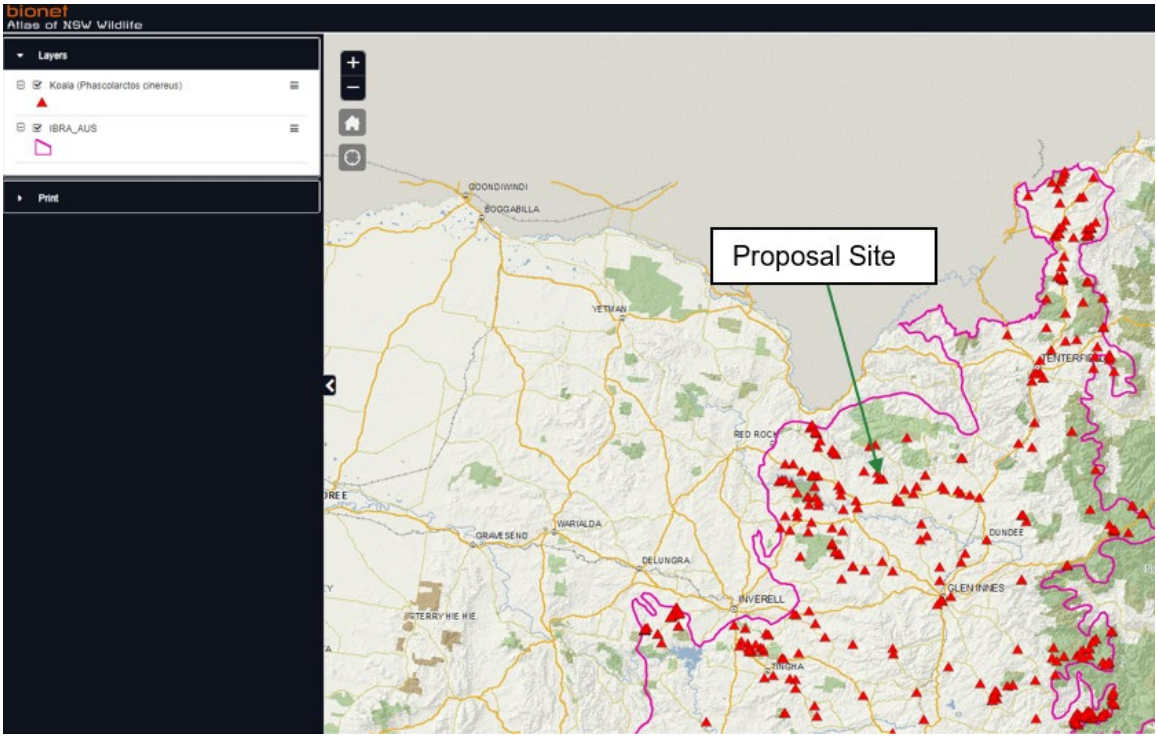
Koala dog detection surveys were undertaken in September 2023 both within the Project Site (and adjoining 'offset site'). Koala dog detection surveys did not record any additional Koala scats either within the Project Site (and adjoining 'offset site'), indicating that the presence of the species is likely to be at a low density and the site is unlikely to provide core Koala habitat. It is possible that the Project Site may be used on an intermittent basis during local movements.

Koalas have a large distribution across eastern Australia. There are estimated to be approximately 2,771 individuals within the New England Tablelands IBRA Region, based on population modelling (DAWE, 2022). There are 1,916 Koala BioNet records within the New England Tablelands IBRA Region - two of which are located on the Project Site (one record is incorrectly placed).

Map 1 The distribution of the koala




**Distribution of Koala and the approx. location of the site (yellow triangle) for context. Map not to scale.**




**BioNet record in proximity to the Project Site. Map not to scale.**

## Significant Impact Assessment

Koala within the Northern Tablelands region are known to have home ranges of 35-50 ha, which vary in size summer to winter (The Envirofactor, 2016). The Project Site is located between two local Koala populations identified by Enviro (2016), being '*5 (Emmaville to east of Deepwater areas*)' and '*7 (Pindaroi and surrounds to the Qld border*)'.

While the Proposed Action would remove up to 258 ha of known habitat and thus incrementally reduce the AOO of the species – this represents a 0.03 % loss of Northern Tableland Dry Sclerophyll Forests, New England Grassy Woodlands and Eastern Riverine Forests within the IBRA region, in which Koala habitat occurs. The Proposed Action it is not likely lead to a long-term decrease in the size of a population given.

- Based on historical records and survey evidence, the presence of the species is likely to be at a low density and the Project Site is unlikely to provide core Koala habitat. It is possible that the Project Site may be used on an intermittent basis during local movements.
- The site is outside of known local populations and their movement corridors (The Envirofactor, 2016).
- The Proposed Action will not fragment or isolate known habitat such that Koala movement in the locality will be impeded, areas of potential habitat and associated movement corridors in the locality will remain unaffected by the Proposed Action.
- The Proposed Action will not introduce disease, predators or interfere with the recovery of the species.

For reasons outlined above, the Proposed Action is considered unlikely to cause a long-term decrease in the size of the Koala population within the Northern Tablelands region.

### Would the action reduce the area of occupancy of the species?

The Project Site is likely to be used by the species on an intermittent basis during local movements (owing to lack of recordings on site), however this could also be attributed to the lack of survey intensity on site and in the region more broadly. The Project Site is dominated by LIKT (comprising Silver-top Stringybark (*E. laevopinea*), Caley's Ironbark (*E. caleyi*) and Tumbledown Red Gum (*E. dealbata*). In less steep and flatter terrain areas comprise a co-dominance of Rough-barked Apple (*A. floribunda*) and Yellow Box (*E. melliodora*).

The Proposed Action would remove up to 258 ha of known habitat. This represents a 0.03 % loss of Northern Tableland Dry Sclerophyll Forests, New England Grassy Woodlands and Eastern Riverine Forests within the IBRA region. As such the Proposed Action has the potential to incrementally reduce the area of occupancy for Koala, albeit by a contextually minor amount.

### Would the action fragment an existing population into two or more populations?

The Project Site is located between two local Koala populations being *'5 (Emmaville to east of Deepwater areas*)' and '*7* (*Pindaroi and surrounds to the Qld border*)'. The Proposed Action does not occur within recognised Koala movement corridors, nor would the Proposed Action create a significant barrier between these populations.

Whilst faecal pellets were identified within the Project Site (in 2017 and 2022), subsequent Koala dog detection surveys were undertaken in the Project Site and did not record any additional Koala scats, indicating that the presence of the species is likely to be a low density. There are no historical BioNet Koala records on site.

Whilst the Proposed Action will incrementally contribute to habitat loss, the Proposed Action would not fragment an existing population into two or more populations for the following reasons.

- The Proposed Action is located outside known local Koala populations (The Envirofactor, 2016).
- The Proposed Action will not create significant landscape scale barriers between these known local Koala populations – retained forested areas in the locality will continue to provide movement corridors for the species.
- The site appears to support a low-density population of Koalas which may use the site intermittently (owing to lack of records on site, historically and through recent survey evidence).

### Would the action adversely affect habitat critical to the survival of a species?

## Significant Impact Assessment

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

However, as defined in the *National Recovery Plan for the Koala* (DAWE, 2022), habitat critical to the survival of a species is the area the species relies on to halt decline and promote the recovery of the species. Whilst ideally this would be identified spatially, the distribution of the listed Koala population is confounded by the absence of data on Koala distribution and abundance and consequently their habitat requirements in those areas. DAWE (2022) describes the functional ecology of the Koala in terms of the combined assemblage of habitat qualities theoretically required to stop decline and promote recovery. Key questions in evaluating habitat for Koala are:

- *(a) whether the habitat is used during periods of stress*
- *(b) whether the habitat is used to meet essential life cycle requirements*
- *(c) the extent to which habitat is used by important populations*
- *(d) whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development.*
- *(e) whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements*
- *(f) whether the habitat is necessary to ensure the long-term future of the species or ecological community through reintroduction or recolonisation*
- *(g) any other way in which habitat may be critical to the survival of a listed threatened species or listed threatened ecological community (EPBC Act).*

As discussed below, the known habitat on site comprises habitat critical to the survival the species, in accordance with (a) – (g) above.

Whilst faecal pellets were identified within the Project Site, subsequent Koala dog detection surveys were undertaken in the Project Site and did not record any additional Koala scats - indicating that the presence of the species is likely to be a low density and low habitat utilisation. Local Koala populations (The Envirofactor, 2016), are not restricted to the Project Site.

LIKT at the Project Site comprise Silver-top Stringybark (*E. laevopinea*), Caley's Ironbark (*E. caleyi*) and Tumbledown Red Gum (*E. dealbata*). In less steep and flatter terrain areas comprise a co-dominance of Rough-barked Apple (*A. floribunda*) and Yellow Box (*E. melliodora*).Given the findings above, the Project Site may be used on an intermittent basis during local movements. Habitat on site satisfies the definition of habitat critical to the survival the species, in accordance with (a) – (g) above.

While the Proposed Action would remove up to 258 ha of habitat critical to the survival the species, this represents a 0.03 % loss of Northern Tableland Dry Sclerophyll Forests, New England Grassy Woodlands and Eastern Riverine Forests within the IBRA region, in which Koala habitat occurs.

While the Proposed Action will impact areas of habitat critical to the survival of Koala, the impact is considered a relatively minor proportion of habitat available for the species within the IBRA Region.

### Would the action disrupt the breeding cycle of a population?

No individuals have been directly recorded at the Project Site to date. Faecal pellets were identified within the Project Site, subsequent Koala dog detection surveys were undertaken in the Project Site and did not record any additional Koala scats. Local Koala populations (The Envirofactor, 2016), are not restricted to the Project Site. Small number of records do occur in the locality and vegetation in the Project Site contains LIKT.

It is expected that the Project Site is used by the species on an intermittent basis during local movements, but it is not likely to represent important habitat for a breeding population. Therefore, it is considered unlikely that the Proposed Action will disrupt the breeding cycle of a koala population.

### Would the action modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The Proposed Action will disturb approximately 258 ha of known habitat considered to be used by the species on an intermittent basis during local movements.

**Significant Impact Assessment**

The removal of approximately 258 ha of known habitat is an incremental loss, decreasing the amount of suitable foraging habitat available locally. As a proportion, this represents a 0.03 % loss of Northern Tableland Dry Sclerophyll Forests, New England Grassy Woodlands and Eastern Riverine Forests within the IBRA region.

The proposed action would not result in a significant fragmentation (resulting in isolation) of Koala habitat or reduce the availability of access to Koala habitat in the locality as connectivity would be maintained by surrounding potential Koala habitat.

Considering the mobile nature of this species and large home range, the Proposed Action is unlikely to isolate the species habitat significantly such that the species is likely to decline.

**Would the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the Koala will become further established as a result of the Proposed Action.

**Would the action introduce disease that may cause the species to decline?**

The Proposed Action would be unlikely to introduce any disease that may cause the species to decline.

**Would the action interfere with the recovery of the species?**

The National Recovery Plan for the Koala (DAWE, 2022) notes:

*'…it is clear that in order to halt decline and promote the recovery of the listed Koala, the following should be avoided:*

- Clearing of habitat used by Koalas for feeding and resting.
- Reducing connectivity between patches of habitat used by Koalas for feeding, resting, commuting and dispersing (either by clearing of vegetation or by the erection of barriers to passage).
- Clearing of habitat used by Koalas during extreme events (heat waves, drought/ fire refuge).
- Avoiding activities that will expose Koalas to additional threats (e.g. dogs, cars) in places where Koalas must use the ground to move between resting and feeding trees.

The Proposed Action is not consistent with the above due to habitat clearing and reduction in connectivity related threats.

**Conclusion**

The Proposed Action will disturb approximately 258 ha of known habitat considered to be used by the species on an intermittent basis during local movements, but it is not likely to represent important habitat given.

- Based on historical records and survey evidence, the presence of the species is likely to be at a low density and the Project Site is unlikely to provide core Koala habitat. It is possible that the Project Site may be used on an intermittent basis during local movements.
- The site is outside of known local populations and their movement corridors (The Envirofactor, 2016).
- The Proposed Action will not fragment or isolate known habitat such that Koala movement in the locality will be impeded. Areas of potential habitat and associated movement corridors in the locality will remain unaffected by the Proposed Action.
- The Proposed Action will not introduce disease, predators or interfere with the recovery of the species.

While the Proposed Action would remove up to 258 ha of known habitat and thus incrementally reduce the area of occupancy of the species – this represents a relatively minor (0.03 %) loss of Northern Tableland Dry Sclerophyll Forests, New England Grassy Woodlands and Eastern Riverine Forests within the IBRA region, in which Koala habitat occurs.

The Proposed Action is unlikely to represent significant increases to habitat isolation and/or fragmentation when considering the large home ranges, mobility, and the location of known local

populations (outside of the site) and their associated movement corridors. The Proposed Action would not impact the long-term survival of populations in the locality and is unlikely to further create a movement barrier for these species.

For reasons outlined above, the Proposed Action is considered unlikely to have a significant impact on the species.

#### 2.2.6.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Koala (*Phascolarctos cinereus*)

Department of Agriculture, Water and the Environment (DAWE) (2022). *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory.*

Department of Agriculture, Water and the Environment (DAWE) (2022), *National Recovery plan for the Koala: Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory).* Department of Agriculture, Water and the Environment, Canberra. March 2022.

GeoLINK (2017) *Ecological Assessment Addendum Taronga Tin Project* (2523-1035).

NSW Bionet Threatened Biodiversity Profile Data Collection (NSW TBDC) (2024). Profile:Koala (*Phascolarctos cinereus*)

The Envirofactor, 2016. *Northern Tablelands Koala Recovery Strategy 2015-202* for the Northern Tablelands Local Land Services (NT LLS).

University of the Sunshine Coast (USC) (2021). *Cool Country Koala Project 2020 – 2021: Koala Habitat and Disease Pilot Project.*

Youngentob, K.N, Marsh, K.F., Skewes, J., *A review of koala habitat assessment criteria and methods*, report prepared for the Department of Agriculture, Water and the Environment, Canberra, November 2021.

## 2.3 Vulnerable species listed under the EPBC Act

**Significant impact criteria**: *An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:*

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

Assessments have been completed for the following endangered or critically endangered species listed at **Table 2.14**. **Table 2.14** provides a summary for the reader, with regard to the outcome of the assessment for each species. The detailed significant impact assessment for each species is provided within **Section 2.3**.

**Table 2.14. EPBC Act listed Vulnerable species considered for assessment**

| Scientific Name | Common Name | EPBC Act | Direct Impact (ha) to Habitat | Significant Impact? |
|---|---|---|---|---|
| **Flora** | | | | |
| *Acacia pubifolia* | Velvet Wattle | V | 8.28 ha or 1,967 individuals | **Yes** - The Proposed Action will directly impact approximately 47% of the estimated number of recorded individuals across NSW. The Proposed Action may result in a significant adverse impact to the important population such that it may cause a long-term decrease in the size of an important population. |
| *Dichanthium setosum* | Bluegrass | V | 0.64 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| **Fauna** | | | | |
| *Aphelocephala leucopsis* | Southern Whiteface | V | 154.2 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| *Climacteris picumnus victoriae* | Brown Treecreeper | V | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |

| Scientific Name | Common Name | EPBC Act | Direct Impact (ha) to Habitat | Significant Impact? |
|---|---|---|---|---|
| *Grantiella picta* | Painted Honeyeater | V | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| *Hirundapus caudacutus* | White-throated Needletail | V | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| Stagonopleura guttata | Diamond Firetail | V | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| *Nyctophilus corbeni* | Corben's Long-eared Bat | V | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | V | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| *Uvidicolus sphyrurus* | Border Thick-tailed Gecko | V | 258 ha | **Yes** - the Proposed Action is considered likely to have a significant impact on the species |

V = Vulnerable

### 2.3.1 Velvet Wattle

#### 2.3.1.1 Status

Velvet Wattle (*Acacia pubifolia*) listed as Vulnerable under the EPBC Act.

#### 2.3.1.2 Habitat and Ecology

Velvet Wattle is known from two sites in NSW, one north of Emmaville in the Torrington State Recreation Area and the other on private property near Warrabah National Park (35 km south-east of Barraba), and from near Wyberba in Queensland. This species grows in dry scrubby woodland on granite, sandy, stony, loam and metasediment soils. It occurs within the Border Rivers-Gwydir, Namoi, Northern Rivers (NSW), and Border Rivers Maranoa-Balonne Natural Resource Management Regions (Department of the Environment, Water, Heritage and the Arts, 2008).

#### 2.3.1.3 Specific impacts

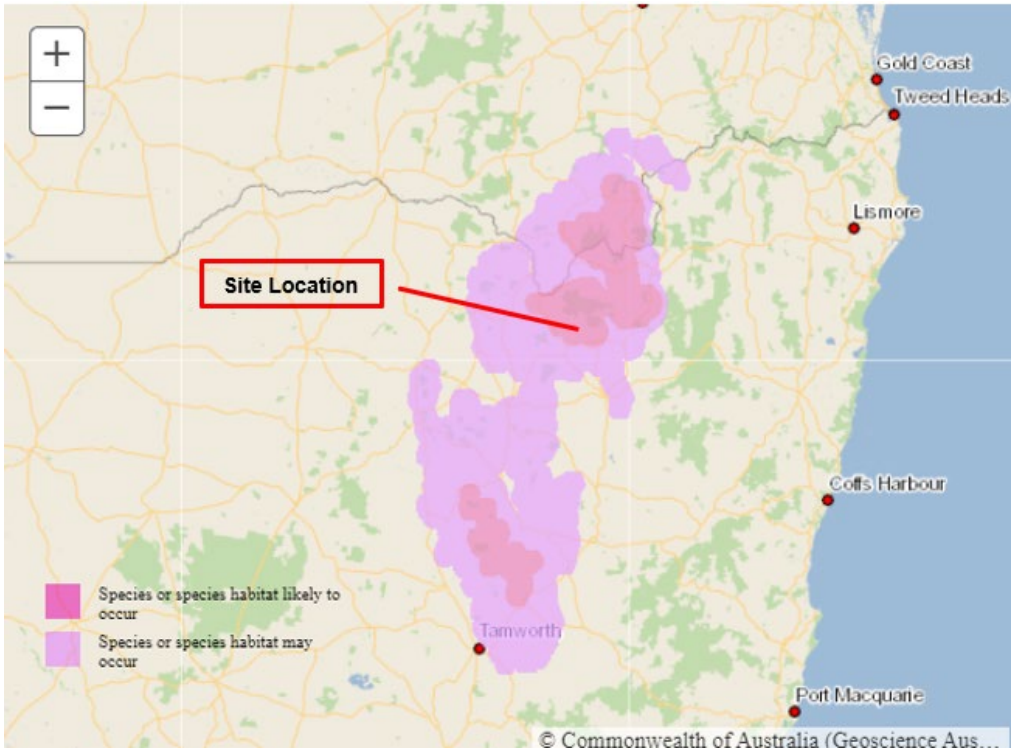
Velvet Wattle has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCT 3722. Approximately 8.28 ha of known habitat associated with Velvet Wattle would be impacted by the Proposed Action. The Proposed Action would result in the direct impact to approximately 1,967 individuals, which comprise of both juveniles (occurring predominately as regrowth) and mature individuals.

#### 2.3.1.4 Defining the Important Population Subject to this Assessment

Velvet Wattle within the site does form part of an 'important population' for the following reasons:

- The species is endemic to two disjunct localities on the tablelands and north-west slopes region one being north of Emmaville (Spring Hill subpopulation) and the other near Warrabah National Park (Warrabah subpopulation), 35 km south-east of Barraba.
- The local population (not the important population – defined below) is considered to be individuals identified in BioNet searches within a 50 km radius of the site which is approximately 7,771 records (25/02/2025). Of these, 4,220 individuals were recorded during surveys and subsequently been added to BioNet database records. It should be noted that this region is likely to be unsurveyed and areas have not been surveyed outside known occurrences, there is a high likelihood of additional plants occurring on suitable habitat around existing nearby BioNet records likely linking subpopulations in the locality inclusive of the site. During surveys, substantial areas of Velvet Wattle were observed outside the site.
- The Conservation Assessment of *Acacia pubifolia Pedley* (Fabaceae) (NSW Department of Climate Change, Energy, the Environment and Water, 2024) notes " *foraging ranges of typical Acacia pollinators and seed disperser species are less than 3 km, resulting in limited gene flow*". The closest known records of Velvet Wattle to those recorded on site are associated with the Spring Hill subpopulation approximately 8 km away. Given the distance to the closest known subpopulation is in excess of 3km the site population can be considered a distinct subpopulation as defined by IUCN (2022).
- For the purposes of the assessment, the population of Velvet Wattle is defined as all Velvet Wattle on site.
- It is acknowledged that there may be additional records of Velvet Wattle in potential habitat between the site and the Spring Hill subpopulation (reducing pollination and seed dispersal distances and the potential for the site population to form part of the Spring Hill subpopulation), but until further survey is conducted the site population is conservatively considered a subpopulation.

- Velvet Wattle within the site is considered a key source population for dispersal of the species within the locality.
- Due to the species geographic range, individuals on site are necessary for maintaining genetic diversity.
- The site is near the limit of its known northern population AOO; however it wouldn't be near the extent of its overall possible distribution associated with its EOO.




**Distribution of Velvet Wattle and the approx. location of the site for context. Map not to scale.**

#### 2.3.1.5 Impact Assessment

**Table 2.15. Significant impact assessment – Velvet Wattle –Vulnerable**

| Significant impact | Assessment |
|---|---|
| **Would the action lead to a long-term decrease in the size of an important population of a species?** | |
| Approximately 8.28 ha of known habitat associated with Velvet Wattle would be impacted by the Proposed Action. With regard to the number of known individuals, approximately 4,220 individuals (at all growth stages) have been recorded by GeoLINK to date as part of ecological investigation for the Proposed Action – this includes individuals within the Disturbance footprint (1,967) and those outside of the impact area within the site (1,652).<br>The Proposed Action will directly impact 1,967 individuals, as a proportion this is approximately 47% of the important population subject to the assessment. In regard to the recorded population within the greater locality (50 km), which currently totals 7,771 individuals (BioNet records) the Proposed action impact equates to the loss of 25%. Based on the direct impact to known individuals (as quantified by count), the Proposed Action may result in a significant adverse impact to the important population such that it may cause a long-term decrease in the size of the defined important population. | |
| **Would the action reduce the area of occupancy of an important population?** | |
| A buffer of 30m was applied to all records of Velvet Wattle on site to determine the area of occupancy on site for the subject defined important population. The area of occupancy for the | |

define important population is 23.22 ha. The Proposed Action will directly impact 8.28 ha (36%)of the important population.

Based on the direct impact to known individuals (as quantified by count), the Proposed Action may result in a significant adverse impact on the estimated number of recorded individuals and the area of which they occupy

**Would the action fragment an existing important population into two or more populations?**

The disturbance footprint would not create barriers to movement such that the subject defined important population would fragment. Reproductive capacity and exchange of genetic material would still occur within the Project Site and locality.

Whilst the Proposed Action will incrementally contribute to habitat loss, the Proposed Action would not fragment an existing population into two or more populations.

**Would the action adversely affect habitat critical to the survival of a species?**

There are no approved areas of declared critical habitat for the species. Given the isolated and sporadic occurrences of known habitat in the locality, it is unlikely that the Disturbance footprint occurs exclusively within habitat critical to the survival of the species.

**Would the action disrupt the breeding cycle of an important population?**

Whilst the Proposed Action will incrementally contribute to habitat loss, the Proposed Action would not disrupt the breeding cycle of an important population for the following reasons.

- Velvet Wattle reproduces through seed germination. Flora pollination is likely to be insects and to a lesser extent birds. Seed dispersal is considered to favour wind and insect dispersal agents such as ants (NSW TSSSC, 2024) – pollination and seed dispersal can continue post clearing for the defined subject important population.
- Suitable habitat with known occurrences of individuals will be retained on the Project Site and within the adjoining property (owned by the Proponent) post development.

**Would the action modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

Approximately 8.28 ha of known habitat associated with Velvet Wattle would be impacted by the Proposed Action.

The occurrence of Velvet Wattle would persist (albeit reduced) within the Project Site and surrounding areas despite the Proposed Action occurring. The Proposed Action would not limit the reproductive capacity and exchange of genetic material of Velvet Wattle.

The Proposed Action is considered unlikely to significantly modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

**Would the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?**

Mitigation measures provided would minimise the potential for the introduction of plant pathogens into adjacent areas of habitat and the introduction of disease is unlikely.

**Would the action introduce disease that may cause the species to decline?**

There are no known diseases causing a population of Velvet Wattle to decline.

**Would the action interfere with the recovery of the species?**

No Commonwealth Recovery plan has been prepared for this species at this stage.

Velvet Wattle is currently listed under the *NSW Biodiversity Conservation Act 2016* and a conservation project has been developed by the NSW DCCEEW under the Saving our Species (SoS) program. Activities to assist this species currently recommended by the SoS program include:

| Significant impact | Assessment |
|---|---|

- Managing habitat loss, disturbance and modification
- Ex situ conservation
- Survey and monitoring
- Information and stakeholder liaison.

The Proposed Action could interfere with the SoS program due to the removal of 8.28 ha of known habitat.

**Conclusion**

- The individuals on site are considered an important population.
- Approximately 8.28 ha of known habitat associated with Velvet Wattle would be impacted by the Proposed Action, 36% of the area of occupancy for the important population.
- The Proposed Action will directly impact 1,967 individuals, as a proportion this is approximately 47% of the important population subject to the assessment. In regard to the recorded population within the greater locality (50 km), which currently totals 7,771 individuals (BioNet records) the Proposed action impact equates to the loss of 25%.
- The disturbance footprint would not create barriers to movement such that the subject defined important population would fragment.
- Whilst the Proposed Action will incrementally contribute to habitat loss, the Proposed Action would not disrupt the breeding cycle of an important population.
- Suitable habitat with known occurrence of individuals will be retained on the Project Site and within the adjoining property (owned by the Proponent) post development.

Based on the direct impact to known individuals (as quantified by count), the Proposed Action may result in a significant adverse impact to the important population such that it may cause a long-term decrease in the size of an important population.

As such, there is a real chance that the Proposed Action will cause a significant impact to the species over the long-term – hence referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water is required.

#### 2.3.1.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Velvet Wattle (*Acacia pubifolia*)

(Department of the Environment, Water, Heritage and the Arts, 2008). *Approved Conservation Advice for Acacia pubifolia.*

NSW Bionet Threatened Biodiversity Profile Data Collection (NSW TBDC) (2024). Profile: Velvet Wattle (*Acacia pubifolia*)

### 2.3.2 Bluegrass

#### 2.3.2.1 Status

Bluegrass (*Dichanthium setosum*) listed as Vulnerable under the EPBC Act

#### 2.3.2.2 Habitat and Ecology

*Dichanthium setosum* occurs chiefly on the northern tablelands in the Saumarez area, west of Armidale, and 18-30 km east of Guyra. It is more rarely found on the north-western slopes, central western slopes and north-western plains of NSW, extending west to Narrabri. In Queensland it has been reported from the Leichhardt, Morton, North Kennedy and Port Curtis region. This species occurs in the Mistake Range, in Main Range National Park, and possibly in Glen Rock Regional Park, adjacent to the Main Range National Park. *Dichanthium setosum* is associated with heavy basaltic black soils and stony red-brown hardsetting loam with clay subsoil and is found in moderately disturbed areas such as cleared woodland, grassy roadside remnants, grazed land and highly disturbed pasture (Department of the Environment, Water, Heritage and the Arts, 2008).

#### 2.3.2.3 Specific impacts

Bluegrass has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site (Glen Innes Mine Camp) comprises potential habitat for the species in the form of PCT 3339 – Guyra Basalt Snow Gum Woodland (poor condition). Approximately 0.64 ha of potential habitat would be impacted by the Proposed Action. No direct impact of recorded individuals would occur due to the disturbance footprint.

Targeted flora surveys were undertaken at the Mine Site and the Mine Camp for all potential threatened EPBC Act listed flora, including Bluegrass. Targeted surveys did not record the species at the Mine Site, only the Mine Camp at Glenn Innes Airport (PCT 3339) is considered potential habitat for the species.

#### 2.3.2.4 Defining the Important Population Subject to this Assessment

Bluegrass within the Project Site (Mine Camp) is unlikely to be a key source population for breeding or dispersal or be necessary for maintaining genetic diversity as the habitat is not preferred by local populations (given the lack of BioNet recording within the locality and the Project Site is not within known concentrations of the species occurrence). Individuals within the Project Site are not at the limit of the threatened species range. For these reasons, individuals within the Project Site cannot be identified as an important population.

**Distribution of Bluegrass and the approx. location of the site for context. Map not to scale.**

#### 2.3.2.5 Impact Assessment

**Table 2.16. Significant impact assessment – Bluegrass –Vulnerable**

| Significant impact | Assessment |
|---|---|
| **Would the action lead to a long-term decrease in the size of an important population of a species?** | |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. | |
| **Would the action reduce the area of occupancy of an important population?** | |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. | |
| **Would the action fragment an existing important population into two or more populations?** | |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. | |
| **Would the action adversely affect habitat critical to the survival of a species?** | |
| There are no approved areas of declared critical habitat for the species. Given the isolated and sporadic occurrences of known habitat in the locality, it is unlikely that the Disturbance footprint occurs exclusively within habitat critical to the survival of the species.<br>Thus, the Proposed Action is considered unlikely to adversely affect habitat critical to the survival of a species. | |

| Significant impact | Assessment |
|---|---|
| **Would the action disrupt the breeding cycle of an important population?** | |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. | |
| **Would the action modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?** | |
| Approximately 0.64 ha of potential habitat is likely to be affected by the Proposed Action. Although the Proposed action represents the loss of potential habitat, the Disturbance footprint comprises < 0.01% of the species AOO and < 0.01% of the species EOO. The Disturbance footprint (Mine Camp) comprises potential habitat for the species in the form of PCT 3339 (poor condition). This area is disturbed native vegetation in a derived stated. Bluegrass in the locality will not be restricted to habitat within the Development Site. Therefore, the Proposed Action is considered unlikely to significantly modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | |
| **Would the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?** | |
| Mitigation measures provided would minimise the potential for the introduction of plant pathogens into adjacent areas of habitat and the introduction of disease is unlikely. | |
| **Would the action introduce disease that may cause the species to decline?** | |
| There are no known diseases causing a population of Bluegrass to decline. | |
| **Would the action interfere with the recovery of the species?** | |
| No Commonwealth Recovery plan has been prepared for this species at this stage. | |
| **Conclusion** | |
| Bluegrass within the Project Site cannot be identified as an important population. Approximately 0.64 ha of potential habitat is likely to be affected by the Proposed Action. Although the Proposed action represents the loss of potential habitat, the Disturbance footprint comprises < 0.01% of the species AOO and < 0.01% of the species EOO.<br>The Proposed Action is not considered likely to fragment any locally occurring populations, affect habitat critical to their survival, disrupt their breeding cycles, or interfere with the recovery of the species. Therefore, the Proposed Action is assessed as representing an incremental loss of local habitat, which it is not considered likely to affect the long-term viability of the species in the locality. The Proposed Action is unlikely to have a significant effect on Bluegrass. | |

2.3.2.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Bluegrass (*Dichanthium setosum*)

(Department of the Environment, Water, Heritage and the Arts, 2008). *Approved Conservation Advice for Dichanthium setosum.*

NSW Bionet Threatened Biodiversity Profile Data Collection (NSW TBDC) (2025). Profile: Bluegrass (*Dichanthium setosum*).

### 2.3.3 Southern Whiteface

#### 2.3.3.1 Status

Southern Whiteface (*Aphelocephala leucopsis*) listed as Vulnerable under the EPBC Act.

#### 2.3.3.2 Habitat and Ecology

Southern Whiteface occurs across most of mainland Australia south of the tropics, from the north-eastern edge of the Western Australian wheatbelt, east to the Great Dividing Range. Southern Whitefaces live in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains. Southern Whiteface forage almost exclusively on the ground, favouring habitat with low tree densities and an herbaceous understorey litter cover (Commonwealth DCCEEW, 2023).

#### 2.3.3.3 Specific impacts

Southern Whiteface has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.17**. A total of 519.25 ha of potential habitat is available for the species at the Project Site and 154.2 ha of habitat will be directly impacted (refer to **Table 2.17**). The Southern Whiteface does not use shrubby woodland habitat forms where the Proposed Action is located, it is prefers very open grassy woodland habitats that occur outside of such shrubby forested habitats. The upslope densely forested vegetation (typically PCT 3722) in which the Proposed Action is located is generally characterised by a dense understory shrub layer. Whilst 258 ha of native vegetation will be impacted by the Proposed Action – much of this habitat is characterised as containing the non-preferred high understory shrub densities. This species was recorded within the biodiversity study area at two locations (PCT 3722 modified and PCT 3722 Poor). The locations where the species was recorded at the Project Site is characterised by a sparse shrub layer – typical of the prefer habitat for the species and as such approximately 154.2 ha of suitable habitat is considered to be impacted. Large areas of similar or higher quality habitat for the species occur in surrounding woodland/ forest in the locality. This species was not recorded within the biodiversity study area despite targeted surveys.

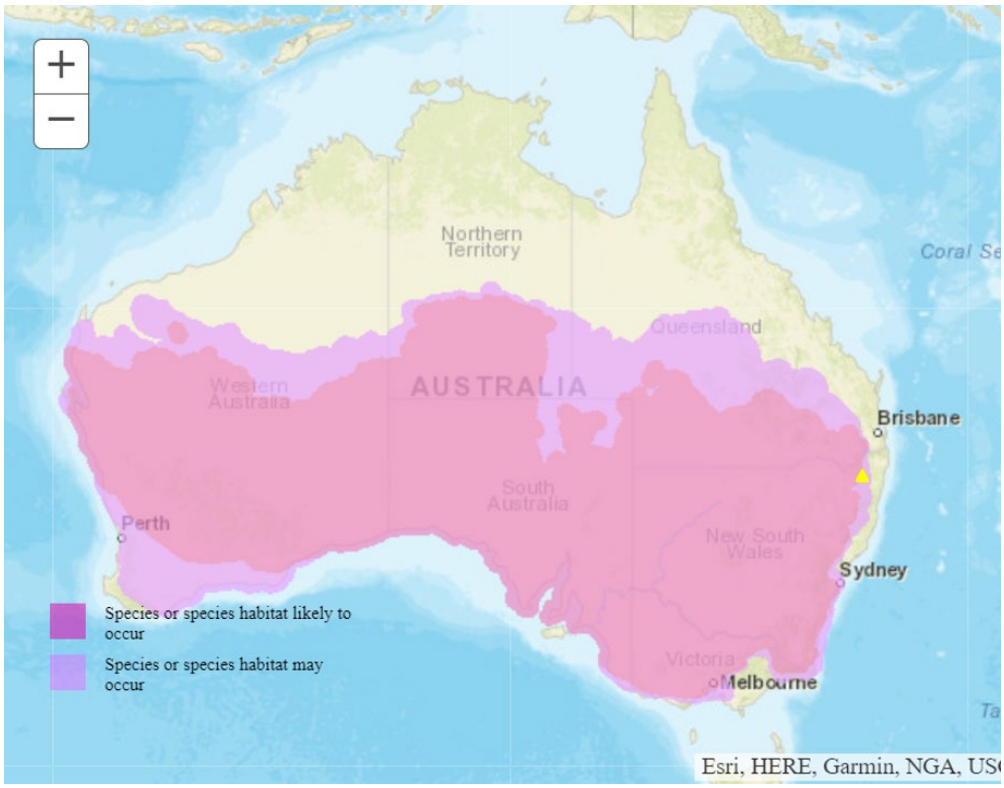
**Table 2.17. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Modified | 97.37 |
| | | Poor | 55.73 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| | | Poor | 0.41 |

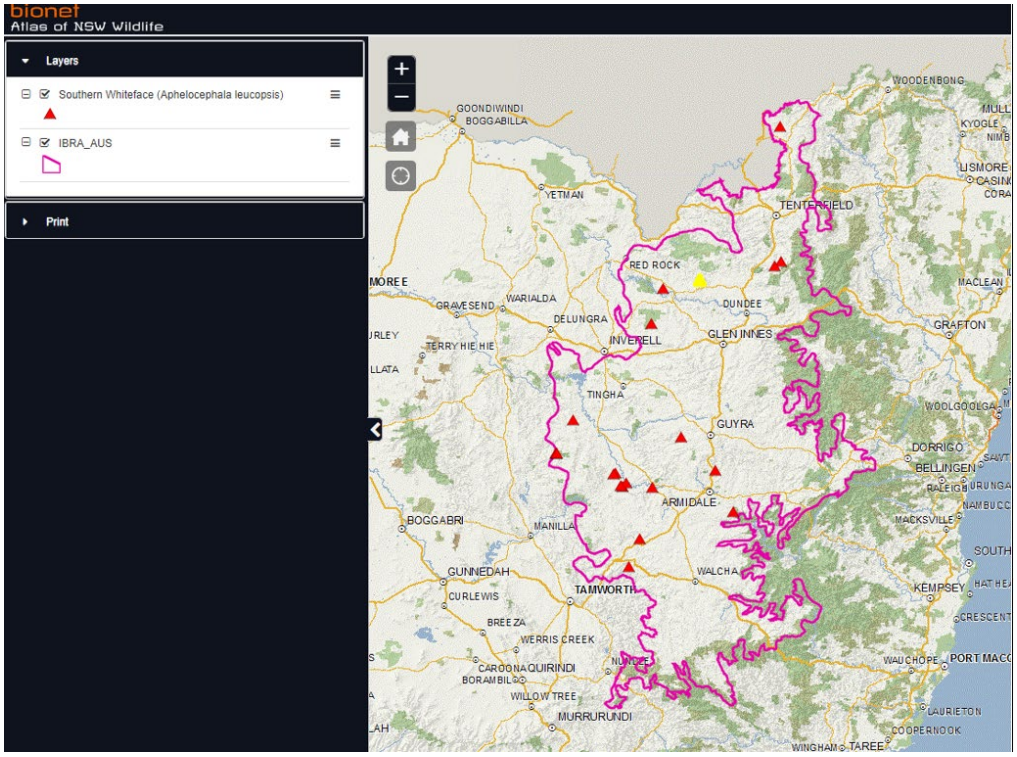
| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **154.24** |

#### 2.3.3.4 Defining the Important Population Subject to this Assessment

Southern Whiteface individuals (if present) within the Project Site are near the eastern limit of the threatened species range. For this reason, individuals within the Project Site are identified as an important population. For the purpose of this assessment, the 'important population' is defined as all individuals within the New England Tablelands IBRA Region – given the highly mobile species occurs throughout the IBRA region.




**Distribution map for the species (via SPRAT Profile). Site indicated by yellow triangle. Map not to scale.**




**BioNet records (total 21) within the New England Tablelands IBRA Region. Project Site indicated by yellow triangle. Map not to scale.**

### 2.3.3.5 Impact Assessment

**Table 2.18. Significant impact assessment – Southern Whiteface - Vulnerable**

| **Significant impact Assessment** |
|---|
| **Would the action lead to a long-term decrease in the size of an important population of a species?** |
| Approximately 154.2 ha of potential eucalypt woodland and sclerophyll forest habitat is likely to be affected by the Proposed Action.<br>In order to contextualise the impact to potential habitat for the species within the New England Tablelands IBRA Region - in which the species and Proposed Action occur, the table below identifies the amount (in ha) of each vegetation class impacted by the Proposed Action in the context of similarly available habitat within the IBRA Region. |

| Vegetation Class* | Area (ha) within New England Tablelands IBRA Region* | Area (ha) impacted by Proposed Action | Proportion Impacted by Proposed Action within IBRA Region (%) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | 506,298 | 153.1 | 0.03% |
| New England Grassy Woodlands | 18,382 | 1.03 | 0.005% |
| Eastern Riverine Forests | 258,433 | 0.11 | <0.001% |

| Significant impact Assessment | | | |
|---|---|---|---|
| **Totals** | **783,113** | 154.24 | 0.04% |

**Vegetation data obtained via NSW State Vegetation Type Map*

Although the Proposed Action represents the loss of potential habitat, the Disturbance footprint will only be a small component of locally occurring habitat that will be utilised by the species (0.04 %). The Proposed Action it is not likely lead to a long-term decrease in the size of a population given.

- Ecological investigations for the Proposed Action and a review of fauna records (BioNet) does not indicate that this species has been recorded at the Project Site.
  - If a population of the Southern Whiteface is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger home range.
- Any identified population of Southern Whiteface in the locality will not be restricted to habitat within the Project Site.
- The Proposed Action will not fragment or isolate potential habitat such that Southern Whiteface movement in the locality will be impeded – areas of potential habitat and associated movement corridors in the locality which will remain unaffected by the Proposed Action.

Therefore, the Proposed Action is not considered likely to significantly contribute to a long-term decline in the size of an important population of the species.

**Would the action reduce the area of occupancy of an important population?**

Across its distribution, Commonwealth DCCEEW (2023) identifies the Southern Whiteface known EOO is approximately 4,910,000 km$^2$. The AOO is estimated to be approximately 70,000 km$^2$. Within the New England Tablelands IBRA Region, the Proposed Action will directly impact < 0.01% of Northern Tableland Dry Sclerophyll Forests, New England Grassy Woodlands and Eastern Riverine Forests which would be expected to provide areas of suitable habitat.

The Proposed Action would remove up to 154.2 ha of potential habitat and thus incrementally reduce the EOO and AOO by < 0.01%. As such the Proposed Action has the potential to incrementally reduce the area of occupancy for the Southern Whiteface, albeit by a minor amount.

**Would the action fragment an existing important population into two or more populations?**

Habitat connectivity is not likely to be affected by the Proposal, given the subject species is highly mobile. Ecological investigations for the Proposed Action and a review of fauna records (BioNet) does not indicate that this species has been recorded at the Project Site. If a population of the Southern Whiteface is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger 'important population' which occurs within the New England Tablelands IBRA Region.

Whilst the Proposed Action will incrementally contribute to habitat loss, the Proposed Action would not present a significant barrier to this is highly mobile species. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing in the Project Site and locality more broadly. .

**Would the action adversely affect habitat critical to the survival of a species?**

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat. As per Approved Conservation Advice (Commonwealth DCCEEW (2023)), habitat critical to the survival of the Southern Whiteface includes areas of:

- *relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both;*
- *habitat with low tree densities and an herbaceous understory litter cover which provides essential foraging habitat;*
- *living and dead trees with hollows and crevices which are essential for roosting and nesting. Habitat critical to the survival should not be cleared, fragmented or degraded.*

*Any known or likely habitat should be considered as habitat critical to the survival of the species. Additionally, areas that are not currently occupied by the species due to recent disturbance (e.g.*

*fire, grazing or human activity), but should became suitable again in the future, should also be considered habitat critical to the survival of the species.*

The known habitat on site provides habitat critical to the survival of the Southern Whiteface given:

- the site contains relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both;
- habitat with low tree densities and an herbaceous understory litter cover which provides essential foraging habitat;
- living and dead trees with hollows and crevices which are essential for roosting and nesting. Habitat critical to the survival should not be cleared, fragmented or degraded.
- Whilst, known habitat on site may meet the definition of critical habitat as per approved Conservation Advice (Commonwealth DCCEEW (2023)) for the species, it should be noted that upslope densely forested vegetation (typically PCT 3722 – Intact condition) in which the Proposed Action is located is generally characterised by a dense understory shrub layer. This is not characterised as being non-preferred habitat for the species - owing to high understory shrub densities.
- The Project Site does contain open woodlands; however these areas are a result of previous clearing or have been modified from their natural state. Commonwealth DCCEEW (2023) states that '*Habitat critical to the survival should not be cleared, fragmented or degraded.'*

To contextualise the direct impact of the proposal on critical habitat, within the New England Tablelands IBRA Region, the Proposed Action will directly impact < 0.01% of Northern Tableland Dry Sclerophyll Forests, New England Grassy Woodlands and Eastern Riverine Forests which would be expected to provide areas of suitable habitat.

While the Proposed Action will impact areas of habitat critical to the survival of the Southern Whiteface, the impact is considered a relatively minor proportion of habitat available for the species within the IBRA Region.

**Would the action disrupt the breeding cycle of an important population?**

Upslope densely forested vegetation (typically PCT 3722 – Intact condition) in which the Proposed Action is located is generally characterised by a dense understory shrub layer. These habitat characteristics limit the species occupation of habitats associated with the Project Site. Ecological investigations for the Proposed Action and a review of fauna records (BioNet) does not indicate that this species has been recorded at the Project Site, additionally the species is highly mobile and would be expected to disperse into other areas of potential habitat in the locality. Therefore, the direct impact to approximately 154.2 ha of potential dispersal habitat is unlikely to disrupt the breeding cycle of an important population of the Southern Whiteface.

**Would the action modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

The Proposed Action will directly impact approximately 154.2 ha of native vegetation considered to be dispersal habitat for the species. The removal of potential habitat is considered to be an incremental loss, decreasing the amount of suitable foraging habitat available locally. However, this species is likely to occupy higher quality habitat within greater locality (i.e. relatively undisturbed open woodlands and shrublands).

Considering the mobile nature of this species, the Proposed Action is unlikely to isolate the species habitat significantly. Given the marginal condition of habitat observed at the Project Site it is unlikely that the Proposed Action will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline.

**Would the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action.

**Would the action introduce disease that may cause the species to decline?**

**Significant impact Assessment**

The Proposed Action would be unlikely to introduce any disease that may cause the species to decline.

**Would the action interfere with the recovery of the species?**

There is no adopted or made Recovery Plan for this species.

**Conclusion**

The Proposed Action will disturb approximately 154.2 ha of potential habitat considered to be potential habitat. The Proposed Action would directly impact the species EOO and AOO by < 0.01%. As such the Proposed Action has the potential to incrementally reduce the area of occupancy for the Southern Whiteface, albeit by a minor amount. The Proposed Action is unlikely to have a significant effect on the Southern Whiteface given that:

- Ecological investigations for the Proposed Action and a review of fauna records (BioNet) does not indicate that this species has been recorded at the Project Site.
  - If a population of the Southern Whiteface is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger home range.
- Any identified population of Southern Whiteface in the locality will not be restricted to habitat within the Project Site.
- The Proposed Action will not fragment or isolate potential habitat such that Southern Whiteface movement in the locality will be impeded – areas of potential habitat and associated movement corridors in the locality which will remain unaffected by the Proposed Action.

Therefore, the Proposed action is not considered likely to significantly contribute to a long-term decline in the size of a population of the species.

#### 2.3.3.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Southern Whiteface (*Aphelocephala leucopsis*).

Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW) (2023). *Conservation Advice for Aphelocephala leucopsis (southern whiteface).*

### 2.3.4 Brown Treecreeper

#### 2.3.4.1 Status

Brown Treecreeper (*Climacteris picumnus victoriae*) listed as Vulnerable under the EPBC Act

#### 2.3.4.2 Habitat and Ecology

Brown Treecreeper are found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest in the inland slopes and plains inland of the Great Dividing Range. The species mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. They are sedentary species; present in all seasons or year-round at many sites, though some birds may disperse locally after breeding.

Observed in pairs or groups of 8 to 12 birds, terrestrial and arboreal in about equal proportions. They feed mainly on insects, mostly ants, but also nectar and sap from eucalypts. They forage on the ground in leaf litter, tussocks and fallen timber and in trees along trunks and lateral branches. The Brown Treecreeper nest in hollows of standing dead or live trees or in tree stumps.

#### 2.3.4.3 Specific impacts

Brown Treecreeper has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.19**. The Proposed Action will remove up to 258 ha of potential habitat. Large areas of similar or higher quality habitat for the species occur in surrounding woodland/ forest in the locality. This species was recorded within the Project Site as part of ecological investigations for the Proposed Action.

**Table 2.19. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

#### 2.3.4.4 Defining the Important Population Subject to this Assessment

Brown Treecreeper individuals within the Project Site are unlikely to be a key source population for breeding or dispersal or be necessary for maintaining genetic diversity across its range as the Project Site is not at the limit of the threatened subspecies range. For these reasons, individuals within the Project Site are not identified as an important population.

#### 2.3.4.5 Impact Assessment

**Table 2.20. Significant impact assessment – Brown Treecreeper - Vulnerable**

| Significant Impact Assessment |
|---|
| **Would the action lead to a long-term decrease in the size of an important population of a species?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action reduce the area of occupancy of an important population?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action fragment an existing important population into two or more populations?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action adversely affect habitat critical to the survival of a species?** |
| No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat. As per Approved Conservation Advice for the species (Commonwealth DCCEEW (2023)), habitat critical to the survival of the Brown Treecreeper includes areas of:<br>■ *Relatively undisturbed grassy woodland with native understorey.*<br>– *Habitat structure should be quite open at ground level so that birds are able to feed on or near the ground and maintain vigilance against predators.*<br>– *The required degree of openness is mostly likely to be created by moderate levels of disturbance by fire and/or grazing.*<br>■ *Large living and dead trees which are essential for roosting and nesting sites and for foraging;*<br>■ *Fallen timber which provides essential foraging habitat and;*<br>■ *Hollows in standing dead or live trees and tree stumps are also essential for nesting.*<br>The known habitat on site provides habitat critical to the survival of the Brown Treecreeper given:<br>■ the presence of grassy woodland with native understorey, large living and dead trees, fallen timber and hollows in standing dead or live trees and tree stumps.<br>Whilst known habitat on site may meet the definition of critical habitat as per approved Conservation Advice (Commonwealth DCCEEW (2023)) for the species, it should be noted that<br>■ Upslope densely forested vegetation (typically PCT 3722 – Intact condition) in which the Proposed Action is located is generally characterised by a dense understory shrub layer. This is not characterised as being non-preferred habitat for the species - owing to high understory shrub densities.<br>■ The Project Site does contain open woodlands; however these areas are a result of previous clearing or have been modified from their natural state. Commonwealth DCCEEW (2023) states that '*Habitat critical to the survival should not be cleared, fragmented or degraded.'*<br>As a proportion within the IBRA Region (in the context of habitat available to the species) the Proposed Action will impact approximately:<br>– 0.05% of Northern Tableland Dry Sclerophyll Forests |

- 0.005% of New England Grassy Woodlands
- <0.001% of Eastern Riverine Forests.

While the Proposed Action will impact areas of habitat critical to the survival of the Brown Treecreeper, the impact is considered a relatively minor proportion of habitat available for the species within the IBRA Region.

**Would the action disrupt the breeding cycle of an important population?**

Not applicable as individuals, which might occur within the Project Site are not part of an important population.

**Would the action modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

The Proposed Action will directly impact approximately 258 ha of native vegetation considered to be habitat for the species, some of which contains marginal denser shrubby woodland habitat. The removal of approximately 258 ha of potential habitat is an incremental loss, decreasing the amount of suitable foraging habitat available locally. However, this species is likely to occupy higher quality / preferred habitat within greater locality (i.e. relatively undisturbed open woodlands). As a proportion within the IBRA Region, the Proposed Action will impact approximately:

- 0.05% of Northern Tableland Dry Sclerophyll Forests
- 0.005% of New England Grassy Woodlands
- <0.001% of Eastern Riverine Forests.

Considering the highly mobile nature of this species and the marginal condition of habitat observed at the Project Site, it is unlikely that the Proposed Action will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline.

**Would the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action.

**Would the action introduce disease that may cause the species to decline?**

The Proposed Action would be unlikely to introduce any disease that may cause the species to decline.

**Would the action interfere with the recovery of the species?**

There is no adopted or made Recovery Plan for this species.

**Conclusion**

Vegetation to be removed (258 ha) comprises a relatively small proportion of potential foraging habitat present in surrounding areas and the broader locality. As a proportion within the IBRA region, the Proposed Action will impact approximately.

- 0.05% of Northern Tableland Dry Sclerophyll Forests
- 0.005% of New England Grassy Woodlands
- <0.001% of Eastern Riverine Forests.

The extent of native vegetation removal also consists of marginal habitat associated with denser shrubby woodland vegetation (typically PCT 3722 – Intact condition), these denser shrubby woodland areas are usually non-preferred habitat for the species.

The Proposed Action will not fragment any locally occurring populations, affect habitat critical to their survival, disrupt their breeding cycles, or interfere with the recovery of the species. Therefore, the Proposed Action is assessed as representing an incremental loss of local habitat, which it is not considered likely to affect the long-term viability of the species in the locality. The Proposed Action is unlikely to have a significant effect on the Brown Treecreeper.

#### 2.3.4.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Brown Treecreeper (*Climacteris picumnus victoriae*).

Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW) (2023). *Conservation Advice for Climacteris picumnus victoriae (brown treecreeper (south-eastern)).*

### 2.3.5 Painted Honeyeater

#### 2.3.5.1 Status

Painted Honeyeater (*Grantiella picta*) listed as Vulnerable under the EPBC Act

#### 2.3.5.2 Habitat and Ecology

The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests.

A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*. Feeds on nectar from insects and nectar from mistletoes.

Nests from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.

#### 2.3.5.3 Specific impacts

Painted Honeyeater has potential habitat associations within the New England Tablelands IBRA region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCT identified in **Table 2.21**. The Proposed Action will remove up to 258 ha of potential habitat. Large areas of similar or higher quality habitat occur in the surrounding woodland/ forest in the locality. This species was not recorded within the Project Site as part of ecological investigations for the Proposed Action.

The Project Site does not represent potential breeding habitat critical to the survival of a species given it does not contain known or likely breeding habitat characteristics as listed in DAWE (2016), similarly, the Project Site would not be considered habitat for the long-term maintenance of the species, given the Project Site is not within a 'Key Biodiversity Area' for the species as listed in the approved recovery plan (DAWE, 2016).

**Table 2.21. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

#### 2.3.5.4 Defining the Important Population Subject to this Assessment

Painted Honeyeater individuals within the Project Site (if present) are unlikely to be key source populations for breeding or dispersal or be necessary for maintaining genetic diversity as the habitat is not preferred by local populations (given the lack of BioNet recording within the locality and the Project Site is not within known concentrations of the species occurrence, which are the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland –(DAWE, 2021)), and individuals within the Project Site are not at the limit of the threatened species range. For these reasons, individuals within the Project Site cannot be identified as an important population.

#### 2.3.5.5 Impact Assessment

**Table 2.22. Significant impact assessment – Painted Honeyeater - Vulnerable**

| **Significant Impact Assessment** |
|---|
| **Would the action lead to a long-term decrease in the size of an important population of a species?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action reduce the area of occupancy of an important population?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action fragment an existing important population into two or more populations?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action adversely affect habitat critical to the survival of a species?** |
| No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat. As per Approved Conservation Advice for the species (DAWE (2016)), habitat critical to the survival of the Painted Honeyeater includes:<br>■ ***Breeding habitat***<br>– *Known or likely breeding habitat in Boree/Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) woodlands, box-gum woodlands and box-ironbark forests on the inland slopes of the Great Dividing Range in New South Wales, Victoria and southern Queensland.*<br>■ ***Foraging habitat***<br>– *All preferred foraging species within known and likely foraging habitat particularly mistletoes of the genus Amyema growing on forest and woodland eucalypts and acacias.*<br>■ ***Habitat for the long-term maintenance of the species***<br>– *All Key Biodiversity Areas with Painted Honeyeater as a Trigger species.*<br>– *Suitable habitat in future climate niches as information becomes available.*<br>The Project Site does not represent potential breeding habitat critical to the survival of a species given it does not contain known or likely breeding habitat characteristics as listed in DAWE (2016), similarly, the Project Site would not be considered habitat for the long-term maintenance of the species, given the Project Site is not within a 'Key Biodiversity Area' for the species as listed in the approved recovery plan (DAWE, 2016).<br>The Project Site would be considered critical foraging habitat as per Approved Conservation Advice for the species (DAWE, 2016) for the species. As a proportion within the IBRA Region (in the context of habitat available to the species) the Proposed Action will impact approximately:<br>– 0.05% of Northern Tableland Dry Sclerophyll Forests<br>– 0.005% of New England Grassy Woodlands |

- <0.001% of Eastern Riverine Forests.

Whilst the Proposed Action will impact areas of critical foraging habitat, this impact represents a relatively small component of locally occurring resources that would be accessible to this species within the IBRA Region.

**Would the action disrupt the breeding cycle of an important population?**

Not applicable as individuals, which might occur within the Project Site are not part of an important population.

**Would the action modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

The Proposed Action will directly impact approximately 258 ha of native vegetation considered to be habitat for the species. The removal of potential habitat is an incremental loss, decreasing the amount of suitable foraging habitat available locally. However, this species is likely to occupy higher quality habitat within the greater locality. As a proportion within the IBRA Region, the Proposed Action will impact approximately:

- 0.05% of Northern Tableland Dry Sclerophyll Forests
- 0.005% of New England Grassy Woodlands
- <0.001% of Eastern Riverine Forests.

Considering the highly mobile nature of this species, the marginal condition of habitat observed at the Project Site and general lack of species sightings in the locality, it is unlikely that the Proposed Action will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline.

**Would the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action.

**Would the action introduce disease that may cause the species to decline?**

The Proposed Action would be unlikely to introduce any disease that may cause the species to decline.

**Would the action interfere with the recovery of the species?**

Recovery strategies outlined in the Painted Honeyeater Recovery Plan (DoE, 2021) include:

- Protect, manage and restore Painted Honeyeater breeding and foraging habitats at the local, regional and landscape scales.
- Monitor, reduce and manage threats and sources of mortality.
- Develop and apply techniques to measure changes in population trajectory in order to measure the success of recovery actions.
- Improve understanding of habitat use at a landscape scale in order to better target protection and restoration measures.
- Engage local communities and stakeholders in Painted Honeyeater conservation
- Coordinate, review and report on recovery progress.

The Proposed Action would be in conflict with the first objective above to a small extent, by not improving the extent of habitat for the Painted Honeyeater.

**Conclusion**

The extent of native vegetation and the removal of habitat associated with the Proposed Action is relatively small (258 ha) in terms of available habitat for the species within the locality and New England Tablelands IBRA Region (approximately 0.03%).

**Significant Impact Assessment**

The Proposed Action will not fragment any locally occurring populations, affect habitat critical to their survival, disrupt their breeding cycles, or interfere with the recovery of the species. Therefore, the Proposed Action is assessed as representing an incremental loss of local habitat, it is not considered likely to affect the long-term viability of the species in the locality. The Proposed Action is unlikely to have a significant effect on the Painted Honeyeater.

#### 2.3.5.6 References


Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Painted Honeyeater (*Grantiella picta*).

Department of Agriculture, Water and the Environment (DAWE) (2021). The National Recovery Plan for the Painted Honeyeater (*Grantiella picta*).

Department of the Environment (DoE) (2015). *Conservation Advice Grantiella picta painted honeyeater.*

### 2.3.6 White-throated Needletail

#### 2.3.6.1 Status

White-throated Needletail (*Hirundapus caudacutus*) listed as Vulnerable under the EPBC Act.

#### 2.3.6.2 Habitat and Ecology

The White-throated Needletail is widespread in eastern and south-eastern Australia. In eastern Australia, the species is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Dividing Range and occasionally onto the adjacent inland plains. In Australia, the White-throated Needletail is mostly aerial, from heights of less than 1 m up to more than 1000 m above the ground. Although they occur over most types of habitat, they are recorded most often above wooded areas, including open forest and rainforest, and may also fly below the canopy between trees or in clearings. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks (TSSC,2019).

The species roosts in trees amongst dense foliage in the canopy or in hollows. Feeding During the non-breeding season in Australia, the White-throated Needletail has been recorded eating a wide variety of insects, including beetles, cicadas, flying ants, bees, wasps, flies, termites, moths, locusts and grasshoppers.

#### 2.3.6.3 Specific impacts

White-throated Needletail has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.23**. The Proposed Action will remove up to 258 ha of potential habitat. Large areas of similar or higher quality habitat for the species occur in surrounding woodland/ forest in the locality. This species was not recorded within the Project Site as part of ecological investigations for the Proposed Action.

**Table 2.23. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

#### 2.3.6.4 Defining the Important Population Subject to this Assessment

The White-throated Needletail a migratory species and occurs in Australia only between late spring and early autumn but mostly in summer. This species are non-breeding migrants with breeding taking place in Northern Asia (Birdlife Australia, 2020). They have been recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows. Probably recorded most often above wooded areas, including open forest and rainforest (Birdlife Australia, 2020). This species is not or near the limit of its range as it occurs over eastern and northern Australia and in Northern Asia (Birdlife Australia, 2020). White-throated Needletail is almost exclusively aerial and although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. As the Project Site does not contain key resources for breeding or dispersal, does not occur at the limit of the species distribution range and is unlikely to be necessary for maintaining genetic diversity populations which may occur are not considered to form part of an 'important population'.

#### 2.3.6.5 Impact Assessment

**Table 2.24. Significant impact assessment – White-throated Needletail - Vulnerable**

| Significant Impact Assessment |
|---|
| **Would the action lead to a long-term decrease in the size of an important population of a species?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action reduce the area of occupancy of an important population?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action fragment an existing important population into two or more populations?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action adversely affect habitat critical to the survival of a species?** |
| No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat. |
| **Would the action disrupt the breeding cycle of an important population?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?** |
| The Proposed Action will directly impact approximately 258 ha of native vegetation considered to be habitat for the species in the form of wooded vegetation. The removal of approximately 258 ha of potential habitat is an incremental loss, decreasing the amount of suitable foraging habitat available locally. However, this species is likely to occupy higher quality habitat within greater locality. As a proportion within the IBRA Region, the Proposed Action will impact approximately:<br>– 0.05% of Northern Tableland Dry Sclerophyll Forests<br>– 0.005% of New England Grassy Woodlands<br>– <0.001% of Eastern Riverine Forests. |

| Significant Impact Assessment |
| --- |
| Considering the highly mobile nature of this species and its ariel foraging patterns, the Project Site, it is unlikely that the Proposed Action will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline. |
| **Would the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?** |
| It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action. |
| **Would the action introduce disease that may cause the species to decline?** |
| The Proposed Action would be unlikely to introduce any disease that may cause the species to decline. |
| **Would the action interfere with the recovery of the species?** |
| No approved recovery plan has been prepared for this species. As this species does not breed in Australia and forages on the wing and has the potential to occur intermittently within the locality, the Proposed action is not likely to interfere with the recovery of this species. |
| **Conclusion** |
| The extent of native vegetation and the removal of habitat associated with the Proposed Action is relatively small (258 ha) in terms of available habitat for the species within the locality and New England Tablelands IBRA Region (approximately 0.03%).<br>The Proposed Action is not considered likely to fragment any locally occurring populations, affect habitat critical to their survival, disrupt their breeding cycles, or interfere with the recovery of the species. Therefore, the Proposed Action is assessed as representing an incremental loss of local habitat, which it is not considered likely to affect the long-term viability of the species in the locality. The Proposed Action is unlikely to have a significant effect on the White-throated Needletail. |

#### 2.3.6.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: White-throated Needletail (*Hirundapus caudacutus*).

Threatened Species Scientific Committee (TSSC) (2019). *Conservation Advice Hirundapus caudacutus White-throated Needletail.*

### 2.3.7 Diamond Firetail

#### 2.3.7.1 Status

Diamond Firetail (*Stagonopleura guttata*) listed as Vulnerable under the EPBC Act.

#### 2.3.7.2 Habitat and Ecology

Diamond Firetail occur on the south-east mainland of Australia from south-east Queensland to Eyre Peninsula, South Australia, and about 300 km inland from the sea. They occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees. They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover.

Diamond Firetail usually occur in flocks of between 5 to 40, and occasionally more. The species appears to be sedentary, though some populations move locally. Their flight is described as low and direct in long lines with slight undulations. Birds roost in dense shrubs or in smaller nests built especially for roosting. Diamond firetails feed predominantly at ground level, on ripe and partly ripe grass and herb seeds and green leaves, and on insects.

#### 2.3.7.3 Specific impacts

Diamond Firetail has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.25**. The Proposed Action will remove up to 258 ha of potential habitat. Large areas of similar or higher quality habitat for the species occur in surrounding woodland/ forest in the locality. This species was recorded within the Project Site as part of ecological investigations for the Proposed Action.

**Table 2.25. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

#### 2.3.7.4 Defining the Important Population Subject to this Assessment

This species was recorded within the Project Site and is known to occur within the locality and across the New England Tablelands IBRA Region, evidenced via BioNet records. Individuals and flocks

occurring within the Project Site would not be at the limit of their known range; nor would any population there be likely to be a key source population or necessary for maintaining genetic diversity.

While potential breeding habitat occurs within the Project Site, such habitats are abundant on adjacent lands, in the locality and within the New England Tablelands IBRA Region more broadly. Therefore, it is considered that any population of the species that may be present is unlikely to be an 'important population'.

#### 2.3.7.5 Impact Assessment

**Table 2.26. Significant impact assessment – Diamond Firetail - Vulnerable**

| Significant Impact Assessment |
|---|
| **Would the action lead to a long-term decrease in the size of an important population of a species?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action reduce the area of occupancy of an important population?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action fragment an existing important population into two or more populations?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |
| **Would the action adversely affect habitat critical to the survival of a species?** |
| No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat. As per Approved Conservation Advice for the species (Commonwealth DCCEEW) (2023)), habitat critical to the survival of the Diamond Firetail includes:<br>■ *Eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats;*<br>■ *Low tree density, few large logs, and little litter cover but high grass cover for foraging, roosting and breeding;*<br>■ *Drooping she-oak (Allocasuarina verticillata) within the Mt Lofty Ranges.*<br>The Project Site contains features representative of habitat critical to the survival of the species, including:<br>■ Eucalypt woodlands, open forest and lightly timbered habitats.<br>■ Vegetation zones with a low tree density, few large logs, and little litter cover but high grass cover.<br>The Project Site would be considered critical habitat as per Approved Conservation Advice for the species (Commonwealth DCCEEW, 2023) for the species. As a proportion within the IBRA Region (in the context of habitat available to the species) the Proposed Action will impact approximately:<br>– 0.05% of Northern Tableland Dry Sclerophyll Forests<br>– 0.005% of New England Grassy Woodlands<br>– <0.001% of Eastern Riverine Forests.<br>Whilst the Proposed Action will impact areas of critical foraging habitat, this impact represents a relatively small component of locally occurring resources that would be accessible to this species within the IBRA Region. |
| **Would the action disrupt the breeding cycle of an important population?** |
| Not applicable as individuals, which might occur within the Project Site are not part of an important population. |

| Significant Impact Assessment |
|---|
| **Would the action modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?** |
| The Proposed Action will directly impact approximately 258 ha of native vegetation considered to be habitat for the species. The removal of approximately 258 ha of known habitat is an incremental loss, decreasing the amount of suitable foraging habitat available locally. However, this species is likely to occupy higher quality habitat within greater locality. As a proportion within the IBRA Region, the Proposed Action will impact approximately:<br>– 0.05% of Northern Tableland Dry Sclerophyll Forests<br>– 0.005% of New England Grassy Woodlands<br>– <0.001% of Eastern Riverine Forests.<br>Considering the highly mobile nature of this species, the Project Site, it is unlikely that the Proposed Action will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline. |
| **Would the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?** |
| It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action. |
| **Would the action introduce disease that may cause the species to decline?** |
| The Proposed Action would be unlikely to introduce any disease that may cause the species to decline. |
| **Would the action interfere with the recovery of the species?** |
| No approved recovery plan has been prepared for this species. |
| **Conclusion** |
| The extent of native vegetation and the removal of habitat associated with the Proposed Action is relatively small (258 ha) in terms of available habitat for the species within the locality and New England Tablelands IBRA Region (approximately 0.03%).<br>The Proposed Action is not considered likely to fragment any locally occurring populations, affect habitat critical to their survival, disrupt their breeding cycles, or interfere with the recovery of the species. Therefore, the Proposed Action is assessed as representing an incremental loss of local habitat, which it is not considered likely to affect the long-term viability of the species in the locality. The Proposed Action is unlikely to have a significant effect on the Diamond Firetail. |

#### 2.3.7.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Diamond Firetail (*Stagonopleura guttata*).

Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW) (2023). *Conservation Advice for* Stagonopleura guttata *(diamond firetail)*.

### 2.3.8 Corben's Long-eared Bat

#### 2.3.8.1 Status

Corben's Long-eared Bat (*Nyctophilus corbeni*) listed as Vulnerable under the EPBC Act.

#### 2.3.8.2 Habitat and Ecology

Corben's Long-eared Bat is found in southern central Queensland, central western New South Wales, north-western Victoria and eastern South Australia, where it is patchily distributed, with most of its range in the Murray Darling Basin. Most records are from inland of the Great Dividing Range. The species is uncommon within this distribution and is rarely recorded, except in some areas including the Nandewar and Brigalow Belt South bioregions in New South Wales and Queensland (TSSC, 2015).

In Queensland and New South Wales it inhabits a variety of vegetation types but it is distinctly more common in box / ironbark / cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of New South Wales and southern Queensland. The species is more abundant in extensive stands of vegetation in comparison to smaller woodland patches, suggesting its home range is probably large. It appears that old-growth vegetation is a critical habitat component in the Victorian distribution. The species has also been found to be much more abundant in habitats that have a distinct tree canopy and a dense, cluttered understorey layer (TSSC, 2015).

Corben's Long-eared Bat is an insectivorous bat that hunts by taking flying prey or by foliage-gleaning in flight or by foraging on the ground. When hunting in flight it generally consumes beetles, bugs and moths. The species roosts solitarily, mainly in dead trees or dead spouts of live trees. In studies of roosting behaviour in Victoria most bats were found roosting individually in mallee eucalypts in areas of long-unburnt mallee, with some under bark or in fissures of dead Buloke (*Allocasuarina leuhmannii*) or Belah (*Casuarina cristata*) trees. A study in New South Wales found maternity colonies, consisting of 10-20 individuals, roosting in dead trees including ironbarks, cypress and buloke. It appears that most roost sites are used just for a single day and large distances are travelled at night, with consecutive roost sites generally within four km (TSSC, 2015).

#### 2.3.8.3 Specific impacts

Corben's Long-eared Bat has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.27**. The Proposed Action will remove up to 258 ha of potential habitat. Large areas of similar or higher quality habitat for the species occur in surrounding woodland/ forest in the locality. This species was not recorded within the Project Site as part of ecological investigations for the Proposed Action.

**Table 2.27. Area of Potential Habitat for the Species within the Project Site**

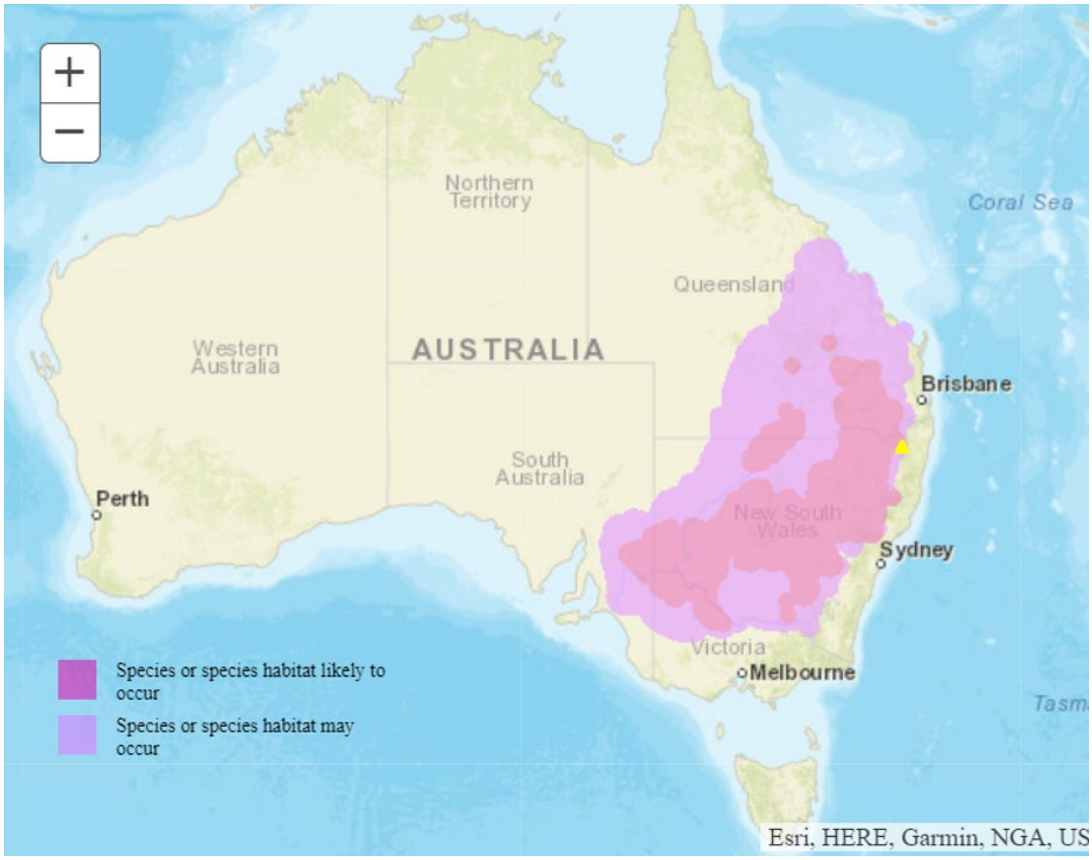
| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

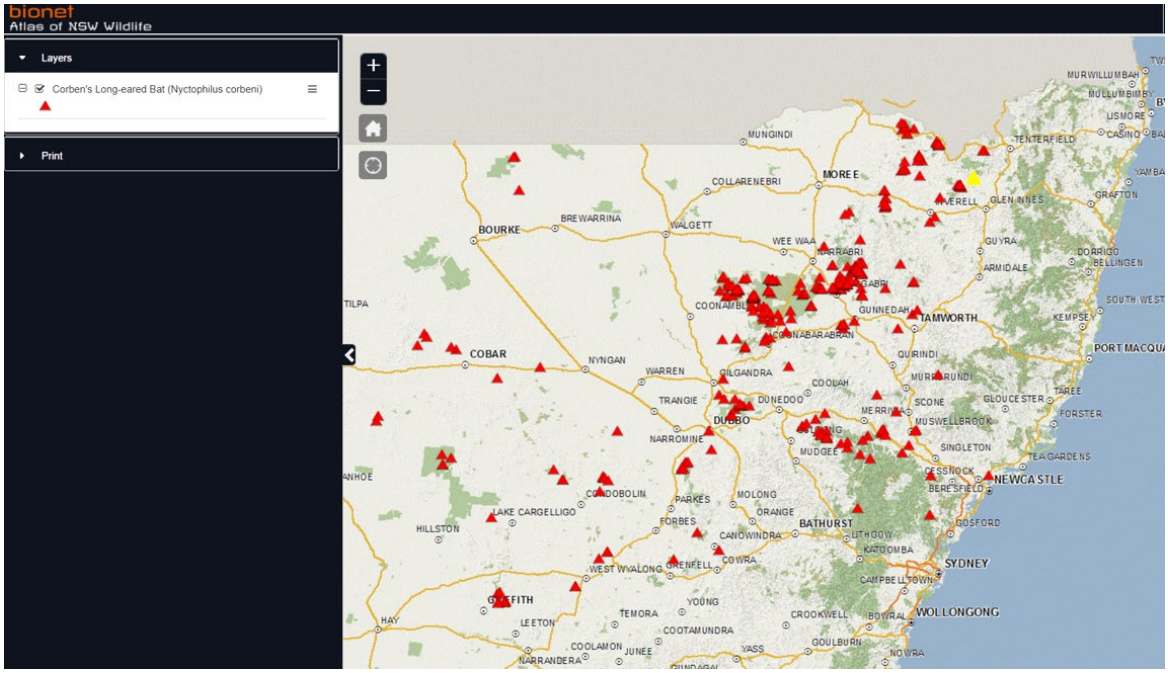
#### 2.3.8.4 Defining the Important Population Subject to this Assessment

Corben's Long-eared Bat was not recorded within the Project Site but is known to occur within the locality and across the New England Tablelands IBRA Region - evidence via BioNet records. There are no important populations outlined in the SPRAT profile or NSW TBDC profile for Corben's Long-eared Bat.

However, Corben's Long-eared Bat individuals (if present) within the Project Site are near the eastern limit of the threatened species range. For this reason, individuals within the Project Site are identified as an important population. For the purpose of this assessment, the 'important population' is defined as all individuals within the New England Tablelands IBRA Region, given the IBRA Region is located on the eastern limit of the threatened species range.




**Distribution map for the species (via SPRAT Profile). Site indicated by yellow triangle. Map not to scale.**




**BioNet records – a total of 572 within NSW and 20 in the New England Tablelands IBRA Region. Project Site indicated by yellow triangle. Map not to scale.**

### 2.3.8.5 Impact Assessment

**Table 2.28. Significant impact assessment – Corben's Long-eared Bat - Vulnerable**

| **Significant impact Assessment** |
|---|
| **Would the action lead to a long-term decrease in the size of an important population of a species?** |

Approximately 258 ha of potential eucalypt woodland and sclerophyll forest habitat is likely to be affected by the Proposed Action.

In order to contextualise the impact to potential habitat for the species within the New England Tablelands IBRA Region - in which the species and Proposed Action occur, the table below identifies the amount (in ha) of each vegetation class impacted by the Proposed Action in the context of similarly available habitat within the IBRA Region.

| Vegetation Class* | Area (ha) within New England Tablelands IBRA Region* | Area (ha) impacted by Proposed Action | Proportion Impacted by Proposed Action within IBRA Region (%) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | 506,298 | 257.26 | 0.05% |
| New England Grassy Woodlands | 18,382 | 0.62 | 0.005% |
| Eastern Riverine Forests | 258,433 | 0.11 | <0.001% |
| **Totals** | **783,113** | **257.99** | **0.03%** |

**Vegetation data obtained via NSW State Vegetation Type Map*

## Significant impact Assessment

Although the Proposed Action represents the loss of potential habitat, the Disturbance footprint will only be a relatively small component of locally occurring habitat that will be utilised by the species (0.03%). The Proposed Action it is not likely lead to a long-term decrease in the size of a population given.

- Ecological investigations for the Proposed Action and a review of fauna records (BioNet) does not indicate that this species has been recorded at the Project Site.
  - If a population of the Corben's Long-eared Bat is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger home range.
- Any identified population of Corben's Long-eared Bat in the locality will not be restricted to habitat within the Project Site.
- The Proposed Action will not fragment or isolate potential habitat such that Corben's Long-eared Bat movement in the locality will be impeded – areas of potential habitat and associated movement corridors in the locality which will remain unaffected by the Proposed Action.

Therefore, the Proposed Action is not considered likely to significantly contribute to a long-term decline in the size of an important population of the species.

### Would the action reduce the area of occupancy of an important population?

The Project Site is not considered to contain 'core' habitat for the species – owing to the lack of BioNet records on site and generally within the locality and the species was not recorded on site as part of ecological investigations for the Proposed Action. The Project Site is not within close proximity to any known stronghold (TSSC, 2015), or cluster of BioNet records for the species. The nearest cluster of BioNet records (8 records) for the species is located at Willows-Boorabee Indigenous Protected Area, Severn River, approximately 15 km southwest of the Project Site. If a population of the Corben's Long-eared Bat is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger 'important population' which occurs within the New England Tablelands IBRA Region.

While a local population of Corben's Long-eared Bat would not be restricted to habitat resources in the Project Site, the Proposed Action will reduce the area of occupancy for this species by an additional 258 ha, which represents an incremental loss of habitats depleted by cumulative impacts locally. As such the Proposed Action has the potential to incrementally reduce the area of occupancy for the Corben's Long-eared Bat, albeit by a relatively minor amount in the context of available habitat in the locality.

### Would the action fragment an existing important population into two or more populations?

Habitat connectivity is not likely to be affected by the Proposal, given that this species is highly mobile and known to have large homes ranges (TSSC, 2015). Ecological investigations for the Proposed Action and a review of fauna records (BioNet) does not indicate that this species has been recorded at the Project Site. If a population of the Corben's Long-eared Bat is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger 'important population' which occurs within the New England Tablelands IBRA Region.

Whilst the Proposed Action will incrementally contribute to habitat loss, the Proposed Action would not present a significant barrier to this is highly mobile species. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing in the Project Site and locality more broadly. .

### Would the action adversely affect habitat critical to the survival of a species?

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

As per TSSC (2015), 'old growth' vegetation is considered a critical habitat component for the species (at least in Victoria). Vegetation within the Project Site is not considered to be 'old growth' owing to the evidence of disturbance (clearing, mining and agricultural activities) which has

occurred on site over previous decades. Additionally, The Project Site is not within close proximity to any known stronghold for the species (TSSC, 2015).

For these reasons the Project Site cannot be identified as habitat critical to the survival of the Corben's Long-eared Bat.

**Would the action disrupt the breeding cycle of an important population?**

Ecological investigations for the Proposed Action and a review of fauna records (BioNet) does not indicate that this species has been recorded at the Project Site, additionally the species is highly mobile and would be expected to disperse into other areas of potential habitat in the locality. Therefore, the direct impact to approximately 258 ha of potential habitat is unlikely to disrupt the breeding cycle of an important population of the Corben's Long-eared Bat.

**Would the action modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

The Proposed Action will directly impact approximately 258 ha of native vegetation considered to be dispersal habitat for the species. The removal of potential habitat is considered to be an incremental loss, decreasing the amount of suitable foraging habitat available locally. However, this species is likely to occupy higher quality habitat within the broader locality.

Considering the mobile nature of this species, the Proposed Action is unlikely to isolate areas of potential habitat. It is unlikely that the Proposed Action will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline.

**Would the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action.

**Would the action introduce disease that may cause the species to decline?**

The Proposed Action would be unlikely to introduce any disease that may cause the species to decline.

**Would the action interfere with the recovery of the species?**

There is no adopted or made Recovery Plan for this species.

**Conclusion**

The Proposed Action will disturb approximately 258 ha of potential habitat for Corben's Long-eared Bat. The Proposed Action would incrementally reduce the EOO and AOO for Corben's Long-eared Bat – albeit by a relatively minor amount in the context of available habitat in the locality, the IBRA Region and across the species distribution generally (approximately 0.03%). The Proposed Action is unlikely to have a significant effect on the Corben's Long-eared Bat given:

- Ecological investigations for the Proposed Action and a review of fauna records (BioNet) does not indicate that this species has been recorded at the Project Site.
  - If a population of Corben's Long-eared Bat is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger home range.
- Any identified population of Corben's Long-eared Bat in the locality will not be restricted to habitat within the Project Site.
- The Proposed Action will not fragment or isolate potential habitat such that Corben's Long-eared Bat movement in the locality will be impeded – areas of potential habitat and associated movement corridors in the locality which will remain unaffected by the Proposed Action.
- The Project Site is not within close proximity to any known stronghold for the species (TSSC, 2015).

Therefore, the Proposed action is not considered likely to significantly contribute to a long-term decline in the size of a population of the species.

#### 2.3.8.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Corben's Long-eared Bat (*Nyctophilus corbeni*).

Threatened Species Scientific Committee (TSSC) (2015). *Conservation Advice Nyctophilus corbeni south-eastern long-eared bat.*

### 2.3.9 Grey-headed Flying-fox

#### 2.3.9.1 Status

Grey-headed Flying-fox (*Pteropus poliocephalus*) listed as Vulnerable under the EPBC Act.

#### 2.3.9.2 Habitat and Ecology

Grey-headed Flying-foxes are regularly found from the coast, inland to the tablelands and western slopes of northern New South Wales and the tablelands of southern Queensland. Breeding camps have been recorded as far north as Ingham in far north Queensland and more recently, the species has become established in South Australia, the Australian Capital Territory and Victoria and inland areas of New South Wales (DAWE, 2021).

Grey-headed Flying-fox roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. They can travel up to 50 km from the camp to forage; commuting distances are more often <20 km. They feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Annual mating commences in January and conception occurs in April or May; a single young is born in October or November (NSW TBDC, 2024).

#### 2.3.9.3 Specific impacts

Grey-headed Flying-fox has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.29**. The Proposed Action will remove up to 258 ha of potential habitat. Large areas of similar or higher quality habitat for the species occur in surrounding woodland/ forest in the locality.

**Table 2.29. Area of Potential Habitat for the Species within the Project Site**

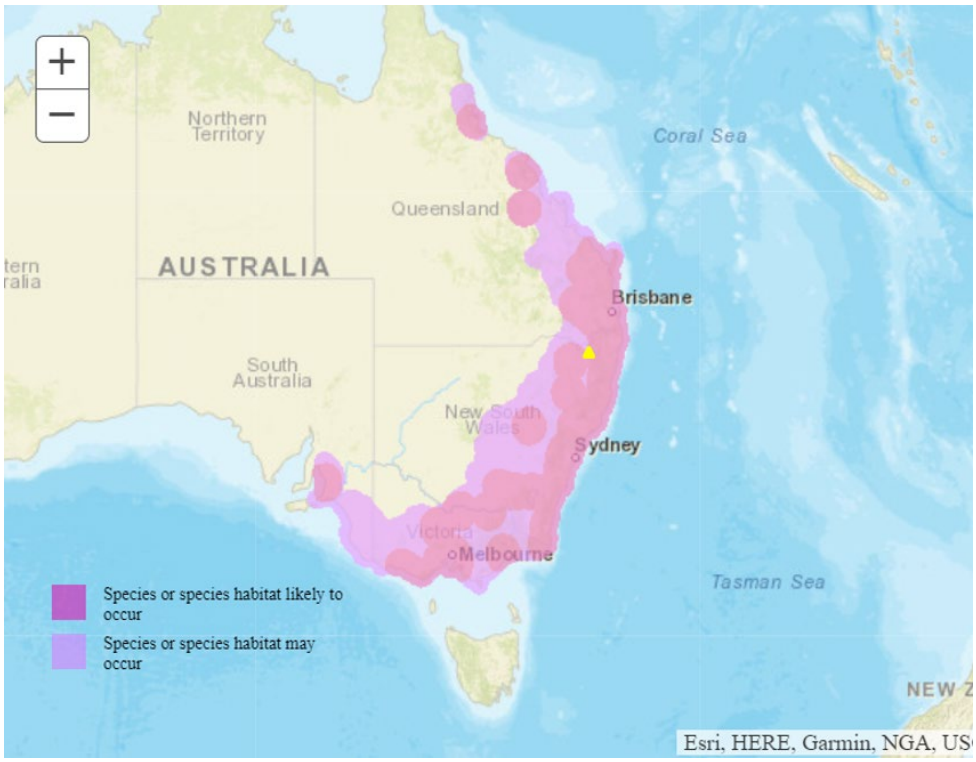
| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

#### 2.3.9.4 Defining the Important Population Subject to this Assessment

Occurrences of the Grey-headed Flying-fox within the Project Site are not at the limits of the species distribution, nor are any maternity camps present in the Project Site, and as such the habitat within the

Project Site can only be considered to represent a part of the foraging range of widely occurring individuals.

The Grey-headed Flying-fox has no separate or distinct populations (Commonwealth DCCEEW (2024). The species constantly exchanges genetic information between camps throughout its geographic range. Therefore, the species occurs as one population and therefore any individuals that occur in the Project Site would be considered to form part of 'an important population'.




**Distribution map for the species (via SPRAT Profile). Site indicated by yellow triangle. Map not to scale.**

#### 2.3.9.5 Impact Assessment

**Table 2.30. Significant impact assessment – Grey-headed Flying-fox - Vulnerable**

| **Significant impact Assessment** |
|---|
| **Would the action lead to a long-term decrease in the size of an important population of a species?** |
| Approximately 258 ha of potential eucalypt woodland and sclerophyll forest habitat is likely to be affected by the Proposed Action.<br>In order to contextualise the impact to potential habitat for the species within the New England Tablelands IBRA Region - in which the species and Proposed Action occur, the table below identifies the amount (in ha) of each vegetation class impacted by the Proposed Action in the context of similarly available habitat within the IBRA Region. |

| Vegetation Class* | Area (ha) within New England Tablelands IBRA Region* | Area (ha) impacted by Proposed Action | Proportion Impacted by Proposed Action within IBRA Region (%) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | 506,298 | 257.26 | 0.05% |
| New England Grassy Woodlands | 18,382 | 0.62 | 0.005% |
| Eastern Riverine Forests | 258,433 | 0.11 | <0.001% |
| **Totals** | **783,113** | **257.99** | **0.03%** |

**Vegetation data obtained via NSW State Vegetation Type Map*

There are no recorded Flying-fox camps within the Project Site- with reference to Commonwealth DCCEEW (2024) *National Flying-fox monitoring viewer*. The closest significant recorded camp in relation to the Project Site is:

- Blair athol, Inverall (camp #270) – about 56 km southwest of the Project Site, according to the National Flying Fox monitoring viewer this camp includes 16,000-49,999 individuals in 2013.

Although the Proposed Action represents the loss of potential foraging habitat, the Disturbance footprint will only be a small component of locally occurring habitat that will be utilised by the species. The Proposed Action it is not likely lead to a long-term decrease in the size of a population given:

- If a population of Grey-headed Flying-fox is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger home range.
- Any identified population of Grey-headed Flying-fox in the locality will not be restricted to habitat within the Project Site.
- No Flying-fox camps occur within (or within 50 km) of the Project Site.
- The Proposed Action will not fragment or isolate potential habitat such that Grey-headed Flying-fox movement in the locality will be impeded – areas of potential habitat and associated movement corridors in the locality which will remain unaffected by the Proposed Action.

Therefore, the Proposed Action is not considered likely to significantly contribute to a long-term decline in the size of an important population of the species.

**Would the action reduce the area of occupancy of an important population?**

While a local population of Grey-headed Flying-fox would not be restricted to habitat resources in the Project Site, the Proposed Action will reduce the AOO for this species by an additional 258 ha, which represents an incremental loss of habitats depleted by cumulative impacts locally. As such the Proposed Action has the potential to incrementally reduce the area of occupancy for the Grey-headed Flying-fox, albeit by a minor amount in the context of available habitat in the locality.

**Would the action fragment an existing important population into two or more populations?**

Habitat connectivity is not likely to be affected by the Proposal, given that this species is highly mobile and is known to have a large home range. If a population of the Grey-headed Flying-fox is present in the locality, individuals from this population may potentially occur periodically within the Project Site as part of a larger 'important population' across its distribution.

Whilst the Proposed Action will incrementally contribute to habitat loss, the Proposed Action would not present a significant barrier to this is highly mobile species. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing in the Project Site and locality more broadly. .

**Would the action adversely affect habitat critical to the survival of a species?**

According to the national recovery plan for the species, habitat critical to the survival of the Grey-headed Flying- fox includes:

**Significant impact Assessment**

*Important winter and spring vegetation communities including those that contain Eucalyptus tereticornis, E. albens, E. crebra, E. fibrosa, E. melliodora, E. paniculata, E. pilularis, E. robusta, E. seeana, E. sideroxylon, E. siderophloia, Banksia integrifolia, Castanospermum australe, Corymbia citriodora citriodora, C. eximia, C. maculata, Grevillea robusta, Melaleuca quinquenervia or Syncarpia glomulifera. Habitat critical to survival also include communities that:*

- *contain native species that are known to be productive as foraging habitat during the final weeks of gestation, and during the weeks of birth, lactation and conception (August to May)*
- *contain native species used for foraging and occur within 20 km of a nationally important camp as identified on the Department's interactive flying-fox web viewer, or*
- *contain native and or exotic species used for roosting at the site of a nationally important Grey-Headed Flying-Fox camp as identified on the Department's interactive flying-fox web viewer.*

Under the definition above habitat to be removed is considered habitat critical to the survival of the species. The Proposal will remove 258 ha of habitat, representing potential foraging habitat for this species in the locality. As this species is highly mobile, with individuals foraging up to 50 km from roost sites, it is likely that suitable foraging resources could be accessed widely throughout the locality and beyond.

As a proportion within the IBRA Region (in the context of habitat available to the species) the Proposed Action will impact approximately:

- 0.05% of Northern Tableland Dry Sclerophyll Forests
- 0.005% of New England Grassy Woodlands
- <0.001% of Eastern Riverine Forests.

Whilst the Proposed Action will impact areas of critical habitat, this impact represents a relatively small component of locally occurring resources that would be accessible to this species within the IBRA Region.

**Would the action disrupt the breeding cycle of an important population?**

No Grey headed Flying-fox camps occur within the Project Site (or within 50 kms). The area of habitat to be directly impacted by the Proposal is relatively small (in the context of available habitat in the locality) and similar or higher quality foraging resources existing within the locality and broader region. Therefore, the proposed action is unlikely to disrupt the breeding cycle of the Grey-headed Flying-fox.

**Would the action modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

The Proposed Action will directly impact approximately 258 ha of native vegetation considered to be dispersal habitat for the species. The removal of approximately 258 ha of potential habitat is an incremental loss, decreasing the amount of suitable foraging habitat available locally.

Considering the mobile nature of this species, the Proposed Action is unlikely to isolate the species habitat significantly. It is unlikely that the Proposed Action will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline.

**Would the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action.

**Would the action introduce disease that may cause the species to decline?**

The Proposed Action would be unlikely to introduce any disease that may cause the species to decline.

**Would the action interfere with the recovery of the species?**

The National Recovery Plan for the Grey-headed Flying-fox (DAWE, 2021) outlines the following actions to improve the national population trend of this species:

- identify, protect and increase key foraging and roosting habitat

- improve the community's capacity to coexist with flying-foxes; and
- increase awareness about flying-foxes, the threats they face and the important ecosystem services they provide as seed dispersers and pollinators.

The Proposed Action may interfere slightly with the first action 'identify, protect and increase key foraging and roosting habitat', however, due to the relatively small amount of foraging habitat to be removed (in the context of available habitat in the locality) and the availability of this habitat within the locality and broader region, this impact is unlikely to significantly hinder recovery efforts for the species.

**Conclusion**

The Proposed Action represents the loss of potential foraging habitat, the Disturbance footprint is a small component of locally occurring habitat that will be utilised by the species. The Proposed Action is unlikely to have a significant effect on the Grey-headed Flying-fox given:

- Grey-headed Flying-fox in the locality may potentially occur periodically within the Project Site to forage as part of a larger home range.
- Any identified population of Grey-headed Flying-fox in the locality will not be restricted to habitat within the Project Site.
- No Flying-fox camps occur within (or within 50 km) of the Project Site.
- The Proposed Action will not fragment or isolate potential habitat such that Grey-headed Flying-fox movement in the locality will be impeded – areas of potential habitat and associated movement corridors in the locality which will remain unaffected by the Proposed Action.

#### 2.3.9.6 References

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Grey-headed Flying-fox (*Pteropus poliocephalus*)

Commonwealth DCCEEW (2024). *National Flying-fox monitoring viewer.*

Department of Agriculture, Water and the Environment (DAWE) (2021). *National Recovery Plan for the Grey-headed Flying-fox Pteropus poliocephalus.*

Threatened Species Scientific Committee (TSSC) (2001). *Commonwealth Listing Advice on Pteropus poliocephalus (Grey-headed Flying-fox).*

NSW Bionet Threatened Biodiversity Profile Data Collection (NSW TBDC) (2024). Profile: Grey-headed Flying-fox (*Pteropus poliocephalus*)

### 2.3.10 Border Thick-tailed Gecko

#### 2.3.10.1 Status

Border Thick-tailed Gecko (*Uvidicolus sphyrurus*) is listed as Vulnerable under the EPBC Act.

#### 2.3.10.2 Habitat and Ecology

The Border Thick-tailed Gecko occurs primarily on the northern slopes and tablelands of northern NSW and southern Qld. The geographic range is located from around Quirindi in the south to Stanthorpe in the north and west to Moree. The Border Thick-tailed Gecko is most commonly found in undisturbed habitat remnants on rock outcrops and stony hills within eucalypt and cypress-pine open forest or woodland between 500 and 1100 m elevation (Commonwealth DCCEEW, 2024).

Habitat preferences include areas with numerous logs and timber debris, and a sufficiently dense tree canopy to create a sparse grass/herb ground cover and abundant litter. Geckos shelter in well-shaded micro-sites, frequently under rocks and logs, under bark on standing trees and commonly inside decomposing logs. Continuous suitable woodland is considered important for this species' ability to disperse between suitable patches of habitat. The species' range is characterised by a relatively harsh climate with rock outcrops likely providing a thermal buffer for the species during hot and/or dry periods (Commonwealth DCCEEW, 2024).

#### 2.3.10.3 Specific impacts

Border Thick-tailed Gecko has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.31**. A total of 258 ha of potential habitat will be directly impacted by the Proposed Action.

The Project Site contains low, medium and high-quality habitat for Border Thick-tailed Gecko. Herpetological specialist (Alex Dudley) (Faunaverse, 2023) identified areas of suitable habitat for Border Thick-tailed Gecko within the Project Site. Due to historical disturbance including mining activities, tree-clearing, grazing and the introduction of weeds such as Coolatai Grass (*Hyparrhenia hirta*) has reduced the habitat quality through reducing the visual field of the gecko or by removing cover, increasing the risk of predation and loss of thermal buffer provided by tree cover after nightfall, reducing foraging time. While the Border Thick-tailed Gecko is unlikely to be at detectable densities in some areas of degraded habitat, it is likely that they would disperse through them from time to time. Only the lowest quality of habitat is likely to be avoided by the species at all times (i.e. poor condition vegetation zones). This assessment has assumed the Border Thick-tailed Gecko will utilise intact and modified vegetation zones within the Disturbance footprint (refer to **Table 2.31**) in order to provide a comprehensive impact assessment.

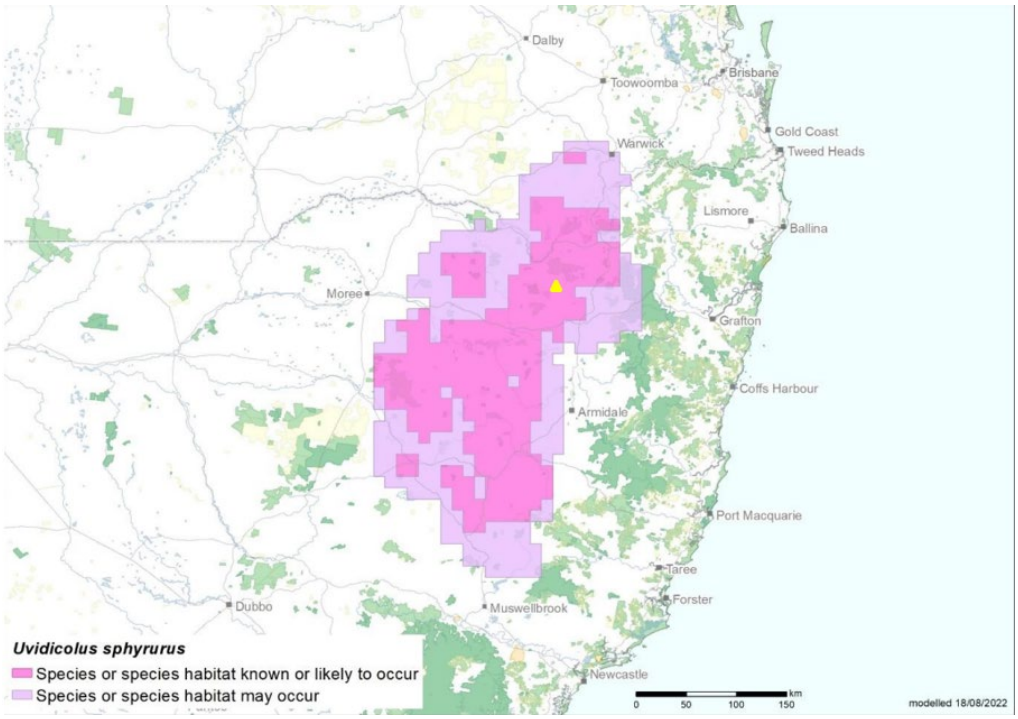
Five Border Thick-tailed Gecko were recorded as part of part of ecological investigations for the Proposed Action. One individual occurred within the Project Site within habitat associated with Disturbance footprint. Four individuals were recorded in the broader study area, in a land parcel to the north which contains similar vegetation and habitat characteristics and is owned by the Proponent of the Proposed Action.

**Table 2.31. Area of Potential Habitat for the Species within the Project Site**

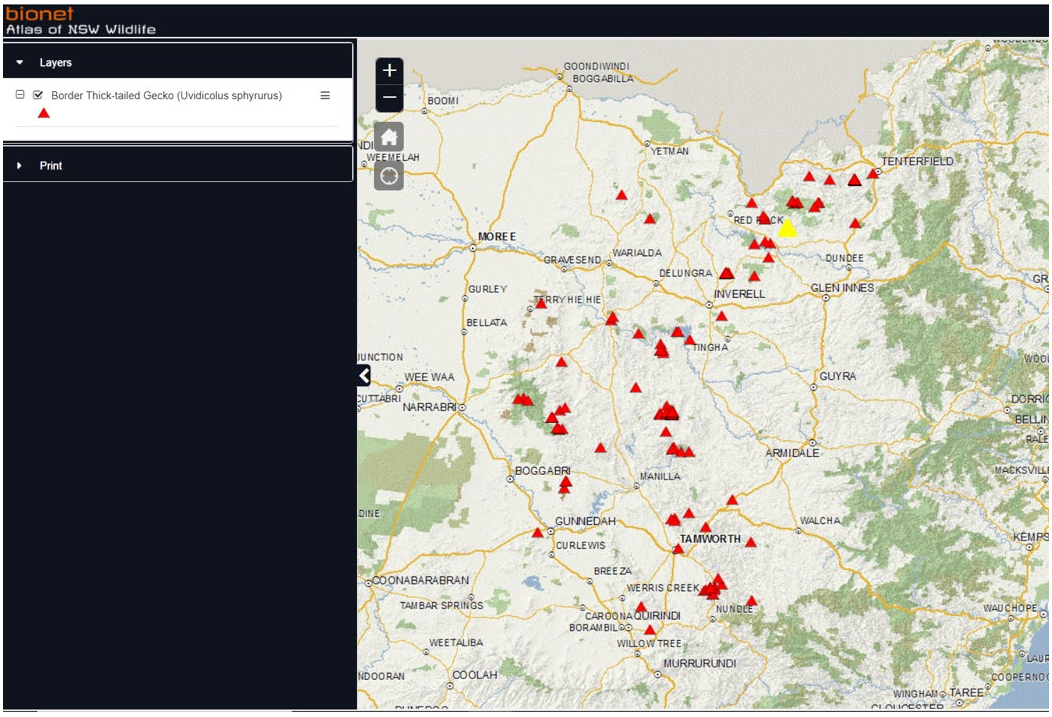
| Plant community type | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|
| PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | Modified | 97.37 |
| PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | **Total** | **257.99** |

#### 2.3.10.4 Defining the Important Population Subject to this Assessment

The Border Thick-tailed Gecko occurs primarily on the northern slopes and tablelands of northern NSW and southern Qld. The geographic range is located from around Quirindi in the south to Stanthorpe in the north and west to Moree. The eastern edge of its distribution, the species may occur in component reserves of the World Heritage listed Gondwana Rainforests of Australia.




**Distribution of Border Thick-tailed Gecko and the approx. location of the site (yellow triangle) for context. Map not to scale. Source: (Commonwealth DCCEEW, 2024).**




**BioNet records (red triangles) of Border Thick-tailed Gecko and the approx. location of the site (yellow triangle) for context. Map not to scale. Source: NSW TBDC (2024).**

Scattered records for the species exist across its known distribution (NSW TBDC, 2024). Currently, this species is known only to exist in isolated subpopulations scattered across its distribution. Conservation Advice for the Border Thick-tailed Gecko (Commonwealth DCCEEW, 2024) states:

- Data on population genetics are needed to determine population connectivity. A previous estimate of 55 discrete sites for the species in NSW was made, based on subpopulations being separated by more than 2 km.
- The records for Border Thick-tailed Gecko are closely associated with undisturbed habitat. While there is insufficient evidence to indicate the level of fragmentation of the population, the undisturbed fragments of habitat form loose clusters associated with minor ranges (though within these areas, records also appear to be fragmented). Four broad locations are considered as the minimum, conforming to clusters of records occurring in association with these minor ranges (approximately): 1. Mt Kaputar-Boggabri Gunnedah; 2. Tamworth-Gwydir River National Park (NP); 3. North-west of Inverell-Torrington NP; and 4. Stanthorpe region including Girraween NP.

Given data is generally insufficient for the species, for the purposes of this assessment, Border Thick-tailed Gecko within the New England Tablelands IBRA Region is defined as the important population.

#### 2.3.10.5 Impact Assessment

| Significant impact | Assessment |
|---|---|
| **Would the action lead to a long-term decrease in the size of an important population of a species?** | |
| Individuals recorded using the habitat within the Project Site should be assumed to be part of the broader important population. Approximately 258 ha of potential habitat would be impacted by the Proposed Action. In order to contextualise the impact to potential habitat for the species within the New England Tablelands IBRA Region - in which the species and Proposed Action occur, the table below identifies the amount (in ha) of each vegetation class impacted by the Proposed Action in the context of similarly available habitat within the IBRA Region. | |

| Significant impact | Assessment | | |
|---|---|---|---|
| **Vegetation Class*** | **Area (ha) within New England Tablelands IBRA Region*** | **Area (ha) impacted by Proposed Action** | **Proportion Impacted by Proposed Action within IBRA Region (%)** |
| Northern Tableland Dry Sclerophyll Forests | 506,298 | 257.26 | 0.05% |
| New England Grassy Woodlands | 18,382 | 0.62 | < 0.01% |
| Eastern Riverine Forests | 258,433 | 0.11 | <0.001% |
| **Totals** | **783,113** | **257.99** | **0.03%** |

**Vegetation data obtained via NSW State Vegetation Type Map*

The Proposed Action is not likely lead to a long-term decrease in the size of a population given:

- No preferred habitat of steep rocky or scree slopes with dense forested vegetation will become isolated from other areas of native vegetation as a result of the Proposed Action – thus the Proposed Action would not fragment habitat such that the species is limited in its dispersal ability in the locality.
- The Proposed Action is unlikely to create dispersal barriers between any known subpopulation such that the broader important population will be unable to exchange genetic material.
- The subpopulation which occupies the Project Site would retain the ability to disperse through the landscape via forested habitat and rocky areas or areas of similar quality habitat on adjoining land parcels.

**Would the action reduce the area of occupancy of an important population?**

Suitable habitat potential habitat within the New England Tablelands IBRA Region 783,113 ha (Northern Tableland Dry Sclerophyll Forests, New England Grassy Woodlands and Eastern Riverine Forests combined).

The Proposed Action would remove up to 258 ha of potential habitat and thus incrementally reduce the EOO and AOO by 0.03%. As such the Proposed Action has the potential to incrementally reduce the area of occupancy for the Border Thick-tailed Gecko.

**Would the action fragment an existing important population into two or more populations?**

It is considered unlikely that the Proposed Action would fragment an existing important population into two or more populations for the following reasons:

- The Proposed Action will not create dispersal barriers between any known subpopulation such that the broader important population will be unable to exchange genetic material.
- The subpopulation which occupies the Project Site would retain the ability to disperse through the landscape via forested habitat and rocky areas or areas of similar quality habitat on adjoining land parcels.
  - One individual occurred within the Project Site within habitat associated with Disturbance footprint. Four individuals were recorded in the broader study area, in a land parcel to the north which contains similar vegetation and habitat characteristics and is owned by the Proponent of the Proposed Action.

**Would the action adversely affect habitat critical to the survival of a species?**

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

| Significant impact | Assessment |
|---|---|

Habitat critical to the survival of a species may also include areas that are not listed on the Register of Critical Habitat if they are necessary:

- *for activities such as foraging, breeding, roosting, or dispersal*
- *for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)*
- *to maintain genetic diversity and long-term evolutionary development, or*
- *for the reintroduction of populations or recovery of the species or ecological community (Department of the Environment, 2013)*

The Project Site contains low, medium and high-quality habitat for Border Thick-tailed Gecko. Herpetological specialist (Alex Dudley) (Faunaverse, 2023) identified areas of suitable habitat for Border Thick-tailed Gecko within the Project Site. Historical disturbance including mining activities, tree-clearing, grazing and the introduction of weeds such as Coolatai Grass (*Hyparrhenia hirta*) has reduced the habitat quality through reducing the visual field of the gecko or by removing cover, increasing the risk of predation and loss of thermal buffer provided by tree cover after nightfall, reducing foraging time. While the Border Thick-tailed Gecko is unlikely to be at detectable densities in some areas of degraded habitat, it is likely that they would disperse through them from time to time.

Whilst the Proposed Action will not affect Critical Habitat as defined under section 207A of the EPBC Act, it may result in the removal of 258 ha of critical habitat which is necessary for:

- activities such as foraging, breeding, or dispersal.
- to maintain genetic diversity and long-term evolutionary development

**Would the action disrupt the breeding cycle of an important population?**

It is considered unlikely that the Proposed Action will disrupt the breeding cycle of the subject important population for the following reasons.

- The breeding cycle will continue outside of the Project Site for the subject important population.
- The subpopulation which occupies the Project Site would retain the ability to disperse through the landscape via forested habitat and rocky areas or areas of similar quality habitat on adjoining land parcels.
  - One individual occurred within the Project Site within habitat associated with Disturbance footprint. Four individuals were recorded in the broader study area, in a land parcel to the north of the Project Site which contains similar vegetation and habitat characteristics and is owned by the Proponent of the Proposed Action. These areas will continue to contribute to habitat availability in the locality and the breeding cycle for the species.

**Would the action modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

- The Proposed Action would remove up to 258 ha of potential habitat for Border Thick-tailed Gecko within the Project Site, it is unknown if these impacts will lead to a decrease of the availability or quality of habitat to the extent that the species is likely to decline.

**Would the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?**

It is not likely that invasive species (such as introduced predators) that are harmful to the Border Thick-tailed Gecko would become further established as a result of the Proposed Action.

**Would the action introduce disease that may cause the species to decline?**

There are no known disease issues affecting this species in relation to the Proposed Action. The Proposed Action would be unlikely to increase the potential for significant disease vectors to affect the species.

**Would the action interfere with the recovery of the species?**

| Significant impact Assessment |
|---|

No recovery plan has been prepared for this species at this stage. The approved conservation advice for the species outlines several local and regional priority recovery and threat abatement actions can be done to support the recovery of the Border Thick-tailed Gecko.

As the Proposed Action involves removal of potential habitat for the species, it could interfere with the regional priority recovery and threat abatement actions for the species, in particular; *Retain and protect areas of known habitat and areas of rocky habitat in dry open woodland from clearing and fragmentation*.

**Conclusion**

The Proposed Action may lead to a long-term decrease in the size of a population given:

- The removal of 258 ha of critical habitat which is necessary for activities such as foraging, breeding, or dispersal, and to maintain genetic diversity and long-term evolutionary development.
- The uncertainty surrounding the extent to which these impacts will lead to a decrease of the availability or quality of habitat to the extent that the species is likely to decline.

There is scientific uncertainty about the impacts of the action and potential impacts are serious or irreversible, therefore the precautionary principle is applicable, hence referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water is required.

#### 2.3.10.6 References


Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Border Thick-tailed Gecko (*Uvidicolus sphyrurus*)

Commonwealth DCCEEW (2024). *Conservation Advice for Uvidicolus sphyrurus (border thick-tailed gecko)*

Faunaverse (2023). *The Border Thick-tailed Gecko, Uvidicolus sphyrurus at the Taronga Mine Lease Emmaville.* Unpublished report by Herpetological specialist Alex Dudley of Faunaverse.

NSW Bionet Threatened Biodiversity Profile Data Collection (NSW TBDC) (2024). Profile: Border Thick-tailed Gecko (*Uvidicolus sphyrurus*)

## 2.4 Critically endangered and endangered ecological communities listed under the EPBC Act

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

- *reduce the extent of an ecological community*
- *fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines*
- *adversely affect habitat critical to the survival of an ecological community*
- *modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns*
- *cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting*
- *cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:*
  - *assisting invasive species, that are harmful to the listed ecological community, to become established, or*
  - *causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or*
- *interfere with the recovery of an ecological community.*

### 2.4.1 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

#### 2.4.1.1 Status

*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* is listed as Critically Endangered under the EPBC Act.

#### 2.4.1.2 Specific impacts

PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest is associated with the EPBC Act listed threatened ecological community (TEC) *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (herein referred to as 'Box-Gum Woodland TEC' or 'the TEC'). The TEC is listed as Critically Endangered under the EPBC Act. The Proposed Action will remove up to 1 ha of 'Box Gum Woodland TEC'. The impact area to PCT 3363 and associated TEC is listed at **Table 2.32**. Large areas of similar or higher quality habitat for the TEC occur in the surrounding locality.

The impact to the TEC is generally restricted to previously disturbed areas within the road reserve of Grampians Road. The impacts to this TEC are a result of road improvements and widening to improve road access and safety to the Mine site.

**Table 2.32. Area of Potential Habitat for the Species within the Project Site**

| Plant community type | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|
| PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest (*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC*) | Intact | 0.62 |
| | Poor | 0.41 |
| | **Total** | **1.03** |

2.4.1.3 Impact Assessment

**Table 2.33. Significant impact assessment – White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered**

| **Significant impact Assessment** |
|---|
| **Would the action reduce the extent of an ecological community?** |
| The Proposed Action would result in a reduction of the extent of the Box-Gum Woodland TEC. Approximately 1.03 ha of this community would be impacted by the Proposed Action. This direct impact is considered to reduce the extent of the community within the Project Site, as well as reduce the extent of the community within the region.<br>In order to contextualise the impact to potential habitat for the TEC within the New England Tablelands IBRA Region - in which the species and Proposed Action occur, Box-Gum Woodland TEC' occupies 136,244 ha of the New England Tablelands IBRA Region (based on vegetation data obtained via NSW State Vegetation Type Map).<br>The Proposed Action will impact approx. 1.03 ha. Therefore <0.001 % of the TEC will be impacted within the IBRA Region – this is an incremental loss of the TEC across its distribution. |

## Significant impact Assessment

**Would the action fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines?**

The Proposed Action would require the removal and /or disturbance to 1.03 ha Box-Gum Woodland TEC within areas of existing disturbance – within the road reserve of Grampians Road. This community generally occurs within a fragmented landscape, by other impacts such as agriculture. The Proposed Action would not fragment the TEC to an extent beyond that which currently existing in the locality.

**Would the action adversely affect habitat critical to the survival of an ecological community**

Box-Gum Woodlands recorded within the Project Site occur as fragmented patches in a variety of condition types. "White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland National Recovery Plan" (2010) notes that "*given the currently highly fragmented and degraded state of this ecological community, all areas of Box-Gum Grassy Woodland which meet the minimum condition criteria outlined in Section 3 should be considered critical to the survival of this ecological community*".

Based on the recovery plan for this community, all areas that have been assessed are likely to be habitat critical for the survival of the community.

The Proposed Action will impact 1.03 ha of this habitat, which is considered a relatively minor amount (< 0.001%) in the context of available habitat within the New England Tablelands IBRA Region – which is 136,244 ha.

**Would the action modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns?**

Any large-scale excavation (i.e. road construction / widening) that occurs in close proximity to the community or to marginal patches would involve mitigation measures to minimise sedimentation and hydrological impacts. Therefore, the Proposed Action is considered unlikely to substantially modify or destroy these abiotic factors.

**Would the action cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting?**

The Proposed Action would require the removal and/or disturbance to 1.03 ha Box-Gum Woodland within areas of existing disturbance. This has resulted in the modification of the communities structurally integrity i.e. absence of one or more strata and weed incursion.

Therefore, the Proposed Action is considered unlikely to substantially change the species composition of an occurrence of this community.

**Would the action cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**

- **assisting invasive species, that are harmful to the listed ecological community, to become established, or**
- **causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community?**

Box-Gum Woodland TEC within the Project Site is currently subject to weed and pest invasion. Additionally, the majority of the Proposed Action occurs within previously disturbed land. Therefore, it is considered unlikely that the Proposed Action would substantially reduce the quality or integrity of the community's occurrence or significantly increase the spread of invasive species.

Additionally, mitigation measures recommended in the BDAR, such as vegetation clearing protocols and sediment and control measures, aim to minimise the likelihood of spread of weeds or pathogens into the Project Site. These mitigation measures would aid in reducing potential impacts associated with the Proposed Action that may otherwise result in the further reduction of the community's quality.

## Significant impact Assessment

### Would the action interfere with the recovery of the ecological community.?

The following are the objectives of the National Recovery Plan for the TEC:

- achieving no net loss in extent and condition of the ecological community throughout is geographic distribution
- increasing protection of sites with high recovery potential
- increasing landscape functionality of the ecological community through management and restoration of degraded sites
- increase transitional areas around remnants and linkages between remnants; and
- bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity and function of Box Gum Woodlands.

The proposed action is likely to remove 1.03 ha of this community, which is likely to interfere with the recovery of Box-Gum Woodland TEC – albeit at a minor level.

### Conclusion

Approximately 1.03 ha of this community would be impacted by the Proposed Action. As a proportion, the Proposed Action will impact approximately < 0.001 % of the TEC within the New England Tablelands IBRA Region.

This direct impact will reduce the extent of the community within the Project Site, as well as reduce the extent of the community within the region – however this is considered to be a minor incremental loss. Mitigation measures will reduce the risk of the Proposed Action causing a substantial reduction in the quality of the TEC and introducing disease and weed species.

For these reasons, the Proposed Action is unlikely to result in a significant impact to Box-Gum Woodland TEC.

## 2.5 Listed migratory species under the EPBC Act

An action will require approval if the action has, will have, or is likely to have a significant impact on a listed migratory species. Note that some migratory species are also listed as threatened species. The criteria below are relevant to migratory species that are not threatened.

**Significant impact criteria**: An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- *substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species*
- *result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or*
- *seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.*

Assessments have been completed for the following migratory species listed at **Table 2.34**. **Table 2.34** provides a summary for the reader, with regard to the outcome of the assessment for each species.

**Table 2.34. EPBC Act listed Migratory species considered for assessment**

| Scientific Name | Common Name | EPBC Act Status | Direct Impact (ha) to Potential Habitat | Significant Impact? |
|---|---|---|---|---|
| *Apus pacificus* | Fork-tailed Swift | M | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |
| *Myiagra cyanoleuca* | Satin Flycatcher | M | 258 ha | No - the Proposed Action is considered unlikely to have a significant impact on the species |

M = Migratory

### 2.5.1 Fork-tailed Swift

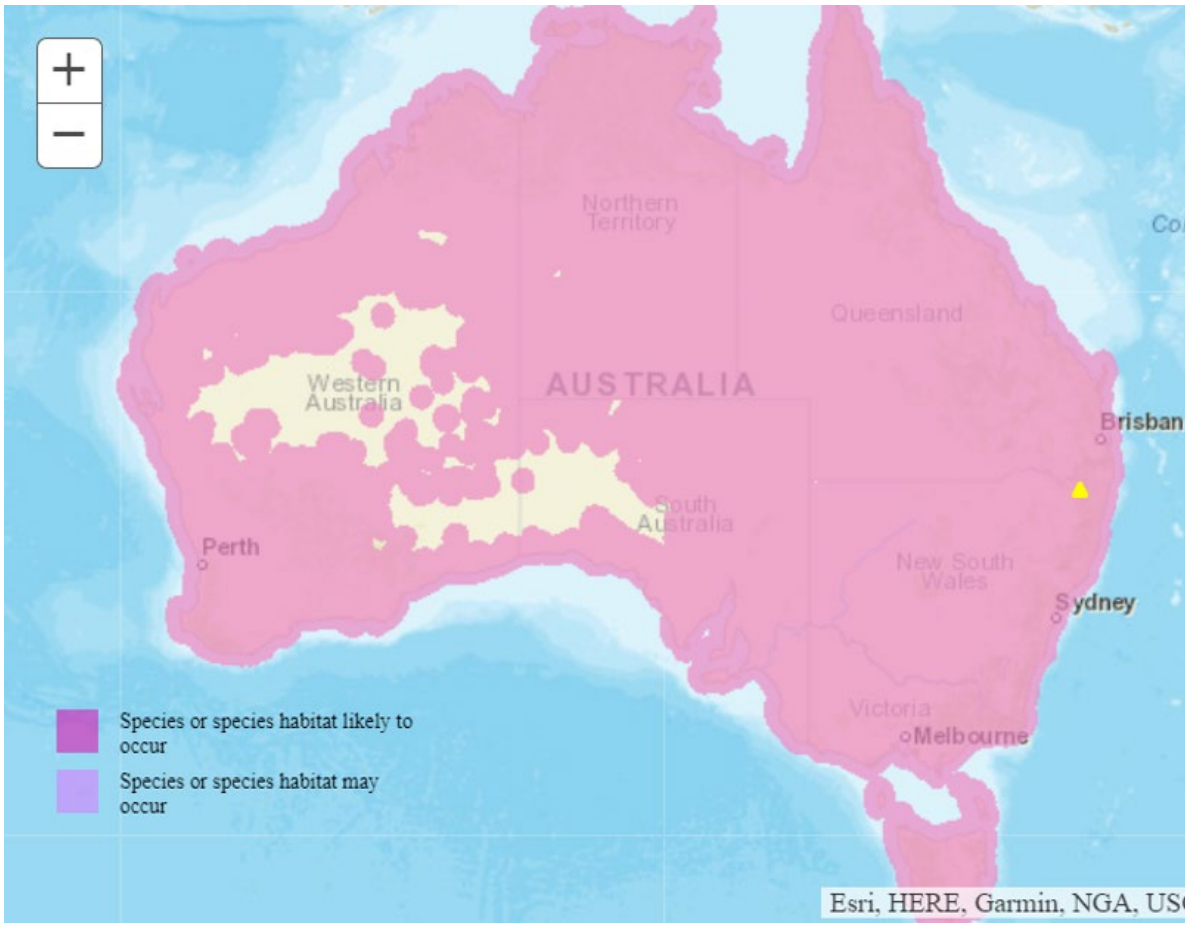
#### 2.5.1.1 Status

Fork-tailed Swift (*Apus pacificus*) is listed as Migratory under the EPBC Act.

#### 2.5.1.2 Habitat and Ecology

The Fork-tailed Swift is a non-breeding visitor to all states and territories of Australia. In NSW, the Fork-tailed Swift is recorded in all regions. Many records occur east of the Great Divide, however, a few populations have been found west of the Great Divide. These are widespread but scattered further west of the line joining Bourke and Dareton. Sightings have been recorded at Milparinka, the Bulloo River and Thurloo Downs (Commonwealth DCCEEW (2024).

The Fork-tailed Swift is almost exclusively aerial, flying from less then 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh (Commonwealth DCCEEW (2024).




**Distribution map for the species (via SPRAT Profile). Site indicated by yellow triangle. Map not to scale.**

2.5.1.3 Specific impacts

Fork-tailed Swift has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form of PCTs identified at **Table 2.35**. The Proposed Action will remove up to 258 ha of potential habitat. Large areas of similar or higher quality habitat for the species occur in surrounding woodland/ forest in the locality. This species was not recorded within the Project Site as part of ecological investigations for the Proposed Action.

**Table 2.35. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

**2.5.1.4 Impact Assessment**

**Table 2.36. Significant impact assessment – Fork-tailed Swift - Migratory**

| **Significant impact Assessment** |
|---|
| **Would the action substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?** |

*An area of 'important habitat' for a migratory species is:*

- *habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or*
- *habitat that is of critical importance to the species at particular life-cycle stages, and/or*
- *habitat utilised by a migratory species which is at the limit of the species range, and/or*
- *habitat within an area where the species is declining.*

More specifically, *Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act* (DoE, 2015) describes important habitat for the Fork-tailed Swift as:

*Non-breeding habitat only: Found across a range of habitats, from inland open plains to wooded areas, where it is exclusively aerial. **

*The species does not breed in Australia.*

Table 3 of *Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act* (DoE, 2015) defines "an ecologically significant proportion of a population of a species. For species such as the Fork-Tailed Swift that aggregate in flocks, 1% of the population is considered internationally important, 0.1% as nationally important and therefore ecologically significant."

In this instance, an internationally important population of the species (1%) is approximately 1,000 birds, whilst a nationally important population (0.1%) would be 100 birds.

**Significant impact Assessment**

While the Fork-tailed Swift may use the Project Site and locality on occasion for foraging (species does not breed in Australia), it would not be classed as an 'important habitat' for the following reasons:

- There are no specifically important habitats for the Fork-tailed Swift in the Project Site as outlined in *The Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act* (DoE, 2015).
- A nationally significant proportion of a listed Migratory bird population would not be supported by the habitats in the Project Site.
- The Project Site does not contain any known important foraging grounds for the Fork-tailed Swift and the Proposed Action would not impact on any significant foraging habitats.
- The Project Site does not contain any known important staging grounds for migration.
- The Project Site does not contain habitat that is at the limit of a listed Migratory species' range.
- The Proposed Action would impact a negligible amount of available habitat for the species across its distribution.

For these reasons, the Proposed Action would not substantially modify, destroy or isolate an area of important habitat for the species.

**Would the action result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action.

**Would the action seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?**

As the Fork-tailed Swift is widely distributed across Australia and does not breed in Australia, there is not considered to be any ecologically significant proportions of the Fork-tailed Swift population within the Project Site. Whilst the species may use the Project Site and locality on occasion for foraging, the Proposed Action will not seriously disrupt the lifecycle of an ecologically significant proportion of the Fork-tailed Swift population.

**Conclusion**

- There are no important habitats for the Fork-tailed Swift in the Project Site as outlined in *The Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act* (DoE, 2015).
- A nationally significant proportion of a listed Migratory bird population would not be supported by the habitats in the Project Site.
- The Project Site does not contain any known important foraging grounds for the Fork-tailed Swift and the Proposed Action would not impact on any significant foraging habitats.
- The Project Site does not contain any known important staging grounds for migration.
- The Project Site does not contain habitat that is at the limit of a listed Migratory species' range.
- The Proposed Action would impact a negligible amount of available habitat for the species across its distribution.

For these reasons, the Proposed Action would not significantly affect an ecologically significant proportion of the Fork-tailed Swift population.

#### 2.5.1.5 References

(Department of the Environment (DoE) (2015) *Draft referral guideline for 14 birds listed as migratory species under the EPBC Act.*

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Fork-tailed Swift (*Apus pacificus*)

### 2.5.2 Satin Flycatcher

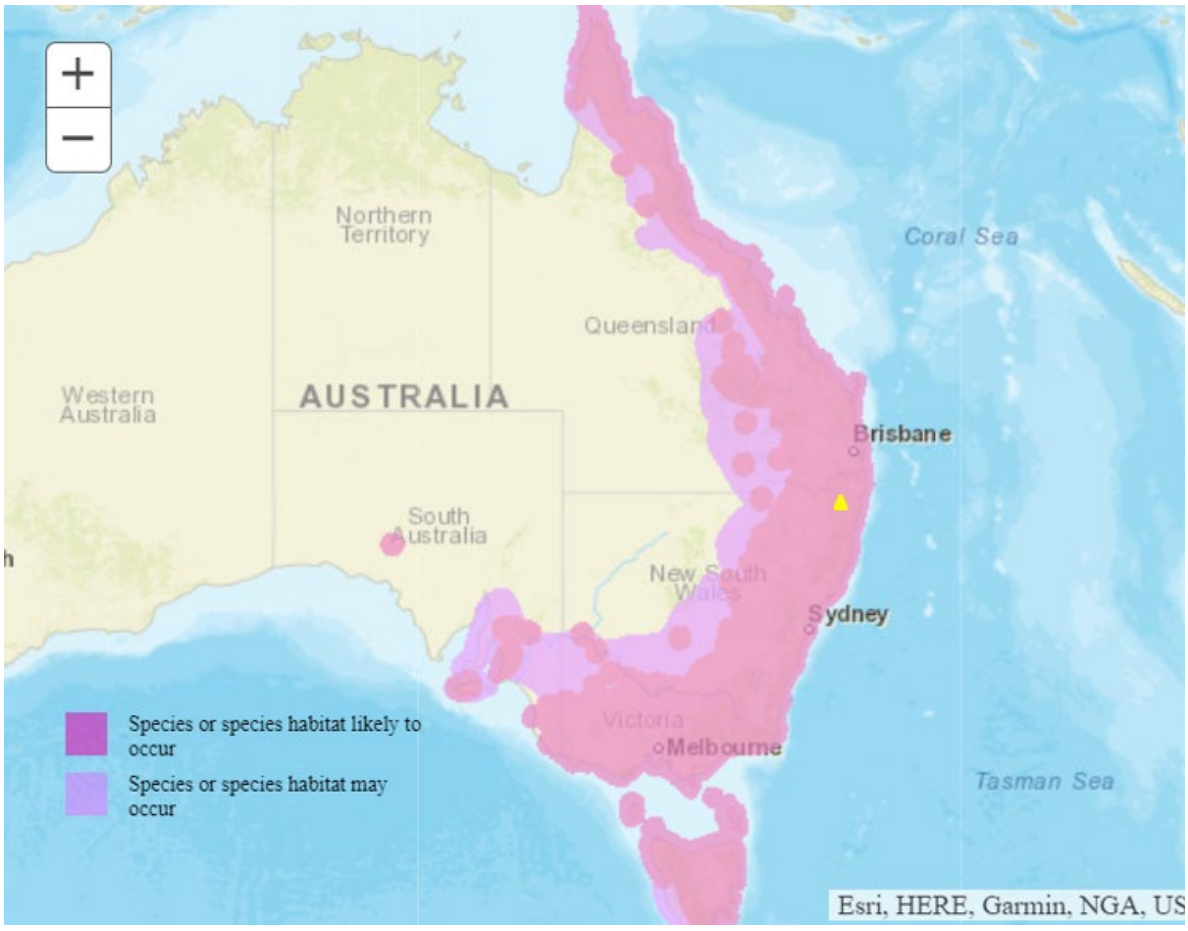
#### 2.5.2.1 Status

Satin Flycatcher (*Myiagra cyanoleuca*) is listed as Migratory under the EPBC Act.

#### 2.5.2.2 Habitat and Ecology

The Satin Flycatcher is widespread in eastern Australia and vagrant to New Zealand. In NSW, they are widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains (Commonwealth DCCEEW (2024).

Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They also occur in eucalypt woodlands with open understorey and grass ground cover and are generally absent from rainforest. The species is known to breed in forests of eastern Australia (Commonwealth DCCEEW (2024).




**Distribution map for the species (via SPRAT Profile). Site indicated by yellow triangle. Map not to scale.**

#### 2.5.2.3 Specific impacts

Satin Flycatcher has potential habitat associations within the New England Tablelands IBRA Region in which the Project Site occurs. The Project Site comprises potential habitat for the species in the form

of PCTs identified at **Table 2.37**. The Proposed Action will remove up to 258 ha of potential habitat. Large areas of similar or higher quality habitat for the species occur in surrounding woodland/ forest in the locality. This species was not recorded within the Project Site as part of ecological investigations for the Proposed Action.

**Table 2.37. Area of Potential Habitat for the Species within the Project Site**

| Vegetation Class | Plant Community Type (PCT) | Vegetation zone | Extent in disturbance footprint (ha) |
|---|---|---|---|
| Northern Tableland Dry Sclerophyll Forests | PCT 3722 Western New England Box-Tumbledown Gum Grassy Forest | Intact | 159.89 |
| | | Modified | 97.37 |
| New England Grassy Woodlands | PCT 3363 – Western New England Blakely's Red Gum-Box Grassy Forest | Intact | 0.62 |
| Eastern Riverine Forests | PCT 4080 – Northwest River Oak-Apple Forest | Modified | 0.11 |
| | | **Total** | **257.99** |

#### 2.5.2.4 Impact Assessment

**Table 2.38. Significant impact assessment – Satin Flycatcher - Migratory**

| **Significant impact Assessment** |
|---|
| **Would the action substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?** |

*An area of 'important habitat' for a migratory species is:*

- *habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or*
- *habitat that is of critical importance to the species at particular life-cycle stages, and/or*
- *habitat utilised by a migratory species which is at the limit of the species range, and/or*
- *habitat within an area where the species is declining.*

More specifically, Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act (DoE, 2015) describes important habitat for the Satin Flycatcher as.

*Eucalypt forest and woodlands, at high elevations when breeding. They are particularly common in tall wet sclerophyll forest, often in gullies or along water courses. In woodlands they prefer open, grassy woodland types. During migration, habitat preferences expand, with the species recorded in most wooded habitats except rainforests. Wintering birds in northern Qld will use rainforest - gallery forests interfaces, and birds have been recorded wintering in mangroves and paperbark swamps.*

Table 3 of *Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act* (DoE, 2015) defines "an ecologically significant proportion of a population of a species. 1% of the population is considered internationally important and 0.1% as nationally important and therefor ecologically significant. In this instance, an internationally important population of the Satin Flycatcher (1%) is approximately 17,000 birds, whilst a nationally important population (0.1%) would be 1700 birds.

While the Satin Flycatcher may use the Project Site and locality on occasion during seasonal movements, it would not be classed as an 'important habitat' for the following reasons:

**Significant impact Assessment**

- A nationally significant proportion of a listed Migratory bird population would not be supported by the habitats in the Project Site.
- The Project Site does not contain habitat that is at the limit of a listed Migratory species' range.
- The Proposed Action would impact a negligible amount of available habitat for the species across its distribution.

For these reasons, the Proposed Action would not substantially modify, destroy or isolate an area of important habitat for the species.

**Would the action result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or?**

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the species will become further established as a result of the Proposed Action.

**Would the action seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?**

As the Satin Flycatcher is widely distributed across eastern Australia, there are not considered to be any ecologically significant proportions of the Satin Flycatcher population within the Project Site. Whilst the species may use the Project Site and locality on occasion during seasonal movements, the Proposed Action will not seriously disrupt the lifecycle of an ecologically significant proportion of the Satin Flycatcher population.

**Conclusion**

- A nationally significant proportion of a listed Migratory bird population would not be supported by the habitats in the Project Site.
- The Project Site does not contain habitat that is at the limit of a listed Migratory species' range.
- The Proposed Action would impact a negligible amount of available habitat for the species across its distribution.

For these reasons, the Proposed Action would not significantly affect an ecologically significant proportion of the Satin Flycatcher population.

#### 2.5.2.5 References

(Department of the Environment (DoE) (2015) *Draft referral guideline for 14 birds listed as migratory species under the EPBC Act.*

Commonwealth DCCEEW (2024). Species Profile and Threats Database (SPRAT) Profile: Satin Flycatcher (*Myiagra cyanoleuca*).

# Appendix J

# FM Act Assessments of Significance

A Test of Significance in accordance with the requirements of the *Fisheries Management Act 1994* has been completed for the Southern Purple Spotted Gudgeon (SPSG) (*Mogurnda adspersa*) below.

***a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,***

The SPSG is a small fish listed as Endangered under the NSW *Fisheries Management Act 1994*. The species occurs in inland drainages of the Murray-Darling basin as well as coastal drainages of northern NSW and Queensland.

SPSG are found in a variety of lotic and lentic habitats including small coastal streams, rainforest streams, large rivers and in dune lake and stream systems. There are also reports of the SPSG being found in estuaries. SPSG are classified as a pool dwelling species, occurring in slow-flowing weedy areas and slow moving or still waters in rivers, creeks and billabongs (Pusey et al. 2004). Miles (2013) suggests that ideal SPSG habitat comprises “stagnant” pools or backwaters, < 61 metres long and 16 metres wide, depth < 600 mm, 1-60 per cent riparian cover, 40-60 per cent riparian shading, > 21 per cent macrophyte cover, mud or rocky bottom, dissolved oxygen between 6-12 mg/L-1, conductivity 101-300µm, pH 6-8.99 and 30-150 cm Secchi depth.

SPSG may occur across a range of mesohabitat conditions ranging from small, shallow riffles with moderately fast current velocities to long, moderately deep pools with no obvious flow (Pusey et al. 2004). Substrates may range from complete dominance by mud and sand to those dominated by rock or bedrock. On average, SPSG typically occur in streams less than 10 metres in width, about 40 cm deep and with a moderate current velocity (Pusey et al. 2004).

SPSG feed mainly on insect larvae, but also consume worms, tadpoles, small fish and some plant matter. Female SPSG may lay several batches of eggs per season (30-1,300 per batch). The eggs are deposited in clusters on solid objects such as rocks, wood or broad-leaved plants. The male guards and fans the eggs until hatching (three to eight days). The spawning period in northern NSW is not known with any certainty.

Threats to SPSG include:

- Predation by introduced fish such as gambusia and redfin perch.
- Habitat degradation, particularly the loss of aquatic plants.
- Fluctuations in water levels as a result of river regulation, leading to negative impacts on reproduction and recruitment.

***Potential impacts of the Activity***

Marginal habitat for the SPSG occurs within the Project Site associated with Vegetable Creek. Higher quality habitat is associated with larger more permanent creeks and rivers associated within the Beardy River. Likely impacts are discussed below.

Fish passage within Vegetable Creek may be temporarily halted during the proposed works relating to:

- The potential requirement to dewater during road and culvert construction (re-diverting creek flow may allow for flow of partially obstructed fish movement).
- The potential for in-stream intrusion resulting from culvert construction/ installation.
- The removal or trimming of tree canopy associated with riparian area to facilitate an upgrade to the existing causeway to ensure safe vehicle passage to site.
- Indirect impacts to SPSG habitat may result from road construction which may result in increased turbidity and temporary disturbance within potential SPSG habitat.

Vegetable Creek at the site flows intermittently and flows during high rainfall events. Fish passage is currently partially obstructed within Vegetable Creek at the site, given the existing culverts and crossings block the water flow during low flow periods. It is expected that the proposed works (road upgrade and culverts) will facilitate an improvement of fish passage within Vegetable Creek.

The channel within Vegetable Creek (outside the site) will continue to allow for flow and unobstructed fish movement. No impacts to any significant spawning habitat such as gravel beds would occur.

**On this basis, it is concluded that the proposed development is not expected to have an adverse effect on the life cycle of the SPSG such that a viable local population of the species is likely to be placed at risk of extinction.**

***a) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,***

No consideration under this part of the assessment is required.

***b) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:***

***i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***

***ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction***

No consideration under this part of the assessment is required.

***c) in relation to the habitat of a threatened species, population or ecological community:***

***i. the extent to which habitat is likely to be removed or modified as a result of the action proposed,***

Habitat removal or modification associated with the Project includes:

- Potential stream bed and bank disturbance associated with culvert construction or installation (stream bed at these locations comprise existing culverts or compact gravel road).
- Potential for short term localised disturbance and turbidity.
- The potential requirement to dewater during road and culvert construction (re-diverting creek flow may allow for flow of partially obstructed fish movement).

These works are minor in the context of Vegetable Creek and occur over a very small, localised area.

***ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and***

The Project may result in temporary barriers to movement of SPSG during the construction stage. There is a possibility for dewatering during culvert construction/ installation at each crossing (re-diverting creek flow may allow for flow of partially obstructed fish movement).

Following works, unobstructed fish movement allowing both downstream and upstream aquatic habitats to be freely accessed by any aquatic species will be re-instated. As previously noted, fish passage is currently disturbed and does not allow for flow and unobstructed fish movement. It is expected that the proposed works (road upgrade and culverts) will facilitate an improvement of fish passage within Vegetable Creek.

***iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality***

The habitat to be disturbed is expected to be of moderate importance to SPSG, given the fair condition of Vegetable Creek and the extent of potential SPSG habitat. The Project would see only a temporary reduction in the habitat values of the project footprint for SPSG during the works. Post works, aquatic habitat values within Vegetable Creek would be retained. Hence, no habitat important to the long-term survival of the SPSG in the locality would be adversely affected by the Project.

***d) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)***

The Project is not within an area of critical habitat listed under the FM Act.

***e) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,***

A recovery plan has not been prepared under the FM Act for the SPSG. A Priorities Action Statement (PAS) has been prepared for SPSG (refer: http://www.dpi.nsw.gov.au/fishing/species-protection/conservation/what-current/endangered-species/purple-spotted-gudgeon/priorities-action-statement-actions-for-the-purple-spotted-gudgeon). The Activity is not inconsistent with any of these recovery actions.

***f) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process***

Key threatening processes listed in Schedule 6 of the FM Act include:

- Current shark meshing program in NSW waters.
- Hook and line fishing in areas important for the survival of threatened fish species.
- Human-caused climate change.
- Instream structures and other mechanisms that alter natural flow.
- Introduction of non-indigenous fish and marine vegetation to the coastal waters of New South Wales.
- The introduction of fish to fresh waters within a river catchment outside their natural range.
- The removal of large woody debris from NSW rivers and streams.
- The degradation of native riparian vegetation along New South Wales water courses.

The Project is not considered characteristic any listed KTPs. Works would be of short duration and natural flow is unlikely to be hindered.

On this basis the degree that the Project would contribute to any threatening process is not considered likely to place SPSG at significant risk of extinction.

# Appendix K

# BAM information requirements for a BDAR

**Table K 1 Minimum information requirements for a BDAR (Table 24 and 25 of the BAM)**

| Report Section | Information | Section in BDAR | Maps and Data | Section in BDAR |
|---|---|---|---|---|
| **Introduction** | ■ Introduction to the biodiversity assessment including:<br>– brief description of the proposal.<br>– identification of subject land boundary, including:<br>• Operational footprint (if BDAR).<br>• Construction footprint indicating clearing associated with temporary/ ancillary construction facilities and infrastructure (if BDAR).<br>• Land proposed for biodiversity certification (if BCAR).<br>– General description of the subject land.<br>– Sources of information used in the assessment, including reports and spatial data. | **Section 1** and **Section 3** | ■ Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ ancillary construction facilities and infrastructure (if BDAR). | **Illustration 1.2** and **Sheet 2 of 2** |
| **Landscape features** | ■ Identification of site context components and landscape features, including:<br>– General description of subject land topographic and hydrological setting, geology and soils.<br>– Percent native vegetation cover in the assessment area (as described in BAM Section 3.2).<br>– IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))<br>– Rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E).<br>– Wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.)).<br>– Connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6)).<br>– Karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.).<br>– Areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.)).<br>– Any additional landscape features identified in any SEARs for the proposal.<br>– NSW (Mitchell) landscape on which the subject land occurs. | **Section 4** | ■ Site Map<br>– Boundary of subject land.<br>– Cadastre of subject land.<br>– Landscape features identified in BAM Subsection 3.1.3.<br>■ Location Map<br>– Digital aerial photography at 1:1,000 scale or finer.<br>– Boundary of subject land.<br>– Assessment area, (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development.<br>– Landscape features identified in BAM Subsection 3.1.3.<br>– Additional detail (e.g. local government area boundaries) relevant at this scale.<br>■ Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/ or Location map include:<br>– IBRA bioregions and subregions.<br>– Rivers, streams and estuaries.<br>– Wetlands and important wetlands.<br>– Connectivity of different areas of habitat.<br>– Karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features.<br>– Areas of outstanding biodiversity value occurring on the subject land and assessment area.<br>– Any additional landscape features identified in any SEARs for the proposal.<br>– NSW (Mitchell) landscape on which the subject land occurs. | **Illustration 1.1** and **Illustration 1.2**<br>**Illustration 4.1, Illustration 4.2, Illustration 4.3, Illustration 4.4,Illustration 4.5, Illustration 4.6** |
| **Native vegetation** | ■ Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3) and Subsection 4.1.1).<br>■ Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2).<br>■ Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1).<br>■ Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2.<br>■ Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A).<br>■ For each PCT within the subject land, describe:<br>– Vegetation class.<br>– Extent (ha) within subject land. | **Section 5** | ■ Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2).<br>■ Map of PCTs within the subject land (as described in BAM Section 4.2(1.)).<br>■ Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1).<br>■ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCTs boundaries.<br>■ Map of TEC distribution on the subject land and table of TEC listing, status and area (ha).<br>■ Patch size areas (as described in BAM Subsection 4.3.2).<br>■ Table of current vegetation integrity scores for each vegetation zone within the site and including:<br>– Composition condition score.<br>– Structure condition score. | **Illustration 4.3**<br>**Illustration 5.1**<br>**Table 5.1** Vegetation communities and vegetation zones within the Beardy River Hills IBRA subregion |

| Report Section | Information | Section in BDAR | Maps and Data | Section in BDAR |
|---|---|---|---|---|
| | – Evidence used to identify a PCT including any analyses undertaken, references/ sources, existing vegetation maps (BAM Section 4.2(1–3.)).<br>– Plant species relied upon for identification of the PCT and relative abundance of each species.<br>– If relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.)).<br>– Estimate of percent cleared value of PCT (BAM Subsection 4.2.1(5.)).<br>■ Describe the vegetation integrity assessment of the subject land, including:<br>– Identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1).<br>– Assessment of patch size (as described in BAM Subsection 4.3.2).<br>– Survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.).<br>– Use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.)).<br>■ Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A):<br>– Identify the PCT or vegetation class for which local benchmark data will be applied.<br>– Identify published sources of local benchmark data (if benchmarks obtained from published sources).<br>– Describe methods of local benchmark data collection (if reference plots used to determine local benchmark data).<br>– Provide justification for use of local data rather than BioNet Vegetation Classification benchmark values.<br>– Provide written confirmation from the decision-maker that they support the use of local benchmark data. | | – Function condition score.<br>– Presence of hollow bearing trees. | |
| **Threatened species** | ■ Identify ecosystem credit species likely to occur on the subject land, including:<br>– List of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.)).<br>– Justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2).<br>– Justification for addition of any ecosystem credit species to the list.<br>■ Identify species credit species likely to occur on the subject land, including:<br>– List of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1).<br>– Justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2).<br>– Justification and supporting evidence for exclusions based on degraded habitat constraints and/ or microhabitats on which the species depends (as described in BAM Subsection 5.2.2).<br>– Justification for addition of any species credit species to the list.<br>■ From the list of candidate species credit species, identify:<br>– Species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.)).<br>– Species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.)).<br>– Species for which targeted surveys are to be completed to determine species presence (Subsection 5.2.4(2.b.)).<br>– Species for which an expert report is to be used to determine species presence (Subsection 5.2.4(2.c.)). | **Section 6** | ■ Table showing ecosystem credit species in accordance with BAM Section 5.1.1, and identifying:<br>– The ecosystem credit species removed from the list.<br>– The sensitivity to gain class of each species.<br>■ Table detailing species credit species in accordance with BAM section 5.2 and identifying:<br>– The species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or micro habitat features are not present.<br>– The candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map.<br>■ Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4).<br>■ Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5). | **Table 6.2, Table 6.3, Table 6.4**<br>**Table 6.5, Table 6.6, Table 6.7, Table 6.8, Table 6.9, Table 6.10, Table 6.11, Table 6.12**<br>**Illustration 6.2** and **Illustration 6.8** |

| Report Section | Information | Section in BDAR | Maps and Data | Section in BDAR |
|---|---|---|---|---|
| | ■ Present the outcomes of species credit species assessments from:<br>– Threatened species survey (as described in BAM Section 5.2.4).<br>– Expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Section 5.2.4 and 5.3, Box 3).<br>■ Where survey has been undertaken include detailed information on:<br>– Survey method and effort, (as described in BAM Section 5.3).<br>– Justification of survey method and effort (e.g. citation of peer reviewed literature) if approach differs from the Department's taxa specific survey guides or where no relevant guideline has been published.<br>– Timing of survey in relation to requirements in the TBDC or the Department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys.<br>– Survey personnel and relevant experience.<br>– Describe any limitations to surveys and how these were addressed/ overcome.<br>■ Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include:<br>– Justification of the use of an expert report.<br>– Identify the expert, provide evidence of their expert credentials and Departmental approval of expert status.<br>– All requirements of Box 3 have been addressed in the expert report.<br>■ Where use of local data is proposed (BAM Subsection 1.4.2):<br>– Identify relevant species.<br>– Identify data to be amended.<br>– Identify source of information for local data, e.g. published literature, additional survey data, etc.<br>– Justify use of local data in preference to VIS Classification or TBDC Data.<br>– Provide written confirmation from the decision-maker that they support the use of local data.<br>■ Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that:<br>– the unit of measure for each species is documented for species assessed by area:<br>• The polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5).<br>• A description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied.<br>– for species assessed by counts of individuals:<br>• The number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.)).<br>• The method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken.<br>• The polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land.<br>■ Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4). | | | |

| Report Section | Information | Section in BDAR | Maps and Data | Section in BDAR |
|---|---|---|---|---|
| **Prescribed impacts** | ■ Identify potential prescribed biodiversity impacts on threatened entities, including:<br>– Karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1).<br>– Occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2).<br>– Corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3).<br>– Water bodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4).<br>– Protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5).<br>– Where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6).<br>■ Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts.<br>■ Describe the importance of habitat features to the species including, where relevant, impacts on life-cycle or movement patterns (e.g. Subsection 6.1.3). | **Section 7** | ■ Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.) | **Illustration 7.1** |
| **Avoid and Minimise Impacts** | ■ Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative:<br>– Modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting.<br>– The proposed mode or technology.<br>– Routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route.<br>– Alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location.<br>– Alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site.<br>■ Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2).<br>■ Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Section 7.2.1(3.)). | **Section 9** | ■ Table of measures implemented to avoid and minimise the impacts of the proposal. | **Table 9.1,Table 9.2** |
| **Assessment of Impacts** | ■ Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1).<br>■ Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):<br>– Description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal.<br>– Documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications.<br>– Reporting any limitations or assumptions, etc. made during the assessment<br>– identification of the threatened entities and their habitat likely to be affected.<br>■ Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including: assessment of the nature, extent and duration of impacts on the habitat of threatened species or ecological communities associated with:<br>– Karst, caves, crevices, cliffs, rocks and other features of geological significance.<br>– Human-made structures.<br>– Non-native vegetation. | **Section 10** | ■ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts. | **Table 10.1** |

| Report Section | Information | Section in BDAR | Maps and Data | Section in BDAR |
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| | – Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.<br>– Movement of threatened species that maintains their life cycle.<br>– Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities. | | | |
| **Mitigation and Management of Impacts** | ■ Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:<br>– Techniques, timing, frequency and responsibility.<br>– Identify measures for which there is risk of failure.<br>– Evaluate the risk and consequence of any residual impacts.<br>– Document any adaptive management strategy proposed.<br>■ Identification of measures for mitigating impacts related to:<br>– Displacement of resident fauna (as described in BAM Subsection 8.4.1(2.))<br>– indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.)).<br>– Mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2).<br>■ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5). | **Section 11** | ■ Table of measures to be implemented to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility | **Table 11.1** |
| **Impact Summary** | ■ Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAII, in accordance with BAM Section 9.1) including:<br>– Addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAII present on the subject land.<br>– Addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAII present on the subject land.<br>– Documenting assumptions made and/ or limitations to information.<br>– Documenting all sources of data, information, references used or consulted.<br>– Clearly justifying why any criteria could not be addressed.<br>■ Identification of impacts requiring offset in accordance with BAM Section 9.2.<br>■ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.).<br>■ Identification of areas not requiring assessment in accordance with BAM Section 9.3.<br>■ Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including:<br>– Future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H).<br>– Change in vegetation integrity score (BAM Subsection 8.1.1).<br>– Number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 9).<br>– Number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3). | **Section 12** | ■ Map showing the extent of TECs at risk of an SAII within the subject land<br>■ Map showing location of threatened species at risk of an SAII within the subject land<br>– Map showing location of:<br>• Impacts requiring offset.<br>• Impacts not requiring offset.<br>• Areas not requiring assessment.<br>■ Table of PCTs requiring offset and the number of ecosystem credits required.<br>■ Table of threatened species requiring offset and the number of species credits required. | **Illustration 12.1, Illustration 12.2, Illustration 12.3**<br>**Table 12.4, Table 12.5, Table 12.6, Table 12.7** |
| **Biodiversity Credit Report** | ■ Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2). | **Section 12** and **Appendix F** | ■ Table of credit class and matching credit profile.<br>■ BAM credit report in pdf format. | **Appendix F** |

# Appendix L

# Response Log

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30 March 2026

Brittany Golding
A/Senior Environmental Officer
Resource Assessments
Department of Planning, Housing and Infrastructure
Brittany.Golding@planning.nsw.gov.au

## Response to Request for Information: RFI-96105708

## Taronga Tin Mine: SSD-73489710

Dear Brittany,

This letter responds to correspondence from Louisa Mamouney, Executive Director, Planning Offsets and Threatened Species Conservation Programs, Heritage and Regulation Group, dated 13th November 2025, which provided a Request for Information from the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Conservation Programs, Heritage and Regulation Group (CPHR).

All thirteen (13) items outlined in CPHR's comments, have been addressed through the provision of additional information and clarifications relating to the Biodiversity Development Assessment Report (BDAR). Biodiversity Australia will incorporate the contents of this response and associated amendments into the existing BDAR (GeoLINK 2025), including all required revisions and detailed responses to the matters raised. The updated BDAR will be subject to review and certification by GeoLINK's Accredited Assessor.

Our approach remains focused on meeting the proponents' statutory obligations under the *Biodiversity Conservation Act 2016*, the *Biodiversity Conservation Regulation 2017* and the Biodiversity Assessment Method 2020 while ensuring that outcomes are practical and proportionate.

We trust that the information provided herein will assist CPHR in its review and demonstrate our compliance with the relevant requirements. Should any further clarification be needed, please do not hesitate to contact either myself or Karl Robertson (0410 522 399 email at karl.robertson@biodiversityaust.com.au).

Yours faithfully,

Dr. Cheryl O'Dwyer
BAM Accredited Assessor BAAS18153
Principal Ecologist
Cheryl.odwyer@biodiversityaust.com.au (0410552708)

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| CPHR Issue No. | 1. |
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| CPHR Issue | The tree growth form was recorded as absent in tree stem count in Biodiversity Assessment Method (BAM) plot 21, despite a tree growth form being recorded in the floristic survey. Consequently, the Vegetation Integrity (VI) score for the Plant Community Type (PCT) 3363_poor Vegetation Zone (VZ) may have been underestimated, which could result in an underestimation of the biodiversity offset obligation generated for direct impacts on the VZ by the project. |
| CPHR Comments | Biodiversity Assessment Method (BAM) sampling plot 21 was established to inform the vegetation type and condition state of the 3363_Poor vegetation zone (VZ). However, the location of BAM plot 21 has not been identified in either illustration 6.1 of the BDAR or the corresponding GIS spatial file. |
| CPHR Recommendation | • Illustration 6.1 of the BDAR and the corresponding GIS spatial file be amended to identify the location of BAM plot 21 on the subject land.<br>• The stem count data for BAM plot 21 be rectified to accord with the floristic data and the BAM-Calculator and BDAR be updated to incorporate the correction and any subsequent change in biodiversity offset obligation. |
| Biodiversity Australia Response | Biodiversity Australia reviewed the plot data for Plot 21 and consulted with the original BAM Accredited Assessor to verify the recorded attributes. The review confirmed the presence of five (5) individual *Angophora floribunda* within the plot, representing a cover of approximately 0.1%. All individuals were identified as regenerating (<5 cm).<br>Accordingly, the regeneration attribute within the BAM Calculator (BAMC) was updated from “absent” to “present” to accurately reflect site conditions. This revision resulted in an increase in the Vegetation Integrity (VI) score to 47.6, and a corresponding increase in credit obligation from 10 credits to 12 credits for PCT 3363_Poor. This change did not alter the credit requirements for any other ecosystem or species credits.<br>The location of Plot 21 is shown in Figure 1 below, with the full vegetation map provided in Figure 2. Table 1 shows the updated Direct impacts on Plant Community Types with the updated VI scores directly from the Biodiversity Assessment Method Calculator (BAMC).<br>Table 5.1 (pg 46 and Table 10.1 (pg 149) within the BDAR have been updated to reflect these changes. The BDAR and BAMC reflect the same VI scores. |

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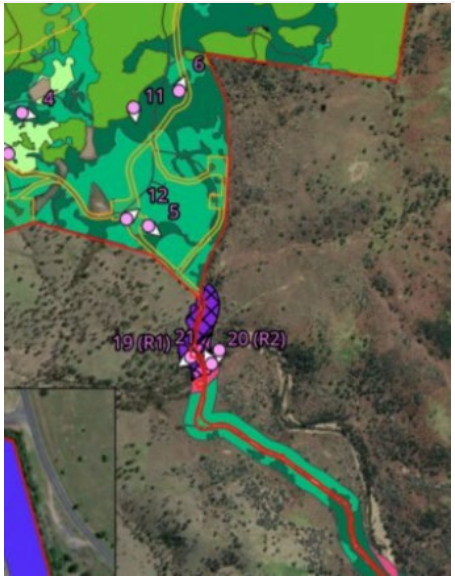


Figure 1: Location of Plot 21

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| **CPHR Issue No.** | **2.** |
| **CHPR Issue** | Reconsider the approach used to determine the Velvet Wattle species polygon |
| **CPHR Comments** | The assessor has applied a precautionary approach when preparing the species polygon for velvet wattle (*Acacia pubifolia*), by including all vegetation zones associated with PCT 3722 within the species polygon.<br><br>Velvet wattle is considered predominantly a clonal species in NSW, which is consistent with the information contained in the Threatened Biodiversity Data Collection (TBDC). Page 20 of the survey guide for threatened plants and their habitats published by the Department (DPIE 2020) notes, where a species is clonal, the species polygon must encompass the entire plant within a suitable buffer. Based on this advice, it would be appropriate to reduce the size of the species polygon for velvet wattle to encompass each entire plant within a suitable buffer. A buffer width of 50 m would be suitable given the TBDC refers to a buffer of 50 m from rocky areas as suitable habitat for velvet wattle. |

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| **CPHR Recommendation** | • The species polygon for velvet wattle be revised to encompass each entire plant within a 50 m buffer. |
| **Biodiversity Australia Response** | Biodiversity Australia has reviewed the GIS spatial files provided by GeoLinks and valid BioNet ATLAS Threatened Species Records to identify the confirmed locations of Velvet Wattle (*Acacia pubifolia*) within the Subject Land and Development Footprint.<br>The following text has been included on page 89 of the BDAR, *In response to CPHR's recommendations, the species polygon for Velvet Wattle has been revised to reflect the clonal nature of the species and guidance provided in the Threatened Biodiversity Data Collection (TBDC) and the Survey Guide for Threatened Plants and Their Habitats (DPIE 2020). Specifically, the updated Species Polygon has been derived by applying a 50m buffer on all valid recorded occurrences of Velvet Wattle within the Development Footprint and merging these buffered areas to form a consolidated species polygon.*<br>*This approach replaces the previous precautionary method, which incorporated all vegetation zones associated with PCT 3722 and PCT 3363. The revised Species Polygon (15 ha) will replace the current polygon (314.03 ha) and is considered to more accurately represent the distribution of the species within the development footprint.*<br>Table 2 (from the BAMC) shows the Direct Impacts on Velvet Wattle, with species credit obligations outlined in Table 3. Direct impacts on all other species remains unchanged. The updated Species Polygon is presented in Figure 3, and the revised credit obligation (669 credits) is detailed in the updated Credit Reports provided in Appendix 1.<br>Illustration 6.2 and Table 10.5 (pg 153) have been updated in the BDAR to reflect these changes. |
| **CPHR Issue No.** | **3.** |
| **CPHR Issue** | More detail about potential indirect biodiversity impacts of dust deposition is required |
| **CPHR Comments** | • The assessor has potentially underestimated the indirect impacts of dust on retained native vegetation by indicating:<br>1. dust deposition on foliage is likely to be highly localised, intermittent and temporary, making it unlikely to have a major long-term impact on the retained vegetation in the project site, and<br>2. dry sclerophyll woodland is more resilient to the effects of dust than other more sensitive vegetation types.<br>Dust deposition from the project will not be a temporary issue given potential dust generating actions, such as truck movements, drilling and blasting, crusher operation, waste rock transport and emplacement, and wind erosion of exposed surfaces will continue throughout the operational phase of the project.<br>A study by Turner (2013) of the impacts of dust from iron ore mining on dry sclerophyll vegetation recorded a 50 % reduction in stomatal conductance in Acacia species at dust levels as low as 5 g/m2. Furthermore, the impacts extended up to 600 m from dust-generating mining actions. Reduced stomatal conductance can affect a plant's ability to transpire (increasing leaf temperature), uptake carbon (stunting growth) and maintain hydration, resulting in stunted growth and death.<br>• Section 6.3.4.1 of the EIS indicates the target maximum level of dust deposition at the mine site boundary is 4 g/m2/month. Therefore, dust deposition rates on vegetation at or above 5 g/m2 in proximity to dust generating mine activities would appear likely. |

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| **CPHR Recommendation** | • The BDAR and EIS be revised to include a detailed assessment of indirect impacts of dust<br>• deposition on biodiversity values on the subject land and proximate areas. |
| **Biodiversity Australia Response** | To address CPHR's concerns, indirect impacts of dust deposition on retained vegetation and dependent fauna have been further considered. Biodiversity Australia acknowledges the concerns raised regarding the potential underestimation of indirect impacts of dust deposition on retained native vegetation, particularly in relation to the duration, intensity and spatial extent of impacts during the operational phase of the project.<br>The BDAR (Section 10.2, pg 154) had been updated with the following text: "*In response to CPHR recommendations, the assessment of Indirect Impacts has been expanded to evaluate dust accumulation from all operational activities, including haulage, drilling, blasting, crushing and wind erosion of exposed surfaces considering the duration, frequency and spatial extent of deposition. Relevant literature, including Turner (2013) informs the evaluation of physiological and ecological impacts on vegetation including reduced stomatal conductance, impaired gas exchange, decreased photosynthesis and potential cumulative stress leading to vegetation decline. These effects may reduce habitat quality and resource availability for dependent fauna species.*"<br>Table 10.7 (pg 155) of the BDAR has been updated to assess the mechanisms by which dust affects vegetation condition and habitat quality, and potential consequences for dependent fauna. Under the section "Reduced viability of adjacent habitats due to noise, dust or light spill". Biodiversity Australia have added text in the 'Consequence' column, Paragraph 3:<br>*Indirect impacts of dust deposition on retained vegetation and dependent fauna have been further considered. Dust accumulation on foliage can reduce photosynthesis by limiting light penetration and clogging stomata which restricts gas exchange. This can impair transpiration, carbon uptake, and plant water balance which can potentially lead to reduced growth, increased stress, and in severe or prolonged cases, vegetation decline or death. These effects may in turn reduce habitat quality and resource availability for dependant fauna species. To mitigate and manage these impacts an Air Quality Management Plan (AQMP), has been incorporated, including Trigger Action Response Plans (TARPs), proactive dust suppression (eg watering of haul roads, dust suppressants, management of exposed surfaces), and adaptive management in response to meteorological conditions. Monitoring of weather conditions and adaptive management responses during period of increased dust generation risk will also be included.*<br>*Monitoring of vegetation, particularly threatened species outside the development footprint and within 600 m will evaluate the penetration of dust into surrounding retained vegetation. Monitoring of dust and dust-generating activities will also assess whether deposition levels (including those approaching or exceeding 4g/m$^2$/month at the site boundary) result in localised exceedances, particularly in proximity to dust-generating activities, and the implications of this for sensitive vegetation and habitat.*<br>*The Applicant has established a dust deposition monitoring network to support this assessment. Monitoring requirements were developed in consultation with the NSW EPA and Northstar Air Quality Pty Ltd (Northstar). Based on EPA advice and draft consent conditions, Northstar recommended the installation of four dust deposition gauges across the Mine Site. The dispersion model previously developed by Northstar was used to inform the selection of monitoring locations, with a focus on areas of predicted arsenic deposition, and locations were refined based on site access and operational constraints.* |
| **CPHR Issue No.** | **4.** |
| **CPHR Issue** | More detail about potential indirect biodiversity impacts of site contamination is required |

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| **CPHR Comments** | • Heavy metals and metalloids (e.g. arsenic) from waste rock, dust and residual water associated with mining have been demonstrated to have adverse effects on vegetation and wildlife.<br><br>• The risks of human exposure to heavy metals and metalloids have been considered in the EIS, and the assessor has noted in the BDAR that mine-affected water would be contained within the mine site. However, no detail has been provided in the EIS or BDAR to demonstrate consideration of potential long-term indirect impacts from elevated arsenic and/or heavy metal concentrations in dust, soil and surface water on biodiversity residing on the subject land and nearby surrounding areas (i.e. highly mobile fauna residing offsite may still access surface water on the subject land). |
| **CPHR Recommendation** | • The BDAR and EIS be revised to include a detailed assessment of indirect impacts of heavy metal and metalloid contamination of dust, soil and surface water on biodiversity values on the subject land and proximate areas. |
| **Biodiversity Australia Response** | To address CPHR's concerns, indirect impacts of site contamination from heavy metals and metalloids (including arsenic) on retained vegetation and dependent fauna have been assessed and evaluated. Biodiversity Australia recognises potential exposure pathway from dust, soil, waste rock and mine-affected water. While human health risks and containment of mine-affected water have been addressed in the EIS, further consideration of potential long-term ecological exposure pathways was undertaken.<br><br>The BDAR (Section 10.2, pg 154) was updated with the following text: *The assessment also evaluates potential exposure pathways associated from dust, soil, and surface water, including deposition of contaminated dust onto vegetation and soils, uptake by plants, ingestion by herbivores and omnivores, and use of surface water by resident and highly mobile fauna. The evaluation considered potential physiological and ecological effects on vegetation (e.g., reduced growth, stress responses, and declines in condition) and potential bioaccumulation and chronic toxicity effects on fauna.*<br><br>Table 10.7 (pg 157) was revised to illustrate the mechanisms by which heavy metals and metalloids affect vegetation condition and habitat quality, and potential consequences for dependent fauna. A new row was added to Table 10.7 to capture heavy metals and metalloids occurring during operation and construction, affecting flora and fauna species across all PCTs with the long-term effects.<br><br>The following text was added:<br><br>*"Indirect impacts relating to site contamination from heavy metals and metalloids (including arsenic) have been further considered. These contaminants are derived from dust, soil and surface water, and may enter the ecological pathways via deposition of contaminated dust onto vegetation and soils, uptake by plants, ingestion by herbivores and omnivores, and use of surface water by resident and highly mobile fauna. Elevated concentrations may adversely affect plant health, resulting in reduced growth, physiological stress, and declines in vegetation condition, which in turn may reduce habitat quality and resource availability for fauna. Fauna may be exposed through ingestion of contaminated food sources, soil, water or direct contact with potential sub-lethal and lethal effects depending on exposure levels and duration.*<br><br>*The revised assessment also considered the potential for off-site impacts, noting that highly mobile fauna may access water sources and forage within the subject land and extending potential contamination beyond the project boundary.*<br><br>*The findings of the Air Quality Impact Assessment (AQIA), which predict no exceedances of relevant criteria for toxic metals (including arsenic, lead, cadmium and copper), are acknowledged. Additional validation and adaptive management measures have been incorporated including dust deposition monitoring. To mitigate and manage these potential impacts an Air Quality Management Plan (AQMP), will be implemented, including Trigger Action Response Plans (TARPs), proactive dust suppression (eg watering of haul roads, dust suppressants, management of exposed surfaces), and adaptive management in response to meteorological conditions.*<br><br>*Air, Soil and Water Quality monitoring will be undertaken to determine whether levels of heavy metals exceed acceptable thresholds. Where monitoring identifies elevated metal deposition with the potential to pose ecological risk, additional management measures will be implemented through a Pollution Reduction* |

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| | *Program (PRP). These may include enhanced dust suppression, source control measures, and operational adjustments to minimise contaminant generation and dispersion. The Applicant has already established a dust deposition monitoring network to support this assessment, with locations selected focusing on areas of predicted heavy metal deposition.* |
| **CPHR Issue No.** | **5.** |
| **CPHR Issue** | More detail about the potential indirect impacts of airblast is required |
| **CPHR Comments** | • Air overpressure or airblast, is a rapid displacement of air caused by a sudden compression, such as the detonation of an explosive. Airblast can impact flora and fauna through direct physical trauma, habitat destruction, and noise and vibration disturbance. The EIS and BDAR have not provided any analysis of potential airblast impacts from the project on biodiversity values. |
| **CPHR Recommendation** | • The BDAR and EIS be revised to include a detailed assessment of indirect impacts of airblast on biodiversity values on the subject land and proximate areas. |
| **Biodiversity Australia Response** | To address CPHR's concerns of potential indirect impacts of air blast from blasting activities on biodiversity values have been assessed and evaluated. Biodiversity Australia recognises potential impacts from air blast caused by rapid air displacement from explosive detonation, can impact flora and fauna through direct physical trauma, habitat disturbance and noise and vibration effects.<br>The BDAR (Section 10.2, pg 154) was updated with the following text: *In addition, the assessment considered potential impacts of air blast from blasting activities on retained vegetation and dependent fauna. Blasts associated with mining have the potential to impact flora and fauna through direct physical trauma, habitat disturbance and noise and vibration effects which may lead to short-term behavioural responses, disturbance or displacement of fauna.*<br>Table 10.7 (pg 158) was revised to illustrate the mechanisms by which airblast may affect vegetation condition and habitat quality, and potential consequences for dependent fauna. A new row was added to Table 10.7 to capture airblast occurring during operation and construction, affecting flora and fauna species across all PCTs with the short and long-term effects.<br>The following text was added:<br>*Potential indirect impacts of airblast from blasting activities on retained vegetation and dependent fauna have been assessed and evaluated. Airblast, caused by rapid air displacement from explosive detonation, can impact flora and fauna through direct physical trauma, habitat disturbance, and noise and vibration effects. The assessment considered both the magnitude and frequency of airblast events across the development footprint, including potential effects on sensitive vegetation communities and fauna habitats.*<br>*Blasting will occur within areas that are progressively cleared and devoid of trees and habitat, thereby minimising the risk of direct impacts such as branch breakage or defoliation. These areas will have been subject to pre-clearing surveys in accordance with the Biodiversity Management Plan (BMP) prior to clearing, including the identification and management of fauna and habitat features. Potential indirect impacts are therefore primarily limited to adjacent retained habitats. These may include short-term disturbance or behavioural responses in fauna, temporary displacement, and localised avoidance of affected areas. Associated noise and vibration may also disrupt foraging and breeding behaviours in nearby habitats, and if repeated, may contribute to a temporary reduction in habitat utilisation.*<br>*The spatial extent of effects has been considered, recognising that highly mobile fauna may temporarily avoid affected areas and move into adjacent habitats. While this may reduce immediate exposure to airblast, it may result in short-term displacement, increased energy expenditure, and minor increases in competition within surrounding habitats. These effects are expected to be localised and transient.* |

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| | *Mitigation and management measures will focus on minimising potential impacts to adjacent retained habitats. This will include the identification of sensitive fauna habitat (including potential breeding habitat)* ***in proximity*** *to blasting areas, and the application of avoidance measures where practicable. Additional measures include the establishment of buffer zones around key habitat areas, and monitoring of airblast intensity and frequency at representative locations to validate predicted impacts and inform adaptive management. Existing monitoring infrastructure (e.g. dust monitoring stations) will support ongoing environmental performance monitoring.* |
| **CPHR Issue No.** | **6.** |
| **CPHR Issue** | A more detailed analysis of project impacts on displaced wildlife is required |
| **CPHR Comments** | • Impacts on displaced fauna are unlikely to be negligible as indicated by the assessor in Table 10.7 of the BDAR. For example, the proposed removal of 258 ha of known squirrel glider habitat will result in the loss of several family groups and associated territories. These displaced family groups will most likely succumb to inter- and/or intra-specific competition within adjoining areas of occupied habitat. |
| **CPHR Recommendation** | • The BDAR be revised to provide a more detailed analysis of wildlife displacement from clearing for the project to identify which species will be most affected and to inform proposed minimisation and mitigation measures. |
| **Biodiversity Australia Response** | To address CPHR's concerns of potential indirect impacts on displaced fauna (ie squirrel glider) resulting from vegetation clearing have been further assessed and evaluated.<br>The BDAR (Section 10.2, pg 154) was updated with the following text: *The assessment further considers potential impacts of fauna displacement resulting from vegetation clearing. This includes the evaluation of the extent of habitat loss (including approximately 258 ha of habitat for species such as the squirrel glider) and identification of species most likely to be affected based on habitat specificity, mobility, and territorial behaviour. Species with strong site fidelity and reliance on hollow-bearing trees and connected canopy habitat (e.g., arboreal mammals) are recognised as being particularly vulnerable to displacement and associated competition pressures in adjacent habitats.*<br>Table 10.7 (pg 157) was revised to assess displacement and potential consequences for dependent fauna. Under the "Increased risk of starvation, exposure and loss of shade or shelter". Biodiversity Australia have added text in the 'Consequence' column, Paragraph 2:<br>*The loss of up to 258 ha of woodland habitat is expected to result in indirect impacts to fauna species, particularly those most sensitive based on habitat specificity, mobility, and territorial behaviour. Species with strong site fidelity and reliance on hollow-bearing trees and connected canopy habitat (e.g., arboreal mammals) are recognised as being particularly vulnerable to displacement and increased competition pressures in adjacent habitats. Displacement may lead to increased inter- and intra-specific competition, reduced access to resources, disruption to social structures (e.g., family groups and territories), and potential declines in survival and reproductive success. As such, these impacts are not considered negligible.*<br>*Fauna displacement resulting from vegetation clearing can force individuals into already occupied habitats, increasing competition for limited resources. This may reduce food availability, increase physiological stress, and heighten susceptibility to disease and predation, particularly for species with small home ranges or specialised habitat requirements. The removal of key habitat features, including hollow-bearing trees and ground cover such as leaf litter, further reduces the availability of shelter and breeding sites.* |

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| | *Avoidance and mitigation measures will be outlined in the Biodiversity Management Plan (BMP) to minimise these impacts. While vegetation within operational areas will be progressively cleared in accordance with the Development Footprint, native vegetation will be retained within the broader Subject Land outside of operational areas, providing ongoing habitat and connectivity opportunities. In addition, the adjoining biodiversity offset area will be enhanced and managed to support habitat availability and long-term conservation outcomes for affected species.*<br>*Additional measures include staged clearing to facilitate gradual fauna movement, and strategic timing of clearing, where practicable. Pre-clearing inspections and the use of suitably qualified fauna spotter-catchers will be implemented to manage and relocate affected individuals where necessary.* |
| **CPHR Issue No.** | **7.** |
| **CPHR Issue** | Details of proposed mitigation measures contained in the EIS and BDAR are to be consistent |
| **CPHR Comments** | • The level of detail and wording used to describe the proposed biodiversity mitigation measures in the BDAR is inconsistent with section 6.2.7.3 and Table A4.1 of the EIS. For example, the BDAR has proposed a restricted internal vehicle speed limit of 50 km/h, whereas the EIS indicates a speed limit of 40 km/h.<br>• Also, Table 11.1 of the BDAR has provided a detailed description of the proposed Biodiversity Management Plan (BMP), with 13 dot-pointed commitments, whereas the sections and tables within the EIS relating to proposed mitigation measures contain several references to a BMP but no collated list of BMP commitments. |
| **CPHR Recommendation** | • The BDAR and EIS be revised to contain consistent descriptions of proposed mitigation measures. |
| **Biodiversity Australia Response** | Details of proposed mitigation measures contained in the EIS and BDAR will be consistent. For example the BDAR has been updated to restrict vehicle speeds to 40 km/h in line with the EIS. Additionally, the BMP Framework in the BDAR has been updated in the EIS. |
| **CPHR Issue No.** | **8.** |
| **CPHR Issue** | Measures to mitigate impacts from dust deposition, site contamination and airblast are required |
| **CPHR Comments** | • The assessor has not demonstrated in the BDAR enough consideration of potential indirect biodiversity impacts of the project from dust deposition, site contamination or airblast. Consequently, the assessor has not included in the BDAR specific mitigation measures to minimise or mitigate these potential impacts.<br>If dust deposition presents a risk to native vegetation, particularly individuals of the endangered velvet wattle, the assessor could detail mitigation measures to limit dust generation, particularly in proximity to environmentally sensitive areas (e.g. good condition native vegetation and individuals of velvet wattle).<br>• If there is a risk of biodiversity impacts from wildlife ingesting or absorbing heavy metal and/or metalloid contaminants, the assessor could consider the feasibility of mitigation measures such as fauna exclusion fencing and netting of water containment basins to prevent or significantly limit fauna access to contaminated water sources. |

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| | • If airblast presents a risk to biodiversity the assessor could demonstrate how various components of the blasting design and/or schedule will reduce the likelihood or severity of potential airblast impacts. |
| **CPHR Recommendation** | • The BDAR and EIS be revised to include measures to prevent or minimise potential indirect biodiversity impacts of the project from dust deposition, site contamination and airblast. |
| **Biodiversity Australia Response** | To address CPHR's concerns, specific mitigation and management measures have been updated and included in the BDAR (Section 11, pg 191) to minimise potential indirect biodiversity impacts associated with dust deposition, site contamination, and airblast.<br>Table 11.1 (pg 173) was updated. An additional row was added after B6. The following text was added:<br>"*Where impacts to native vegetation and fauna cannot be accurately determined at this stage, Section 8.5 of the Biodiversity Assessment Method (BAM) 2020 requires the application of adaptive management. Accordingly, Adaptive Management Plans will be developed during the post-approval phase, informed by the mitigation measures. These will include Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) measures and Trigger Action Response Plans (TARPs), which will be incorporated into relevant environmental management plans.*<br>*In relation to dust deposition, additional measures will be included to minimise impacts on retained native vegetation, particularly areas of high conservation value and threatened species such as Velvet Wattle. These measures may include targeted dust suppression in proximity to sensitive species, progressive rehabilitation of disturbed areas, management of exposed surfaces to limit wind erosion, and the application of buffer distances around high-value vegetation. Dust control measures outlined in the Air Quality Management Plan (AQMP), including watering, use of dust suppressants, and TARPs, will be explicitly linked to biodiversity protection outcomes.*<br>*For site contamination, mitigation measures will be implemented to reduce fauna exposure to heavy metals and metalloids. This may include the use of physical controls such as fauna exclusion fencing around high-risk areas and netting or other deterrents to limit fauna access to mine-affected water bodies, where appropriate. These measures will be supported by targeted monitoring of air, soil, and water quality, with adaptive management responses implemented where contamination risks are identified.*<br>*In relation to airblast, blast design and scheduling will be implemented to minimise potential impacts on biodiversity. This includes consideration of blast timing, charge size, frequency, and spatial controls to reduce peak airblast overpressure. Where sensitive fauna retained habitat has been identified in proximity to blasting areas, consideration will be given to scheduling blasting activities, where practicable, to avoid key breeding periods.*<br>*Mitigation measures across dust, contamination, and airblast pathways will be integrated into project design and environmental management frameworks to avoid or minimise indirect impacts on biodiversity values*".<br>Under the heading "Reason" the following text was added: "*Protection of flora and fauna where impacts cannot be accurately determined Adaptive Management Plans and TARPs will provide a structured management and monitoring framework to address potential indirect impacts on biodiversity*". Implementation of these mitigation measures will be the responsibility of the Project manager and/or Environmental Manager. |
| **CPHR Issue No.** | **9.** |
| **CPHR Issue** | Impacts from dust deposition, site contamination and airblast to be considered in an adaptive management plan |
| **CPHR Comments** | • As mitigation measures have not been identified in the BDAR, Sections 8.5(1) and (2) of the BAM require the proponent to develop an adaptive management plan to address impacts. |

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| **CPHR Recommendation** | • If there is uncertainty about the likelihood or severity of potential biodiversity impacts associated with dust deposition, site contamination, or airblast, then monitoring and contingency measures for such impacts be included in an adaptive management plan for the project in accordance with section 8.5 of the BAM. |
| **Biodiversity Australia Response** | An Adaptive management Framework is provided below (Table 4) and incorporated into the BDAR (Section 11 pg 176).<br>*An Adaptive Management Plan will be prepared during the post-approval phase and incorporated into relevant environmental management plans. These plans will ensure that monitoring outcomes are regularly reviewed and that management measures are refined in response to observed impacts, thereby providing an effective mechanism to avoid or minimise indirect impacts on biodiversity arising from dust, site contamination and airblast.*<br>*This framework will incorporate monitoring, trigger levels, and contingency measures to manage impacts that are infrequent, uncertain, or difficult to quantify at the current stage of assessment. Monitoring programs will be established to assess dust deposition, airblast intensity, and potential contamination of soil and surface water, as well as the response of vegetation and fauna to these stressors. Trigger Action Response Plans (TARPs) will define threshold levels (triggers) at which management actions are required and outline clear response measures where monitoring indicates that impacts exceed predicted levels or pose a risk to biodiversity values.*<br>*Contingency measures may include increased dust suppression, modification of blasting practices (e.g., timing, charge size, or frequency), implementation of additional exclusion measures to limit fauna exposure to contaminated areas, and targeted habitat management or rehabilitation.*<br>*An adaptive management framework has been adopted to address uncertainty associated with indirect impacts from dust deposition, site contamination, and airblast. This includes defined monitoring programs, trigger thresholds, and corresponding management actions, as outlined in Table 4. Potential monitoring sites are identified in Figure 4.*<br>The Applicant has established a dust deposition monitoring network to support this assessment. |
| | |
| **CPHR Issue No.** | **10.** |
| **CPHR Issue** | Addition of biodiversity credits would be appropriate mitigation measures for residual impacts |
| **CPHR Comments** | • Further consideration of potential dust deposition impacts may indicate a reduction of vegetation condition being likely along woodland edges in proximity to dust generating activities. If so, additional biodiversity credits could compensate for such residual indirect impacts, as supported by Section 8.6 of the BAM.<br>• Section 4.5.10 of the BAM 2020 Operational Manual - Stage 2 (DPE 2023) also provides further guidance on approaches for calculating an offset for residual indirect impacts. |
| **CPHR Recommendation** | • If biodiversity impacts from dust deposition are likely to include a loss of vegetation condition in some areas, then the BDAR be revised to include additional biodiversity credits as a mitigation measure for the residual impacts. |

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| **Biodiversity Australia Response** | Biodiversity Australia acknowledges that additional biodiversity credits may be an appropriate mitigation measure for residual indirect impacts, including potential reductions in vegetation condition from dust deposition, as outlined in Section 8.6 of the BAM 2020 and the Stage 2 Operational Manual (DPE 2023).<br>However, where the mitigation measures and adaptive management plans outlined in the BDAR are fully implemented—including dust suppression, habitat protection measures, monitoring, and Trigger Action Response Plans—the residual indirect impacts on retained vegetation and associated biodiversity are expected to be minimal.<br>Consequently, no additional biodiversity credits are required to compensate for residual impacts, as the combination of avoidance, minimisation, and adaptive management measures is expected to effectively prevent or mitigate any significant reductions in vegetation condition. |
| **CPHR Issue No.** | **11.** |
| **CPHR Issue** | The current conservation assessment for Velvet Wattle needs to be considered when assessing the risk of SAII |
| **CPHR Comments** | • Section 9.1.2 of the BAM requires the assessor to consult with the TBDC and/or other sources to report on the current population of a species at risk of a SAII. The current NSW Threatened Species Scientific Committee (NSW TSSC) conservation assessment for *Acacia pubifolia* (Phillips 2024) has not been considered when reporting on the current population of the species. The conservation assessment contains relevant species information relating to evidence of population decline, population size, geographic range and challenges for management. |
| **CPHR Recommendation** | • Section 12.1.2 of the BDAR be revised to include consideration of the current NSW TSSC conservation assessment for velvet wattle. |
| **Biodiversity Australia Response** | In accordance with Section 9.1.2 of the BAM 2020, the current NSW TSSC conservation assessment for *Acacia pubifolia* (Phillips 2024) has been considered in updating the BDAR SAII Assessment for this species. The assessment confirms that Velvet Wattle is Endangered under the BC Act and listed as Vulnerable under the EPBC Act. Notably, the TSSC assessment identifies evidence of population decline, small and fragmented population sizes, restricted geographic range, and species-specific challenges related to drought, fire response and habitat specificity. These factors reinforce that the species has limited capacity to respond to management actions and is highly susceptible to loss of individuals and habitat.<br><br>Table 6 provides the updated SAII Assessment for Velvet Wattle. Table 12.3 (pg 203) has been updated to reflect these additions. |
| **CPHR Issue No.** | **12.** |
| **CPHR Issue** | Detail measures taken to avoid impacts on the entity |
| **CPHR Comments** | • The project development footprint intersects with the box-gum woodland remnants at several locations along the proposed mine access road (Grampians Road). The proposed road design will be located within the existing Grampians Road corridor. Deviations from the existing road surface will also be contained within the existing road corridor and will be limited to modifications required to facilitate safe truck movements, thus maximising avoidance of box-gum woodland. |

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| **CPHR Recommendation** | • CPHR considers that, based upon the constraints relating to the resource access, the proponent has demonstrated appropriate consideration of avoidance of measures for direct impacts on boxgum woodland and velvet wattle. However, the assessor has not adequately considered the potential physiological or biochemical indirect impacts of dust deposition on velvet wattle. Consequently, Page 6 of 13 the assessor has not proposed any specific mitigation measures to address this issue. Possible mitigation measures could include:<br>1. identifying individuals and stands of velvet wattle in proximity to dust generating components of the project,<br>2. implementing specific dust control measures in dust affected areas containing velvet wattle, and<br>• incorporating monitoring of dust deposition impacts in dust affected areas of velvet wattle as part of an adaptive management plan. |
| **Biodiversity Australia Response** | Additional measures to avoid and mitigate impacts to Velvet Wattle have been considered and included in an indicative Adaptive Management Plan Framework outlined in Table 4. Table 5 specifically addresses potential mitigation measures that may be applied to Velvet Wattle and Box Gum Woodland. Both Tables have been included in the BDAR (Section 11, pg 177). |
| **CPHR Issue No.** | **13.** |
| **CPHR Issue** | CPHR is not the consent authority for the project development application |
| **CPHR Comments** | • The statement in section 6.2.6.5 of the EIS that "the final determination whether a particular Project would result in an SAII for a particular entity is a matter for CPHR" is incorrect. The Minister for Planning and Public Spaces is the consent authority for the project development application, hence is responsible for determining if a SAII is likely. |
| **CPHR Recommendation** | • Section 6.2.6.5 of the EIS be revised to identify the correct consent authority for the project development application. |
| **Biodiversity Australia Response** | Section 6.2.6.5 of the EIS be reviewed and updated to correctly identify the relevant consent authority for the project development application. |
| **CPHR Issue No.** | **14.** |
| **CPHR Issue** | A flood impact assessment will be required to inform the EIS about flooding risks |
| **CPHR Comments** | • The EIS does not address flooding matters in accordance with subsections 10 to 14 of the SEARs advice provided by CPHR in our letter dated 21 August 2024 (Reference No. DOC24/643386-3). |

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| **CPHR Recommendation** | • A flood impact assessment be prepared to inform the EIS in accordance with subsections 10 to 14 of the CPHR SEARs advice. |
| **Biodiversity Australia Response** | In response to CPHR's recommendation regarding flooding, the Applicant has commissioned ATCW to undertake a detailed flood impact assessment to address subsections 10 to 14 of the SEARs advice (CPHR correspondence dated 21 August 2024; Ref: DOC24/643386-3).<br>The assessment, documented in a Technical Memorandum, concludes that regional flooding does not represent a material risk to the Project. Specifically:<br>• Vegetable Creek does not present a flood hazard to the Mine Site, and there are no off-site flood impacts attributable to the Project; and<br>• There is no basis to anticipate a worsening of flood conditions at downstream receptors, with modelling indicating a minor reduction in downstream flood flows as a result of the Project.<br>The detailed technical assessment has been provided in the Appendices of the Submission Report and addresses the relevant SEARs requirements. |

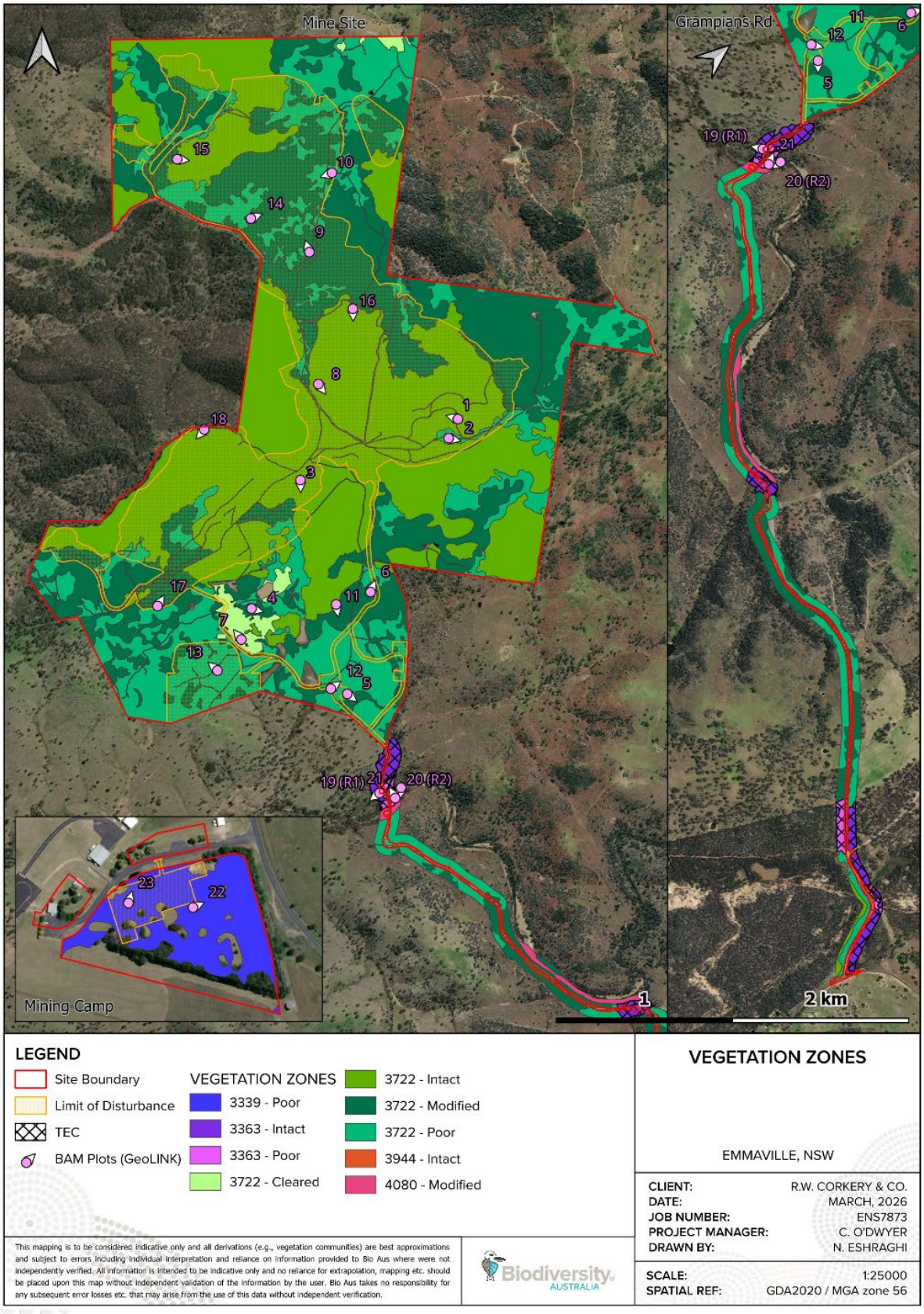


Figure 2: Plant Community Type mapping and BAM Plot Locations

Table 1: Direct impacts on Plant Community Types

| Veg Zone ID | PCT (condition) | TEC | BC Act | EPBC Act | Potential SAII | Area (ha) | VI score | Future VIS |
|---|---|---|---|---|---|---|---|---|
| 1 | 3722 (Intact) | Not a TEC | | | No | 159.89 | 71.4 | 0 |
| 2 | 3722 (Modified) | Not a TEC | | | No | 97.37 | 60.9 | 0 |
| 3 | 3722 (Poor) | Not a TEC | | | No | 55.73 | 24 | 0 |
| 4 | 3722 (Cleared) | Not a TEC | | | No | 0.44 | 2.5 | 0 |
| 5 | 3363 (Intact) | White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highland | CEEC | Not Listed | Yes | 0.62 | 70.7 | 0 |
| 6 | 4080 (Modified) | Not a TEC | | | No | 0.11 | 60.4 | 0 |
| 7 | 3363 (Poor) | White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highland | CEEC | Not Listed | Yes | 0.41 | 47.6 | 0 |

Table 2: Direct Impacts on Threatened Species

| Common name | Species name | BC Act | EPBC Act | Potential SAII | Area / Count |
|---|---|---|---|---|---|
| Velvet Wattle | *Acacia pubifolia* | EN | VU | Yes | 15.04 ha |
| Barking Owl | *Ninox connivens* | VU | Not Listed | No | 260.63 ha |
| Squirrel Glider | *Petaurus norfolcensis* | VU | Not Listed | No | 257.99 ha |
| Koala | *Phascolarctos cinereus* | EN | EN | No | 257.99 ha |
| Border Thick-tailed Gecko | *Uvidicolus sphyrurus* | VU | VU | No | 257.99 ha |

Table 3: Biodiversity Credit Obligations – Species Credits

| Common name | Species name | BC Act listing status | Potential SAII | Credit obligation |
|---|---|---|---|---|
| Velvet Wattle | *Acacia pubifolia* | EN | Yes | 669 |
| Barking Owl | *Ninox connivens* | VU | No | 8729 |
| Squirrel Glider | *Petaurus norfolcensis* | VU | No | 8697 |
| Koala | *Phascolarctos cinereus* | EN | No | 8697 |
| Border Thick-tailed Gecko | *Uvidicolus sphyrurus* | VU | No | 8697 |

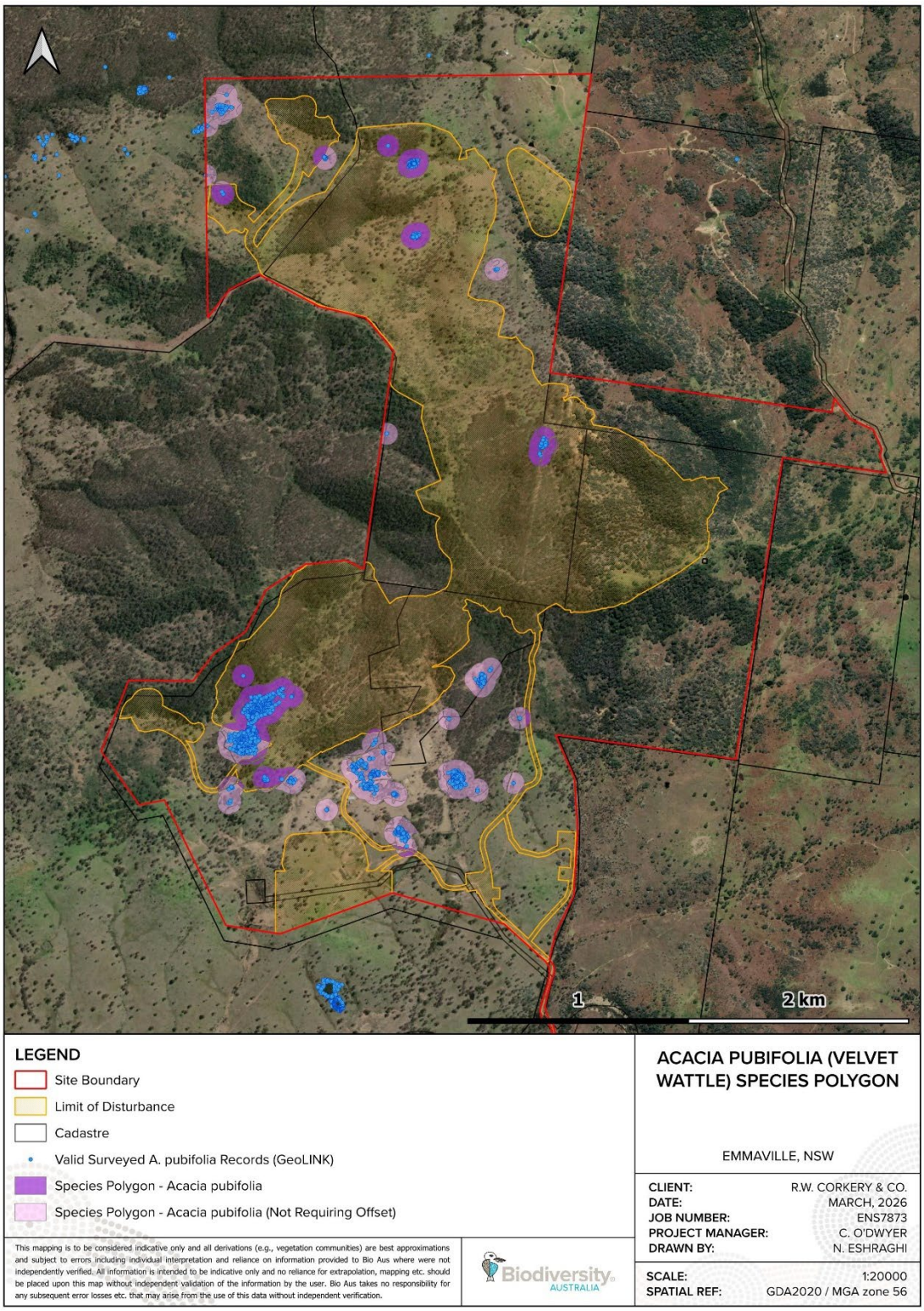


Figure 3: Updated *Acacia pubifolia* species polygon

Table 4: Adaptive Management Framework (Indicative)

| Impact | Monitoring | Trigger Level | Management / Response | Responsibility |
|---|---|---|---|---|
| Dust deposition | Dust deposition rates at sensitive receptors (e.g. threatened species habitat) | Dust deposition approaching or exceeding 4 g/m2/month | Management actions may include but are not limited to: Increase dust suppression (watering / suppressants), reduce vehicle speeds, stabilise exposed areas, implement additional buffers | Environmental Manager |
| Vegetation condition (dust related) | Visual assessment of vegetation health (leaf dust loading, stress indicators) | Observable decline in vegetation condition attributable to dust | Management actions may include but are not limited to: Increase dust controls, implement targeted mitigation near sensitive vegetation, review operations | Environmental Manager |
| Site Contamination (soil / water) | Soil and surface water quality monitoring (heavy metals / metalloids) | Concentrations exceed baseline or guideline values | Management actions may include but are not limited to: Isolate affected areas, implement fauna exclusion zones (fencing / netting) review containment and operational practices. | Environmental Manager |
| Fauna exposure to contamination | Fauna monitoring (activity, mortality, use of water sources) | Evidence of fauna assessing contaminated areas or adverse effects. | Management actions may include but are not limited to: Restrict access (fencing / netting) provide alternative water sources, enhance habitat. | Environmental Manager |
| Airblast | Airblast pressure and vibration monitoring | Exceedance of predicted approval limits | Management actions may include but are not limited to: Modify blast design (charge size, delay timing), reschedule blasts, increase buffers | Project Manager / Environmental Manager |
| Fauna disturbance (airblast) | Fauna observations per and post blast | Repeated disturbance or displacement observed | Management actions may include but are not limited to: Adjustment of blast timing reduce frequency, implement exclusion zones | Environmental Manager |

Table 5: Additional Impact Mitigation Measures for *Acacia pubifolia and Box Gum Woodland*

| Impact Pathway | Avoidance Measure | Mitigation Measure | Monitoring / Adaptive Management | Responsibility |
|---|---|---|---|---|
| Dust Deposition on Velvet Wattle | Infrastructure and access roads contained within existing corridor. Design refinements to reduce footprint near known Velvet Wattle occurrences. | May include but not limited to:<br>Targeted dust suppression actions.<br>Progressive rehabilitation of disturbed areas<br>Managed exposed surfaces to reduce wind erosion<br>Buffer distances around sensitive stands. | Dust deposition monitoring in areas containing Velvet Wattle<br>- Trigger Action Response Plans linked to biodiversity outcomes<br>- Adaptive Management Plan to implement additional measures if dust exceeds thresholds | Project Environmental Manager |
| Indirect physiological / biochemical stress on Velvet Wattle | Avoidance of sensitive stands where feasible | May include but not limited to:<br>Minimise dust exposure through operational controls (haul road | Periodic health assessments of Velvet Wattle (foliage condition, growth)<br>- Adaptive Management Plan to adjust | Project Environmental Manager |

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| | | traffic, scheduling)<br>- Staged clearing to reduce sudden exposure<br>Germination trials to propagate seed for restoration<br>Translocation trials | mitigation if stress indicators are observed.<br>Evaluate success of germination and translocation trials and refine method as required. | |
| Indirect impact on surrounding box-gum woodland | Maximise avoidance along Grampians Road corridor<br>- Minimise clearing outside existing road footprint | May include but not limited to:<br>Dust suppression and rehabilitation measures<br>- Limit exposed surfaces and maintain vegetated buffers | Monitoring of vegetation condition along woodland edges<br>- TMPL to implement further control if decline observed | Project Environmental Manager |

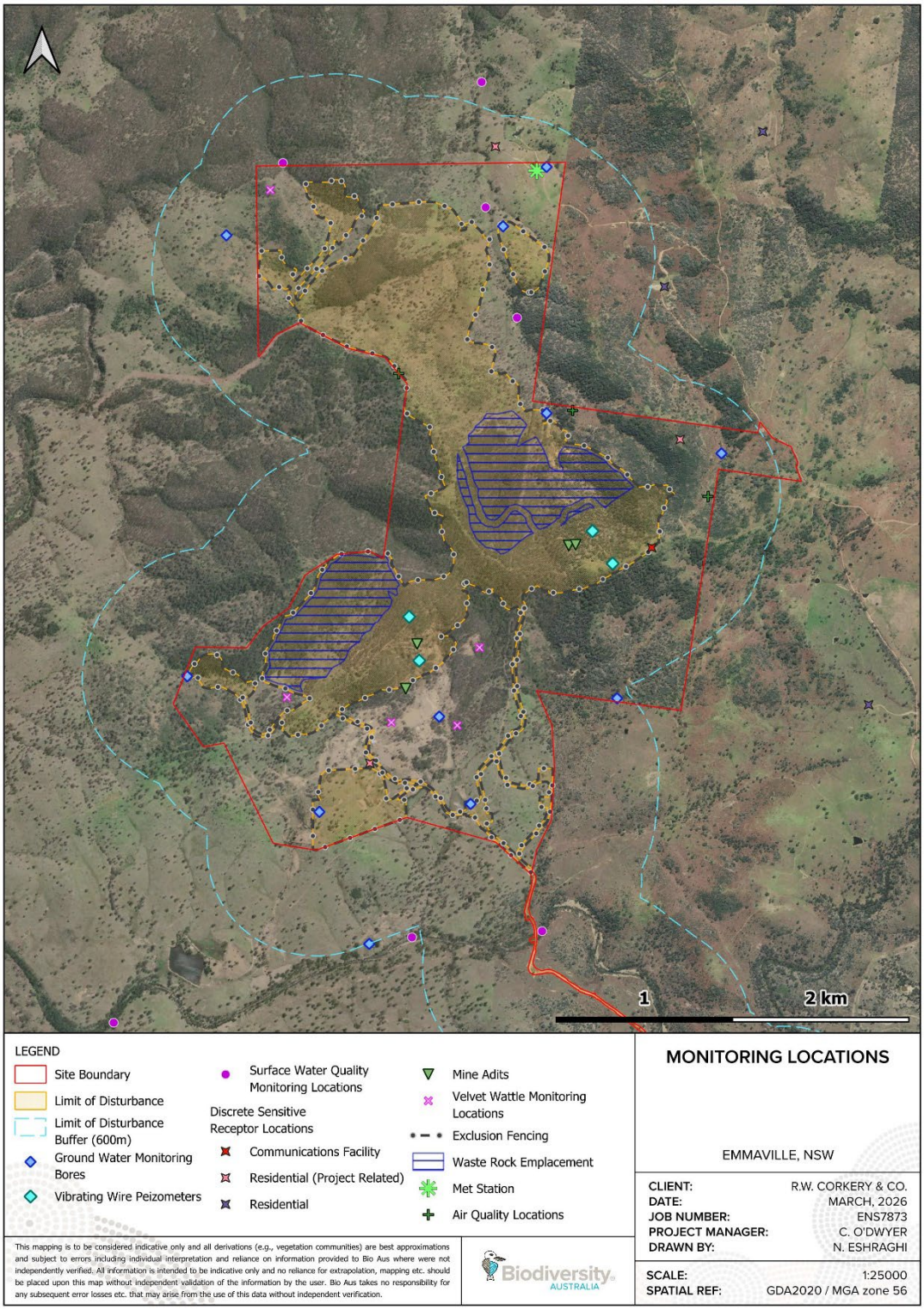


Figure 4: Potential Monitoring Locations

Table 6: SAII Assessment – *Acacia pubifolia*

<table>
<tr><th>Assessment Requirements</th><th>Acacia pubifolia (Velvet Wattle)</th></tr>
<tr><td>The action and measures taken to avoid the direct and indirect impact on a species at risk of an SAII.</td><td>Direct impacts on Acacia pubifolia will be avoided where possible through design refinement. To date, the following actions/ measures have been undertaken to avoid impact on the species:<br>Placement of infrastructure outside known occurrences of Velvet Wattle (where possible).<br>Design refinement and reduction in design footprint in known occurrences of Velvet Wattle (i.e. Southern Waste Rock Emplacement).<br>Indirect impacts would be managed through mitigation measures, which are outlined in Section 11.</td></tr>
<tr><td>The assessor must consult the TBDC and/or other sources to report on the current population of the species, including:<br>Evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:<br>i) decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or<br>ii) decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/ or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites<br><br>Evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by:<br>an estimate of the species' current population size in NSW, and<br>an estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and<br>where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations.<br>Evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:<br>extent of occurrence<br>area of occupancy<br>number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and<br>whether the species' population is likely to undergo extreme fluctuations<br><br>Evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:<br>known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site<br>the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or<br>iii) life history traits and/ or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).</td><td>2.a) A. pubifolia has suffered a population reduction in the past due to the combined effects of increased frequency and duration of drought due to climate change and clearing of habitat for agricultural and infrastructure developments. Within the three-generation timeframe of 43.8-55.2 years, reductions in the overall number of individuals of approximately 28% in the Warrabah subpopulation and 15% in the Gulf Rd subpopulations have been recorded.<br>2.b) (i) The population of A. pubifolia is estimated to contain a minimum of 3,539−4,609 mature individuals across its entire range, with approximately 3000 mature individuals occurring within NSW. However, the population across NSW may have increased with many more records on BioNet indicating the population may be reaching 8000. Additional survey effort across NSW have increased records in the greater locality to 7,771 records (as of 25/02/2025). Bionet records across the whole state identified approximately 7,936 records (as of 24/02/2025) – this includes records from subject site.<br>A. pubifolia is known from three locations in NSW, one north of Emmaville in the Torrington State Recreation Area, Spring Hill west of the Beardy River, and the other on private property near Warrabah National Park. The species also occurs near Wyberba in Queensland (Tindale & Kodela, 2001; DECC, 2005a).<br>(ii) When the threat of increased frequency and duration of drought due to climate change is considered, the eleven subpopulations of A. pubifolia can be considered to occur across three threat-defined locations, as per the IUCN definition (Appendix 2; IUCN 2022). This is due to increased frequency and duration of drought being the most serious plausible threat that results in the lowest number of locations for the taxon, and the effects of this threat are likely to differ in magnitude and effect across the three major regions of the Granite Belt, Emmaville and Warrabah in all but the most significant drought events. Droughts are likely to become a more frequent occurrence with predicted intensity and duration due to climate change.<br>The only long-term demographic monitoring of the species in the Warrabah subpopulation shows a steady decline in the overall number of plants over the past 24 years (Eco Logical Australia 2021b), with other subpopulations also showing contemporary evidence of similar declines as a result of drought (Eco Logical 2021a; ALA 2023).<br>(iii) Based on TSSC (Phillips 2024) the population size in 2024 in NSW is presented in the Table below. However, given the increase in survey effort across NSW the total population may be approaching 8000 individuals.
<table>
<tr><th>Region</th><th>Subpopulation</th><th>Time since last fire</th><th>Minimum estimate of all individuals</th><th>Minimum estimate of mature individuals</th><th>References</th></tr>
<tr><td>Emmaville NSW</td><td>Flagstone Creek</td><td>2019</td><td>2</td><td>Unknown</td><td>Copeland 1997</td></tr>
<tr><td>Emmaville NSW</td><td>Gulf Road</td><td>2019</td><td>1159-1409</td><td>564</td><td>ELA 2023</td></tr>
<tr><td>Emmaville NSW</td><td>Spring Hill</td><td>2009</td><td>2439</td><td>2074</td><td>Copeland et al 2018</td></tr>
</table>
</td></tr>
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| | | | | | |
|---|---|---|---|---|---|
| Warrabah NSW | Warrabah | 2018 | 295 | 221 | Hunter and Copeland 2027. ELA 2021b |
| Total | | | 4145 | 2859 | |
| Percentage | | | | 70% | |

2.c) (i) *A. pubifolia* is an uncommon species with a wide but patchy distribution along the western edge of the New England Tableland in northern New South Wales (NSW) to west of Stanthorpe in the Darling Downs of southeast Queensland (DCCEEW 2023). This area is within the New England Tablelands Bioregion (DAWE 2012) and on the traditional lands of the Kamilaroi, Ngarabul and Kambuwal People (Horton 1996; NPWS 2003a, 2003b; QPWS 2010).
The Area of Occupancy (AOO) of *A. pubifolia* is highly restricted and was estimated to be 100 km2 using 2 x 2 km grid cells, the scale recommended by IUCN (2022). The Extent of Occurrence (EOO) was estimated to be 3,672 km2 and is based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2022). Both EOO and AOO were calculated using ArcGIS (Esri 2015), enclosing all confirmed survey records and cleaned spatial datasets. Based on these estimates, *A. pubifolia* has a highly restricted AOO and EOO.
Area of Occupancy (AOO) of 100 km2 and,
Extent of Occurrence (EOO) of 3,672 km2.

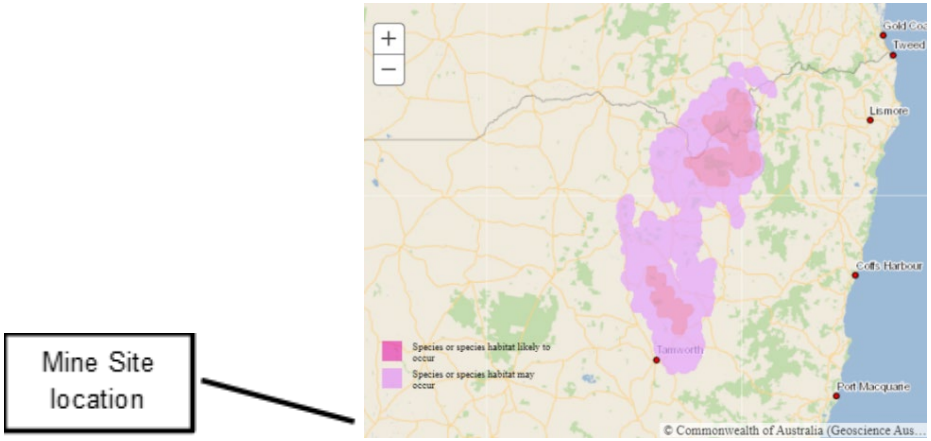


Figure 12.2 Distribution of Velvet Wattle

(iii) *A. pubifolia* is known from three threat-defined locations, Emmaville, Spring Hill and Warrabah. A significant threat to the species is an inappropriate fire regime where fires are too frequent (less than 5 years), the duration between fires is too long (greater than 30 years), or not hot enough for seed germination.
The NSW portion of the *A. pubifolia* population is split across two major areas and has been much more comprehensively surveyed, with population monitoring undertaken yearly from 2018-2021 and again in 2023 (Eco Logical Australia 2021b, 2023). Northwest of Emmaville on the western edge of the Mole Tableland are three subpopulations. The largest of these is the Spring Hill subpopulation, which is within a single private property to the west of the Beardy River containing 2,439 plants after the last census in 2018 (Copeland et al 2018).

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| | To the east of the Beardy River lies the Gulf Rd subpopulation, spanning an area along the southern boundary of Torrington State Conservation Area and consisting of several discrete stands with a total of 1,159–1,409 plants including 564 mature plants counted by census (Eco Logical Australia 2023; Hunter 2022). This subpopulation also includes a large, recently discovered stand that consists mostly of juveniles recovering post-fire (Hunter 2022). The third subpopulation at Flagstone Creek consists of a small, isolated stand on private land south of Torrington State Conservation Area (Copeland 1997). This subpopulation, recorded as having only two plants (Copeland 1997), has not been surveyed again since 1997, but likely persists given the area remains uncleared and fire-stimulated recruitment may have occurred following fire at the site in 2019 as seen in the recently discovered stand to the west.<br>(iv) *A. pubifolia* is a relatively long-lived species and is unlikely to undergo extreme fluctuations. However, given that droughts are predicted to increase in frequency, intensity and duration under climate change conditions, impacts to this species may be significant. Impacts of severe drought adversely affect *A. pubifolia* and drought may be the greatest driver of decline. Changes in fire regimes, grazing and vegetation clearing are also key threats.<br><br>2.d) (i) *A. pubifolia* has been considered an obligate seeder, reliant on seedling recruitment alone for post-disturbance recovery (Clarke et al. 1997). However, records of the species reshooting post-fire in the Wyberba subpopulation and recent observations of extensive suckering in the NSW subpopulations mean that the species more likely has a variable response to disturbances such as fire, depending on the intensity and severity of past disturbance events. *A. pubifolia* is known to produce new stems via suckering from the rootstock, with this appearing to be the main regenerative response to fire and other disturbance in the NSW subpopulations. Thus, a dependence on suckering for the majority of reproduction is theorised to have become apparent in stands of *A. pubifolia* to allow them to persist within fragmented and modified landscapes (Hunter and Copeland 2007). Clonality may also be naturally derived due to limitations in soil nutrients and regular fire frequencies in open, shrubby ecosystems to enable persistence in harsh ambient conditions<br>Flowers are borne between September to November with fruit maturing from December to January. and Nov. There is evidence the species appears to be an obligate seeder although sporadic with the potential that reproductive characteristics may limit the ability to increase the existing population on a site. It is assumed that *A. pubifolia* has similar generation lengths to other large wattles which live up to 35 years.<br><br>(ii) This species grows on rocky granite hillsides, with course sandy, stony or loamy soils in eucalypt-scrub woodland or Eucalyptus-Callitris dominated forests and woodlands. There is a single record of this species growing on metamorphic rocks (BRI undated). These abiotic features (soil type & rocky habitat) currently occur within the 'offset site.' There is potential to restore similar on a biodiversity stewardship site.<br>(iii) Increased frequency and duration of drought is contributing to continuing decline in the *A. pubifolia* population and is strongly inferred to do so into the future. In the Warrabah subpopulation, significant numbers of older, large individuals of *A. pubifolia* were observed to die off along with a stalling of recruitment and flowering/fruiting through both the Millennium Drought of 1997–2009 and the 2017–2019 drought (Table 3; Hunter and Copeland 2007; Eco Logical Australia 2019, 2020, 2021b), with subsequent numbers never appearing to recover back to pre-drought estimates. Over a 24-year period encompassing these two major drought events, the abundance within an experimental enclosure set up to protect an intact stand of *A. pubifolia* on the 'Romani' property saw the numbers of *A. pubifolia* drop from 95 in 1999 to 83 in 2006 during the Millennium Drought. By 2018, as the 2017-2019 drought took hold, the number had again dropped to 48, with this trend continuing throughout the drought with only 29 plants recorded in 2019 and 2020. By 2021, after the drought had abated, the number had slightly recovered back to 33 (Eco Logical Australia 2021b).<br>While it is thought that some of the trees may recover through resprouting in time and this is already underway in some stands (Eco Logical Australia 2021a, 2021b, 2023), the survey data from 2006 and 2018 shows a still sizeable decline in total abundance. This is despite the intervening years having favourable climatic conditions, the plants remaining protected within the fenced enclosure and being unaffected by fire throughout this time. |

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| | Drought is likely to increase in frequency and magnitude in the future due to widely accepted projections of increased air temperatures.<br>OEH Threats relevant to this species include:<br>• Inappropriate fire regime. Fire events may occur too frequently (less than five years) or too seldom (greater than 30 years) between events, and/ or fires may not be hot enough to promote seed germination.<br>• Grazing by domestic stock.<br>• Clearing and fragmentation of Central Hunter Grey Box - Ironbark Woodland for agriculture, development and mining.<br>• Destruction and disturbance of habitat for roadworks.<br>• Suitable habitat exists, but a sufficient survey has not occurred in order to sufficiently establish baseline population data.<br>• Browsing by feral browsers damages/ removes adults and recruits from the population.<br>• Small population size.<br>Key threatening process relevant to the species:<br>• Drought<br>• Ecological consequences of high frequency fires.<br>• Clearing of native vegetation.<br>The ability to control the above threats on a biodiversity stewardship site is not considered to be negligible. Control to fire regime, herbivory due to feral/ stock animals and clearing can be managed. |
| Where the TBDC indicates data is 'unknown' or 'data deficient' for a species for a criterion listed in Subsection 9.1.1(2.), the assessor must record this in the BDAR. | The TBDC does not provide information relevant to SAII principles for this species. |
| In relation to the impacts from the proposal on the species at risk of an SAII, the assessor must include data and information on:<br><br>the impact on the species' population (Principles 1 and 2) presented by:<br>an estimate of the number of individuals (mature and immature) present in the subpopulation on the Subject Land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and<br>an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or<br>if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal<br><br>impact on geographic range (Principles 1 and 3) presented by:<br>the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW<br>the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted | 4.a) (i)<br>Approximately 3,619 *A. pubifolia* individuals have been recorded within the Project Site.<br>BioNet records across the whole state identified approximately 7,936 records (as of 24/02/2025) – this includes records from Project Site and offset site.<br>Based on known BioNet records, the recorded individuals within the Project Site account for 45.6% of the known BioNet recorded NSW population.<br>The local population is considered to be individuals recorded within the Project Site as well as any other individuals occurring within the greater locality (50 km radius). Although only small areas have been surveyed outside the Project Site (i.e. proposed offset site) there is a high likelihood of additional plants occurring in the greater locality on adjoining properties based on suitable habitat and nearby BioNet records. The subpopulation occurring on the Project Site and adjoining areas may account for a smaller proportion of the total NSW population than what is stated in species profiles.<br>Based on BioNet records, the species is observed to be reasonably abundant where it occurs; this may be based on its reproductive ability as an obligate seeder. Overall, due to the deficient data and lack of records of the species across is predicted range, it is difficult to accurately state what population proportion the Project Site accommodates with respect to the NSW population as a whole, as the species is likely under surveyed.<br>(ii) Approximately 1,967 *A. pubifolia* individuals would be impacted as a result of the Project. This would represent 24.8% of the total known recorded NSW population given the New BioNet recordings.<br>(iii) Approximately 1,967 *A. pubifolia* individuals would be impacted as a result of the Project. Approximately 15 ha of habitat associated with Velvet Wattle would be impacted by the Project. |

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| to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g. seed dispersal) and pollination distance for the species<br>iv) to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors, including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR. | 4.b) (i) AOO is estimated to be 100 km2 (10000 ha) with an EOO of 3672 kmskm2 (367200 ha). Removing 15 ha equates to a reduction in 0.15 % of AOO and 0.004% of EOO.<br>(ii) The Project would directly impact 1,967 individuals (15 ha). The Project would avoid 1,652 individuals and avoid impacting 379.48 ha of suitable habitat within the Project Site.<br><br>Additionally, the Applicant is proposing to establish a Biodiversity Stewardship Agreement (BSA) (offset site) immediately adjacent to the Mine Site. This BSA would conserve 677 individuals (recorded to date) and conserve approximately 1,800 ha of suitable habitat in perpetuity, resulting in a net positive outcome. The establishment of the BSA would result in a long-term conservation site for the species. Targeted translocation of individuals from the Development Footprint into the Stewardship Site may be undertaken on a trial basis as part of an adaptive management framework. This would be supported by germination trials and propagation studies to improve understanding of the species' reproductive ecology, establishment success and response to management. Outcomes of these trials would be monitored and used to inform ongoing management actions, with methods refined over time to maximise conservation outcomes for the species.<br><br>(iii) Acacia species predominantly rely on insects for the bulk of pollination with the most important of these being bees and wasps, with flies, beetles, and to a lesser extent, birds also involved (Bernhardt 1987; Stone et al. 2003; Gibson et al. 2011). Insects are drawn to the flowers to forage on the large pollen loads, with the pollen packaged into compounds consisting of multiple grains called polyads, which are particularly attractive to smaller native bee species and introduced honeybees (Apis mellifera) (Stone et al. 2003; Gibson et al. 2011). Pollination by birds such as honeyeaters, enabling occasional long-distance pollination, has also been postulated for some Acacia species (Vanstone and Paton 1998; Stone et al. 2003) This pollination mode is possible in *A. pubifolia* given the presence of a small gland on the phyllode which may act as an extrafloral nectary attractive to birds (Stone et al. 2003). In Acacia pycnantha, the exclusion of honeyeaters from these extrafloral nectaries resulted in much lowered production of fruit (Vanstone and Paton 1988) and so these birds may also affect pollination in *A. pubifolia* in a similar manner.<br><br>(iv) Indirect impacts on the local population occurring on Project Site would be reduced by:<br>Implementing management measures including, weed control, herbivore control (i.e. goat, cattle removal) and appropriate fire management. |
| The assessor may also provide new information that demonstrates that the principle identifying that the species is at risk of an SAII is not accurate. | This BDAR does not provide any new information that demonstrates that the principle identifying that the species is at risk of an SAII is not accurate. |

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