Biodiversity Development Assessment Report

Mt Bundarbo – Bald Hill Quarry

October 2022

Project Number: 20-481

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This BDAR was prepared in accordance with the principles of the Biodiversity Assessment Method 2020.

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Acronyms and abbreviations

ASL	Above sea level
AWS	Automatic weather station
BHQ	Bald Hill Quarry
BAM	Biodiversity Assessment Method 2020
BAM-C	BAM Calculator
BC Act	*Biodiversity Conservation Act 2016 (NSW)*
BCD	Biodiversity Conservation Division
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	*Biosecurity Act 2015 (NSW)*
BOM	Australian Bureau of Meteorology
CEMP	Construction environmental management plan
Cwth	Commonwealth
DoEE	(Cwth) Department of the Environment and Energy
DP&I	(NSW) Department of Planning and Infrastructure (now DPIE)
DPIE	(NSW) Department of Planning, Industry and Environment
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EIA	Environmental impact assessment
EPBC Act	*(Cwth) Environment Protection and Biodiversity Conservation Act 1999*
EP&A Act	*(NSW) Environmental Planning and Assessment Act 1979*
EPL	Environmental Protection Licence
ESD	Ecologically Sustainable Development
FM Act	*(NSW) Fisheries Management Act 1994*
ha	hectares
ISEPP	(NSW) State Environmental Planning Policy (Infrastructure) 2007
KFH	Key Fish Habitat
km	kilometres
LEP	Local Environment Plan
m	Metres
NES	*Matters of National environmental significance under the EPBC Act (c.f.)*
NPW Act	*National Parks and Wildlife Act 1974 (NSW)*
NSW	New South Wales

OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
PCT	Plant Community Type
REP	Regional Environmental Plan
SAII	Serious and Irreversible Impact
SEPP	(NSW) State Environmental Planning Policy
SIS	Species Impact Statement
sp/spp	Species/multiple species
TEC	Threatened Ecological Community
TEC	Threatened Ecological Community

Executive summary

NGH has been engaged by Bald Hill Quarry Pty Ltd to assess the impacts of the construction of an open cut basalt quarry 9km East South East (ESE) of Jugiong, NSW.

The development site occurs within the following cadastral boundaries:

- Lot 11/ DP 133540 – Freehold.
- Lot 7002/ DP 1031310 – Crown Land.
- Lot 9/ DP 439146 – Freehold.
- Lot 148/ DP 753592 – Freehold.

This development is being assessed under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The clearing of native vegetation as part of this proposal exceeds the area clearing thresholds listed under Cl7.2 of the Biodiversity Conservation Act 2016 (BC Act) regulations. In accordance with the BC Act the Biodiversity Offset Scheme (BOS) applies, and a Biodiversity Development Assessment Report (BDAR) has been prepared. This BDAR assesses the impacts of the proposed construction of an open cut basalt quarry according to the NSW Biodiversity Assessment Methodology 2020 (BAM).

The BDAR was submitted for approval to Hilltops Council on the 8th of June 2021 who is the determining authority for the BDAR. Recent consultation was received from Biodiversity Conservation Division (BCD) on the 16th of September 2022 and has been addressed in this report. A summary of this consultation and where it has been addressed is provided in Appendix J.

A site assessment was undertaken by two ecologists on 25th – 27th August 2020 to determine the Plant Community Types (PCTs) and vegetation zones present. A BAM accredited ecologist was present for these surveys. An additional survey was conducted on the 13th of April 2021 by an ecologist for the Hume Highway modification for the Hume Highway access.

The native vegetation determined to be present on the development site includes two PCTs and exotic vegetation. The exotic vegetation, vegetation zone 3, covers 6.03 hectares in the proposed development site.

The PCTs that are present on site include the following:

- 23.01 hectares of PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion within the quarry site including Vegetation Zone 1 (PCT 266 exotic understory) and Vegetation Zone 2 (PCT 266 Derived Grassland).
- 0.05 hectares of PCT 277 Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion at the Hume Highway intersection including Vegetation Zone 4 (PCT 277 exotic understory).

The development site is comprised of two separate areas these are:

- Mt Bundarbo – proposed open cut quarry and,
- Hume Highway – proposed access upgrade.

Development Site	Area	Development Footprint	Area
Mt Bundarbo	28.88	Mt Bundarbo	12.88
Hume	0.68	Hume	0.09

Development Site	Area	Development Footprint	Area
Total	**29.57**	**Total**	**12.96**

PCT 266 (Vegetation Zone 1 and 2) occurs within the Mt Bundarbo site. PCT 277 occurs within the Hume Highway site. Exotic vegetation occurred within both sites. Existing road formation forms 0.05 ha of the Hume Highway site. The vegetation impacted from the proposed quarry site includes the following:

- 6.83 hectares of Vegetation Zone 1 (PCT 266 exotic understory) -70 credits generated.
- 2.08 hectares Vegetation Zone 2 (PCT 266 Derived Grassland) - 0 credits generated.
- 3.8 exotic vegetation (Vegetation Zone 3) - 0 credits generated.
- There will be no impact on Vegetation Zone 4 (PCT 277 exotic understory). - 0 credits generated.

There is no offset requirements for vegetation zone 3 or vegetation zone 2. There are 70 Ecosystem Credits required for Vegetation Zone 1 (PCT 266 exotic understory) which is PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.

PCT 266 and PCT 277 are listed as the Threatened Ecological Community (TEC) White Box-Yellow Box-Blakely's Red Gum Woodland under the BC Act (Box-Gum Woodland). The communities within the development site do not meet the criteria for the federally listed CEEC, due to having a very degraded understory dominated by exotic annual grasses.

Targeted flora and fauna surveys for threatened species were undertaken by two ecologists on the 25th to 27th of August, 6th–9th October 2020 and 2nd – 3rd December 2020. These surveys were conducted during optimal survey periods for candidate species where possible.

Targeted flora surveys were carried out for Ausfelds Wattle (*Acacia ausfeldii*), Yass Daisy (*Ammobium craspedioides*), Euphrasia arguta, Tumut Grevillea (*Grevillea wilkinsonii*), Small Purple-pea (Swainsona recta), Silky Swainson-pea (*Swainsona sericea*), Small Scurf-pea (*Cullen Parvum*). No threatened flora were recorded on site, therefore no species credits for threatened flora were generated.

Targeted fauna surveys included the following species:

- **Reptiles:** Pink tailed legless lizard (*Aprasia parapulchella*) not present on site
- **Mammals**
    - Koala (*Phascolarctos cinereus*) not present on site.
    - Grey-headed Flying Fox (*Pteropus poliocephalus*) not present on site.
    - Large-eared Pied Bat (*Chalinolobus dwyeri*) - assumed foraging habitat in PCT 277, however this PCT will not be impacted therefore no species credits were generated.
    - Squirrel Glider (*Petaurus norfolcensis*) not present on site.
    - Brush-tailed Rock Wallaby (*Petrogale penicillata*)
    - Brush-tailed Phascogale (*Phascogale tapoatafa)* Assumed Presence in Vegetation Zone 1-6.83 ha.
- **Birds**
    - Bush Stone-curlew (*Burhinus grallarius*) not present on site.

- Glossy Black-Cockatoo (*Calyptorhynchus lathami*) not present on site.
- Little Eagle (*Hieraaetus morphnoides*) not present on site.
- Square-tailed Kite (*Lophoictinia isura*) not present on site.
- Barking Owl (*Ninox connivens*) not present on site.
- Superb Parrot (*Polytelis swainsonii*) not present on site.
- Masked Owl (*Tyto novaehollandiae*) not present on site.

Brush-tailed Phascogale was unable to be surveyed for during the assessment phase. Resourcing constraints and survey effort required under the newly released Survey Guidelines made survey prohibitive at the time. Preliminary communication with the species expert Dr Rodney van der Ree from WSP indicated that the habitat would unlikely be degraded enough to rule out presence of the species without further studies. Therefore, Brush-tailed Phascogale was assumed present based on the following:

- Low population densities, large home range size, annual male die-off and fluctuating local abundance make Brush-tailed Phascogales difficult to detect reliably (Bionet, 2020).
- Communication with Species Expert Dr Rodney van der Ree indicated Brush-tailed Phascogale can occur in disturbed agricultural landscapes across large home ranges making detectability through survey difficult.
- As a precautionary approach the species was assumed present due to the large number of fallen timber and hollow bearing trees present in the development site.

Therefore, it is assumed this species is present on site in PCT 266 Vegetation Zone 1. The impact area (species polygon) covers 6.83 ha (Vegetation Zone 1) generating 70 species credits. There will be a loss of 97 Hollow-bearing trees in Vegetation Zone 1.

Box-Gum Woodland is listed as an entity that is at a risk of a Serious and Irreversible Impact (SAII) under the BC Act. An assessment has been completed in accordance with BAM 2020 and the principals set out in the BC Regulation to assist the determining authority in determining whether a SAII is possible.

An Assessment of Significance was completed for the Environment Protection and Biodiversity Conservation Act 1999 (EPBC) listed species (below). However, it was determined no EPBC referral is required.

- The Assessment of Significance was completed for the following species:
- Superb Parrot *Polytelis swainsonii* – Vulnerable
- Large-eared Pied Bat *Chalinolobus dwyeri* – Vulnerable
- Corben's Long-eared Bat *Nyctophilus corbeni* – Vulnerable
- Koala *Phascolarctos cinereus*—Vulnerable
- Swift Parrot *Lathamus discolor*—Endangered
- Spotted tail Quoll *Dasyurus maculatus*—Endangered

To prevent any indirect impacts to surrounding native vegetation, mitigation measures have been outlined for the construction phase of the development. With the retirement of credits and effective implementation of the mitigation measures, the proposal would be consistent with the requirements of the BAM.

1. Introduction

Bald Hill Quarry Pty Ltd proposes to construct a quarry pit (Mt Bundarbo Pit) 700m south of the existing North Ridge Pit. The proposed works include an 800m extension of the existing haul road to allow access.

Bald Hill Quarry (BHQ) Pty Ltd, is a regional landfill and quarry operator. BHQ operates the Bald Hill and North Ridge quarries adjacent to the Hume Highway, 7km east of Jugiong in Southern NSW (Figure 1-1). The basalt quarry has been operating in the area for more than 30 years. The operations include open pits, crushing, screening and transporting material offsite providing the local area with aggregates and road base material.

Development consent for the operation was originally granted in 1984. In 1989, following significant investment and restructuring, BHQ commenced a strategic market development plan targeting a quality product to a market specifically seeking high quality crushed rock products.

A Development Consent for the North Ridge operation was granted in April 1999 (DA T.98.027) for the extension of hard rock quarrying activities, new extraction site, ongoing use of existing processing plant, new raw feed haul route and product transportation. Bald Hill can extract 100,000 to 150,000 tonnes per annum (tpa) with peak demands of up to 300,000 tpa.

BHQ Jugiong operates under Environmental Protection Licence (EPL) number 2552, last updated in October 2020.

The original Bald Hill pit is now a landfill and the North Ridge pit is still in operation as outlined in the Environmental Impact Statement (1998) and Development approval DA T.98.027.

The landfill, known as “Ecofill”, is accommodated in the exhausted Bald Hill quarry void. Ecofill has a contractual arrangement with a consortium of Local Government Councils known as South West Regional Waste Management Group (SWRWMG) to take waste from their waste transfer stations and furthermore to restrict all other sources of waste to the Local Government Areas the Councils represent. The Facility is open five days a week with most waste being delivered by truck.

This development is being assessed under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The clearing of native vegetation as part of this proposal exceeds the area clearing thresholds listed under Cl7.2 of the Biodiversity Conservation Act 2016 (BC Act) regulations. In accordance with the BC Act the Biodiversity Offset Scheme (BOS) applies, and a Biodiversity Development Assessment Report (BDAR) has been prepared.

This BDAR assesses the impacts of the proposed construction of an open cut basalt quarry according to the NSW Biodiversity Assessment Methodology 2020 (BAM).

The following terms are used in this document:

- Development footprint – The area of land that is directly impacted on by the proposal including, Mt Bundarbo Pit impact area and associated road upgrades.
- Development site – The development site is approximately 29.57 hectares (ha). The development site is the area surveyed for this assessment.
- Subject land – All land that has been assessed. It is the same as the development site.
- Buffer area – All land within 1500 m of the outside edge of the boundary of the development footprint.

1.1 The proposal

The Mount Bundarbo Quarry (the proposal) will include a new open cut pit, haul road extension and modification to the Hume Highway access. The proposed development footprint covers an area of 12.96 ha.

Initial construction of the site would be through clearing and earthworks using excavator and dozer. Removal of material would be through drill and blast. Extraction would involve an excavator, loader and dump truck moving the material for processing. Processing of material would be either via mobile crushing at Mt Bundarbo or taken back to the existing processing plant for processing.

The construction phase for Mt Bundarbo pit would last approximately 3 months and would involve:

1. Haul road extension
2. Bundarbo Pit development

The ongoing operation of the Mt Bundarbo quarry pit would be as for the current North Ridge Pit. As the Mt Bundarbo pit opens up and is more and more accessible, so the North Ridge pit will correspondingly scale down.

Key features of the proposed construction would include the following elements:

- Establishment of environmental controls.
- Vegetation clearing.
- Construction of the haul road extension.
- Establishment of the Mt Bundarbo Pit:
    - Excavation and repurpose of surface material.
    - Excavation and processing of quarry stone.

1.2 The development site

1.2.1 Site location

The proposed location of the Mt Bundarbo Pit is within the Hilltops Local Government Area (LGA) around 9km East South East (ESE) of Jugiong, NSW. The development site is located on Mt Bundarbo. The development site is located within the Harden Local Environmental Plan (LEP) 2011. The development site occurs within the following cadastral boundaries:

- Lot 11/ DP 133540 – Freehold.
- Lot 7002/ DP 1031310 – Crown Land.
- Lot 9/ DP 439146 – Freehold.
- Lot 148/ DP 753592 – Freehold.

The development site as noted above encompasses around 29.56 ha.

1.2.2 Site description

The development site is accessed internally via the existing haul road within the Bald Hill Quarry site. The haul road connects to the Hume Highway. This is the only access point to the Bald Hill Quarry site. The development site is a basalt peak with an Australian Height Datum (AHD) elevation of around 577m.

The development site at Mt Bundarbo is zoned RU1 – Primary Production; the development site at the Hume Highway is zoned SP2 – Infrastructure under the Harden LEP 2011.

The development site is located within the New South Wales (NSW) South Western Slopes Interim Biogeographic Regionalisation of Australia (IBRA) Bioregion and Lower Slopes IBRA Sub-region. The development site is largely encompassed by the Mt Bundarbo Basalt Caps Mitchell Landscape with the outer edges covered by the Young Hills and Slopes.

The main vegetation types identified within the development site were Western Slopes Grassy Woodlands, Western Slopes Derived Grasslands and exotic (non-native) dominated vegetation.

The development site is situated within an agricultural dominated landscape, with the exception of the Hume Highway and Bald Hill Quarry site. A fixed survey trigonometrical station is located within Lot 7002/ DP 1031310 – Crown Land. The development site is comprised on two unconnected areas, Mt Bundarbo and access to the Hume Highway.

Although drainage lines, watercourses and water features occur within the general landscape, no hydrological features including dams or watercourses occur within the development site. Sawpit Creek and Kylers Creek occur within the 1500m buffer zone. The Murrumbidgee River occurs around 2km south west of the development site.

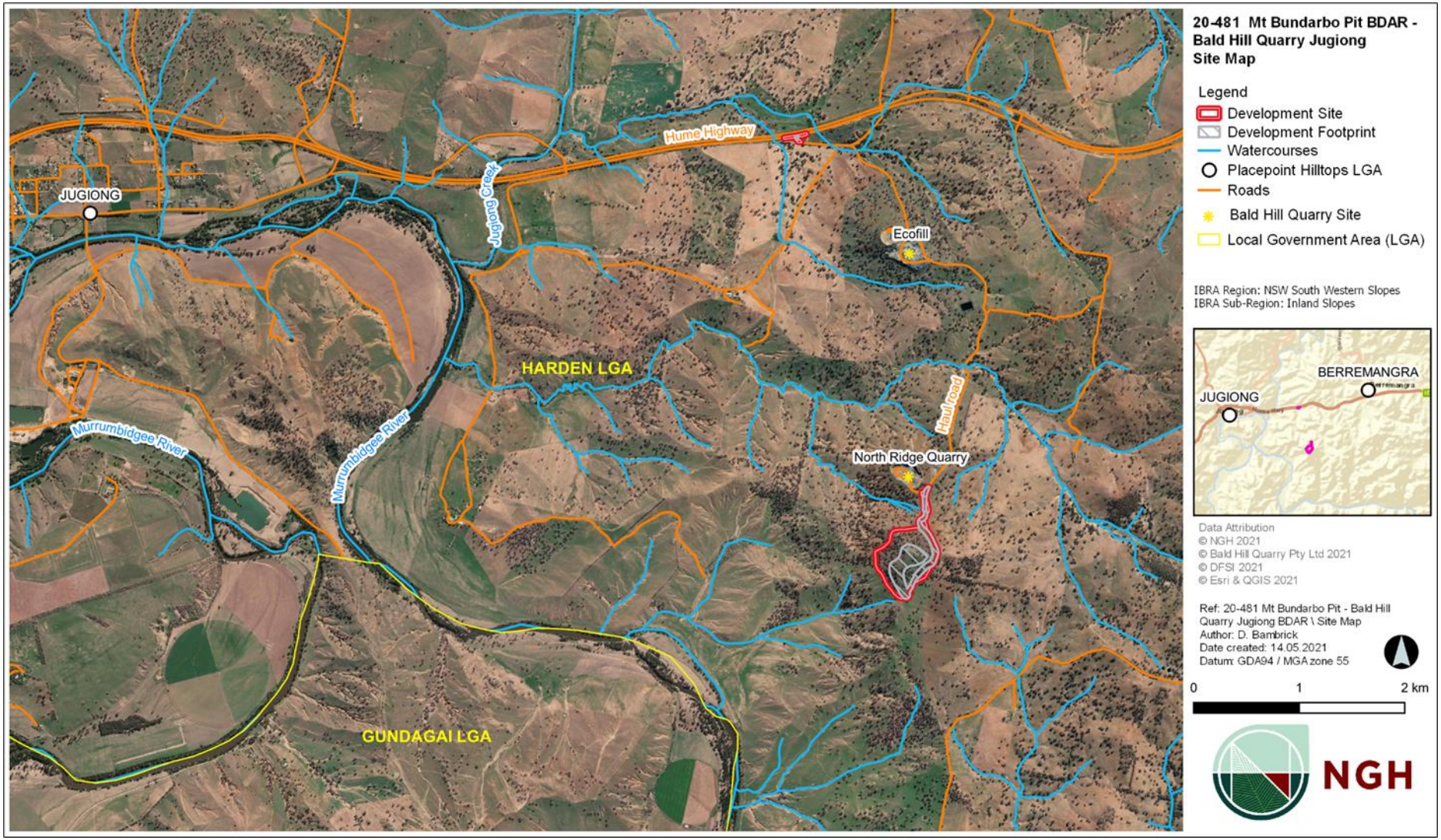


Figure 1-1 Site map, development locality

Figure 1-2 Site map, development site Mt Bundarbo

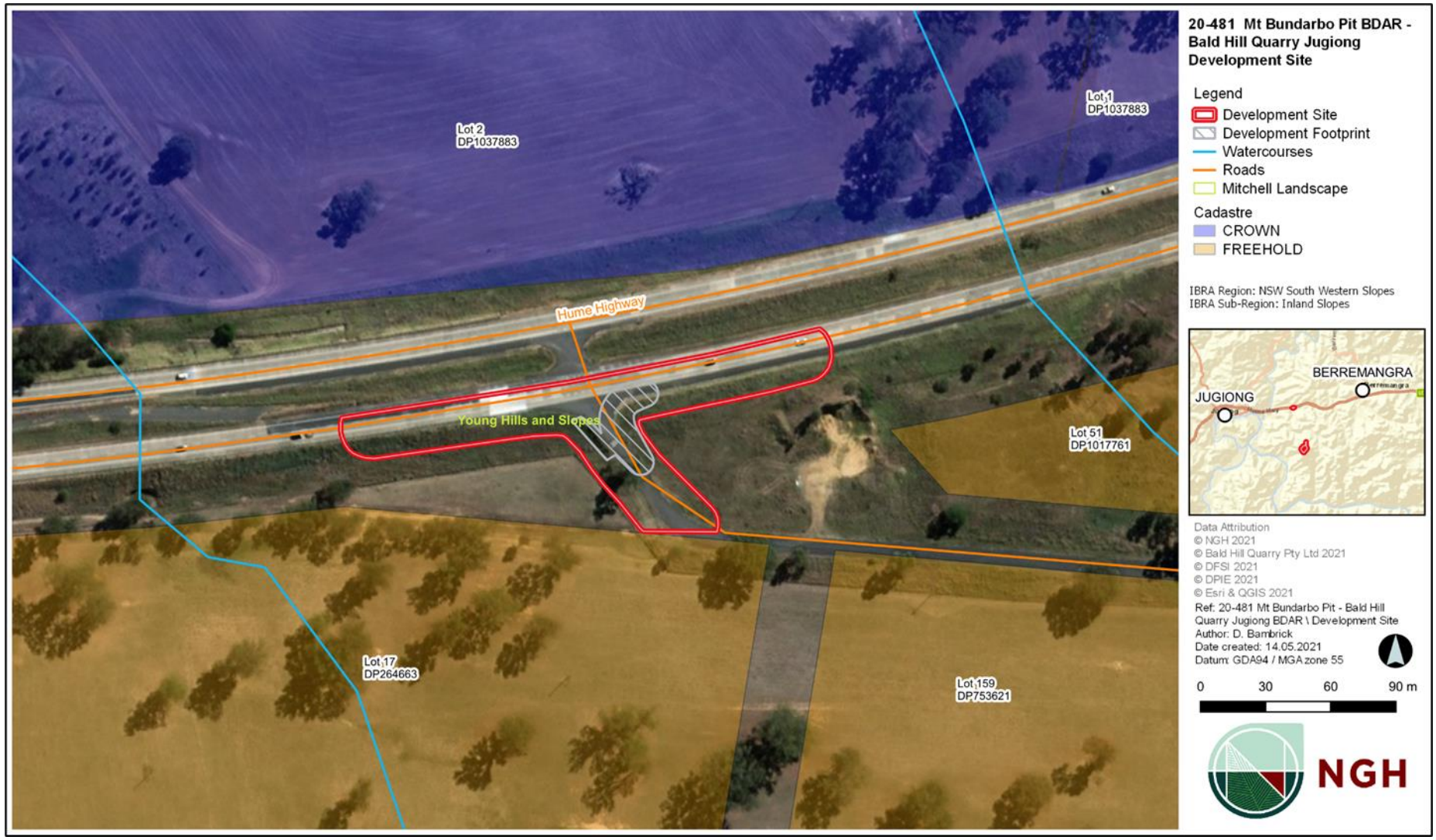


Figure 1-3 Site map, development site Hume Highway

1.3 Study Aims

This BDAR has been prepared by NGH Pty Ltd on behalf of Bald Hill Quarry Pty Ltd.

The aim of this BDAR is to address the requirements of the Biodiversity Assessment Method (BAM), as required in the Secretary's Environmental Assessment Requirements (SEARs) and summarised below.

Table 1-1 Secretary's Environmental Assessment Requirements relevant to this BDAR

Secretary's Environmental Assessment Requirements
Including: • *accurate predictions of any vegetation clearing on site;* • *a detailed assessment of the potential biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems undertaken in accordance with Sections 7.2 and 7.7 of the Biodiversity Conservation Act 2016; and* • *a detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant.*
BIODIVERSITY CONSERVATION DIVISION
The EIS must assess the impact of the proposed development on biodiversity values to determine if the proposed development is "likely to significantly affect threatened species" for the purposes of Section 7.2 of the *Biodiversity Conservation Act 2016* (BC Act), as follows: ***a)*** *The EIS must demonstrate and document how the proposed development exceeds, or does not exceed, the biodiversity offsets scheme threshold as set out in Section 7.4 of the BC Act 2016 and Clause 7.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation) by determining whether the proposed development involves:* ***i.*** *The clearing of native vegetation exceeds the thresholds listed under Clause 7.23 of the BC Regulation, or* ***ii.*** *The clearing of native vegetation, or other action, on land included on the Biodiversity Values Map published under Clause 7.23 of the BC Regulation (this map includes areas of outstanding biodiversity value, as declared under Section 3.1 of the BC Act).* ***a)*** *If the proposal does not trigger any of the criteria in (a) above, then the EIS must determine whether the proposed development is likely to have a significant impact based on 'the test for determining whether proposed development likely to significant affect threatened species or ecological communities' in Section 7.3 of the BC Act.* ***b)*** *Where there is reasonable doubt regarding potential impacts, or where information is not available, then a significant impact upon biodiversity should be considered likely when applying the test in Section 7.3 of the BC Act. Where it is concluded that there is no significant impact, the EIS must justify how the conclusion has been reached.*

Secretary's Environmental Assessment Requirements
c) *If the development exceeds the thresholds in (a) or (b), then the EIS must be accompanied by a biodiversity development assessment report (BDAR) prepared in accordance with Part 6 of the BC Act. That is, the Biodiversity Assessment Methodology applies.*
DEPARTMENT OF PRIMARY INDUSTRY
Biosecurity Standards met • *Include a biosecurity (pests and weeds) risk assessment outlining the likely plant, animal and community risks.* • *Develop a biosecurity response plan to deal with identified risks as well as contingency plans for any failures. Including monitoring and mitigation measures in weed and pest management plans.*

1.4 Information sources used in assessment

The following information sources were used in this BDAR.

Australian Government's Species Profiles and Threats (SPRAT) database http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

NSW Threatened Species Profiles http://www.environment.nsw.gov.au/threatenedspeciesapp/ and www.environment.nsw.gov.au/AtlasApp/UI_Modules/

Department of Primary Industries (DPI) profiles of threatened species, population, and ecological communities

Commonwealth Department of Agriculture, Water, and the Environment Protected Matters Search Tool Accessed online at http://environment.gov.au/epbc/protected-matters-search-tool

Australia's IBRA Bioregions and sub-bioregions. Accessed October 2019 http://environment.gov.au/land/nrs/science/ibra/australias-bioregions-maps

Department of Environment and Climate Change NSW (DECC) (2002). Descriptions for NSW (Mitchell) Landscapes, Version 3

NSW OEH's Biodiversity Assessment Method (BAM) calculator (http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx)

NSW OEH's BioNet threatened biodiversity database Accessed online via login at http://www.bionet.nsw.gov.au/

NSW Government (2021). *BioNet Vegetation Classification – PCT data*. Accessed online: https://www.environment.nsw.gov.au/NSWVCA20PRapp/search/pctsearch.aspxDPIE State Vegetation Mapping (Riverina) V1.2-VIS_ID 4469.

Office of Environment and Heritage (OEH) (2020). Biodiversity Assessment Method

NSW Government SEED Mapping https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU

NSW Biodiversity Values Map https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

Aerial imagery of historical land use (Sourced from Google Earth and Spatial Services Delivery)

2017 V1.2 Land Use Dataset (Australian Land Use and Management (ALUM) Classification Version 7 (Office of Environment and Heritage (OEH), 2017)

NSW Woody vegetation extent and Foliage Projective Cover (FPC) 2011 (OEH, 2015)

Sensitive regulated and vulnerable regulated lands on the Native Vegetation Regulatory Map portal

2. Landscape features

2.1 IBRA bioregions and subregions

IBRA Bioregions are geographically distinct bioregions based on common climates, geology, landforms and native vegetation (Thackaway and Creswell, 1995). There are 89 IBRA bioregions within Australia. Each IBRA bioregion contains multiple sub-regions. The proposal falls within the NSW South Western Slopes (SWS) IBRA Bioregion and Inland Slopes IBRA sub-region.

The NSW SWS is described by the Office of Environment and Heritage (OEH) bioregion overview, (OEHa,2016) as follows:

The NSW SWS occurs from Albury to Dunedoo. The bioregion includes parts of the Murray, Murrumbidgee, Lachlan and Macquarie River catchments. The NSW SWS climate is classified as dominated by a sub-humid climate characterised by hot summers and no dry season.

The bioregion is a large area of foothills and ranges comprising the western fall of the Great Dividing Range to the edge of the Riverina Bioregion. A very wide range of rock types is found across the bioregion, which is also affected by topographic and rainfall gradients that decrease toward the west.

The Lower Slopes (LS) sub-region (Inland Slopes) is described as containing undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans.

The following vegetation types are noted within the sub-region:

- Dwyer's Gum on granite.
- Red Ironbark on sedimentary rocks.
- White Cypress Pine and Red Stringybark in the ranges.
- Grey Box woodlands with Yellow Box.
- White Cypress Pine and Belah on lower areas.
- Poplar Box, Kurrajong, Wilga, and Red Box in the north.
- Limited areas of Bull Mallee, Blue Mallee, Green Mallee and Congoo Mallee in the central west.
- Myall, Rosewood and Yarran on grey clays.
- Yellow Box, Poplar Box, and Belah on alluvial loams.
- River Red Gum on all streams with Black Box in the west with some Lignum and River Cooba.

2.2 NSW landscape regions and area

The development site occurs within the Mt Bundarbo Basalt Caps Mitchell Landscape Young Hills and Slopes Mitchell Landscapes. The majority of the development site occurs within the Mt Bundarbo Basalt Caps, with the lower edges of the development site fringed by the Young Hills and Slopes.

Mt Bundarbo Basalt Caps was used in the BAM – C.

2.3 Native vegetation

As determined by database sources, the site assessment and GIS software, approximately 1295.78 ha of native vegetation occurs in the surrounding 1500m buffer area. This vegetation in the landscape surrounding the development site is predominantly Western Slopes Grassy Woodlands and Western Slopes Grasslands.

Native vegetation percent cover was estimated by using aerial imagery, existing state vegetation mapping (VIS_4469) and field inspection. The area of the 1500m buffer is 1895.16 ha. Therefore, the percent native vegetation in the 1500m buffer is 68.37 %.

This puts the native vegetation cover class as 30-70% in the BAM – C.

2.4 Cleared areas

Within the 1500m buffer around the development site, around 599.37 ha of land has been cleared of native vegetation. These cleared areas within the landscape are primarily utilised for agricultural grazing, local roads and the Hume Highway. Alongside this, cleared land has occurred for the construction of roads to the Bald Hill Quarry and Ecofill. Within the development site, cleared areas coincide predominantly within the crown land (Lot 7002/ DP 1031310) where minor development of a historical trigonometric station has occurred. However, cleared areas occur where the development site has been utilised for grazing purposes within the past (Figure 2-1). It does not currently form part of a grazing regime by Bald Hill Quarry.

Figure 2-1 Example of cleared area within development site

2.5 Rivers, streams and wetlands

The development site is located within the Murrumbidgee Catchment, where the Murrumbidgee River occurs around 2km south east of the development site.

No watercourses or mapped drainage lines occur within the development site. Within the 1500m buffer a number of ephemeral drainage (unnamed) watercourses occur. Alongside this, two non-perennial creeks (Sawpit Creek and Kyles Creek) occur. No dams or waterbodies occur within the development site. Within the 1500m buffer seven dams are mapped as occurring.

Given the geology of the Mt Bundarbo development site, containing a basalt peak with an AHD of 577m elevation leading down to AHD elevations below 480m, drainage of surface water from the development during rainfall events is likely to flow into watercourses situated within the surrounding landscape. The Hume Highway development site would incur roadside runoff during rain events. A culvert runs under this section of the development site. Therefore, the development site may form part of a natural drainage system of water within the landscape.

No wetlands occur within the development site or within the 1500m buffer area.

2.6 Connectivity features

The 1295.78 ha of native vegetation occurring in the surrounding 1500m buffer area forms part of a contiguous landscape connecting to the broader landscape (Figure 2-2). Major connectivity features in the broader landscape include the major watercourses including the Murrumbidgee River alongside minor defined and undefined watercourses. No tracts of remnant vegetation classified as National Parks, reserves or state forest occur within the 1500m buffer area. However, woody vegetation within the development site and the surrounding landscape occurs as sparsely scattered old growth trees and low condition woodland which act as stepping stones throughout the landscape. The remnant vegetation provides moderate connectivity in the landscape.

Figure 2-2 Aerial overview of development site, contiguous vegetated landscape.

2.7 Areas of geological significance

The NSW Geology Plus website maps the development site as Silurian Granite including S-type granite with quartz feldspar, muscovite biotite, and cordierite, where some granite may be porphyritic - where larger crystals (typically feldspar) are surrounded by smaller ones. No karst, caves, crevices or cliffs occur within the development footprint. The development footprint occurs within the Hilltops LGA, where the general landscape is known for undulating slopes and basalt peaks.

The development footprint is largely a basalt peak. The Mitchell Landscapes detail that these basalt caps occur throughout the broader landscape. The development site occurs on Mt Bundarbo, despite this, the development site is not an area of geological significance (Cartoscope, 2021).

2.8 Areas of outstanding biodiversity value

No Areas of Outstanding Biodiversity Value (AOBV) occur within the development site or the 1500m buffer area. No areas of land mapped on the NSW Biodiversity Values Map under the Biodiversity Conservation Regulation 2017 occur within the development site. Sawpit Creek and Kyles Creek, within the 1500m buffer area, are mapped as Biodiversity Values Land (Figure 2 3).

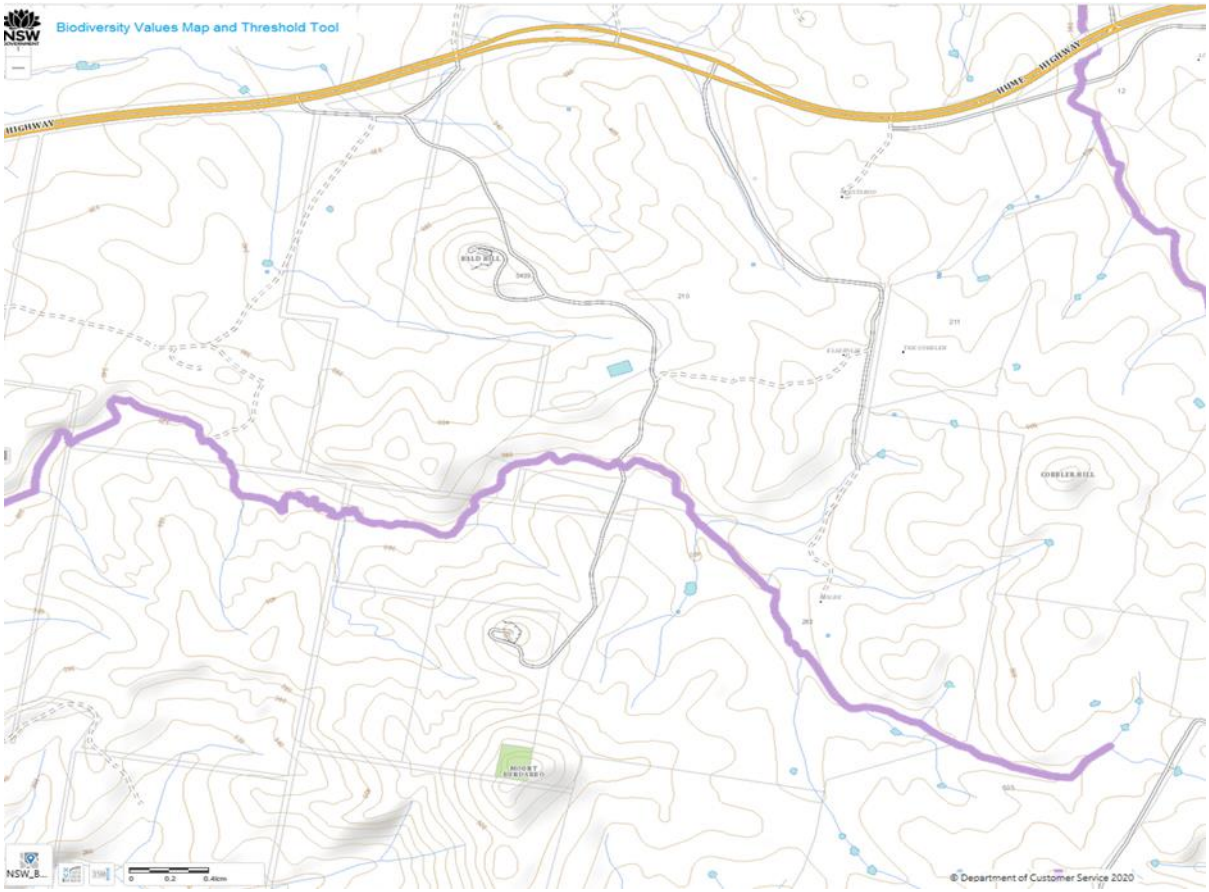


Figure 2-3 Biodiversity Value mapped land within the locality

2.9 Site context components

2.9.1 Method applied

The proposal conforms to the definition of a site-based development under the BAM and therefore the site-based development assessment methodology has been used in this BAM assessment. Native Vegetation was calculated by estimating the percent cover of native vegetation relevant to the benchmark for the Plant Community Type (PCT). PCTs were allocated based on existing vegetation mapping, field inspections and aerial imagery.

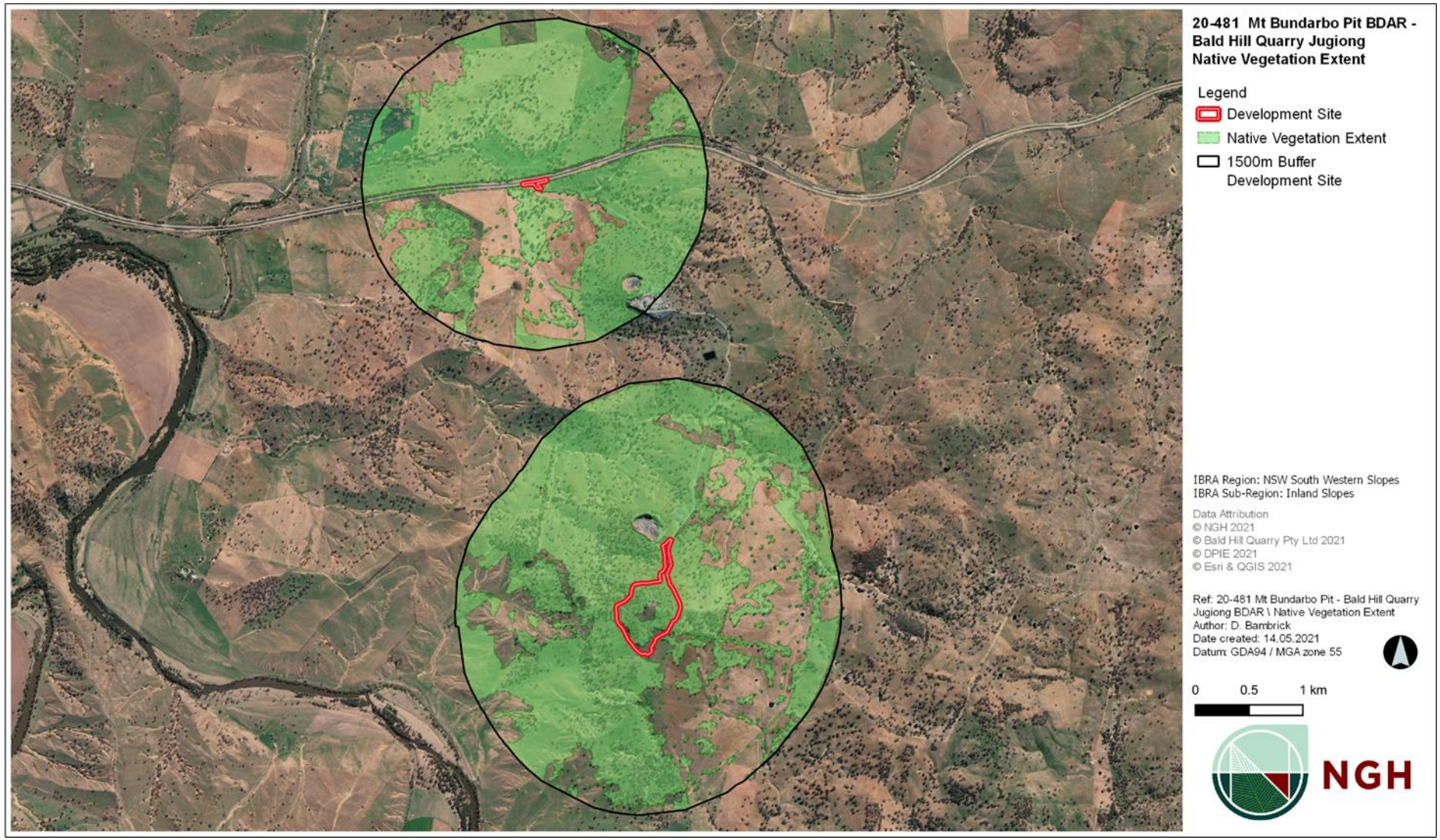


Figure 2-4 Native vegetation extent 1500m buffer development site

3. Native vegetation

3.1 Native vegetation extent

23.21 ha of native vegetation occurs within the development site comprised predominantly of White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion with areas of derived grassland (See Figure 3-1 and Figure 3-2).

Scattered trees are defined as trees that:

- Have a DBH greater than 5cm.
- Are located more than 50m away from any living tree.
- Have a 100% exotic groundcover comprised from cereal crops.

The PCT within the development site is PCT 266 (Section 3 of this report) that forms part of a contiguous patch of vegetation, therefore no scattered trees occur within the development site.

Figure 3-1 Native vegetation, development site Mt Bundarbo

Figure 3-2 Native vegetation in development site, Hume Highway

3.2 Land Category Assessment

Section 6.8(3) of the BC Act determines that the BAM is to exclude the assessment of the impacts of clearing of native vegetation on Category 1 - Exempt Land (within the meaning of Part 5A of the *Local Land Services Act 2013* (LLS Act)). Category 1 - Exempt Land on the Native Vegetation Regulatory Mapping are not yet publicly available. During the transitional period, accredited assessors may establish the categorisation of land for the agency head to consider.

A Land Category Assessment (LCA) was completed for the development site (See Figure 3 3) and is provided in Appendix H

0.40 ha of Category 1 - Exempt Land and 28.48 ha of Category 2 - Regulated Land occur within the development site. 0.68 ha of Excluded Land occurs along the Hume Highway and is zoned as SP2 – Infrastructure under Harden LEP and Transport under the NSW Land Use Layer. Category 1 land does not apply to Excluded Land and has therefore been determined at Category 2 Land. Areas of Category 1 and Category 2 are provided in and Figure 3-3.

The area identified as Crown Land (Lot 7002 DP 1031310) has been mapped as Category 2 Land. An area of exotic vegetation occurs on the peak of the hill within this area. A Floristic Plot and threatened species surveys have been completed in this area in accordance with the BAM (2020).

The land category assessment was conducted using available spatial data and ground-truthed surveys by an accredited assessor. Spatial data utilised for the land category assessment included:

- NSW Landuse 2017.
- NSW Land zoning.
- Woody vegetation.
- Historic aerial imagery.
- NRM (Vulnerable and Sensitive) land.

The full LCA is located within Appendix H.

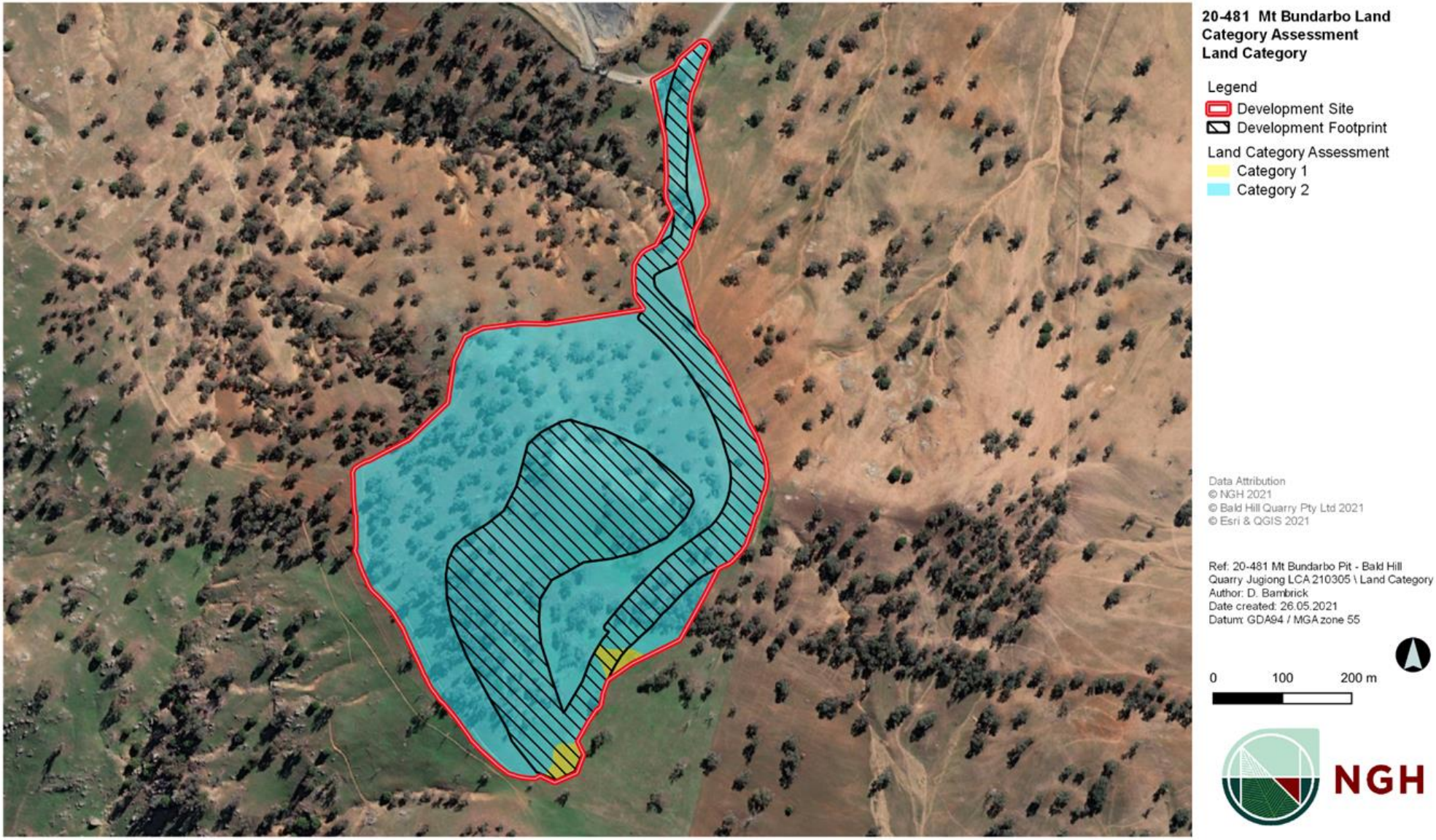


Figure 3-3 Land Category Assessment, development site, Hume Highway

Figure 3-4 Land Category Assessment, development site, Hume Highway

3.3 Plant Community Types (PCTs)

3.3.1 Methods to assess PCTs

Review of existing information

A search was undertaken of OEH Vegetation Information System (VIS) database and NSW Sharing and Enabling Environmental Data (SEED) mapping to access existing vegetation mapping information within the development site. One relevant existing vegetation map was assessed:

- DPIE VIS State Vegetation Mapping (Riverina Region V1.2 – VIS_ID 4469).

The existing mapping has three PCTs mapped for the development site, these are:

- PCT 266 *White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.*
- PCT 796 *Derived grassland of the NSW South Western Slopes.*
- PCT 277 *Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion*

A site assessment was completed to determine PCTs present in the development site and is detailed below.

Floristic survey

An initial site survey was undertaken on the 25th – 27th August 2020. The entire development site was surveyed by two ecologists via vehicle and foot to determine the PCTs and zones present. Additional surveys were undertaken on the 6th - 9th October 2020 and 2nd – 3rd December 2020. A BAM accredited ecologist was present for each of these surveys. A site survey was conducted on the 13th of April 2021 by an ecologist for the addition of the Hume Highway development site.

The aim of these surveys was to confirm the PCTs present and determine the condition and extent of communities and threatened species habitat in the development site. Random meander searches were conducted to determine the flora species present. Rapid Assessment of PCTs and zones was completed during the initial August survey period. PCTs were identified from the native species present, landforms, physiography and location in the IBRA subregion using the BioNet Vegetation Classification Database. The proposal area was then stratified into areas of similar condition class to determine vegetation zones for each PCT.

Vegetation Integrity Plots (BAM Plots) were completed to verify the PCTs and condition zones. BAM plots of 20 m by 50 m were completed in each vegetation zone within Category 2 Land. The required number of plots were completed for each vegetation zone to be impacted and is detailed in Table 3-2. A total of Nine (9) BAM Plots were completed in accordance with the BAM. One Vegetation Zone (Zone 4 PCT 277_exotic understory) outside of the development footprint is missing a vegetation plot. Benchmark data has been used for this zone. Data was collected utilising the methodology presented in the BAM 2020 by persons trained in the BAM and under the direction of persons accredited under the BAM.

3.3.2 PCTs identified in the development site

Based on the field surveys two PCTs were identified within the development site and the Hume Highway and Haul Road intersection were:

- PCT 266 White Box grassy woodland in the upper slopes sub region of the NSW South Western Slopes Bioregion. PCT 266 occurred as two zones PCT 266 Exotic understory and 266 Derived grassland.
- PCT 277 Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion. PCT 277 occurs adjacent to the Hume Highway intersection and the Quarry's existing access (Haul Road).

The Plant Community Types are shown in Figure 3-8 and Figure 3-9. Descriptions of the PCTs are described in Table 3 1 below.

Table 3-1 Plant Community Types (PCTs) detail

PCT 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.		
Vegetation formation	Grassy Woodlands	
Vegetation class	Western Slopes Grassy Woodlands	
Vegetation type	**PCT ID**	266
	Common Community Name	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.
Condition zones in development site	This community occurs as two zones: Zone 1: Remnant woodland Eucalypts (*Eucalyptus albens*) with exotic understory (PCT 266 exotic understory) Zone 2: Derived Grassland community (PCT 266 derived grassland)	
Approximate extent within the development site	20.02 ha of PCT 266_Exotic_understory occurs in the development site. 2.99 ha of PCT 266_Derived_Grasslands occurs in the development site.	
Species relied upon for PCT identification	***Species name***	***Relative abundance***
	Eucalyptus albens – White Box	Remnant canopy trees present. Dominated by White Box.
	Brachychiton populneus - Kurrajong	Remnant canopy trees present.
	Austrostipa scabra - Spear grass	0
	Oxalis perennans -	Present in low abundance in groundcover

PCT 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.		
	Oxalis	
	Rytidosperma sp.- Wallaby Grass	Present in low abundance in groundcover
	Rumex brownii – Swamp Dock	Present in low abundance in groundcover
Justification of evidence used to identify the PCT	PCT 266 was identified as occurring onsite by: • using State Vegetation Mapping, • occurring within the correct IBRA subregion, • Dominance of *Eucalyptus albens* in the canopy • topographical locations, and • presence of remnant canopy species of *Eucalyptus albens* and *Brachychiton populneus.* • Several remnant native groundcover and shrub species observed in this PCT were consistent with the species common to this PCT (NSW Government, 2020). The understory was highly disturbed with a low native plant cover across the entirety of this PCT. Dominant weeds included: Paterson's Curse (**Echium plantagineum*), Saffron Thistle (**Carthamus lanatus*), Barley Grass (**Hordeum sp.*), Ryegrass (*Lolium sp.*) and Medic (*Medicago sp.*). The derived grassland occupied a similar characteristic species without the presence of canopy and shrub species. Based on these conclusions PCT 266 was selected as the most appropriate PCT.	
TEC Status	This PCT forms part of the **BC Act** listed *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 Riverina Bioregions, referred to from this point onwards as 'Box-Gum Woodland'. This TEC is listed as Critically Endangered under the BC Act.* *This PCT, due to the presence of an exotic dominated understory (more than 50%) does not meet the condition thresholds for the **EPBC Act** equivalent of this TEC (DEH, undated).*	
Estimate of percent cleared in NSW	94%	

PCT 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.	
Examples	 Figure 3-5 PCT 266 Woodland  Figure 3-6 PCT 266_Derived Grasslands
PCT 277 Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands

PCT 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.		
Vegetation type	**PCT ID**	277
	Common Community Name	**Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion**
Approximate extent within the development site	Vegetation Zone 4 includes 0.05 ha of this PCT occurs in the development site (near Hume Highway). This is comprised of moderate quality woodland.	
Species relied upon for PCT identification	***Species name***	***Relative abundance***
	Yellow Box – Eucalyptus melliodora-present *Blakelys Red Gum-Eucalyptus blakelyi-* *Phalaris sp.* *Paspalum sp.*	Dominant canopy species in development site and surrounding locality
Justification of evidence used to identify the PCT	PCT 277 was identified as occurring onsite by: • using existing State Vegetation Mapping, • occurring within the correct IBRA subregion, • topographical locations, (low slopes) • presence of remnant canopy species of *Eucalyptus melliodora.* • Presence clay loam soil • Several remnant native groundcover and shrub species observed in this PCT were consistent with the species common to this PCT (NSW Government, 2020). The understory was disturbed due to past road construction and ongoing roadside disturbances. However, some hardy native species persisted in the ground layer beneath the drip line. Dominant weeds included: Paterson's Curse, Saffron Thistle, Barley Grass, Ryegrass and Medic. Based on these conclusions PCT 277 was selected as the most appropriate PCT.	
TEC Status	This PCT forms part of the **BC Act** listed *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 Riverina Bioregions. This TEC is listed as Critically Endangered under the BC Act.* *This PCT, although dominated by native grass species, contained less than 12 native forb species and only 2 native grass species were present, and contained less than 50% native groundcover therefore does not meet the condition thresholds for the **EPBC Act** equivalent of this TEC (DEH, undated).*	
Estimate of	94%	

PCT 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.	
percent cleared in NSW	
Examples	 Figure 3-7 PCT 277

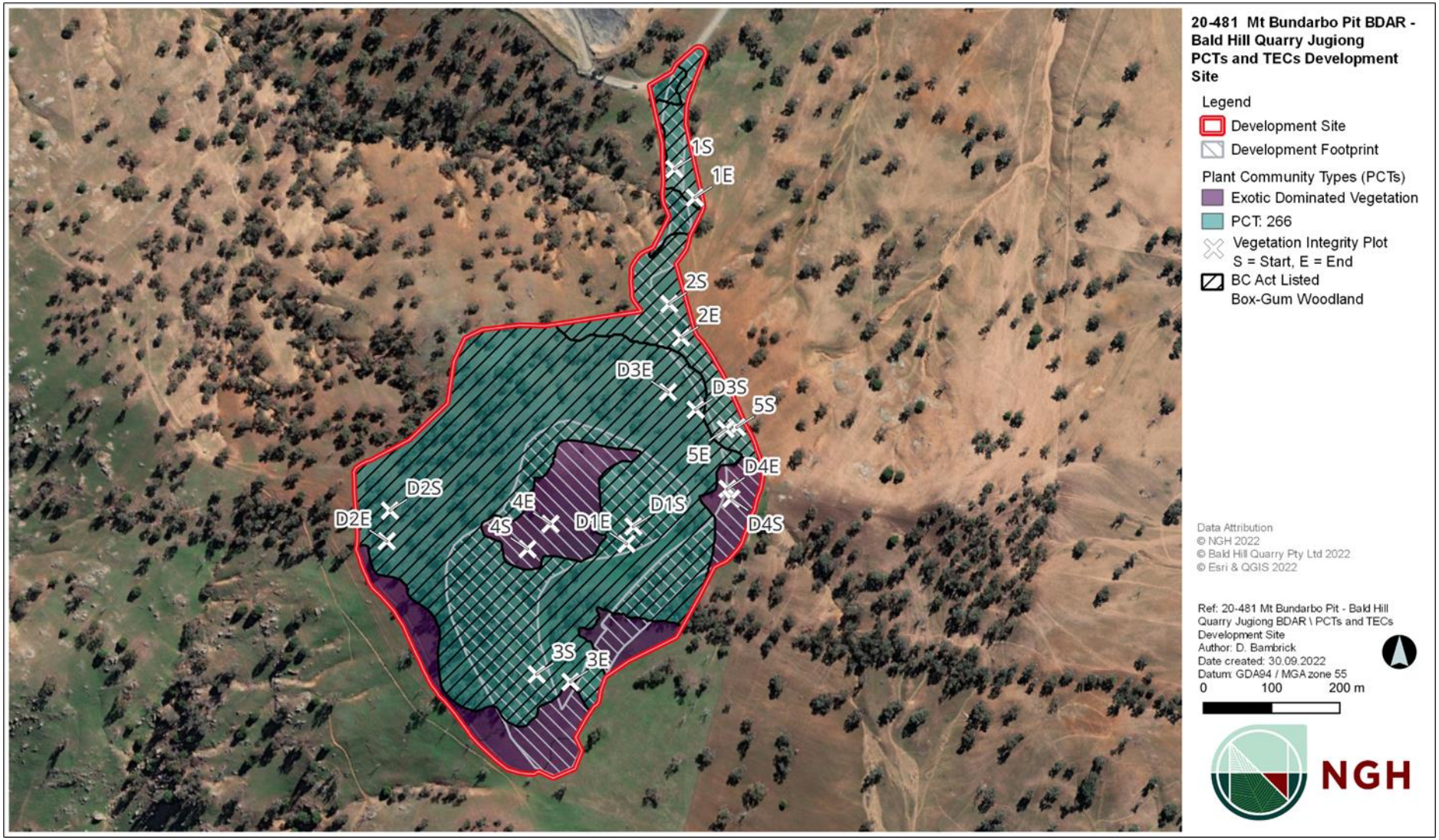


Figure 3-8 Plant Community Types in the development site, Mt Bundarbo

Figure 3-9 Plant Community Types, development site, Hume Highway intersection

3.4 Vegetation integrity assessment

3.4.1 Vegetation zones and survey effort

Two PCTs were identified within the development site. These PCTs were considered in terms of whether they should be stratified into zones on the basis of current condition state/ management or other environmental variables. PCT 266 was identified to occur in two conditions throughout the development site on the basis of tree cover, flora composition and exotic dominated understory. The understory of the development site was highly modified due to a history of grazing and pasture improvement. During the initial vegetation zoning assessment, PCT 226 Woodland (Zone 1) had a consistently disturbed understory across the development site. In the more open Derived Grassland areas (PCT 266 Vegetation Zone 2), native grasses and forbs were more prevalent, however the presence of exotic annual weeds was still present.

PCT 277 was identified in one zone near the Hume Highway. The site was visibly disturbed however a floristic plot was unable to completed in this area and Benchmark data has been used for this zone. An area of exotic dominated vegetation also occurs in the development site. PCT zones are detailed within Table 3-2 and shown in Figure 3-10 and Figure 3-11.

Vegetation Integrity BAM Plot locations were established in accordance with the requirements listed within chapter 4.3.4 of the BAM 2020, including:

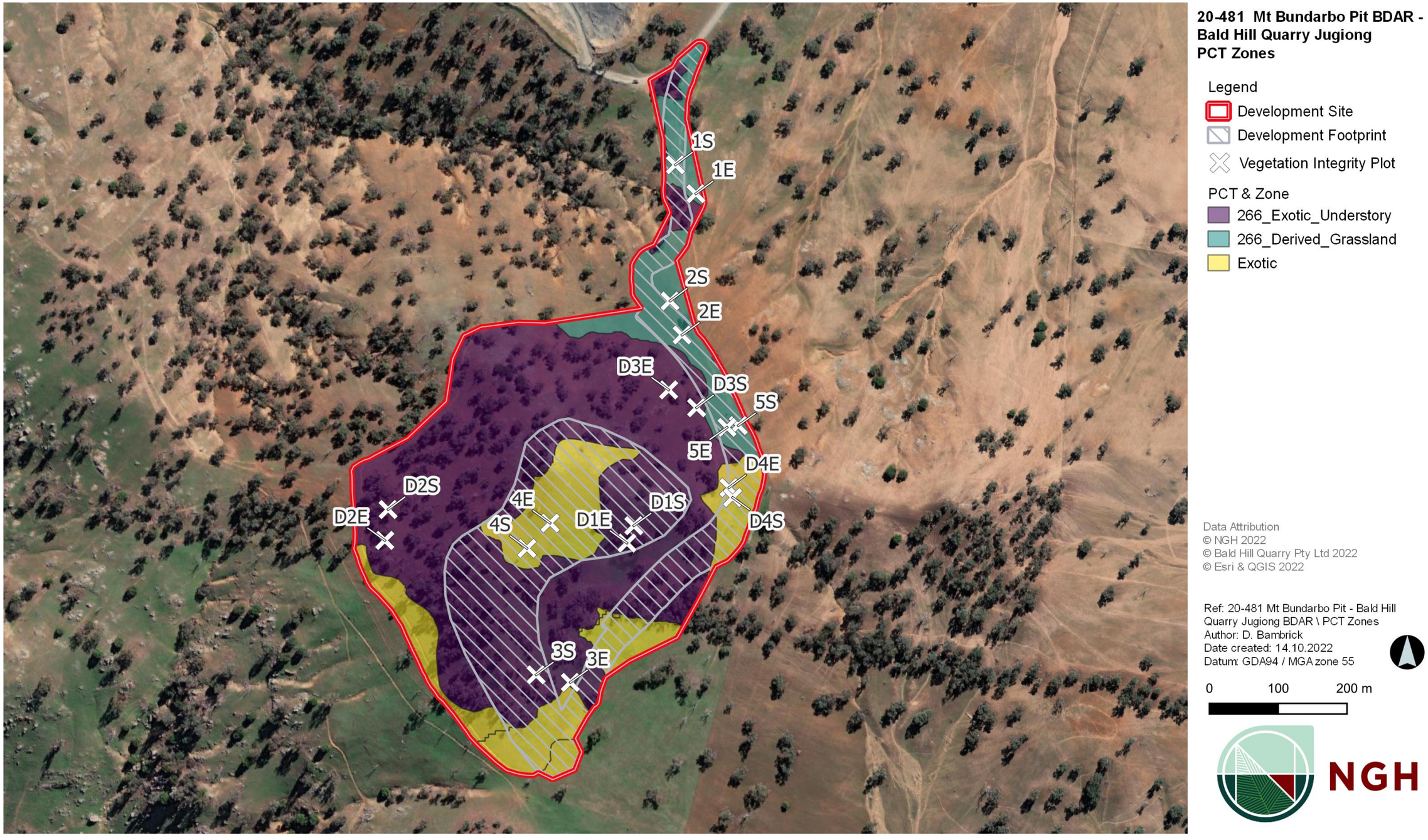
- *random location of waypoints and bearings, and establishing plots at all or some of these waypoints*
- *walking a random distance into the vegetation zone and establishing the plot on a random bearing. A random number generator on a mobile device was used in the field by staff completing plots.*
- *locating plots to ensure they capture attributes relevant to that vegetation zone.*

The BAM plots were completed over two site visits, 6th to 9th October 2020 and 3rd December 2020. Not all plots were complete in October 2020 due to the dominance of exotic annual grasses and forbs, variegated thistle (*Silybum marianum*) was a significant weed at the time of the survey. The BAM plots surveys were postponed until early summer to improve visibility of native groundcovers. However, it was apparent that the disturbed condition remained the same between surveys. Therefore, on review of all BAM Plot data between the two site visits, it was determined that the condition scores of the zones remained consistent and will be representative of the zones and the location of the plots adequately represented the condition of the vegetation at the time of the surveys in 2020.

Table 3-2 Plant Community Type and Zones

Zone ID	PCT ID	Stratification/ condition	Area (Ha) in development site	Survey effort (BAM Plots)	Patch size (ha)	Examples
1	266	**Exotic_Understory** Remnant native woodland comprising exotic dominated ground cover. This PCT forms part of the BC Act Listed Box-Gum Woodland.	19.63	4	>100 ha	
2	266	**Derived_Grassland** Native dominated grassland comprising a floristic composition and moderate density of native grass species. This PCT forms part of the BC Act Listed Box-Gum Woodland.	2.99	3	>100 ha	

Zone ID	PCT ID	Stratification/ condition	Area (Ha) in development site	Survey effort (BAM Plots)	Patch size (ha)	Examples
3	0	**Exotic Dominated** Exotic dominated vegetation occurs as vegetation dominated by exotic species, not associated with any PCT. These areas were highly disturbed and modified.	3.27 ha occurs as Category 2 Regulated Land. 3.507 ha occurs at category 1 Exempt Land. (Total of 6.03)	2 (applicable to Category 2 Land only)	Nil	
4	277	**Exotic_Understory**	0.05	0 Benchmark data used	>100 ha	



20-481 Mt Bundarbo Pit BDAR - Bald Hill Quarry Jugiong PCT Zones

Legend
- Development Site
- Development Footprint
- Vegetation Integrity Plot

PCT & Zone
- 266_Exotic_Understory
- 266_Derived_Grassland
- Exotic

Data Attribution
© NGH 2022
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© Esri & QGIS 2022

Ref: 20-481 Mt Bundarbo Pit - Bald Hill Quarry Jugiong BDAR \ PCT Zones
Author: D. Bambrick
Date created: 14.10.2022
Datum: GDA94 / MGA zone 55

0 100 200 m

NGH

Figure 3-10 Vegetation zones and vegetation integrity plots, Mt Bundarbo

Figure 3-11 Vegetation zones and vegetation integrity plots, Mt Bundarbo

3.4.2 Vegetation integrity assessment results

The plot data from the vegetation integrity survey plots were entered into the BAM Calculator by an accredited assessor (BAAS19039). Plot data can be found in Appendix A.1.

The results of the vegetation integrity assessment are provided within Table 3 3.

Table 3-3 Current vegetation integrity scores for each vegetation zone within the development site

Zone ID	PCT/Zone	Composition score	Structure score	Function score	Vegetation Integrity Score
1	266_Exotic understory	7.7	16.8	65.6	20.4
2	266_Derived_Grassland	34.8	17.5	0	1.3
4	277_Exotic understory (Benchmark data)	98.9	100	99.3	99.3

4. Threatened species

4.1 Ecosystem credit species

The following ecosystem credit species were returned by the calculator as being assigned with the PCTs.

Table 4-1 Ecosystem credit species predicated by the BAM-C.

CE = Critically Endangered, E = Endangered, V = Vulnerable

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Fauna			
Mammals			
Koala *Phascolarctos cinereus* (Foraging)	266	V	V
Grey-headed Flying Fox (foraging) *Pteropus poliocephalus*	266	V	V
Spot-tailed Quoll *Dasyurus maculatus*	266	V	Not Listed
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	266	V	Not Listed
Large Bent-winged Bat *Miniopterus orianae oceanensis*	266	V	Not Listed
Corben's Long-eared Bat *Nyctophilus corbeni*	266	V	V
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	266	V	Not Listed
Aves			
Regent Honeyeater *Anthochaera phrygia*	266	CE	CE
Dusky Woodswallow *Artamus cyanopterus cyanopterus*	266	V	Not Listed
Glossy Black-Cockatoo *Calyptorhynchus lathami*	266	V	Not Listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Speckled Warbler *Chthonicola sagittata*	266	V	Not Listed
Spotted Harrier *Circus assimilis*	266	V	Not Listed
Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae*	266	V	Not Listed
Varied Sittella *Daphoenositta chrysoptera*	266	V	Not Listed
Purple-crowned Lorikeet *Glossopsitta porphyrocephala*	266	V	Not Listed
Little Lorikeet *Glossopsitta pusilla*	266	V	Not Listed
Painted Honeyeater *Grantiella picta*	266	V	Not Listed
White-bellied Sea-Eagle *Haliaeetus leucogaster* (Foraging)	266	V	Not Listed
Little Eagle *Hieraaetus morphnoides* (Foraging)	266	V	Not Listed
Swift Parrot *Lathamus discolor* (Foraging)	266	E	CE
Square-tailed Kite *Lophoictinia isura* (Foraging)	266	V	Not Listed
Hooded Robin (south-eastern form) *Melanodryas cucullata cucullata*	266	V	Not Listed
Black-chinned Honeyeater (Eastern subspecies) *Melithreptus gularis gularis*	266	V	Not Listed
Turquoise Parrot *Neophema pulchella*	266	V	Not Listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Barking Owl *Ninox connivens* (Foraging)	266	V	Not Listed
Scarlet Robin *Petroica boodang*	266	V	Not Listed
Flame Robin *Petroica phoenicea*	266	V	Not Listed
Superb Parrot *Polytelis swainsonii* (Foraging)	266	V	V
Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis temporalis*	266	V	Not Listed
Diamond Firetail *Stagonopleura guttata*	266	V	Not Listed
Masked Owl *Tyto novaehollandiae* (Foraging)	266	V	Not Listed

4.1.1 Species excluded from the assessment

No Ecosystem Credit Species were excluded from the assessment.

4.2 Species credit species

4.2.1 Candidate species to be assessed

The BAM-C predicted the following species credit species to occur at the development site. The following table assess each species credit species to see if they require targeted surveys and declares them included or excluded from requiring survey. All included species were surveyed during required periods within August, October and December 2020 if the survey window was suitable.

Table 4-2 Candidate species credit species requiring assessment.

Species Credit Species	Habitat components and geographic limitations	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Ausfeld's Wattle *Acacia ausfeldii*	Foot slopes and low rises on sandstone	High sensitivity to potential gain	Vulnerable	Not listed	Foot slopes and low rises. Woodland and derived grassland.	Included	Habitat components on site in all zones.
Yass Daisy *Ammobium craspedoides*	South of Cowra	High sensitivity to potential gain	Vulnerable	Vulnerable	Grassland and eucalyptus woodland.	Included	Habitat components in Zone 2- 266 Derived Grassland. Excluded from Zone 1, 3 and 4 due to disturbed and modified understory.
Euphrasia arguta		High sensitivity to potential gain	Critically Endangered	Critically Endangered	Grassland.	Included	Habitat components in Zone 2- 266 Derived Grassland. Excluded from Zone 1, 3 and 4 due to disturbed and modified understory.
Booroolong Frog *Litoria booroolongensis*		High sensitivity to potential gain	Endangered	Endangered	Permanent streams with rocky banks and fringing and emergent vegetation.	Excluded	Suitable habitat components are absent on site. No permanent streams.

Species Credit Species	Habitat components and geographic limitations	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Tumut Grevillea *Grevillea wilkinsonii*		High sensitivity to potential gain	Critically Endangered	Endangered	Grassland and eucalyptus woodland.	Included	Habitat components in Zone 2- 266 Derived Grassland. Excluded from Zone 1, 3 and 4 due to disturbed and modified understory.
Small Purple-pea *Swainsona recta*		High sensitivity to potential gain.	Endangered	Endangered	Grassland and eucalyptus woodland.	Included	Habitat components in Zone 2- 266 Derived Grassland. Excluded from Zone 1, 3 and 4 due to disturbed and modified understory.
Silky Swainson-pea *Swainsona sericea*		High sensitivity to potential gain.	Vulnerable	Not Listed	Grassland and eucalyptus woodland.	Included	Habitat components in Zone 2- 266 Derived Grassland. Excluded from Zone 1, 3 and 4 due to disturbed and modified understory.
Pink tailed legless lizard	Rocky areas, within 50m of rocky areas	High sensitivity to	Vulnerable	Vulnerable	Rocky areas.	Included	Areas of Zone 1 and Zone 2 with suitable

Species Credit Species	Habitat components and geographic limitations	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Aprasia parapulchella		potential grain					rocky habitat.
Striped legless Lizard *Delmar impar*		Moderate Sensitivity to Potential Gain	Vulnerable	Vulnerable		Excluded	Outside known or predicted geographical location (DSEWPC, 2011)
Koala *Phascolarctos cinereus* (Breeding)	Areas identified via survey as important habitat.	High sensitivity to potential grain	Vulnerable	Vulnerable	Eucalyptus woodland.	Included	Habitat components in Zone 1.
Grey-headed Flying Fox (Breeding) *Pteropus poliocephalus*	Breeding camps.	High sensitivity to potential gain/	Vulnerable	Vulnerable.	No breeding habitat on site.	Excluded.	No suitable breeding habitat comments present on site. No Flying Fox Camps identified on site.
Large Bent-winged Bat *Miniopterus orianae oceanensis*	Caves, tunnels, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code “IC – in cave observation type code” E nest-roost with numbers of individuals >500.	Very High Sensitivity to Potential Gain	Vulnerable	Not Listed	Absent	Excluded	No suitable habitat including caves, tunnels, mines, culverts present on site.
Squirrel Glider *Petaurus norfolcensis*		High sensitivity to potential	Vulnerable	Not Listed	Hollow bearing trees.	Included.	Habitat components present on site in all zones.

Species Credit Species	Habitat components and geographic limitations	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
		gain					
Brush-tailed Rock Wallaby *Petrogale penicillata*	Land within 1km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines.	High sensitivity to potential gain.	Endangered	Vulnerable	Rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops.	Included.	Habitat components present on site in all zones.
Brush-tailed Phascogale *Phascogale tapoatafa*		High sensitivity to potential gain.	Vulnerable	Not Listed	Hollow bearing trees, eucalyptus woodland.	Included	Habitat components in Zone 1 -Woodland habitat.
Eastern Pygmy-possum *Cercartetus nanus*	Associated with PCT 277.	High sensitivity to potential gain.	Vulnerable	Not listed	Hollow bearing trees, eucalyptus woodland.	Excluded	Zone 4 PCT 277 does not include suitable habitat for this species due to the highly disturbed and isolated nature of habitat.
Regent Honeyeater *Anthochaera phrygia* (Breeding)		High sensitivity to potential grain	Critically Endangered	Critically Endangered	Eucalyptus woodland.	Excluded	No mapped important areas.
Bush Stone-curlew *Burhinus grallarius*	Fallen/standing dead timber including logs.	High sensitivity to potential grain.	Endangered	Noted Listed	Fallen/standing dead timber including logs.	Included	Habitat components in all zones.

Species Credit Species	Habitat components and geographic limitations	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Glossy Black-Cockatoo *Calyptorhynchus lathami* *(Breeding)*	Hollow bearing trees, Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground.	High sensitivity to potential grain.	Vulnerable	Noted Listed	Hollow bearing trees, Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground.	Included	Habitat components in all zones.
White-bellied Sea-eagle (Breeding) *Haliaeetus leucogaster*	Living or dead mature trees within suitable vegetation within 1km of a river, lake, large dam or creeks, wetland, and coastlines.	High sensitivity to potential grain.	Vulnerable	Noted Listed	Suitable breeding habitat absent.	Included	Minor habitat components on site.
Little Eagle *Heiraaetus morphnoides* (Breeding)	Nest trees – live (occasionally dead) large old trees within vegetation.	Moderate sensitivity to potential gain.	Vulnerable	Noted Listed	Nest trees – live (occasionally dead) large old trees within vegetation.	Included	Habitat components on site.
Swift Parrot (Breeding) *Lathamus discolor*		Moderate sensitivity to potential gain.	Endangered	Critically Endangered	Eucalyptus woodland.	Excluded	Not within mapped important area, no breeding mainland Australia. Excluded in all zones.
Square-tailed Kite *Lophoictinia isura*	Nest trees	Moderate sensitivity to potential gain.	Vulnerable	Noted Listed	Nest trees. Eucalyptus woodland.	Included.	Habitat components in Zone 1 and 4.
Barking Owl	Hollow bearing trees, living or dead	High	Vulnerable	Noted	Hollow bearing trees, living	Included.	Habitat components

Species Credit Species	Habitat components and geographic limitations	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Ninox connivens (Breeding)	trees with hollows greater than 20cm in diameter and greater than 4m above the ground.	sensitivity to potential gain.		Listed	or dead trees with hollows greater than 20cm in diameter and greater than 4m above the ground.		in Zone 1,2 and 4.
Superb Parrot *Polytelis swainsonii* (Breeding)	Hollow bearing trees, Living or dead E. *blakleyi, E melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5cm diameter greater than 4m above ground or trees with a DBH greater than 30cm.	High sensitivity to potential gain.	Vulnerable	Vulnerable	Hollow bearing trees, Living or dead *E melliodora, E. albens*, with hollows greater than 5cm diameter greater than 4m above ground or trees with a DBH greater than 30cm.	Included.	Habitat components in Zone 1,2 and 4.
Masked Owl *Tyto novaehollandiae* (Breeding)	Hollow bearing trees, living or dead trees with hollows greater than 20cm diameter.	High sensitivity to potential gain.	Vulnerable	Not Listed	Hollow bearing trees, living or dead trees with hollows greater than 20cm diameter.	Included.	Habitat components in Zone 1,2 and 4.
Gang-gang Cockatoo *Callocephalon fimbriatum* (Breeding)	Hollow bearing trees, Eucalypt tree species with hollows greater than 9cm in diameter.	High sensitivity to potential gain.	Vulnerable	Not Listed	Hollow bearing trees, Eucalypt tree species with hollows greater than 9cm in diameter.	Included.	Habitat components in Zone 1,2 and 4.
Large -eared Pied Bat *Chalinolobus dwyeri*	Cliffs Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or	Very High Sensitivity to Potential Gain SAII	Vulnerable	Vulnerable	Foraging habitat including Eucalyptus present.	Included	Surrounding landscape may have rocky areas or other suitable breeding roosting habitat

Species Credit Species	Habitat components and geographic limitations	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
	tunnels						features. Included in associated habitat- Zone 4 PCT 277.
Small Scurf-Pea *Cullen Parvum*		High sensitivity to potential gain.	Endangered	Not listed	Absent	Included	Habitat components in Zone 2- 266 Derived Grassland. Excluded from Zone 1, 3 and 4 due to disturbed and modified understory.
Tarengo Leek Orchid *Prasophyllum petilum*	East of Binalong and South and east of Boorowa	Moderate Sensitivity to Potential Gain	Endangered	Endangered	Grassy Woodlands	Excluded	Outside geographical restrictions. Site occurs west of Binalong and Boorowa.
Golden Sun Moth *Synemon plana*	Wallaby grass (*Rytidosperma sp*) Chilean needlegrass (*Nassella nessiana*) or Serrated Tussock (Nassella trichotoma).	High sensitivity to potential gain.	Endangered	Critically Endangered	Absent.	Excluded.	Outside geographical restrictions. Not located within 15km of Tumut.

4.2.2 Inclusions based on habitat features

The BAM-C predicted the species credit species listed to occur at the development site. As per the BAM Operational Manual - Stage 1, an assessor must consider species recorded on or near the subject land even if they are not predicted by the BAM-C. Within 10 km of the development site, BioNet contains records of the following NSW threatened species:

- Barking Owl *Ninox connivens*
- Black Falcon *Falco subniger*
- Black-chinned Honeyeater (eastern subspecies) *Melithreptus gularis gularis*
- Blue-billed Duck *Oxyura australis*
- Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae*
- Diamond Firetail *Stagonopleura guttata*
- Dusky Woodswallow *Artamus cyanopterus cyanopterus*
- Gang-gang Cockatoo *Callocephalon fimbriatum*
- Large Bent-winged Bat *Miniopterus orianae oceanensis*
- Little Eagle *Hieraaetus morphnoides*
- Scarlet Robin *Petroica boodang*
- Speckled Warbler *Chthonicola sagittate*
- Spotted-tailed Quoll *Dasyurus maculatus*
- Superb Parrot *Polytelis swainsonii*
- Varied Sittella *Daphoenositta chrysoptera*
- Yass Daisy *Ammobium craspedioides*

Only one BioNet recorded species was not present in the ecosystem or candidate species list, this was the Blue-billed Duck (*Oxyura australis*). This species requires the presence of aquatic habitat for foraging and breeding. No suitable foraging or breeding habitat is present within the development site. No additional species have been included.

4.2.3 Candidate species requiring confirmation of presence or absence

The species listed in Table 4-3are those considered to have habitat present within the development site. Targeted surveys have been used to assess each species as summarised below where the survey window allowed. Details of the survey methodologies and results are provided for each surveyed species with locations shown in Figure 4-1 and survey effort and results detailed in Table 4 3. All species in bold are likely to be impacted or cannot be ruled out due to inappropriate survey window or inability to survey.

Table 4-3 List of species credit species requiring assessment.

Species Credit Species	Biodiversity risk weighting	Assumed to occur/survey/ expert report	Present on site?	Species polygon area or count
Fauna				
Reptiles				
Pink tailed legless lizard *Aprasia parapulchella*	High (2)	Survey period September – November. Surveys completed Surveyed 6th - 9th October, 2nd - 3rd December.	No	
Mammals				
Koala *Phascolarctos cinereus*	High (2)	Survey period January – December. Surveyed 25th - 26th August. Opportunistic surveys 6th - 9th October, 2nd - 3rd December.	No	
Grey-headed Flying Fox (foraging) *Pteropus poliocephalus*		Survey period October – December. Surveyed 6th - 9th October, 2nd - 3rd December.	No	
Large-eared Pied Bat *Chalinolobus dwyeri*	Very High (3)``	Assumed foraging habitat in 277. No targeted surveys completed.	Yes	0 (Outside disturbance footprint)
Squirrel Glider *Petaurus norfolcensis*	High (2)	Survey period January – December. Surveyed 6th - 9th October, 2nd - 3rd December.	No	
Brush-tailed Rock Wallaby *Petrogale penicillata*	Very high (3)	Survey period January – December. Surveyed 25th - 26th August, 6th - 9th October and 2nd - 3rd December.	No	
Brush-tailed Phascogale *Phascogale tapoatafa*	High (2)	Assumed Presence	Yes- assumed present	Vegetation Zone 1- 6.83 ha
Aves				
Bush Stone-curlew *Burhinus grallarius*	High (2)	Survey period January – December. Surveyed 25th - 26th August, 6th - 9th October and 2nd - 3rd December.	No	

Species Credit Species	Biodiversity risk weighting	Assumed to occur/survey/ expert report	Present on site?	Species polygon area or count
Glossy Black-Cockatoo *Calyptorhynchus lathami*	High (2)	Survey period April – August. Surveyed 25th and 26th August	No	
Little Eagle *Heiraaetus morphnoides*	Moderate (1.5)	Survey period August – October. Surveyed 25th - 26th August, 6th – 9th October.	No	
Square-tailed Kite *Lophoictinia isura*	Moderate (1.5)	Survey period September – January. Surveyed 6th - 9th October and 2nd – 3rd December.	No	
Barking Owl *Ninox connivens*	High (2)	Survey period March – December. Surveyed 25th - 26th August. Opportunistic surveys on 6th - 9th October, 2nd - 3rd December.	No	
Superb Parrot *Polytelis swainsonii*	High (2)	Survey period September – November. Surveyed 6th - 9th October.	No	
Masked Owl *Tyto novaehollandiae*	High (2)	Survey period May – August. Surveyed 25th - 26th August	No	
FLORA				
Ausfelds Wattle *Acacia ausfeldii*	High (2)	Survey period August – October. Surveyed 25th - 26th August and 6th - 9th October.	No	
Yass Daisy *Ammobium craspedoides*	High (2)	Survey period September – November. Surveyed 6th - 9th October.	No	
Euphrasia arguta	Very High (3)	Survey period November – March. Surveyed 2nd - 3rd December.	No	
Tumut Grevillea *Grevillea wilkinsonii*	Very High (3)	Survey period October. Surveyed 6th - 9th October.	No	
Small Purple-pea *Swainsona recta*	High (2)	Survey period September – November. Surveyed 6th - 9th October.	No	
Silky Swainson-pea *Swainsona sericea*	High (2)	Survey period September – November. Surveyed 6th - 9th October.	No	

Species Credit Species	Biodiversity risk weighting	Assumed to occur/survey/ expert report	Present on site?	Species polygon area or count
Small Scurf-pea Cullen Parvum	High (2)	Assumed to occur in associated PCT 277 near Hume Highway.	No	

4.2.4 Weather

Weather conditions recorded for these dates from the Bureau of Meteorology (BOM) at the closest weather station- Burrinjuck Dam {station 073007} are presented in Table 4 4. The weather provided optimal survey conditions during August and December. The October survey period was suboptimal for nocturnal fauna surveys so additional survey was undertaken in December to increase the survey effort. Survey results and limitations are discussed in Section 4.2.5.

Table 4-4 Weather conditions during surveys (BOM, 2020)

Survey Date	Maximum temperature (°C)	Minimum temperature (°C)	Relative Humidity (RH)	Rainfall (mm) on survey date, preceding 14 days	Max wind gust (km/h)	Survey
25/08/2020	BOM Data error	BOM Data error	BOM Data error	0	BOM Data error	Flora survey
26/08/2020	BOM Data error	BOM Data error	BOM Data error	0	BOM Data error	Flora survey
06/10/2020	17.5	13.0	94	13.6	Calm	Flora/Fauna survey
07/10/2020	17.5	12.3	94	5.2	Calm	Flora/Fauna survey
08/10/2020	BOM Data error	14	95	12.2	Calm	Flora/Fauna survey
09/10/2020	14.6	BOM Data error	BOM Data error	0	BOM Data error	Flora/Fauna survey
02/12/2020	25.0	13.9	52	0	6	Flora/Fauna survey
03/12/2020	27.0	15.0	85	0	Calm	Flora/Fauna survey

4.2.5 Candidate species survey methods and results

Methodology for targeted surveys is detailed below and illustrated in Figure 4-1. Refer to Table 4-3 for specific survey period requirements for each species.

Diurnal avian fauna (Gang-gang Cockatoo, Superb Parrot, Glossy Black-Cockatoo, Little Eagle, White-bellied Sea Eagle)

Two avian surveys were carried out by a qualified ecologist on each day of each survey to increase survey effort from the 25th – 27th August 2020, 6th - 9th October 2020 and 2nd – 3rd December 2020.

The avian surveys were conducted over 20 minutes from survey points. Survey points were determined in the field to represent coverage of avian habitat features within the development site. These generally occurred within woodland areas with a clear view of the surrounding habitat. All fauna species observed by sight and avian songs/calls were recorded.

The August and December surveys were completed in calm weather conditions, with no adverse weather conditions such as rain, extreme hot or cold temperatures or high wind. During the August and October survey periods fauna were observed as active within the site. October surveys were completed within overcast and raining conditions, fauna were less active during this time period however a number of common species were still observed between rainfall during the day. Diurnal avian surveys within the October survey period were conducted during optimal times when rain was not falling.

The targeted threatened species during all three survey periods were the Gang-gang Cockatoo, Glossy Black-Cockatoo, Little Eagle and Square-tailed Kite as well as any other threatened species that may utilise the site.

The Gang-gang Cockatoo nests in hollows with a DBH of 10cm or larger at least 9m from the ground within eucalyptus woodland. Habitat within the development site is suitable for this species.

The Square-tailed Kite and Little Eagle utilise stick nests for breeding. The Square-tailed Kite usually builds stick nests near water courses, it is unlikely they would utilise the development site for breeding given the distance from perennial watercourses within the landscape. Their breeding period is July to February. The Little Eagle builds their nest in winter, breeding August to October, young are raised in spring and summer. Habitat for this species includes eucalypt woodland. Habitat for the Little Eagle is present within the development site.

The Superb Parrot breeding season is between September and December, within colonies or individually. In the region of the development site this species is known to prefer nesting sites within River Red Gum (Eucalyptus camaldulensis) along the Murrumbidgee River (Baker Gabb, 2011). The woodland and Hollow-bearing trees (HBTs) within the development site are not likely to be preferred breeding habitat for this species. However, the habitat would be considered suitable foraging habitat for this species.

Glossy Black-Cockatoo prefer foraging and nesting habitat near water, this species flocks to water sources at the end of each day to drink. Glossy Black-cockatoos nest in large hollows (>15cm Diameter) in dead and living eucalyptus trees. Habitat within the development site would be suitable for this species given the presence of farm dams within the landscape and suitable breeding hollows within the development site. This species feed predominantly on casuarina seeds; these were not present within the development site (OEH, 2018). Therefore, foraging habitat is not likely to be suitable. Glossy Black-Cockatoo breeds between March and May.

The White-bellied Sea-Eagle frequents areas adjacent to large waterbodies as their diet consists predominantly of freshwater fauna species (Fish, turtles, waterbirds). Terrestrial breeding habitat for this species usually occurs close to large bodies of water. Breeding occurs between June and September. All woodland areas within the development site were surveyed for stick nests. All

HBTs were recorded and assessed for the presence of stick nests. No stick nests were observed within the development site.

All avian species recorded during the surveys were recorded and provided in Appendix A.3.

SURVEY RESULTS

A total of 25 avian species were recorded during the targeted fauna species. 23 of these species were recorded during the diurnal avifauna surveys. None of the species observed at the development site are listed as threatened. No targeted avian species were recorded on the site. These species were surveyed during the appropriate survey period and are considered absent from the site. No stick nests were observed in any trees. Therefore, the site is currently not being utilised by Little Eagle or Square-tailed Kite for breeding. No threatened avian species polygons have been mapped for the development site (Figure 4-1).

Nocturnal avifauna (Bush Stone Curlew, Barking Owl, and Masked Owl)

SURVEY EFFORT

A survey of all the hollow bearing trees was undertaken for the presence and potential use by forest owls. The DBH (Diameter at Breast Height), tree species, estimated height and size of the hollows was recorded. Call playback and spotlighting for each of the forest owls was completed to detect presence during their survey period (25th – 27th of August, 2020).

There is a large number of logs and fallen timber in the woodland area within the development site suitable for Bush Stone Curlew. To determine the presence/absence for the Bush Stone Curlew, Call Play back and spotlighting was completed during the August (25th – 27th) survey period at the same time as the Owl Surveys. Call playback for Bush Stone Curlew and Forest Owl Species call played via megaphone with a > 10-minute waiting period for each call (repeated 3 times).

No lights were used or sound made during the call play back and waiting period. Spotlighting transects were conducted on foot following call playback sessions. Spotlighting transects were conducted for 4 person hours each night.

The Stag watching was conducted during the August survey at sunset. Call playback was completed after sundown around 7pm – 8pm. Spotlighting transects were conducted from 8pm to 10pm utilising 100 watt headtorches.

Spotlighting transects without call playback were conducted during the October (6th - 9th) and December (2nd – 3rd) survey periods. Spotlighting and call playback surveys were conducted during optimal weather conditions; no spotlighting or call playback surveys were conducted during adverse weather.

Survey summary:

- August: 8 person hours call playback, stagwatch and spotlighting.
- October: 8 person hours spotlighting.
- December: 4 person hours spotlighting.

SURVEY RESULTS

From the 25 avian species recorded during the targeted fauna species, two of these species were recorded during the nocturnal surveys. None of the species observed at the development site are listed as threatened. No targeted avian species were recorded on the site. These species were

surveyed during the appropriate survey period and are considered absent from the site. No threatened avian species polygons have been mapped for the development site.

Mammals (Brush-tailed Rock Wallaby, Squirrel Glider, and Koala)

SURVEY EFFORT

The spotlighting of the canopy trees during the spotlighting effort (refer to Nocturnal avifauna) included survey efforts for the Squirrel Glider. Spotlighting methodology is described above in Nocturnal avifauna, and spotlighting summary is as follows:

- August: 8 person hours call playback, stagwatch and spotlighting.
- October: 8 person hours spotlighting.
- December: 4 person hours spotlighting.

Suitable habitat for the Brush-tailed Rock Wallaby occurred within the development site on Mt Bundarbo, where rocky escarpments and woodland on slopes is present. HBTs within the development site are suitable for the Squirrel Glider. Open eucalyptus woodland is suitable for Koala foraging and breeding. All species have the potential to breed and forage within the development site.

Further searches for the evidence of koala's presence on the development site included the spot assessment technique (SAT) searching a specific area at the base of trees for koala scats to determine the usage of particular trees by Koala. All trees within the development site were assessed for the presence of Koalas or for the evidence of Koala presence. Walked diurnal surveys were completed over each survey period (August, October and December) for the assessment of vegetation. These surveys were utilised for targeted surveys of diurnal terrestrial mammal species. Four diurnal mammal species were observed:

- Common Wallaroo.
- Eastern Grey Kangaroo.
- European Hare.
- European Rabbit.

SURVEY RESULTS

No mammals were observed during the August spotlighting survey. Eight Common Brush-tailed Possums (*Trichosurus vulpecula*) and five Ring-tailed Possums *(Pseudocheirus peregrinus*) were observed during the October spotlighting survey. five Black Rat (*Rattus rattus*), 6 Common Brush-tailed Possums and four Ring-tailed Possums were recorded during the December spotlight survey. A total of seven mammal species were recorded during the targeted fauna species. Three of these species were recorded during the nocturnal surveys. None of the species observed at the development site are listed as threatened. No targeted avian species were recorded on the site. These species were surveyed during the appropriate survey period and are considered absent from the site. No threatened mammal species polygons have been mapped for the development site for the:

- Brush-tailed Rock Wallaby.
- Squirrel Glider.
- Koala.

The Koala SAT tree results were completed by assessing all trees. No trees were found to have scratches. Common Brush-tailed Possum scat was observed at a number of HBTs. No Koalas were observed within any of the trees in the development site.

Brush-tailed Phascogale

Brush-tailed Phascogale was unable to be surveyed for during the assessment phase. Resourcing constraints and survey effort required under the newly released Guidelines made survey prohibitive. Preliminary communication with the species expert Dr Rodney van der Ree (from WSP) indicated that the habitat would unlikely be degraded enough to rule out presence of the species without further investigation. A quote was sought from WSP to complete the next stage of targeted surveys for the Brush-tailed Phascogale but due to the limitations and the likelihood of species presence, the species was determined to be assumed presence. Assumed presence for the Brush-tailed Phascogale was based on the following:

- Low population densities, large home range size, annual male die-off and fluctuating local abundance make Brush-tailed Phascogales difficult to detect reliably (Bionet, 2020).
- Communication with Species Expert Dr Rodney van der Ree indicated Brush-tailed Phascogale can occur in disturbed agricultural landscapes across large home ranges making detectability through survey difficult.
- As a precautionary approach the species was assumed present due to the large number of fallen timber and hollow bearing trees present in the development site.

Absence could not be ruled out through survey effort, the Brush-tailed Phascogale was assumed to be present within associated habitat in accordance with the BAM. A species polygon has been mapped within areas of PCT 266-Exotic understory (Zone 1) for this species.

Threatened Flora (Small Purple Pea, Silky Swainson Pea, Ausfelds Wattle, Yass Daisy, Euphrasia arguta, Tumut Grevillea)

SURVEY EFFORT

Flora transects were conducted during each survey period, 25th – 27th August 2020, 6th- 9th October 2020 and 2nd – 3rd December 2020. Transects were conducted for targeted flora species based on identified areas of suitable habitat within the development site. Flora transects were conducted each day of each survey period. Transects were conducted with two suitably qualified ecologists walking around 10m apart for 200+ metres within areas of suitable habitat in derived grassland.

Given the woodland areas of the development site were significantly degraded, the random meander method was used to survey woodland areas. Derived grassland areas within the development site contained suitable habitat for all targeted species. The majority of native grasses in derived grassland habitat were disturbance tolerant species including *Austrostipa scabra.* Woodland areas within the development site did not contain suitable habitat for Euphrasia arguata.

SURVEY RESULTS

No threatened flora were observed during either site visit. None of the flora species observed at the development site are listed as threatened. Targeted species were surveyed during the appropriate survey period and are considered absent from the site. No threatened flora species polygons have been mapped for the development site.

Threatened Reptiles (Pink-tailed legless Lizard)

SURVEY EFFORT

Targeted surveys for this species were conducted during the 7th-9th October 2020 and 2nd – 3rd December 2020 in accordance with the Survey guidelines for Australia's threatened reptiles (Australian Government 2011). Suitable habitat included loosely or slightly embedded rocks located in the development site. These rocks were turned by ecologists whilst walking in transects in the development site. The survey effort was concentrated to the exposed rock areas of Mt Bundarbo within the development site. The majority of the rock environment on the higher elevations of Mt Bundarbo included heavily embedded rocks which were unable to be turned and deemed unsuitable for the species, therefore the lower elevations on slopes tended to have more suitable rocks for turning. On average 300 rocks were turned each survey day by each ecologist over 3 full days. It is estimated that between both survey periods, up to 1800 rocks were turned within the development site.

Survey effort summary:

- October: 28 person hours of targeted rock turning (two days for two ecologists)
- December:16 person hours (one day for two ecologists)

SURVEY RESULTS

No threatened reptiles were recorded in all survey attempts. The survey transects were completed during optimal weather conditions in Spring after rainfall and early summer before before the temperature exceeded optimum survey suitability.

4.2.6 Further Survey Recommendations

No further targeted surveys are required. For threatened species that were outside of the preferred survey months, these species were assumed present and offset under BAM-C.

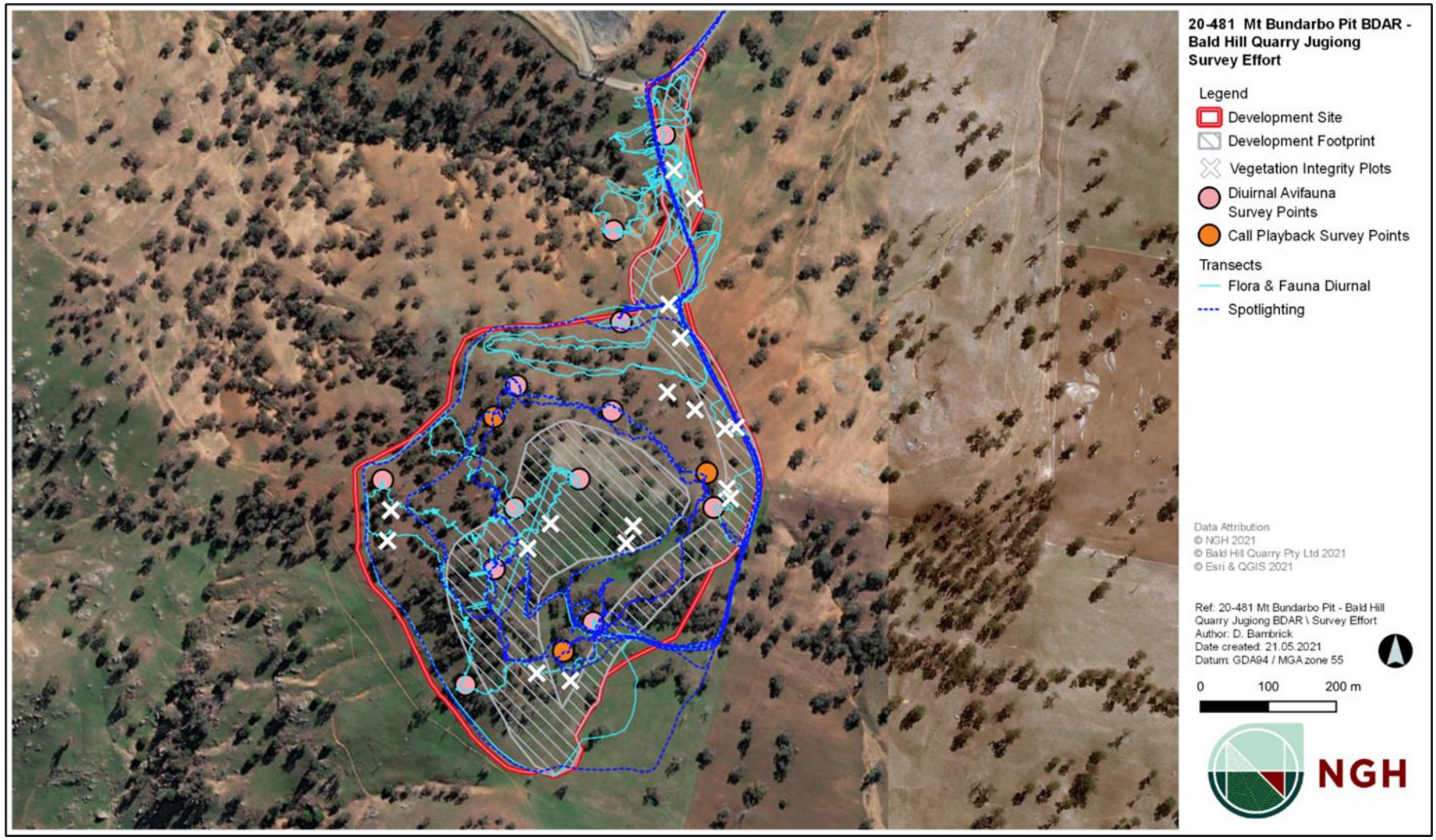

Figure 4-1 Survey effort and targeted survey locations, Mt Bundarbo.

*Note data loss regarding transect records occurred during the field surveys, therefore the entire track log effort is not represented on this map.

Figure 4-2 Survey effort and targeted survey locations, Hume Highway

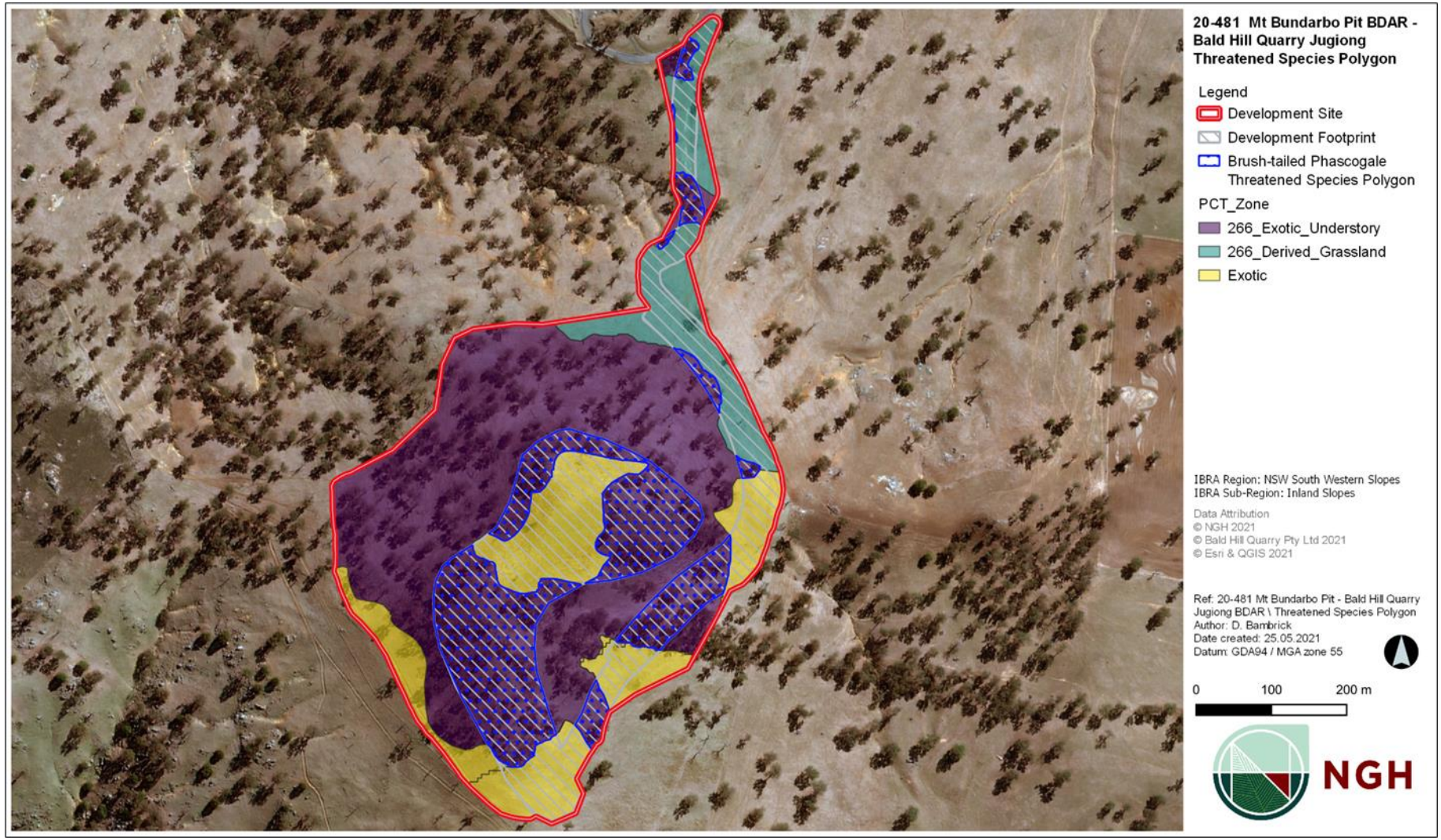

Figure 4-3 Threatened species polygon

4.3 Additional habitat features relevant to prescribed biodiversity impacts

4.3.1 Occurrence of Karst, caves, crevices and cliffs

As verified by the field inspection, there are no occurrences of karst, caves, crevices, or cliffs in the development site. No areas directly adjacent to the development site were noted as containing of karst, caves, crevices, or cliffs.

4.3.2 Occurrences of rock

The development site is located on Mt Bundarbo, where basalt rock occurs. Partially buried rocks, boulders and shale occur alongside surface rocks. Rocky outcrops, partially buried rocks and exposed rocks occur throughout the study area.

4.3.3 Occurrences of human made structures and non-native vegetation

As verified by the field inspection, there are two human made structures within the development site. These include the trigonometric station and man-made rock stacks. Directly adjacent to the trigonometric station is the original trigonometric station base made of stacked rocks from the surrounding landscape. Rocks were stacked in approximate lines to represent the crown land boundary.

No buildings occur within or adjacent to the development site.

4.3.4 Hydrological processes that sustain and interact with the rivers, streams and wetlands

As noted in section 2.5, no dams, rivers, streams or wetlands occur within the development site. However, given the elevation of the development site there is a potential that drainage of surface water from the development during rainfall events is likely to flow into watercourses situated within the surrounding landscape. Therefore, the development site may form part of a natural drainage system of water within the landscape.

5. Matters of national environmental significance

An EPBC Act Protected Matters report was undertaken on the 16th of November 2020 (10km buffer of the development site) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the development site (refer to Table 5-1), these include:

- Wetlands of International Importance – 4.
- Threatened Ecological Communities – 3.
- Threatened species – 31.
- Migratory species – 11.

The potential for these MNES to occur at the development site are discussed below.

5.1 Wetlands of international importance

Four wetlands of international importance were returned from the Protected Matters Report, these were:

- Banrock station wetland complex – 700-800km downstream.
- Hattah-Kulkyne lakes – 500-600km downstream.
- Riverland 600-700km downstream.
- The Coorong, and Lakes Alexandrina and albert wetland 700-800km downstream

The Murrumbidgee River is around 2km south-west of the development site. There is no indication that the proposed works would impact wetland of international importance.

5.2 Threatened ecological communities

Three (3) Threatened Ecological Communities (TECs) were returned from the Protected Matters Report. One of these TECs has characteristics present in the development site.

The presence of White Box and derived grassland indicates the potential for the federally listed critically endangered community White Box – Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grassland to occur.

As assessment was undertaken of PCT 266 and PCT 277 to determine if either PCT meets the key diagnostic characteristics and minimum condition thresholds of the EPBC Act listed community. A site assessment confirmed that PCT 266 and PCT 277 do not contain sufficient perennial native vegetation cover (≥50%) to be considered part of the EPBC Act listed TEC.

No federally listed TECs are considered to occur within the development site.

5.3 Threatened species

The following threatened species were considered to potentially occur in the development site by the Protected Matters Search Tool. 10 birds, 3 fish, 2 frogs, 1 insect, 6 mammals, 2 reptiles, and 7 plant species were listed (Table 5-1).

A habitat evaluation has been completed in Appendix F.

Table 5-1 Threatened Species listed in Protected Matters Search

Common Name	Scientific Name	EPBC Act Status
Birds		
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered
Australasian Bittern	*Botaurus poiciloptilus*	Endangered
Curlew Sandpiper	*Calidris ferruginea*	Critically Endangered
Grey Falcon	*Falco hypoleucos*	Vulnerable
Painted Honeyeater	*Grantiella picta*	Vulnerable
White-throated Needletail	*Hirundapus caudacutus*	Vulnerable
Swift Parrot	*Lathamus discolor*	Critically Endangered
Eastern Curlew	*Numenius madagascariensis*	Critically Endangered
Superb Parrot	*Polytelis swainsonii*	Vulnerable
Australian Painted Snipe	*Rostratula australis*	Endangered
Fish		
Trout Cod	*Maccullochella macquariensis*	Endangered
Murray Cod	*Maccullochella peelii*	Vulnerable
Macquarie Perch	*Macquaria australasica*	Endangered
Frogs		
Sloane's Froglet	*Crinia sloanei*	Endangered
Booroolong Frog	*Litoria booroolongensis*	Endangered
Insects		
Golden Sun Moth	*Synemon plana*	Critically Endangered
Mammals		
Large-eared Pied Bat	*Chalinolobus dwyeri*	Vulnerable
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	Endangered
Corben's Long-eared Bat	*Nyctophilus corbeni*	Vulnerable
Greater Glider	*Petauroides volans*	Vulnerable
Koala	*Phascolarctos cinereus*	Vulnerable
Grey-headed Flying Fox	*Pteropus poliocephalus*	Vulnerable
Plants		
Yass Daisy	*Ammobium craspedoides*	Vulnerable
River Swamp Wallaby Grass	*Amphibromus fluitans*	Vulnerable
Crimson Spider-orchid	*Caladenia concolor*	Vulnerable
Cotoneaster Pomaderris	*Pomaderris cotoneaster*	Endangered
Tarengo Leek Orchid	*Prasophyllum petilum*	Endangered
Small Purple-pea	*Swainsona recta*	Endangered
Austral Toadflax	*Thesium australe*	Vulnerable
Reptiles		
Pink-tailed Worm-lizard	*Aprasia parapulchella*	Vulnerable

Common Name	Scientific Name	EPBC Act Status
Striped Legless Lizard	*Delma impar*	Vulnerable

5.4 Potential Koala Habitat

Habitat for Koalas within the development site was considered moderate potential due to the connectivity features in the landscape.

The EPBC Referral Guidelines for the Koala (DoE 2014) documents the 'Koala habitat assessment tool' to assist proponents in determining if a proposal may impact on habitat critical to the survival of the Koala. The tool is provided as Table 5-2 below as it applies to the proposal. Impact areas that score five or more using the habitat assessment tool contain habitat critical to the survival of the Koala.

The assessment in (Table 5-2) resulted in a score of 5, and so habitat within the study area is considered to be critical to the survival of the Koala. Given there is moderate connectivity in the landscape however woodland is of low condition and sparsely distributed a precautionary approach was taken for habitat connectivity. Targeted surveys were completed in accordance with the BAM and Koalas were not identified on three survey attempts.

An assessment of significant impact according to the EPBC Act significant impact criteria has been completed in Appendix G.

Table 5-2 Koala habitat assessment tool for inland areas (DoE 2014)

Attribute	Score	Inland	Applicable to the proposal?
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.	
	0 (low)	None of the above.	✓ No records of Koala within 10km of the development site. Koala not detected during site surveys.
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, **OR** 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	✓ White Box (*Eucalyptus albens*) food tree species in the South Western Slopes Bioregion
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.	

Attribute	Score	Inland	Applicable to the proposal?
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	✓ Development site part of moderately connected landscape
	+1 (medium)	Area is part of a **contiguous landscape** < 1000 ha, but ≥ 500 ha.	
	0 (low)	None of the above.	
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, **OR** Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.	
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, **OR** Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	✓ No Koala mortality observed during the survey
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	

Attribute	Score	Inland	Applicable to the proposal?
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	✓ Study area is not considered a habitat refuge nor does it provide important connectivity to large areas surrounding a habitat refuge
Total	**5**	**Decision: Habitat critical to the survival of the Koala—Assessment of Significance completed.**	

5.5 Migratory species

Fourteen listed migratory species were returned from the protected matters report. None of these species are considered to have the potential to occur at the development site. 1 migratory marine bird, 4 migratory terrestrial birds, and 6 migratory wetland bird species were listed. These birds are mainly coastal species which would not be impacted by the proposed development, therefore a low likelihood of occurring on site. Marine migratory fauna has been excluded as it would not be impacted by the proposed development. No suitable habitat for breeding or foraging was identified within the development site for migratory species.

6. Avoid and minimise impacts

6.1 Avoiding and minimising impacts on native vegetation and habitat

6.1.1 Site selection – consideration of alternative locations/routes

The development site is zoned RU1 – primary production. 8.91 ha of native vegetation would be removed by the proposed works. The proposed works are restricted to suitable basalt caps within the locality. The development site is already owned by the proponent, where other potentially suitable sites within the region are not. Access to the development site has already been developed from previous works by the proponent. No other sites owned by the proponent are suitable for the proposed works.

As part of this development proposal, it is not possible to avoid impacts on native vegetation and habitat within the subject land. However, all vegetation has been assessed under BAM and ecosystem credits and species credits generated to appropriately offset the impacts.

- Measures to minimise impacts on native vegetation and habitat include:
- Environmental, sediment and erosion control measures.
- Fauna management during vegetation clearance and construction.
- Fauna surveillance prior to vegetation removal.
- Assessment of impacts on threatened entities and the likelihood of their occurrence on site.
- Retirement of offsets as set under the BAM.
- Biodiversity Stewardship Site Assessment Report (BSSAR) for potential Stewardship Site establishment.

Mitigation measures have been included in more detail in Section 7.

6.1.2 Proposal planning phase – detailed design

During the assessment phase of the proposal there have been a number of design iterations. The footprint has been reduced from 9.22 ha of impacts to woodland vegetation to 6.83 ha (PCT 266 Vegetation Zone 1) as a measure to reduce impacts to biodiversity.

A commitment of the proposal design has been to include rehabilitation at operational closure where practicable. A conservation set aside area is also being considered as an additional measure by the proponent.

Benefits of the proposed rehabilitation works would include:

- Revegetated areas would reintroduce habitat and foraging resources back into the landscape.
- The water collected and pumped from the sediment basin would be used for filling farm dams for the landholder to use for watering stock.
- Land within the footprint would be returned to agricultural production.
- A constructed and maintained road would be available for the landholder to use.

7. Impacts unable to be avoided

7.1 Direct impacts

The construction and operational phases of the proposal have the potential to impact biodiversity values at the site that cannot be avoided. This would occur through direct impacts such as habitat clearance and installation and existence of infrastructure.

7.1.1 Changes in vegetation integrity scores

The changes in the vegetation integrity scores for the four zones is zero from the removal of vegetation. The assumed vegetation integrity scores are below in Table 7 1.

Table 7-1 Current and future vegetation integrity scores for each zone within the development site

Zone ID	PCT/Zone	TEC and/or threatened species habitat	Area (ha)	Area impacted (ha)	Current Vegetation Integrity Score	Future vegetation integrity score
1	266_Exotic understory	BC Act	20.03	6.83	20.4	0
2	266_Derived_Grassland	BC Act	3	2.08	1.3	0
5	277_Exotic understory (Benchmark data)	BC Act	0.05	0	99.3	99.3

7.1.2 Loss of species credit species habitat of individuals

The loss of species credit species habitat or individuals as a result of clearing is documented within Table 7 2. The Brush-tailed Phascogale was assumed to be present in Vegetation Zone 1 (PCT 266_Exotic). The Superb Parrot was recorded within 2km of the development site however was not recorded breeding or foraging within the development site in all surveys. Therefore, this species has not been included as a species credit species requiring offset. Foraging habitat for Superb Parrot would be offset as part of the ecosystem credits for the proposal. All other species were surveyed for and found not to be present on site.

Species Polygons are shown within Figure 4-1and Figure 10-1.

Table 7-2 Summary of species credit species loss at the development site.

Species credit Species	Biodiversity Risk Rating	Area of habitat or count of individuals lost.
Brush-tailed Phascogale *Phascogale tapoatafa*	High (2)	6.83 ha of vegetation Zone 1 PCT 266_Exotic- Assumed presence

7.1.3. Loss of Hollow-bearing Trees

316 HBTs were recorded within the development site. Of these a total of 97 HBTs are proposed for removal and would be directly impacted by the proposal (Figure 7-1). Pre-clearance surveys would be required as part of the mitigation measures.

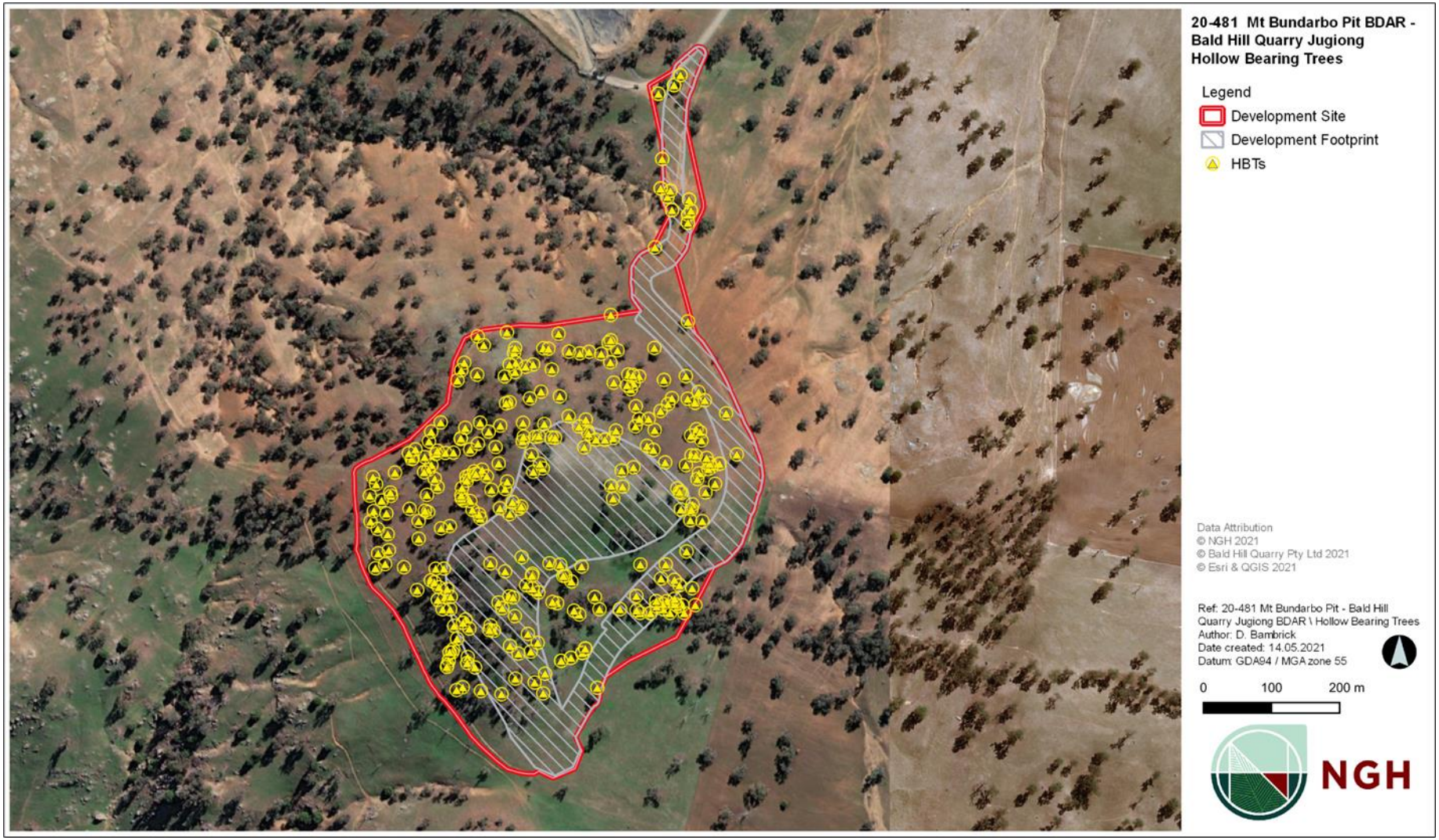

Figure 7-1 Hollow bearing trees within development site.

Figure 7-2 Hollow bearing trees in development site, Hume Highway intersection.

7.2 Indirect impacts

Indirect impacts of the proposal include soil and water contamination, creation of barriers to fauna movement, or the generation of excessive dust, light, or noise. An assessment from the proposed quarry expansion needs to consider indirect impacts on native vegetation, threatened entities and their habitat during construction and operation.

As outlined in BAM (2020) Section 8.2 (2a-2p), indirect impacts on TECs/PCTs and/or threatened species and their habitat beyond the development footprint including but not limited to:

a. ***inadvertent impacts on adjacent habitat or vegetation***
b. ***reduced viability of adjacent habitat due to edge effects***
c. ***reduced viability of adjacent habitat due to noise, dust or light spill***
d. ***transport of weeds and pathogens from the site to adjacent vegetation***
e. ***increased risk of starvation or exposure, and loss of shade or shelter***
f. ***loss of breeding habitat***
g. ***trampling of threatened flora species***
h. ***inhibition of nitrogen fixation and increased soil salinity***
i. ***fertiliser drift***
j. ***rubbish dumping,***
k. ***wood collection***
l. ***removal and disturbance of rocks, including bush rock.***
m. ***increase in predators.***
n. ***increase in pest animal populations.***
o. ***changed fire regimes.***
p. ***disturban*ce to specialist breeding and foraging habitat (e.g., beach nesting for shorebirds).**

An assessment of the indirect impacts from the proposed quarry expansion are in bold above. The indirect impact assessment in Table 7 3 details the nature, extent, frequency, timing, intensity, duration, and consequence of the direct and indirect impacts of the proposal.

Table 7-3 Potential impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)					
Inadvertent impacts on adjacent habitat or vegetation	Unknown	Rare	Construction Phase: Short-term	• Superb Parrot • Brush-tailed Phascogale	• Injury and mortality of fauna during clearing of fauna habitat and habitat trees; • Disturbance to stags, fallen timber; and • Increased edge effects.
Reduced viability of adjacent habitat due to edge effects	Unknown	Constant	Operational Phase: Long-term	• Superb Parrot • Brush-tailed Phascogale	• Reduction of connectivity between vegetation on both sides of the property. • Potential to reduce genetic diversity within fragmented populations
Reduced viability of adjacent habitat due to noise, dust, heat or light spill	Unknown	Rare	Operational Phase: Short-term	• Superb Parrot • Brush-tailed Phascogale	• May alter fauna activities and/or movements; • Loss of foraging or breeding habitat
Transport of weeds and pathogens from the site to adjacent vegetation	Unknown	Irregular	Construction & Operational Phase: Long-term	• Superb Parrot • Brush-tailed Phascogale	• Degradation of community biodiversity and integrity; a • Weed encroachment into surrounding creeks and drain lower native vegetation diversity and cover. • Weed encroachment changing ground storey cover
Increased risk of starvation, exposure and loss of shade or shelter	Unknown	Rare	Construction & Operational Phase: Long-term	• Superb Parrot • Brush-tailed Phascogale	• Loss of foraging habitat; • Exposure to predators when moving between segmented patches of vegetation.
Loss of breeding habitats	Unknown	Unknown	Construction Phase: Long- Term	• Superb Parrot • Brush-tailed Phascogale	• Loss of potential breeding habitat including fallen and hollow logs at height; • Loss of vegetation close to water: and • Increased pressure and competition for remaining HBT

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
					resources from native and exotic hollow dependent fauna
Earthworks and mobilisation of sediments	Unknown	Regular	Construction & Operational Phase: Long term	• Adjacent drainage lines	• Erosion and sediment deposition pollution on downstream habitats; and • Reduced water quality at the point of discharge into the creek
Removal and disturbance of rocks, including bush rock	Unknown	Regular	Construction & Operational Phase: Long term	• Adjacent rock areas and exposed rocks	• Loss of habitat including rock crevices, exposed rocks and protruding rocks. • No stockpiling of rocks or soil during construction and operation in adjacent vegetation or rock areas will reduce habitat loss
Increase in pest animal populations	Unknown	Regular	Construction & Operational Phase: Long term	• Superb Parrot • Brush-tailed Phascogale	• Impact these species if they come down to the ground to move from one location to another. • Increase in industrial development provides more harbour for rabbits, increase is Indian Myna populations developing in this area and competing for hollows and opportunities for foxes.
Increase in predators	Unknown	Regular	Construction & Operational Phase: Long term	• Superb Parrot • Brush-tailed Phascogale	• Increase in the presence of pest animal populations if these species come down to the ground. • Increase in industrial development provides more harbour for pest animals such as rabbits.
Rubbish dumping	Unknown	Regular	Construction & Operational Phase: Long term	• TEC • Superb Parrot • Brush-tailed Phascogale • Adjacent drainage lines	• Degradation of creek lines introducing new pathogens, reducing vegetation quality, reducing water quality. • Indirect impacts on threatened fauna and TECs from rubbish dumping.

Figure 7-3 Direct and Indirect Impacts, Mt Bundarbo

Figure 7-4 Direct and Indirect Impacts, Hume Highway

7.3 Prescribed impacts

Under Clause 6.1 of BC Regulations (2017) and Section 8.3 of the BAM (2020), additional biodiversity prescribed impacts to which the scheme applies (sections 6.3 and 6.6 (2)):

1. The impacts on biodiversity values of the following actions are prescribed (subject to subclause (2)) as biodiversity impacts to be assessed under the biodiversity offsets scheme:
   (a) the impacts of development on the following habitat of threatened species or ecological communities:
      i. karst, caves, crevices, cliffs and other geological features of significance,
      ii. rocks,
      iii. human made structures,
      iv. non-native vegetation,
   (b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,
   (c) the impacts of development on movement of threatened species that maintains their lifecycle,
   (d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),
   (e) the impacts of wind turbine strikes on protected animals,
   (f) the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

These are discussed in detail below and the necessary information required by Section 8.3 of the BAM (2020) provided.

7.3.1 The impacts of development on the following habitat of threatened species or ecological communities

The prescribed impacts of the development on the following habitat of threatened species or ecological communities are outlined below.

i. karst, caves, crevices, cliffs and other geological features of significance,

There are no occurrences of karst, caves, crevices, or cliffs in the proposed quarry development site or adjacent areas.

ii. rocks

Mt Bundarbo is basalt with partially exposed rocks, boulders and shale occurring alongside surface rocks. These rocks provide habitat for a range of fauna, in particular reptiles. Targeted fauna surveys were undertaken October 6-9 and December 2nd and 3rd for Pink-tailed legless lizard (Aprasia parapulchella). No individuals were found on site. However, fauna management is likely to be required as part of the pre-construction and this has been included in Section 8 of this report. All areas of Mt Bundarbo contained rocky habitat; rocky habitat increased in density with elevation.

iii. Human made structures

The human made structures includes the trigonometric station with man-made rock stacks. The Trigonometric station was not in sound structure and collapsing. Directly adjacent to the trigonometric station is the original trigonometric station base made of stacked rocks from the surrounding landscape. Rocks were stacked in approximate lines to represent the crown land boundary. The rock stack and trigonometric station will be deconstructed and the fauna management is likely to be required pre-construction. No buildings occur within or adjacent to the development site.

iv. non-native vegetation

The non-native vegetation includes exotic grassland (Vegetation Zone 4) which has limited foraging and/or breeding habitat for threatened species. The proposed vegetation removal is 4.00 ha.

7.3.2 The impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range

The threatened species that require connectivity of different areas of habitat at this locality includes the Brush-tailed Phascogale, Superb Parrot and the Large-eared Pied Bat. The development site forms part of a contiguous woodland landscape within the region which is a mix of PCT 266 and PCT 277 (Box-Gum Woodlands). The woodland varies in its density of coverage however is moderately connected across the landscape.

The Brush-tailed Phascogale has not been recorded within 10kms of this locality. The Brush-tailed Phascogales require hollow-bearing trees for breeding and is known to leave the tree canopy to travel to surrounding trees for breeding or move to another tree within their home range. The Brush-tailed Phascogale is assumed presence as the surveys were unable to be completed. Further survey work will be required prior to vegetation clearance with appropriate mitigation measures in place if the species is present on site. Overall, the proposal will have a negligible impact on the Brush-tailed Phascogale population within this locality (10kms). If present on site, relocation of these individuals would be required and vegetation clearance should be planned outside of breeding season (April-June).

The Superb Parrot was recorded within 2km of the development site. There were Hollow-bearing trees recorded within the development site and surrounding areas, however no Superb Parrots were nesting at the time of the surveys. The surveys were undertaken during the known breeding period. It is assumed the Superb Parrot is likely is utilise the site and surrounding locality for foraging and connecting to preferred breeding locations. However, is unlikely the removal of the Hollow-bearing trees will limit, fragment or restrict the movement of the Superb Parrot's range within the locality.

Large-eared Pied Bat requires breeding habitat within 100m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts or derelict concrete buildings. The development site is considered foraging habitat only as there are no caves, crevices cliffs etc present on site. The removal of woodland trees will not restrict the species' ability to move through the landscape to forage. Therefore, the proposal prescribed impacts are considered negligible.

7.3.3 The impacts of development on movement of threatened species that maintains their lifecycle

The Brush-tailed Phascogale, Superb Parrot and Large-eared Pied Bat are the three threatened species that require further consideration to ascertain whether the proposed development will restrict their movement to maintain their lifecycle.

The Brush-tailed Phascogale is considered unlikely to occur on site and the proposed development is unlikely to interrupt the species' breeding cycle. However, due to the presence of hollow-bearing trees and limited targeted surveys, a biodiversity management plan should include this species.

The Superb Parrot will be able to continually move through this locality as part of its breeding and foraging behaviour. Although the proposed development does remove hollow-bearing trees, no Superb Parrots were breeding in the development site and there are sufficient hollow bearing trees within the adjacent Woodlands and in the locality. The potential impacts to Superb Parrot will be if tree removal occurs during breeding season and the species is reliant on the flowering gums within the locality. Therefore, Superb Parrot should be considered in the development of the biodiversity management plan to ensure tree clearance considers the breeding cycle and movement of the species through the landscape.

The Large-eared Pied Bat does not have any breeding habitat in the development site. These species will be able to freely move through the landscape to forage and therefore able to maintain their lifecycle.

7.3.4 The impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development)

There are no water bodies within the development site. It is unlikely the proposed development will impact water quality; water bodies and hydrological processes that would impact threatened species. As part of quarry operations, mitigation measures must be in place to comply with appropriate EPA NSW standards to ensure dirty water does not leave the site. These impacts can be managed through sediment control mitigation measures.

7.3.5 The impacts of wind turbine strikes on protected animals

The proposal is to expand the quarry operations. Therefore, there is no impacts of wind turbine strikes on protected animals.

7.3.6 The impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community

It is likely vehicle traffic will increase at the location during construction and operation of the proposed quarry. Vehicle movement may increase the risk of vehicle strike on fauna but unlikely to impact the Superb Parrot and Large-eared Pied Bat. The Brush-tailed Phascogale are nocturnal and quarry operations are likely to occur during daylight. It is considered unlikely vehicle strike as a result of quarry operations will impact the Brush-tailed Phascogale. The quarry site is surrounded by country roads where common and threatened species would currently be crossing. Vehicle strike is likely for common species such as Kangaroos and Wombats. Mitigation measures as part of site management to enforce and reduce site speed limits would minimise vehicle strikes.

7.4 Impacts to Matters of national environmental significance

7.4.1 Wetlands of international importance

No wetlands of international importance would be impacted by the development. The nearest wetland of international importance occurs at the Hattah-Kulkyne Lakes 500-600km downstream of the development site.

7.4.2 Threatened ecological communities

No federally listed communities are considered to occur within the development site. See Table 3 1

PCTs 266 (including the derived grassland) and 277 did not meet the criteria for the White Box-Yellow Box-Blakely's Red Gum grassy woodlands and derived native grasslands of south-eastern Australia.

7.4.3 Threatened species

Based on a habitat assessment (Appendix F), habitat value for federally listed threatened species has been determined to be marginal at best. However ,an Assessment of Significance has been completed for the following species with potential to occur in the development site:

- Superb Parrot Polytelis swainsonii – Vulnerable
- Large-eared Pied Bat Chalinolobus dwyeri – Vulnerable
- Corben's Long-eared Bat Nyctophilus corbeni – Vulnerable
- Koala Phascolarctos cinereus—Vulnerable
- Swift Parrot Lathamus discolor—Endangered
- Spotted tail Quoll Dasyurus maculatus—Endangered

No referral is considered necessary to the Federal Department of Environment and Energy (DoEE) for threatened species.

7.4.4 Migratory species

Based on a habitat assessment (Appendix F), no federally listed migratory species are considered likely to occur on the development site.

No referral is considered necessary to the DoEE for migratory species.

7.5 Limitations to data, assumptions and predictions

The floristic plots are based on two separate site visits. Floristic surveys were undertaken in both late spring (October) and early summer (December) 2020. It is possible not all plant species were detected or that dominance of ground cover species may have varied due to seasonal and climatic constraints. In particular, inconspicuous or geophytic species which flower outside the surveyed period may not have been recorded.

Plots within Zone 2 (PCT 266_derived) produced a Vegetation Integrity Score (VIS) of 1.3, which is below the minimum VIS of 15 required for PCTs that are TECs to generate an offset obligation.

The favourable conditions and rainfall received in the winter provided suitable conditions for survey.

The calculation of hollow-bearings trees, in particular the size and number of hollows, was made from ground level. It is possible that some hollows are present that were not visible from ground level, which may result in underestimates of the number of hollows. However, the majority of the trees within the survey area were marked as hollow bearing, therefore it is likely that calculation of HBTs is of a high accuracy.

8. Mitigating and managing impacts

8.1 Mitigation measures

A general summary of the key measures required to mitigate the impacts of the proposal is provided below. Mitigation measures proposed to manage impacts, including proposed techniques, timing, frequency, responsibility for implementing each measure, risk of failure and an analysis of the consequences of any residual impacts are provided in Table 8 1.

8.1.1 Impacts from the clearing of habitats

1. Time works to avoid critical life cycle events;
2. Implement clearing protocols during tree clearing works, including pre-clearing surveys, daily surveys, HBT removal protocol and staged clearing, in the presence of a trained ecologist or wildlife handler; and
3. Relocate habitat features (fallen timber, hollow logs, rocky habitat) into retained vegetation patches.

8.1.2 Indirect impacts

1. Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed;
2. Adaptive dust monitoring programs to control air quality;
3. Environmental protocols to control water, waste, pollution and erosion into retained woodland and surrounding areas;
4. Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas; and
5. Staff training and site briefing to communicate environmental features to be protected and measures to be implemented.

8.1.3 Prescribed impacts

1. Implementation of biodiversity management plan;
2. Adaptive dust monitoring programs to control air quality;
3. Sediment barriers and spill management protocols to control the quality of water runoff from the site into the receiving environment; and
4. Enforce site speed limits to reduce impacts of vehicle strikes on threatened fauna.

8.1.4 SAII impacts (Box Gum Woodland)

1. Clearing and rehabilitation protocols to ensure the protection of SAII entities.

Table 8-1 Mitigation measures proposed to avoid and minimise impacts on native vegetation and habitat.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Displacement of resident fauna through vegetation clearing and habitat removal						
Time works to avoid critical life cycle events	• If clearing outside of this period cannot be achieved, pre-clearing surveys would be undertaken to ensure no impacts to fauna would occur (see below) • vegetation clearance should be planned outside of the breeding season of the Brush-tailed Phascogale (April-June) and Superb Parrot (Sept to November).	Construction	Regular	Contractor	Moderate	Species not detected during pre-clearing surveys may be impacted.
Implement clearing protocols during tree clearing works, including pre-clearing surveys, and staged clearing, the presence of a trained ecological or wildlife handler	• Ecologist to conduct a pre-clearing survey and pre-clearing checklist no more than 7 days prior to tree clearing. • If nesting/roosting fauna are observed during the pre-clearing survey, an ecologist or trained wildlife handler would be present during the felling of the tree to either relocate said fauna or take to nearest veterinary hospital or wildlife carer. • Pre-clearing checklist • HBT & Tree clearing procedure (Appendix DD-I	Construction	Regular	Contractor	Moderate	Species not detected during pre-clearing surveys may be impacted
Relocate habitat features (fallen timber, hollow logs, lossley embedded rocks) from within the development site	• Tree-clearing procedure including relocation of habitat features to adjacent areas of Zone 2 (derived grassland) for habitat enhancement. • Where practicable, rocks from within the impact area would be placed in adjacent	Construction	Regular	Contractor	Low	None

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	woodland and derived grassland habitat to be retained.					
Indirect impacts on native vegetation and habitat						
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	• Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing. • No stockpiling or storage within dripline of any mature trees to be retained; • In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance; and • Where trees are to be retained, an adequate protection zone (TPZ) will be provided around each tree for the duration of construction, where possible. Details for calculating TPZs are provided within *Australian Standard 4970-2009 – Protection of trees on development site*.	Construction	Regular	Contractor	Low	None
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	• Construction Environmental Management Plan will include measures to avoid noise encroachment on adjacent habitats such as avoiding night works as much as possible.	Construction	Regular	Contractor	Low	None
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	• Avoid night works; and • Direct lights away from vegetation.	Construction/Operation	Regular	Contractor	Low	None
Adaptive dust monitoring	• Daily monitoring of dust generated by	Construction	Regularly	Contractor	Moderate	Sedimentation in

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
programs to control air quality	construction activities; and • Construction would cease if dust observed being blown from site until control measures were implemented; and • All activities relating to the proposal would be undertaken with the objective of preventing visible dust emissions from the development site.					nearby ephemeral waterways and dams.
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	• Machinery would be cleaned prior to entering the site to ensure that weed seeds and propagules are not imported to the site. • Weeds shall be managed according to the requirements of the Biosecurity Act; in that they are to be disposed of at a licenced waste management facility or similar. Weeds are not to be mulched and repurposed for any landscaping use. • Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated, and reported.	Construction, Operation	Regular	Contractor	Moderate	Weed encroachment
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	• Site induction; and • Toolbox talks.	Construction	Regular	Contractor	Moderate	Impacts to native vegetation or threatened species for Staff training not being followed
Injury and mortality of fauna entering the proposal site during construction and road strike risk	• If fauna are encountered during construction, allow fauna to leave an area without intervention as much as possible. • The project manager and/or environment	Construction	Regular	Contractor	Moderate	Local decrease in fauna populations.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	manager should ensure the contact details of the animal rescue agency/wildlife care group or vet are provided to the site manager, displayed in the site office and included in the Construction Environmental Management Plan (CEMP) or other relevant management plans for the project.					
Prescribed biodiversity impacts						
Sediment barriers and spill management procedures to control the quality of water runoff released from the site into the receiving environment	• An erosion and sediment control plan would be prepared in conjunction with the final design and implemented; and • Spill management procedures would be implemented.	Construction	Regular	Contractor	Moderate	Impacts may occur to waterway if erosion and sedimentation control plan not implemented
Staff training and site briefing to communicate impacts of traffic strikes on native fauna	• Awareness training during site inductions regarding enforcing site speed limits; and • Site speed limits to be enforced to minimise fauna strike.	Construction and Operation	Regular	Contractor	Moderate	Fauna strikes from vehicles resulting in decrease of local fauna populations.
SAII Box-Gum Woodland						
Clearing and rehabilitation protocols to ensure the protection of SAII entities.	• Complete a Construction Environmental Management Plan (CEMP) to include the following: o Ensure construction site has exclusion fencing to ensure no accidental vegetation removal occurs in the adjacent Box-Gum Woodland. o Ensure no stockpiling or storage of	Construction	Regular	Contractor	Moderate	Impacts to native vegetation or threatened species for Staff training not being followed.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	equipment, soil or rubbish occurs in the adjacent Box-Gum Woodland. ○ As part of a site induction, inform construction staff these areas are exclusion zones and therefore not to be disturbed. ○ Place logs from trees that are to be removed in the development site in the woodland areas to be retained. ○ Where practicable place waste rock in scattered locations to form future rocky microhabitats in adjacent woodland and grassland areas. • Complete a Rehabilitation Plan including a Vegetation Management Plan for designated retained woodland areas (conservation set aside area) to manage: ○ Weed control. ○ Replanting or regeneration ○ Location of hollows from tree removal ○ Location of nest boxes ○ Location of logs ○ Permanent fencing to protect the retained area of Box-Gum Woodland (conservation set aside area) ○ Outline management actions and regimes ○ Enhancement through revegetation					

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	to re-plant the understory and regenerate the overstorey					
General						
Implementation of management plans.	• Preparation and implementation of a Biodiversity Management Plan (BMP). Including fauna and flora management and relevant procedures and protocols. • Preparation and implementation of Construction Environment Management Plan (CEMP). • Preparation and implementation of Rehabilitation Plan (RP).	Construction	Regular	Contractor	Moderate	Impacts to native vegetation or threatened species for Staff training not being followed

9. Serious and irreversible impact (SAII)

The principles set out in section 6.7 of the *Biodiversity Conservation Regulation 2017* are used to determine if a development will have Serious and Irreversible Impacts (SAII), where:

1. *An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because—*

it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or

it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or

it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or

the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

2. For the purpose of this clause, a decline of a species or ecological community is a continuing or projected decline in—
   a) an index of abundance appropriate to the taxon, or
   b) the geographic distribution and habitat quality of the species or ecological community.
3. *If the guidance published by the Environment Agency Head under section 6.5(2) of the Act is changed, a biodiversity assessment report may, during the period of 90 days after the guidance was changed, be prepared on the basis of the guidance in force before the change, but only if the report states that it has been prepared on that basis.*

9.1 Potential serious and irreversible impacts

9.1.1 Threatened ecological communities

Under the Guidance to assist a decision-maker to determine a serious and irreversible impact (OEH 2017c), One threatened ecological community listed as a potential SAII entity would be impacted by the proposed quarry. This includes:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland (Box-Gum Woodland)

PCT 266 and PCT 277 associated TEC is White Box - Yellow Box - Blakely's Red Gum Grassy Woodland. However, PCT 277 will not be impacted by this development proposal and therefore does not require further assessment as a SAII. PCT 266 will be impacted and is addressed in Section 9.2.

The Box-Gum Woodland TEC is potentially at risk of a serious and irreversible impact according to Principles 1 and 2:

1. The impact will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline.
2. The impact will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size.

9.1.2 Threatened species

There are no SAII candidate species that would be impacted by the development. One mammal species Large-eared Pied Bat (Chalinolobus dwyeri) was assumed present in a small low condition section of PCT 277 along the Hume Highway. However, there are no impacts to the native vegetation for this PCT 277, therefore all impacts to the Large-eared Pied Bat have been avoided and no further SAII assessment is required.

9.1.3 Additional potential entities

No further species were considered to be potential SAII entities.

9.2 Serious and irreversible impact provisions

9.2.1 White Box - Yellow Box – Blakely's Red Gum Woodland (Box-Gum Woodland)

1. Actions and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII. Where these have been addressed.

Direct Impacts

Box-Gum Woodland occurs within the development site as PCT 266 and PCT 277.

PCT 266 occurs within the development site for the proposed quarry. It occurs in two conditions states, a modified woodland condition (Vegetation zone 1: 20ha) and derived grassland condition (Vegetation Zone 2: 3ha). PCT 266 cover 23 ha of the development site.

PCT 277 occurs along the roadside of the Hume Highway intersection and includes modified woodland (Vegetation zone 4: 0.05ha) with one canopy species identified to be Yellow Box and predominantly exotic understorey.

Direct impacts to the TEC have been avoided where possible. During the design phase there have been a number of footprint iterations. Based on NGHs PCT mapping, the impacts to higher quality TEC was reduced. Impacts to PCT 266 Woodland was reduced from 9.22ha to 6.83ha and PCT 277 was excluded from the development footprint. The footprint incorporated the areas of exotic vegetation as far as practicable. The proposed development footprint covers an area of 12.91 ha, which includes 4ha of exotic vegetation.

The total amount of TEC to be impacted is 8.91ha, which consists of 6.83ha of Zone 1 (PCT 266 exotic understorey) and 2.08ha of Zone 2 (PCT 266 derived grassland). This equates to 38.65% of the TEC in the defined Development Site. The large majority, approximately 14.14ha (61.35%) of TEC within the development site would be retained.

The areas impacted are modified and have been subject to historic clearing and grazing for agriculture. Where Box-Gum Woodland would be directly impacted, ecosystem credits have been generated. As outlined in Section 10.1.1:

Indirect Impacts

To prevent indirect impacts to the retained Box-Gum Woodland, the following would occur:

- Complete a Construction Environmental Management Plan (CEMP), to include:

- Ensure construction site has permanent exclusion fencing to ensure no accidental vegetation removal occurs in the adjacent Box-Gum woodland.
- Ensure no stockpiling or storage of equipment, soil or rubbish occurs in the adjacent Box-Gum woodland.
- As part of a site induction, inform construction staff these areas are exclusion zones and therefore not to be disturbed.
- Place logs from trees that are to be removed in the development site in the Woodland areas to be retained.

- Complete a Rehabilitation Plan including a Vegetation Management Plan (VMP) for the Woodland areas to manage:
  - Weed control.
  - Replanting or regeneration
  - Location of hollows from tree removal
  - Location of nest boxes
  - Location of log
  - Permanent fencing to protect remaining areas of Box-Gum Woodland with management objectives and actions to improve natural regeneration and increase diversity of native shrubs and understory.
  - Site selection could consider separate areas that are not currently actively managed but provide habitat connection to the surrounding landscape as well as areas already managed or protected that contain remnant Box-Gum Woodland
  - Consider protection of these areas in perpetuity.

2. *Current status of the Box-Gum Woodland*
   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).*

Principle 1, clause 6.7(2)(a) BC Regulation states *'It will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline..'*

The Final Determination by the NSW Threatened Species Scientific Committee (2020) when considering the listing for Box Gum Woodland, the committee decided the distribution of this TEC is not restricted. The extent of occurrence of the TEC is estimated at 702,800 square km based on a minimum convex polygon enclosing known occurrences of the community using the method of assessment recommended by IUCN (NSW Threatened Species Scientific Committee, 2020). The TEC is listed as Critically Endangered,

Box-Gum Woodland geographical distribution in NSW extends from the Queensland border (west of the Great Dividing Range) to the Victorian border in the south. Box-Gum Woodland extends from the far south east coast of NSW to Balranald in the west of NSW. The IBRA regions in NSW include the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina.

The reduction in geographic distribution is defined as greater than or equal to 80% in ten years or three generations (NSW Department of Planning an Environment , 2020). The estimated reduction

in geographic extent of the TEC since 1970 is not defined in the TBDC. The Box-Gum Woodland community has undergone a large decline in geographic distribution due to widespread clearing and degradation throughout its range which has left remnants typically fragmented, isolated and often with understories highly modified (Threatened Species Scientific Committee, 2006). Approximately three quarters of the distribution of Box-Gum Woodland occurs in NSW (Threatened Species Scientific Committee, 2006). The following losses were attributed during the 2009-2018 periods (NSW Threatened Species Scientific Committee, 2020):

- Clearing of Grassy Woodlands from Agriculture:
  - 2009 – 2016 an average of 395ha annually
  - 2016 -2017 an average of 654 ha annually
  - 2017 -2018 an average of 1,344 ha annually
- Clearing of Grassy Woodlands from Infrastructure:
  - 2009 -2016 an average of 155 ha annually
  - 2016 -2017 an average of 216 ha annually
  - 2017 -2018 an average of 589 ha annually

The percent reduction in extent of PCT 266 is estimated at 94% (NSW DPE, 2021). Data listed in the PCT description gives an estimated 800,000ha occurring pre-European times and 50 000 ha as the current extent (NSW Department of Planning and Environment, 2021). According to the current information, PCT 266 has been cleared mainly for agriculture (NSW DPE, 2021). For example, previous surveys conducted by Prober & Thiele (1993) estimate only 0.01% of White Box woodland south of Molong remains relatively unmodified.

The current threats to further clearance of Box-Gum Woodland include clearing, timber harvesting, firewood cutting, grazing, weed invasion, fire, soil disturbance and increased nutrient loads, soil acidification, salinity, and loss of connectivity with other vegetated areas (DECC 2007).

This SAII entity does not have any listed thresholds, therefore, any impact to this entity could be considered a SAII by the decision maker.

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

i. change in community structure.
ii. change in species composition.
iii. disruption of ecological processes
iv. invasion and establishment of exotic species
v. degradation of habitat, and
vi. fragmentation of habitat

Principle 2 (b) states '*it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size…'*

There is 23.2 ha of Box-Gum Woodland within the Development Site, consisting of 20.03ha Zone 1 (PCT 266 woodland Exotic understorey), 3.00 ha of Zone 2 (PCT 266_Derived Grassland) and 0.05ha Zone 4 (PCT 277 Exotic understorey). Previous land clearing and land management in the development site has reduced the community structure and species composition. All vegetation

within the development footprint of Zone 1 and Zone 2 would be removed, hence 8.91 ha (38.65 % of the Development Site) of the current community structure and species composition of the TEC would be lost. All canopy species (*Eucalyptus albens*) would be removed in the development footprint of Zone 1 reducing seed sources of local genetic provenance. Zone 2 Derived grassland is comprised of common disturbance tolerant understory species and no significant species would be lost to the retained areas of TEC. 13.2ha of Zone 1 PCT 266 and 0.05ha of Zone 4 PCT 277 woodland would remain in the Development Site (67.66%) (Figure 9-1).

There is potential for ecological process disruptions in the retained TEC vegetation to occur given the 8.91ha area of TEC loss and creation of edge effects. However, the TEC currently undergoes ecological process disruption from agricultural activities. Grazing of native vegetation and modified pastures has occurred at the Development Site. Grazing is associated with ground compaction, erosion, and ground enrichment of the topsoil, leading to degradation of the lower stratum. This has led to structural and compositional degradation and partial failure of the native lower stratum to regenerate.

There is potential for weed invasion and establishment and degradation of habitat in the remaining TEC area due to the creation of edge effects and increased disturbance. The Box-Gum Woodland in the development site is currently considered highly modified due to the presence of exotic groundcover and low native flora diversity and abundance. The removal of native ground cover species and the introduction and establishment of exotic species has led to the degradation and fragmentation of habitat in this locality. These changes have been occurring since European settlement and the introduction of agriculture, rather than from the proposed development.

Connectivity of the TEC would be maintained within the Development Site and surrounding areas given the design of the Development Footprint and no areas of retained TEC would become isolated.

c) evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the

i. extent of occurrence

ii. area of occupancy, and

iii. number of threat-defined locations

The TEC is not listed as a SAII under Principle 3.

d) evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation)

The TEC is not listed as a SAII under Principle 4.

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 or BCAR.

The estimated reduction in geographic extent of the TEC since 1970 is not defined in the TBDC

4. *In relation to the impacts from the proposal on the TEC at risk of an SAII, the assessor must include data and information on*

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 in:

i. in hectares, and

8.91 ha of Box-Gum Woodland would be directly impacted by the proposal through clearing for the open cut basalt quarry. This is comprised of 6.83ha Zone 1 (PCT 266 Exotic understory) and 2.08ha Zone 2 (266 Derived Grassland.)

ii. as a percentage of the current geographic extent of the TEC in NSW.

NSW Threatened Species Scientific Committee (2020) estimates the area of occupancy (AOO) of Box-Gum Woodland remaining in the NSW South Western Slopes IBRA Region is 151,100km2. Approximately 8.91ha is proposed to be removed in the Development Footprint which is less than 0.0001% of the estimated extent remaining.

b) 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

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

To estimate the remaining presence of Box-gum Woodland, NSW State Vegetation mapping, VIS_4469 (Department of Planning, Industry and Environment, 2015) was used.

A 500m buffer of the Development Footprint using associated PCTS, found approximately 185.45ha of Box-Gum Woodland TEC. Of this 8.91ha of TEC would be removed, which equates to approximately 4.8% within 500m of the Development Footprint (Figure 9-2).

Box-Gum Woodland does not have a limited geographical distribution.

The extent of occurrence of Box-Gum Woodland in NSW extends from Queensland to Victoria. The population in NSW is scattered and fragmented throughout NSW in its known distribution

ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by 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 estimated maximum dispersal distance for native flora species characteristic of the TEC, and• other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development

The remaining areas of Box-Gum Woodland within 500m (Figure 9-2) shows reasonable connectivity with no isolation of Box-Gum Woodland being caused from the proposed vegetation removal. The Box-Gum Woodland present in the development site and surrounding 500m is fragmented within the region, being highly modified from past agricultural disturbances. Eucalypts have low seed dispersal distances, usually similar to the height of the tree (Booth, 2017). The proposal would impact seed dispersal through the clearing of 6.83ha of woodland.

There are no isolated areas of the TEC within the Development Site. There is exotic vegetation at the southern edge, on part of the western and eastern edge, and in the middle of the widest section of the Development Site (4 patches).

The proposal involves the removal of a roughly formed 680m long strip of Vegetation Zone 1 & 2, ranging in widths of between 20m and 50m, in the north and north-east section of the Development Footprint. According to SVM (VIS_4469), (as mentioned in section b.i. above), this area is surrounded by Box-Gum Woodland.

There are patches of Box-Gum Woodland from Zone 1 in the remaining section of the Development Footprint in odd shapes and varying sizes to be cleared including:

- a strip with approximate length of 160m and average width of approximately 50m,
- a broad strip with approximate length of 246m and approximate width of 147m,
- a patch with approximate length of 63m and width of 45m,
- a rough strip with a bend with approximate length of 270m and average width of approximately 30m,
- a patch with approximate length 140m and average width of approximately 100m.

There is some exotic vegetation adjacent to these patches of Box-Gum Woodland, however these patches are predominantly surrounded by TEC. The TEC would remain connected in a 'U' shape fashion around the Development Footprint.

iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.

Table 9 1 shows the vegetation integrity scores including the composition, structure and function condition scores for vegetation zones 1 and 2 for PCT 266 that will be impacted by the development.

Vegetation Zone 2 (Derived Grassland) has low native species diversity and an absence of canopy trees and shrubs representing a vegetation zone in low condition. The vegetation integrity score of <15 reflects the low diversity in this vegetation zones composition, structure and function. This vegetation integrity score is categorically too low to generate offsets.

Vegetation Zone 1 (Woodland) has a vegetation integrity score of 20.4. This is low due to the absence of native shrubs and understory species, however it is high enough to generate ecosystem credits. 70 credits were generated for impacts to this zone (section 10.1).

Table 9-1 Vegetation integrity scores

Zone ID	PCT/Zone	TEC	Area impacted (ha) Development Footprint	Composi-tion	Structure	Function	Current Vegetation Integrity Score	Future vegetation integrity score
1	266_Exotic understory	BC Act	6.83	7.7	16.8	65.6	**20.4**	0
2	266_Derived_Grassland	BC Act	2.08	34.8	17.5	0	**1.3**	0

1. *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.*

There is currently no new information available that demonstrates that the principle identifying that the TEC is at risk of an SAII is not accurate.

Figure 9-1 SAII within Development Site

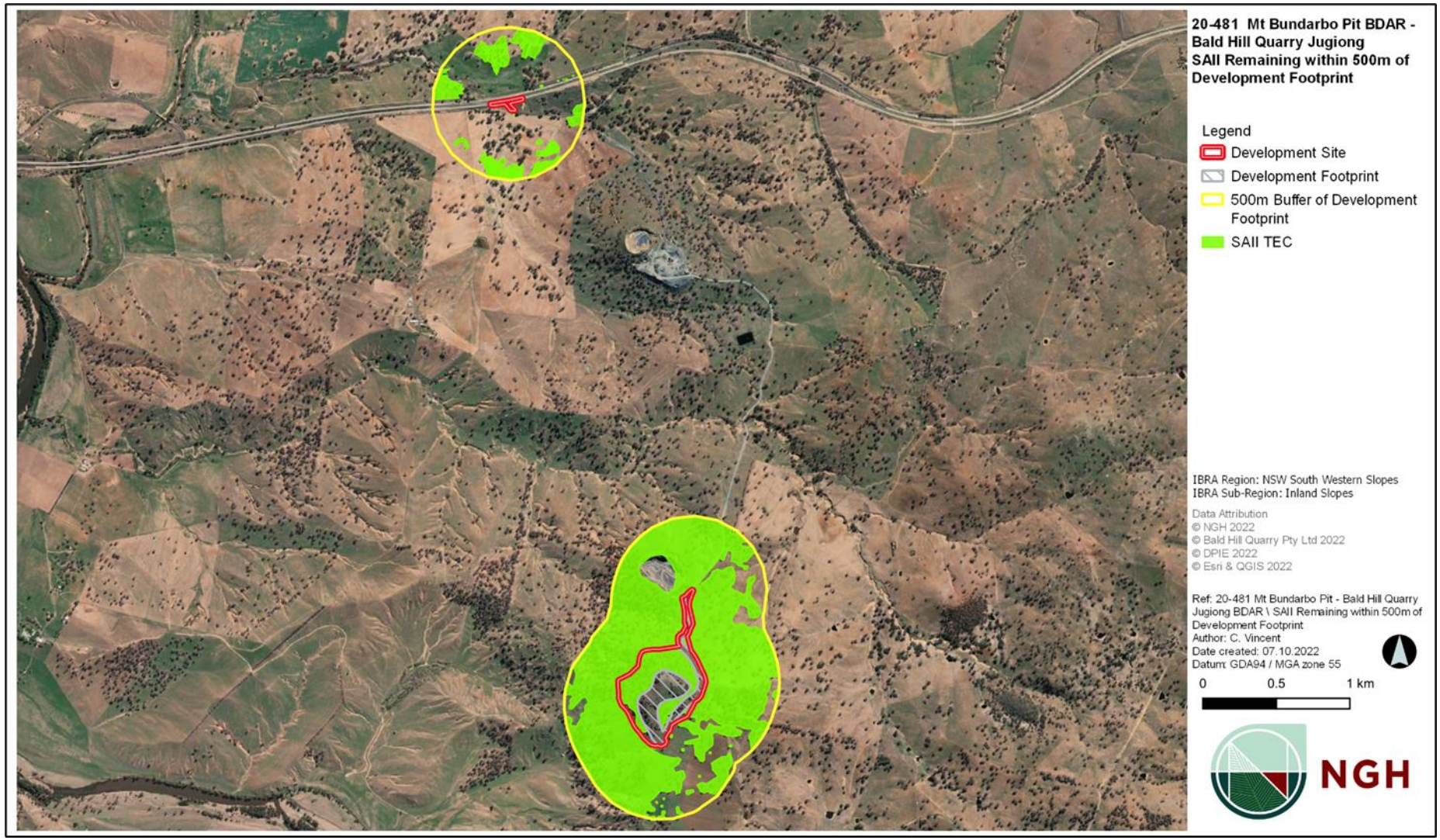

Figure 9-2 SAII Remaining with in 500m of Development Footprint

10. Requirements to offset

10.1 Impacts requiring an offset

10.1.1 Ecosystem credits

An offset is required for all impacts of development on PCTs that are associated with:

a) a vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community, or

b) a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or

c) a vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offset, and the ecosystem credits required, are documented in Table 10 1and mapped in Figure 10 1.

Table 10-1 PCTs and vegetation zones that require offsets.

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
1	266_Exotic understory	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	6.83	20.4	70
				TOTAL:	**70**

The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix C.

10.1.2 Species credits

An offset is required for the threatened species impacted by the development that require species credits. This species was unable to be surveyed for and are assumed to occur within the development site. The species credits required are documented in Table 10 2.

Table 10-2 Species credits that require offsets.

Species Credit Species	Biodiversity risk weighting	Area of habitat lost (ha)	Species Credits required
Fauna			
Brush-tailed phascogale *Phascogale tapoatafa*	2.0	6.83 ha	70
		TOTAL	**70**

The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix C.

10.2 Impacts not Requiring an Offset

Impacts to land that does not contain native vegetation do not require offsets. Pastures and paddocks were comprised of non-native vegetation. These areas' vegetation integrity scores were too low to generate offset credits.

Table 10-3 PCTs and vegetation zones that do not require offsets.

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score
2	PCT 266 Derived grassland	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	2.08	1.3
4	Exotic	Non - native	4.00	N/A

Figure 10-1 Impacts requiring offset

11. Conclusions

The aim of this BDAR is to address the biodiversity matters raised in the Secretary's Environmental Assessment Requirements (SEARs) and to address the requirements of the Biodiversity Conservation Act 2016 (NSW) (BC Act) and the Environmental Protection and Biodiversity Conservation Act 1999 (Cwth) (EPBC Act). This BDAR forms part of an Environmental Impact Statement (EIS), prepared under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The BDAR includes:

- Comprehensive mapping and assessment completed in accordance with the BAM.
- Identification of two PCTs and the assumed presence of one threatened species within the development site, the impacts to which have been adequately assessed.
- Mitigation measures which have been outlined to reduce the impacts to biodiversity.
- The generation of 70 ecosystem credits within the development site, and 70 species credits.

The PCTs present in the development site include:

- 23.05 hectares of PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion within the quarry site including Vegetation Zone 1 (PCT 266 exotic understory) and Vegetation Zone 2 (PCT 266 Derived Grassland).
- 0.05 hectares of PCT 277 Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion at the Hume Highway intersection including Vegetation Zone 4 (PCT 277 exotic understory).

The development site is approximately 29.57 hectares (ha). The proposed development footprint covers 12.96 ha. The vegetation impacted from the proposal includes the following:

- 6.83 hectares of Vegetation Zone 1 (PCT 266 Exotic Understory)
- 2.08 hectares Vegetation Zone 2 (PCT 266 Derived Grassland).
- 4.00 exotic vegetation (Vegetation Zone 3)
- There will be no impact on Vegetation Zone 4 (PCT 277 exotic understory).

There is no offset requirements for vegetation zone 3 or vegetation zone 2.

The offsets requirements for the development site include:

- 70 Ecosystem Credits required for Vegetation Zone 1 (PCT 266 exotic understory).
- 70 Species credits were generated for the Brush-tailed Phascogale which was assumed present in the development site.

The retirement of these credits will be carried out in accordance with the NSW Biodiversity Offsets Scheme, and will be achieved by either:

a) Retiring credits under the Biodiversity Offsets Scheme based on the like-for-like rules, or
b) Making payments into the Biodiversity Conservation Fund using the offset payments calculator, or
c) Funding a biodiversity action that benefits the threaten entity(ies) impacted by the development.

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Appendix A Survey Data

A.1 Plot Photos

Plot 1

Plot 2

Plot 3

Plot D1

PLOT D2

PLOT D3

PLOT D4

Plot D5

A.2 Plot Data

BAM Site Field Survey

Project:	20-481	**Plot Identifier**	1	**Pic 20x20**		**Pic 20x50**		
Survey date:	9/10/2020		**Compass Orientation (head of 20x20 plot)**			153		
Recorders		LH DM	**PCT:**	266				
GPS Easting	629766	**GPS Northing**	6143008		**Datum**	55	**Zone**	266_derived grassland

Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**			**Slope**		
LandF Element			**Soil Colour**			**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**		
Microrelief			**Geology**			**Watercourses**		

Plot Disturbance

	Severity	Age	Observational Evidence
Clearing			
Cultivation			
Soil erosion			
Firewood			
Grazing			
Fire Damage			
Storm Damage			
Weediness			
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

Age class of trees (DBH range) , Condition of Vegetation, Hollows

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot

FUNCTION

Function attributes for 1

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	6
	Grass & grasslike (GG)	3
	Fern (EG)	0
	Other (OG)	0
	TOTAL	9

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0.7
	Grass & grasslike (GG)	15.1
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	15.8
	TOTAL 'HTE'	0.1

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49			
20-29			
10-19			
5-9			
<5			
Length of logs (m)		1.5	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %
Litter Cover	5m	1%	1.2%
	15m	1%	
	25m	1%	
	35m	1%	
	45m	2%	
Bare ground cover	5m	0%	0.0%
	15m	0%	
	25m	0%	
	35m	0%	
	45m	0%	
Cryptogam cover	5m	0%	0.0%
	15m	0%	
	25m	0%	
	35m	0%	
	45m	0%	
Rock Cover	5m	0%	1.0%
	15m	0%	
	25m	5%	
	35m	0%	
	45m	0%	

COMPOSITION & STRUCTURE

Species recorded for 1

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
poa bulb	*Poa bulbosa*	Bulbous Poa	Poaceae	15	2000	*		No
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	10	2000		Grass & grasslik	No
ryti caes	*Rytidosperma caespitosu*	Ringed Wallaby Grass	Poaceae	5	200		Grass & grasslik	No
cras sieb	*Crassula sieberiana*	Australian Stonecrop	Crassulaceae	0.2	200		Forb (FG)	No
rume brow	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	3		Forb (FG)	No
erod	*Erodium spp.*	Crowfoot	Geraniaceae	0.1	50		Forb (FG)	No
trif subt	*Trifolium subterraneum*	Subterranean Clover	Fabaceae (Fab	5	100	*		No
arct cale	*Arctotheca calendula*	Capeweed	Asteraceae	1	30	*		No
hord	*Hordeum spp.*	A Barley Grass	Poaceae	0.1	30	*		No
identified forb	*#N/A*	#N/A	#N/A	0.1	30		Forb (FG)	FALSE
malv parv	*Malva parviflora*	Small-flowered Mallow	Malvaceae	1	50	*		No
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0.1	30	*		HTE
echi plan	*Echium plantagineum*	Patterson's Curse	Boraginaceae	2	50	*		No
medi	*Medicago spp.*	A Medic	Fabaceae (Fab	2	200	*		No
loli	*Lolium spp.*	A Ryegrass	Poaceae	0.1	50	*		No
lepi afri	*Lepidium africanum*	Common Peppercress	Brassicaceae	0.1	1	*		No
marr vulg	*Marrubium vulgare*	White Horehound	Lamiaceae	0.1	1	*		No
oxal pere	*Oxalis perennans*		Oxalidaceae	0.1	1		Forb (FG)	No
trif subt	*Trifolium subterraneum*	Subterranean Clover	Fabaceae (Fab	0.1	15	*		No
both macr	*Bothriochloa macra*	Red Grass	Poaceae	0.1	2		Grass & grasslik	No
euph drum	*Euphorbia drummondii*	Caustic weed	euphorbiacae	0.1	1		Forb (FG)	No
hypo	*Hypochaeris spp.*	A Catsear	Asteraceae	0.1	2	*		No
sily mari	*Silybum marianum*	Variegated Thistle	Asteraceae	0.1	2	*		No
trif subt	*Trifolium subterraneum*	Subterranean Clover	Fabaceae (Fab	0.5	20	*		No
trif subt	*Trifolium subterraneum*	Subterranean Clover	Fabaceae (Fab	0.1	10	*		No
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE

BAM Site Field Survey

Project:	20-481	**Plot Identifier**	2	**Pic 20x20**		**Pic 20x50**		
Survey date:	9/10/2020		**Compass Orientation (head of 20x20 plot)**			163		
Recorders		LH DM	**PCT:**	797				
GPS Easting	629758	**GPS Northing**	6142810		**Datum**		**Zone**	266_derived grassland

Landform		**Soils**		**Drainage & Slope**	
Morphology		**Soil Texture**		**Slope**	
LandF Element		**Soil Colour**		**Aspect**	
LandF Pattern		**Soil Depth**		**Drainage**	
Microrelief		**Geology**		**Watercourses**	

Plot Disturbance

	Severity	Age	Observational Evidence
Clearing			
Cultivation			
Soil erosion			
Firewood			
Grazing			
Fire Damage			
Storm Damage			
Weediness			
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

Age class of trees (DBH range) , Condition of Vegetation, Hollows

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot

FUNCTION

Function attributes for 2

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	2
	Grass & grasslike (GG)	4
	Fern (EG)	0
	Other (OG)	0
	TOTAL	6

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0.2
	Grass & grasslike (GG)	10.7
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	10.9
	TOTAL 'HTE'	0.1

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49			
20-29			
10-19			
5-9			
<5			
Length of logs (m)			

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %
Litter Cover	5m	0%	0.4%
	15m	1%	
	25m	0%	
	35m	0%	
	45m	1%	
Bare ground cover	5m	0%	0.0%
	15m	0%	
	25m	0%	
	35m	0%	
	45m	0%	
Cryptogam cover	5m	0%	0.0%
	15m	0%	
	25m	0%	
	35m	0%	
	45m	0%	
Rock Cover	5m	0%	1.0%
	15m	0%	
	25m	5%	
	35m	0%	
	45m	0%	

COMPOSITION & STRUCTURE

Species recorded for 2

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
both macr	*Bothriochloa macra*	Red Grass	Poaceae	10	100		Grass & grasslike	No
medi	*Medicago spp.*	A Medic	Fabaceae (Fab	50	2000	*		No
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	0.1	10		Grass & grasslike	No
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0.1	30	*		HTE
arct cale	*Arctotheca calendula*	Capeweed	Asteraceae	10	1000	*		No
brom hord	*Bromus hordeaceus*	Soft Brome	Poaceae	0.1	30	*		No
loli	*Lolium spp.*	A Ryegrass	Poaceae	2	200	*		No
hord	*Hordeum spp.*	A Barley Grass	Poaceae	2	200	*		No
chen	*Chenopodium spp.*	Goosefoot, Crumbweed	Chenopodiace	0.2	50	*		No
ryti	*Rytidosperma spp.*		Poaceae	0.5	30		Grass & grasslike	No
euph drum	*Euphorbia drummondi*	Cautic weed	Euphorbiacea	0.1	2		Forb (FG)	No
sily mari	*Silybum marianum*	Variegated Thistle	Asteraceae	1	200	*		No
rume brow	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	10		Forb (FG)	No
caps burs	*Capsella bursa-pastoris*	Shepherd's Purse	Brassicaceae	0.1	20	*		No
poa bulb	*Poa bulbosa*	Bulbous Poa	Poaceae	0.5	100	*		No
trif subt	*Trifolium subterraneum*	Subterranean Clover	Fabaceae (Fab	0.1	100	*		No
echi plan	*Echium plantagineum*	Patterson's Curse	Boraginaceae	0.2	30	*		No
aust	*Austrostipa unidentified*	#N/A	#N/A	0.1	10	#N/A	Grass & grasslike	No
vulp		Rat's-tail Fescue	Poaceae	0.1	2	*		FALSE
erod botr	*Erodium botrys*	Long Storksbill	Geraniaceae	0.1	1	*		No
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE
	#N/A	#N/A	#N/A			#N/A		FALSE

BAM Site Field Survey								
Project:	20-481	Plot Identifier	3	Pic 20x20		Pic 20x50		
Survey date:	9/10/2020		Compass Orientation (head of 20x20 plot)			105		
Recorders		LH DM	PCT:	266				
GPS Easting	629563	GPS Northing	6142267		Datum		Zone	266_exotic

Landform		Soils			Drainage & Slope		
Morphology		Soil Texture			Slope		
LandF Element		Soil Colour			Aspect		
LandF Pattern		Soil Depth			Drainage		
Microrelief		Geology			Watercourses		

Plot Disturbance			
	Severity	Age	Observational Evidence
Clearing			
Cultivation			
Soil erosion			
Firewood			
Grazing			
Fire Damage			
Storm Damage			
Weediness			
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information
Current land use
Age class of trees (DBH range) , Condition of Vegetation, Hollows
Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)
Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	

FUNCTION

Function attributes for	3

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	1
	Shrub (SG)	0
	Forb (FG)	0
	Grass & grasslike (GG)	0
	Fern (EG)	0
	Other (OG)	0
	TOTAL	1

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	15
	Shrub (SG)	0
	Forb (FG)	0
	Grass & grasslike (GG)	0
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	15
	TOTAL 'HTE'	0

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	2%	0.4%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	1.0%	
	15m	0%		
	25m	5%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	3		3
50-79			
30-49			
20-29			
10-19			
5-9			
<5			
Length of logs (m)		41	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	3							
Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
sily mari	*Silybum marianum*	Variegated Thistle	Asteraceae	50	500	*		No	
euca albe	*Eucalyptus albens*	White Box	Myrtaceae	15	1		Tree (TG)	No	
malv parv	*Malva parviflora*	Small-flowered Mallow	Malvaceae	10	1000	*		No	
brom cath	*Bromus catharticus*	Praire Grass	Poaceae	0.1	5	*		No	

gera moll	*Geranium molle*	Cranesbill	#N/A	0.1	10	*		No	#N/A
hord	*Hordeum spp.*	A Barley Grass	Poaceae	30	2000	*		No	#REF!
urti uren	*Urtica urens*	Small Nettle	Urticaceae	0.2	50	*		No	
loli	*Lolium spp.*	A Ryegrass	Poaceae	0.2	100	*		No	
chen	*Chenopodium spp.*	Goosefoot, Crumbweed	Chenopodiace	0.1	5	*		No	
sonc	*Sonchus spp.*	Sowthistle	Asteraceae	0.1	1	*		No	
lysi arve	*Lysimachia arvensis*	Scarlet Pimpernel	Myrsinaceae	1	500	*		No	
caps burs	*Capsella bursa-pastoris*	Shepherd's Purse	Brassicaceae	0.1	5	*		No	
erod	*Erodium spp.*	Crowfoot	Geraniaceae	0.1	30	*		No	
brom hord	*Bromus hordeaceus*	Soft Brome	Poaceae	0.1	2	*		No	
echi plan	*Echium plantagineum*	Patterson's Curse	Boraginaceae	0.1	2	*		No	
medi	*Medicago spp.*	A Medic	Fabaceae (Fab	0.1	5	*		No	
arct cale	*Arctotheca calendula*	Capeweed	Asteraceae	0.1	1	*		No	
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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BAM Site Field Survey

Project:	20-481	Plot Identifier	4	Pic 20x20		Pic 20x50		
Survey date:	9/10/2020		Compass Orientation (head of 20x20 plot)					
Recorders		LH DM	PCT:	Exotic				
GPS Easting	629550	GPS Northing	6142450		Datum		Zone	Exotic

Landform			Soils			Drainage & Slope		
Morphology			Soil Texture			Slope		
LandF Element			Soil Colour			Aspect		
LandF Pattern			Soil Depth			Drainage		
Microrelief			Geology			Watercourses		

Plot Disturbance

	Severity	Age	Observational Evidence
Clearing			
Cultivation			
Soil erosion			
Firewood			
Grazing			
Fire Damage			
Storm Damage			
Weediness			
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

Age class of trees (DBH range) , Condition of Vegetation, Hollows

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot

FUNCTION

Function attributes for 4

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	2
	Grass & grasslike (GG)	0
	Fern (EG)	0
	Other (OG)	0
	TOTAL	2

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0.2
	Grass & grasslike (GG)	0
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	0.2
	TOTAL 'HTE'	0

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photos
Litter Cover	5m	0%	0.2%	
	15m	0%		
	25m	1%		
	35m	0%		
	45m	0%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	1.0%	
	15m	0%		
	25m	5%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49			
20-29			
10-19			
5-9			
<5			
Length of logs (m)			

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for 4

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
hord	*Hordeum spp.*	A Barley Grass	Poaceae	80	5000	*		No		
loli	*Lolium spp.*	A Ryegrass	Poaceae	5	1000	*		No		
medi	*Medicago spp.*	A Medic	Fabaceae (Fal	0.1	5	*		No		
aven fatu	*Avena fatua*	Wild Oats	Poaceae	0.1	1	*		No		
gera moll	*Geranium molle*	cranesbill	Geraniaceae	0.1	1	*		No	#N/A	#N/A
urti inci	*Urtica incisa*	Stinging Nettle	Urticaceae	0.1	5	*		No	#REF!	#REF!
sily mari	*Silybum marianum*	Variegated Thistle	Asteraceae	0.1	1	*		No		
brom cath	*Bromus catharticus*	Praire Grass	Poaceae	0.1	5	*		No		
echi plan	*Echium plantagineum*	Patterson's Curse	Boraginaceae	0.1	1	*		No		
brom hord	*Bromus hordeaceus*	Soft Brome	Poaceae	0.1	20	*		No		
cotu aust	*Cotula australis*	Common Cotula	Asteraceae	0.1	1		Forb (FG)	No		
dauc gloc	*Daucus glochidiatus*	Native Carrot	Apiaceae	0.1	1		Forb (FG)	No		
trif subt	*Trifolium subterraneum*	Subterranean Clover	Fabaceae (Fal	0.1	5	*		No		
chen	*Chenopodium spp.*	Goosefoot, Crumbweed	Chenopodiac	0.5	30	*		No		
lysi arve	*Lysimachia arvensis*	Scarlet Pimpernel	Myrsinaceae	0.1	10	*		No		
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A	#N/A
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		#N/A	#N/A			#N/A		FALSE	#N/A	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A	#N/A
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BAM Site Field Survey								
Project:	20-481	Plot Identifier	D1	Pic 20x20		Pic 20x50		
Survey date:	3.12.20		Compass Orientation (head of 20x20 plot)				148	
Recorders		KV DB	PCT:					
GPS Easting	629705	GPS Northing	6142483		Datum		Zone	

Landform		Soils			Drainage & Slope		
Morphology		Soil Texture			Slope		
LandF Element		Soil Colour			Aspect		
LandF Pattern		Soil Depth			Drainage		
Microrelief		Geology			Watercourses		

Plot Disturbance			
	Severity	Age	Observational Evidence
Clearing			
Cultivation			
Soil erosion			
Firewood			
Grazing			
Fire Damage			
Storm Damage			
Weediness			
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information	
Current land use	
Age class of trees (DBH range) , Condition of Vegetation, Hollows	
Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)	
Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)	
Dominant Species outside Plot	

FUNCTION

Function attributes for	D1
BAM Attribute (20x20m plot)	
Stratum	Sum
Tree (TG)	1
Shrub (SG)	0
Forb (FG)	3
Grass & grasslike (GG)	1
Fern (EG)	0
Other (OG)	0
TOTAL	5
BAM Attribute (20x20m plot)	
Stratum	Sum
Tree (TG)	8
Shrub (SG)	0
Forb (FG)	0.7
Grass & grasslike (GG)	0.1
Fern (EG)	0
Other (OG)	0
TOTAL Native	8.8
TOTAL 'HTE'	10

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	60%	54.0%	
	15m	15%		
	25m	60%		
	35m	60%		
	45m	75%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	1.0%	
	15m	0%		
	25m	5%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79	3		3
30-49	1		1
20-29			
10-19			
5-9			
<5			
Length of logs (m)		17	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	D1								
Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
loli	*Lolium spp.*	A Ryegrass	Poaceae	60	5000	*		No	
lyci barb	*Lycium barbarum*	Chinese Boxthorn	Solanaceae	1	2	*		No	
chen glau	*Chenopodium glaucum*		Chenopodiace	0.5	30		Forb (FG)	No	
medi	*Medicago spp.*	A Medic	Fabaceae (Fab	4	1000	*		No	

dysp pumi	*Dysphania pumilio*	Small Crumbweed	Chenopodiace	3	1000			No	
helio euro	*Heliotropium europaeum*	Potato Weed	Boraginaceae	0.2	40	*		No	#N/A
gali apar	*Galium aparine*	Goosegrass	Rubiaceae	0.3	50	*		No	
urti inci	*Urtica incisa*	Stinging Nettle	Urticaceae	0.1	30		Forb (FG)	No	
urti uren	*Urtica urens*	Small Nettle	Urticaceae	0.2	50	*		No	
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	30	*		No	
sily	*Silybum spp.*		Asteraceae	5	80	*		No	
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	10	200	*		HTE	
erag	*Eragrostis spp.*	A Lovegrass	Poaceae	0.1	10	*	Grass & grasslike (GG)	No	
euca albe	*Eucalyptus albens*	White Box	Myrtaceae	8	1		Tree (TG)	No	
rume	*Rumex spp.*	Dock	Polygonaceae	0.1	30	*	Forb (FG)	No	
prob loui	*Proboscidea louisianica*	Purple-flowered Devil's Claw	Martyniaceae	0.1	1	*		No	
echi plan	*Echium plantagineum*	Patterson's Curse	Boraginaceae	0.1	15	*		No	
trib terr	*Tribulus terrestris*	Cat-head	Zygophyllacea	0.1	20	*		No	
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A

BAM Site Field Survey								
Project:	20-481	Plot Identifier	D2	Pic 20x20		Pic 20x50		
Survey date:	3.12.20		Compass Orientation (head of 20x20 plot)				175	
Recorders		KV DB	PCT:	266				
GPS Easting	629347.93	GPS Northing	6142508.37		Datum		Zone	266_exotic
Landform			**Soils**			**Drainage & Slope**		
Morphology			Soil Texture			Slope		
LandF Element			Soil Colour			Aspect		
LandF Pattern			Soil Depth			Drainage		
Microrelief			Geology			Watercourses		

Plot Disturbance			
	Severity	Age	Observational Evidence
Clearing			
Cultivation			
Soil erosion			
Firewood			
Grazing			
Fire Damage			
Storm Damage			
Weediness			
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information
Current land use
Age class of trees (DBH range) , Condition of Vegetation, Hollows
Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)
Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	

FUNCTION

Function attributes for	D2
BAM Attribute (20x20m plot)	
Stratum	Sum
Tree (TG)	1
Shrub (SG)	0
Forb (FG)	4
Grass & grasslike (GG)	1
Fern (EG)	0
Other (OG)	0
TOTAL	6

Count of Native Richness

BAM Attribute (20x20m plot)	
Stratum	Sum
Tree (TG)	10
Shrub (SG)	0
Forb (FG)	0.7
Grass & grasslike (GG)	0.1
Fern (EG)	0
Other (OG)	0
TOTAL Native	10.8
TOTAL 'HTE'	0.5

Count of cover abundance (native vascular plants)

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79	4		4
30-49			
20-29			
10-19			
5-9			
<5			N/A
Length of logs (m)		37	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	50%	51.0%	
	15m	30%		
	25m	50%		
	35m	50%		
	45m	75%		
Bare ground cover	5m	1%	1.6%	
	15m	2%		
	25m	5%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	10%	7.0%	
	15m	10%		
	25m	5%		
	35m	10%		
	45m	0%		

COMPOSITION & STRUCTURE

Species recorded for	D2								
Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
loli	*Lolium spp.*	A Ryegrass	Poaceae	50	3000	*		No	
lyci barb	*Lycium barbarum*	Chinese Boxthorn	Solanaceae	1	1	*		No	
chen glau	*Chenopodium glaucum*		Chenopodiace	0.5			Forb (FG)	No	
citr lana lana	*Citrullus lanatus var. lanc*	Wild Melon, Camel Melon,Bitter	Cucurbitaceae	0.5	10	*		No	

rume	*Rumex spp.*	Dock	Polygonaceae	,1	15		Forb (FG)	No	
medi	*Medicago spp.*	A Medic	Fabaceae (Fab	0.5	100	*		No	
dysp pumi	*Dysphania pumilio*	Small Crumbweed	Chenopodiace	0.1	50		Forb (FG)	No	
helio euro	*Heliotropium europaeum*	Potato Weed	Boraginaceae	0.1	15	*		No	#N/A
gali apar	*Galium aparine*	Goosegrass	Rubiaceae	0.1	30	*		No	
urti inci	*Urtica incisa*	Stinging Nettle	Urticaceae	0.1	5		Forb (FG)	No	
urti uren	*Urtica urens*	Small Nettle	Urticaceae	0.1	30	*		No	
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	50	*		No	
hord	*Hordeum spp.*	A Barley Grass	Poaceae	10	500	*		No	
sily	*Silybum spp.*		Asteraceae	20	100	*		No	
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0.5	50	*		HTE	
erag	*Eragrostis spp.*	A Lovegrass	Poaceae	0.1	20	*	Grass & grasslike (GG)	No	
euca albe	*Eucalyptus albens*	White Box	Myrtaceae	10	1		Tree (TG)	No	
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A

BAM Site Field Survey								
Project:	20-481	Plot Identifier	D3	Pic 20x20		Pic 20x50		
Survey date:	3.12.20		Compass Orientation (head of 20x20 plot)				40	
Recorders		KV DB	PCT:	266				
GPS Easting	629796	GPS Northing	6142655		Datum		Zone	266_Low

Landform		Soils		Drainage & Slope	
Morphology		Soil Texture		Slope	
LandF Element		Soil Colour		Aspect	
LandF Pattern		Soil Depth		Drainage	
Microrelief		Geology		Watercourses	

Plot Disturbance			
	Severity	Age	Observational Evidence
Clearing			
Cultivation			
Soil erosion			
Firewood			
Grazing			
Fire Damage			
Storm Damage			
Weediness			
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information
Current land use
Age class of trees (DBH range) , Condition of Vegetation, Hollows
Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)
Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	

FUNCTION

Function attributes for	D3
BAM Attribute (20x20m plot)	
Stratum	Sum
Tree (TG)	0
Shrub (SG)	0
Forb (FG)	3
Grass & grasslike (GG)	0
Fern (EG)	0
Other (OG)	0
TOTAL	3

Count of Native Richness

BAM Attribute (20x20m plot)	
Stratum	Sum
Tree (TG)	0
Shrub (SG)	0
Forb (FG)	0.3
Grass & grasslike (GG)	0
Fern (EG)	0
Other (OG)	0
TOTAL Native	0.3
TOTAL 'HTE'	5

Count of cover abundance (native vascular plants)

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			1
50-79			3
30-49	1		
20-29			
10-19	1		
5-9			
<5			N/A
Length of logs (m)		30	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	60%	54.0%	
	15m	15%		
	25m	60%		
	35m	60%		
	45m	75%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	1.0%	
	15m	0%		
	25m	5%		
	35m	0%		
	45m	0%		

COMPOSITION & STRUCTURE

Species recorded for	D3								
Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
loli	*Lolium spp.*	A Ryegrass	Poaceae	75	3000	*		No	
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	5	60	*		HTE	
echi plan	*Echium plantagineum*	Patterson's Curse	Boraginaceae	1	30	*		No	
gera home	*Geranium homeanum*		Geraniaceae	0.1	10		Forb (FG)	No	

medi	*Medicago spp.*	A Medic	Fabaceae (Fab	1	100	*		No	
dysp pumi	*Dysphania pumilio*	Small Crumbweed	Chenopodiace	0.1	50		Forb (FG)	No	
helio euro	*Heliotropium europaeum*	Potato Weed	Boraginaceae	0.1	10	*		No	#N/A
gali apar	*Galium aparine*	Goosegrass	Rubiaceae	0.2	30	*		No	
urti inci	*Urtica incisa*	Stinging Nettle	Urticaceae	0.1	30		Forb (FG)	No	
urti uren	*Urtica urens*	Small Nettle	Urticaceae	0.1	30	*		No	
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	50	*		No	
aven barb	*Avena barbata*	Bearded Oats	Poaceae	0.1	20	*		No	
sily mari	*Silybum marianum*	Variegated Thistle	Asteraceae	20	100	*		No	
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A

BAM Site Field Survey								
Project:	20-481	Plot Identifier	D4	Pic 20x20		Pic 20x50		
Survey date:	3.12.20		Compass Orientation (head of 20x20 plot)				350	
Recorders		KV DB	PCT:	797				
GPS Easting	629844.55	GPS Northing	6142536.87		Datum	55	Zone	Exotic
Landform			**Soils**			**Drainage & Slope**		
Morphology			Soil Texture			Slope		
LandF Element			Soil Colour			Aspect		
LandF Pattern			Soil Depth			Drainage		
Microrelief			Geology			Watercourses		

Plot Disturbance			
	Severity	Age	Observational Evidence
Clearing			
Cultivation			
Soil erosion			
Firewood			
Grazing			
Fire Damage			
Storm Damage			
Weediness			
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information
Current land use
Age class of trees (DBH range) , Condition of Vegetation, Hollows
Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)
Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	

FUNCTION

Function attributes for	D4	
BAM Attribute (20x20m plot)		
Count of Native Richness	Stratum	Sum
	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0
	Grass & grasslike (GG)	0
	Fern (EG)	0
	Other (OG)	0
	TOTAL	0
BAM Attribute (20x20m plot)		
Count of cover abundance (native vascular plants)	Stratum	Sum
	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0
	Grass & grasslike (GG)	0
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	0
	TOTAL 'HTE'	0.1

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	30%	45.0%	
	15m	60%		
	25m	50%		
	35m	35%		
	45m	50%		
Bare ground cover	5m	0%	6.0%	
	15m	0%		
	25m	0%		
	35m	30%		
	45m	0%		
Cryptogam cover	5m	0%	0.2%	
	15m	0%		
	25m	0%		
	35m	1%		
	45m	0%		
Rock Cover	5m	5%	6.2%	
	15m	5%		
	25m	1%		
	35m	20%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49			
20-29			
10-19			
5-9			
<5			
Length of logs (m)		0	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	D4								
Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
loli	*Lolium spp.*	A Ryegrass	Poaceae	15	5000	*		No	
hord	*Hordeum spp.*	A Barley Grass	Poaceae	70	5000	*		No	
amar albu	*Amaranthus albus*	Tumbleweed	Amaranthacea	0.5	50	*		No	
dysp pumi	*Dysphania pumilio*	Small Crumbweed	Chenopodiace	0.5	300			No	

urti uren	*Urtica urens*	Small Nettle	Urticaceae	0.1	20	*		No	
citr lana lana	*Citrullus lanatus var. lana*	Wild Melon, Camel Melon,Bitter	Cucurbitaceae	0.1	20	*		No	
xant spin	*Xanthium spinosum*	Bathurst Burr	Asteraceae	0.1	15	*		HTE	
prob loui	*Proboscidea louisianica*	Purple-flowered Devil's Claw	Martyniaceae	0.1	3	*		No	
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A

BAM Site Field Survey								
Project:	20-481	Plot Identifier	5	Pic 20x20		Pic 20x50		
Survey date:	3.12.20		Compass Orientation (head of 20x20 plot)				210	
Recorders		KV DB	PCT:					
GPS Easting	629857	GPS Northing	6142629		Datum		Zone	266_Derived_Grassland

Landform		Soils		Drainage & Slope	
Morphology		Soil Texture		Slope	
LandF Element		Soil Colour		Aspect	
LandF Pattern		Soil Depth		Drainage	
Microrelief		Geology		Watercourses	

Plot Disturbance

	Severity	Age	Observational Evidence
Clearing			
Cultivation			
Soil erosion			
Firewood			
Grazing			
Fire Damage			
Storm Damage			
Weediness			
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use
Age class of trees (DBH range) , Condition of Vegetation, Hollows
Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)
Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	

FUNCTION

Function attributes for 5

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	3
	Grass & grasslike (GG)	6
	Fern (EG)	0
	Other (OG)	0
	TOTAL	9

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	3.2
	Grass & grasslike (GG)	5.3
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	8.5
	TOTAL 'HTE'	0.3

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49			
20-29			
10-19			
5-9			
<5			
Length of logs (m)		30	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photos
Litter Cover	5m	0%	0.9%	
	15m	0%		
	25m	5%		
	35m	0%		
	45m	0%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	1.0%	
	15m	0%		
	25m	5%		
	35m	0%		
	45m	0%		

COMPOSITION & STRUCTURE

Species recorded for 5

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
aust scab	*Austrostipa scabra*	Austrostipa scabra	Poaceae	1	15		Grass & grasslike (GG)	No	
loli	*Lolium spp.*	A Ryegrass	Poaceae	50	5000	*		No	
hord	*Hordeum spp.*	A Barley Grass	Poaceae	10	500	*		No	
medi	*Medicago spp.*	A Medic	Fabaceae (Fab	40	1000	*		No	
Ryti	*Rytidosperma spp.*		Poaceae	3	50		Grass & grasslike (GG)	No	
Xant spin	*Xanthium spinosum*	Bathurst Burr	Asteraceae	0.1	5	*		HTE	
dysp pumi	*Dysphania pumilio*	Small Crumbweed	Chenopodiace	3	100		Forb (FG)	No	
both	*Bothriochloa spp.*	Redgrass, Bluegrass	Poaceae	0.1	4	*	Grass & grasslike (GG)	No	

sily	*Silybum spp.*		Asteraceae	0.1	10	*		No	
erag	*Eragrostis spp.*	A Lovegrass	Poaceae	0.1	15		Grass & grasslike (GG)	No	
boer domi	*Boerhavia dominii*	Tarvine	Nyctaginaceae	0.1	10		Forb (FG)	No	
aven	*Avena spp.*	Oats	Poaceae	0.2	50	*		No	
rume	*Rumex spp.*	Dock	Polygonaceae	0.1	20		Forb (FG)	No	
echi plan	*Echium plantagineum*	Patterson's Curse	Boraginaceae	0.1	15	*		No	
cenc	*Cenchrus spp.*		Poaceae	0.1	5		Grass & grasslike (GG)	No	
heli euro	*Heliotropium europaeum*	Potato Weed	Boraginaceae	0.2	50	*		No	
lyci fero	*Lycium ferocissimum*	African Boxthorn	Solanaceae	0.1	1	*		HTE	
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0.1	10	*		HTE	
vulp	*Vulpia spp.*	Rat's-tail Fescue	Poaceae	3	40	*		No	
cyno dact	*Cynodon dactylon*	Common Couch	Poaceae	1	100		Grass & grasslike (GG)	No	
urti uren	*Urtica urens*	Small Nettle	Urticaceae	0.1	2	*		No	
trif	*Trifolium spp.*	A Clover	Fabaceae (Fab	0.1	15	*		No	
citr amar	*Citrullus amarus*	Camel Melon	Curcurbitacea	0.1	15	*		No	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A

BAM Site Field Survey								
Project:	20-481	Plot Identifier	D1	Pic 20x20		Pic 20x50		
Survey date:	3.12.20		Compass Orientation (head of 20x20 plot)				148	
Recorders		KV DB	PCT:					
GPS Easting	629705	GPS Northing	6142483		Datum		Zone	

Landform		Soils			Drainage & Slope		
Morphology		Soil Texture			Slope		
LandF Element		Soil Colour			Aspect		
LandF Pattern		Soil Depth			Drainage		
Microrelief		Geology			Watercourses		

Plot Disturbance			
	Severity	Age	Observational Evidence
Clearing			
Cultivation			
Soil erosion			
Firewood			
Grazing			
Fire Damage			
Storm Damage			
Weediness			
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information	
Current land use	
Age class of trees (DBH range) , Condition of Vegetation, Hollows	
Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)	
Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)	
Dominant Species outside Plot	

FUNCTION

Function attributes for	D1
BAM Attribute (20x20m plot)	
Stratum	Sum
Tree (TG)	1
Shrub (SG)	0
Forb (FG)	3
Grass & grasslike (GG)	1
Fern (EG)	0
Other (OG)	0
TOTAL	5
BAM Attribute (20x20m plot)	
Stratum	Sum
Tree (TG)	8
Shrub (SG)	0
Forb (FG)	0.7
Grass & grasslike (GG)	0.1
Fern (EG)	0
Other (OG)	0
TOTAL Native	8.8
TOTAL 'HTE'	10

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	60%	54.0%	
	15m	15%		
	25m	60%		
	35m	60%		
	45m	75%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	1.0%	
	15m	0%		
	25m	5%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79	3		3
30-49	1		1
20-29			
10-19			
5-9			
<5			
Length of logs (m)		17	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	D1								
Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
loli	*Lolium spp.*	A Ryegrass	Poaceae	60	5000	*		No	
lyci barb	*Lycium barbarum*	Chinese Boxthorn	Solanaceae	1	2	*		No	
chen glau	*Chenopodium glaucum*		Chenopodiace	0.5	30		Forb (FG)	No	
medi	*Medicago spp.*	A Medic	Fabaceae (Fab	4	1000	*		No	

dysp pumi	*Dysphania pumilio*	Small Crumbweed	Chenopodiace	3	1000			No	
helio euro	*Heliotropium europaeum*	Potato Weed	Boraginaceae	0.2	40	*		No	#N/A
gali apar	*Galium aparine*	Goosegrass	Rubiaceae	0.3	50	*		No	
urti inci	*Urtica incisa*	Stinging Nettle	Urticaceae	0.1	30		Forb (FG)	No	
urti uren	*Urtica urens*	Small Nettle	Urticaceae	0.2	50	*		No	
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	30	*		No	
sily	*Silybum spp.*		Asteraceae	5	80	*		No	
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	10	200	*		HTE	
erag	*Eragrostis spp.*	A Lovegrass	Poaceae	0.1	10	*	Grass & grasslike (GG)	No	
euca albe	*Eucalyptus albens*	White Box	Myrtaceae	8	1		Tree (TG)	No	
rume	*Rumex spp.*	Dock	Polygonaceae	0.1	30	*	Forb (FG)	No	
prob loui	*Proboscidea louisianica*	Purple-flowered Devil's Claw	Martyniaceae	0.1	1	*		No	
echi plan	*Echium plantagineum*	Patterson's Curse	Boraginaceae	0.1	15	*		No	
trib terr	*Tribulus terrestris*	Cat-head	Zygophyllacea	0.1	20	*		No	
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
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	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A
	#N/A	#N/A	#N/A			#N/A		FALSE	#N/A

A.3 Fauna survey results

The following species were detected during the fauna survey conducted during August 2020.

Common Name	Scientific Name	BC Act Status	EPBC Act Status
Birds			
Rainbow Bee-eater	*Merops ornatus*	Not threatened	Marine
Black-faced Cuckoo Shrike	*Coracina novaehollandiae*	Not threatened	Not threatened
Galah	*Eolophus roseicapilla*	Not threatened	Not threatened
Red Wattlebird	*Anthochaera carunculata*	Not threatened	Not threatened
Australian Raven	*Corvus coronoides*	Not threatened	Not threatened
Little Raven	*Corvus mellori*	Not threatened	Not threatened
Striated Pardalote	*Pardalotus striatus*	Not threatened	Not threatened
Australian Magpie	*Cracticus tibicen*	Not threatened	Not threatened
Grey Shrike thrush	*Colluricincla harmonica*	Not threatened	Not threatened
Magpie-Lark	*Grallina cyanoleuca*	Not threatened	Not threatened
Wedgetail Eagle	*Aquila audax*	Not threatened	Not threatened
Red-rumped Parrot	*Psephotus haematonotus*	Not threatened	Not threatened
Pied Currawong	*Strepera graculina*	Not threatened	Not threatened
White-plumed Honeyeater	*Lichenostomus penicillatus*	Not threatened	Not threatened
Eastern Rosella	*Platycercus eximius*	Not threatened	Not threatened
Superb Fairy Wren	*Malurus cyaneus*	Not threatened	Not threatened
Southern Boobook	*Ninox boobook*	Not threatened	Not threatened
Nankeen Kestrel	*Falco cenchroides*	Not threatened	Not threatened
Sulphur-crested Cockatoo	*Cacatua galerita*	Not threatened	Not threatened
White-throated Treecreeper	*Cormobates leucophaea*	Not threatened	Not threatened
Mammals			
Common Wallaroo	*Macropus robustus*	Not threatened	Not threatened

Common Name	Scientific Name	BC Act Status	EPBC Act Status
Eastern Grey Kangaroo	*Macropus giganteus*	Not threatened	Not threatened
Black Rat	*Rattus rattus*	Exotic	Exotic
Common Wombat	*Vombatus ursinus*	Not threatened	Not threatened
European Hare	*Lepus europaeus*	Exotic	Exotic
European Rabbit	*Oryctolagus cuniculus*	Exotic	Exotic
Ring-tailed Possum	*Pseudocheirus peregrinus*	Not threatened	Not threatened
Brush-tailed Possum	*Trichosurus vulpecula*	Not threatened	Not threatened
Reptiles			
Robust Ctenotus	*Ctenotus robustus*	Not threatened	Not threatened

Appendix B Personnel

Name	Title	Qualifications	Role
Lisa Hamilton	Team Leader & Senior Ecologist	B Environmental Science (Management) BAM Accredited Assessor (BAAS 19039)	Peer reviewed BDAR and BAM C. Completion of plots
Kirsten Vine	Ecologist	BAM Accredited Assessor	Ecologist. Completion of plots
Dimity Bambrick	Ecologist	B Science (Zoology) (Ecology and Conservation)	Field ecologist Lead Author GIS Mapping
Clare Vincent	Environmental Consultant	Graduate Diploma (Environmental Management)	Field Ecologist
Jessie Whieldon	Environment Consultant	B Science (Land Resources)	Field Ecologist
Michelle Patrick	Senior Ecologist	MoE Masters of Environment BTech Bachelor of Technology (Natural Resource Management) BAM Accredited Assessor (BAAS 19078)	Peer reviewed BDAR Final v1 and Final v2

Appendix C BAM Calculator Credit Report

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00021738/BAAS19039/20/00021740	Mt Bundarbo Pit Quarry	29/03/2021
Assessor Name	Report Created	BAM Data version *
Lisa K Hamilton	26/05/2021	38
Assessor Number	BAM Case Status	Date Finalised
BAAS19039	Finalised	26/05/2021
Assessment Revision	Assessment Type	BOS entry trigger
2	Part 4 Developments (General)	BOS Threshold: Area clearing threshold

* 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)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion											
1	266_Exotic_understory	White Box Yellow Box Blakely's Red Gum Woodland	20.4	20.4	6.8	Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.00	TRUE	70

2	266_derived_grassland	White Box Yellow Box Blakely's Red Gum Woodland	1.3	1.3	2.1	Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.00	TRUE	0
										Subtotal	**70**
										Total	**70**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Species credits
Phascogale tapoatafa / Brush-tailed Phascogale (Fauna)								
266_Exotic_understory	20.4	20.4	6.8	Vulnerable	Not Listed	2	False	70
							Subtotal	**70**

Appendix D Hollow-bearing tree protocol

The clearing of hollow-bearing trees (HBTs) is to be done in accordance with the following protocols.

D.1 Clearing hollow-bearing trees

3. Prior to works commencing, the tree spotter [1] is to undertake a brief site inspection to ensure that each HBT to be removed is (still) clearly marked so that machinery operators and site construction workers are well of their presence so as to avoid any indirect impacts occurring beyond, or in a manner not consistent with the methodology specified in this document. Marking of the HBTs to be removed and/or retained is to be clear and must differentiate between removed/retained trees such as through the use of different coloured flagging tape or spray paint.
4. Once the tree is identified, using an excavator (preferable) or dozer, gently shake/tap the HBT to encourage any resident fauna to vacate the tree. The tree is then to be left overnight (at a minimum) before being removed. Any HBT that has been left for longer than 48 hours since being shaken/tapped, is to be re-shaken/tapped at least the day prior to removal.
5. When removing hollow-bearing trees, a spotter should be present at each tree to be removed to look for signs of animal movement in the tree to be cleared. The spotter should be able to communicate directly with plant operators.
6. Prior to clearing hollow-bearing trees, use an excavator or loader to hit the trunk as high up the tree as possible several times. Wait at least 30 seconds. Repeat this process several times.
7. The tree would be felled, in a controlled manner with an excavator to minimise break up of tree, and impact/crushing risk to fauna.
8. Once the hollow-bearing limbs or hollow-bearing tree are on the ground, the spotter must check each hollow for signs of wildlife before the next limb/tree is removed.
9. If taking the tree down in stages, remove non-hollow-bearing limbs first. Then remove hollow-bearing limbs.
10. Records of any animals removed or injured must be retained.

Fallen trees would be left in place or moved to a nearby area to retain fauna habitat.

D.2 Handling wildlife

1. Direct contact with any wildlife should be avoided wherever possible.
2. Any uninjured wildlife must be encouraged to leave the site.
3. If wildlife is injured, WIRES or similarly qualified and licensed personnel should be contacted to collect and treat any injured individuals.

[1] The 'spotter' needs to be experienced and qualified to handle fauna, have experience in undertaking fauna surveys, and recognise fauna attributes and habitats. EPBC ACT PMST

Appendix E EPBC Act PMST

Australian Government

Department of Agriculture, Water and the Environment

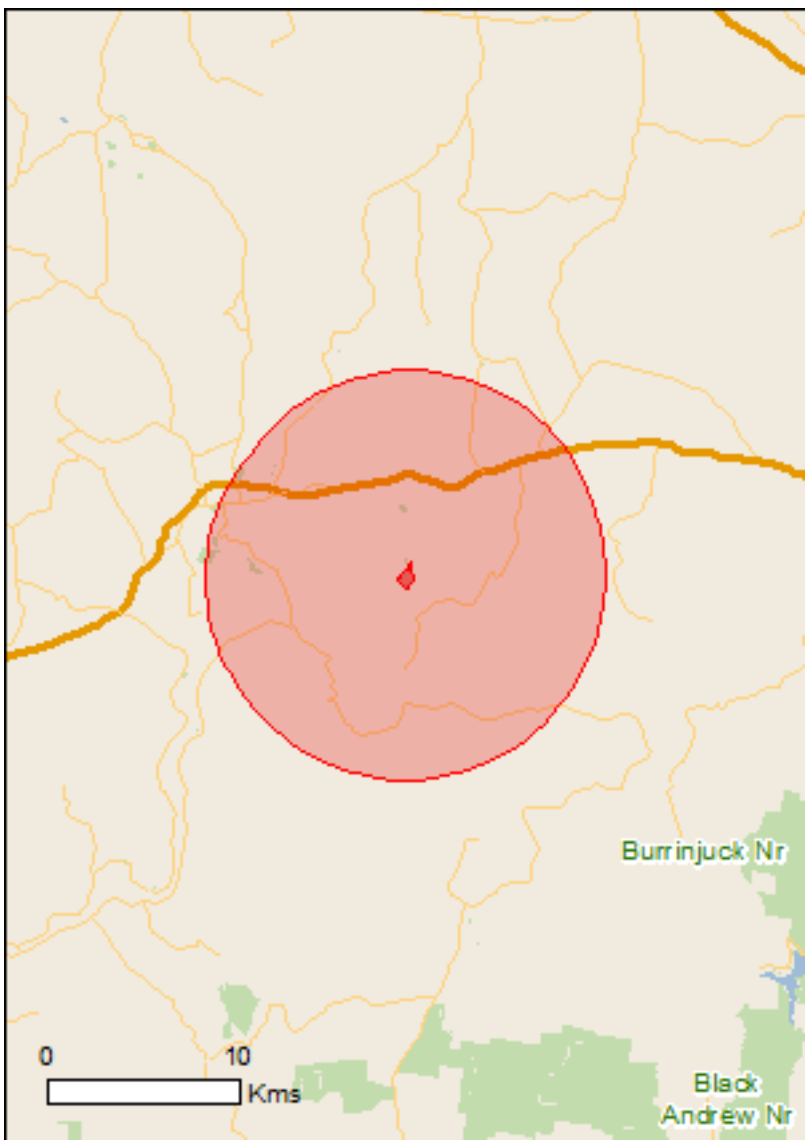
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

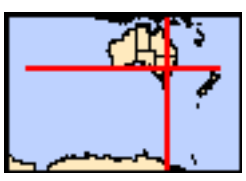
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 16/11/20 15:14:24



Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	31
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	29
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Banrock station wetland complex	700 - 800km upstream
Hattah-kulkyne lakes	500 - 600km upstream
Riverland	600 - 700km upstream
The coorong, and lakes alexandrina and albert wetland	700 - 800km upstream

Listed Threatened Ecological Communities		[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Species or species habitat likely to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos		
Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
[Polytelis swainsonii](#)		
Superb Parrot [738]	Vulnerable	Breeding known to occur within area
[Rostratula australis](#)		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
[Maccullochella macquariensis](#)		
Trout Cod [26171]	Endangered	Species or species habitat likely to occur within area
[Maccullochella peelii](#)		
Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
[Macquaria australasica](#)		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
[Crinia sloanei](#)		
Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area
[Litoria booroolongensis](#)		
Booroolong Frog [1844]	Endangered	Species or species habitat likely to occur within area
Insects		
[Synemon plana](#)		
Golden Sun Moth [25234]	Critically Endangered	Species or species habitat likely to occur within area
Mammals		
[Chalinolobus dwyeri](#)		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
[Dasyurus maculatus maculatus (SE mainland population)](#)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
[Nyctophilus corbeni](#)		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
[Petauroides volans](#)		
Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
[Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)](#)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
[Pteropus poliocephalus](#)		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
[Ammobium craspedioides](#)		
Yass Daisy [20758]	Vulnerable	Species or species habitat known to occur within area
[Amphibromus fluitans](#)		
River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat may occur within area
[Caladenia concolor](#)		
Crimson Spider-orchid, Maroon Spider-orchid [5505]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Pomaderris cotoneaster Cotoneaster Pomaderris [2043]	Endangered	Species or species habitat may occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Commission

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-34.845883 148.418994,-34.845689 148.419466,-34.845689 148.419466,-34.848771 148.419702,-34.85106 148.420818,-34.852786 148.42056,-34.855075 148.418178,-34.85504 148.417234,-34.853807 148.415303,-34.851536 148.413844,-34.851008 148.41438,-34.849123 148.416269,-34.848789 148.419165,-34.845883 148.418994

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix F EPBC Act Habitat Evaluation

Presence of habitat:

- Present: Potential or known habitat is present within the study area.
- Absent: No potential or known habitat is present within the study area.

Likelihood of occurrence

- Unlikely: Species known or predicted within the locality but unlikely to occur in the study area.
- Possible: Species could occur in the study area.
- Present: Species was recorded during the field investigations.

Possible to be impacted

- No: The proposal would not impact this species or its habitats. No Assessment of Significance (AoS) is necessary for this species.
- Yes: The proposal could impact this species or its habitats. An AoS has been applied to these entities.

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
FLORA							
Ammobium craspedioides Yass Daisy	V	V	Found in moist or dry forest communities, Box-Gum Woodland and secondary grassland derived from clearing of these communities. Grows in association with a large range of eucalypts (*Eucalyptus blakelyi, E. bridgesiana, E. dives, E. goniocalyx, E. macrorhyncha, E. mannifera, E. melliodora, E. polyanthemos, E. rubid*a). Apparently unaffected by light grazing, as populations persist in some grazed sites. Found in	2	**Present** White Box Woodland	**Possible**	**No** Targeted survey conducted; species not identified within study

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	**EPBC ACT**					
			a number of TSRs, Crown reserves, cemeteries and roadside reserves within the region. E.g., near Crookwell on the Southern Tablelands to near Wagga Wagga on the South Western Slopes. Most populations are in the Yass region.				area.
Amphibromus fluitans Floating Swamp Wallaby-grass	V	V	Grows mostly in permanent swamps. The species needs wetlands which are at least moderately fertile and which have some bare ground, conditions which are produced by seasonally-fluctuating water levels. Habitats in south-western NSW include swamp margins in mud, dam and tank beds in hard clay and in semi-dry mud of lagoons with *Potamogeton* and *Chamaeraphis* species. The species is virtually aquatic, often with only the flower heads above the water. It has been recorded recently in lagoons beside the Murray River near Cooks Lagoon (Shire of Greater Hume), Mungabarina Reserve, East Albury, at Ettamogah, Thurgoona (Charles Sturt University Campus), near Narrandera, and also further west along the Murray River (near Mathoura) and in Victoria. There is a recent record of this species near Laggan in Upper Lachlan Shire. It is also found in Victoria and in Tasmania.	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No**
Caladenia concolor Crimson Spider Orchid	E	V	In the area where this species occurs, only the Rosella Spider Orchid *C. rosella* is similar, but it is musk-scented and has paler, pink-streaked flower-parts. The current NSW Scientific Committee listing incorporates two populations which have	0	**Present** White Box Woodland on basalt hill.	**Unlikely** Species not known to occur within the locality.	**No**

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			each been described as separate species. Other occurrences of the Crimson Spider Orchid in NSW are from the Nail Can Hill Crown Reserve near Albury. The species also occurs at two localities in Victoria near Beechworth and Chiltern. Habitat is regrowth woodland on granite ridge country that has retained a high diversity of plant species, including other orchids. The dominant trees are Blakely's Red Gum (*Eucalyptus blakelyi*), Red Stringybark (*E. macrorhyncha*), Red Box (*E. polyanthemos*) and White Box (*E. albens*); the diverse understory includes Silver Wattle (*Acacia dealbata*), Hop Bitter-pea (*Daviesia latifolia*), Common Beard-heath (*Leucopogon virgatus*), Spreading Flax-lily (*Dianella revoluta*) and Poa Tussock (*Poa sieberiana*).			Was not detected during survey period.	
Pomaderris cotoneaster Cotoneaster Pomaderris	E	E	Recorded in a range of habitats in predominantly forested country. The habitats include forest with deep, friable soil, amongst rock beside a creek, on rocky forested slopes and in steep gullies between sandstone cliffs. Has a very disjunct distribution, being known from the Nungatta area, northern Kosciuszko National Park (near Tumut), the Tantawangalo area in South-East Forests National Park and adjoining freehold land, Badgery's Lookout near Tallong, Bungonia State Conservation Area, the Yerranderie area, Kanangra-Boyd National Park, the Canyonleigh area and Ettrema Gorge in Morton National Park. The species has also been recorded along the Genoa River in Victoria.	0	**Present** White Box Woodland on basalt hill.	**Unlikely** Species not known to occur within the locality.	**No**

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
Swainsona recta Small Purple-pea	E	E	Before European settlement it occurred in the grassy understory of woodlands and open-forests dominated by *Eucalyptus blakelyi, E. melliodora, E. rubida* and *E. goniocalyx.* Grows in association with understory dominants that include *Themeda triandra, Poa* spp. and *Austrostipa* spp. Recorded historically from places such as Carcoar, Culcairn and Wagga Wagga where it is probably now extinct. Populations still exist in the Queanbeyan and Wellington-Mudgee areas. Also known from the ACT and a single population of four plants near Chiltern in Victoria.	0	**Present** White Box Woodland	**Possible**	**No** Targeted survey conducted; species not identified within study area.
Thesium australe Austral Toadflax	V	V	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast, in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda triandra*).	0	**Present** Derived grasslands and grassy woodlands within NSW	**Unlikely** Species not known to occur within the locality.	**No**
TECs							
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native	E	E	Inland Grey Box Woodland includes those woodlands in which the most characteristic tree species, *Eucalyptus microcarpa* (Inland Grey Box), is often found in association with *E. populnea* subsp. *bimbil* (Bimble or Poplar Box), *Callitris*	0	**Absent** Characteristic species are not present within study	**Unlikely** Characteristic species are not present within study	**No** TEC did not occur.

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
Grasslands of South-eastern Australia			*glaucophylla* (White Cypress Pine), *Brachychiton populneus* (Kurrajong), *Allocasuarina luehmannii* (Bulloak) or *E. melliodora* (Yellow Box), and sometimes with *E. albens* (White Box). Shrubs are typically sparse or absent, although this component can be diverse and may be locally common, especially in drier western portions of the community. A variable ground layer of grass and herbaceous species is present at most sites. At severely disturbed sites the ground layer may be absent. The community generally occurs as an open woodland 15–25 m tall but in some locations the overstorey may be absent as a result of past clearing or thinning, leaving only an understory. Inland Grey Box Woodland occurs predominately within the Riverina and South West Slopes regions of NSW down to the Victorian border. It includes Albury to the east and may extend out west towards Hay. This community also extends across the slopes and plains in Central and Northern NSW up to the Queensland Border. This includes Yetman and Inverell in the North, Molong to the east of the Central Slopes and plains and out towards Nymagee to the west.		area.	area.	
Natural Temperate Grassland of the South Eastern Highlands		CE	Natural Temperate Grassland is a natural grassland community dominated by a range of perennial grass species and, in highly intact sites, containing a large range of herbaceous species in many plant families, including daisies, peas, lilies, orchids and plants in many other families, all	0	**Absent** Characteristic species are not present within study area.	**Unlikely** Characteristic species are not present within study area.	**No** TEC did not occur.

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			collectively known as forbs, or "wildflowers" in the case of the more showy species. A number of distinct associations have been described in Armstrong et al. (2013), identified by combinations of the co-occurring grasses and forbs, and each found in particular regions and/or landscape positions. The community is often treeless, though trees of a range of species may occur in low densities, either as isolated individuals or in clumps. Seasonally wet areas within a site may also contain a range of wetland flora species, including rushes, sedges and a variety of wetland specialist forbs. A limited range of shrub species may occur at some sites, but these too occur in low densities. Many of the flora species of the community are threatened. The community supports a range of fauna species, some of which are unique to grassland communities, or if not unique, are restricted to sites with grassy ecosystems (i.e., grassy woodland communities). Many of these fauna species, including several birds and reptiles and an invertebrate (Golden Sun Moth *Synemon plana*), are listed as threatened. Particular condition criteria must be met for an area of grassland to be considered natural temperate grassland. For information on this refer to the Policy Statement in the 'Natural Temperate Grassland of the South eastern Highlands in Community and Species Profile and Threats database' link. Natural Temperate Grassland is confined to the Southern Tablelands, a region				

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			bounded by the ACT, Yass, Boorowa, the Abercrombie River, Goulburn, the Great Eastern Escarpment, the Victorian border and the eastern boundary of Kosciusko National Park. The community occurs in a number of distinct plant associations (see Armstrong et al., 2013). According to the association present, the community is found in various topographical positions and on a variety of substrates. The altitudinal range of the community is between 500 m and 1200 m asl. The community is found on broad sweeping plains with poor drainage and cold air inversions that promote frosts which inhibit tree growth; on all topographical locations, including upper-slopes, crests and plateaux on basalt landscapes; and in frost hollows in areas otherwise dominated by woodlands or forests. The community may also occur in a landscape mosaic with several woodland communities.				
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	CE	White Box Yellow Box Blakely's Red Gum Woodland (commonly referred to as Box-Gum Woodland) is an open woodland community (sometimes occurring as a forest formation), in which the most obvious species are one or more of the following: White Box *Eucalyptus albens*, Yellow Box *E. melliodora* and Blakely's Red Gum *E. blakelyi*. Intact sites contain a high diversity of plant species, including the main tree species, additional tree species, some shrub species, several climbing plant species, many grasses and	0	**Present** Characteristic species are present within study area.	**Possible** Characteristic species present within study area.	**No** PCT present did not meet the condition thresholds for listing under the EPBC Act.

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			a very high diversity of herbs. The community also includes a range of mammal, bird, reptile, frog and invertebrate fauna species. Intact stands that contain diverse upper and mid-storeys and ground layers are rare. The Australian Government listing of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland is slightly different to the NSW listing. Areas that are part of the Australian Government listed ecological community must have either; an intact tree layer and predominately native ground layer; or an intact native ground layer with a high diversity of native plant species but no remaining tree layer. Box-Gum Woodland is found from the Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW.				
FAUNA							
Aves							
Actitis hypoleucos Common Sandpiper		M	Found along all coastlines of Australia and in many areas inland. The population that migrates to Australia breeds in the Russian far east. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. 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. The Common	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags. The species is known to perch on posts, jetties, moored boats and other artificial structures, and to sometimes rest on mud or 'loaf' on rocks.				
Anthochaera phrygia Regent Honeyeater	CE	CE	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak, that inhabit woodlands that support a significantly high abundance and species richness of bird species, and have large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Recently recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago. A generalist forager, although mainly feeds on the nectar from a relatively small number of eucalypts that produce high volumes of nectar e.g., Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species	0	**Present** White Box Woodland.	**Unlikely** Species not known to occur within the locality. Study area is not mapped as important habitat for this species.	**No**

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			may be regionally important e.g., Lower Hunter Spotted Gum forests support regular breeding events. Flowering of associated species such as *Eucalyptus eugenioides* and other Stringybark species, and *E. fibrosa* can also contribute important nectar flows at times. Nectar and fruit from *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. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Nests in horizontal branches or forks in tall mature eucalypts, mistletoes and Sheoaks. In NSW, the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands.				
Apus pacificus Fork-tailed Swift		M	Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW.	0	**Present** White Box Woodland.	**Unlikely** Species not known to occur within the locality. Species is largely aerial.	**No** Species is largely aerial, unlikely to utilise habitat within the study area.
Botaurus	E	E	Favours permanent freshwater wetlands with tall,	0	**Absent**	**Unlikely**	**No**

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
poiciloptilus Australasian Bittern			dense vegetation, particularly *Typha* spp. and *Eleocharis.* Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges.		No aquatic habitat present.	Habitat not suitable.	Species would not occur.
Calidris acuminata Sharp-tailed Sandpiper		M	The Sharp-tailed Sandpiper spends the non-breeding season in Australia. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats.	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.
Calidris ferruginea Curlew Sandpiper	CE	CE, M	Generally, occupies littoral and estuarine habitats, and in NSW is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. Roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			seaweed, or on rocky shores. Feeds on worms, molluscs, crustaceans, insects and some seeds. Distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration.				
Calidris melanotos Pectoral Sandpiper		M	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. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum.	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.
Falco hypoleucos Grey Falcon	E	V	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, and near wetlands where surface water attracts prey. Preys primarily on birds, especially parrots and pigeons, using	0	**Present** White Box Woodland.	**Unlikely** Species not known to occur within the locality. No	**No**

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			high-speed chases and stoops; reptiles and mammals are also taken. Utilises old nests of other birds of prey and ravens, usually high in a living eucalypt near water or a watercourse; peak laying season is in late winter and early spring. Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Believed to be extinct in areas with more than 500mm rainfall in NSW.			watercourses within the study area. No stick nests recorded within study area.	
Gallinago hardwickii Latham's Snipe		M	Usually inhabit open, freshwater wetlands with low, dense vegetation (e.g., swamps, flooded grasslands or heathlands, around bogs and other water bodies). Known to occur in the upland wetlands of the New England Tablelands and Monaro Plateau.	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.
Grantiella picta Painted Honeyeater	V	V	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. 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.* Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	0	**Present** White Box Woodland.	**Unlikely** Species not known to occur within the locality.	**No**

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
Hirundapus caudacutus White-throated Needletail		M	Arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. Are non-breeding migrants in Australia. Breeding takes place in northern Asia.	0	**Present** White Box Woodland.	**Unlikely** Species not known to occur within the locality. Species is largely aerial.	**No** Species is largely aerial, unlikely to utilise habitat within the study area.
Lathamus discolor Swift Parrot	CE	CE	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. Migrates to the Australian south-east mainland between March and October. No breeding in NSW. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*.	0	**Present** White Box Woodland (foraging habitat only).	**Possible** Species not recorded within locality; however, species is known to forage throughout South West Slopes. (No mapped important habitat recorded)	**Yes**
Motacilla flava Yellow Wagtail		M	Occupies a range of damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs to	0	**Absent** No aquatic habitat	**Unlikely** Habitat not suitable.	**No** Species would not

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			damp steppe and grassy tundra. In the north of its range, it is also found in large forest clearings. Breeds from April to August, although this varies with latitude.		present.		occur.
Myiagra cyanoleuca Satin Flycatcher		M	Found along the east coast of Australia in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. Nests in loose colonies of two to five pairs nesting at intervals of about 20-50 m apart. It builds a broad-based, cup-shaped nest of shredded bark and grass, coated with spider webs and decorated with lichen. The nest is placed on a bare, horizontal branch, with overhanging foliage, about 3-25 m above the ground.	0	**Present** White Box Woodland	**Unlikely** Species not known to occur within the locality.	**No**
Numenius madagascariensis Eastern Curlew	CE	CE, M	In NSW, occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast. Generally, occupies coastal lakes, inlets, bays and estuarine habitats, and in NSW is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. Forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. Roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			including low saltmarsh or mangroves. May also roost on wooden oyster leases or other similar structures. Is carnivorous, mainly eating crustaceans.				
Polytelis swainsonii Superb Parrot	V	V	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina, the birds' nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. Nest in small colonies, often with more than one nest in a single tree. Breed September-January. May forage up to 10 km from nesting sites, primarily in grassy box woodland. Feeds in trees and understory shrubs and on the ground and their diet consists mainly of grass seeds, herbaceous plants, fruits, berries, nectar, buds, flowers, insects and grain. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. The other main breeding sites are in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers where birds are present all year round. It is estimated that there are less than	5	**Present** White Box Woodland	**Present** Species was recorded in locality during the targeted surveys. .	**Yes**

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	**EPBC ACT**					
			5000 breeding pairs left in the wild.				
Rhipidura rufifrons Rufous Fantail		M	Found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas. Builds a small compact cup nest, of fine grasses bound with spider webs, that is suspended from a tree fork about 5 m from the ground. The bottom of the nest is drawn out into a long stem.	0	**Present** White Box Woodland	**Unlikely** Species not known to occur within the locality.	**No**
Rostratula australis Australian Painted Snipe	E	E	A small freshwater wader restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW, many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella and wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves.	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.
Mammals							

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	**EPBC ACT**					
Chalinolobus dwyeri Large-eared Pied Bat	V	V	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies. Females have been recorded raising young in maternity roosts from November to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months.	0	**Present** Associated with PCT 277 with HBTs.	**Possible** Assumed present in PCT 277. Species not recorded within the locality however microbats are inconspicuous and may not have been recorded.	**Yes**
Dasyurus maculatus maculatus Spot-tailed Quoll	E	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common.	1	**Present** White Box Woodland large hollow bearing logs.	**Possible** Species recorded once within the locality.	**Yes**

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
Nyctophilus corbeni Corben's Long-eared Bat	V	V	Overall, the distribution coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. Inhabits a variety of vegetation types, including mallee, buloke (*Allocasuarina luehmannii)* and box eucalypt dominated communities, 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 NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark. Mating takes place in autumn with one or two young born in late spring to early summer.	0	**Present** White Box Woodland with HBTs.	**Possible** Species not recorded within the locality however microbats are inconspicuous and may not have been recorded.	**Yes**
Petauroides volans Greater Glider		V	Arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Shelter during the day in tree hollows and will use up to 18 hollows in their home range. Typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.	0	**Present** White Box Woodland with large number of HBTs.	**Unlikely** Species not known to occur within the locality.	**No**
Phascolarctos cinereus Koala	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse	0	**Present** Habitat was identified as critical habitat in accordance	**Possible.** Species not recorded during targeted	**Yes**

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			species. Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Generally solitary but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery.		with DOE Guidelines.	surveys	
Pteropus poliocephalus Grey-headed Flying-fox	V	V	Occur 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 commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, giving birth and rearing young. Annual mating commences in January and a single young is born in October or November. Site fidelity to camps is high; some camps have been used for over a century. Can travel up to 50km from the camp to forage; commuting distances are more often <20 km. Feed on the nectar and pollen of native trees, in particular *Eucalyptus, Melaleuca* and *Banksia,* and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.	0	**Present** White Box Woodland	**Unlikely** Species not known to occur within the locality. Nearest known camp is located around 40km away in Yass, NSW (Flying Fox Viewer).	**No**
Reptiles							

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
Aprasia parapulchella Pink-tailed Worm-lizard	V	V	Known from the Central and Southern Tablelands, and the South Western Slopes. A concentration of populations in the Canberra/Queanbeyan Region, Cooma, Yass, Bathurst, Albury and West Wyalong. Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (*Themeda triandra*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. Feeds on the larvae and eggs of the ants with which it shares its burrows.	0	**Present** Native grasses and basalt hill with suitable rocky habitat.	**Possible**	**No** Targeted survey conducted over two survey attempts; species not identified within study area.
Delma impar Striped Legless Lizard	V	V	Occurs in the Southern Tablelands, the South West Slopes, the Upper Hunter and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma, Muswellbrook and Tumut areas. Also occurs in the ACT, Victoria and south-eastern South Australia. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda triandra*, spear-grasses *Austrostipa* spp., Poa tussocks *Poa* spp., and occasionally wallaby grasses *Austrodanthonia* spp. Sometimes present	0	**Present** Native grasses and basalt hill with suitable rocky habitat.	**Unlikely** Outside know or predicted geographical range.	**No**

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			in modified grasslands with a significant content of exotic grasses. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter. Sometimes utilises dried cowpats for shelter. Actively hunts for spiders, crickets, moth larvae and cockroaches.				
Invertebrates							
Synemon plana Golden Sun Moth	E	CE	NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. Historical distribution extended from Bathurst (central NSW) through the NSW Southern Tablelands, through to central and western Victoria, to Bordertown in eastern South Australia. Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which ground layer is dominated by wallaby grasses *Austrodanthonia* spp. Grasslands dominated by wallaby grasses are typically low and open - the bare ground between the tussocks is thought to be an important microhabitat feature, as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several wallaby grass species, which are typically associated with other grasses particularly spear-grasses *Austrostipa* spp. or Kangaroo Grass *Themeda triandra*. Larvae feed on the roots of the wallaby grass plant.	0	**Present** Native grasses including wallaby grasses.	**Possible** Species is inconspicuous and known to occur within the region.	**No** Targeted survey conducted; species not identified within study area.
Fish							

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
Maccullochella macquariensis Trout Cod		E		1 (NSW DPI Threatened Freshwater Species Indicative Distributions)	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.
Maccullochella peeli Murray Cod		V	Widely distributed in waterways of the Murray-Darling Basin. There are approx. 13,245km of waterways in the Murray-Darling Basin that may be suitable habitat. An estimate of the extent of occurrence based on an average river width of 50m would be approximately 660km2. Murray Cod has specific habitat requirements. Sedentary and territorial rather than free ranging and has a distinct preference for woody debris (snags), debris piles and bank side vegetation that provides shelter from high water velocities. The availability of these specific habitats has been reduced since European settlement due to de-snagging, habitat degradation in the form of physical fragmentation, cold water discharges from dams and other forms of pollution	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.
Macquaria australasica Macquarie Perch		E	A riverine, schooling species, they are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury/Nepean and Shoalhaven catchments. Has been long-term declines in their abundance. Inhabit cool, shaded	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			pristine streams and rivers. Prefers clear water and deep rocky holes with lots of cover. As well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks.				
Amphibians							
Crinia sloanei Sloane's Froglet	V		It is typically associated with periodically inundated areas in grassland, woodland and disturbed habitats. Recorded from widely scattered sites in the floodplains of the Murray-Darling Basin, with the majority of records in the Darling Riverine Plains, NSW South Western Slopes and Riverina bioregions in New South Wales. At a number of sites where records are verified by museum specimens, the species has not been subsequently detected during more recent frog surveys in the vicinity (e.g., Holbrook, Nyngan, Wagga Wagga and Tocumwal).	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.
Litoria booroolongensis Booroolong Frog	E	E	Lives along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses with riffles, cobble banks and other rock structures within stream margins. Breeding occurs in spring and early summer and tadpoles metamorphose in late summer to early autumn. Restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. It has disappeared from much of the Northern Tablelands; however, several populations have recently been recorded in the Namoi	0	**Absent** No aquatic habitat present.	**Unlikely** Habitat not suitable.	**No** Species would not occur.

Species	Listing		Habitat	Number of records within 10km (BioNet)	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW BC ACT	EPBC ACT					
			catchment.				

Appendix G EPBC Act Assessment of Significant Impact

G.1 Vulnerable Species

The Environment Protection and Biodiversity Conservation Act 1999 specifies factors to be considered in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. These assessments characterise the significance of likely impacts associated with the proposal on the following Vulnerable species:

- Superb Parrot Polytelis swainsonii – Vulnerable
- Large-eared Pied Bat Chalinolobus dwyeri – Vulnerable
- Corben's Long-eared Bat Nyctophilus corbeni – Vulnerable
- Koala Phascolarctos cinereus—Vulnerable

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
a) Will the action lead to a long-term decrease in the size of an important population of a species?
Superb Parrot
The National Recovery Plan for the Superb Parrot details the development site to be a place where breeding is likely to occur. This species shows a preference for nesting on major waterways and the site lies approximately 2.5 km east of the Murrumbidgee River. Around 6.83 ha of woodland habitat, potentially suitable for these species would be removed by the proposed works. Approximately 97 HBTs would be removed. Superb Parrots are known to nest in HBTs and breed along watercourses, with males of the species will travel up to 7-10km from nesting sites to forage. The project area is located approximately 2.5 km from the Murrumbidgee River. The species has been observed in the locality and, as such, there is a possibility that the species might utilise habitat for foraging. The Superb Parrot was not observed within the development site during two targeted surveys within the species known breeding season. It is unlikely that the species is breeding within the development site. Further, the loss of potential foraging habitat for this species is small given the nature of the surrounding landscape. The proposal is not considered an action that would lead to a long-term decrease in the size of an important population of this species. Due to the potential presence of hollow-bearing species it has been recommended that that a suitably qualified person is present to survey woodland vegetation for removal prior to the commencement of works to rescue and/or relocate any fauna, including breeding fauna. This would include following a Hollow-bearing Tree Removal Protocol, detailed within Appendix D.
Corben's Long-eared Bat
Corben's Long-eared bat roosts in tree hollows, crevices and under loose bark. Potential foraging and roosting habitat for Corben's Long-eared Bat occurs within the proposal area. The proposal would result in the removal of approximately 6.83 ha of potentially suitable foraging habitat and approximately 97 HBTs in the area. This species breeds from autumn onwards, with one or two young

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
born in late spring to early summer. This species has been assigned to the SoS program, under the landscape species management plan. This species occurs patchily across the landscape, congruent with the availability of hollow-bearing trees. Management is primarily at the landscape scale. Populations of these species have been identified as being known to occur within the landscape; however, the species was not identified during any of the surveys conducted at the site. The proposal is not considered to be an action that would lead to a long-term decrease in the size of an important population of this species. The loss of potential roosting habitat for this species is small given the nature of the surrounding landscape. It has been recommended that a suitably qualified person is present to survey woodland vegetation for removal prior to the commencement of works to rescue and/or relocate any fauna, including breeding fauna.
Large-eared Pied Bat
The National Recovery Plan for the Large-eared Pied Bat details Jugiong as a potential area of occurrence. Within NSW, based on available records, the largest concentration of populations appears to be in the sandstone escarpments of the Sydney basin and northwest slopes of NSW. The Large-eared Pied Bat roosts in tree hollows, disused mine shafts and caves. This species breeds during summer. There are only a few known breeding sites and they tend to coincide with sandstone caves and rocky terrain. The proposal would result in the removal of approximately 6.83 ha of potentially suitable woodland foraging habitat and approximately 97 HBTs. This species was not recorded during any of the surveys conducted at the site. The proposal is not considered to be an action that would lead to a long-term decrease in the size of an important population of this species. This is due to the fact that no breeding habitat was identified within the development site locality. Potential foraging habitat may be removed; however, this is considered to have a minimal impact on this species as the Jugiong area is a locality where the species has the potential of occurring. This locality does not appear to be the preferred breeding habitat and therefore minimal foraging habitat. Although it is considered unlikely the species is present in this locality due to limited preferred breeding options, it is however recommended that a suitably qualified person is present to survey woodland vegetation for removal prior to the commencement of works as a precautionary approach to rescue and/or relocate any fauna, including breeding fauna.
Koala
The proposal area has been determined by the Koala Habitat Assessment to contain habitat that may be critical habitat. No evidence of Koala's was observed during the three site visits. However, due to the presence of food tree species and connectivity within the landscape the species may occur. No records of the Koala are present within the locality. Historic records occur within the LGA however are located north east of the LGA (>100km away) with the majority of records dated from the 70s. The proposal area will impact around 6.83 ha of PCT 266. This impact will occur in the form of direct clearing for the quarry pit area and road upgrades which would involve the removal of food tree species. However, the proposed works would only impact a small area of habitat in the regional context. Connectivity and habitat for this species will be retained. Mitigation measures have been recommended included unexpected threatened species finds and recommendation of finalisation of works prior to the peak breeding season for this species. While there is potential for this species to occur in the proposal area, it is considered unlikely that the proposal would lead to a long-term decrease in the size of a population of this species.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
b) Will the action reduce the area of occupancy of an important population of a species?
Superb Parrot
As noted above, an important population of this species is not likely to occur within the proposal area. This species has been recorded within the locality and the targeted surveys were conducted during the known breeding periods for this species. No breeding pairs were recorded in the development site. The Superb Parrot has been recorded breeding in Yass and the ACT as well as their preferred breeding habitat in Barmah State Forest on the Victoria/NSW border. Superb Parrots prefer to nest in HBTs along watercourses and travelling 7-10km to forage; therefore, vegetation on site is considered foraging habitat. Within the locality (approximately 1000 hectares), 76% has been determined to be Box-Gum Woodland which include hollow-bearing trees and sufficient foraging habitat for the Superb Parrot when the proportion of woodland to be cleared from the development site is 6.83 ha. Therefore, the proposal is not considered an action that would reduce the area of occupancy of an important population for this species.
Corben's Long-eared Bat
As noted above, an important population of this species is not known to occur within the proposal area. The proposal would result in the removal of potential foraging and breeding habitat for this species; however, it is predicted that the area of occupancy of an important population of this species would not be reduced by the proposed works given the connectivity of the surrounding landscape.
Large-eared Pied Bat
As noted above, an important population of this species is not known to occur within the proposal area. The proposal would result in the removal of potential foraging habitat for this species; however, it is predicted that the area of occupancy of an important population of this species would not be reduced by the proposed works given the connectivity the surrounding landscape.
Koala
An important population of this species is not known to occur within the proposal area. 6.83 ha of suitable habitat would be directly impacted by the proposal. The remaining 13.38 ha of suitable habitat would be retained in addition to the wider extent of habitat in the locality, including food tree species. The proposal would result in the removal of potential foraging habitat for this species; however, it is predicted that the area of occupancy of an important population of this species would not be reduced by the proposed works given the limited removal of habitat in the local context and surrounding connectivity of the landscape.
c) Will the action fragment an existing important population into two or more populations?
Superb Parrot
As noted above, an important population is not known to occur within the proposal area. This is due to the fact that the species was not recorded during targeted surveys conducted during the known breeding periods. The vegetation proposed for removal does not form part of any important or large wildlife movement corridor. Removal of woodland vegetation within the proposal area is not considered an action that would fragment any important populations into two or more populations. Connectivity of the woodland area would be retained on both sides of the development site and within the surrounding agricultural locality. The proposal area is not considered likely to form part of an important population for this species or fragment a population into two or more populations.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Corben's Long-eared Bat
As noted above the proposal would result in the reduction of potential woodland foraging and breeding habitat for this species. The vegetation proposed for removal does not form part of any important or large wildlife movement corridor. Removal of woodland vegetation within the proposal area is not considered an action that would fragment any important populations into two or more populations. Connectivity of the woodland area would be retained on both sides of the development site. The proposal area is not considered likely to form part of an important population for this species or fragment a population into two or more populations.
Large-eared Pied Bat
The proposal would result in the reduction of potential woodland foraging habitat for this species. The vegetation proposed for removal does not form part of any important or large wildlife movement corridor. Removal of woodland vegetation within the proposal area is not considered an action that would fragment any important populations into two or more populations. Connectivity of the woodland area would be retained on both sides of the development site. The proposal area is not considered likely to form part of an important population for this species or fragment a population into two or more populations.
Koala
The proposal would result in the reduction of potential woodland foraging habitat for this species. The vegetation proposed for removal does not form part of any important or large wildlife movement corridor as connectivity in the landscape is widespread. Of the 20ha of woodland vegetation in the development site about 13.2 ha of similar quality woodland would be retained. The proposed works are not expected to cause fragmentation for this species. Connectivity would be retained during construction and post-completion of the proposal. The proposed works would not fragment any existing population of the Koala into two or more populations.
d) Will the action adversely affect habitat critical to the survival of a species?
Superb Parrot
The National Recovery Plan for the Superb Parrot, states habitat critical to the survival of the Superb Parrot can be divided into breeding and foraging habitat. Breeding is unlikely to occur at the development site, as the species was not observed during any of the targeted surveys conducted during known breeding periods. The proposal would result in the disturbance/removal of around 6.83 ha of potential foraging habitat and approximately 97 HBTs within the proposal area. Given the extent of similar condition woodland in the surrounding locality and surrounding woodland, this habitat is not likely to be considered critical to the survival of this species and the proposal is not considered an action that would adversely affect the survival of this species.
Corben's Long-eared Bat
No National Recovery Plan for this species has been adopted; therefore, no critical habitat has been defined for this species. No critical habitat is defined under the SoS program for this species. Therefore, all habitat for this species is considered important. The proposal would result in the disturbance/removal of around 9.22 ha of potential foraging habitat and approximately 97 HBTs within the proposal area. Given the woodland habitat of the surrounding landscape, this habitat is not likely to be considered critical to the survival of this species and the proposal is not considered an action that would adversely affect the survival of this species.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Large-eared Pied Bat
The National Recovery Plan for this species states that habitat critical to this species includes diurnal roosting habitat. The species is not known to breed within HBTs, preferring caves and disused mine shafts, which do not occur at the development site. The proposal would result in the disturbance/removal of around 6.83 ha of potential foraging habitat and approximately 97 HBTs within the proposal area. Given the nature of the surrounding landscape, this habitat is not likely to be considered critical to the survival of this species and the proposal is not considered an action that would adversely affect the survival of this species.
Koala
The Koala Habitat Assessment determined a score of 5. Therefore, the proposal area may be considered habitat critical to the survival of the Koala.
e) Will the action disrupt the breeding cycle of an important population?
Superb Parrot
The proposal has the potential to disrupt and impact the lifecycle of any birds nesting in HBTs. Because the species was not identified during targeted surveys during the species known breeding period, it is considered unlikely that the development site would support an important population for this species. Therefore, the works are not likely to disrupt the breeding cycle of an important population.
Corben's Long-eared Bat
The proposal has the potential to disrupt the lifecycle of any hollow-dependent mammals breeding within HBTs. Given the nature of the surrounding landscape, this habitat is not likely to be considered critical to the survival of this species and the works are not likely to disrupt the breeding cycle of an important population of this species.
Large-eared Pied Bat
This species is not known to breed within HBTs, preferring caves and disused mine shafts, which do not occur at the development site. The proposal would result in the disturbance/removal of potential foraging habitat. Given the nature of the surrounding landscape, the works are not likely to disrupt the breeding cycle of an important population of this species.
Koala
The Approved Recovery Plan for the Koala (2008) states *Koalas live in breeding aggregations, generally comprising a dominant male, a small number of mature females, as well as juveniles of various ages* with variable home range sizes based on habitat availability and quality and food tree presence. The plan details: • Breeding season between September and February. • Females can breed every year; however, this generally does not occur due to the metabolic pressures of lactation. • Gestation period is 35 days. • Young remain in the pouch for around 6 moths. • Post-leaving of the pouch, young remain dependent on the mother (carried on her back) for 12 months. The proposed works will not increase fragmentation, creation isolation of habitat or hinder movement of this species. It has been recommended that works do not occur any later then September to avoid any

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
disruption to any potential presence of Koala during the breeding season. The proposed works should cease, with further assessment to be conducted if Koala's are found within the proposal area during the works, in accordance with the unexpected threatened species protocol. With the recommended mitigation measures, the proposed works are not expected to disrupt the breeding cycle of any potential population of the Koala within the proposal area.
f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?
Superb Parrot
The proposal would result in the removal of around 6.83 ha of woodland habitat and result in the removal of 97 HBTs from the development site. The proposal would result in the removal of potential foraging habitat for this species. However, the development site is not considered an area where breeding occurs. Therefore, an important population for this species is not likely to occur within the development site and the works would not impact on critical habitat. Therefore, the proposal is not considered an action that would modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Corben's Long-eared Bat
The proposal would result in the removal of around 6.83 ha of woodland habitat and 97 HBTs. The proposal would result in the removal of potential foraging and breeding habitat for this species. However, this species has not been recorded within the development site and an important population for this species is considered unlikely to occur. Therefore, the proposed works would not impact on critical habitat. Therefore, the proposal is not considered an action that would modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Large-eared Pied Bat
The proposal would result in the removal of around 6.83 ha of woodland habitat and 97 HBTs. The proposal would result in the removal of potential foraging habitat for this species. However, this species has not been recorded within the development site and an important population for this species is considered unlikely to occur. Furthermore, it is unlikely that the species breeds within the development site. The proposed works would not impact on critical habitat. Therefore, the proposal is not considered an action that would modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Koala
The proposal would result in the removal of around 6.83 ha of woodland habitat suitable for this species including feed trees. This is minimal habitat given the large extent of similar suitable habitat in the surrounding landscape and existing connectivity. This species is considered unlikely to be present given there are no known records within the locality and is likely to be locally extinct from the area. The proposal is not considered an action that would modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
g) Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?
A number of invasive flora species, including Variegated Thistle, have been recorded in the proposal area

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
however no priority weeds were identified. The proposal has the potential to contribute to the spread of invasive species, mainly through the clearing of vegetation and transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal would therefore be unlikely to result in invasive species that are harmful to these species becoming established in their potential habitat.
h) Will the action introduce disease that may cause the species to decline?
The proposal has the potential to contribute to the spread of disease through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of disease on site. The proposal would therefore be unlikely to result in disease which may cause any of the above mentioned species to decline.
i) Will the action interfere substantially with the recovery of the species?
Superb Parrot
The National Recovery Plan for Superb Parrot lists the following specific objectives: • Determine population trends in the Superb Parrot. • Increase the level of knowledge of the Superb Parrot's ecological requirements. • Develop and implement threat abatement strategies. • Increase community involvement in and awareness of the Superb Parrot recovery program. The proposal would not interfere with any of these objectives.
Corben's Long-eared Bat
Corben's Long-eared Bat does not have a Recovery Plan but is under the 'Saving our Species' conservation strategy. Only a small proportion of potential roosting habitat would be removed by these works, given the nature of the landscape. The works are not predicted to substantially interfere with the recovery of the species. Mitigation measures have been recommended.
Large-eared Pied Bat
The National Recovery Plan for the Large-eared Pied Bat lists the following specific objectives: • 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. • Determine the meta-population dynamics throughout the distribution of the large-eared pied bat. The proposal would not interfere with any of these objectives.
Koala
The overall objective of the NSW Approved Recovery Plan for the Koala Recovery Plan (DECC 2008) is to reverse the decline of the koala in New South Wales, to ensure adequate protection, management and restoration of koala habitat, and to maintain healthy breeding populations of koalas throughout their current range. The specific objectives include: • 1: To converse Koalas in their existing habitat. • 2 To rehabilitate and restore koala habitat and populations.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
• 3: To develop a better understanding for the conservation biology of koalas. • 4: To ensure that the community has access to factual information about the distribution, conservation and management of koalas at a national, state and local scale. • 5: To manage captive, sick or injured koalas and orphaned wild koalas to ensure consistent high standards of care. • 6: To manage over browsing to prevent both koala starvation and ecosystem damage in discrete patches of habitat. • 7: To coordinate, promote the implement, and monitor the effectiveness of the NSW Koala Recovery Plan across NSW. The proposal will not interfere with these recovery objectives.

The impacts of the proposal on the assessed threatened species listed under the EPBC Act are considered to be manageable. A significant threat impact is considered unlikely based on the following conclusions:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context and surrounding connectivity features.
- Incremental fragmentation of the woodland habitat would occur in a modified landscape.
- No known substantial contribution to any key threatening process would be expected.
- Minimal impact to any important population is expected by the proposed works.
- Mitigation measures have been recommended to minimise potential impacts to threatened species.

The principle to avoid minimise and offset have been applied to impacted habitat.

G.2 Endangered and Critically Endangered Species

The Environment Protection and Biodiversity Conservation Act 1999 specifies factors to be considered in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. These assessments characterise the significance of likely impacts associated with the proposal on the following Endangered and Critically Endangered species:

- Spotted-tailed Quoll Dasyurus maculatus maculatus – Endangered.
- Swift Parrot Lathamus discolor – Critically Endangered.

An action is likely to have a significant impact on an Endangered or Critically Endangered species if there is a real chance or possibility that it will:
a) lead to a long-term decrease in the size of a population
Spotted-tailed Quoll
Potential habitat for the Spotted-tail Quoll occurs within the proposal area. The species was not detected during targeted searches; however, it is possible that any occurrence of the species may not have been

An action is likely to have a significant impact on an Endangered or Critically Endangered species if there is a real chance or possibility that it will:
visible during the site survey. The proposed works would involve the removal of approximately 6.83 ha of woodland vegetation including 97 Hollow-bearing trees. The proportion of impacted woodland vegetation and HBTs is minimal in this locality given the proportion of woodlands present within the landscape. It is unlikely that the proposed works would disrupt the life cycle of this species, potentially leading to a long term decrease in the size of the population. An unexpected threatened species find procedure would be implemented. It has been recommended that a suitably qualified person is present to survey woodland vegetation for removal prior to the commencement of works to rescue and/or relocate any fauna.
Swift Parrot
Potential habitat for the Swift Parrot occurs within the proposal area. The Swift Parrot does not breed on mainland Australia, therefore only foraging habitat for this species occurs within the development site. The species migrates to south eastern mainland Australia during autumn and winter feeding on flowering Eucalypts. These species may tend to migrate to localities where the food resources are in abundance and the tree removal at this location will not impact the migration. The critical survival of this species is protection of nesting sites in Tasmania and retaining Eucalypts and revegetation with flowering gums as much as possible in mainland Australia. To avoid indirect impacts from the loss of flowering Eucalypts at the site, ongoing management of the adjacent woodland vegetation could include natural regeneration and revegetation. This species requires careful consideration as part of any works as it is critically endangered. Although the first site survey for this development site was in August 2020; it is difficult to determine the migration of the Swift Parrot each year. Therefore, the Swift Parrot would need to be surveyed by a qualified ecologist prior to vegetation removal works if planned in autumn-winter. This approach will ensure that the tree removal does not occur if the Swift Parrot is migrating in this locality and therefore the proposed works would not lead to a long term decrease in the size of the population.
b) reduce the area of occupancy of the species
Spotted-tailed Quoll
The Spotted-tailed Quoll requires a very large home range and the proposed works would not reduce the area of occupancy for this species. The landscape is dominated by Box-Gum Woodland and the area has been modified for agriculture purposes which limits a Spotted-tailed Quolls ability to move within the landscape. Given the locality, land use and vegetation modification, it is unlikely the Spotted-tailed Quoll can persist and occupy this area. It is not expected that the proposed works would reduce the area of occupancy of this species.
Swift Parrot
The proposal would result in the removal of 6.83 ha of woodland foraging habitat potentially suitable for the Swift Parrot. This is a very minor reduction of potential foraging habitat given the presence of flowering gums available for the Swift Parrots northerly migration each year. It is not expected that the proposed works would reduce the area of occupancy of this species.
c) Will the action fragment an existing population into two or more populations?
Spotted-tailed Quoll
The proposal would result in the removal of 6.83 ha of woodland habitat potentially suitable for these species. The vegetation proposed for removal does not form part of any important or large wildlife

An action is likely to have a significant impact on an Endangered or Critically Endangered species if there is a real chance or possibility that it will:
movement corridor. Removal of woodland vegetation within the proposal area is not considered an action that would fragment any important populations into two or more populations. The development site does not represent an important connectivity between woodland habitat within the locality. Woodland would surround the site and allow continued population movement. The proposal is not considered an action that would fragment any existing populations of these species into two or more populations.
Swift Parrot
The proposal would result in the removal of 6.83 ha of woodland habitat potentially suitable for this species. The vegetation proposed for removal does not form part of any important or large wildlife movement corridor. Removal of woodland vegetation within the proposal area is not considered an action that would fragment any important populations into two or more populations. The development site does not represent an important connectivity between woodland habitat within the locality. Woodland would surround the site and allow continued population movement. The proposal is not considered an action that would fragment any existing populations of these species into two or more populations.
d) Will the action adversely affect habitat critical to the survival of a species?
Spotted-tailed Quoll
The National Recovery Plan for the Spotted-tailed Quoll lists habitat critical to the species as large patches of forest with adequate denning resources and relatively high densities of medium-sized mammalian prey. No population is known to occur within the locality of the proposal area. Given that the species is known to have a home range that is several hundred thousand hectares in size, the removal of 6.83 ha of woodland would not affect habitat critical to the survival of this species.
Swift Parrot
The proposal area falls within known foraging habitat of the Swift Parrot. No critical habitat has been identified for the Swift Parrot within NSW. White Box, Yellow Box and Blakely's Red Gum woodland are not listed as an important foraging resource for this species. The proposal will not adversely affect habitat critical to the survival of this species.
e) Will the action disrupt the breeding cycle of a population?
Spotted-tailed Quoll
A reduction in HBTs in the area could affect the abundance of prey available to the Spotted-tailed Quoll, which in turn, could have an impact on this species breeding cycle. This species was not detected during site surveys. Given that the species is known to have a home range that is several hundred thousand hectares in size, the removal of 6.83 ha of woodland would not disrupt the breeding cycle of a population.
Swift Parrot
The Swift Parrot is a migratory species that breeds in Tasmania and migrates to mainland Australia during non-breeding months; therefore, the proposal will not disrupt the breeding cycle of a population of this species.

An action is likely to have a significant impact on an Endangered or Critically Endangered species if there is a real chance or possibility that it will:
The vegetation proposed for removal does not form part of any important or large wildlife movement corridor. Removal of woodland vegetation within the proposal area would not disrupt any connectivity of potential threatened species populations. An unexpected threatened species find procedure has been recommended.
f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?
Spotted-tailed Quoll
The proposal would result in the removal of 6.83 ha of potentially suitable habitat for this species. This area is modified and mainly used for agriculture. The Box-Gum Woodland presence in this locality is extensive in tree cover but understory vegetation has the potential to be highly modified similar to the 6.83 hectares of woodland proposed to be removed. As such, it is unlikely the proposed action/works will further destroy, modify or further isolate the habitat for this species to the extent that it would lead to further decline. There are no known or recorded individuals in the area. The proposal would not reduce the availability or quality of habitat for these species such that they are likely to decline.
Swift Parrot
The proposal would result in the removal of 6.83 ha of woodland habitat potentially suitable for these species. This is a very minor reduction of potential foraging habitat in the landscape and that no known occurrences of this species have been identified in the area. The proposal would not reduce the availability or quality of habitat for these species such that they are likely to decline.
g) Will the action result in invasive species that are harmful to a Critically Endangered or Endangered species becoming established in the Critically Endangered or Endangered species' habitat?
A number of invasive flora species, including Variegated Thistle, have been recorded in the proposal area however no priority weeds were identified. The proposal has the potential to contribute to the spread of invasive species, mainly through the clearing of vegetation and transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal would therefore be unlikely to result in invasive species that are harmful to these species becoming established in their potential habitat.
h) Will the action introduce disease that may cause the species to decline?
The proposal has the potential to contribute to the spread disease through the transfer and/or introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of disease that may cause the species to decline.
i) Will the action interfere substantially with the recovery of the species?
Spotted-tailed Quoll
The objectives for The National recovery Plan for the Spotted-tailed Quoll are as follows: • Determine the distribution and status of Spotted-tailed Quoll populations throughout the range and identify key threats and implement threat abatement management practices. • Investigate key aspects of the biology and ecology of the Spotted-tailed Quoll to acquire targeted information to aid recovery.

An action is likely to have a significant impact on an Endangered or Critically Endangered species if there is a real chance or possibility that it will:
• Reduce the rate of habitat loss and fragmentation on private land. • Evaluate and manage the risk posed by silvicultural practices. • Determine and manage the threat posed by introduced predators (foxes, cats, wild dogs) and of predator control practices on Spotted-tailed Quoll populations. • Determine and manage the impact of fire regimes on Spotted-tailed Quoll populations. • Reduce deliberate killings of Spotted-tailed Quolls. • Reduce the frequency of Spotted-tailed Quoll road mortality. • Assess the threat Cane Toads pose to Spotted-tailed Quolls and develop threat abatement actions if necessary. • Determine the likely impact of climate change on Spotted-tailed Quoll populations. • Increase community awareness of the Spotted-tailed Quoll and involvement in the Recovery Program. The proposal would not interfere with these objectives.
Swift Parrot
The objectives for The National recovery Plan for the Swift Parrot are as follows: • To identify and prioritise habitats and sites used by the species across its range, on all land tenures. • To implement management strategies to protect and improve habitats and sites on all land tenures. • To monitor and manage the incidence of collisions, competition and Beak and Feather Disease (BFD) • To monitor population trends and distribution throughout the range. The proposal would not interfere with these objectives.

The impacts of the proposal on the assessed threatened species listed under the EPBC Act are considered to be manageable. A significant impact is considered unlikely based on the following conclusions:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context.
- Incremental fragmentation of the woodland habitat would occur in a modified landscape.
- No known substantial contribution to any key threatening process would be expected.
- Minimal impact to any important population is expected by the proposed works.
- Mitigation measures have been recommended to minimise potential impacts to threatened species.

Appendix H Land Category Assessment

LAND CATEGORY ASSESSMENT

Mt Bundarbo Pit – Bald Hill Quarry Jugiong

March 2020

Project Number: 20-481

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DOCUMENT VERIFICATION

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Revision	Date	Prepared by	Reviewed by	Approved by
Draft Rev 1	26/0/2021	D. Bambrick	L. Hamilton/J. Gooding (BAAS18074)	L. Hamilton
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1. LAND CATEGORY ASSESSMENT

1.1. Introduction

NGH were engaged by Bald Hill Quarry Pty Ltd. to prepare a Land Category Assessment (LCA) for the proposed Mt Bundarbo Pit. The proposal would be subject to an EIS assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). To satisfy the requirements of the *Biodiversity Conservation Act 2016* (BC Act), a Biodiversity Development Assessment Report (BDAR) is being prepared for the proposal.

Section 6.8(3) of the BC Act determines that the Biodiversity Assessment Method (BAM) is to exclude the assessment of the impacts of clearing of native vegetation on Category 1 - Exempt Land (within the meaning of Part 5A of the *Local Land Services Act 2013* (LLS Act)). Boundaries mapping Category 1 - Exempt Land on the Native Vegetation Regulatory Mapping are not yet publicly available. During the transitional period, accredited assessors may establish the categorisation of land for the agency head to consider, following the method utilised to develop the Native Vegetation Regulatory Map.

Category 1 – Exempt Land is defined as:

- Land cleared of native vegetation as at 1 January 1990 or lawfully cleared of vegetation between 1 January 1990 and 25 August 2017;
- Low Conservation Grasslands;
- Land containing only low conservation groundcover (not being grasslands);
- Native vegetation identified as regrowth in a Property Vegetation Plan under the repealed Native Vegetation Act 2003; or
- Land biodiversity certified under the BC Act.

Category 2 – Regulated Land is defined as:

- Land not cleared as at 1st January 1990 or unlawfully cleared after 1st January 1990;
- Native vegetation grown with the assistance of public funds;
- Land that is (or was previously) subject to a Private Native Forestry Plan or Private Native Forestry PVP;
- Grasslands that are neither low nor high conservation grasslands;
- Travelling stock reserves.

Additionally, two subcategories of Category 2 – Regulated Land are also relevant and include:

Category 2 Vulnerable Regulated Land, including:

- Steep or highly erodible land
- Protected riparian areas,
- Land susceptible to erosion, or land that is otherwise environmentally sensitive.

Category 2 Sensitive Regulated Land, including:

  - Land subject to a private land conservation agreement
  - A set aside under the Land Management Code
  - Land subject to a biocertification conservation measure
  - Land comprising an offset under a Property Vegetation Plan or set aside under a code under the Native Vegetation Act 2003
  - Coastal wetlands and littoral rainforests (Coastal Management Act 2016)
  - High conservation grassland
  - Core Koala habitat identified in a plan of management (Koala Habitat Protection SEPP)
  - Critically endangered plants and critically endangered ecological communities

- Ramsar wetlands (EPBC Act)
- Land subject to remedial action or conservation measures under the BC Act
- Land subject to a property, trust or conservation agreement
- Land recommended for listing as an Area of Outstanding Biodiversity Value
- Conservation Areas under the Southern Mallee Land Use Agreement
- Native vegetation that must be retained under the Plantation and Reafforestation Act 1999
- Land subject to a condition of development consent requiring the land to be set aside for conservation purposes under the Environmental Planning and Assessment Act 1979
- Rainforest and old growth forest.

Excluded Land

Excluded land is other land where the land is not subject to the LLS Act such as National Parks, State Forests and urban areas (subject to the Vegetation SEPP).

1.2. Method

A desktop assessment of available spatial data, a literature review of relevant studies of the subject land and field observations were undertaken for the subject land to determine the potential ecological constraints, native vegetation communities and land category class within the subject land. A detailed approach was used when identifying Category 2 – Regulated Land. Where data was conflicting, land was mapped as Category 2 based on hierarchy of available data and ground-truthed assessment.

Desktop Assessment

A desktop assessment of the development site as a Category 1 – Exempt land and Category 2 – Regulated land was undertaken using the following data sources:

- Aerial imagery of historic land use (Dept. Spatial Services).
- 2017 V1.2 Land Use Dataset (Australian Land Use and management (ALUM) Classification Version 8 (Department of Planning, Industry and environment, 2020).
- NSW Woody Vegetation Extent and Foliage Projective Cover (FPC) 2011 (Office of Environment and Heritage, 2015).
- Sensitive Regulated and Vulnerable Regulated Lands (Native Vegetation Regulatory Map Portal, 2020).
- South East Local Land Services Biometric Vegetation Map (V1.2-VIS ID 4469, DPIE 2020).
- Plant Community Types identified from NGH field assessments.

Site Assessment

An initial site survey was undertaken on the 25th – 27th August 2020. The entire development site was surveyed by two ecologists via vehicle and foot. Additional surveys were undertaken on the 2nd - 4th October 2020 and 2nd – 3rd December 2020. A BAM accredited ecologist was present for each of these surveys. An additional survey was undertaken on the 13th of April 2021 by an NGH ecologist to survey the Hume Highway development site. The site assessment included assessment and classification of Plant Community Types (PCTs), vegetation condition and ground-truthing of vegetation mapping according to the Biodiversity Assessment Method (BAM).

1.3. Results

The analysis of the above sources identified demonstrates evidence of native vegetation modification resulting from land use (clearing and grazing) within the southern cleared areas of the development site, prior to and post 1990. The following table (Table 1-1) demonstrates how the above-mentioned layers were used in determining land category.

An area which is mapped as modified pastures under the Land use data set and is dominated by exotic vegetation occurs in Lot 7002 DP 1031310. This lot is classified as Crown Lands and has been categorised as Category 2 Land.

Table 1-1: Summary of data sources and interpretation

Data Sources	Category 1 – Exempt Land	Category 2– Regulated Land	Excluded Land
Current Aerial Imagery Mt Bundarbo Locality	• Clear evidence of grazing. • Clear evidence of cleared land.	• Woody vegetation present at 1990 demonstrated within woody vegetation extent layer	N/A
1989 Historic Aerial Imagery Mt Bundarbo Locality	• Clear evidence of grazing. • Clear evidence of cleared land.	• Woody vegetation present at 1990	N/A
2017 Land Use Dataset	Land use identified as; • Grazing modified pastures (part areas) • Cropping	Land use identified as: • Grazing native vegetation • Grazing modified pastures (part areas)	N/A
NSW Woody vegetation extent	• Areas of woody vegetation regrowth that has occurred post 1990 following previous clearing events	• Woody vegetation present at 1990 in conjunction with historic aerial imagery.	N/A
Native Regulatory Map • Sensitive regulated land • Vulnerable regulated land. • Excluded land	• N/A	• Areas identified as vulnerable or sensitive regulated land occur within the development site.	An area identified as Excluded Land occurs along the Highway.
Crown Lands	• N/A	• An area identified as Crown Land occurs in Lot 7002 DP 1031310	N/A

1.4. Conclusion

Based on the above data sources, there is evidence to suggest that historically cleared areas and grazing has occurred prior to 1990. This is supported by recent imagery as well as the 2017 Land Use mapping data and woody vegetation mapping data. These areas have been mapped as Category 1 - Exempt Land

Areas of Mt Bundarbo would constitute Steep or highly erodible land, this is reflected in the Native Regulatory Map (Vulnerable regulated land). Clear evidence of woody vegetation present at 1990 was found. This

vegetation was supported by the woody vegetation mapping data and ground truth truthed field assessment by BAM accredited assessors. These areas have been mapped as Category 2 - Regulated Land.

The Area identified as Crown Lands has been classified as Category 2- Regulated Land.

The map of areas considered to be Category 1 - Exempt land and Category 2 - Regulated land has been produced and shown in Appendix A.1. The relevant datasets used in the assessment are included in Appendix A.2 – Appendix A.7.

APPENDIX A MAPS

A.1 Land Categorisation

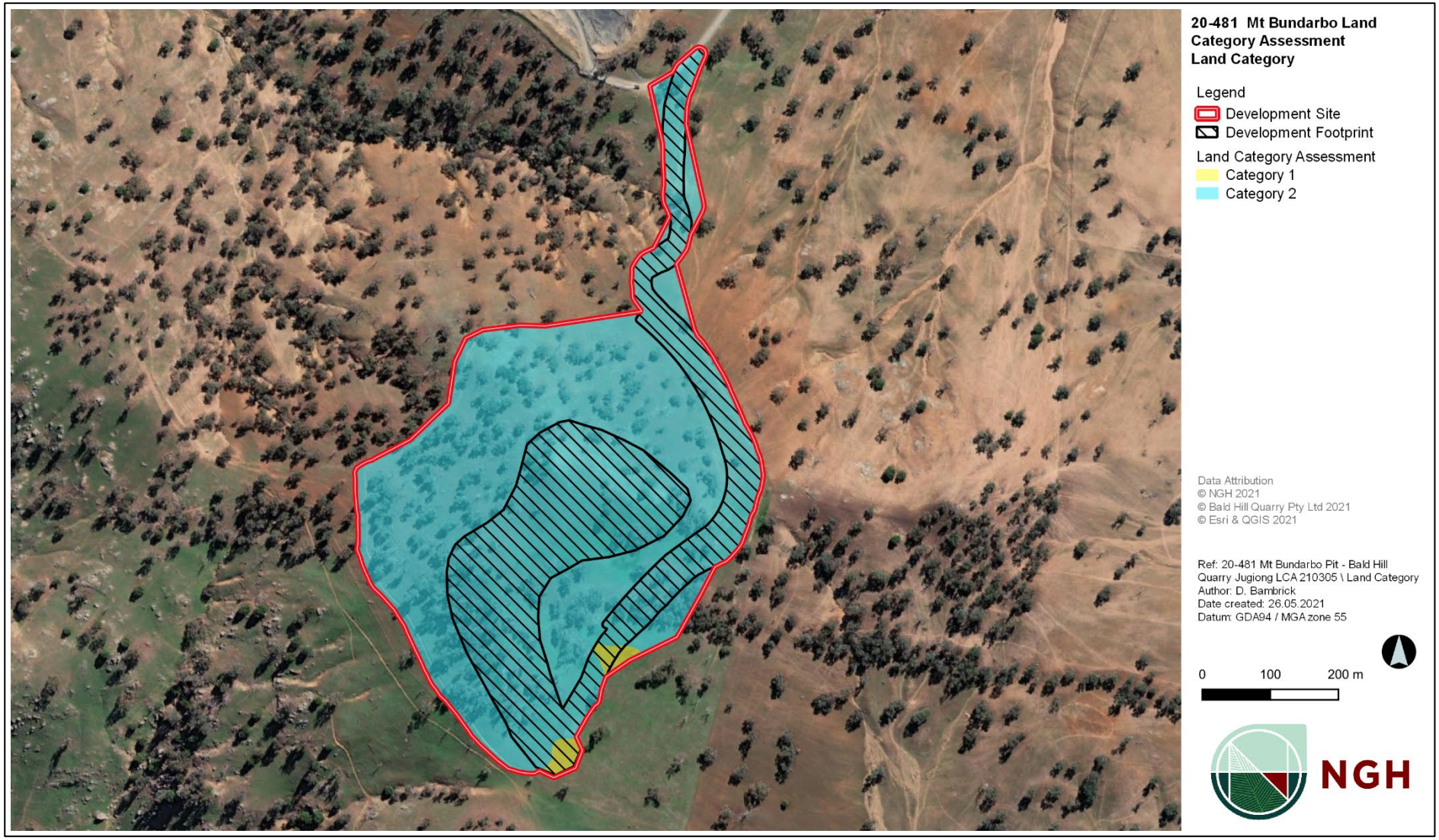

Figure 1-1: Land Categorisation Mt Bundarbo

Figure 1-2: Land Categorisation Hume Highway

A.2 Historic 1990 Aerial Imagery

Figure 1-3: Historic 1989 Aerial Imagery Mt Bundarbo

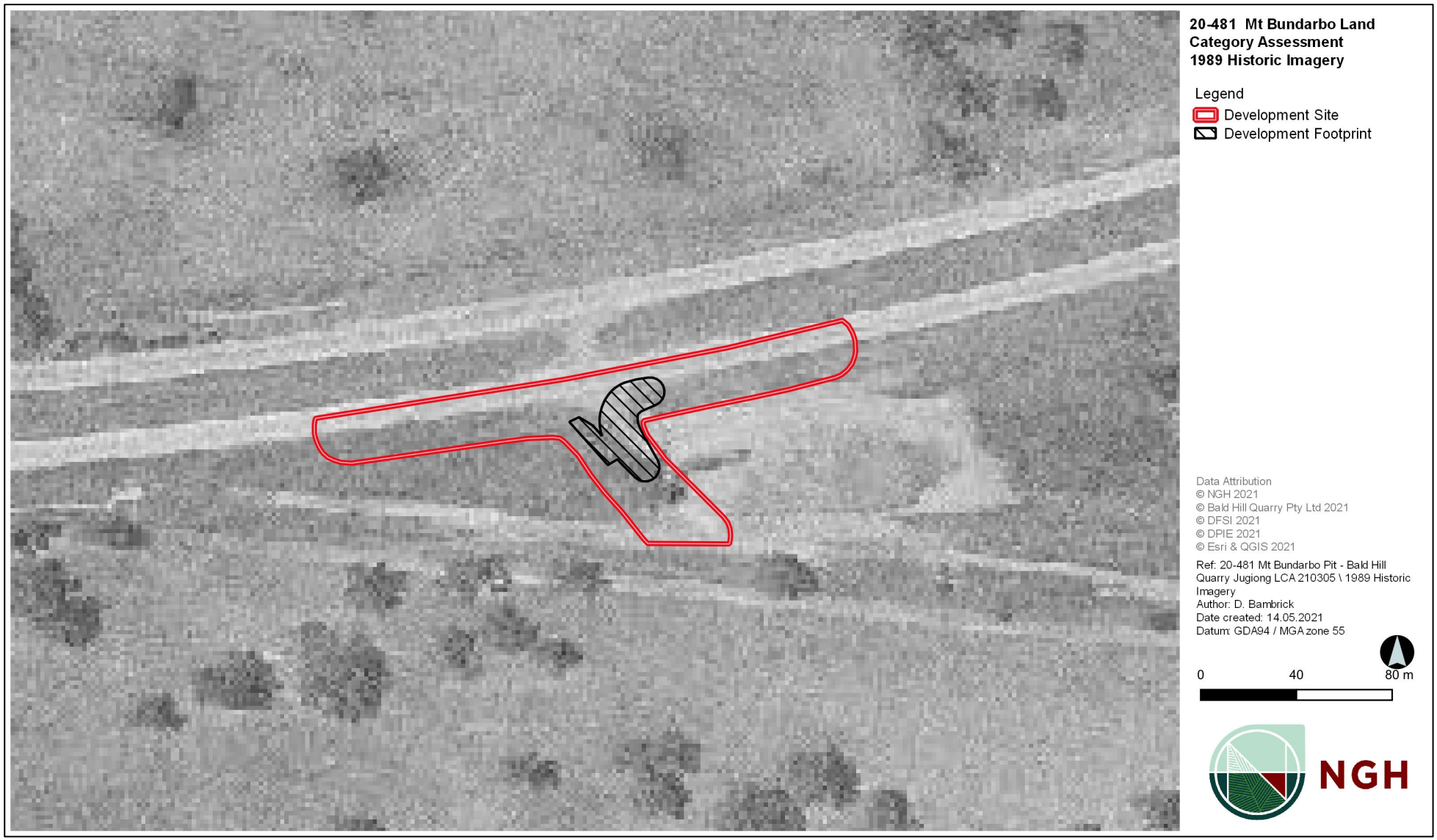

Figure 1-4: Historic 1989 Aerial Imagery Hume Highway

A.3 Plant Community Types

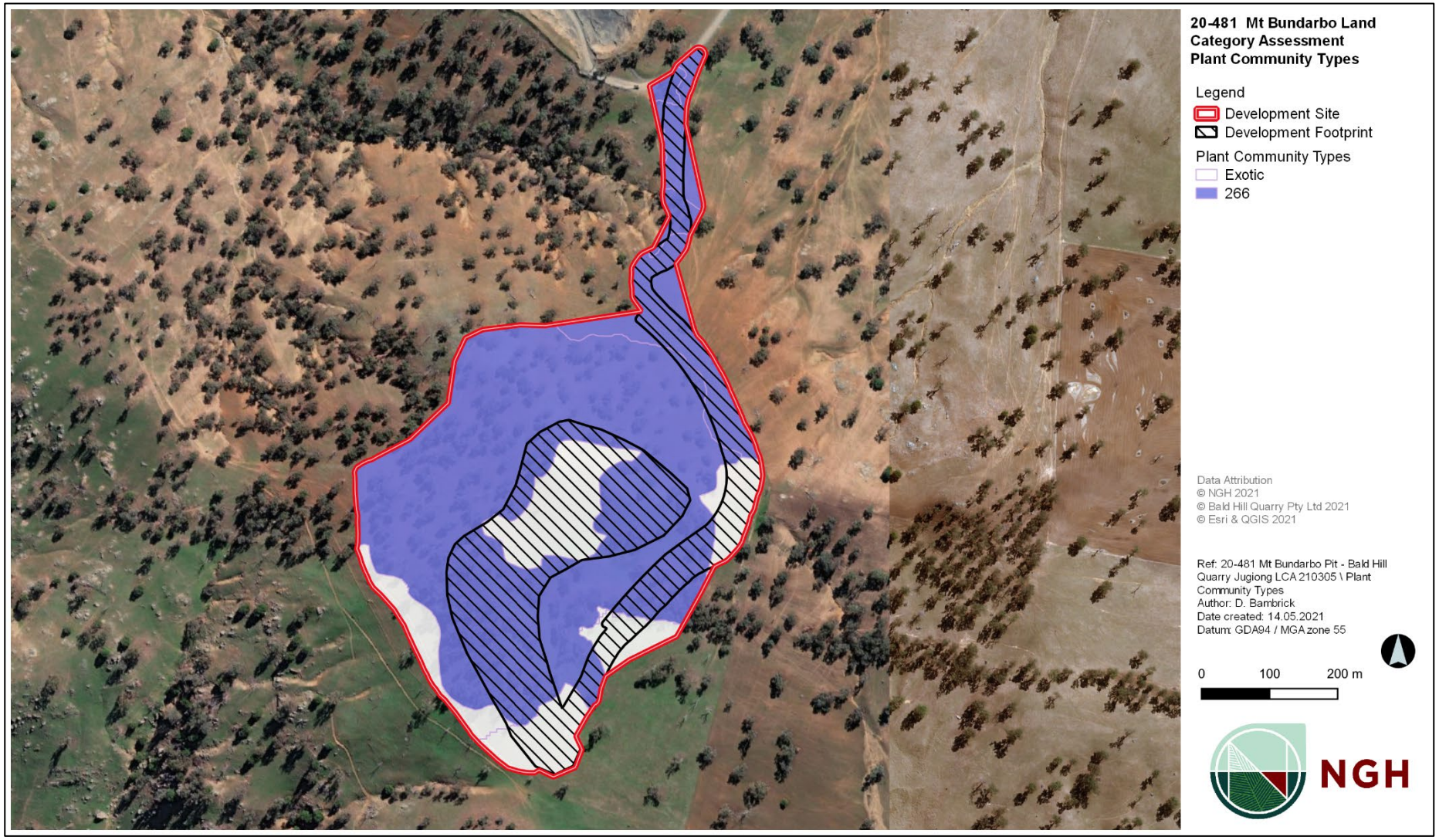

Figure 1-5: Ground Truthed Vegetation Mt Bundarbo

Figure 1-6: Ground Truthed Vegetation Hume Highway

A.4 NSW Land Use 2017

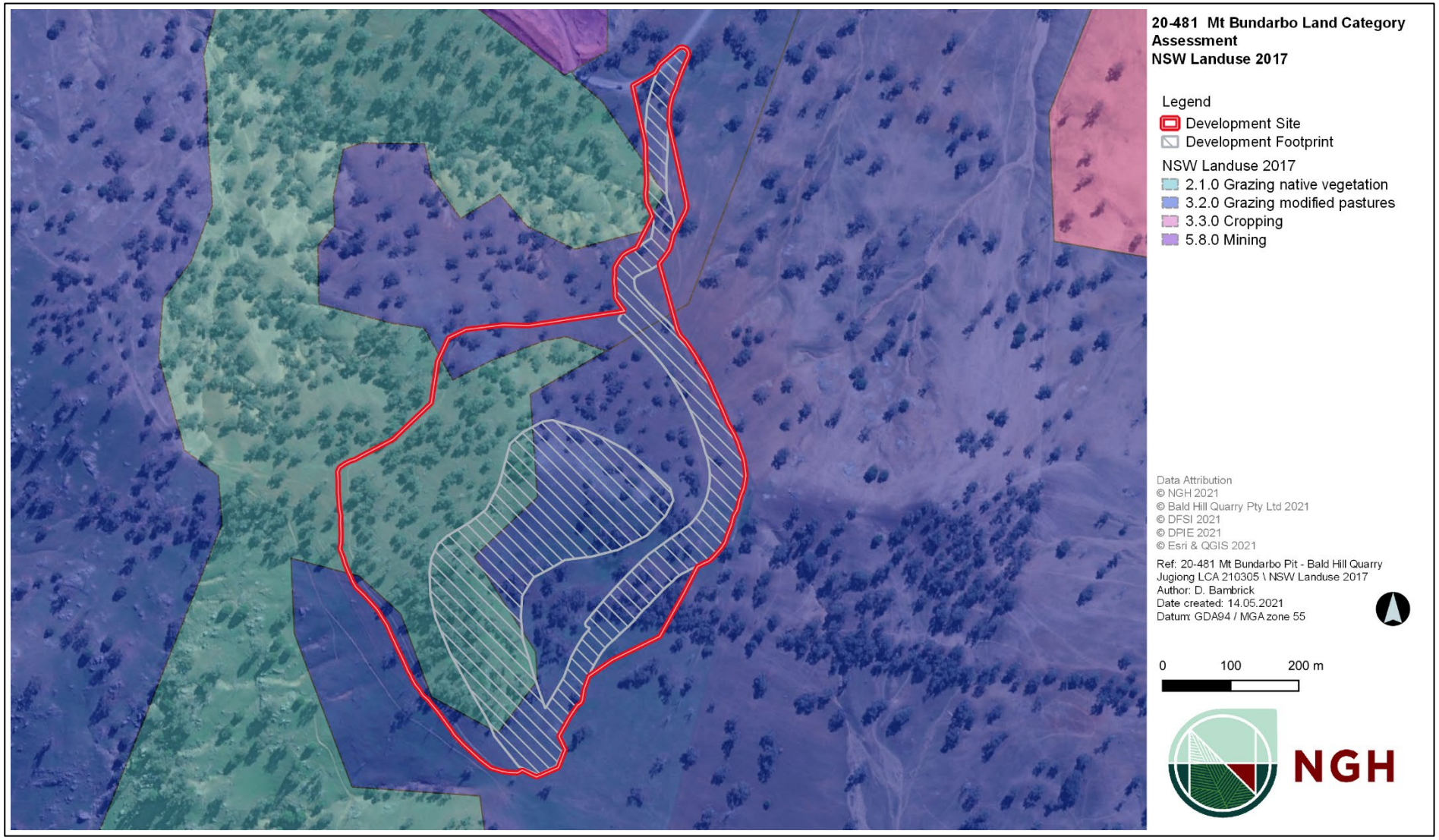

Figure 1-7: NSW Land Use 2017 Mt Bundarbo

Figure 1-8: NSW Land Use 2017 Hume Highway

A.5 Land Zoning

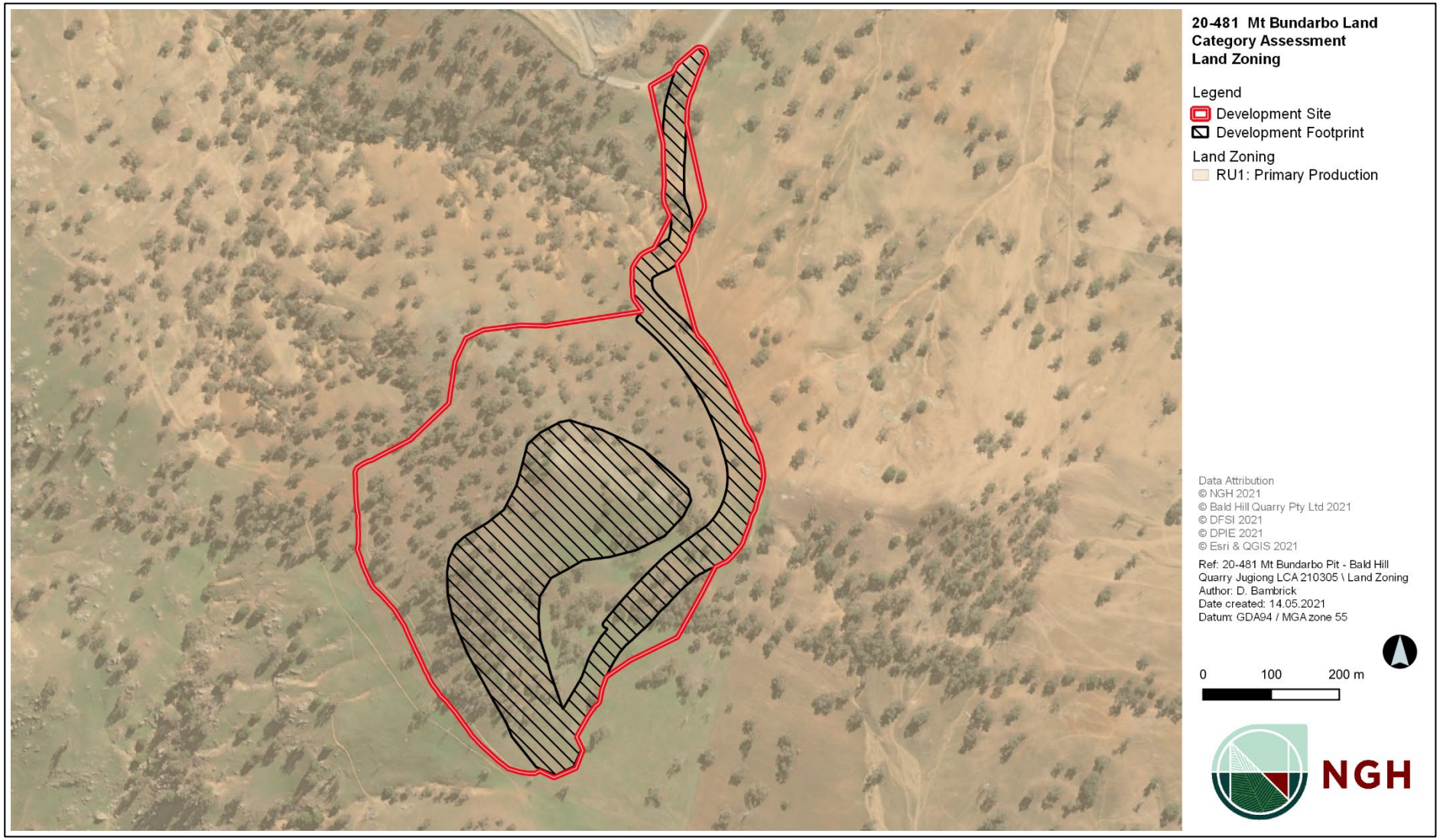

Figure 1-9: Land Zoning Mt Bundarbo

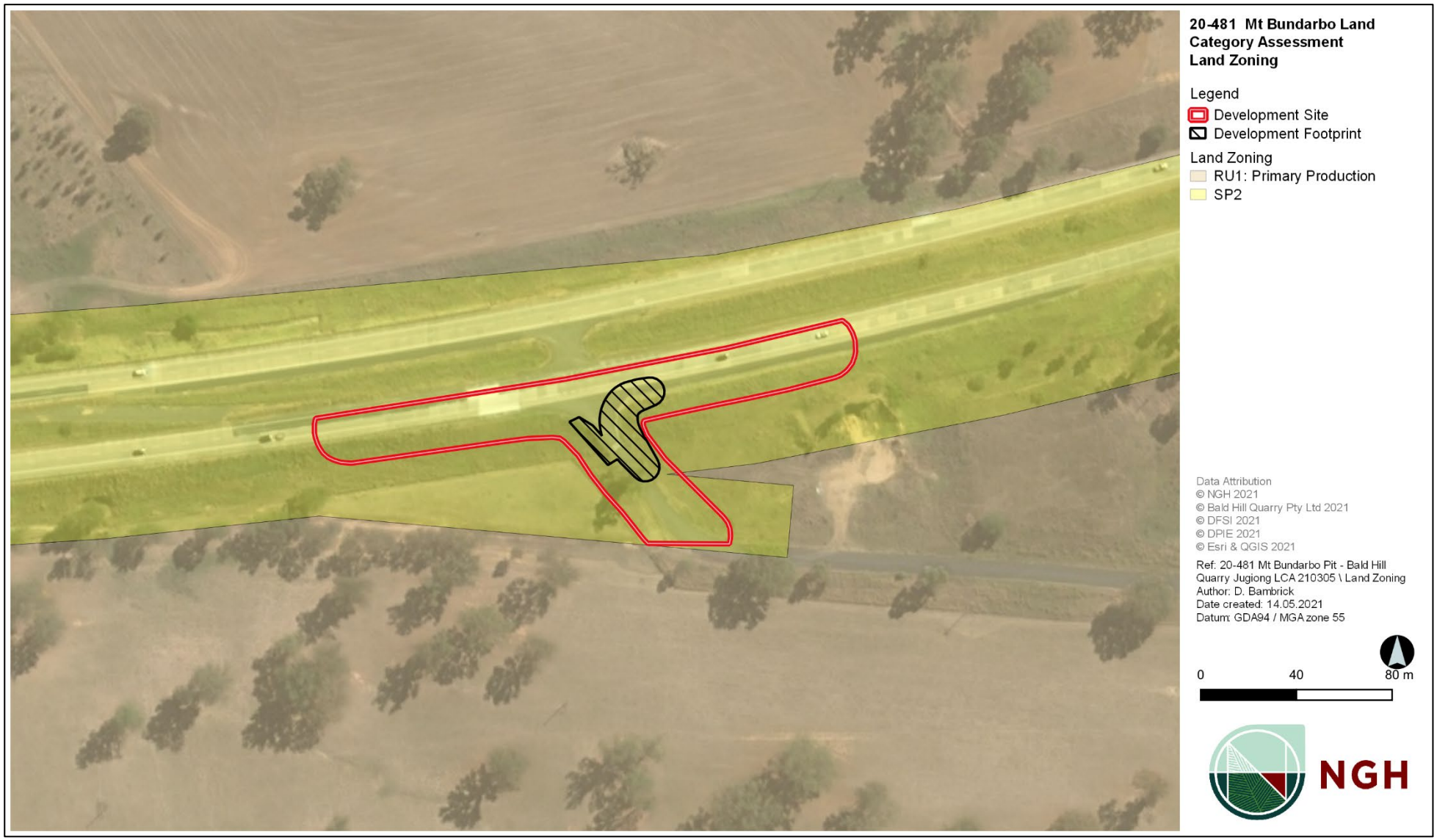

Figure 1-10: Land Zoning Hume Highway

A.6 Woody Vegetation Extent

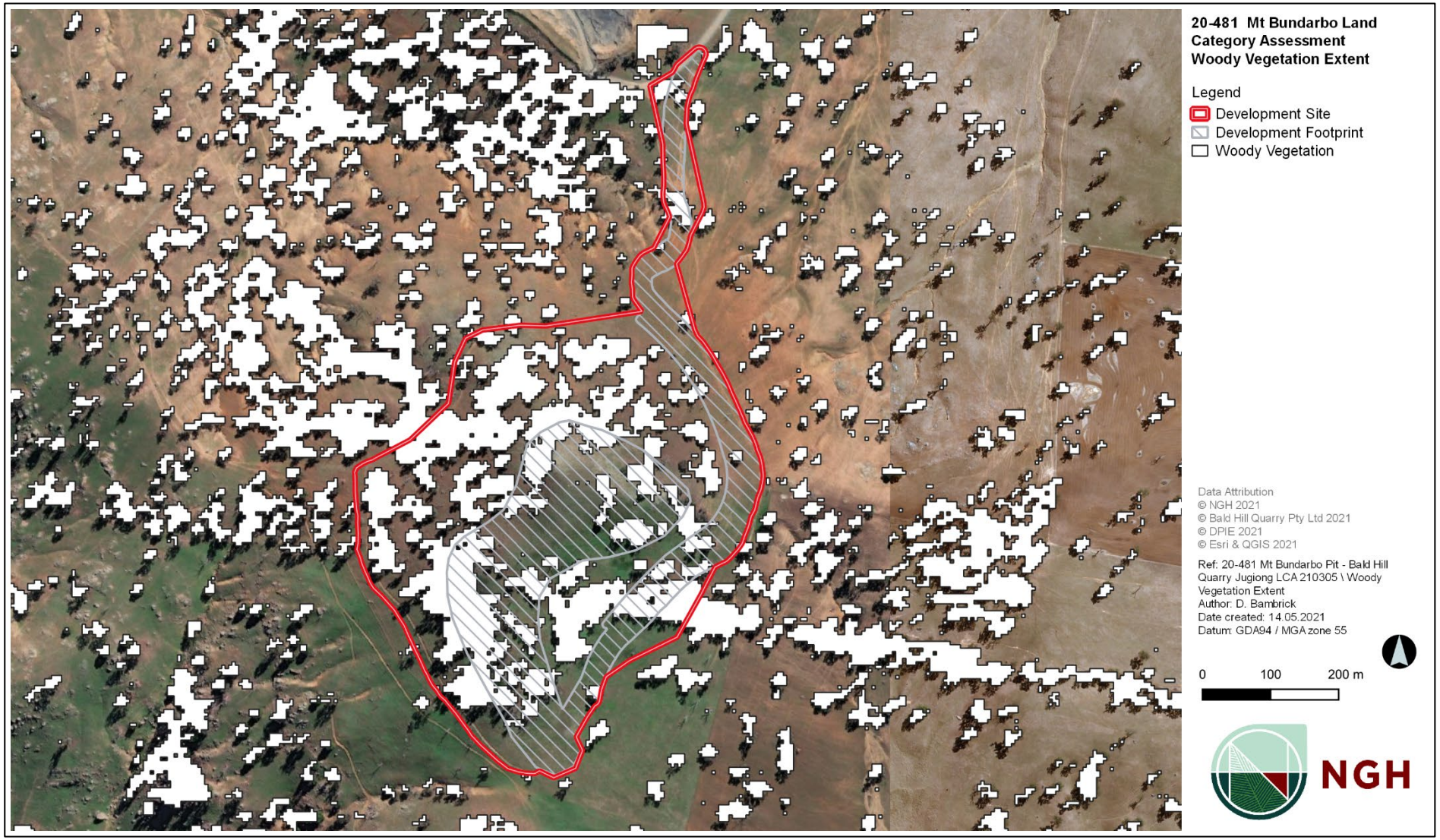

Figure 1-11: Woody vegetation Extent Mt Bundarbo

Figure 1-12: Woody vegetation Extent Hume Highway

A.7 Native Regulated Land

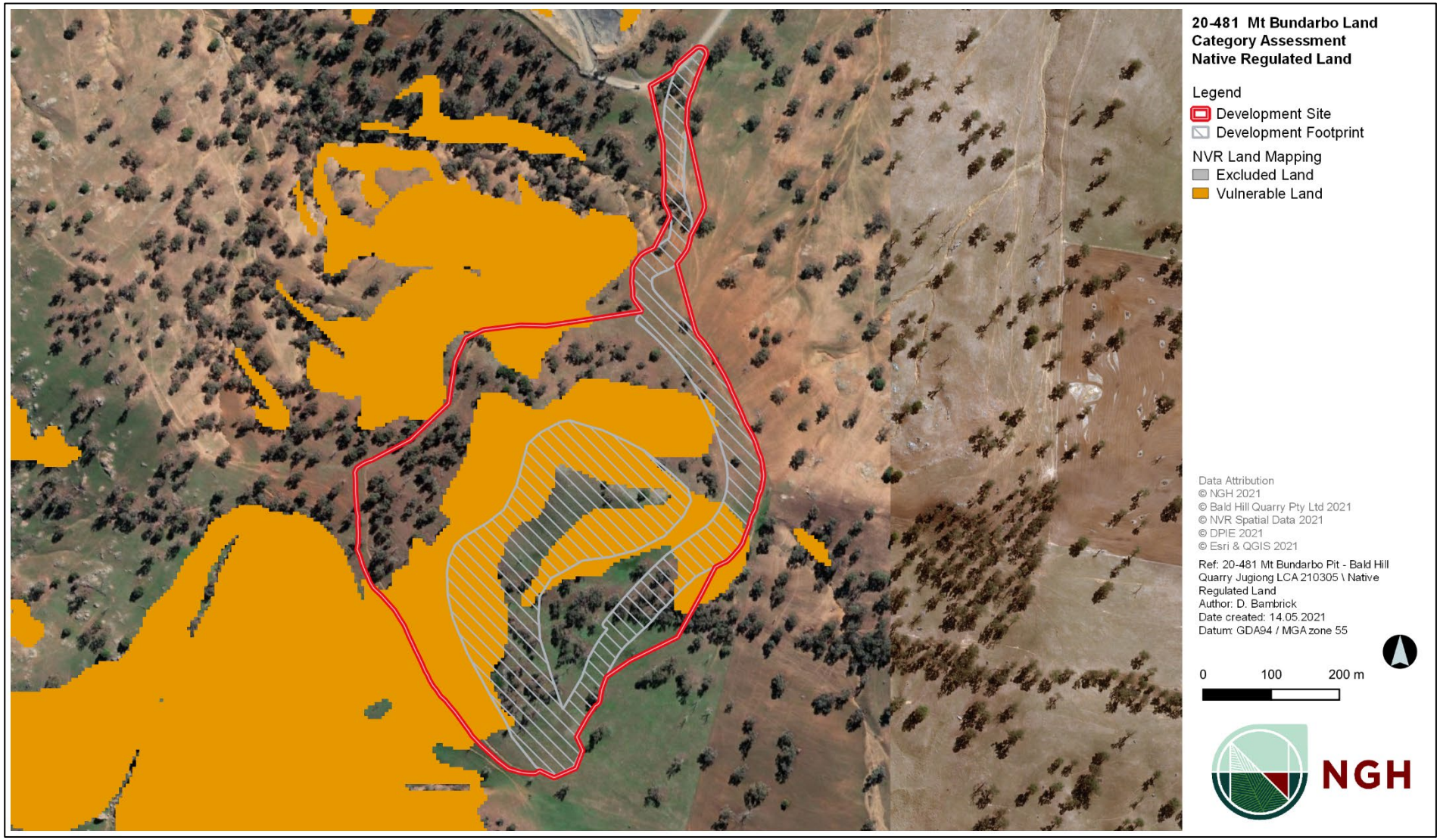

Figure 1-13: Native Regulated Land Mt Bundarbo

Figure 1-14: Native Regulated Land Hume Highway

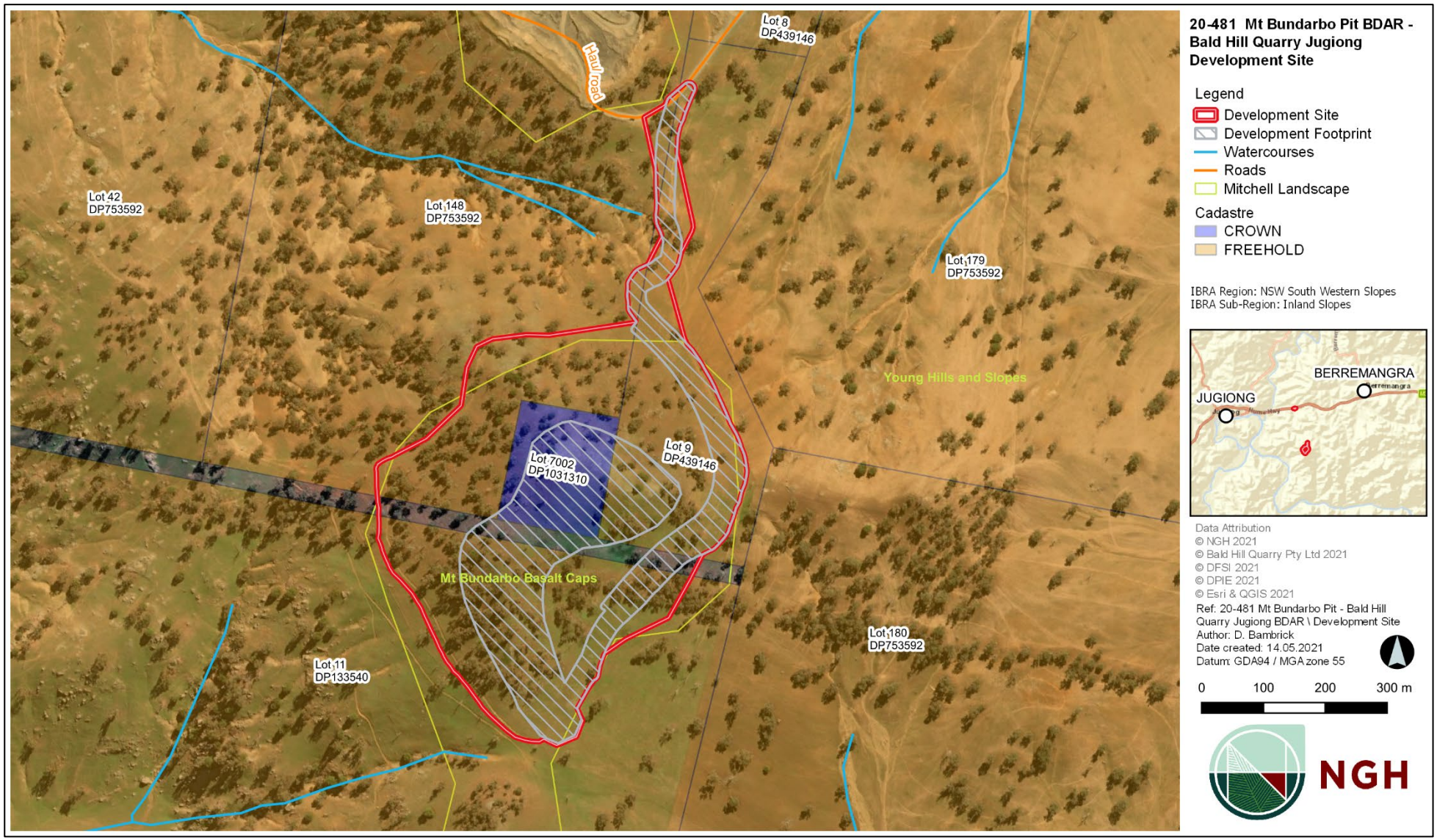

Figure 1-15 Council Lots Mt Bundarbo

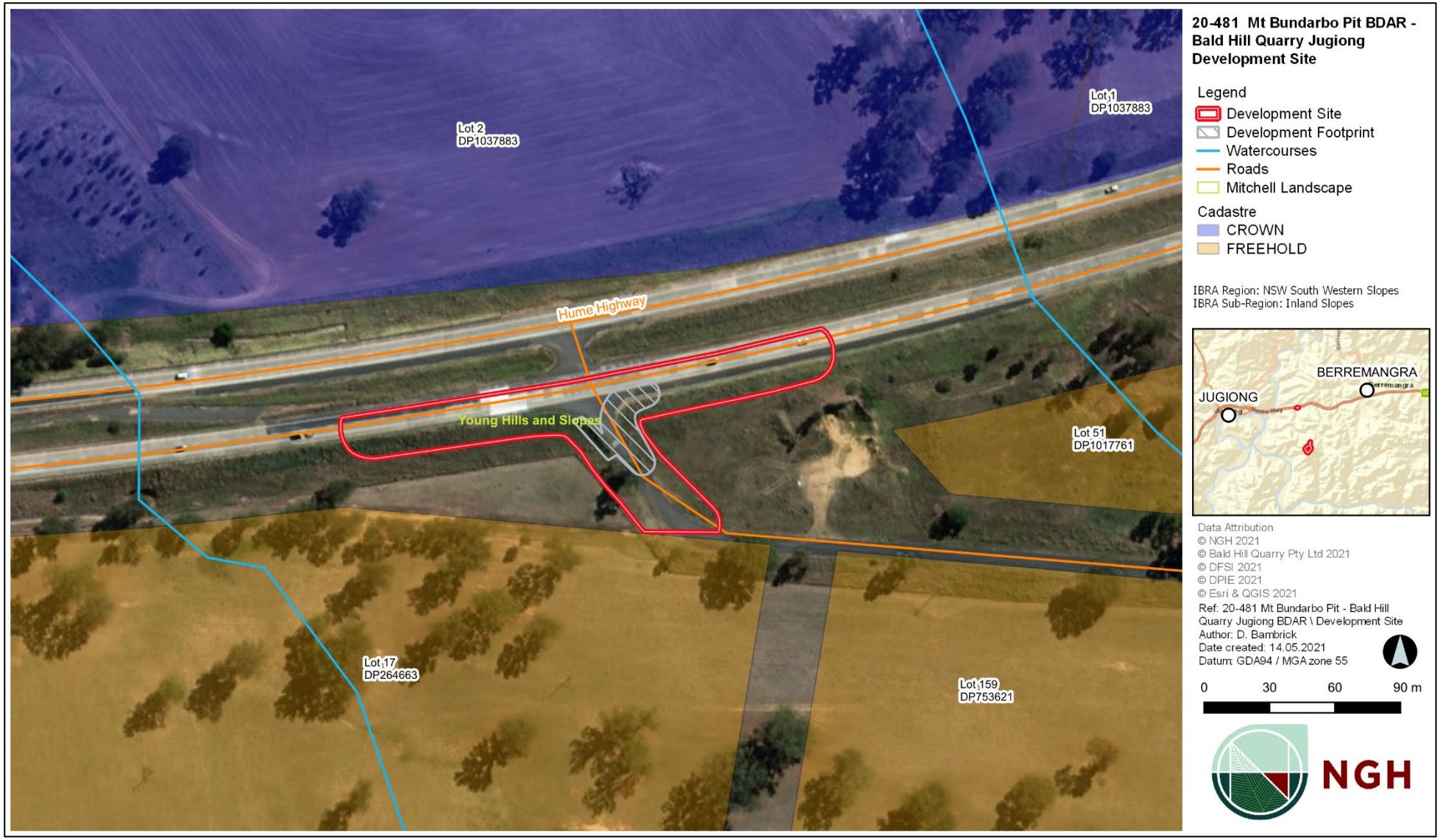

Figure 1-16 Council Lots Hume Highway

Appendix I HBT Tree Inventory

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
1	White Box	*Eucalyptus albens*	50		4	2							629630.6	6142298.3	Retain
2	Stag	*Eucalyptus sp.*	50										629634.9	6142304.9	Retain
3	White Box	*Eucalyptus albens*	50										629634.9	6142304.9	Retain
4	White Box	*Eucalyptus albens*	50					2					629614.1	6142291.2	Retain
5	White Box	*Eucalyptus albens*	50		2								629599.6	6142286.8	Retain
6	White Box	*Eucalyptus albens*	50		1	1		2					629762.2	6142947.9	Remove
7	White Box	*Eucalyptus albens*	50			1	1		1				629755.4	6142967.3	Remove
8	White Box	*Eucalyptus albens*	50				1	2	3				629759.8	6142976.2	Remove
9	White Box	*Eucalyptus albens*	60				3						629745.6	6142979.7	Retain
10	White Box	*Eucalyptus albens*	50					3					629747.9	6143022.9	Remove
11	White Box	*Eucalyptus albens*	50					4					633373.4	6147048.6	Retain
12	White Box	*Eucalyptus*	50				1	1					629742.3	6143118.7	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
		albens													
13	White Box	*Eucalyptus albens*	50				1	1					629765.2	6143131.1	Remove
14	White Box	*Eucalyptus albens*	50				2	1					629774.6	6143145.9	Remove
15	White Box	*Eucalyptus albens*	50					2					629787.3	6142963.3	Retain
16	White Box	*Eucalyptus albens*	50					2					629786	6142941.1	Remove
17	White Box	*Eucalyptus albens*	50	1				2					629790	6142947.2	Retain
18	White Box	*Eucalyptus albens*	50				1	1			1		629800	6142927	Remove
19	White Box	*Eucalyptus albens*	70	2	1								629408.9	6142623	Retain
20	White Box	*Eucalyptus albens*	50	1									629405.6	6142608.8	Retain
21	White Box	*Eucalyptus albens*	40	1	1								629415.9	6142590.3	Retain
22	Stag	*Eucalyptus sp*	30		1								629417.9	6142595	Retain
23	White Box	*Eucalyptus albens*	50				2						629429.6	6142591.8	Retain
24	White Box	*Eucalyptus albens*	80				3						629441.5	6142592.2	Retain
25	White Box	*Eucalyptus albens*	50				2						629460.3	6142556.9	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
26	White Box	*Eucalyptus albens*	50				3						629464.9	6142558.6	Retain
27	White Box	*Eucalyptus albens*	50	1									629461	6142551.1	Retain
28	White Box	*Eucalyptus albens*	50					1					629471.8	6142564.6	Retain
29	White Box	*Eucalyptus albens*	50	1			1						629483.6	6142567.2	Retain
30	Stag	*Eucalyptus sp*	50	1				2					629490.5	6142557.6	Retain
31	Stag	*Eucalyptus sp*	50				2						629474.5	6142560.9	Retain
32	White Box	*Eucalyptus albens*	90	1	1		2						629474.5	6142560.9	Retain
33	Stag	*Eucalyptus sp*	50			1		6					629524.1	6142502.1	Remove
34	White Box	*Eucalyptus albens*	50				8						629537.9	6142509.9	Remove
35	Stag	*Eucalyptus sp*	50		2								629541	6142513.1	Remove
36	White Box	*Eucalyptus albens*	50	2									629528.1	6142519.6	Remove
37	White Box	*Eucalyptus albens*	90	3			1						629517.3	6142538.9	Retain
38	White Box	*Eucalyptus albens*	50	3			1						629520.4	6142549.8	Retain
39	White Box	*Eucalyptus albens*	100	1			1						629509.7	6142510.6	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
40	White Box	*Eucalyptus albens*	60		1			1					629481.1	6142495.6	Retain
41	Stag	*Eucalyptus sp*	50		1		2						629479.2	6142501.7	Retain
42	Stag	*Eucalyptus sp*	50	2									629497.3	6142537.7	Retain
43	White Box	*Eucalyptus albens*	60	1									629469.4	6142508.2	Retain
44	White Box	*Eucalyptus albens*	50	1			1						629466.1	6142521.2	Retain
45	White Box	*Eucalyptus albens*	50	2									629456.3	6142522	Retain
46	White Box	*Eucalyptus albens*	50				4						629453.6	6142524.9	Retain
47	White Box	*Eucalyptus albens*	50	3			1						629453.1	6142529.5	Retain
48	Stag	*Eucalyptus sp*	50				8						629454.1	6142540.3	Retain
49	White Box	*Eucalyptus albens*	70	3									629418.2	6142542	Retain
50	White Box	*Eucalyptus albens*	60				3						629414.1	6142553.8	Retain
51	White Box	*Eucalyptus albens*	80	1									629409.2	6142574	Retain
52	White Box	*Eucalyptus albens*	40	1									629404.8	6142567	Retain
53	White Box	*Eucalyptus albens*	50				1						629398.5	6142563.6	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
54	White Box	*Eucalyptus albens*	40				3						629399.3	6142585.7	Retain
55	White Box	*Eucalyptus albens*	70	2									629382	6142583.4	Retain
56	Stag	*Eucalyptus sp*	40				3						629380.5	6142582.8	Retain
57	White Box	*Eucalyptus albens*	60	1									629385.9	6142597	Retain
58	White Box	*Eucalyptus albens*	50				1						629376.2	6142591.5	Retain
59	Stag	*Eucalyptus sp*	60				4						629355.7	6142563	Retain
60	White Box	*Eucalyptus albens*	100				3						629388.3	6142390.6	Retain
61	White Box	*Eucalyptus albens*	80				2						629408.4	6142404.7	Retain
62	White Box	*Eucalyptus albens*	40	1									629413.5	6142402	Retain
63	White Box	*Eucalyptus albens*	50	1									629420.1	6142394.7	Retain
64	White Box	*Eucalyptus albens*	40	1									629428.8	6142380	Retain
65	Stag	*Eucalyptus sp*	50	2									629418.6	6142376.3	Retain
66	White Box	*Eucalyptus albens*	40	2									629425.6	6142362.4	Retain
67	White Box	*Eucalyptus albens*	40	1									629436.7	6142362.4	Remove
68	White Box	*Eucalyptus*	50	1									629442.6	6142338.2	Remove

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
		albens													
69	White Box	*Eucalyptus albens*	90			1							629446.8	6142319.2	Retain
70	White Box	*Eucalyptus albens*	40				3						629441.2	6142303.7	Retain
71	White Box	*Eucalyptus albens*	30		1								629439.7	6142299.4	Retain
72	White Box	*Eucalyptus albens*	40				2						629435.9	6142299.3	Retain
73	White Box	*Eucalyptus albens*	50			1							629434.8	6142287.3	Retain
74	Stag	*Eucalyptus sp*	30	3									629432.7	6142280.9	Retain
75	Stag	*Eucalyptus sp*	30	4									629431.8	6142277.9	Retain
76	White Box	*Eucalyptus albens*	50	1									629455.1	6142248.1	Retain
77	Stag	*Eucalyptus sp*	60	1	1								629576	6142267.9	Remove
78	White Box	*Eucalyptus albens*	50		4	2							629630.6	6142298.3	Retain
79	Stag	*Eucalyptus sp*	50										629634.9	6142304.9	Retain
80	White Box	*Eucalyptus albens*	50										629634.9	6142304.9	Retain
81	White Box	*Eucalyptus albens*	50					2					629614.1	6142291.2	Retain
82	White Box	*Eucalyptus*	50		2								629599.6	6142286.8	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
		albens													
83	White Box	*Eucalyptus albens*	50					4					633373.4	6147048.6	Retain
84	Stag	*Eucalyptus sp*	70				2						629841.7	6142649.8	Remove
85	Stag	*Eucalyptus sp*	60	2			2	2					629714	6142641.4	Retain
86	Stag	*Eucalyptus sp*	30				2			1			629782.5	6142704.4	Remove
87	White Box E	*Eucalyptus albens*	80				1			2			629736.3	6142745.7	Retain
88	White Box	*Eucalyptus albens*	100	1						1			629682.3	6142742.3	Retain
89	White Box	*Eucalyptus albens*	30							1			629676.8	6142694.8	Retain
90	Stag	*Eucalyptus sp*	40	3			2						629669.2	6142753.6	Retain
91	Stag	*Eucalyptus sp*	40							2			629672.4	6142757	Retain
92	Stag	*Eucalyptus sp*	50							2			629672.5	6142794	Retain
93	White Box	*Eucalyptus albens*	50				2						629595.8	6142766.5	Retain
94	White Box	*Eucalyptus albens*	110							2			629573.4	6142745.3	Retain
95	White Box	*Eucalyptus albens*	60				3						629558.6	6142721.5	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
96	White Box	*Eucalyptus albens*	50					3					629547.4	6142718.2	Retain
97	White Box	*Eucalyptus albens*	70				1	1					629530.6	6142738.7	Retain
98	White Box	*Eucalyptus albens*	50				2						629533.1	6142724	Retain
99	White Box	*Eucalyptus albens*	40							1			629532.1	6142710.3	Retain
100	Stag	*Eucalyptus sp*	50				5						629516.8	6142703.9	Retain
101	Stag	*Eucalyptus sp*	35				2	3					629532.1	6142745.6	Retain
102	White Box	*Eucalyptus albens*	65				1	2				1	629574.9	6142634.1	Retain
103	White Box	*Eucalyptus albens*	55						1				629523.8	6142666.1	Retain
104	White Box	*Eucalyptus albens*	70				1						629585.6	6142614.5	Remove
105	White Box	*Eucalyptus albens*	70									2	629523.8	6142721.3	Retain
106	White Box	*Eucalyptus albens*	70				1	2					629610.6	6142645.4	Retain
107	White Box	*Eucalyptus albens*	70	1	1								629558.6	6142564.1	Remove
108	White Box	*Eucalyptus albens*	70	1	1								629597.5	6142674.7	Retain
109	White Box	*Eucalyptus albens*	100						1				629635.8	6142640.7	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
110	White Box	*Eucalyptus albens*	100				3	1					629638.6	6142623.5	Remove
111	White Box	*Eucalyptus albens*	80			1	2						629675.9	6142613.5	Remove
112	Stag	*Eucalyptus sp*	100		1		2						629680	6142624.5	Retain
113	White Box	*Eucalyptus albens*	100	1						1			629725.5	6142602.1	Retain
114	White Box	*Eucalyptus albens*	50					1	1				629734.9	6142596.2	Retain
115	White Box	*Eucalyptus albens*	80				3	1					629752.2	6142577.8	Retain
116	White Box	*Eucalyptus albens*	110							2			629782.6	6142573.8	Retain
117	White Box	*Eucalyptus albens*	70		1		3						629770	6142539.7	Remove
118	White Box	*Eucalyptus albens*	170			1							629776	6142532.9	Remove
119	White Box	*Eucalyptus albens*	60							1			629775.2	6142508.8	Remove
120	White Box	*Eucalyptus albens*	50	1									629792.3	6142516.3	Retain
121	Stag	*Eucalyptus sp*	20				3						629773.2	6142534.4	Remove
122	Stag	*Eucalyptus sp*	25				3						629790.6	6142509.1	Retain
123	White Box	*Eucalyptus albens*	70	1			2						629789.1	6142493	Retain
124	White Box	*Eucalyptus*	55	1			2						629806.8	6142491.7	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
		albens													
125	White Box	*Eucalyptus albens*	80				4						629832.1	6142575.8	Retain
126	White Box	*Eucalyptus albens*	60								1		629811.5	6142533.9	Retain
127	White Box	*Eucalyptus albens*	100					1		1			629825.5	6142546.5	Retain
128	White Box	*Eucalyptus albens*	80	1				1		1			629820	6142570.9	Retain
129	White Box	*Eucalyptus albens*	120				2	2	1				629801.1	6142681.2	Remove
130	White Box	*Eucalyptus albens*	80					1	1				629715.9	6142427.9	Retain
131	White Box	*Eucalyptus albens*	120							1			629689.7	6142542.4	Remove
132	White Box	*Eucalyptus albens*	120				2	1					629783.6	6142447.2	Remove
133	White Box	*Eucalyptus albens*	50				1						629780.2	6142357	Retain
134	White Box	*Eucalyptus albens*	90				1						629759.3	6142357.1	Retain
135	White Box	*Eucalyptus albens*	50							1			629749.4	6142362.5	Remove
136	White Box	*Eucalyptus albens*	90				1				1	2	629730.6	6142356.6	Remove
137	White Box	*Eucalyptus albens*	50						1				629715.2	6142357	Remove

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
138	White Box	*Eucalyptus albens*	25	1									629710.4	6142361	Remove
139	White Box	*Eucalyptus albens*	50	1									629685.7	6142362.6	Remove
140	Stag	*Eucalyptus sp*	40				2			1			629655.8	6142362.4	Retain
141	White Box	*Eucalyptus albens*	60				3						629649	6142380.3	Retain
142	White Box	*Eucalyptus albens*	60				2						629629.6	6142425.1	Retain
143	White Box	*Eucalyptus albens*	100				2						629614.7	6142403.1	Retain
144	White Box	*Eucalyptus albens*	20							1			629605.7	6142411.7	Retain
145	White Box	*Eucalyptus albens*	40				1						629602.8	6142411.4	Retain
146	Stag	*Eucalyptus sp*	50				2						629598.2	6142427.9	Remove
147	White Box E	*Eucalyptus albens*	150				2	2					629582.6	6142429.8	Remove
148	White Box	*Eucalyptus albens*	40				1						629557.4	6142414.5	Remove
149	Stag	*Eucalyptus sp*	20	1									629556.9	6142411.7	Remove
150	White Box	*Eucalyptus albens*	55				2						629541.7	6142438.7	Remove
151	White Box	*Eucalyptus albens*	50				1						629517.4	6142418	Remove
152	White Box	*Eucalyptus*	40				2						629495.7	6142429.6	Remove

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
		albens													
153	Stag	*Eucalyptus sp*	50				4						629523.6	6142381.4	Remove
154	White Box	*Eucalyptus albens*	45				1						629507.5	6142372.4	Remove
155	Stag	*Eucalyptus sp*	40				2			3			629513.2	6142364.1	Remove
156	White Box	*Eucalyptus albens*	60		1		2						629495.9	6142338.9	Remove
157	White Box	*Eucalyptus albens*	30				1			1			629500.9	6142331	Remove
158	White Box	*Eucalyptus albens*	50					1					629494.3	6142331.9	Remove
159	Stag	*Eucalyptus sp*	50	3			2						629524.5	6142308.8	Remove
160	Stag	*Eucalyptus sp*	50	1	1								629536.9	6142297.5	Remove
161	White Box	*Eucalyptus albens*	100				2	1					629554.9	6142300.3	Remove
162	White Box	*Eucalyptus albens*	60				1						629565.1	6142313.2	Remove
163	White Box	*Eucalyptus albens*	55					1					629422.8	6142636.5	Retain
164	Stag	*Eucalyptus sp*	60				1					1	629452.1	6142612.2	Retain
165	Stag	*Eucalyptus sp*	50		1								629452.4	6142613.4	Retain
166	White Box	*Eucalyptus*	80				1						629466.1	6142596.9	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
		albens													
167	White Box	*Eucalyptus albens*	100				1						629477.5	6142605.3	Retain
168	White Box	*Eucalyptus albens*	60				1						629503.3	6142600.4	Retain
169	White Box	*Eucalyptus albens*	55					1					629556	6142589.2	Remove
170	White Box	*Eucalyptus albens*	60		1								629507.9	6142576.4	Retain
171	White Box	*Eucalyptus albens*	60		1		1	1					629542.9	6142608.8	Retain
172	White Box	*Eucalyptus albens*	50				1						629510.3	6142631.7	Retain
173	White Box	*Eucalyptus albens*	70				2						629493.2	6142623	Retain
174	White Box	*Eucalyptus albens*	100	1				2					629480.6	6142636.1	Retain
175	White Box	*Eucalyptus albens*	100				3			3			629458.9	6142628.6	Retain
176	White Box	*Eucalyptus albens*	70	2						1			629436.2	6142484.5	Retain
177	White Box	*Eucalyptus albens*	70								1		629423.4	6142481.2	Retain
178	White Box	*Eucalyptus albens*	50										629404.3	6142504.8	Retain
179	White Box	*Eucalyptus albens*	50					1					629399.7	6142507	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
180	White Box	*Eucalyptus albens*	60		1			3					629377.2	6142509.7	Retain
181	Stag	*Eucalyptus sp*	70	1									629402.7	6142530.2	Retain
182	White Box	*Eucalyptus albens*	60				1						629349.9	6142528.8	Retain
183	White Box	*Eucalyptus albens*	50										629348.8	6142533.7	Retain
184	White Box	*Eucalyptus albens*	40			1							629336.2	6142522	Retain
185	White Box	*Eucalyptus albens*	60			1							629390.5	6142491.9	Retain
186	White Box	*Eucalyptus albens*	80		1			1					629345	6142472.5	Retain
187	White Box	*Eucalyptus albens*	80					1		1			629390.6	6142465.9	Retain
188	Stag	*Eucalyptus sp*	60	1			1						629427.5	6142422	Retain
189	Stag	*Eucalyptus sp*	50										629415.5	6142421.9	Retain
190	White Box	*Eucalyptus albens*	40	1									629432.3	6142392.1	Remove
191	White Box	*Eucalyptus albens*	30		1								629437.5	6142380.6	Remove
192	White Box	*Eucalyptus albens*	50										629459.2	6142347.4	Remove
193	White Box	*Eucalyptus albens*	70								1		629455.6	6142342.5	Remove

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
194	White Box	*Eucalyptus albens*	70		1								629464.9	6142334.1	Remove
195	Stag	*Eucalyptus sp*	50	1			4						629462.4	6142292.3	Remove
196	Stag	*Eucalyptus sp*	50					4					629473.2	6142277.1	Remove
197	White Box	*Eucalyptus albens*	50										629461.8	6142283.6	Retain
198	White Box	*Eucalyptus albens*	70					3	1				629446.1	6142243.9	Retain
199	White Box	*Eucalyptus albens*	40				1						629481.9	6142242.5	Retain
200	White Box	*Eucalyptus albens*	50				2						629560.7	6142254.9	Remove
201	White Box	*Eucalyptus albens*	60				1						629573.3	6142239.1	Remove
202	White Box	*Eucalyptus albens*	50		4	2							629630.6	6142298.3	Retain
203	Stag	*Eucalyptus sp*	50										629634.9	6142304.9	Retain
204	White Box	*Eucalyptus albens*	50										629634.9	6142304.9	Retain
205	White Box	*Eucalyptus albens*	50					2					629614.1	6142291.2	Retain
206	White Box	*Eucalyptus albens*	50		2								629599.6	6142286.8	Retain
207	White Box	*Eucalyptus albens*	50					4					633373.4	6147048.6	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
208	Stag	*Eucalyptus sp*	50				2						633373.4	6147048.6	Retain
209	Stag	*Eucalyptus sp*	80				1	2					633373.4	6147048.6	Retain
210	Stag	*Eucalyptus sp*	80				1	2					629796.2	6142665.2	Retain
211	Stag	*Eucalyptus sp*	80					2					629810.3	6142669	Remove
212	White Box	*Eucalyptus albens*	40				1						629785.2	6142671.2	Retain
213	White Box	*Eucalyptus albens*	70				1	2					629762.1	6142672.1	Retain
214	Stag	*Eucalyptus sp*	70				3	4					629756.3	6142663.4	Retain
215	White Box	*Eucalyptus albens*	80				1						629750.4	6142698.9	Retain
216	Stag	*Eucalyptus sp*	70				3	4					629714	6142704.2	Retain
217	White Box	*Eucalyptus albens*	90				2						629705.7	6142693.5	Retain
218	White Box	*Eucalyptus albens*	120	1			2						629701.8	6142685.3	Retain
219	White Box	*Eucalyptus albens*	65				1						629696.4	6142691.2	Retain
220	White Box	*Eucalyptus albens*	70				1	1					629698.1	6142706.8	Retain
221	Stag	*Eucalyptus sp*	90				4						629704.9	6142705.9	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
222	Stag	*Eucalyptus sp*	100				4						629671.8	6142724.7	Retain
223	White Box	*Eucalyptus albens*	80				2	1	1				629658.4	6142737	Retain
224	White Box	*Eucalyptus albens*	60				1						629640.5	6142740.1	Retain
225	White Box	*Eucalyptus albens*	80				3						629627	6142737.8	Retain
226	White Box	*Eucalyptus albens*	60				3						629611.1	6142740.3	Retain
227	Stag	*Eucalyptus sp*	90				3	1					629581	6142744.7	Retain
228	White Box	*Eucalyptus albens*	70				3						629585.8	6142714.1	Retain
229	White Box	*Eucalyptus albens*	60				1	1					629570.1	6142681.5	Retain
230	White Box	*Eucalyptus albens*	60				2						629553.7	6142671.8	Retain
231	White Box	*Eucalyptus albens*	90				5	4	2				629518.8	6142664.5	Retain
232	White Box	*Eucalyptus albens*	50		1		2	3					629543.6	6142635.9	Retain
233	Stag	*Eucalyptus sp*	70				3						629544.5	6142615.6	Retain
234	White Box	*Eucalyptus albens*	80		2		3	1					629561.5	6142615.4	Remove
235	White Box	*Eucalyptus albens*	60				2	1					629566.9	6142616.5	Remove

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
236	White Box	*Eucalyptus albens*	50				2						629572.6	6142569.3	Remove
237	White Box	*Eucalyptus albens*	30				4						629568.6	6142575.9	Remove
238	White Box	*Eucalyptus albens*	60				3	1					629633.4	6142600.1	Remove
239	White Box	*Eucalyptus albens*	60				2	1					629639.8	6142619.9	Remove
240	White Box	*Eucalyptus albens*	70				4	1					629650.5	6142611.2	Remove
241	White Box	*Eucalyptus albens*	70				4	2					629625.9	6142630.5	Remove
242	White Box	*Eucalyptus albens*	70				3	1					629590.6	6142613.9	Remove
243	White Box	*Eucalyptus albens*	90				2						629663.8	6142611.2	Remove
244	White Box	*Eucalyptus albens*	90	1			3	5					629663.8	6142611.2	Remove
245	White Box	*Eucalyptus albens*	90				4						629705.7	6142570.7	Remove
246	White Box	*Eucalyptus albens*	90	1			3	4					629688.4	6142566	Remove
247	White Box	*Eucalyptus albens*	80				3						629673.1	6142543.4	Remove
248	White Box	*Eucalyptus albens*	60	3									629675.8	6142524.7	Remove
249	White Box	*Eucalyptus albens*	70				2	1	1				629736.8	6142625.3	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
250	Stag	*Eucalyptus sp*	90				2	4	4				629745.3	6142653.3	Retain
251	White Box	*Eucalyptus albens*	70				2	3					629727.9	6142641.7	Retain
252	White Box	*Eucalyptus albens*	50				1	2					629708.6	6142630.8	Retain
253	White Box	*Eucalyptus albens*	80				3	5			1		629709.1	6142660.1	Retain
254	White Box	*Eucalyptus albens*	90				3	1					629790.2	6142617.2	Retain
255	Stag	*Eucalyptus sp*	50				2	1					629798.1	6142626.5	Retain
256	White Box	*Eucalyptus albens*	50				1						629803.4	6142622.4	Retain
257	White Box	*Eucalyptus sp*	90				6						629805.6	6142610.2	Retain
258	Stag	*Eucalyptus sp*	70	2	1								629790.8	6142588.2	Retain
259	Stag	*Eucalyptus sp*	50				7						629797.1	6142587.9	Retain
260	White Box	*Eucalyptus albens*	60				5						629801.6	6142561.8	Retain
261	White Box	*Eucalyptus albens*	50				3	2	1				629799.4	6142553.5	Retain
262	White Box	*Eucalyptus albens*	50				5						629815.6	6142568.1	Retain
263	Stag	*Eucalyptus sp*	50				3	2					629817.5	6142576.4	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
264	White Box	*Eucalyptus albens*	80				2	1					629813	6142584.4	Retain
265	White Box	*Eucalyptus albens*	90				5						629753.1	6142428.3	Remove
266	White Box	*Eucalyptus albens*	90				1						629746.3	6142407.5	Remove
267	White Box	*Eucalyptus albens*	80				2	4					629765.8	6142405.7	Remove
268	Stag	*Eucalyptus sp*	50				4						629773.2	6142397.5	Remove
269	White Box	*Eucalyptus albens*	40				2						629796.4	6142368.5	Retain
270	White Box	*Eucalyptus albens*	50				3						629777.5	6142368.5	Retain
271	White Box	*Eucalyptus albens*	50				1						629770.9	6142366.5	Retain
272	White Box	*Eucalyptus albens*	60				4	2					629766.5	6142369.9	Retain
273	White Box	*Eucalyptus albens*	50	1			2						629766.2	6142377.7	Retain
274	White Box	*Eucalyptus albens*	50				2						629754.1	6142374	Remove
275	White Box	*Eucalyptus albens*	30				1						629748.7	6142370.2	Remove
276	White Box	*Eucalyptus albens*	50				2	3					629739.7	6142366.7	Remove
277	White Box	*Eucalyptus albens*	50				1	2					629739.1	6142374.5	Remove

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
278	White Box	*Eucalyptus albens*	70				2						629710	6142381.9	Remove
279	White Box	*Eucalyptus albens*	50		1		2						633373.4	6147048.6	Retain
280	White Box	*Eucalyptus albens*	50				3						629626.2	6142354.7	Retain
281	White Box	*Eucalyptus albens*	50				3	1					629618.5	6142360.4	Retain
282	White Box	*Eucalyptus albens*	60				1	2					629593.7	6142371.4	Retain
283	White Box	*Eucalyptus albens*	70				2	1					629566.2	6142387	Remove
284	White Box	*Eucalyptus albens*	50				1						629557.9	6142392.9	Remove
285	White Box	*Eucalyptus albens*	50				2						629586.9	6142373.1	Retain
286	White Box	*Eucalyptus albens*	50	1			2						629548	6142397.8	Remove
287	Stag	*Eucalyptus sp*	50				5						629529	6142379.7	Remove
288	White Box	*Eucalyptus albens*	50				4						629531.6	6142352.3	Remove
289	White Box	*Eucalyptus albens*	50				3						629550.8	6142326.2	Remove
290	White Box	*Eucalyptus albens*	50										629652.6	6142247.3	Remove
291	White Box	*Eucalyptus albens*	50										628553.2	6146473.8	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
292	White Box	*Eucalyptus albens*	50										629346.7	6142449.1	Retain
293	White Box	*Eucalyptus albens*	50										629331	6142444.5	Retain
294	White Box	*Eucalyptus albens*	50										629368.9	6142424.1	Retain
295	White Box	*Eucalyptus albens*	50										629327	6142422.6	Retain
296	White Box	*Eucalyptus albens*	50										629341.3	6142428.7	Retain
297	White Box	*Eucalyptus albens*	50										629318.8	6142528.9	Retain
298	White Box	*Eucalyptus albens*	50										629323.5	6142556.1	Retain
299	White Box	*Eucalyptus albens*	50										629328.1	6142545.8	Retain
300	White Box	*Eucalyptus albens*	50										629476.3	6142706.5	Retain
301	White Box	*Eucalyptus albens*	50										629457.3	6142724	Retain
302	White Box	*Eucalyptus albens*	50										629453	6142712.9	Retain
303	White Box	*Eucalyptus albens*	50										629447.3	6142698.3	Retain
304	White Box	*Eucalyptus albens*	50										629477	6142762.7	Retain
305	White Box	*Eucalyptus albens*	50										629486	6142749.8	Retain

Tree ID	Common Name	Scientific Name	HBT Detail										Easting	Northing	Status
			DBH (cm)	Small Trunk	Medium Trunk	Large Trunk	Small Limb	Medium Limb	Large Limb	Small Fissure	Medium Fissure	Large Fissure			
306	White Box	*Eucalyptus albens*	50										629520	6142768.8	Retain
307	White Box	*Eucalyptus albens*	50										629785.6	6142784.5	Remove
308	White Box	*Eucalyptus albens*	50										629737.2	6142893.3	Remove
309	White Box	*Eucalyptus albens*	50										629791.8	6142393.3	Retain
310	White Box	*Eucalyptus albens*	50										629857.3	6142589.6	Remove
311	White Box	*Eucalyptus albens*	50										629343.1	6142503	Retain
312	White Box	*Eucalyptus albens*	50										629324.7	6142506.4	Retain
313	White Box	*Eucalyptus albens*	50										629319.9	6142491.2	Retain
314	White Box	*Eucalyptus albens*	50										629330.4	6142480.3	Retain
315	White Box	*Eucalyptus albens*	50										629512.1	6142237.8	Remove
316	White Box	*Eucalyptus albens*	50										629532.5	6142260.7	Remove

Appendix J BCS Consultation and response

BCD Comment – SAII	NGH response
SAII Entity The Box-gum Woodland community (BGW) has undergone an extensive reduction in geographic distribution with widespread clearing throughout its range leaving its remnants typically small, isolated and fragmented. This has resulted in predominantly cleared landscapes that exhibit highly modified understories but still represent the listing (TSSC 2006)[2].	Section 9 of this BDAR was re-assessed and additional justifications and detail were included to aid in guiding the decision maker on determining the entities risk of SAII. Box Gum Woodland was identified as representing the BC Act listing in Section 9.2.
The BDAR's SAII justification does not examine this thoroughly and offers to make its own decision on whether or not it is an SAII entity. We note the assessor has made a determination within the BDAR. Accredited Assessors (AA) are not the decision maker for a determination of SAII this decision sits with the Consent Authority, in this case Council. The BDAR and assessment of the Risk of SAII should provide the information to the Council to make the decision. The AA should not provide a determination of SAII within the BDAR. It should be used to guide the decision maker (Council) on determining the entities risk if impacted by this development. Here is the link to the Guidelines to assist the decision maker to determine a serious and irreversible impact. https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and- plants/Biodiversity/guidance-decision-makers-determine-serious-irreversible-impact-190511.pdf	It was not the intent of the AA to make a determination in the report. However, on review the language may have been perceived this way. Wording was clarified in Chapter 9 to ensure clear communication that this BDAR does not offer to make a decision regarding a SAII determination.
The SAII section lacks justification, specifically the data for the rates of modification and clearing for this entity. The listing determination for this community states that there is little known, and it is difficult to measure as all the estimates regarding the rates of clearing for this community are likely to be underestimated. The community also has a large historical decline in its geographical distribution which was not clear from the SAII discussion supplied within the BDAR.	Section 9 has been updated to reflect the current threats facing the SAII entity and ensure there is adequate data presented which provides a robust and accurate assessment.
We also note that this community has no thresholds, which was not stated within the BDAR SAII evaluation. This means that any	Section 9 has been updated to clearly state that Box Gum Woodland has no current threshold.

BCD Comment – SAII	NGH response
impact could be determined as SAII. The principles for determining significant risk are set out in clause 6.7 *of the Biodiversity Conservation Regulation 2017.* These Principles need to be evaluated within the report and justified for the decision maker. This community is SAII in accordance with Principle 1, which is, *the impact will cause a further decline of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline*. The guidelines and principles have been developed to align with the International Union for Conservation of Nature (IUCN) requirements to list that ecological community as critically endangered, and this should be remembered when evaluating this section.	Chapter 9 has revised its assessment against the principles associated with Box Gum Woodland and provided further detail to assist Council in its determination.
As discussed above, the BDAR lacks detail to support the decision maker in their determination, such as characteristics and functionality of the community, threats and indirect impacts to the TEC and the inclusion of maps within this section. Lastly, we do support some of the measures proposed, however we feel that more detail and commitments need to be included, we have included some suggestions on how this section can be expanded below. • to fence, protect and enhance the remainder of the BGW in perpetuity with a vegetation management plan. This could outline management actions and regimes that replant the understorey and regenerate the overstorey, it should also incorporate the management of weeds, and place a section 88b covenant over the land for enforcement. • Select a separate area that is not already being managed or protected that contains remnant BGW that could have similar measures enacted as above, such as replanting, fencing and protection in perpetuity. This could potentially reconnect some habitat connectivity within the landscape.	Section 9 has been updated to assist Council in determining whether a SAII is possible. The characteristics and functionality of the community and threats and indirect impacts have now been assessed in detail in Section 9. Further mitigation regarding impacts to SAII Box Gum Woodland have also been proposed in Section 8.1.4 and been included in Table 8-1. The applicant is currently negotiating with the landowner to set aside a specific area for conservation of the Box Gum Woodland and a plan to manage and improve its quality as part of a Vegetation Management Plan. This mitigation is provided in Table 8.1. The applicant has considered also including a separate set-aside area, however this goal is likely to be unachievable based on land ownership dynamics. In addition to the mitigation measures in Table 8.1, offsets have been generated in accordance with the BAM and purchased to mitigate direct impacts to Box Gum Woodland in the development site.

BCS Comment – BDAR General	**NGH Response** – BDAR General
Figure 3-8 Plant Community Types in the development site, presents a map with X's for vegetation integrity plots, which would indicate that 18 plots were conducted, however we note that from the report it is stated only 9 were completed. This is misleading and could be displayed in a better way. We also highlight that the locations of the plots are questionable.	Nine (9) BAM plots were completed, 18 X's are shown in the original figure to detail start and end points, however, this was not clearly labelled, Figure 3-8 has been updated to illustrate the start/end location of each plot including plot ID. Plot locations were selected in accordance with the BAM methodology. Additional details regarding plot location and justification of method applied is provided in section 3.4.1.
We note that 315 hollow bearing trees (HBT) are recorded to be within the development site with 105 of these to be directly impacted and removed. No tree inventory was found within the report and no reference to how many trees other than those that contain hollows were recorded to be impacted. This should be supplied.	The HBT shapefile was reviewed, and a number of duplicate data points were identified. The HBT shapefile has been edited and changes updated in this report. The number of HBTs to be removed has been reduced from 105 to 97. Reference to HBT numbers in the document has been amended in Executive summary, section 7.1.3 and appendix G. An inventory of HBTs has been included as Appendix I. HBTs were recorded as part of the targeted fauna surveys and habitat assessment as part of the BDAR. Therefore, only HBTs were specifically recorded. Impacts to all non-hollow bearing trees are assessed as part of the calculated impacts to vegetation zones in accordance with BAM. No trees were identified as scattered trees in accordance with the criteria set in Section B.1 of the BAM. Therefore, specific details for all impacted individual trees are not a requirement of the BAM.
We don't support species credit species being assumed present, especially when surveys can be completed. The Brush-tailed Phascogale has been assumed present. We note the closest record is at least 50 km away and is a 93-year-old record. This species is unlikely to be present and the assumption of presence places undue costs on the proponent and can also pass the requirement of resourcing and cost of the credits onto the Biodiversity Conservation Trust.	Brush-tailed Phascogale was unable to be surveyed for during the assessment phase. Resourcing constraints and survey effort required under the newly released Guidelines made survey prohibitive at the time of investigation. Preliminary communication via phone call with the Species Expert Dr Rodney van der Ree indicated that the habitat would unlikely be degraded enough to rule out presence of the species without further assessment. A quote to engage the Species expert was reviewed and was considered as part of the assessment process for this candidate species.

BCS Comment – BDAR General	**NGH Response** – BDAR General
	The decision was made to take a precautionary approach and assume presence of the Brush-tailed Phascogale based on the following: • Low population densities, large home range size, annual male die-off and fluctuating local abundance make Brush-tailed Phascogales difficult to detect reliably (Bionet, 2020). • Communication with Species Expert Dr Rodney van der Ree indicated Brush-tailed Phascogale can occur in disturbed agricultural landscapes across large home ranges making detectability through survey difficult. • As a precautionary approach the species was assumed present due to the large number of fallen timber and hollow bearing trees present in the development site. • It was determined that there was a high probability that the expert would be unlikely to rule out suitable habitat and would recommend assuming presence for this species. The report has been updated as per above in the Executive Summary. The applicant has legally purchased like for like species credits for Brush-tailed Phascogale and ecosystem credits required for Box Gum Woodland.
The dates provided for surveys do not line up with the calendar dates. This contributes to the credibility of the report.	On Page 21, an error in the October survey dates (2nd to the 4th of October) was identified. This has been updated in line with field dates completed (6th – 9th October). All species were surveyed for within the specified survey periods in accordance with the BAM based on data produced from the calculator as of 26/05/2021.
We note that regarding the survey effort for threatened reptiles that '*At least 300 rocks were turned by each ecologist on each day of survey. Therefore, around 3000 rocks were within the development site.'* This is not a sound conclusion and misleading.	Further details regarding survey effort and justification has been included in Section 4.2.5. Clarification regarding assumed number of rocks turned has been made including a breakdown of person hours completed during reptile surveys. The calculation of total rocks surveyed was miss calculated and has been revised.
With reference to the rocks, which are a prescribed impact, there is no map to indicate	Additional descriptions of survey effort has been added to section 7.3.1 (ii) to detail all

BCS Comment – BDAR General	**NGH Response** – BDAR General
where the rocks are on site and no map to indicate where the rock rolling surveys were completed. See Figure 4-1. *Survey effort and targeted survey locations, Mt Bundarbo* only refers to diurnal avifaunal survey plots and call playback points, with transects for flora & fauna diurnal and spotlighting. More information and maps would be beneficial. Information on what would be done with the rocks post impact would also be beneficial, e.g. if they will be placed on the adjacent land to provide for future habitat.	areas of the development site (excluding the Hume Highway) contained varying levels of rocky habitat. All walked areas of the site surveyed during the diurnal periods were subject to rock turning. Due to data loss during the field surveys, the tracklog data represented in Figure 4-1 shows the tracklog data from one ecologist over the survey period for rock turning. Two tracklogs from another ecologist corrupted due to satellite/GPS connectivity issues. A note has been added to Figure 4-1 that states **Note data loss regarding transect records occurred during the field surveys, therefore the entire track log effort is not represented on this map.* The mitigation measure 'Relocate habitat features' has been amended to include rocky habitat in Table 8-1. 'Where practicable, surface rocks from within the impact area would be placed in adjacent woodland and derived grassland habitat to be retained'
The BDAR SAII section makes a statement that it isn't SAII, however the accredited assessor is unable to make this judgement and should only be providing evidence for the determining authority to make their decision.	Wording was clarified to ensure clear communication that this BDAR does not offer to make a decision regarding a SAII determination.
The BOAMs case was not submitted to either the decision maker, or BCD for assessment with this application (which can be done by our rog.southeast@environment.nsw.gov.au email). Therefore we have been unable to check the calculations in the credit calculator against the shape files for the development. This is required as part of the assessment process.	The BDAR case was finalised and the Final V1 BDAR was submitted to Council for approval on the 8th June 2021 including delivery of packaged shapefiles and data for analysis. Further communication was made with Council regarding BOAMS submission on the 8th June 2021. As Council was the determining authority, submission was not made to rog.southeast@environment.nsw.gov.au. If council wishes rog.southeast to be added to the CASE this can be completed.