

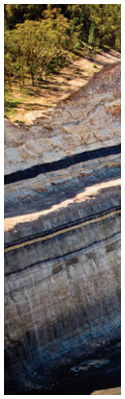



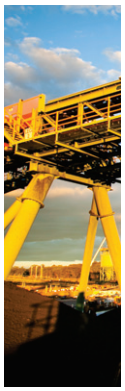

MOOLARBENCOAL

Moolarben Coal Complex
UG1 Optimisation Modification

Environmental Assessment

APPENDIX E

FLORA AND FAUNA IMPACT ASSESSMENT

Moolarben Coal Complex – UG1 Optimisation Modification

Flora and Fauna Impact Assessment

Prepared for
Moolarben Coal Operations Pty Ltd

21 May 2015

DOCUMENT TRACKING

Item	Detail
Project Name	Moolarben Coal Complex – UG1 Optimisation Modification Flora and Fauna Impact Assessment
Project	14MUDECO - 0020
File location	W:\Projects\Mudgee\14MUDECO\14MUDECO-0020
Project Manager	Rachel Murray (02) 4302 1228 Level 1, 79 Market St, Mudgee NSW 2850
Prepared by	David Allworth, Kurtis Lindsay and Daniel Magdi
Approved by	Mark Adams
Status	Final
Version	V1
Last saved on	21 May 2015
Cover Photo	*Eucalyptus punctata* (Grey Gum) and *Eucalyptus crebra* (Narrow-leaved Ironbark).

This report should be cited as 'Eco Logical Australia 21 May 2015. *Moolarben Coal Complex - UG1 Optimisation Modification Flora and Fauna Impact Assessment*. Prepared for Moolarben Coal Operations Pty Ltd.

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd.

Executive Summary

Eco Logical Australia was engaged by Moolarben Coal Operations Pty Ltd (MCO) to undertake a flora and fauna impact assessment for a proposed modification to the MCO Underground 1 (UG1) mine. This flora and fauna assessment will be used to support an environmental assessment to facilitate the modification of the Stage 1 Moolarben Coal Project Approval (PA 05_0117) and Stage 2 Moolarben Coal Project Approval (PA 08_0135) under section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The UG1 mine currently forms part of the Stage 2 Moolarben Coal Project.

MCO has recently lodged a separate modification (Open Cut 4 [OC4] South-West Modification) which proposes a realignment of the approved Stage 2 haul road. Realignment of the haul road will result in a reduction of surface disturbance associated with the Moolarben Coal Complex. This reduced surface disturbance footprint has been considered, where relevant, in the assessment of impacts associated with the UG1 Optimisation Modification within this report.

This flora and fauna impact assessment has been undertaken to determine any potential impacts from the proposed modification on threatened vegetation communities, flora and fauna within and adjacent to the proposed impact area pursuant to the EP&A Act, *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The proposed modification for UG1 consists of approximately 8.4 hectares of surface disturbance (clearing of vegetation) and approximately 115.7 hectares of underground activities below land that was not previously subject to subsidence from the approved Stage 2 Moolarben Coal Project.

The surface disturbance area contains two BioMetric vegetation types, including White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland), an Endangered Ecological Community (EEC) listed under the TSC Act and a Critically Endangered Ecological Community under the EPBC Act (CEEC). No threatened flora or fauna species were recorded within the surface disturbance areas of the UG1 Optimisation Modification.

The underground mining area contains five BioMetric vegetation types, of which two are EECs, including Box-Gum Woodland and Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions which is listed under the TSC Act. One threatened flora species, *Pomaderris queenslandica* (Scant Pomaderris), and six threatened fauna species *Calyptorhynchus lathami* (Glossy Black-Cockatoo), *Climacteris picumnus victoriae* (Brown Treecreeper [eastern subspecies]), *Chthonicola sagittata* (Speckled Warbler), *Daphoenositta chrysoptera* (Varied Sittella), *Stagnopleura guttata* (Diamond Firetail) and *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat) were recorded within the underground mining area.

Habitat requirements for observed and potentially occurring threatened species and ecological communities were compared with the study area's characteristics. Two threatened ecological communities, three threatened flora species, 37 threatened fauna species, and seven non-threatened migratory fauna species have potential to occur or have been recorded in the area. The two threatened ecological communities and 47 species were assessed in accordance with the relevant legislative guidelines.

The vegetation to be impacted by the proposed surface disturbance works is either located in previously disturbed areas or is adjacent to existing, cleared agricultural land and the Stage 2 Moolarben Coal Project area (PA 08_0135).

Assessments of significance were applied under section 5A of the EP&A Act as well as significance assessments under the EPBC Act guidelines to determine the potential impacts to species, populations and communities in the study area. Based on these detailed assessments (Appendices B and C) the UG1 Optimisation Modification is unlikely to result in significant impacts to threatened biodiversity.

Derived Native Grassland associated with Box-Gum Woodland will be impacted under the proposed works, however is not considered to be significantly impacted based upon the following:

- 0.25 hectares of EEC will be impacted by the expanded mining;
- the degraded condition of the Box-Gum Woodland Derived Native Grassland stand as a result of previous disturbance from grazing and historical clearing;
- the total clearance of native vegetation associated with the UG1 Optimisation Modification and the OC4 South-West Modification is 13.5 ha, approximately 5 ha less than the 18.5 ha associated with the approved Stage 2 Moolarben Coal Project; and
- the previously calculated offsets for Stage 2 Moolarben Coal Project (see the Biodiversity Offset Strategy) are based on the larger extent of clearing.

The proposed underground mining will potentially result in subsidence over an additional area of approximately 115.7 hectares. The impacts from subsidence on these areas are expected to be minimal and within the expected subsidence limits approved within the Stage 2 Moolarben Coal Project Approval.

Two EECs, Box-Gum Woodland (listed under the TSC Act and EPBC Act) and Central Hunter Grey Box – Ironbark Woodland (listed under the TSC Act) are located above the underground mining area and have undergone detailed assessments (Appendices B and C). The impacts of subsidence on vegetation above the underground mining areas are not expected to result in the loss of vegetation cover or community structure. As such, no significant impact is anticipated for these threatened ecological communities.

Habitat for observed and potential threatened flora and fauna species has also undergone detailed assessments (Appendices B and C). Fauna habitat (including potential Koala habitat) will not be directly impacted by the occurrence of subsidence. Direct mortality of plants and animals (including cave roosting bats) may occur as a result of subsidence-induced rock fall or collapse; however the impacts of such events are expected to be short-term and inconsequential.

The impacts associated with the proposed modification have been considered as not triggering the need for an EPBC referral.

The additional impacts associated with this modification (8.4 hectares of Derived Native Grassland including 0.25 of Box-Gum Woodland Derived Native Grassland) are well catered for within the established offsetting ratios of the Biodiversity Offset Strategy for the mine. The current Biodiversity Offset Strategy for Stage 2 will result in surplus areas under this proposal, as the proposed modification (in conjunction with the OC4 South-West Modification) results in less surface disturbance than the approved Stage 2 Project, as a result of the relocation of the haul road (13.5 hectares [including the OC4 South-West Modification] versus 18.5 hectares).

Mitigation measures for impacts on vegetation and fauna habitat will be undertaken in accordance with the Landscape Management Plan or its future revision (i.e. the Biodiversity Management Plan that is required under Project Approvals 05_0117 and 08_0135).

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Abbreviations

Abbreviation	Description
BOS	Biodiversity Offset Strategy
BOP	Biodiversity Offset Package
CEEC	Critically Endangered Ecological Community
DNG	Derived Native Grassland
DotE	Commonwealth of Australia Department of the Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
OEH	Office of Environment and Heritage
IA	Ecological Impact Assessment
KTP	Key Threatening Process
LGA	Local Government Area
MCO	Moolarben Coal Operations Pty Ltd
MNES	Matter of National Environmental Significance under EPBC Act
PMST	Protected Matters Search Tool
SIS	Species Impact Statement
TEC	Threatened Ecological Community
TSC Act	*Threatened Species Conservation Act 1995*

1 Introduction

1.1 BACKGROUND

Eco Logical Australia (ELA) was engaged by Moolarben Coal Operations Pty Ltd (MCO) to undertake a flora and fauna impact assessment for a proposed modification to the MCO Underground 1 (UG1) mine known as the UG1 Optimisation Modification (the modification). This flora and fauna assessment will be used to support an Environmental Assessment to facilitate the modification of the Stage 1 Moolarben Coal Project Approval (PA 05_0117) and Stage 2 Moolarben Coal Project Approval (PA 08_0135) under section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The UG1 mine currently forms part of the Stage 2 Moolarben Coal Project (Stage 2).

This flora and fauna impact assessment has been undertaken to determine any potential impacts from the proposed modification on threatened flora and fauna within and adjacent to the proposed impact area (i.e. the surface disturbance areas and underground mining areas), and is required pursuant to the EP&A Act, New South Wales (NSW) *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.2 DESCRIPTION OF PROJECT

The proposed modification would comprise three new surface disturbance areas (**Figure 1**):

- remote services facilities;
- rear air intake shaft and associated fan; and
- coal conveyor.

The proposed modification to UG1 will result in approximately 8.4 hectares (ha) of additional surface disturbance to native vegetation. A portion of the remote services facilities would be located on land approved for surface disturbance as part of the Stage 2 Project (**Figure 1**). Subsequent discussion, mapping and assessment of the remote services facilities within this report is therefore limited to those portions additional to the approved footprint. Additional surface disturbance would also include a narrow corridor for a coal conveyor, immediately south of the railway, near Ulan Road. No clearance of native vegetation would be associated with this small corridor, as it would be located in an area of exotic dominated grassland/cleared land. Due to the negligible impacts associated with this infrastructure, it is not considered further in this report.

The proposed modification would also result in additional subsidence impacts. Approximately 607 ha within the study area would be subject to subsidence impacts as part of the modification, however, large portions of this area have been assessed for subsidence impacts and approved as part of the Stage 2 Project. Further, impacts within areas which are currently approved for subsidence will be negligible (i.e. an increase in longwall width of 6 m and increase in seam extraction thickness of 300 millimetres [mm]). Areas additional to those which are currently approved (i.e. extension of longwalls to the north-east and south-west and removal of access roads across longwall panels) have been considered within this assessment. Areas additional to those which have been approved for subsidence impacts (and considered in this report) cover approximately 115.7 ha.

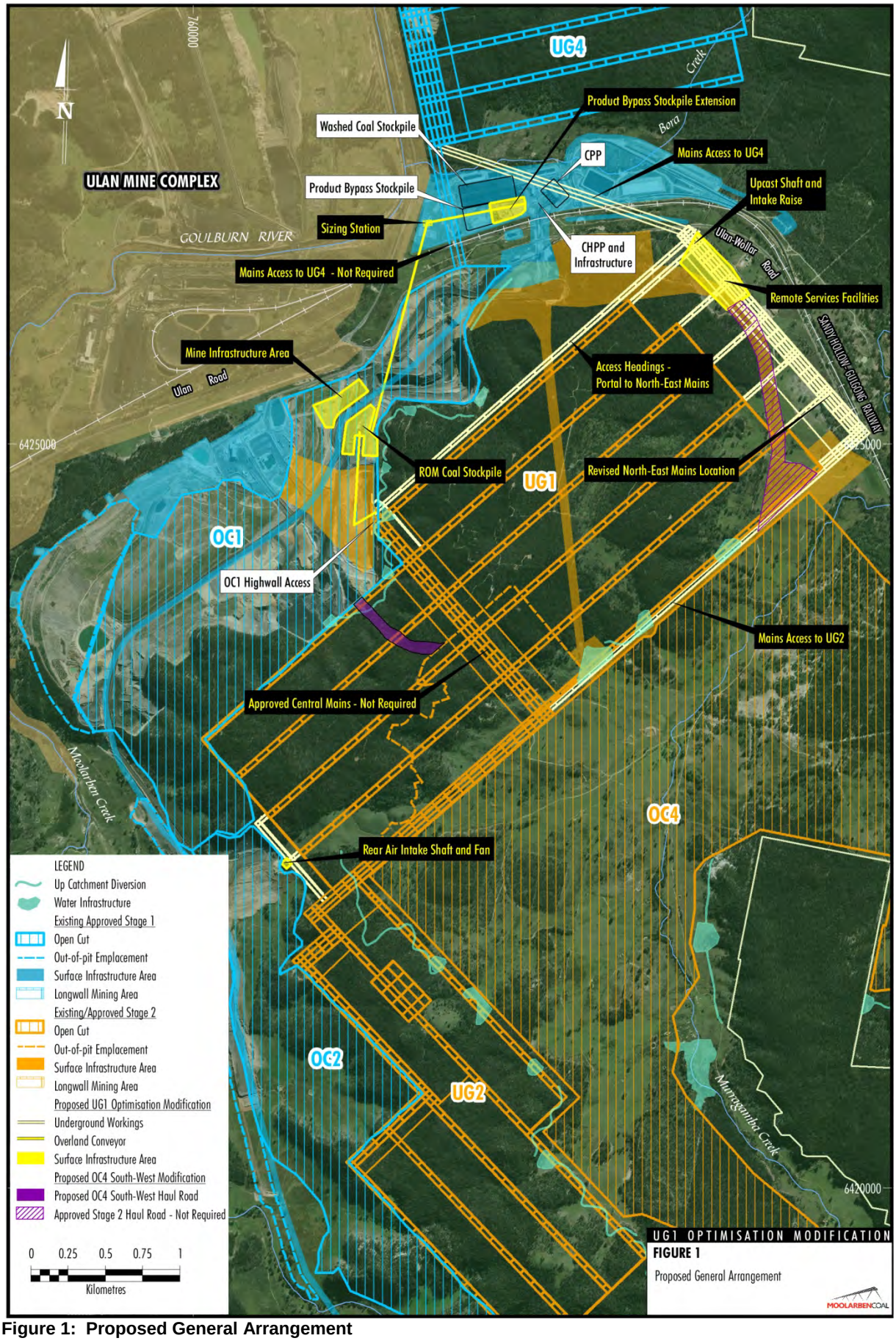

Figure 1: Proposed General Arrangement

The proposed modification will require surface disturbance activities (underground mine infrastructure construction and vegetation clearing) and underground mining (which would potentially result in subsidence from underground mining activities).

1.3 STUDY AREA

The Moolarben Coal Complex (MCC) is located approximately 40 kilometres (km) north of Mudgee within the Mid-Western Regional Council Local Government Area (LGA).

The modification study area is located to the south and east of the existing MCO surface activities (**Figure 1**). The area surveyed has been subject to historical clearing, logging and grazing. The larger north-eastern patch of surface disturbance has been heavily cleared and grazed in the past. The smaller (5 m x 5 m) pad of surface disturbance in the south-west is in close proximity to current open cut mine operations and is subject to impacts from dust, noise and vibration.

1.4 REPORT OBJECTIVES

The aims of this report are to:

- report on the ecological values present within the study area;
- assess the impact of the proposed works on threatened flora and fauna species, populations and ecological communities that occur or are likely to occur in the study area in accordance with TSC Act and EPBC Act requirements; and
- propose mitigation and management measures where appropriate to minimise and/or manage impacts.

1.5 LEGISLATIVE REQUIREMENTS

Relevant legislation is identified in **Table 1**.

Table 1: Legislation Relevant to the Proposed Works

Name	Relevance to the Project
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999	The EPBC Act establishes a process for assessing the environmental impact of activities and developments where "matters of national environmental significance" (MNES) may be affected. Under the Act, any action which "has, will have, or is likely to have a significant impact on a matter of national environmental significance" is defined as a "controlled action", and requires approval from the Commonwealth Department of the Environment (DotE) responsible for administering the EPBC Act. MNES have been identified on or near the site and have been considered in this report.
State	
Environmental Planning and Assessment Act 1979	The modification is to be assessed under Part 3A, section 75W of the EP&A Act. Assessments of significance for impacts to NSW threatened species and endangered ecological communities have been prepared in accordance with section 5A of the Act and the report addresses the relevant requirements of section 228 of the *Environmental Planning and Assessment Regulation 2000*.

Name	Relevance to the Project
Threatened Species Conservation Act 1995	The TSC Act, as amended, aims to protect and encourage the recovery of threatened species, populations and communities listed under the Act. The Act is integrated with the EP&A Act and requires consideration of whether a development is likely to significantly affect threatened species, populations and ecological communities or their habitat. This report assesses the potential impacts on threatened species, communities and populations and their habitat that are known or likely to occur, as described in the *Draft Guidelines for Threatened Species Assessment* (Department of Environment and Conservation and Department of Primary Industries [DEC & DPI], July 2005). This document identifies matters which are relevant to the assessment of impacts to threatened species, populations, or ecological communities, or their habitats arising from a development proposal assessed under the transitional provisions of Part 3A of the EP&A Act.
Fisheries Management Act 1995 (FM Act)	The FM Act provides for the protection, conservation, and recovery of threatened species defined under the Act. It also makes provision for the management of threats to aquatic threatened species, populations and ecological communities defined under the FM Act, as well as the protection of fish and fish habitat in general. No aquatic habitats or species will be impacted by the proposed works.
Noxious Weeds Act 1993 (NW Act)	The site contains weeds listed under the NW Act and proposed control measures have been proposed.
State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44)	Mid-Western Regional Council is listed as one of the Councils to which SEPP 44 applies *albeit* that the SEPP is not relevant to an application made under section 75W of the EP&A Act. Notwithstanding, the following has been considered for this assessment: • No LGA wide Koala Plan of Management has been developed by Mid-Western Regional Council to date. • *Eucalyptus albens* (White Box) located on site is a tree listed under Schedule 2 of SEPP 44 as a Koala feed tree species qualifying the site as 'potential koala habitat'. • Core Koala habitat means an area with a resident population of koalas, evidenced by attributes such as breeding females, recent sightings and historical records. • There is no current or recent history of Koala activity on site. • There is no Core Koala habitat.

2 Methods

2.1 DATA AUDIT

A desktop literature review was undertaken to determine the location and extent of previous surveys. The review aimed to identify flora and fauna within the study area, the potential presence of any threatened species, populations and ecological communities listed under the TSC Act and EPBC Act. The following information and databases were reviewed:

- Atlas of Living Australia (Atlas of Living Australia 2014).
- Atlas of NSW Wildlife (via BioNet) (Office of Environment & Heritage [OEH] 2014a) covering an area from latitude -32.24 to -32.34 and longitude 149.72 to 149.82 (Datum GDA94).
- EPBC Protected Matters Search Tool (DotE 2014a) using a radius of 10 km around coordinates -32.28879, 149.77346 (Datum GDA94).
- Moolarben Coal Project – Stage 1 Optimisation Modification. Ecological Impact Assessment (EMGA Mitchell McLennan 2013).
- Moolarben Coal Flora and Fauna Monitoring 2011/2012 Summary (ELA 2012).
- Moolarben Coal Project – Stage 2 Ecological Impact Assessment (EcoVision Consulting 2008).
- Moolarben Coal Project Flora, Fauna and Aquatic Ecology Assessment (Moolarben Biota 2006).

Sections 3.1, 3.2 and **3.4** identify the threatened species returned by the database searches together with an assessment of the likelihood of occurrence for each species. Each species' likely occurrence was determined by reviewing records in the area, considering the habitat available and using expert knowledge of the species ecology.

Five terms for the likelihood of occurrence of species are used in this report, as defined below:

- "yes" = the species was or has been observed on the site.
- "likely" = a medium to high probability that a species uses the site.
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely, or unlikely to occur.
- "unlikely" = a very low to low probability that a species uses the site.
- "no" = habitat on site and in the vicinity is unsuitable for the species.

2.2 FIELD SURVEY

The study area was surveyed by ELA ecologists David Allworth and Kurtis Lindsay on 17 – 19 June 2014. Temperatures were cool, ranging from 0.8 °C to 18.6 °C. There was no rainfall recorded. Weather records were collected from the nearest public weather station, Gulgong, NSW (Bureau of Meteorology 2014) (**Table 2**).

Table 2: Weather Conditions During the Field Survey

Date	Min (°C)	Max (°C)	Rainfall (mm)
17th June 2014	2.4	15.1	0
18th June 2014	0.8	18.6	0
19th June 2014	1.0	18.5	0

A comprehensive flora and fauna survey was not conducted due to the large body of detailed ecological assessments that have been performed in the locality to date. The survey targeted potential threatened flora, potential threatened fauna and their habitats (e.g. tree hollows and large woody debris), endangered populations and threatened ecological communities (TECs) listed under the TSC Act and EPBC Act.

The field assessment consisted of validating BioMetric vegetation types, identifying general floristic structure, targeted threatened flora searches, targeted microbat and diurnal bird surveys, habitat assessment, Koala habitat assessment and opportunistic fauna sightings. Whilst some threatened species are out of season for survey (e.g. *Diuris tricolor* [Pine Donkey Orchid]), potential habitats for these species were recorded (if present) during the field survey.

Fauna habitat features within the study area were GPS located for mapping. These features include:

- hollow-bearing trees;
- nests;
- large woody debris;
- rocks and outcrops; and
- woody understorey plants.

Flora surveys were conducted within the study area by undertaking rapid vegetation survey plots. This was done in order to understand the extents of the vegetation communities across the study area.

Field survey was also conducted using the random meander technique (Cropper 1993). This method allowed a species list of aboveground vascular flora to be generated. The random meander technique was used in areas where there was potential threatened flora habitat. Flora species were listed to species level, genera or family level following nomenclature used in the NSW Government's PlantNet database (Royal Botanic Gardens & Domain Trust 2014). Where possible an assessment of cover/abundance using a modified Braun-Blanquet system was undertaken for plants.

Targeted surveys were carried out for diurnal birds and microbats (see **Figure 2**). These surveys supplement the previous surveys completed over the study area. These surveys contributed to the current knowledge of the presence of threatened species within the study area.

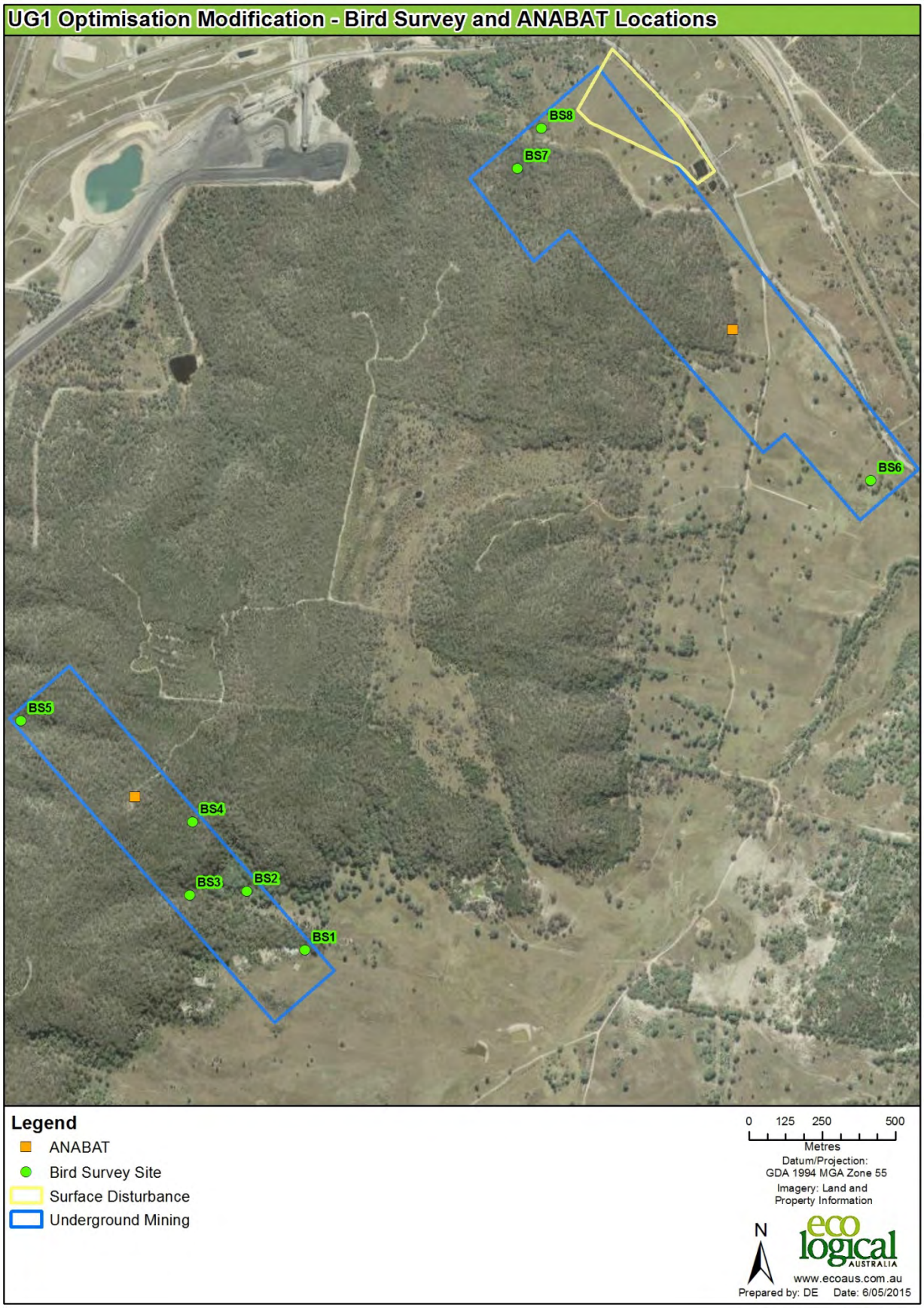

Figure 2: Bird and Microbat (AnaBat) Survey Locations

Bat surveys were conducted using an AnaBat SD2 recorder positioned along an open edge of vegetation and on a track, both constituting potential fly ways. AnaBat recordings were analysed by ELA microbat acoustics specialist Peter Knock. Recordings were taken over two nights.

Bird surveys were conducted by performing 20 minute point counts over a selection of sites that were representative of the varied habitats existing across the study area (see **Figure 2**). Bird species were identified using both visual and acoustic cues.

All fauna and flora observed within the study area are recorded in **Appendix A**.

2.3 LIMITATIONS

According to the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft)* (DEC 2004), an intensive survey should utilise a variety of survey methodologies and include varying climatic and seasonal conditions to produce an extensive census of fauna and flora species within the subject area.

Winter survey conditions did not allow survey for migratory birds which are present in the locality during spring and summer, reptiles and amphibians which can enter brumation (extended periods of sleep or dormancy similar to hibernation) during the cooler months, or annual herbs which only emerge in the warmer months or after spring rain. There was also limited ability to detect flora species such as *Diuris tricolor* (Pine Donkey Orchid) a spring flowering species.

Taking these limitations into account, the methodologies used in this study are considered adequate given the existing body of data on fauna and flora in the locality, in addition to the small size of the study area and suitable supplementary habitat assessments. It was further recognised that the development of a detailed vegetation community map of the study area, particularly the surface disturbance area, as well as a search for significant populations of any threatened species utilising habitat within the study area was important.

It should be noted that the species list in **Appendix A** is not an exhaustive list of species present in the study area. The species lists were developed after fieldwork activities and provide a record of what was seen during the survey.

Except where specifically noted, the field survey was undertaken using hand-held GPS units, which were used to record the location of flora and fauna observed in the field. It is noted that these units can have errors in the accuracy of the locations taken of 5 m up to 20 m (subject to availability of satellites on the day).

Within the underground mining areas, it has been assumed that there will be subsidence impacts across the entire underground mining area.

3 Results

3.1 VEGETATION COMMUNITIES

The data audit revealed nine TECs listed under the TSC Act and/or EPBC Act as having been recorded, or modelled as having the potential to occur within a 10 km radius of the study area. These TECs are listed in **Table 3** together with an assessment of the 'likelihood of occurrence' of each species.

Table 3: Threatened Ecological Communities Recorded within a 10 km Radius of the Study Area

Threatened Ecological Community	Conservation Significance		Habitat Associations	Likelihood of Occurrence
	TSC Act	EPBC Act		
Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	E	-	This endangered ecological community generally occurs on Permian sediments in the Hunter Valley. The community typically forms woodland to open forest on slopes and undulating hills (OEH 2014b). This endangered ecological community has been recorded within the Stage 1, Stage 2 and Modification 9 approval areas. Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions is located within the underground mining area.	Yes
Grey Box (*Eucalyptus microcarpa*) Woodlands and Derived Native Grasslands (DNG) of South-eastern Australia *listed under the TSC Act as* Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions.	E	E	Woodland to open forest with a canopy dominated by eucalypts and an understorey with a moderately dense to sparse shrub layer and a ground layer of perennial and annual native forbs and graminoids. The canopy layer is dominated by *Eucalyptus microcarpa* (Grey Box). Other tree species are often present and may be co-dominant with Grey Box at some sites. The species of trees associated with Grey Box vary across the range of the ecological community, depending on the bioregion, landscape or site (**Appendix A**). The more widespread associated tree species that may be present include: *Allocasuarina luehmannii* (Bulloak), *Brachychiton populneus* (Kurrajong), *Callitris glaucophylla* (White Cypress Pine), *E. albens* (White Box) and *E. melliodora* (Yellow Box). This EEC has not been recorded within or adjacent to the proposed impact area. The study area is not in the specified bioregions for this EEC.	No .

Threatened Ecological Community	Conservation Significance		Habitat Associations	Likelihood of Occurrence
	TSC Act	EPBC Act		
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	E	-	Tall woodland or open forest dominated by *Eucalyptus conica* (Fuzzy Box), often with *Eucalyptus microcarpa* (Grey Box), *E. melliodora* (Yellow Box), or *Brachychiton populneus* (Kurrajong). *Allocasuarina luehmannii* (Bulloak) is common in places. Shrubs are generally sparse, and the groundcover moderately dense, although this will vary with season. This community occurs on brown loam or clay, alluvial or colluvial soils on prior streams and abandoned channels or slight depressions on undulating plains or flats of the western slopes (OEH 2014b). The study area is not in the specified bioregions. This EEC has not been recorded within or adjacent to the proposed impact area.	No
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	E	-	This ecological community occurs on floodplains and associated floodplain rises along the Hunter River and tributaries. The community typically forms a tall woodland. All sites are within the NSW North Coast and Sydney Basin Bioregions (OEH 2014b). This EEC has not been recorded within or adjacent to the proposed impact area. No habitat exists for Hunter Floodplain Red Gum Woodland within the proposed impact area.	Unlikely
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion	V	-	Hunter Valley Footslopes Slaty Gum Woodland is a woodland, or occasionally an open forest, with a sparse to moderately dense tree layer with occasional small trees and a moderately dense to dense shrub layer. The tree canopy is typically dominated by *Eucalyptus dawsonii* (Slaty Gum) and/or *E. microcarpa* (Grey Box). *Acacia salicina* (Cooba) and *Allocasuarina luehmannii* (Bulloak) may form a small tree layer or be part of the upper-most canopy (OEH 2014b). This EEC has not been recorded within or adjacent to the proposed impact area. No habitat exists for Hunter Valley Footslopes Slaty Gum Woodland within the proposed impact area.	Unlikely

Threatened Ecological Community	Conservation Significance		Habitat Associations	Likelihood of Occurrence
	TSC Act	EPBC Act		
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions	E	-	Hunter Valley Vine Thicket typically forms a low forest, usually less than 10 m tall, with a closed canopy dominated by small trees. Emergent eucalypts are common and include *Eucalyptus albens* (White Box), *E. dawsonii* (Slaty Gum) and *E. crebra* (Narrow-leaved Ironbark). A shrub stratum is usually present and vines are common, while the ground cover is generally sparse (OEH 2014b). This EEC has not been recorded within or adjacent to the proposed impact area. No habitat exists for Hunter Valley Vine Thicket within the proposed impact area.	Unlikely
Hunter Valley Weeping Myall Woodland of the Sydney Basin Bioregion	E	CE	Occurs in a range from open woodlands to woodlands and the inland alluvial plains west of the Great Dividing Range in NSW and Queensland generally where *Acacia pendula* (Weeping Myall) trees are the sole or dominant overstorey species. Found in the Riverina, NSW South Western Slopes, Darling Riverine Plains, Brigalow Belt South, Brigalow Belt North, Murray-Darling Depression, Nandewar and Cobar Peneplain IBRA Bioregions (OEH 2014b). This EEC has not been recorded within or adjacent to the proposed impact area. No habitat exists for Hunter Valley Weeping Myall Woodland within the proposed impact area.	Unlikely
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	This ecological community is associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees (OEH 2014b). This EEC has not been recorded within or adjacent to the proposed impact area. No habitat exists for Swamp Oak Floodplain Forest within the proposed impact area.	Unlikely

Threatened Ecological Community	Conservation Significance		Habitat Associations	Likelihood of Occurrence
	TSC Act	EPBC Act		
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and DNG	E	CE	This community is characterised by the presence or prior occurrence of *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box) and/or *E. blakelyi* (Blakely's Red Gum). It 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 (OEH 2014b). The community is found widely in the local area, and is known from the study area. This EEC has been recorded within the Stage 1, Stage 2 and Modification 9 approval areas. White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and DNG is located within both the surface disturbance area and underground mining area.	Yes

***TSC Act Status**: E – Endangered; V – Vulnerable*

***EPBC Act Status**: CE – Critically Endangered; E – Endangered*

The study area has been mapped into five BioMetric vegetation types by ELA, comprising 11 vegetation communities and their respective cleared equivalents within the study area. The BioMetric vegetation types, associated vegetation communities, condition and approximate areas are shown in **Table 4** below. **Figure 3**, **Figure 4** and **Figure 5** show the BioMetric vegetation types present within each disturbance area.

Table 4: BioMetric Vegetation Types within the Proposed Modification Study Area

BioMetric Vegetation Type	Vegetation Community Description	Condition	Surface Area (ha)	Underground Area (ha)	EPBC Act	TSC Act
HU603 Rough-barked Apple – Silvertop Stringybark – Red Stringybark grassy open forest on hills of the upper Hunter Valley, southern North Coast.	*Angophora floribunda* ± *Eucalyptus punctata, E. blakelyi, E. crebra* sandy alluvium	Woodland	-	6.02	-	-
	Angophora floribunda, Eucalyptus punctata, E. blakelyi, E. crebra sandy alluvial DNG or *Cassinia arcuata* and *Acacia linearifolia* shrubland	DNG	-	3.15		
	Angophora floribunda, Eucalyptus rossi, E. crebra DNG on sandy rise	DNG	-	6.45		

BioMetric Vegetation Type	Vegetation Community Description	Condition	Surface Area (ha)	Underground Area (ha)	EPBC Act	TSC Act
HU515 Blakely's Red Gum – Yellow Box grassy open forest or woodland of the New England Tablelands	*Eucalyptus blakelyi* grassy woodland	Woodland	-	2.52	CEEC	EEC
	Eucalyptus blakelyi ± *E. melliodora, Angophora floribunda* grassy woodland	Woodland	-	2.29		
	Eucalyptus blakelyi ± *E. melliodora, Angophora floribunda* DNG	DNG	-	11.33		
HU653 White Box – Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter Valley, Sydney Basin	*Eucalyptus blakelyi* shrubby woodland	Woodland	-	0.38	-	-
	Eucalyptus albens shrubby woodland on fine sediments (siltstone etc).	Woodland	-	1.82		
HU654 White Box – Yellow Box grassy woodland on basalt slopes in the upper Hunter Valley, Brigalow Belt South	*Eucalyptus albens* DNG	DNG	0.25	2.35	CEEC	EEC
HU551 Grey Box – Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin	*Eucalyptus moluccana, E. crebra* woodland	Woodland	-	2.17	-	EEC
	Eucalyptus moluccana, E. crebra woodland DNG	DNG	-	3.33		-
	Eucalyptus crebra DNG	DNG	8.13	8.76		
HU552 Grey Gum – Narrow-leaved Stringybark – Ironbark woodland on ridges of the upper Hunter Valley, Sydney Basin	*Eucalyptus crebra, E. punctata, E. sparsifolia, E. agglomerata, Callitris endlicheri* shrubby woodland	Woodland	-	9.57	-	-
	Eucalyptus crebra, E. punctata, E. sparsifolia, E. agglomerata, Callitris endlicheri shrubby woodland	Cleared	-	2.6		
	Eucalyptus fibrosa, Callitris endlicheri, ± *E. dwyeri, E. parramattensis,* shrubby woodland	Woodland	-	27.1		

BioMetric Vegetation Type	Vegetation Community Description	Condition	Surface Area (ha)	Underground Area (ha)	EPBC Act	TSC Act
	Eucalyptus dwyeri, *E. crebra*, low shrubby woodland with emergent *Callitris endlicheri* on relatively rocky areas.	Woodland	-	17.99		
	Eucalyptus fibrosa, Callitris endlicheri, ± *E. dwyeri, E. parramattensis, E. blakelyi* regenerating shrubland	Regenerating	-	3.37		
HU574 Narrow-leaved Stringybark - Grey Gum shrubby woodland on footslopes on the upper Hunter Valley, Sydney Basin	*Eucalyptus crebra, E. fibrosa, E. punctata, E. sparsifolia, E. agglomerata, Callitris endlicheri* shrubby woodland	Woodland	-	4.42		

3.1.1 White Box – Yellow Box – Blakely's Red Gum Grassy Woodland

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland occurs as two BioMetric vegetation types across the study area (HU515 and HU654). Blakely's Red Gum – Yellow Box grassy woodland is located in low lying areas and on low sloped land of Permian origin which rises to meet Triassic sandstone slopes. The canopy is dominated by *Eucalyptus blakelyi* (Blakely's Red Gum) where a tree layer occurs, with *Angophora floribunda* (Rough-barked Apple) and *E. melliodora* (Yellow Box) occurring less frequently. The grassy understorey is dominated by *Aristida spp*., *Arundinella nepalensis* (which is a native tufted reedgrass) and *Sporobolus spp*.

White Box – Yellow Box grassy woodland is located on basalt slopes and caps. The canopy is usually dominated by *Eucalyptus albens* (White Box) where a tree layer occurs, with Yellow Box occurring less frequently. The grassy understorey is dominated by *Aristida spp*., *Arundinella nepalensis* (which is a native tufted reedgrass) and *Sporobolus spp*.

Some of the areas of this BioMetric type (i.e. the DNG) are located in paddocks that have been historically grazed. The pasture composition is dominated by a poor quality native ground layer of tussocked grasses (*Aristida ramosa* [Purple Wiregrass]). Within areas of this community, exotics have become co-dominant, in particular the annual *Echium plantagineum* (Paterson's Curse); however the understorey remains predominately native.

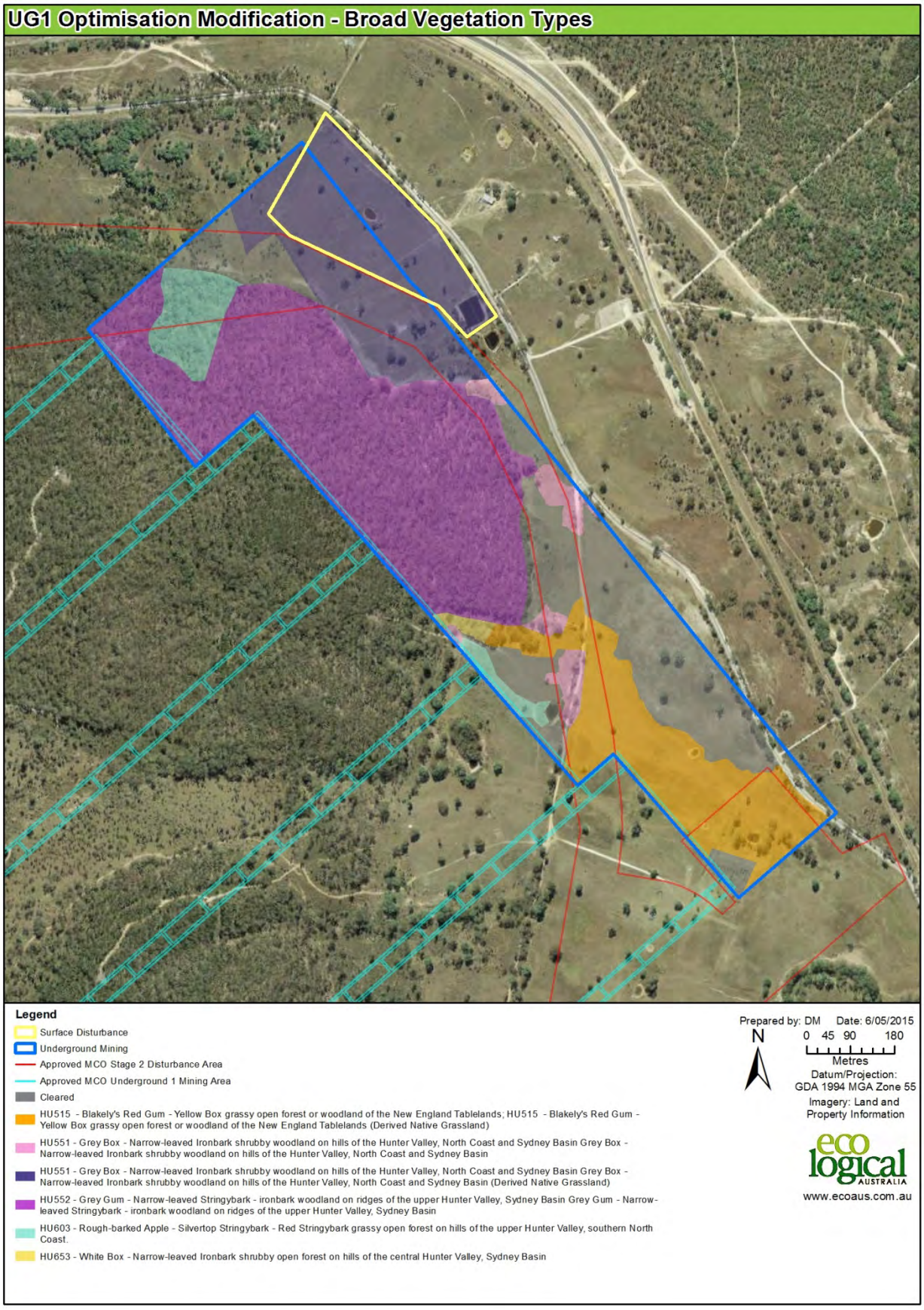

Figure 3: BioMetric Vegetation Types within Underground Mining Area 1 and Surface Disturbance Area 1

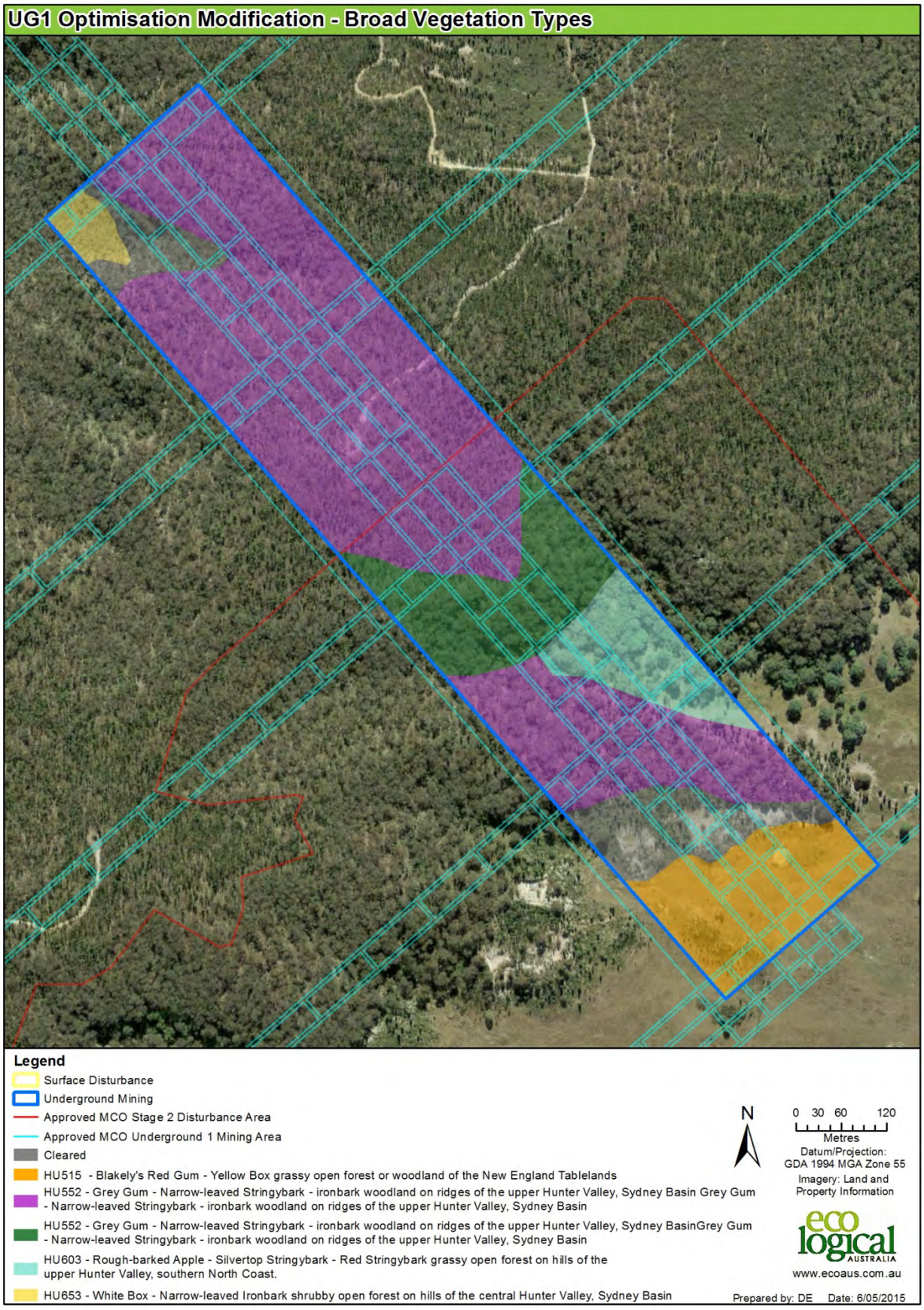

Figure 4: BioMetric Vegetation Types within Underground Mining Area 2

Figure 5: BioMetric Vegetation Types within Surface Disturbance Area 2 and Underground Mining Area 3

White Box – Yellow Box – Blakely's Red Gum Woodland meets the definition under the following legislation:

- *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and DNG* - EPBC Act.
- *White Box – Yellow Box – Blakely's Red Gum Woodland* - TSC Act.

The *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and DNG* to be potentially impacted by surface disturbance forms part of larger patches of this community. These patches extend beyond the study area and into the locality (**Figure 6**).

The patch of *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and DNG* is deemed to meet the criteria for the EPBC listed critically endangered ecological community, including:

- having, or previously having, *Eucalyptus melliodora* (Yellow Box) or *E. blakelyi* (Blakely's Red Gum) as a common overstorey species (Blakely's Red Gum);
- having a predominantly native understorey;
- being in a patches of 2 ha or greater in size; and
- having natural regeneration of the dominant overstorey eucalypts (regenerating *E. blakelyi* [Blakely's Red Gum]).

The patch of *White Box – Yellow Box – Blakely's Red Gum Woodland* is deemed to meet the criteria for the TSC Act listed endangered ecological community (NSW Scientific Committee, 2002) including:

- The site is in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands or NSW South Western Slopes Bioregions.
- The site has native species in the understorey and is likely to respond to assisted natural regeneration.
- The site is predominantly treeless but likely to have supported *Eucalyptus melliodora* (Yellow Box) prior to clearing.
- The site is predominantly treeless but likely to have supported *E. albens* (White Box), *E. melliodora* (Yellow Box), or *E. blakelyi* (Blakely's Red Gum) prior to clearing.
- Grass and herbaceous species generally characterise the ground layer.

Figure 6: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland & DNG Patch in Surface Disturbance Area 2 and Underground Mining Area 3

3.1.2 Grey Box – Narrow-leaved Ironbark Shrubby Woodland on Hills

Grey Box – Narrow-leaved Ironbark Shrubby Woodland on hills of the Hunter Valley, North Coast and Sydney Basin (HU551) occurs on the mid-slopes to lower slopes in the east of the study area. The canopy is dominated by *Eucalyptus moluccana* (Grey Box) and *E. crebra* (Narrow-leaved Ironbark). The mid-storey is dominated by *Acrotriche rigida, Bossiaea spp, Callitris endlicheri* (Black Cypress Pine), *Leucopogon muticus* (Blunt Beard-heath) and *Persoonia linearis* (Narrow-leaved Geebung). The groundcover is sparse with scattered native grasses and herbs.

Grey Box – Narrow-leaved Ironbark Shrubby Woodland is listed as an EEC under the TSC Act as *Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions*. This community has been previously mapped as occurring in the locality by EcoVision Consulting (2008). The community was not mapped as an EEC in this previous assessment, as it predated the final determination of this community in 2010.

3.1.3 Grey Gum – Narrow-leaved Stringybark – Ironbark Woodland

Grey Gum – Narrow-leaved Stringybark – Ironbark Woodland on ridges of the upper Hunter Valley, Sydney Basin is the dominant BioMetric vegetation type (HU552) within the study area. This vegetation type is found on rocky escarpments of coarse grained sedimentary rocks or on sandy to skeletal soils on crests of coarse grained sedimentary beds.

The canopy is dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark), *E. fibrosa* (Broad-leaved Ironbark) and *E. punctata* (Grey Gum), with *E. agglomerata* (Blue-leaved Stringybark) and *E. dwyeri* (Dwyer's Red Gum) occurring less frequently (**Figure 7**). The mid-storey is dominated by *Acrotriche rigida, Bossiaea spp, Callitris endlicheri* (Black Cypress Pine), *Leucopogon muticus* (Blunt Beard-heath) and *Persoonia linearis* (Narrow-leaved Geebung). The groundcover is sparse with scattered native grasses and herbs.

This community is not listed under the TSC Act or the EPBC Act.

3.1.4 Narrow-leaved Stringybark – Grey Gum Shrubby Woodland

Narrow-leaved Stringybark – Grey Gum Shrubby Woodland on footslopes on the upper Hunter Valley, Sydney Basin (HU574) occurs on the mid-slopes in the west of the study area. The canopy is dominated by *E. agglomerata* (Blue-leaved Stringybark), *Eucalyptus crebra* (Narrow-leaved Ironbark), *E. fibrosa* (Broad-leaved Ironbark) and *E. punctata* (Grey Gum), with *E. dwyeri* (Dwyer's Red Gum) occurring less frequently. The mid-storey is dominated by *Acrotriche rigida, Bossiaea spp, Callitris endlicheri* (Black Cypress Pine), *Leucopogon muticus* (Blunt Beard-heath) and *Persoonia linearis* (Narrow-leaved Geebung). The groundcover is sparse with scattered native grasses and herbs.

This community is not listed under the TSC Act or the EPBC Act.

3.1.5 Rough-barked Apple – Silvertop Stringybark – Red Stringybark Grassy Open Forest

Rough-barked Apple - Silvertop Stringybark - Red Stringybark Grassy Open Forest on hills of the upper Hunter Valley, southern North Coast (HU603) occurs on the lower slopes of the study area. This vegetation type is found on slopes of fine and coarse grained sedimentary bed.

The canopy is dominated by *Angophora floribunda* (Rough-barked Apple), with *Eucalyptus blakelyi* (Blakely's Red Gum), *E. crebra* (Narrow-leaved Ironbark) and *E. punctata* (Grey Gum) occurring less frequently. The mid-storey is dominated by *Callitris endlicheri* (Black Cypress Pine) and *Allocasuarina* spp. The groundcover is sparse with scattered native grasses and herbs.

This community is not listed under the TSC Act or the EPBC Act.

Figure 7: Grey Gum – Narrow-leaved Stringybark – Ironbark Woodland BioMetric Vegetation Type

3.1.6 White Box – Narrow-leaved Ironbark Shrubby Open Forest

White Box – Narrow-leaved Ironbark Shrubby Open Forest on hills of the central Hunter Valley, Sydney Basin (HU653) occurs on the slopes of the proposed impact area. This vegetation type is found on steep slopes of fine grained sedimentary rocks or on broad outwash areas downslope from coarse and fine grained sedimentary escarpments.

The canopy is dominated by *Eucalyptus albens* (White Box), with *E. crebra* (Narrow-leaved Ironbark) and *E. blakelyi* (Blakely's Red Gum) occurring less frequently (**Figure 8**). The mid-storey is dominated by *Acrotriche rigida, Cassinia spp* and *Oxylobium ilicifolium*. The groundcover is sparse with scattered native grasses and herbs.

This community is not listed under the TSC Act or the EPBC Act.

Figure 8: White Box – Narrow-leaved Ironbark Shrubby Open Forest BioMetric Vegetation Type

3.2 FLORA

One hundred and thirty two plant species were recorded during the field survey and are listed in **Appendix A**. This consisted of 122 native and 10 exotic flora species.

The data audit revealed 13 threatened flora species listed under the TSC Act and/or EPBC Act as having been recorded or modelled as having the potential to occur within a 10 km radius of the study area. These threatened flora species are listed in **Table 5** together with an assessment of the 'likelihood of occurrence' of each species.

One threatened flora species *Pomaderris queenslandica* (Scant Pomaderris) has been previously recorded in the area (EcoVision Consulting 2008). Specimens of an unidentified *Pomaderris sp.* were collected in the same general area as the *Pomaderris queenslandica* recorded by EcoVision Consulting (2008). Specimens were sent to the NSW Herbarium for confirmation of identification. The specimens were confirmed as *Pomaderris queenslandica*. No other threatened flora species were recorded during the current survey.

Opuntia stricta (Prickly Pear) was recorded within the study area. This species is listed as a Weed of National Significance (WONS) under the EPBC Act and a Class 4 Noxious weed in the Mid-Western Regional Council LGA under the NW Act. This means that the growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread.

Table 5: Threatened Flora Species Recorded within a 10 km Radius of the Study Area

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Acacia ausfeldii	Ausfeld's Wattle	V	-	Found to the east of Dubbo in the Mudgee, Ulan - Gulgong area of the NSW South Western Slopes bioregion. Associated species include *Eucalyptus albens* (White Box), *E. crebra* (Narrow-leaved Ironbark), *E. blakelyi* (Blakely's Red Gum), *Angophora floribunda* (Rough-barked Apple) and *Callitris* spp., with an understorey dominated by *Cassinia* spp. and grasses (OEH 2014b). *Acacia ausfeldii* has previously been recorded within the Stage 1 approval area and the proposed surface disturbance area constitutes potential habitat for this species.	Potential
Cryptostylis hunteriana	Leafless Tongue Orchid	V	V	Has been recorded from as far north as Gibraltar Range National Park (NP) south to Orbost, Victoria. Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum), *E. sieberi* (Silvertop Ash), *Corymbia gummifera* (Red Bloodwood), *Allocasuarina littoralis* (Black She-Oak). Appears to prefer open areas in the understorey of this community and is often found in association with the *C. subulata* (Large Tongue Orchid) and the *C. erecta* (Tartan Tongue Orchid) (OEH 2014b). *Cryptostylis hunteriana* has not been recorded previously during assessments undertaken for Stage 1 and Stage 2 Projects. No potential habitat will be removed as a result of the modification.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Diuris tricolor	Pine Donkey Orchid	V	-	Grows in sclerophyll woodland among grass, often with *Callitris spp*., found in sandy soils, either on flats or small rises (OEH 2014b). It has also been recorded on red soil in a *Eucalyptus populnea* (Poplar Box) community in western NSW (OEH 2014b). Soils include gritty orange-brown loam on granite, shallow red loamy sand on stony porphyry, skeletal lateritic soil and alluvial grey silty loam (OEH 2014b). The species occurs on the western slopes and plains from the north to the south of the state. *Diuris tricolor* has previously been recorded within the Stage 1 area and the proposed surface disturbance area constitutes potential habitat for this species.	Potential
Eucalyptus cannonii	Capertee Stringybark	V	-	Restricted to an area of about 100 x 60 km in the central tablelands of NSW. The western border is approximately marked by a line between Bathurst and Mudgee, while the eastern locations occur approximately on a line between Lithgow and the town of Bylong. Recorded from Tablelands Grassy Woodland Complex communities and Talus Slope Woodland, and dominated by *Eucalyptus macrochyncha* (Red Stringybark) and *E. goniocalyx* (Long-leaved Box) (OEH 2014b). *Eucalyptus cannonii* has previously been recorded within the Stage 1 area, however the proposed impact area does not constitute potential habitat for this species.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Euphrasia arguta	-	CE	CE	An erect semi-parasitic herb. Has only been recorded from relatively few places from an area extending from Sydney to Bathurst and north to Walcha in eucalypt forest with a mixed grass and shrub understorey (DotE 2014b). Was thought to be extinct until rediscovered near Nundle in 2008 (DotE 2014b). Some suitable habitat occurs within the study area, however, this plant has not been recorded within 100 km of the study area for over 100 years. *Euphrasia arguta* has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. No potential habitat will be removed as a result of the modification.	Unlikely
Grevillea obtusiflora	-	E	E	Subspecies '*obtusiflora*' occurs as scattered groups in the understorey of low open eucalypt forest at an altitude of 730 metres above sea level. Grows near Rylstone. Subspecies '*fecunda*' occurs in clusters within low, open scrub beneath open, dry sclerophyll forest, on orange, sandy loam soils with sandstone boulders, at an altitude of 570 metres. Grows in the Capertee Valley, north-west of Lithgow, and in the Gardens of Stone NP. *Grevillea obtusiflora* has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. No potential habitat will be removed as a result of the modification.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Homoranthus darwinioides	-	V	V	Although historically recorded from numerous areas on the NSW Central West Slopes. It now appears to be restricted to two disjunct populations – Goulburn River NP and surrounding areas to the south-west of Merriwa, and in the Goonoo Forest to the north of Dubbo. Plants grow in shrubby woodland on sandy soils over sandstone (OEH 2014b). There is suitable habitat in the area, given the geology and vegetation types. However, this plant has not been recorded within 10 km of the study area for a considerable length of time (over 10 years), despite the undertaking of numerous investigations for this distinctively flowering plant with terete leaves and visible oil dots. *Homoranthus darwinioides* has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. No potential habitat will be removed as a result of the modification.	Unlikely
Pelargonium sp. Striatellum (G.W. Carr 10345)	-	E	E	In NSW this species is known from the Southern Tablelands (DotE 2014b). Otherwise, only known from the shores of Lake Omeo near Benambra in Victoria where it grows in cracking clay soil that is probably occasionally flooded (DotE 2014b). No suitable habitat occurs within the study area. The closest confirmed population of this plant is over 100 km to the south of the study area. *Pelargonium* sp. Striatellum (G.W. Carr 10345) has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. No potential habitat will be removed as a result of the modification.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Philotheca ericifolia	-	-	V	Known only from the upper Hunter Valley and Pilliga to Peak Hill districts of NSW. Grows chiefly in dry sclerophyll forest and heath on damp sandy flats and gullies. It has been collected from a variety of habitats including heath, open woodland, dry sandy creek beds, and rocky ridge and cliff tops (OEH 2014b). Minimal suitable habitat on site. The closest confirmed populations of this species are over 20 km south of the study area near Botobolar. *Philotheca ericifolia* has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. No potential habitat will be removed as a result of the modification.	Unlikely
Pomaderris queenslandica	Scant Pomaderris	E	-	Known from coastal and tableland areas. It is found in moist eucalypt forest or sheltered woodlands with a shrubby understorey. The species has been confirmed to the east (Goulburn River NP) and west (north-east of Dubbo) of the area. *Pomaderris queenslandica* has previously been recorded within the Stage 2 approval area and the proposed underground mining area constitutes potential habitat for this species.	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Prasophyllum sp. Wybong (C. Phelps ORG 5269)	-	-	CE	Generally found in shrubby and grassy habitats in dry to wet soil and is known to occur in open eucalypt woodland and grassland (DotE 2014b). Flowers in spring and dies back to a single leaf over winter (OEH 2014b). Minimal suitable habitat exists in the study area, however the species is only known from a very limited number of locations in the region, the nearest is over 70 km south at Ilford cemetery. It is highly sensitive to disturbance. *Prasophyllum* sp. Wybong (C. Phelps ORG 5269) has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. No potential habitat will be removed as a result of the modification.	Unlikely
Thesium australe	Austral Toadflax	V	V	A small twining semi-parasite of grasses. Occurs in grassland or grassy woodland. Often found in damp sites in association with *Themeda australis* (OEH 2014b). Some suitable habitat exists although there are no proximal records of this species. The nearest confirmed population is over 100 km to the south at Blackman's Flat. *Thesium australe* has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. No potential habitat will be removed as a result of the modification.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Tylophora linearis	-	V	E	Found in the Barraba, Mendooran, Temora and West Wyalong districts in the northern and central western slopes of NSW. Grows among large woody debris and dense shrubbery in dry scrub and open forest (OEH 2014b). Some suitable habitat exists in the study area, however the nearest confirmed population is over 30 km to the south-east in Upper Bylong. *Tylophora linearis* has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. No potential habitat will be removed as a result of the modification.	Unlikely

***TSC Act Status**: E – Endangered; V – Vulnerable*

***EPBC Act Status**: CE – Critically Endangered; E – Endangered; V – Vulnerable*

3.3 FAUNA HABITAT

The study area contains a suite of fauna habitat elements. These habitat elements and the fauna likely to utilise them are presented in **Table 6.**

Table 6: Fauna Habitats Found in the Study Area and Associated Fauna

Habitat Type	Fauna Use
DNG	Foraging habitat for reptiles, birds and terrestrial mammals
Shrubbery	Shelter, nesting and foraging habitat for birds and small mammals
Mature woodland and paddock trees (flower, lerp and mistletoe bearing)	Shelter, nesting and foraging habitat for birds, bats and arboreal mammals
Hollow-bearing live trees and dead trees (stags)	Shelter, nesting and foraging habitat for birds, bats and arboreal mammals
Large woody debris (logs and bark on ground)	Shelter and foraging habitat for birds, small mammals, frogs and reptiles
Cavernous sandstone escarpments	Shelter, nesting and foraging habitat for microbats, small birds, small mammals, frogs and reptiles
Water impoundments (dams and ponds)	Shelter, foraging and breeding habitat for frogs, foraging habitat for waterbirds and a drinking water resource for all birds and medium to large mammals

Prominent escarpments of Triassic sandstones and conglomerates in the locality provide potential maternal roosting sites for threatened cave-roosting microbat species, particularly *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat), which was recorded during the field survey for this study. Two other threatened cave-roosting microbat species, *Chalinolobus dwyeri* (Large-eared Pied Bat) and *Vespadelus troughtoni* (Eastern Cave Bat) have been recorded within the MCO leases on previous occasions therefore were considered likely to occur within the study area (Moolarben Biota 2006; EcoVision Consulting 2008; EMGA Mitchell McLennan 2013).

Hollow-bearing trees are present throughout the study area. The underground mining areas contained high densities of hollow-bearing trees. This was expected as these areas of vegetation are relatively undisturbed. The surface disturbance areas contained fewer hollow-bearing trees, in the form of isolated and scattered paddock trees within the DNG.

Pieces of large woody debris were present throughout the entire study area; however were more prevalent in the remnant woodland within the underground mining area.

3.3.1 Koala habitat

The areas containing designated Koala 'Feed Species' as listed under Schedule 2 of SEPP 44 have been mapped across the subject area (**Figure 9**). The scheduled Koala 'Feed Species' present within the site were *Eucalyptus albens* (White Box) and *E. punctata* (Grey Gum).

A list of Koala habitat and feed trees for the locality has been produced (OEH 2014c) and provides an updated list of potential koala habitat and feed trees. However, this list does not replace the 'Feed Species' scheduled under SEPP 44. A complete list of Koala habitat and feed trees is presented in the 'Assessment of Significance' for the Koala (**Appendix B**).

Potential Koala habitat occurred across the entire study area, however only 13.9 ha contained SEPP 44 Schedule 2 Koala Feed Species (**Figure 9**). These trees were extensive across the underground mining areas and only some species were present in the surface disturbance areas (in very low numbers). No potential Koala habitat occurs within the surface disturbance area. *Eucalyptus albens* (White Box) was the only SEPP 44 Schedule 2 species that existed in the surface disturbance area.

3.4 FAUNA

A total of 83 fauna species were recorded within the study area during the field survey period. This consisted of 67 birds, eight non-flying mammals, seven bats and one frog (**Appendix A**).

Only one of the birds observed was an exotic species, *Sturna vulgaris* (Common Starling). Two of the mammals observed were exotic species; they were *Vulpes vulpes* (European Red Fox) and *Oryctolagus cuniculus* (European Rabbit).

The majority of the fauna species observed during the field survey were recorded from the remnant woodland present within the two underground mining areas. None of the observed fauna species were found to only occur within the surface disturbance areas.

Of the fauna species observed, five birds and one mammal (a microbat), were listed as Vulnerable under the TSC Act. They are listed below:

- *Calyptorhynchus lathami* (Glossy Black Cockatoo).
- *Climacteris picumnus victoriae* (Brown Treecreeper [eastern subspecies]).
- *Chthonicola sagittata* (Speckled Warbler).
- *Daphoenositta chrysoptera* (Varied Sittella).
- *Stagnopleura guttata* (Diamond Firetail).
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat).

The location of all threatened bird species identified was mapped (**Figure 10**). The Eastern Bentwing- bat was recorded at both AnaBat locations (**Figure 2**).

Following the field survey, an assessment of likely occurrence of fauna species was performed based on historic records, habitat in the study area and species ecology. A total of 44 threatened and/or migratory fauna species scheduled under either the TSC Act and/or EPBC Act were deemed to either occur, likely to occur or had potential to occur within the study area. These threatened fauna species are listed in **Table 7** together with an assessment of the 'likelihood of occurrence' of each species.

No threatened fauna species were recorded within the surface disturbance areas. It was considered unlikely that the surface disturbance areas would be used as important habitat by threatened fauna species due to the disturbance these areas have previously undergone.

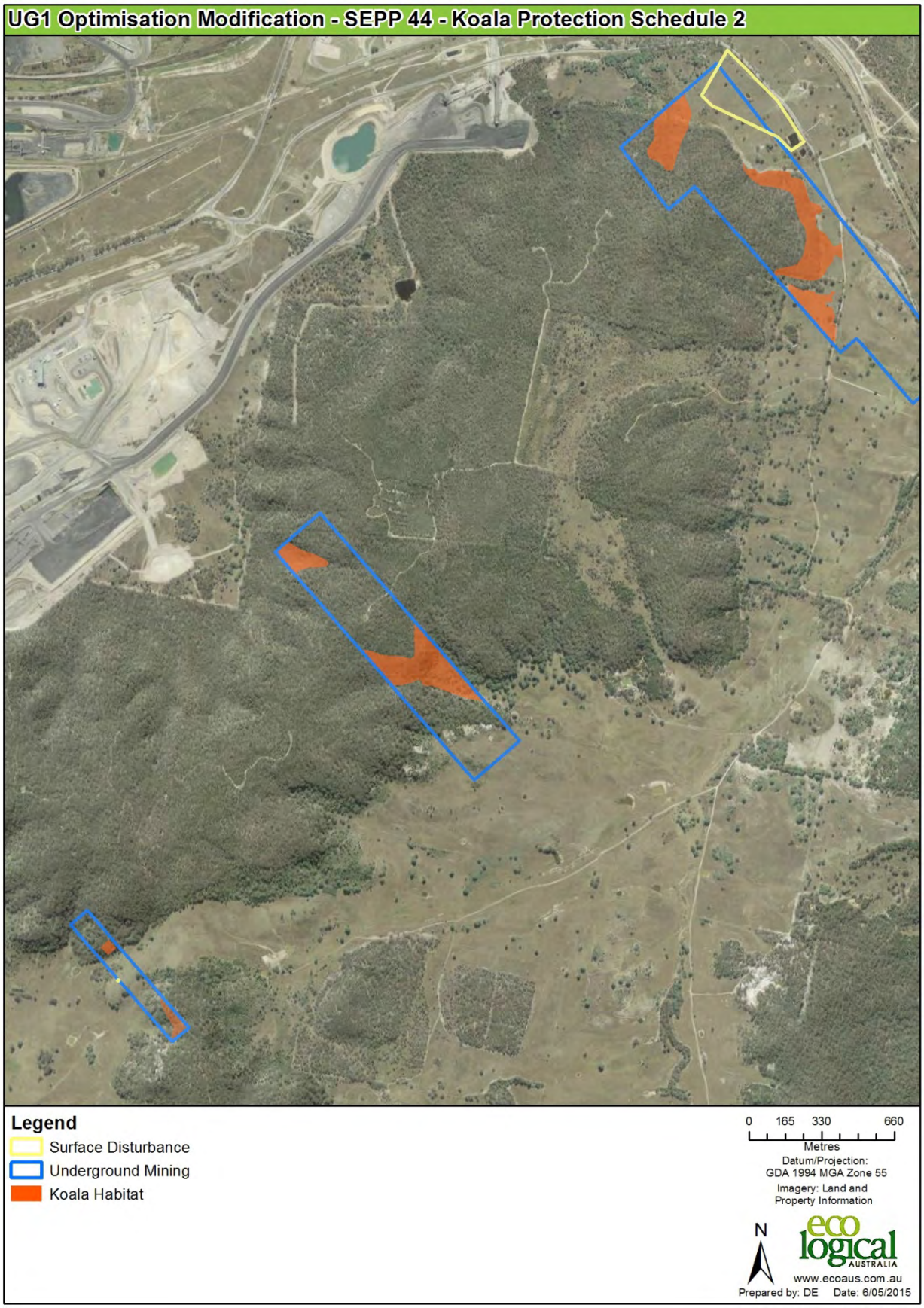

Figure 9: Broad Distribution of Koala Feed Trees as Declared Under SEPP 44 Schedule 2

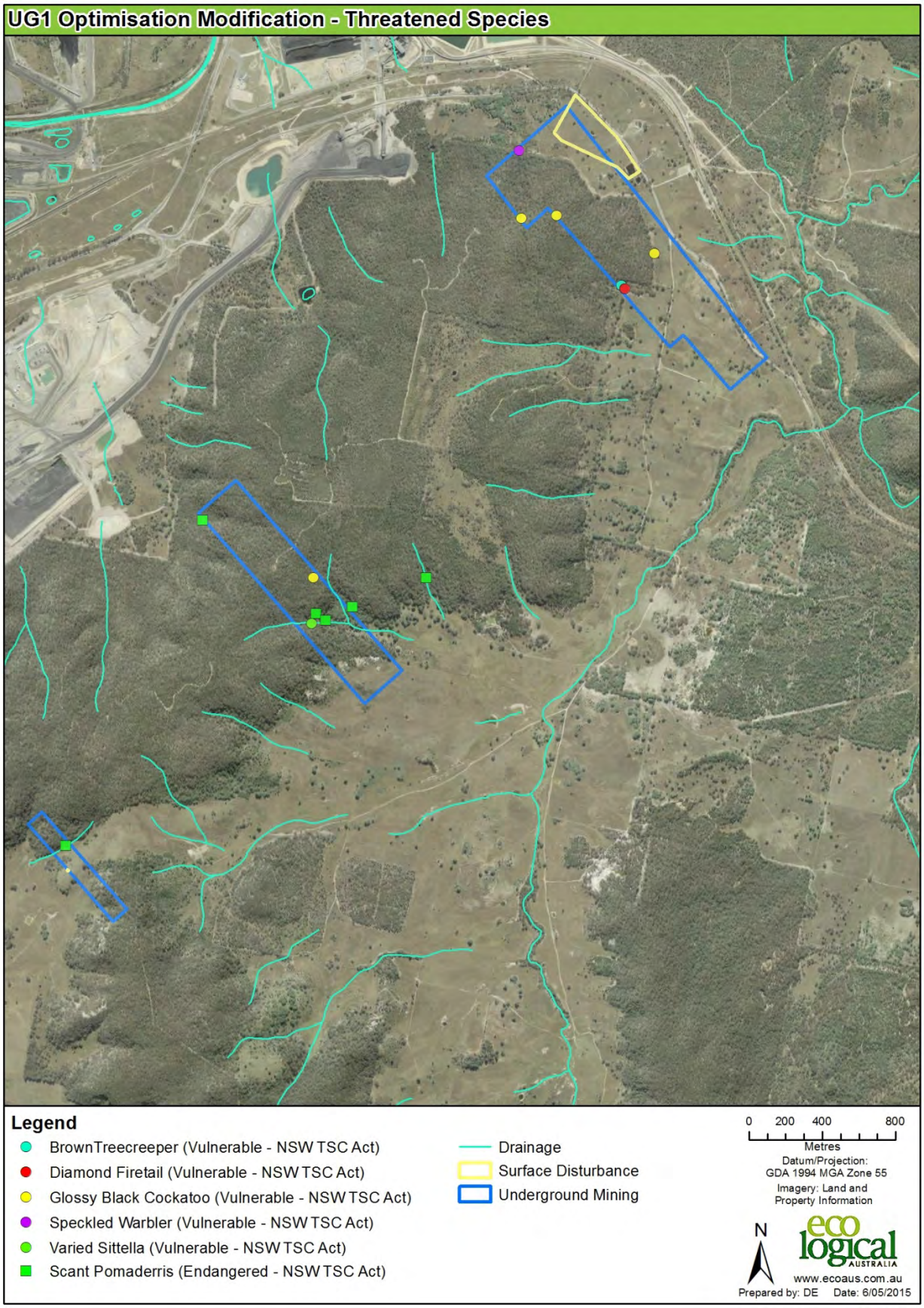

Figure 10: Threatened Species Found within the Study Area

Table 7: Threatened Fauna Species Recorded within a 10 km Radius of the Study Area

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Amphibians					
Litoria booroolongensis	Booroolong Frog	E	E	Typically inhabits western-flowing rocky creeks, although a small number of populations have also been recorded in eastern-flowing streams (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is over 100 km south of the study area. No potential habitat for this species will be removed as a result of the modification.	No
Reptiles					
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	The nearest confirmed record of this species is from over 40 km to the south-west. Inhabits sloping, open woodland areas with predominantly native grassy groundcover, particularly those dominated by *Themeda triandra* (Kangaroo Grass) (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is over 100 km south of the study area. No potential habitat for the Pink-tailed Legless Lizard will be removed as a result of the modification.	No
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Typical habitat sites for this species consist of exposed sandstone outcrops and benching where the vegetation is predominantly woodland, open woodland and/or heath on Triassic sandstone of the Sydney Basin. The Broad-headed Snake utilises rock crevices and exfoliating sheets of weathered sandstone during the cooler months and tree hollows during summer (OEH 2014b).	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
				This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is over 50 km south-east of the study area. Potential habitat for this species exists in the form of exposed sandstone outcrops in the underground mining areas.	
Birds					
Leipoa ocellata	Malleefowl	E	V	The Mallee Fowl is known to inhabit dry inland scrub, mallee with loose sandy soils. Males tend large sand nest-mound (OEH 2014b). The nearest confirmed records of this species are between Dubbo and Mendooran over 50 km away. This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is over 20 km east of the study area. No potential habitat for this species will be removed as a result of the modification.	No
Ardea ibis	Cattle Egret	-	M	The Cattle Egret is common and widespread in Australia. This species forages on pasture, marsh, grassy road verges, rain puddles and croplands, but not usually in the open water of streams or lakes. Some individuals stay close to the natal heronry from one nesting season to the next, but the majority leave the district in autumn and return the next spring (Morcombe 2004). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is less than 10 km north of the study area. Potential habitat for the Cattle Egret exists within the study area in the form of potential foraging habitat within farm dams and paddocks containing cattle.	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Ardea modesta	Eastern Great Egret	-	M	The Eastern Great Egret is common and widespread in Australia. This species forages in a wide range of wet and dry habitats including permanent and ephemeral freshwaters, estuarine mangroves and mudflats (Morcombe 2004). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is less than 10 km north of the study area. Potential habitat for the Eastern Great Egret exists within the study area in the form of potential foraging habitat within farm dams.	Potential
Lophoictinia isura	Square-tailed Kite	V	-	The Square-tailed Kite occurs in woodland and forested areas (OEH 2014b). This species forages and breeds along inland timbered watercourses. It is also known to forage in wooded farmland or urban environments (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. This species was not recorded from or adjacent to the proposed impact area. Potential habitat for this species exists within the proposed impact area in the form of potential foraging habitat as open woodland.	Potential
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	M	The White-bellied Sea-Eagle forages over large open fresh or saline lakes, rivers and wetlands. This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is over 50 km south of the study area. No potential habitat for the White-bellied Sea-Eagle will be removed as a result of the modification.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Circus assimilis	Spotted Harrier	V	-	The Spotted Harrier occurs in grassy open woodland and grasslands (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during assessments undertaken for Stage 1 and Stage 2 approvals. Likely habitat for this species exists within the proposed impact area in the form of foraging habitat.	Likely
Hieraaetus morphnoides	Little Eagle	V	-	The Little Eagle occupies open eucalypt forest, woodland or open woodland, nests in tall living trees within a remnant patch (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during assessments undertaken for Stage 1 and Stage 2 approvals. Likely habitat for this species exists within the proposed impact area in the form of foraging habitat.	Likely
Burhinus grallarius	Bush Stone-curlew	E	-	The Bush Stone-curlew is associated with dry open woodland with grassy areas, dune scrubs, in savanna areas, the fringes of mangroves, golf courses and open forest/farmland (Marchant & Higgins 1993). This species forages in areas with fallen timber, leaf litter, little undergrowth and where the grass is short and patchy (Marchant & Higgins 1993). Is thought to require large tracts of habitat to support breeding, in which there is a preference for relatively undisturbed in lightly disturbed. This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is over 10 km south of the study area. No potential habitat for this species will be removed as a result of the modification.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Rostratula australis	Australian Painted Snipe	E	E, M	The Australian Painted Snipe inhabits shallow inland wetlands which are fresh or brackish, temporarily or permanently inundated. Preferred habitats are fringes of swamps, dams and nearby marshy areas where there is a cover of grass, lignum, low scrub or open timber (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is over 30 km south of the study area. No potential habitat for this species will be removed as a result of the modification.	No
Gallinago hardwickii	Latham's Snipe	-	M	Latham's Snipe is known to inhabit a variety of permanent and ephemeral wetlands, preferring open fresh water wetlands with nearby cover. This species occupies a variety of vegetation around wetlands including wetland grasses and open wooded swamps (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is over 30 km south of the study area. No potential habitat for this species will be removed as a result of the modification.	No
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	The Glossy Black-Cockatoo is associated with a variety of forest types containing *Allocasuarina* species. This species nests in large trees with large hollows (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. Habitat for this species exists within the proposed impact area in the form of foraging habitat (*Allocasuarina* spp.) and potential nesting habitat (hollow-bearing trees).	Yes

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	The Gang-gang Cockatoo is known to inhabit tall, wet forests of mountains and gullies as well as alpine woodlands in summer (OEH 2014b). In winter they occur at lower altitudes in drier more open forests and woodlands, particularly box-ironbark assemblages (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. This species was not recorded from or adjacent to the proposed impact area. Potential habitat for this species exists within the proposed impact area in the form of potential foraging habitat as open woodland.	Potential
Glossopsitta pusilla	Little Lorikeet	V	-	The Little Lorikeet mostly occurs in dry, open eucalypt forests and woodlands containing nectar-bearing eucalypts and mistletoes on which it feeds (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. Potential habitat for this species exists within the proposed impact area in the form of potential foraging and nesting habitat.	Potential
Neophema pulchella	Turquoise Parrot	V	-	The Turquoise Parrot is found in open forest and timbered grassland, especially low shrub ecotones between woodland and grasslands with high proportion of native grasses and forbs (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during the ecological assessment undertaken for the Modification 9 approval. Likely habitat for this species exists within the proposed impact area in the form of foraging and nesting habitat.	Likely
Lathamus discolour	Swift Parrot	E	E	The Swift Parrot occurs in areas where eucalypts are flowering profusely, or where there are abundant lerp. This species breeds in Tasmania during spring and summer, migrating to south-eastern Australia in the autumn and winter months (OEH 2014b).	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
				This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is less than 10 km north of the study area. Potential habitat for this species exists within the proposed impact area in the form of potential foraging habitat with winter flowering eucalypt species.	
Polytelis swainsonii	Superb Parrot	V	V	The core breeding area for the Swift Parrot in the central west is roughly centred from Cowra to Dubbo. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is over 40 km south of the study area. It is unlikely that any potential habitat for this species will be removed as a result of the modification.	Unlikely
Tyto novaehollandiae	Masked Owl	V	-	The Masked Owl is associated with forest with sparse, open, understorey, typically dry sclerophyll forest and woodland (OEH, 2014b) and especially the ecotone between wet and dry forest, and non-forest habitat (OEH 2014b). This species is known to utilise forest margins and isolated stands of trees within agricultural land (OEH 2014b) and heavily disturbed forest where its prey of small and medium sized mammals can be readily obtained (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during the ecological assessment undertaken for the Modification 9 approval. Potential habitat for this species exists within the proposed impact area in the form of foraging habitat.	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Ninox strenua	Powerful Owl	V	-	The Powerful Owl is found in eastern forests, from the coast to the tablelands. This species is now uncommon and occurring at low densities. Powerful Owls can inhabit a wider range of vegetation types, preferring large tracts of woodland or forest habitat (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. This species was not recorded within the study area. Likely habitat for this species exists within the proposed impact area in the form of potential foraging and roosting habitat.	Likely
Ninox connivens	Barking Owl	V	-	The Barking Owl is associated with a variety of habitats such as savannah woodland, open eucalypt forests, wetland and riverine forest. The habitat is typically dominated by eucalypts. This species usually nests near watercourses or wetlands in large tree hollows (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is less than 10 km north of the study area. Potential habitat for this species exists within the proposed impact area in the form of potential foraging and roosting habitat.	Potential
Hirundapus caudacutus	White-throated Needletail	-	M	The White-throated Needletail forages aerially over a variety of habitats usually over coastal and mountain areas, most likely with a preference for wooded areas. This species has been observed roosting in dense foliage of canopy trees, and may seek refuge in tree hollows in inclement weather (Morcombe 2004). This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. Likely habitat for this species exists within the proposed impact area in the form of potential foraging habitat as open woodland.	Likely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Apus pacificus	Fork-tailed Swift	-	M	The Fork-tailed Swift is a migratory species which occurs in Australia between October and late April, and migrates outside of Australia to breed. They occur over a wide range of habitats, but mostly over inland plains and other dry open habitats (DotE 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is less than 10 km east of the study area. Likely habitat for this species exists within the proposed impact area in the form of potential foraging habitat as open woodland.	Likely
Merops ornatus	Rainbow Bee-eater	-	M	The Rainbow Bee-eater is a regular breeding migrant to southern Australia, arriving in September to October, departing February to March. This species occurs in open country, chiefly at suitable breeding places in areas of sandy or loamy soil: sand-ridges, riverbanks, road-cuttings, sand-pits, occasionally coastal cliffs (Morcombe 2004). This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. Likely habitat for this species exists within the proposed impact area in the form of potential foraging habitat as open woodland.	Likely
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	The Brown Treecreeper occupies dry eucalypt woodlands, particularly open grassy woodland lacking a dense understorey but containing abundant fallen woody debris (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during the ecological assessment undertaken for Stage 1 and Stage 2 approvals. Habitat for this species exists within the proposed impact area in the form of foraging habitat and potential nesting habitat.	Yes

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Chthonicola sagittata	Speckled Warbler	V	-	The Speckled Warbler occupies a wide range of eucalypt dominated communities with a grassy understorey, often on rocky ridges or in gullies. Typical habitat for this species would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. Habitat for this species exists within the proposed impact area in the form of potential foraging and nesting habitat.	Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	The Black-chinned Honeyeater is predominantly associated with dry open woodlands containing nectar-bearing eucalypts or mistletoes (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during the ecological assessment undertaken for the Modification 9 approval. Likely habitat for this species exists within the proposed impact area in the form of foraging habitat.	Likely
Anthochaera phrygia	Regent Honeyeater	CE	E	The Regent Honeyeater occupies open woodlands and forests, particularly *Eucalyptus sideroxylon* (Mugga Ironbark), *E. albens* (White Box), *E. melliodora* (Yellow Box) and *E. blakelyi* (Blakely's Red Gum) as well as mistletoes which provide sufficient nectar on which it feeds. This species makes nomadic movements following winter flowering eucalypt species (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is less than 15 km south of the study area. Potential habitat exists for this species within the proposed impact area in the form of potential foraging habitat with winter flowering eucalypt species.	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Grantiella picta	Painted Honeyeater	V	-	The Painted Honeyeater is a nomadic species that typically inhabits woodlands with abundant mistletoe. It is a specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias, preferring *Amyema sp.* mistletoe (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. Potential habitat for this species exists within the proposed impact area in the form of potential foraging and nesting habitat.	Potential
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	The Hooded Robin is associated with a wide range of eucalypt woodlands and open forests. Usually open grassy temperate woodlands, The species favours open areas adjoining large woodland blocks, with areas of dead timber and sparse shrub cover (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during assessments undertaken for Stage 1 and Stage 2 approvals. Likely habitat for this species exists within the proposed impact area in the form of foraging and nesting habitat.	Likely
Petroica phoenicea	Flame Robin	V	-	The Flame Robin breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. This species prefers clearings or areas with open understoreys, and grassy ground layer for breeding habitat. Shrub density does not appear to be an important habitat factor for the Flame Robin. Many individuals move to the inland slopes and plains in winter, or to drier more open habitats in the lowlands (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is less than 5 km south of the study area. Potential habitat for this species exists within the proposed impact area in the form of potential foraging habitat.	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Petroica boodang	Scarlet Robin	V	-	The Scarlet Robin breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. During autumn and winter some birds may appear on the eastern edges of the inland plains. They inhabit dry eucalypt forests and woodlands with an open grassy understorey with few scattered shrubs. Abundant logs and fallen timber are important components of its habitat (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during assessments undertaken for Stage 1 and Stage 2 approvals. Likely habitat for this species exists within the proposed impact area in the form of foraging and nesting habitat.	Likely
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	The Grey-crowned Babbler is known from open woodlands dominated by mature eucalypts with regenerating trees, tall shrubs, and an intact ground cover of grass and forbs (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. Potential habitat for this species exists within the proposed impact area in the form of potential foraging and nesting habitat as open woodland.	Potential
Daphoenositta chrysoptera	Varied Sittella	V	-	The Varied Sittella occurs in eucalypt forests and woodlands with rough-barked species, or mature smooth-barked gums with dead branches (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during assessments undertaken for Stage 1 and Stage 2 approvals. Habitat for this species exists within the proposed impact area in the form of foraging habitat.	Yes
Rhipidura rufifrons	Rufous Fantail	-	M	The Rufous Fantail is a summer breeding migrant to south-eastern Australia. This species is found in rainforest, dense wet eucalypt and monsoon forests, paperbark and mangrove swamps and riverside vegetation. Open country may be used by the Rufous Fantail during migration (Morcombe 2004).	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
				This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. Potential habitat for this species exists within the proposed impact area in the form of potential foraging habitat as open woodland.	
Myiagra cyanoleuca	Satin Flycatcher	-	M	The Satin Flycatcher typically inhabits heavily vegetated gullies in forests, and taller woodlands of coastal south-east Australia. This species also occurs in various sites during migration, including more open areas. This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. Potential habitat for this species exists within the proposed impact area in the form of potential foraging habitat as open woodland.	Potential
Stagonopleura guttata	Diamond Firetail	V	-	The Diamond Firetail is typically found in grassy eucalypt woodlands, but also occurs in open forest, mallee, natural grassland, and in secondary grassland derived from other communities. It is often found in riparian areas and sometimes in lightly wooded farmland (OEH 2014b). This species has been recorded within close proximity to the proposed impact area during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. Habitat for this species exists within the proposed impact area in the form of foraging and nesting habitat.	Yes
Mammals					
Dasyurus maculatus maculatus	Spotted-tailed Quoll (SE mainland population)	V	E	The Spotted-tailed Quoll has been 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 (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is less than 10 km north of the study area. Potential habitat for this species exists within the proposed impact area in the form of roosting (tree hollows) and foraging (woodland).	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Phascolarctos cinereus	Koala	V	V	The Koala is associated with both wet and dry eucalypt forest and woodland with acceptable eucalypt food trees. Some preferred *Eucalyptus* species are: *Eucalyptus albens* (White Box), *E. blakelyi* (Blakely's Red Gum) and *E. punctata* (Grey Gum) (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is less than 10 km north of the study area. Potential habitat for the Koala exists within the proposed impact area in the form of feed trees (White Box).	Potential
Petaurus norfolcensis	Squirrel Glider	V	-	The Squirrel Glider is associated with dry forest and woodlands typically including high nectar producing species, including winter flower species (OEH 2014b). The presence of hollow-bearing eucalypts is a critical habitat feature for the Squirrel Glider (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1 approval. Potential habitat for this species in the form of foraging and shelter (woodlands containing *Eucalyptus punctata* [Grey Gum], *E. blakelyi* [Blakely's Red Gum], *E. albens* [White Box], *E. melliodora* [Yellow Box] and *Angophora floribunda* [Rough-barked Apple]) exists within the proposed impact area.	Potential
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	The Brush-tailed Rock-wallaby is found in rocky areas in a variety of habitats, typically north facing sites with numerous ledges, caves and crevices and usually near fresh water (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is over 100 km south of the study area. No potential habitat for this species will be removed as a result of the modification.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	The Grey-headed Flying-fox roosts in large camps generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is within 5 km of the study area. No potential habitat for this species will be removed as a result of the modification.	Unlikely
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	The Yellow-bellied Sheathtail-bat is found in almost all habitats, from wet and dry sclerophyll forest, open woodland, open country, mallee, rainforests and heathland. This species roosts in tree hollows; may also use caves; has also been recorded in a tree hollows in paddock trees (OEH 2014b). This species has been recorded previously during assessments undertaken for the Stage 1 approval. Potential habitat for this species exists within the proposed impact area in the form of potential foraging and roosting habitat (hollow-bearing trees).	Potential
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Most records of this species are from dry eucalypt forest and woodland east of the Great Dividing Range (OEH 2014b). Individuals have, however, been recorded flying low over a rocky river in rainforest and wet sclerophyll forest and foraging in clearings at forest edges. The Eastern Freetail-bat primarily roosts in hollows or behind loose bark in mature eucalypts (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is within 20 km of the study area. Potential habitat for this species exists within the proposed impact area in the form of potential foraging and roosting habitat (hollow-bearing trees).	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Miniopterus australis	Little Bentwing-bat	V	-	The Little Bentwing-bat inhabits moist eucalypt forest, wet and dry sclerophyll forest. This species is generally found in well-timbered areas. Roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings. Males and juveniles disperse in summer. Only five nursery sites/maternity colonies are known within Australia (OEH 2014b). This species has been recorded previously during assessments undertaken for the Stage 1 and Stage 2 approvals. Potential habitat for this species exists within the proposed impact area in the form of potential foraging and roosting habitat (hollow-bearing trees).	Potential
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	The Eastern Bentwing-bat is associated with a range of habitats such as rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland (OEH 2014b). It forages above and below the tree canopy on small insects. This species will utilise caves, old mines, and stormwater channels, under bridges and occasionally buildings for shelter (OEH 2014b). This species has been recorded previously during assessments undertaken for the Stage 1 and Stage 2 approvals. Habitat for this species exists within the proposed impact area in the form of potential foraging and roosting habitat (hollow-bearing trees).	Yes
Nyctophilus corbeni	South-eastern Long-eared Bat (listed as Corben's Long-eared Bat under the TSC Act)	V	V	The South-eastern Long-eared Bat is thought to prefer structurally complex forest as foraging habitat, and breeding and sheltering is in tree hollows (OEH 2014b). This species has been recorded previously during assessments undertaken for the Stage 2 approval. Potential habitat for this species exists within the proposed impact area in the form of potential foraging and roosting habitat (hollow-bearing trees).	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	The large-eared Pied Bat has been recorded in a variety of habitats, including dry sclerophyll forests, woodland, sub-alpine woodland, edges of rainforests and wet sclerophyll forests. This species roosts in caves, rock overhangs and disused mine shafts (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. Potential roosting habitat for this species exists within the proposed impact area in the form of exposed sandstone outcrops and potential foraging habitat exists in the form as open woodland.	Potential
Chalinolobus picatus	Little Pied Bat	V	-	The Little Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria. This species occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee and Bimbil Box and roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. This species feeds on moths and possibly other flying invertebrates (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1 and Stage 2 approvals. Potential roosting habitat for this species exists within the proposed impact area in the form of exposed sandstone outcrops and potential foraging habitat exists in the form as open woodland.	Potential
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	The Eastern False Pipistrelle prefers moist habitats with trees taller than 20 m (OEH 2014b). This species roosts in tree hollows but has also been found roosting in buildings or under loose bark (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is within 10 km south of the study area. Potential habitat for this species exists within the proposed impact area in the form of potential foraging and roosting habitat (hollow-bearing trees).	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	The Greater Broad-nosed Bat is associated with moist gullies in mature coastal forest, or rainforest, east of the Great Dividing Range (Churchill 2008), tending to be more frequently located in more productive forests. Within denser vegetation types use is made of natural and man-made openings such as roads, creeks and small rivers, where this species hawks backwards and forwards for prey (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is within 10 km of the study area. Potential habitat for this species exists within the proposed impact area in the form of potential foraging and roosting habitat (hollow-bearing trees).	Potential
Vespadelus troughtoni	Eastern Cave Bat	V	-	The Eastern Cave Bat is known to inhabit tropical mixed woodland and wet sclerophyll forest on the coast and the dividing range but extend into the drier forest of the western slopes and inland areas. This species has been found roosting in sandstone overhand caves, boulder piles, mine tunnels and occasionally in buildings (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. The closest record of this species is within 1 km of the study area. Potential roosting habitat exists in the form of exposed sandstone outcrops and potential foraging habitat for this species exists within the proposed impact area in the form as open woodland.	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Pseudomys novaehollandiae	New Holland Mouse	-	V	The New Holland Mouse inhabits open heathlands, open woodlands with a heathland understorey and vegetated sand dunes. A social animal, this species lives predominantly in burrows shared with other individuals (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1, Stage 2 and Modification 9 approvals. Potential habitat for this species exists within the proposed impact area in the form of nesting and foraging (shrubby woodland on sands).	Potential

***TSC Act Status**: E – Endangered; V – Vulnerable*

***EPBC Act Status**: CE – Critically Endangered; E – Endangered; V – Vulnerable; M - Migratory*

4 Impact Assessment

4.1 SUMMARY OF IMPACTS

The proposed modification would require removal of native grassland vegetation and potential fauna habitat within the proposed surface disturbance impact areas (8.4 ha) and result in the subsidence of an additional 115.7 ha. The impacts are described below in relation to direct and indirect impacts upon the vegetation found within the study area and any potential habitat for threatened flora and fauna species. The assessment was undertaken based on NSW and Commonwealth legislation and guidelines to determine the significance of impacts. Including disturbance associated with the Open Cut 4 (OC4) South-West Modification, the proposed modification described in this report would result in less direct disturbance than that associated with the approved Stage 2 Project (the area to be cleared for approved haul road is 18.5 ha, compared with the 8.4 ha of clearance associated with this modification and 5.1 ha associated with the OC4 South-West Modification).

4.1.1 Assessment of Impact on Threatened Species, Populations and Communities

One (1) threatened flora species, six (6) threatened fauna species and two (2) endangered ecological communities listed under the TSC Act and/or the EPBC Act were observed within the proposed impact area.

The six threatened fauna species were observed within the underground mining area, where no direct vegetation clearing will be undertaken.

Habitat requirements for potential threatened species/communities were compared with the study area's characteristics. Three threatened flora species, 37 threatened fauna, and seven non-threatened migratory fauna species were classed as either potential, likely or have been recorded. These 47 species were assessed in accordance with the relevant guidelines.

The results of the threatened species assessments are summarised in **Table 8** below. Assessments for species listed under the TSC Act are detailed in **Appendix B**. Assessments under the EPBC Act are detailed in **Appendix C**. The modification does not impact any additional species to the currently approved project. No significant impact is anticipated on the threatened flora and fauna species within the study area.

Table 8: Summary of Potential Impacts on Threatened Flora, Fauna and Ecological Communities

Scientific Name	Common Name	Conservation Significance		Likelihood of Habitat		Significance of Impact
		TSC Act	EPBC Act	Surface Disturbance	Underground Mining	
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions		E	-	Unlikely	Habitat	Not Significant
White Box – Yellow Box – Blakely's Red Gum Grass Woodland and DNG		E	CE	Habitat	Habitat	Not Significant
Acacia ausfeldii	Ausfeld's Wattle	V	-	Potential Habitat	Potential Habitat	Not Significant
Diuris tricolor	Pine Donkey Orchid	V	-	Potential Habitat	Potential Habitat	Not Significant
Pomaderris queenslandica	Scant Pomaderris	E	-	Potential Habitat	Habitat	Not Significant
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Unlikely	Potential – Nesting, Sheltering and Foraging habitat	Not Significant
Lophoictinia isura	Square-tailed Kite	V	-	Potential – Foraging Habitat	Potential – Foraging and Nesting Habitat	Not Significant
Circus assimilis	Spotted Harrier	V	-	Likely - Foraging Habitat	Likely - Foraging Habitat	Not Significant
Hieraaetus morphnoides	Little Eagle	V	-	Likely - Foraging	Likely - Foraging and Nesting Habitat	Not Significant
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Potential – Foraging Habitat	Yes – Foraging and Nesting Habitat	Not Significant
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	Unlikely	Potential – Foraging Habitat	Not Significant
Glossopsitta pusilla	Little Lorikeet	V	-	Potential – Foraging Habitat	Potential – Foraging and Nesting Habitat	Not Significant
Neophema pulchella	Turquoise Parrot	V	-	Likely - Foraging	Likely - Foraging and Nesting Habitat	Not Significant

Scientific Name	Common Name	Conservation Significance		Likelihood of Habitat		Significance of Impact
		TSC Act	EPBC Act	Surface Disturbance	Underground Mining	
Lathamus discolor	Swift Parrot	E	E	Potential - Foraging Habitat	Potential - Foraging Habitat	Not Significant
Tyto novaehollandiae	Masked Owl	V	-	Likely - Foraging Habitat	Likely - Roosting and Foraging Habitat	Not Significant
Ninox strenua	Powerful Owl	V	-	Likely - Foraging Habitat	Likely - Roosting and Foraging Habitat	Not Significant
Ninox connivens	Barking Owl	V	-	Potential – Foraging Habitat	Potential – Roosting and Foraging Habitat	Not Significant
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Likely - Foraging Habitat	Yes – Nesting and Foraging Habitat	Not Significant
Chthonicola sagittata	Speckled Warbler	V	-	Potential – Foraging Habitat	Yes – Foraging and Nesting Habitat	Not Significant
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	Potential - Foraging Habitat	Potential - Foraging Habitat	Not Significant
Anthochaera Phrygia	Regent Honeyeater	CE	E	Potential - Foraging Habitat	Potential - Foraging Habitat	Not Significant
Grantiella picta	Painted Honeyeater	V	-	Potential – Foraging Habitat	Potential – Foraging and Nesting Habitat	Not Significant
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Likely – Foraging	Likely – Foraging and Nesting Habitat	Not Significant
Petroica phoenicea	Flame Robin	V	-	Potential - Foraging Habitat	Potential - Foraging Habitat	Not Significant
Petroica boodang	Scarlet Robin	V	-	Likely - Foraging Habitat	Likely - Foraging Habitat	Not Significant

Scientific Name	Common Name	Conservation Significance		Likelihood of Habitat		Significance of Impact
		TSC Act	EPBC Act	Surface Disturbance	Underground Mining	
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	Potential - Nesting & Foraging Habitat	Potential - Nesting and Foraging Habitat	Not Significant
Daphoenositta chrysoptera	Varied Sittella	V	-	Likely - Foraging Habitat	Yes - Foraging Habitat	Not Significant
Stagonopleura guttata	Diamond Firetail	V	-	Potential - Foraging Habitat	Yes - Foraging and Nesting Habitat	Not Significant
Dasyurus maculatus maculatus	Spotted-tailed Quoll (SE mainland population)	V	E	Potential – Foraging Habitat	Potential – Foraging Habitat	Not Significant
Phascolarctos cinereus	Koala	V	V	Potential - Koala Feed Trees	Potential - Koala Feed Trees	Not Significant
Petaurus norfolcensis	Squirrel Glider	V	-	Potential – Foraging Habitat	Potential – Foraging Habitat	Not Significant
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Potential - Foraging Habitat	Potential - Roosting and Foraging Habitat	Not Significant
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Potential - Foraging Habitat	Potential - Roosting and Foraging Habitat	Not Significant
Miniopterus australis	Little Bentwing-bat	V	-	Potential - Foraging Habitat	Potential - Roosting and Foraging Habitat	Not Significant
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Potential - Foraging Habitat	Yes - Roosting and Foraging Habitat	Not Significant
Nyctophilus corbeni	South-eastern Long-eared Bat (listed as Corben's Long-eared Bat under the TSC Act)	V	V	Potential - Foraging Habitat	Potential - Roosting and Foraging Habitat	Not Significant
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Potential - Foraging Habitat	Potential - Roosting and Foraging Habitat	Not Significant

Scientific Name	Common Name	Conservation Significance		Likelihood of Habitat		Significance of Impact
		TSC Act	EPBC Act	Surface Disturbance	Underground Mining	
Chalinolobus picatus	Little Pied Bat	V	-	Potential - Foraging Habitat	Potential - Roosting and Foraging Habitat	Not Significant
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Potential - Foraging Habitat	Potential - Roosting and Foraging Habitat	Not Significant
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Potential - Foraging Habitat	Potential - Roosting and Foraging Habitat	Not Significant
Vespadelus troughtoni	Eastern Cave Bat	V	-	Potential - Foraging Habitat	Potential - Roosting and Foraging Habitat	Not Significant
Pseudomys novaehollandiae	New Holland Mouse	-	V	Potential - Nesting & Foraging Habitat	Potential - Nesting and Foraging Habitat	Not Significant

While some impacts are expected for threatened fauna species including diurnal birds, forest owls, and microbats from the loss of potential habitat (for a full list see **Table 8**), these impacts are not considered to be significant as suitable habitat resources will remain present outside the proposed impact area, with abundant similar habitat available in wooded areas to the east and west as well as in the connected corridor with Goulburn River NP to the north, and Munghorn Gap Nature Reserve to the south of the study area. While connectivity is being retained with these areas, proposed offsets established for Stage 1 and Stage 2 aim to improve the connectivity of local conservation areas and the quality of remnant vegetation within the locality and region. This will potentially increase movement corridors for genetic exchange, foraging habitat and increased breeding resources for threatened fauna species.

4.1.2 Assessment of Impacts on Migratory Species

Seven non-threatened, Commonwealth-listed migratory species are considered to potentially occur in the study area (**Table 9**). Assessments of the significance of potential impacts of the proposed modification were undertaken for each of these species using the *'EPBC Act Policy Statement 1.1 Significant Impact Guidelines: Matters of National Environmental Significance'* (**Appendix C**). The results are summarised in **Table 9** below. No significant impact is anticipated for the migratory species.

Table 9: Summary of Potential Impacts upon Migratory Fauna Species

Scientific Name	Common Name	Conservation Significance		Likelihood of Habitat		Significance of Impact
		TSC Act	EPBC Act	Surface Disturbance	Underground Mining	
Ardea ibis	Cattle Egret	-	M	Potential - Foraging Habitat	Unlikely	Not Significant
Ardea modesta	Eastern Great Egret	-	M	Potential - Foraging Habitat	Potential - Foraging Habitat	Not Significant
Hirundapus caudacutus	White-throated Needletail	-	M	Likely - Foraging Habitat	Likely - Foraging Habitat	Not Significant
Apus pacificus	Fork-tailed Swift	-	M	Likely – Foraging Habitat	Likely – Foraging Habitat	Not Significant
Merops ornatus	Rainbow Bee-eater	-	M	Likely - Foraging Habitat	Likely - Foraging and Nesting Habitat	Not Significant
Rhipidura rufifrons	Rufous Fantail	-	M	Likely - Foraging Habitat	Likely - Foraging Habitat	Not Significant
Myiagra cyanoleuca	Satin Flycatcher	-	M	Potential - Foraging Habitat	Potential - Foraging Habitat	Not Significant

4.2 DIRECT IMPACTS

4.2.1 Vegetation Clearing

The proposed works within the surface disturbance areas will affect approximately 8.4 ha of native vegetation all of which is comprised of DNG. The area of each BioMetric vegetation type to be impacted is shown in **Table 10**.

The vegetation to be impacted by the proposed surface disturbance works is either located in previously disturbed areas or is adjacent to existing, cleared agricultural land and the Stage 2 Project area (PA 08_0135).

The proposed vegetation clearing within the surface disturbance areas will impact upon one TEC, Box – Gum Grassy Woodland. Box – Gum Woodland is listed as an EEC under the TSC Act and CEEC under the EPBC Act. This proposed impact will be undertaken on vegetation located adjacent to cleared areas and represents 0.25% (0.25 ha) of the overall vegetation clearing proposed under this modification. This modification will impact a small area of TEC that has undergone historical clearing and grazing. Given this, a non-significant impact has been determined through the application of an assessment for this TEC listed under the TSC Act (**Appendix B**) and under the EPBC Act (**Appendix C**).

Table 10: Areas of Native Vegetation Impacted by Surface Disturbance and Above Underground Mining

Community		Structure Form	Surface Disturbance (ha)	Underground Mining (ha)
HU603	Rough-barked Apple – Silvertop Stringybark – Red Stringybark grassy open forest on hills of the upper Hunter Valley, southern North Coast	Woodland	NA	6.02
		DNG	NA	9.6
HU515	Blakely's Red Gum – Yellow Box grassy open forest or woodland of the New England Tablelands	Woodland	NA	4.81
		DNG	NA	11.33
HU653	White Box – Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter Valley, Sydney Basin	Woodland	NA	2.2
HU654	White Box – Yellow Box grassy woodland on basalt slopes in the upper Hunter Valley, Brigalow Belt South	DNG	0.25	2.35
HU551	Grey Box – Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin	Woodland	NA	2.17
		DNG	8.13	12.09
HU552	Grey Gum – Narrow-leaved Stringybark – Ironbark woodland on ridges of the Upper Hunter Valley, Sydney Basin	Woodland	NA	54.66
		Regenerating	NA	3.37
		Cleared	NA	2.6
HU574	Narrow-leaved Stringybark - Grey Gum shrubby woodland on footslopes on the Upper Hunter Valley, Sydney Basin	Woodland	NA	4.42
	Total		**8.4**	**115.7**

The proposed underground mining will result in potential subsidence over an additional area of approximately 115.7 ha. The impacts from subsidence on these areas are expected to be manageable and would meet the subsidence impact performance measures within the Stage 2 Project Approval (Mine Subsidence Engineering Consultants [MSEC], 2015).

WRM Water & Environment (2015) has reviewed the potential for impacts on surface water as a result of the modification. WRM Water & Environment conclude that there would be a minor increase in the depth of ponded areas under the approved Moolarben Coal Complex (approximately 0.2 m), and approximately five additional areas of ponding, albeit at very shallow depths and surface areas (maximum of 0.4 m depth and maximum surface area of 0.4 ha).

The key area of change is located at the north-eastern extent of the UG1 mining area, where panels are extended under the proposed modification. It is predicted that there will be no change to water availability (e.g. in the soil profile) for flora and fauna as a result of the modification (WRM Water & Environment, 2015). Two TEC's, Box – Gum Woodland (listed under the TSC Act and EPBC Act) and Central Hunter Grey Box – Ironbark Woodland (listed under the TSC Act) are located within the underground mining area and have been assessed under both the TSC Act (**Appendix B**) and EPBC Act (**Appendix C**). The subsidence of vegetation within the underground mining area is not expected to result in the loss of vegetation cover or community structure, therefore, no significant impact is anticipated for these TECs.

The Moolarben Coal Project Stage 2 Biodiversity Offset Strategy (BOS) was developed to offset the net loss of remnant vegetation with compensatory habitat in the form of ecological offsets. The Stage 2 Project will result in the clearing of approximately 1,546 ha of land, including 779 ha of remnant vegetation and an additional 123 ha of the Box-Gum Woodland TEC.

The vegetation loss within the Stage 2 approval area has resulted in the provision of ecological offsets, including 3,612 ha of remnant vegetation and 1,190 ha of Box-Gum Woodland TEC. These offsets are distributed across eight properties.

A proposed modification (OC4 South-West Modification) to the currently approved haul road under the Stage 2 Project Approval (PA 08_0135) represents a smaller area of impact, creating surplus offset areas. The current approved haul road for the Stage 2 Project Approval would impact an area of 18.5 ha. This is approximately 13.4 ha more vegetation than the OC4 South-West Modification haul road realignment which covers an area of 5.1 ha. The combined clearance of the proposed OC4 haul road and proposed modification (8.4 ha) is approximately 5 ha less than the area approved to be cleared for the Stage 2 Project. Therefore, the current BOS developed for the Stage 2 Project adequately covers the impacts from the realigned haul road and the proposed modification, with surplus area.

The proposed modification to the MCO UG1 will result in the direct loss of 8.4 ha of DNG, including 0.25 ha of the DNG form of Box-Gum Woodland TEC. The direct impact of this proposed modification on TECs is minor (0.25 ha) compared to that of the overall Stage 2 approval (123 ha) and the vegetation communities to be impacted have been included within the BOS. The additional impacts associated with this modification will not have any implications in the current offsetting ratios within the BOS as this modification and the OC4 South-West Modification combined result in less surface impact than the approved Stage 2 footprint. The current BOS developed for the Stage 2 Project adequately covers the proposed impacts from the proposed modification, with surplus area.

4.2.2 Loss of Fauna Habitat

Approximately 8.4 ha of DNG containing potential fauna habitat will be removed from the proposed surface disturbance impact area. The proposed works would directly impact fauna and fauna habitat as a result of land clearing within the surface disturbance areas. This is due to loss of habitat and habitat trees from the vegetation clearing activities.

Impacts from the removal of these structural habitat features on the proposed surface disturbance impact area will require management, particularly for threatened species that might rely on these resources for breeding and do not have the ability to migrate to new areas, establish new territories or await the rehabilitation of habitat on site.

Measures to minimise adverse impacts will be undertaken in accordance with MCC's Landscape Management Plan (LMP) or its future revision (i.e. the Biodiversity Management Plan [BMP] that is required by the Project Approvals) and include, where practical, the salvaging and relocation of large hollows identified during pre-clearing surveys.

A proportion of the species listed in **Table 8** and **Table 9** are considered to have the potential to breed within the natural habitat currently present in the proposed surface disturbance areas. Collectively, approximately 0.25 ha of potential threatened species breeding habitat will be removed from the proposed surface disturbance impact area.

The proposed underground mining will result in potential subsidence in areas above longwall mining operations over an area of approximately 115.7 ha. Subsidence of vegetation within the underground mining area is not expected to result in the loss of vegetation cover or community structure. Fauna habitat (including that identified as Koala habitat) will not be directly impacted by the occurrence of subsidence. Direct mortality of plants and animals (including cave roosting bats) may occur as a result of subsidence-induced rock fall or collapse; however the impacts of such events are expected to be short-term and insignificant.

The potential subsidence of cliff line habitats due to the increase of underground mining may impact upon cave roosting bats, particularly *Chalinolobus dwyeri* (Large-eared Pied Bat), which is known to occur in the proposed mining area and surrounds. The nature and extent of habitat for cave roosting bats is not likely to be significantly altered as a result of the proposed modification in a way that would jeopardise the species in the locality. Furthermore, extensive potential habitat has been recorded within the Stage 2 offset areas and the Large-eared Pied Bat has been recorded by surveys on one of the offset properties, where sandstone outcrops provide habitat for this species.

The potential direct and indirect impacts associated with this proposed modification are relatively minor within the overall Stage 2 Project and the Stage 2 BOS is sufficient to cover the direct loss of 8.4 ha of remnant vegetation and potential impacts from subsidence on fauna habitat.

4.3 INDIRECT IMPACTS

A series of indirect impacts are likely to occur as a result of the modification. These include noise, vibration, dust and light pollution.

4.3.1 Noise and Vibration

There are no Commonwealth or NSW noise assessment criteria applicable to the protection of native fauna, including for threatened species and migratory species. The proposed modification is adjacent to an existing mining area. Mine operations already emit noise in the study area, which has the ability to disrupt fauna behaviour.

Unnatural noise and vibration levels may cause disturbance to fauna, particularly acoustic sensitive nocturnal species such as microbats. Fauna will be less likely to inhabit areas of natural habitat close to the source of artificially generated noise. Nesting birds may also be disturbed by artificial noise or vibration generation. Levels of noise associated with Stage 2 have been addressed in the MCO Stage 2 Environmental Noise Impact Assessment (Global Acoustics, 2012). Noise impacts as a result of the proposed modification are not expected to increase greatly above current levels in the study area.

4.3.2 Dust

The increased generation of dust may impact flora and fauna. Existing mining operations in the area produce significant volumes of dust. Dense coatings of dust may alter natural growth of plants within the subject area, this may in turn impact habitat for fauna. The surface disturbance activities within the study area will contribute to the dust load in the locality for a limited period of time. Disturbance from subsidence will not contribute to increased dust generation.

The effects of dust on the environment are addressed in the MCO Stage 2 Air Quality Assessment (PAE Holmes, 2011).

4.3.3 Light Pollution

Increased light pollution may alter the foraging and nesting patterns of nocturnal fauna. However, increased light resulting from the modification is unlikely to be significant, as the surrounding area is already affected by artificial light pollution from existing mining activities. The majority of the additional area to be disturbed under this impact assessment will be solely underground mining activities that will not require additional artificial light requirements.

4.3.4 Fragmentation, Edge Effects and Connectivity

Fragmentation of habitat occurs where areas that were once continuous become divided into separate, isolated fragments by non-woodland areas. It can decrease genetic exchange in vegetation and fauna populations that cannot navigate non-woodland areas (Saunders *et al*. 1991).

A large connected patch of remnant vegetation occurs adjacent to the proposed modification area, connecting it to wooded areas to the east and a large regional corridor containing Goulburn River NP and Munghorn Gap Nature Reserve. The proposed vegetation clearing activities within the surface disturbance areas occur along the edge of woodland areas, thus not affecting large patches of contiguous forest and woodland. There will be no clearance of woodland associated with this modification.

Delineated ‘edges’ in vegetation are created by clearing within or adjacent to a patch of vegetation. Increasing edges in remnant vegetation can lead to changes in microclimate and ecological processes. These changes are known as ‘edge effects’. Microclimatic changes can include changes in light, temperature, humidity and wind, which can favour certain species, leading to changes in structure and diversity in these areas. These changed conditions can suit disturbance tolerant species such as weeds, and increases the ability for feral animals to colonise and utilise remnant vegetation (Oliveira-Filho *et al*. 1997).

The edges of the proposed impact area are currently impacted by edge effects. Any edge effects will be minimised, where possible, using active management techniques. Weeds will be managed in accordance with the LMP or its future revision (i.e. the BMP that is required by the Project Approvals).

4.3.5 Pest Species

In addition to their increased potential to colonise the impact area as a result of increased disturbance and edge effects, pest species including *Vulpes vulpes* (European Red Fox) and *Oryctolagus cuniculus* (European Rabbit) may also be displaced immediately following clearing of the surface disturbance areas, which may cause their numbers to increase in surrounding conservation reserves. Feral animals will be managed in accordance with the LMP or its future revision (i.e. the BMP that is required by the Project Approvals).

4.4 CUMULATIVE IMPACTS

Cumulative impacts include successive, incremental and combined impacts of one or more activities on the environment. Cumulative impacts result from the accumulation and interaction of impacts from past, present or future activities.

Vegetation within the Ulan area has been removed as a result of expansions in operations within the Ulan Coal Complex. The vegetation clearing activities associated with this modification represents the removal of DNG only, no woodland will be removed, thus not resulting in a reduction in woodland within the Ulan area. The proposed modification coupled with the OC4 South-West Modification results in a relocation of vegetation clearance requirements compared to the approved Stage 2 footprint.

Ensuring optimum impact mitigation and management techniques are utilised will aid in reducing the overall cumulative impacts contributed by the proposed development.

4.5 KEY THREATENING PROCESSES

Five Key Threatening Processes (KTPs) listed under the TSC Act and/or EPBC Act are likely to be relevant to the proposal. These are:

- clearing of native vegetation (TSC Act)/land clearance (EPBC Act);
- loss of hollow-bearing trees (TSC Act);
- removal of dead wood and trees (TSC Act);
- invasion of native plant communities by exotic perennial grasses (TSC Act); and
- alteration of habitat following subsidence due to long wall mining (TSC Act).

These threatening processes are considered in the impact assessments in **Appendix B** and **Appendix C**.

4.6 IMPACT MITIGATION MEASURES

Mitigation measures for impacts on vegetation and fauna habitat will be undertaken in accordance with the LMP (MCO 2013), or its future revision (i.e. the BMP that is required by the Project Approvals) and will include the measures described in **Sections 4.6.1** to **4.6.3**.

4.6.1 Prior to Construction

- Implementation of MCO's Vegetation Clearance Protocol. This includes the delineation of areas to be cleared, pre-clearing surveys, management of impacts to fauna, and vegetation clearance procedures.

- Implementation of MCO's Ground Disturbance Permit to be approved by the Environment and Community Manager as required prior to the commencement of clearing activities.

4.6.2 During Construction

- Implementation of MCO's Ground Disturbance Permit to be approved by the Environment and Community Manager as required prior to the commencement of clearing activities. Habitat features important to threatened fauna species will be collected and stockpiled for reinstatement in rehabilitation areas, where practicable.
- Management for weeds and pest animals should occur.
- Implementation of dust minimisation and suppression measures detailed in the Air Quality Management Plan.

4.6.3 Post Construction

- If rehabilitation is to be performed, appropriate native flora species characteristic of the original communities should be used, including use of local provenance seed stock where possible. Rehabilitation activities to be undertaken in accordance with the Mining Operations Plan and Rehabilitation Management Plan.
- Management for weeds and pest animals in accordance with the LMP/BMP.

5 Conclusion

This Flora and Fauna Impact Assessment prepared for MCO assessed the impact of the proposed modification disturbance areas on the flora and fauna present within the study area.

The surface disturbance area contains two BioMetric vegetation types, of which White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and DNG (Box-Gum Woodland) is a TEC listed under the TSC Act and EPBC Act. No threatened flora or fauna species were recorded within the surface disturbance areas of the modification.

Surface disturbance activities will result in the removal of:

- 0.25 ha of the DNG form of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and DNG.
- 8.13 ha of the DNG form of Grey Box – Narrow-leaved Ironbark shrubby woodlands and DNG.

The underground mining area contains five BioMetric vegetation types, of which two are EECs, including Box-Gum Woodland (listed under both the TSC Act and EPBC Act) and Central Hunter Grey Box-Ironbark Woodland (listed under the TSC Act). One threatened flora species, *Pomaderris queenslandica* (Scant Pomaderris), and six threatened fauna species *Calyptorhynchus lathami* (Glossy Black-Cockatoo), *Climacteris picumnus victoriae* (Brown Treecreeper [eastern subspecies]), *Chthonicola sagittata* (Speckled Warbler), *Daphoenositta chrysoptera* (Varied Sittella), *Stagonopleura guttata* (Diamond Firetail) and *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat) were recorded within the underground mining area.

Underground mining will potentially result in the subsidence of approximately 115.7 ha of vegetation. The disturbance to be caused is as a result of subsidence resulting from longwall mining activities. The effect of subsidence upon vegetation is unlikely to cause a significant impact.

Assessments of significance were applied under section 5A of the EP&A Act as well as significance assessments under the EPBC Act guidelines to determine the potential impacts to species, populations and communities in the study area. Following these detailed assessments (**Appendices B** and **C**) the modification is unlikely to result in significant impacts to threatened biodiversity.

Management of potential impacts will be in accordance with an approved LMP/BMP.

Habitat resources occur outside the disturbance footprint, with abundant similar habitat available in wooded areas to the east, and in the connected corridor with Goulburn River NP to the north and Munghorn Gap Nature Reserve to the south of the study area.

While connectivity is being retained with these areas, offsets aim to improve the connectivity of local conservation areas and the quality of remnant vegetation within the locality and region. This will potentially increase movement corridors for improved foraging habitat connectivity and increase breeding resources (leading to improved genetic exchange) for fauna and flora species.

The approved BOS for Stage 2 adequately covers the impacts from the proposed modification, with surplus area as the area to be cleared combined with that of the OC4 South-West Modification is less than the area to be cleared for the approved Stage 2 Project.

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Appendix A – Flora and Fauna Species Recorded in the Project Area

FLORA

Acacia decora	*Clematis aristata*	*Isopogon petiolaris*
Acacia gladiiformis	*Conyza sp**	*Juncus subsecundus*
Acacia ilicifolia	*Correa reflexa*	*Juncus usitatus*
Acacia implexa	*Cymbopogon refractus*	*Kunzea parvifolia*
Acacia lanigera	*Cynodon dactylon*	*Lepidosperma gunnii*
Acacia leucolobia	*Cynoglossum*	*Lepidosperma laterale*
Acacia linearifolia	*Daviesia genistifolia*	*Leucopogon muticus*
Acacia ulicifolia	*Daviesia ulicifolia*	*Lissanthe strigosa*
Acacia verniciflua	*Dianella spp*	*Lomandra confertifolia*
Acaena ovina	*Dichondra spp A*	*Lomandra filiformis*
Acianthus spp	*Digitaria breviglumis*	*Lomandra glauca*
Acrotriche rigida	*Digitaria diffusa*	*Lomandra longifolia*
Allocasuarina gymnanthera	*Dodonaea triangularis*	*Lomandra multiflora*
Allocasuarina luehmannii	*Echium plantagineum**	*Lomandra spp*
*Andropogon virginicus**	*Echinopogon ovata*	*Macrozamia secundus*
Angophora floribunda	*Einadia nutans*	*Melaleuca thymifolia*
Aristida ramosa	*Eleocharis spp*	*Microlaena stipoides*
Aristida vagans	*Entolasia marginata*	*Opuntia stricta**
Arundinella nepalensis	*Entolasia stricta*	*Panicum effusum*
Asperula conferta	*Eragrostis benthamii*	*Paspalum dilatatum*
Astroloma humifusum	*Eragrostis spp*	*Persoonia linearis*
Austrodanthonia spp	*Eragrostis ciliaris*	*Phyllanthus spp.*
Austrostipa falcatapp	*Eragrostis leptostachya*	*Phyllanthus spp.*
Austrostipa scabra ssp falcata	*Eucalyptus agglomerata*	*Podolobium ilicifolium*
Austrostipa sp	*Eucalyptus albens*	*Pomax umbellata*
Bossiaea obcordata	*Eucalyptus blakelyi*	*Pteridium spp*
Bothriochloa macra	*Eucalyptus crebra*	*Pultenaea microphylla*
Brachychiton populneus	*Eucalyptus dwyeri*	*Sannantha cunninghamii*
Brachyloma daphnoides	*Eucalyptus sparsifolia*	*Schinus molle**
Bursaria spinosa	*Eulalia aurea*	*Setaria pumila*
Callitris endlicheri	*Fimbristylis dichotoma*	*Solanum cinereum*
Calotis cuneifolia	*Gahnia aspera*	*Sonchus spp**
Calotis lappulacea	*Glycine clandestina*	*Sporobolus creber*
*Capsella bursar-pastoris**	*Glycine spp*	*Sporobolus elongatus*
Carex spp	*Goodenia hederacea*	*Stackhousia spp*
Cassinia arcuata	*Hardenbergia violacea*	*Stellaria pungens*
Cassinia quinquefaria	*Hibbertia circumdans*	*Styphelia triflora*
Cheilanthes sieberi	*Hibbertia obtusifolia*	*Tagetes minuta**
Chloris truncata	*Hydrocotyle laxiflora*	*Taraxacum officinale**
Cleistochloa rigida	*Imperata cylindrica*	*Veronica plebeia*
		*Vulpia spp**

* = exotic species

FAUNA

Scientific Name	Common Name	TSC Act	EPBC Act	A1 Op	A2 Op	A3 Op	BS1	BS2	BS3	BS4	BS5	BS6	BS7	BS8	BAT1	BAT2
Birds																
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	-	-				x							x		
Acanthiza lineata	Striated Thornbill	-	-				x	x			x					
Acanthiza nana	Yellow Thornbill	-	-				x							x		
Acanthiza pusilla	Brown Thornbill	-	-				x		x	x	x			x		
Acanthiza reguloides	Buff-rumped Thornbill	-	-	x	x					x						
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	-	-			x								x		
Acanthorhynchus tenuirostris	Eastern Spinebill	-	-				x		x					x		
Alisterus scapularis	Australian King Parrot	-	-													
Anthochaera carunculata	Red Wattlebird	-	-			x										
Anthus novaezeelandiae	Australasian Pipit	-	-									x				
Aquila audax	Wedge-tailed Eagle	-	-			x										
Cacatua galerita	Sulphur-crested Cockatoo	-	-		x											
Calyptorhynchus funereus	Yellow-tailed Black-Cockatoo	-	-			x										
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-							x						
Chenonetta jubata	Australian Wood Duck	-	-			x						x				
Chthonicola sagittata	Speckled Warbler	V	-			x								x		

Scientific Name	Common Name	TSC Act	EPBC Act	A1 Op	A2 Op	A3 Op	BS1	BS2	BS3	BS4	BS5	BS6	BS7	BS8	BAT1	BAT2
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-			x										
Colluricincla harmonica	Grey Shrike-thrush	-	-			x			x							
Coracina novaehollandiae	Black-faced Cuckoo-shrike	-	-						x							
Corcorax melanorhamphos	White-winged Chough	-	-			x										
Cormobates leucophaeus	White-throated Treecreeper	-	-				x	x	x		x		x			
Corvus coronoides	Australian Raven	-	-		x	x	x									
Cracticus nigrogularis	Pied Butcherbird	-	-									x				
Cracticus tibicen	Australian Magpie	-	-		x	x				x						
Dacelo novaeguineae	Laughing Kookaburra	-	-				x					x				
Daphoenositta chrysoptera	Varied Sittella	V	-						x							
Dicaeum hirundinaceum	Mistletoebird	-	-		x	x		x								
Dromaius novaehollandiae	Emu	-	-			x										
Egretta novaehollandiae	White-faced Heron	-	-			x										
Eolophus roseicapillus	Galah	-	-			x						x				
Eopsaltria australis	Eastern Yellow Robin	-	-				x									
Entomyzon cyanotis	Blue-faced Honeyeater	-	-			x										
Falco cenchroides	Nankeen Kestrel	-	-			x										
Grallina cyanoleuca	Magpie-lark	-	-				x									
Lichenostomus chrysops	Yellow-faced Honeyeater	-	-				x	x	x		x		x	x		

Scientific Name	Common Name	TSC Act	EPBC Act	A1 Op	A2 Op	A3 Op	BS1	BS2	BS3	BS4	BS5	BS6	BS7	BS8	BAT1	BAT2
Lichenostomus leucotis	White-eared Honeyeater	-	-						x	x						
Lichenostomus penicillatus	White-plumed Honeyeater	-	-			x							x	x		
Lichenostomus melanops	Yellow-tufted Honeyeater	-	-			x					x		x			
Malurus cyaneus	Superb Fairy-wren	-	-				x		x					x		
Manorina melanocephala	Noisy Miner	-	-			x						x				
Melithreptus brevirostris	Brown-headed Honeyeater	-	-				x									
Melithreptus lunatus	White-naped Honeyeater	-	-						x		x					
Menura novaehollandiae	Superb Lyrebird	-	-		x											
Microeca fascinans	Jacky Winter	-	-		x							x		x		
Neochmia temporalis	Red-browed Finch	-	-			x								x		
Ocyphaps lophotes	Crested Pigeon	-	-									x				
Origma solitaria	Rockwarbler	-	-						x							
Pachycephala pectoralis	Golden Whistler	-	-						x	x						
Pardalotus punctatus	Spotted Pardalote	-	-						x	x	x	x	x	x		
Pardalotus striatus	Striated Pardalote	-	-					x				x				
Petroica rosea	Rose Robin	-	-						x							
Philemon corniculatus	Noisy Friarbird	-	-		x											
Phylidonyris novaehollandiae	New Holland Honeyeater	-	-			x								x		
Platycercus eximius	Eastern Rosella	-	-				x					x	x			

Scientific Name	Common Name	TSC Act	EPBC Act	A1 Op	A2 Op	A3 Op	BS1	BS2	BS3	BS4	BS5	BS6	BS7	BS8	BAT1	BAT2
Platycercus elegans	Crimson Rosella	-	-				x									
Plectorhyncha lanceolata	Striped Honeyeater	-	-			x								x		
Psephotus haematonotus	Red-rumped Parrot	-	-			x						x				
Pomatostomus superciliosus	White-browed Babbler	-	-				x		x							
Rhipidura albiscapa	Grey Fantail	-	-		x				x				x	x		
Rhipidura leucophrys	Willie Wagtail	-	-		x									x		
Sericornis frontalis	White-browed Scrubwren	-	-					x	x							
Smicrornis brevirostris	Weebill	-	-				x		x							
*Sturnus vulgaris**	Common Starling	*	*													
Stagonopleura guttata	Diamond Firetail	V	-			x										
Strepera graculina	Pied Currawong	-	-			x										
Taeniopygia bichenovii	Double-barred Finch	-	-											x		
Zosterops lateralis	Silvereye	-	-				x									
Mammals																
Macropus giganteus	Eastern Grey Kangaroo	-	-			x		x								
Wallabia bicolor	Swamp Wallaby	-	-			x										
Macropus rufogriseus	Red-necked Wallaby	-	-	x										x		
Tachyglossus aculeatus	Short-beaked Echidna	-	-													
Trichosurus vulpecula	Common Brush-tailed Possum	-	-							x						

Scientific Name	Common Name	TSC Act	EPBC Act	A1 Op	A2 Op	A3 Op	BS1	BS2	BS3	BS4	BS5	BS6	BS7	BS8	BAT1	BAT2
Vombatus ursinus	Common Wombat	-	-	x		x		x	x		x		x	x		
*Oryctolagus cuniculus**	Rabbit*	-	-			x								x		
*Vulpes vulpes**	Fox*	-	-			x										
Mammals – Bats																
Chalinolobus morio	Chocolate Wattled bat	-	-													x
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-												x	x
Mormopterus 'sp. 4'	Southern Freetail-bat	-	-													x
Nyctophilus sp.	Long-eared Bat	-	-												x	x
Rhinolophus megaphyllus	Eastern Horseshoe Bat	-	-												x	
Tadarida australis	White-striped Freetail-bat	-	-												x	x
Vespadelus vulturnus	Little Forest Bat	-	-												x	x
Frogs																
Crinia signifera	Common Eastern Froglet	-	-													

* - Exotic Species.

Appendix B – EP&A Act Assessment of Significance

Under section 5A of the EP&A Act, an assessment of the possibility of 'significant effect on threatened species, populations or ecological communities, or their habitats' is required. The threatened species that are the subject of the '*Assessment of Significant Effect'* for the proposed works are:

Fauna

- *Hoplocephalus bungaroides* (Broad-headed Snake).
- *Lophoictinia isura* (Square-tailed Kite).
- *Circus assimilis* (Spotted Harrier).
- *Hieraaetus morphnoides* (Little Eagle).
- *Calyptorhynchus lathami* (Glossy Black-Cockatoo).
- *Callocephalon fimbriatum* (Gang-gang Cockatoo).
- *Glossopsitta pusilla* (Little Lorikeet).
- *Neophema pulchella* (Turquoise Parrot).
- *Lathamus discolor* (Swift Parrot).
- *Tyto novaehollandiae* (Masked Owl).
- *Ninox strenua* (Powerful Owl).
- *Ninox connivens* (Barking Owl).
- *Climacteris picumnus victoriae* (Brown Treecreeper [eastern subspecies]).
- *Chthonicola sagittata* (Speckled Warbler).
- *Melithreptus gularis gularis* (Black-chinned Honeyeater [eastern subspecies]).
- *Anthochaera phrygia* (Regent Honeyeater).
- *Grantiella picta* (Painted Honeyeater).
- *Melanodryas cucullata cucullata* (Hooded Robin [south-eastern form]).
- *Petroica phoenicea* (Flame Robin).
- *Petroica boodang* (Scarlet Robin).
- *Pomatostomus temporalis temporalis* (Grey-crowned Babbler [eastern subspecies]).

- *Daphoenositta chrysoptera* (Varied Sittella).
- *Stagonopleura guttata* (Diamond Firetail).
- *Dasyurus maculata* (Spotted-tailed Quoll).
- *Phascolarctos cinereus* (Koala).
- *Petaurus norfolcensis* (Squirrel Glider).
- *Mormopterus norfolkensis* (Eastern Freetail-bat).
- *Miniopterus australis* (Little Bentwing-bat).
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat).
- *Nyctophilus corbeni* (Corben's Long-eared Bat) [listed as South-eastern Long-eared Bat under the EPBC Act].
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat).
- *Chalinolobus dwyeri* (Large-eared Pied Bat).
- *Chalinolobus picatus* (Little Pied Bat).
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle).
- *Scoteanax rueppellii* (Greater Broad-nosed Bat).
- *Vespadelus troughtoni* (Eastern Cave Bat).

Flora and Vegetation Communities

- *Acacia ausfeldii* (Ausfeld's Wattle).
- *Diuris tricolor* (Pine Donkey Orchid).
- *Pomaderris queenslandica* (Scant Pomaderris).
- Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions EEC.
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland EEC.

Fauna

Hoplocephalus bungaroides (Broad-headed Snake)

The Broad-headed Snake is listed as an endangered species under the TSC Act, and a vulnerable species under the EPBC Act. This species has been recorded previously within the Goulburn River NP (OEH 2014b), however has not been recorded within the study area.

The Broad-headed Snake is nocturnal, sheltering by day in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. This species moves from the sandstone rocks to shelter in hollows within 200 m of escarpments in summer. It feeds mostly on geckos and small skinks; but will occasionally eat frogs and small mammals. Females produce four to 12 live young from January to March (OEH 2014b).

An assessment of impact criteria under section 5A of the EP&A Act has been completed to assess potential impacts to the Broad-headed Snake.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The proposed works may disturb a very small area of sandstone rock outcropping and remnant woodland which may serve as potential foraging and sheltering habitat for the Broad-headed Snake. Sandstone outcropping displaying the microhabitat features (e.g. flat exfoliating sandstone on sandstone shelving) required by the Broad-headed Snake is uncommon in the study area and restricted to the underground mining areas. This habitat may be impacted by subsidence, through localised landslip and rock collapse. Chances of such impacts effecting an important population of the Broad-headed Snake (if present) is remote, as impacts would be random and localised. Direct mortality of individual Broad-headed Snakes could occur as a result of subsidence impacts (e.g. rock fall). However, such impacts are expected to be random and localised and the likelihood of their occurrence is low. No impacts are expected to occur to hollow-bearing trees of the type suitable for use by Broad-headed Snake. Given this, it is unlikely that the proposed works affect the lifecycle of this species or cause a long-term decrease in the size of an important population of the species.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed works may disturb a very small area of sandstone rock outcropping and remnant woodland which may serve as potential foraging and sheltering habitat for the Broad-headed Snake. Sandstone outcropping displaying the microhabitat features (e.g. flat exfoliating sandstone on sandstone shelving) required by the Broad-headed Snake is uncommon in the study area and restricted to the underground mining areas. This habitat may be impacted by subsidence, through localised landslip and rock collapse. Chances of such impacts effecting an important population of the Broad-headed Snake (if present) is remote, as impacts would be random and localised.

Factor	Assessment
	No suitable habitat will be removed from the surface disturbance areas. Extensive areas of potential habitat will continue to exist in the underground mining area, and to the east and west of the study area.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the study area is not at the known extent of these species distribution.
How is the proposal likely to affect current disturbance regimes?	Subsidence will be exacerbated as a result of the proposed works. The impacts of this are not expected to be significant to any local population of the Broad-headed Snake (if the species is present).
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It is unlikely to affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

Vulnerable Small Woodland Birds

The following 12 species occupy distinct ecological niches. Some species are nectarivores and frugivores, granivores and some are insectivores. All species have individually specific foraging and nesting needs (e.g. canopy, ground cover, tree trunks, fallen debris) within the woodland environment. Despite the variations in foraging and nesting, these species all share the need for suitable, non-fragmented woodland habitat to forage and breed within. All of these species have suffered various extents of decline across their distributional ranges in NSW resulting in their Vulnerable listing.

***Climacteris picumnus victoriae* (Brown Treecreeper [eastern subspecies])**

This species inhabits woodlands dominated by stringy barks or other rough-barked eucalypts, usually with an open grassy understorey, open ground and fallen timber. It nests in hollows of standing dead or live trees and tree stumps. Fallen timber is an important habitat component for this species and is regularly foraged upon (OEH 2014b). The Brown Treecreeper is considered to be a sedentary species, though some birds may disperse locally after breeding (OEH 2014b). Populations consist of pairs to groups of three to six.

***Stagonopleura guttata* (Diamond Firetail)**

The Diamond Firetail can be found in grassy eucalypt woodlands, including Box-Gum Woodlands. This species can also be found in open forest, mallee, riparian vegetation, and grasslands. This species is often seen in flocks of between five to forty birds. It is a ground feeder, feeding on ripe and partly-ripe grass, herb seeds, green leaves, and on insects. It nests in dense shrubs or in tree canopy (OEH 2014b).

***Daphoenositta chrysoptera* (Varied Sittella)**

The distribution of this species includes most of mainland Australia with the exception of deserts and open grasslands. It prefers eucalypt forests and woodlands with rough-barked species, or mature smooth-barked gums with dead branches, mallee and *Acacia spp.* woodland and feeds on arthropods from bark, dead branches, or small branches and twigs. The Varied Sittella nests in a small cup built onto a branch or peeling bark crevice of a rough-barked tree (OEH 2014b).

***Chthonicola sagittata* (Speckled Warbler)**

The Speckled Warbler inhabits a wide range of eucalypt dominated communities that have a grassy understorey, often on rocky ridges or in gullies. A typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. The bird builds a grass dome nest in a dense grass tussock or shrub (OEH 2014b).

Large, relatively undisturbed remnant vegetation is required for the species to persist in an area. The diet of this species consists of seeds and insects, with most foraging occurring around the base of tussocks and under bushes and trees. Speckled Warblers often join mixed species' feeding flocks in winter, with other species such as the Yellow-rumped, Buff-rumped, Brown and Striated Thornbills (OEH 2014b).

***Pomatostomus temporalis temporalis* (Grey-crowned Babbler [eastern subspecies])**

This species inhabits open woodlands dominated by mature eucalypts with regenerating trees, tall shrubs, and an intact ground cover of grass and forbs. This species avoids very wet areas. Nesting occurs in a large stick nest within the canopy of a medium sized *Allocasurina sp.*, *Acacia sp*. or *Callitris sp*. Chicks are raised communally with roosting occurring in old nests (OEH 2014b).

***Petroica boodang* (Scarlet Robin)**

During autumn and winter some birds migrate from higher altitudes to the eastern edges of the inland plains. They inhabit dry eucalypt forests and woodlands with an open grassy understorey with few scattered shrubs. Abundant logs and fallen timber are important components of its habitat (OEH 2014b).

***Petroica phoenicea* (Flame Robin)**

During autumn and winter some birds may appear on the eastern edges of the inland plains. They inhabit dry eucalypt forests and woodlands with an open grassy understorey with few scattered shrubs. Abundant logs and fallen timber are important components of its habitat. This species displays flocking behaviour and often appear in areas after fire (OEH 2014b).

***Melanodryas cucullata cucullata* (Hooded Robin [south-eastern form])**

This bird is associated with a wide range of eucalypt woodlands, shrubland and open forests. In temperate woodlands, the species favours open areas adjoining large woodland blocks, with areas of dead timber and sparse shrub cover. Hooded Robin home ranges are relatively large, averaging 18 ha for birds from the New England Tableland (OEH 2014b).

***Neophema pulchella* (Turquoise Parrot)**

This species is found in rocky ridges and gullies, rolling hills, valleys and river flats and the plains of the Great Dividing Range (OEH 2014b) and spends much of the time on the ground foraging on seed and grasses (OEH 2014b). It is associated with open forests and timbered grasslands, especially eco tones between woodland and grasslands with a high proportion of native grasses and forbs (OEH 2014b).

***Melithreptus gularis gularis* (Black-chinned Honeyeater [eastern subspecies])**

The Black-chinned Honeyeater inhabits mostly upper levels of drier box and ironbark open forests or woodlands. However, it is also known to inhabit open forests of smooth-barked eucalypts, stringy barks, iron bark and tea-trees. This species is usually seen in pairs and small groups of up to 12 birds. Their feeding territories are large; moving quickly from tree to tree probing for insects, feeding on nectar and honeydew from foliage. The species builds nests high up in mistletoe clumps or dense outer branches of tree crowns.

***Glossopsitta pusilla* (Little Lorikeet)**

This species is distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range. It is a nomadic nectarivore which follows flowering of preferred food trees such as *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box), *E. blakelyi* (Blakely's Red Gum), *E. sideroxylon* (Mugga Ironbark), *E. tereticornis* (Forest Red Gum) and mistletoes (OEH 2014b).

***Grantiella picta* (Painted Honeyeater)**

This species is nomadic and typically inhabits box-ironbark-gum woodlands with abundant mistletoe. It is a specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias, preferring *Amyema* spp. of mistletoe (OEH 2014b).

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to these species.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The study area contains suitable foraging, nesting and roosting habitat for all of the above mentioned vulnerable woodland birds. Given that similar habitat for these mobile species is available across the locality and the region, the small area of habitat loss from the proposed impact is unlikely to affect the life cycles of viable local populations of these species such that they would be placed at risk of extinction.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Approximately 8.4 ha of potential habitat containing potential foraging and nesting habitat (tussocks, shrubbery and scattered paddock trees) will be removed by the proposed surface disturbance. It is noted, however, that much larger areas of potential habitat will continue to exist to the east and west of the study area.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the study area is not at the known extent of these species distribution.

Factor	Assessment
How is the proposal likely to affect current disturbance regimes?	The proposed works will clear a maximum area of approximately 8.4 ha of DNG and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged stags and revegetate previously cleared areas to compensate for the loss of habitat features. The vegetation removal impact is expected to be minimal as it is restricted to surface disturbance areas only. Large undisturbed areas of potential habitat will remain present in areas surrounding the proposed impact area. These surrounding areas are expected to contain a higher density of suitable nesting, roosting and foraging for all of these highly mobile species. Consequently the proposed modification will not place a viable local population of the species at risk of extinction. Increased light and noise from the proposed modification are considered insignificant additions to increased noise and light already approved by the existing three mining operations in the locality.
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It is unlikely to affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

Nomadic Nectivorous Birds

The following two species have undergone significant population declines, and although highly mobile have suffered from historical clearing of temperate woodlands across NSW. The Swift Parrot is a non-breeding annual foraging visitor to NSW. The Regent Honeyeater is a breeding resident of NSW but has suffered from a severe reduction in preferred breeding locations and foraging habitat. Both species are nomadic in NSW, following fluctuating flowering among a selection of *Eucalyptus spp., Corymbia spp.* and *Angophora floribunda* (Rough-barked Apple).

***Anthochaera Phrygia* (Regent Honeyeater)**

This species is a nomadic, migratory nectivorous bird that occurs in open woodlands and forests, particularly *Eucalyptus sideroxylon* (Mugga Ironbark), *E. melliodora* (Yellow Box), *E. blakelyi* (Blakely's Red Gum) and *E. albens* (White Box) associations on fertile flats and alluvial areas (DotE 2014b; OEH 2014b). Foraging can occur anywhere there is sufficient flowering of potential feed trees and elsewhere (DotE 2014b; OEH 2014b). Breeding is only known from select areas within its distribution. The closest location to the proposed impact area is the Capertee Valley (~60km south-east). The bulk of the population forages and breeds in box-gum and ironbark woodlands west of the great divide (DotE 2014b; OEH 2014b) and makes sporadic migratory movements to the east to forage on coastal flowering eucalypt species during times of low eucalypt flowering inland (DotE 2014b; OEH 2014b).

***Lathamus discolour* (Swift Parrot)**

This species is a nomadic, migratory nectivorous bird that occurs in open woodlands and forests, particularly *Eucalyptus sideroxylon* (Mugga Ironbark), *E. melliodora* (Yellow Box), *E. blakelyi* (Blakely's Red Gum), *E. tereticornis* (Forest Red Gum), and *E. albens* (White Box) associations on fertile flats and alluvial areas (DotE 2014b; OEH 2014b). Foraging can occur anywhere there is sufficient flowering of potential feed trees and elsewhere (DotE 2014b; OEH 2014b). It breeds in Tasmania during spring and summer, migrating to south-eastern Australia in the autumn and winter months (OEH 2014b).

Potential habitat for the Regent Honeyeater and Swift Parrot to forage or pass through exists within the study area.

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to these species.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The study area contains feed trees, *E. albens* (White Box) and *E. blakelyi* (Blakely's Red Gum), that contribute to important habitat of the Regent Honeyeater. It is therefore likely that the study area may represent potential foraging habitat for the Regent Honeyeater. Evidence of foraging or breeding has not been recorded in the study area, but has been recorded near Moolarben Creek and at Munghorn Gap Nature Reserve, south of the study area. The study area exists within known habitat of the Swift Parrot. Important feed species are present within the study area. It is therefore likely that the study area may represent potential foraging habitat for the Swift Parrot. Evidence of foraging has not been recorded in the study area, but has been recorded south of the study area. Given that similar habitat for these highly mobile species are available across the locality and the region, the small area of habitat loss from the proposed impact is unlikely to affect the life cycles of viable local populations of these species such that they would be placed at risk of extinction.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Approximately 8.4 ha of potential foraging habitat, DNG containing scattered potential feed trees *E. blakelyi* (Blakely's Red Gum) will be removed by the proposed surface disturbance. It is noted, however, that much larger areas of potential habitat will continue to exist to the east and west of the study area.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the study area is not at the known extent of these species distribution.

Factor	Assessment
How is the proposal likely to affect current disturbance regimes?	The proposed works will clear a maximum area of approximately 8.4 ha of DNG and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged stags and revegetate previously cleared areas to compensate for the loss of habitat features. The vegetation removal impact is expected to be minimal as it is restricted to surface disturbance areas only. Large undisturbed areas of potential habitat will remain present in areas surrounding the proposed impact area. These surrounding areas are expected to contain a higher density of suitable nesting, roosting and foraging habitat for all of these highly mobile species. Consequently the proposed modification will not place a viable local population of the species at risk of extinction. Increased light and noise from the proposed modification are considered insignificant additions to increased noise and light already approved by the existing three mining operations in the locality.
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It will unlikely affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

Vulnerable Raptors

The following three raptors are apex predators. They each occupy different foraging niches but all share the need for abundant vertebrate prey resources and large territories for breeding. They all overlap in their need for sheltered, mature canopy trees for nesting. All three species build their nest out of sticks in a tree and lay their eggs around spring (or sometimes autumn), with young remaining in the nest for several months. All prey on birds, mammals and reptiles and occasionally insects, but only the Little Eagle forages on carrion (OEH 2014b). The Square-tailed Kite's diet features small and medium sized woodland birds, while the Spotted Harrier mostly preys on small grassland birds and mammals and the Little Eagle mostly preys on small to medium sized grassland mammals and medium to larger birds.

***Circus assimilis* (Spotted Harrier)**

The Spotted Harrier is a medium-sized, slender bird of prey which is found throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population (OEH 2014b).

The Spotted Harrier can be found within grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grass land and shrub land. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands (OEH 2014b).

***Hieraaetus morphnoides* (Little Eagle)**

The Little Eagle is a medium to large, stocky raptor which closely resembles a kite rather than an eagle. It occupies open eucalypt forest, woodland or open woodland and grassland. This species may be in decline as a result of loss of prey species (decline in critical weight range marsupials and rabbits) and secondary poisoning from pindone (OEH 2014b).

***Lophoictinia isura* (Square-tailed Kite)**

This species is a medium to large sized raptor with long-broad wings. It occurs in woodland and forested areas with an abundance of small birds on which it feeds (OEH 2014b). This species is sometimes recorded breeding and foraging along inland timbered watercourses and is also known to forage in wooded farmland or urban environments (OEH 2014b).

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to these species.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The proposed works will potentially impact/modify a small area of foraging habitat within the study area. The potential removal of a small amount of DNG within the surface disturbance areas is unlikely to significantly affect foraging habitat for these species. The vegetation to be removed has been previously cleared and is now considered to be DNG, which reduces its suitability as nesting habitat. Higher quality habitat remains in the study area and will not be disturbed as a result of the modification proposal. No clearing works will take place in any areas where nests of these species are known or observed. As such, the proposed works are not likely to affect the life cycle of these species.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Habitat for the Spotted Harrier, Square-tailed Kite and Little Eagle present within the study area consists of vegetation which could be used for foraging and nesting. The proposed works will potentially impact/remove a small area of DNG foraging habitat (but not nesting habitat) within the surface disturbance areas (a maximum of 8.4 ha). The study area has undergone clearing in the past and is subject to ongoing grazing activities.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the study area is not at the known extent of these species distribution.

Factor	Assessment
How is the proposal likely to affect current disturbance regimes?	The proposed works will clear a maximum area of approximately 8.4 ha of DNG and will add to the current disturbance regimes. However, impacts will be managed through the LMP/BMP including measures to retain salvaged stags and revegetate previously cleared areas to compensate for the loss of habitat features. The vegetation removal impact is expected to be minimal as it is restricted to surface disturbance areas only. Large undisturbed areas of potential habitat will remain present in areas surrounding the proposed impact area. These surrounding areas are expected to contain a higher density of suitable nesting, roosting and foraging for all of these highly mobile species. Consequently the proposed modification will not place a viable local population of the species at risk of extinction. Increased light and noise from the proposed modification are considered insignificant additions to increased noise and light already approved by the existing three mining operations in the locality.
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It will unlikely affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

Cave-roosting Bats

The following assessment of significance addresses the potential impacts to the following obligate and non-obligate cave-roosting, threatened bat species.

Obligate Cave-roosting Bats

***Chalinolobus dwyeri* (Large-eared Pied Bat)**

The Large-eared Pied Bat is listed as Vulnerable under the TSC Act. It is a small to medium-sized bat with long, prominent ears and glossy black fur. The lower body has broad white fringes running under the wings and tail-membrane, meeting in a V-shape in the pubic area. The species is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes.

The Large-eared Pied Bat roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the *Hirundo ariel* (Fairy Martin). Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves. They remain loyal to the same cave over many years.

The Large-eared Pied Bat forages in well-timbered areas containing gullies. It frequents low to mid-elevation dry open forest and woodland close to caves, crevices in cliffs, old mine workings and disused mud nests of The Fairy Martin. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy.

The threats to this species include clearing and isolation of forest and woodland habitats near cliffs, caves and old mine workings for agriculture or development; loss of foraging habitat close to cliffs, caves and old mine workings from forestry activities; too-frequent burning, usually associated with grazing; damage to roosting and maternity sites from mining operations, and recreational caving activities; and use of pesticides.

***Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)**

The Eastern Bentwing-bat is listed as a Vulnerable species under the TSC Act. This species occupies a range of forested environments (including wet and dry sclerophyll forests), along eastern Australia.

It forages from just above the tree canopy and will utilise open areas where it is known to forage at lower levels. This highly mobile species is capable of large regional movements in relation to seasonal differences in reproductive behaviour and winter hibernation. Though individuals often use numerous roosts, the species usually congregates in large numbers at a small number of nursery caves to breed and hibernate. Although roosting primarily occurs in caves, it has also been recorded in mines, culverts, stormwater channels, buildings, and occasionally tree-hollows. This species occupies a number of roosts within specific territorial ranges usually within 300 km of the maternity cave, and may travel large distances between roost sites.

The Eastern Bentwing-bat is threatened by a number of processes including loss of foraging habitat, damage to or disturbance of roosting caves (particularly during winter or breeding), application of pesticides in or adjacent to foraging areas, and predation by feral cats and foxes.

***Vespadelus troughtoni* (Eastern Cave Bat)**

The Eastern Cave Bat is listed as Vulnerable under the TSC Act. It inhabits woodland and sclerophyll forest on the coast and the dividing range but extends into the drier forest of the western slopes and inland areas (OEH 2014b). It has been found roosting in sandstone overhangs, caves, boulder piles, disused mine workings and occasionally in buildings (OEH 2014b).

Of these three species, only the Eastern Bentwing-bat was detected (on both AnaBats) during the field survey.

Non-obligate Cave-roosting Bats

***Chalinolobus picatus* (Little Pied Bat)**

The Little Pied Bat occurs in dry open forest, open woodland, mulga woodlands, chenopod shrub lands, cypress pine forest and mallee and box woodlands. It roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. It can tolerate high temperatures and dryness but need access to nearby open water.

***Miniopterus australis* (Little Bentwing-bat)**

The Little Bentwing-bat occurs in moist eucalypt forest, wet and dry sclerophyll forest. Generally found in well-timbered areas. It roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings. Males and juveniles disperse in summer. Only five nursery sites/maternity colonies are known in Australia.

The study area contains potential woodland foraging habitat, and sandstone escarpment cave roosting and potential nesting habitat for all three species

An assessment of impact criteria under section 5A of the EP&A Act has been completed to assess potential impacts of the proposed works to threatened cave roosting bats.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	Potential roosting and possibly breeding habitat for some of the obligate and non-obligate cave-roosting bats may be impacted by the proposed works as a result of rock fall or cave collapse from subsidence, however roosting habitat may also be created as a result of rock cracks and fissures resulting from subsidence. There is also a chance of direct mortality of roosting individuals from cave collapse. Subsidence may limit recruitment and decrease the local population size in the long-term as breeding habitat and caves are a limiting factor in the locality. There is also the possibility that habitat availability could remain stable as new roosting habitat is created from subsidence events. Indirect impacts such as increased artificial lighting may also interrupt these species and potentially affect breeding success in the study area. The Eastern Bentwing-bat and Little Bentwing-bat breed in domed limestone caves outside the study area, as such their breeding cycle will not be affected. A maximum of approximately 8.4 ha of potential foraging habitat (DNG) will occur as a result of the proposed works. This habitat is marginal and highly disturbed, so is unlikely to provide important habitat for any of these species. Infrastructure in the proposed surface disturbance areas would be decommissioned and the area rehabilitated consistent with other Stage 2 areas.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	A maximum of approximately 8.4 ha of potential foraging habitat (DNG) will occur as a result of the proposed works. This habitat is marginal and highly disturbed so is unlikely to provide important habitat for any of these species. Woodland rehabilitation will be undertaken. Foraging habitat is widely distributed in the study area, with sheltering habitat and potential breeding habitat occurring in more restricted areas, only on ridgelines in open forest.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the study area is not at the known extent of this species distribution.

Factor	Assessment
How is the proposal likely to affect current disturbance regimes?	The proposed works will remove/impact approximately 8.4 ha of potential foraging habitat and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged hollows and bush rock to compensate for the loss of these habitat features.
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It will unlikely affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

Tree-roosting Bats

The following assessment of significance addresses the potential impacts to the following obligate tree-hollow-roosting, threatened bat species.

***Nyctophilus corbeni* (Corben's Long-eared Bat)**

The Corben's Long-eared Bat is a large microbat which occurs in a range of inland woodland vegetation types, including box, ironbark and cypress pine woodlands. It is most abundant in vegetation with a distinct canopy with a dense cluttered shrub layer. It roosts in tree hollows.

***Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)**

The Yellow-bellied Sheathtail-bat roosts singularly or in groups of up to six, in tree hollows and buildings. In treeless areas they are known to utilise mammal burrows. They forage in most habitats throughout their very wide range, including areas with and without trees and appear to defend an aerial foraging territory.

***Falsistrellus tasmaniensis* (Eastern False Pipistrelle)**

The Eastern False Pipistrelle prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. It hunts beetles, moths, weevils and other flying insects above or just below the tree canopy.

***Scoteanax rueppellii* (Greater Broad-nosed Bat)**

The Greater Broad-nosed Bat utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.

***Mormopterus norfolkensis* (Eastern Freetail-bat)**

The Eastern Freetail-bat usually occurs in dry sclerophyll forest, woodland and swamp forests east of the Great Dividing Range. It roosts mainly in tree hollows but will also roost under bark or in man-made structures.

While none of these five tree-roosting bat species were recorded during the field survey in the study area, they have each been recorded/or are expected to occur within the locality. Suitable foraging habitat and potential roost sites (hollow-bearing trees) were observed within the study area.

An assessment of impact criteria under section 5A of the EP& A Act has been completed to assess potential impacts of the proposed works to threatened tree roosting bats.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The study area contains potential foraging and breeding habitat (scattered paddock trees), in the form of hollow-bearing trees, for these microbat species. Hollow-bearing trees are considered a limiting resource in the study area and the removal of this resource could impact these species given the likely competition for such resources in the landscape. Potential breeding habitat will be removed for all species which may cause movement out of the study area into nearby conservation reserves and other connected patches of forest and woodland. Bats may also be deterred from breeding in areas adjacent to active mining areas due to increased artificial light. Measures to reduce these potential impacts will be implemented through the LMP/BMP. Indirect impacts such as increased artificial lighting may also interrupt these species and potentially affect breeding success in the study area.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed works will remove up to 8.4 ha of potential foraging and breeding habitat (scattered paddock trees within DNG) for tree roosting bats from the study area. This habitat is considered important for the local populations of these species, if they are present, with the exception of the Eastern False Pipistrelle (this species is an altitudinal migrant that sometimes migrates to lower altitude woodlands in winter). As the 'local populations' are defined as those individuals potentially occurring in the study area and nearby conservation reserves where suitable habitat is available, they are unlikely to be significantly impacted by the proposed works. The proposed works are considered unlikely to remove important habitat for these species or fragment suitable habitat for these species as clearing is due to occur only in areas previously disturbed by clearing (for agriculture), or previously approved mining activities. The areas due to be cleared also exist on the edge of more extensive, suitable habitat.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the study area is not at the known extent of these species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed works will clear up to 8.4 ha and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged hollows and bush rock to compensate for the loss of these habitat features.

Factor	Assessment
How is the proposal likely to affect habitat connectivity?	The proposed works will unlikely affect the overall connectivity of the vegetation in the area, with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve. The proposed works are considered unlikely to remove important habitat for these species or fragment suitable habitat for these species as clearing is due to occur only in areas previously disturbed by clearing (for agriculture), or previously approved mining activities. The areas due to be cleared also exist on the edge of more extensive, suitable habitat.

Vulnerable Forest Owls

The following three species of bird occupy very distinct ecological niches. Three are nocturnal predators of vertebrates and two are a diurnal, specialist seed-eater. All five species share the need for large tree-hollows in which to nest and extensive woodland in which to forage (OEH 2014b).

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

The Barking Owl occurs in a variety of different habitats such as savannah woodland, open eucalypt forests, wetland and riverine forest. Their habitat is typically dominated by eucalypts which readily form hollows. It nests in large hollows in old trees, often near watercourses or wetlands and roosts in dense midstorey canopies (OEH 2014b).

***Ninox strenua* (Powerful Owl)**

The Powerful Owl occurs in forests and woodlands with mature hollow-bearing trees and abundant mammalian prey (particularly possums). It can inhabit a wider range of vegetation types, preferring large tracts of woodland or forest habitat and forages in fragmented landscapes. This species nests in large hollows in mature trees near thick forest growth (OEH 2014b).

***Tyto novaehollandiae* (Masked Owl)**

The Masked Owl lives in dry eucalypt forests and woodlands from sea level to 1100 metres. Pairs have a large home-range of 500 to 1000 ha. This species roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Their diet typically consists of tree-dwelling and ground mammals, especially rats (OEH 2014b).

An assessment of impact criteria under section 5A of the EP&A Act has been completed to assess potential impacts to these species.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	Areas of historically cleared vegetation containing large-hollow bearing trees (paddock trees), which are potential breeding resources for at least one of these species (Masked Owl), will be removed for the proposed surface disturbance areas. This could limit species recruitment and displace breeding pairs. Increased noise and light may deter Owls from breeding or foraging in areas immediately adjacent to the study area which will be retained. The study area is considered to represent a small component of these threatened owls' home ranges (up to 6,000 ha for the Barking Owl [OEH 2014b]). As connectivity to large expanses of native bushland and conservation reserves will be retained, these owls will have access to alternative foraging areas and breeding sites outside the study area. Therefore, the removal of this potential breeding habitat is not expected to impact the species such that they would decline.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed works would result in the removal of a limited area of marginal foraging habitat in the form of shrubs which support small and medium sized mammals (prey for Barking Owl, Masked Owl and Powerful Owl). Such shrubbery may also be used for roosting purposes by all three. The total area of potential foraging habitat to be removed under the proposed works will be 8.4 ha. This is made up of disturbed DNG. No potential nesting habitat for any of these species will be impacted. Even though scattered paddock trees may be removed through the surface disturbance activities, their position in an already disturbed landscape reduced their suitability for nesting by these disturbance-sensitive species. The vegetation removal impact is expected to be minimal as it is restricted to surface disturbance areas only. Large undisturbed areas of potential habitat will remain present in areas surrounding the proposed impact area. These surrounding areas are expected to contain a higher density of suitable nesting, roosting and foraging for all of these highly mobile species. Consequently the proposed modification will not place a viable local population of the species at risk of extinction. If the species occurs within in the study area, potential habitat being removed may be used by the species as a shelter and breeding resource. It is noted, however, that much larger areas of potential habitat exist to the east and west of the study area.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the study area is not at a known limit of these species distribution.

Factor	Assessment
How is the proposal likely to affect current disturbance regimes?	The proposed works will clear a maximum area of approximately 8.4 ha of DNG and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged stags and revegetate previously cleared areas to compensate for the loss of habitat features. The vegetation removal impact is expected to be minimal as it is restricted to surface disturbance areas only. Large undisturbed areas of potential habitat will remain present in areas surrounding the proposed impact area. These surrounding areas are expected to contain a higher density of suitable nesting, roosting and foraging for all of these highly mobile species. Consequently the proposed modification will not place a viable local population of the species at risk of extinction. Increased light and noise from the proposed modification are considered insignificant additions to increased noise and light already approved by the existing three mining operations in the locality.
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It will unlikely affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

Vulnerable Cockatoos

***Callocephalon fimbriatum* (Gang-gang Cockatoo)**

The Gang-gang Cockatoo is an altitudinal migrant, spending spring and summer in tall montane forests, and migrating to lower altitude, drier woodlands in winter. This species breeds from spring to summer in tall montane forests, therefore would not breed in the lower altitude, drier woodlands of the study area. As such, the breeding cycle of this species is unlikely to be affected. The species also requires a proximal source of freshwater for drinking.

***Calyptorhynchus lathami* (Glossy Black-Cockatoo)**

The Glossy Black-Cockatoo is found in a variety of forest types in the study area containing *Allocasuarina* sp. (particularly *A. gymnanthera* and *A. diminuta*). Large tree hollows in sheltered woodlands are required for nesting. The species also requires a proximal source of freshwater for drinking.

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to these species.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	Evidence of foraging or breeding has not been recorded in the study area; however the potential habitat within the proposed impact area is likely to support breeding and foraging habitat for the Glossy Black-Cockatoo and foraging habitat for the Gang-gang Cockatoo. Given similar habitat considered suitable for these species are available across adjacent woodlands and the surrounding region, the proposed impact is unlikely to affect the life cycles of viable local populations of these species such that they would be placed at risk of extinction.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed works would result in the removal of a limited area of marginal foraging habitat: The total area of potential foraging habitat removed under the proposed works will be 8.4 ha. This is made up of disturbed DNG. No potential nesting habitat for any of these species will be impacted and this impact will be restricted to the previously disturbed, surface disturbance areas. Even though scattered paddock trees may be removed through the surface disturbance activities, their position in an already disturbed landscape reduced their suitability for nesting by these disturbance-sensitive species. The vegetation removal impact is expected to be minimal as it is restricted to surface disturbance areas only. Large undisturbed areas of potential habitat will remain present in areas surrounding the proposed impact area. These surrounding areas are expected to contain a higher density of suitable nesting, roosting and foraging for all of these highly mobile species. Consequently the proposed modification will not place a viable local population of the species at risk of extinction. If the species occurs within the study area, potential habitat being removed may be used by the species as a shelter and breeding resource. It is noted, however, that much larger areas of potential habitat exist to the east and west of the study area.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the study area is not at a known limit of these species' distribution.

Factor	Assessment
How is the proposal likely to affect current disturbance regimes?	The proposed works will clear a maximum area of approximately 8.4 ha of DNG and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged stags and revegetate previously cleared areas to compensate for the loss of habitat features. The vegetation removal impact is expected to be minimal as it is restricted to surface disturbance areas only. Large undisturbed areas of potential habitat will remain present in areas surrounding the proposed impact area. These surrounding areas are expected to contain a higher density of suitable nesting, roosting and foraging for all of these highly mobile species. Consequently the proposed modification will not place a viable local population of the species at risk of extinction. Increased light and noise from the proposed modification are considered insignificant additions to increased noise and light already approved by the existing three mining operations in the locality.
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It will unlikely affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

Phascolarctos cinereus (Koala)

The Koala occurs in eucalypt woodlands and forests. A list of known habitat and feed tree species in the Hunter-Central Rivers area has been produced (OEH 2014c). Of these, one primary food tree species (*Eucalyptus parramattensis* [Parramatta Red Gum]), five secondary food tree species (*E. albens* [White Box], *E. dwyeri* [Dwyer's Red Gum], *E. moluccana* [Grey Box]*, E. blakelyi* [Blakely's Red Gum] and *E. melliodora* [Yellow Box]) and two Stringybark/supplementary species (*E. macrorhyncha* [Red Stringybark] and *E. agglomerate* [Blue-leaved Stringybark]) were present within the study area. In addition, two tree species listed under Schedule 2 of the SEPP 44 were present within the study area, *E. punctata* (Grey Gum) and *E. albens* (White Box)*. E. blakelyi* (Blakely's Red Gum) was also present in the study area.

Koalas spend most of their time in trees (resting and foraging), but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than 2 ha to several hundred hectares in size. The species is 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. Females breed at two years of age and produce one young per year (OEH 2014b).

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to the Koala.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The Koala was not recorded in the study area during the field survey. The species is considered as having potential to occur, but in low numbers. Potential foraging habitat in the form of *Eucalyptus albens* (White Box) and *E. blakelyi* (Blakely's Red Gum) trees will be removed as a result of the proposed works. However, the removal of this potential habitat is marginal (0.25 ha in total) and is unlikely to impact the Koala due to its large home range size and high dispersal capability across suitable habitat which will remain in the locality. Increased noise and light may deter Koala from foraging in areas immediately adjacent to the study area which will be retained. This species may move through the proposed surface disturbance areas between more suitable habitat patches which will remain unaffected in the proposed underground mining areas. The surface disturbance areas are not likely to constitute important breeding habitat. Therefore the Koala's life cycle is unlikely to be significantly impacted such that local populations will be placed at risk of extinction.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed works will remove up to 0.25 ha of potential foraging habitat for the Koala from the study area. This habitat is not considered important for a local population. The proposed works are considered unlikely to fragment habitat for this species as the only habitat clearing expected will take place in areas of DNG with scattered paddock trees that exist on the edge of more suitable woodland which will remain unaffected.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the proposed works are not at the known extent of this species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed works will clear a maximum area of approximately 0.25 ha of DNG and will add to the current disturbance regimes. However, impacts will be managed including measures to revegetate previously cleared areas to compensate for the loss of habitat features. The vegetation removal impact is expected to be minimal as it is restricted to surface disturbance areas only. Large undisturbed areas of potential habitat will remain present in areas surrounding the proposed impact area. These surrounding areas are expected to contain a higher density of suitable nesting, roosting and foraging for all of these highly mobile species. Consequently the proposed modification will not place a viable local population of the species at risk of extinction. Increased light and noise from the proposed modification are considered insignificant additions to increased noise and light already approved by the existing three mining operations in the locality.

Factor	Assessment
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It will unlikely affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

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

Petaurus norfolcensis (Squirrel Glider) is a vulnerable species listed under the TSC Act. It is sparsely distributed along the east coast and immediate inland districts from western Victoria to north Queensland, where it occurs in dry sclerophyll forest and woodland (OEH 2014b). Suitable habitat for this species requires abundant hollow-bearing trees and a mix of eucalypts including some smooth barked and winter flowering species (OEH 2014b).

Squirrel Gliders are nocturnal and dependent upon hollows for shelter. They feed on nectar, pollen, flowers, acacia gum and insects, but may also eat sap from feeding scars from other species of Glider (OEH 2014b).

This species is threatened by a number of processes including the loss and fragmentation of habitat through clearing, loss of hollow-bearing trees, and depletion of food resources by inappropriate fire regimes and predation by foxes and cats.

No Squirrel Gliders were recorded during field surveys undertaken as part of this modification, although records have been made near the study area (within 5 km) and suitable habitat for this species was observed within the study area.

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to the Squirrel Glider.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The Squirrel Glider was not recorded in the study area during the field survey, however, the species is considered as having potential to occur. Potential foraging and nesting habitat in the form of flowering and hollow-bearing *Eucalyptus crebra* (Narrow-leaved Ironbark), *E. albens* (White Box) and *E. blakelyi* (Blakely's Red Gum) trees will be removed as a result of the proposed works. However, the removal of this potential habitat is marginal (8.4 ha in total) and is unlikely to impact the Squirrel Glider due to its large home range size and high dispersal capability across suitable habitat which will remain in the locality. Increased noise and light may deter Squirrel Glider from breeding or foraging in areas immediately adjacent to the study area which will be retained. This species may move through the proposed surface disturbance areas between more suitable habitat patches which will remain unaffected in the proposed underground mining areas. The surface disturbance areas are not likely to constitute important breeding habitat. Therefore the Squirrel Glider life cycle is unlikely to be significantly impacted such that local populations will be placed at risk of extinction.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed works will remove up to 8.4 ha of potential foraging habitat for the Squirrel Glider from the study area. This habitat is not considered important for a local population. The proposed works are considered unlikely to fragment habitat for this species as the only habitat clearing expected will take place in areas of historically cleared land that exist on the edge of more suitable woodland which will remain unaffected.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the proposed works are not at the known extent of this species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed works will clear a maximum area of approximately 8.4 ha of DNG and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged stags and revegetate previously cleared areas to compensate for the loss of habitat features. The vegetation removal impact is expected to be minimal as it is restricted to surface disturbance areas only. Large undisturbed areas of potential habitat will remain present in areas surrounding the proposed impact area. These surrounding areas are expected to contain a higher density of suitable nesting, roosting and foraging for all of these highly mobile species. Consequently the proposed modification will not place a viable local population of the species at risk of extinction. Increased light and noise from the proposed modification are considered insignificant additions to increased noise and light already approved by the existing three mining operations in the locality.

Factor	Assessment
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It will unlikely affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

***Dasyurus maculatus* (Spotted-tailed Quoll)**

The Spotted-tailed Quoll (or Tiger Quoll) is a medium-sized marsupial carnivore with reddish-brown fur and white spots. It occupies a range of environments within a disjunct distribution along the east coast of Australia, extending from south-eastern Queensland through NSW and Victoria to Tasmania (OEH 2014b).

This species is found in a variety of habitats, including sclerophyll forest and woodlands, coastal heathlands and rainforests. Occasional sightings are made in open country, grazing lands, rocky outcrops and other treeless areas. This species feeds on a wide variety of birds, reptiles, mammals and invertebrates and uses several 'latrines' within its territory for defecation. It is mostly terrestrial, but is also an agile climber (OEH 2014b).

Nesting occurs in rock shelters, hollow logs, caves or tree hollows and they use numerous dens within the home range. Estimates of home ranges vary from 20 km^2 to 800 ha and individuals may move several kilometres in a night (OEH 2014b).

The Spotted-tailed Quoll is threatened by a number of processes including fragmentation and degradation of habitat through clearing of native vegetation, logging and frequent fire. The loss of large hollow logs and other potential den sites is a major problem, as well as competition for food and predation by foxes and cats (OEH 2014b).

The Spotted-tailed Quoll was not detected during field surveys although there are historical records within the surrounding region.

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to the Spotted-tailed Quoll.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The Spotted-tailed Quoll was not recorded in the study area during the field survey, however, the species is considered as having potential to occur. Potential foraging habitat in the form of DNG with scattered paddock trees occurs within the surface disturbance area and will be removed. However, this potential habitat is marginal due to having been heavily disturbed by historical agriculture and pre-approved mining activities. The proposed works are unlikely to impact the Spotted-tailed Quoll due to its large home range size and high dispersal capability across suitable habitat which will remain in the locality. Increased noise and light may deter Spotted-tailed Quoll from breeding or foraging in areas immediately adjacent to the study area that will be retained. This species may move through the proposed surface disturbance areas between more suitable habitat patches which will remain unaffected in the proposed underground mining areas. The surface disturbance areas are not likely to constitute important breeding habitat. Therefore the Spotted-tailed Quoll life cycle is unlikely to be significantly impacted such that local populations will be placed at risk of extinction.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed works will remove up to 8.4 ha of potential foraging habitat (DNG) for the Spotted-tailed Quoll from the study area. This habitat is not considered important for a local population. The proposed works are considered unlikely to fragment habitat for this species as the only habitat clearing expected will take place in areas of historically cleared land that exist on the edge of more suitable woodland which will remain unaffected.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the proposed works are not at the known extent of this species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed works will clear a maximum area of approximately 8.4 ha of DNG and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged stags and revegetate previously cleared areas to compensate for the loss of habitat features. The vegetation removal impact is expected to be minimal as it is restricted to surface disturbance areas only. Large undisturbed areas of potential habitat will remain present in areas surrounding the proposed impact area. These surrounding areas are expected to contain a higher density of suitable nesting, roosting and foraging for all of these highly mobile species. Consequently the proposed modification will not place a viable local population of the species at risk of extinction. Increased light and noise from the proposed modification are considered insignificant additions to increased noise and light already approved by the existing three mining operations in the locality.

Factor	Assessment
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It will unlikely affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

Vegetation Communities and Flora

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland EEC (surface disturbance area)

White Box – Yellow Box – Blakely's Red Gum Woodland (BGW) is an open woodland community (sometimes occurring as a forest formation) in which the diagnostic canopy tree species consist of one or more of the following: *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box) or *E. blakelyi* (Blakely's Red Gum). Intact sites contain a high diversity of plant species, including the main tree species, occasional additional tree species, a small selection of shrub species, climbing plant species, many grasses and a very high diversity of herbs (OEH 2014b).

The community often exists in a modified condition and may occur as an intact tree layer and predominately native ground layer, or as a characteristic ground layer with a high diversity of native herb and grass species and scattered trees or no remaining tree layer at all (OEH 2014b).

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to this EEC.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The proposed works will remove an area of modified BGW. The area to be removed is approximately 0.25 ha of DNG. Some areas of BGW will remain within the study area. Although the extent of the community will be reduced, the amount is considered small. The composition and structure of the BGW at the study area has been modified. The area had been previously cleared and grazed. This has resulted in modifications to the species found in both the overstorey and the understorey. The patch of BGW in the study area contained only a small number of native understorey species. Although these species will be removed entirely, the impact is not considered significant. This is because better quality remnants of this community will remain in the locality. Approximately 15.94 ha of this EEC has been mapped within the underground mining areas. The EEC will continue to exist within the underground mining areas of the study area. Neither the reduction in extent or alteration to composition of BGW in this case will place the local occurrence of the community at risk of extinction.

Factor	Assessment
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed works will remove an area of modified BGW. The area to be removed is approximately 0.25 ha of DNG. Some areas of BGW will remain within the study area. Although the extent of the community will be reduced, the amount is considered small. The composition and structure of the BGW at the study area has been previously modified. The area had been previously cleared and grazed. This has resulted in modifications to the species found in both the overstorey and the understorey. The patch of BGW in the study area contained only a small number of native understorey species. Although these species will be removed entirely, the impact is not considered significant. This is because better quality remnants of this community will remain in the locality. Neither the reduction in extent or alteration to composition of BGW in this case will place the local occurrence at risk of extinction.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the proposed works are not at the known extent of this ECC.
How is the proposal likely to affect current disturbance regimes?	The proposed works will remove an area of modified BGW. The area to be removed is approximately 0.25 ha of DNG. Some areas of BGW will remain within the study area. Although the extent of the community will be reduced, the amount is considered small. The composition and structure of the BGW at the study area has been previously modified. The area had been previously cleared and grazed. This has resulted in modifications to the species found in both the overstorey and the understorey. The patch of BGW in the study area contained only a small number of native understorey species. Although these species will be removed entirely, the impact is not considered significant. This is because better quality remnants of this community will remain in the locality. The proposal will contribute to the disturbance and removal of BGW in the locality, however, MCO will be taking the steps to mitigate impacts on this EEC through rehabilitation and implementation of the BOS.
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It will unlikely affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions EEC (underground mining area)

Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions is the name given to the ecological community that generally occurs on Permian sediments in the Hunter Valley. The community typically forms woodland to open forest on slopes and undulating hills.

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to this EEC.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	No portion of this ecological community present within the study area will be removed or modified, this is because the entire extent exists within the underground mining area (5.5 ha). It is expected that limited subsidence will occur in the area occupied by this EEC. Studies in the locality have not been able to detect an impact of subsidence on vegetation communities. On this basis, we have assumed that the potential subsidence occurring here will not impact on the extent of this community. There will be no reduction in the extent of this EEC, therefore in this case there is no threat the proposed works will place the local occurrence at risk of extinction.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	It is expected that limited subsidence will occur in the area occupied by this EEC. Studies in the locality have not been able to detect an impact of subsidence on vegetation communities. On this basis, we have assumed that the potential subsidence occurring here will not impact on the extent of this community. There will be no reduction in the extent of this EEC, therefore in this case there is no threat the proposed works will place the local occurrence at risk of extinction.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the proposed works are not at the known limit of the distribution of this EEC.
How is the proposal likely to affect current disturbance regimes?	It is expected that limited subsidence will occur in the area occupied by this EEC. Studies in the locality have not been able to detect an impact of subsidence on vegetation communities. On this basis, we have assumed that the potential subsidence occurring here will not impact on the extent of this community. There will be no reduction in the extent of this EEC, therefore in this case there is limited potential that the proposed works will place the local occurrence at risk of extinction.

Factor	Assessment
How is the proposal likely to affect current disturbance regimes? (Cont.)	The composition and structure of this EEC in the study area has been previously modified. The area had been previously logged and grazed. This has resulted in modifications to the species found in both the overstorey and the understorey. The patch of this EEC in the study area contained only a small number of native understorey species. Increased dust around the surface disturbance areas may impact the growth of native plants in this EEC, however it is not believed that this impact will be significant enough to cause loss of any extent of this EEC.
How is the proposal likely to affect habitat connectivity?	The proposed impact area covers areas that have already been modified (from historical agricultural activity) or occur in very close proximity to existing mining activity. It will unlikely affect the overall connectivity with a large connected patch of remnant vegetation occurring adjacent to the proposed surface disturbance area, connecting it to wooded and forested areas to the east, and a large regional corridor with Goulburn River NP and Munghorn Gap Nature Reserve.

***Diuris tricolor* (Pine Donkey Orchid)**

The Pine Donkey Orchid is a tuberous, deciduous terrestrial orchid. It is sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the Queensland border. Localities in the south include Red Hill north of Narrandera, Coolamon, and several sites west of Wagga Wagga, Condobolin-Nymagee road, Wattamondara towards Cowra, Eugowra, Girilambone, Dubbo and Cooyal, in the Central West (OEH 2014b).

Effects from varying disturbance regimes (e.g. grazing, fire) are not known, although the species is usually recorded from disturbed habitats.

The Pine Donkey Orchid grows in sclerophyll forest among grass, often with *Callitris* spp. It is found in sandy soils, either on flats or small rises. It has also been recorded from a red earth soil in a *Eucalyptus populnea* (Poplar Box) community in western NSW. The understorey the species grows in is often grassy with herbaceous plants such as *Bulbine* spp. Pine Donkey Orchid usually flowers between early September and late October.

Where it occurs, the Pine Donkey Orchid is recorded as locally common, however often only one or two plants have been observed at sites (OEH 2014b). The survey for this proposal occurred outside the period of flowering. Detection of this species is difficult outside the flowering period. We have assumed presence based on the potential habitat at this site.

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to the Pine Donkey Orchid.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The proposed clearing and removal of the potential habitat of this species may cause direct mortality to individuals. If individuals are removed, this may impact processes critical to the species lifecycle, such as pollination and maintenance of genetic variability. Alteration to the understorey as a result of clearing will also impact conditions to support recruitment and growth. This is a worst case scenario and assumes there are individuals of this species present. However, despite these impacts, a viable local population is not likely to be placed at risk. This is because the area of potential habitat to be cleared is relatively small when compared with the area to be retained (albeit subject to subsidence). Within the underground mining areas, the impact upon this species will be minimal due to historical records of subsidence impacts upon vegetation showing that impacts are minor. In addition to this, this species has never been detected within the proposed underground mining areas.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed works will disturb or remove up to 8.4 ha of the potential habitat of this species from the surface disturbance areas; this may cause direct mortality to individuals of the Pine Donkey Orchid (if the species is present). This is a worst case scenario and assumes there are individuals of this species present in the study area. Despite these potential impacts, a viable local population is not likely to be placed at risk. This is because the area of potential habitat to be cleared is relatively small when compared with the area of suitable habitat to be retained in the underground mining areas. Within the underground mining areas, the impact upon this species will be minimal due to historical records of subsidence impacts upon vegetation showing that impacts are minor. In addition to this, the presence of this species was not detected within the underground mining areas.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the proposed works are not at the known limit of the distribution of the Pine Donkey Orchid.
How is the proposal likely to affect current disturbance regimes?	It is expected that limited subsidence will occur in the area occupied by this species. Previous studies in the general locality have not been able to detect an impact of subsidence on local vegetation communities. On this basis, we have assumed that the potential subsidence occurring here will not impact on the extent of the vegetation in which this species is likely to occur. The composition and structure of this vegetation in the study area has been previously modified. The area had been previously logged and grazed. This has resulted in modifications to the species found in both the overstorey and the understorey.

Factor	Assessment
How is the proposal likely to affect current disturbance regimes? (Cont.)	Increased dust produced from mining activity in the region will be further exacerbated by the proposed works, however the extent of this impact is expected to be small and restricted to the vegetation surrounding the disturbance areas. The Pine Donkey Orchid (if present) is likely to continue to survive in these areas, as well as the unmodified habitat present over the rest of the underground mining areas.
How is the proposal likely to affect habitat connectivity?	This species is not believed to be affected by subsidence. Therefore fragmentation of suitable habitat will not occur as a result of this activity in the underground mining areas. Surface disturbance activities will cause removal of areas of potential habitat which exist on the fringes of an extensive woodland remnant. If the Pine Donkey Orchid is present, the species will continue to survive in existing, extensive woodland surrounding the surface disturbance area.

***Pomaderris queenslandica* (Scant Pomaderris)**

Pomaderris queenslandica (Scant Pomaderris) occurs in Queensland and NSW. In NSW it is found in dry sclerophyll woodlands (OEH 2014b). In the local area it has been reported in a protected valley.

Specimens of *Pomaderris* spp. have been collected from the study area and were sent to the NSW Herbarium for identification. Results of this showed that a number of the specimens collected were the Scant Pomaderris. The specimens collected were taken from areas of underground mining only, no Scant Pomaderris plants were observed within the proposed surface disturbance areas.

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to the Scant Pomaderris.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	No individuals of this species were found in the surface disturbance areas; therefore no loss of individuals is expected as a result of clearing works. Direct mortality of individual plants may occur as a result of subsidence-related rock fall, however the extent of these random, direct mortality events is considered low and insignificant to the local population of the species. The Scant Pomaderris is a prolific seeding and suckering plant that benefits from soil disturbance. Subsidence may potentially increase local populations of the species.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Direct mortality of individual plants may occur as a result of subsidence-related rock fall, however the extent of these random, direct mortality events is considered low and insignificant to the local population of the species. The Scant Pomaderris is a prolific seeding and suckering plant that benefits from soil disturbance. Subsidence may potentially increase local populations of the species.

Factor	Assessment
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the proposed works are not at the known limit of the distribution of the Scant Pomaderris.
How is the proposal likely to affect current disturbance regimes?	It is expected that limited subsidence will occur in the area occupied by this species. Previous studies in the general locality have not been able to detect an impact of subsidence on local vegetation communities, and long-term impacts from random direct-mortality events related to subsidence are unlikely. On this basis, we have assumed that the potential subsidence occurring here will not significantly impact this species. Increased dust produced from mining activity in the region will be further exacerbated by the proposed works, however the extent of this impact is expected to be small and restricted to the vegetation surrounding the disturbance areas. The Scant Pomaderris is likely to continue to survive in these areas, as well as the unmodified habitat present over the rest of the underground mining areas.
How is the proposal likely to affect habitat connectivity?	This species is not believed to be affected by subsidence. Therefore fragmentation of suitable habitat will not occur as a result of this activity in the underground mining areas. Surface disturbance activities will cause removal of areas of potential habitat which exist on the fringes of a more extensive woodland remnant. The species will continue to survive in existing, extensive woodland surrounding the surface disturbance area.

Acacia ausfeldii **(Ausfeld's Wattle)**

Ausfeld's Wattle occurs in NSW and Victoria. In NSW it is found restricted to the Mudgee-Wollar region, often in large aggregations. It is found in dry sclerophyll woodlands on sandy soils and is not often found in rocky areas but rather on flats or foot slopes (OEH 2014b). In the Ulan area it is often found in *Angophora floribunda* (Rough-barked Apple) grassy or shrubby woodland, or *Eucalyptus crebra* (Narrow-leaved Ironbark)/*Allocasuarina luehmannii* (Bulloak) shrubby woodland on flats. It also occurs along roadsides were it is often promoted by shallow surface disturbance.

Assessment of impact criteria under section 5A of the EP&A Act has been addressed to assess potential impacts of the proposed works to Ausfeld's Wattle.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	If the species is present within the study area (either as undetected individuals or lying dormant in the seed bank), the proposed clearing and removal of the potential habitat of this species may cause direct mortality to individuals. Due to the high abundance of this species in the locality, if individuals are removed/destroyed, this is unlikely to impact processes critical to the species lifecycle, such as pollination and maintenance of genetic variability. There is very little possibility that a viable local population is likely to be placed at risk as a result of the proposed works. The area of potential habitat to be cleared is relatively small when compared with the area to be retained (albeit subject to subsidence). Within the underground mining areas, the impact upon this species will be minimal due to historical records of subsidence impacts upon vegetation showing that impacts are minor. Direct mortality of individual plants may occur as a result of subsidence-related rock fall, however the extent of these random, direct mortality events is considered low and insignificant to the local population of the species. Ausfeld's Wattle is a prolific seeding and suckering plant that benefits from soil disturbance. Subsidence may potentially increase local populations of the species.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed works will disturb or remove up to 8.4 ha of the potential habitat of this species from the surface disturbance areas; this may cause direct mortality to individuals (if the species is present). This is a worst case scenario and assumes there are individuals of this species present in the study area. Despite these potential impacts, a viable local population is not likely to be placed at risk. This is largely because the area of potential habitat to be cleared is relatively small when compared with the area of suitable habitat to be retained in the underground mining areas. Within the underground mining areas, the impact upon this species will be minimal due to historical records of subsidence impacts upon vegetation showing that impacts are minor. Ausfeld's Wattle is a prolific seeding and suckering plant that benefits from soil disturbance. Subsidence may potentially increase local populations of the species.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, the proposed works are not at the known limit of the distribution of the Ausfeld's Wattle.

Factor	Assessment
How is the proposal likely to affect current disturbance regimes?	It is expected that limited subsidence will occur in the area occupied by this species. Previous studies in the general locality have not been able to detect an impact of subsidence on local vegetation communities. On this basis, we have assumed that the potential subsidence occurring here will not impact on the extent of the vegetation in which this species is likely to occur. The composition and structure of this vegetation in the study area has been previously modified. The area had been previously logged and grazed. This has resulted in modifications to the species found in both the overstorey and the understorey. Increased dust produced from mining activity in the region will be further exacerbated by the proposed works, however the extent of this impact is expected to be small and restricted to the vegetation surrounding the disturbance areas. Ausfeld's Wattle (if present) is likely to continue to survive in these areas, as well as the unmodified habitat present over the rest of the underground mining areas.
How is the proposal likely to affect habitat connectivity?	This species is not believed to be affected by subsidence. Therefore fragmentation of suitable habitat will not occur as a result of this activity in the underground mining areas. Surface disturbance activities will cause removal of areas of potential habitat which exist on the fringes of an extensive woodland remnant. If Ausfeld's Wattle is present, the species will continue to survive in existing, extensive woodland surrounding the surface disturbance area.

Appendix C – EPBC Act Significant Impact Guidelines

The EPBC Act Administrative Guidelines on Significance set out **'Significant Impact Criteria'** that are to be used to assist in determining whether a proposed action is likely to have a significant impact on matters of national environmental significance. Matters listed under the EPBC Act as being of national environmental significance include:

- Listed threatened species and ecological communities.
- Listed migratory species.
- Wetlands of International Importance.
- The Commonwealth marine environment.
- World Heritage properties.
- National Heritage places.
- Nuclear actions.

Specific **'Significant Impact Criteria'** are provided for each matter of national environmental significance except for threatened species and ecological communities in which case separate criteria are provided for species listed as endangered and vulnerable under the EPBC Act.

The relevant Significant Impact Criteria have been applied to the following species and communities:

- *Anthochaera phrygia* (Regent Honeyeater).
- *Lathamus discolour* (Swift Parrot).
- *Ardea modesta* (Eastern Great Egret).
- *Ardea ibis* (Cattle Egret).
- *Apus pacificus* (Fork-tailed Swift).
- *Hirundapus caudacutus* (White-throated Needletail).
- *Merops ornatus* (Rainbow Bee-eater).
- *Myiagra cyanoleuca* (Satin Flycatcher).
- *Rhipidura rufifrons* (Rufous Fantail).
- *Dasyurus maculatus* (Spotted-tailed Quoll).
- *Phascolarctos cinereus* (Koala).
- *Pseudomys novaehollandiae* (New Holland Mouse).
- *Nyctophilus corbeni* (South-eastern Long-eared Bat).
- *Chalinolobus dwyeri* (Large-eared Pied Bat).
- *Hoplocephalus bungaroides* (Broad-headed Snake).
- White Box – Yellow Box – Blakely's Red Gum Woodland and Derived Native Grasslands.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any environmental impact on a World Heritage Property;	No
any environmental impact on Wetlands of International Importance;	The proposal will not affect any part of a Wetland of International Importance
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species;	**Nomadic Nectarivorous Birds** ***Anthochaera phrygia* (Regent Honeyeater);** and ***Lathamus discolor* (Swift Parrot)** **An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:** **Criterion 1: lead to a long-term decrease in the size of an important population of a species** The proposed works will only remove a small area of potential habitat in the form of scattered nectar-bearing trees within DNG (8.4 ha in total). Given this, it is unlikely to lead to a long-term decrease in the size of an important population of a species. **Criterion 2: reduce the area of occupancy of an important population** The proposed works will not reduce the area of occupancy of an important population. **Criterion 3: fragment an existing important population into two or more populations** The proposed works will not fragment an existing important population into two or more populations. **Criterion 4: adversely affect habitat critical to the survival of a species** The proposed works will only disturb potential foraging habitat for these species. Due to the species being highly mobile and the availability of a large expanse of more contiguous and suitable habitat surrounding the proposed works area, it is unlikely that the proposed works will affect habitat critical to the survival of a species. **Criterion 5: disrupt the breeding cycle of an important population** No important populations are known in the study area. Due to the species being highly mobile it is unlikely to that disturbance to foraging habitat will disrupt the breeding cycle of an important population. **Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline** The proposed works may impact upon only a small area of potential foraging habitat for these species. Due to the species being highly mobile it is unlikely the development will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**.**

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species; (Cont.)	***Anthochaera phrygia* (Regent Honeyeater);** and ***Lathamus discolor* (Swift Parrot) (Cont.)** **Criterion 7: result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat** The proposed works will not result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat. **Criterion 8: introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species.** The proposed works will not introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species. **Criterion 9: interfere with the recovery of an endangered species.** The long-term objectives of the Regent Honeyeater Recovery Plan were to: ensure that the species persists in the wild; to achieve a down-listing from nationally endangered to vulnerable by stabilising the population decline and securing habitat extent and quality in the main areas of occupancy, and, to achieve increasing reporting rates (5% per annum) in areas previously used regularly. As no records of this species have been made within the study area, and very limited suitable habitat is going to be removed, no impact is expected on any individuals or populations of Regent Honeyeater. It is therefore believed that the action proposed remains consistent with the objectives of the recovery plan for this species. The overall objectives of the Swift Parrot Recovery Plan were to: prevent further decline of the Swift Parrot population; and achieve a demonstrable sustained improvement in the quality and quantity of Swift Parrot habitat to increase carrying capacity. As no records of this species have been made within the study area, and a very limited area of suitable habitat is to be removed, no impact is expected on any individuals or populations of Swift Parrot. It is therefore believed that the action proposed remains consistent with the objectives of the recovery plan for this species.
	***Dasyurus maculatus* (Spotted-tailed Quoll)** **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:** **Criterion 1: lead to a long-term decrease in the size of an important population of a species** The proposed works will disturb a small area of DNG as a result of vegetation clearing in the surface disturbance areas; this would serve little foraging habitat potential. An extensive area of remnant habitat, suitable for foraging and nesting by the Spotted-tailed Quoll will remain unimpacted in the underground mining areas. Given this, it is unlikely to lead to a long-term decrease in the size of an important population of a species.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species; (Cont.)	***Dasyurus maculatus* (Spotted-tailed Quoll) (Cont.)** **Criterion 2: reduce the area of occupancy of an important population** The proposed works will not reduce the area of occupancy of an important population. **Criterion 3: fragment an existing important population into two or more populations** The proposed works will not fragment an existing important population into two or more populations. **Criterion 4: adversely affect habitat critical to the survival of a species** The proposed works will only disturb potential foraging habitat for the Spotted-tailed Quoll. Due to the species being highly mobile and the availability of a large expanse of more contiguous and suitable habitat surrounding the proposed study area, it is unlikely that the proposed works will affect habitat critical to the survival of a species. **Criterion 5: disrupt the breeding cycle of an important population** No important populations are known in the study area. Due to the species being highly mobile it is unlikely that disturbance to foraging habitat will disrupt the breeding cycle of an important population of Spotted-tailed Quoll. **Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline** The proposed works will impact upon only a small area of potential foraging habitat for the Spotted-tailed Quoll. Due to the species being highly mobile it is unlikely the development will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. **Criterion 7: result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat** The proposed works will not result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat. **Criterion 8: introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species.** The proposed works will not introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species. **Criterion 9: interfere with the recovery of an endangered species.** No current recovery plan has been prepared for the Spotted-tailed Quoll. No potential Spotted-tailed Quoll habitat will be unnecessarily removed, and effort is being made to retain and restore potential habitat present in the locality through implementation of the Biodiversity Offset Strategy and LMP.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species; (Cont.)	***Chalinolobus dwyeri* (Large-eared Pied Bat)** **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:** **Criterion 1: lead to a long-term decrease in the size of an important population of a species** The proposed works may disturb a very small area of DNG as a result of the surface disturbance and woodland as a result of underground activities, which would serve little foraging habitat potential. Subsidence may cause mortality of individuals if roost sites collapse, but this will be a very rare occurrence. Long-term loss of roosting sites is unlikely to occur as subsidence is likely to re-create roosting habitat at the same time as destroying areas of habitat. The loss of marginal foraging habitat or the chance loss of individual bats from roost site collapse is unlikely to lead to a long-term decrease in the size of an important population of the species. **Criterion 2: reduce the area of occupancy of an important population** The proposed works will not reduce the area of occupancy of an important population. **Criterion 3: fragment an existing important population into two or more populations** The proposed works will not fragment an existing important population into two or more populations. **Criterion 4: adversely affect habitat critical to the survival of a species** The proposed works will only disturb a small area of potential foraging habitat for the Large-eared Pied Bat. Due to the species being highly mobile and the availability of a large expanse of more contiguous and suitable habitat surrounding the proposed works area, it is unlikely that the proposed works will affect habitat critical to the survival of a species. Long-term loss of roosting sites is unlikely to occur as subsidence is likely to re-create roosting habitat at the same time as destroying areas of habitat. **Criterion 5: disrupt the breeding cycle of an important population** No important populations are known within the study area. Due to the species being highly mobile it is unlikely that disturbance to foraging habitat will disrupt the breeding cycle of an important population of Large-eared Pied Bat. Collapse of potential maternal roost sites (breeding habitat) may occur as a result of subsidence, however this will be rare occurrence and is likely to occur randomly over small areas, the majority of suitable breeding habitat will remain unaffected by subsidence, therefore the breeding cycle of local populations will not be significantly impacted. **Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline** The proposed works will impact upon only a small area of very marginal potential foraging habitat for the Large-eared Pied Bat. The low suitability of this area for foraging habitat and the high mobility of this species will allow it to forage in optimal woodland habitat which will remain.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species; (Cont.)	***Chalinolobus dwyeri* (Large-eared Pied Bat) (Cont.)** Subsidence may cause mortality of individuals if roost sites collapse, but this will be a very rare occurrence. Long-term loss of roosting sites is unlikely to occur as subsidence is likely to re-create roosting habitat at the same time as destroying areas of habitat. It is unlikely the development will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. **Criterion 7: result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat** The proposed works will not result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat. **Criterion 8: introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species.** The proposed works will not introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species. **Criterion 9: interfere with the recovery of a vulnerable species.** A national recovery plan has been prepared for the Large-eared Pied Bat. The objective of the recovery plan is "to ensure the persistence of viable populations of the large-eared pied bat throughout its geographic range". As no key populations have been identified in the area surrounding the proposed works area, the proposed action does not apply to this modification. However, taking the precautionary principal and assuming the species is present and forms a key population, the area of DNG habitat potentially and areas of sporadic roost site disturbance that my occur as a result of the proposed works is still not likely to contribute significantly to the species habitat, therefore would not interfere with species recovery.
	***Nyctophilus corbeni* (South-eastern Long-eared Bat)** **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:** **Criterion 1: lead to a long-term decrease in the size of an important population of a species** The proposed works may disturb a very small area of DNG, which would serve little foraging habitat potential. Given this, it is unlikely to lead to a long-term decrease in the size of an important population of a species. **Criterion 2: reduce the area of occupancy of an important population** The proposed works will not reduce the area of occupancy of an important population. **Criterion 3: fragment an existing important population into two or more populations** The proposed works will not fragment an existing important population into two or more populations.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species; (Cont.)	***Nyctophilus corbeni* (South-eastern aka Corben's Long-eared Bat) (Cont.)** **Criterion 4: adversely affect habitat critical to the survival of a species** The proposed works will only remove a small area of potential, but marginal foraging habitat for the South-eastern Long-eared Bat. Due to the species being highly mobile and the availability of a large expanse of more contiguous and suitable habitat surrounding the proposed works area, it is unlikely that the proposed works will affect habitat critical to the survival of a species. **Criterion 5: disrupt the breeding cycle of an important population** No important populations are known in the study area. Due to the species being highly mobile it is unlikely that disturbance to foraging habitat will disrupt the breeding cycle of an important population of South-eastern Long-eared Bat. **Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline** The proposed works will impact upon only a small area of potential foraging habitat for the South-eastern Long-eared Bat. Due to the species being highly mobile it is unlikely the development will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. **Criterion 7: result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat** The proposed works will not result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat. **Criterion 8: introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species.** The proposed works will not introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species. **Criterion 9: interfere with the recovery of a vulnerable species.** A national recovery plan is being prepared for the South-eastern Long-eared Bat. The only relevant recovery action is "Identify key populations and protect these from habitat loss and fragmentation". As no important populations have been identified in the area surrounding the proposed works area, the proposed action does not apply to the modification.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species; (Cont.)	***Pseudomys novaehollandiae* (New Holland Mouse)** The New Holland Mouse is a small burrowing native rodent that inhabits open heath lands and open woodlands with a shrubby (heath-like) understorey. It is a social animal, living predominantly in burrows shared with other individuals (OEH 2014b). **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:** **Criterion 1: lead to a long-term decrease in the size of an important population of a species** The proposed works will remove some DNG, most notably shrubbery (foraging and sheltering habitat) from within the proposed surface disturbance area. The area of habitat will be insignificant compared to the volume of suitable foraging and sheltering habitat which will remain in the surrounding adjacent vegetation. Given this, it is unlikely to lead to a long-term decrease in the size of an important population of a species. **Criterion 2: reduce the area of occupancy of an important population** The proposed works will not reduce the area of occupancy of an important population. **Criterion 3: fragment an existing important population into two or more populations** The proposed works will not fragment an existing important population into two or more populations. **Criterion 4: adversely affect habitat critical to the survival of a species** The proposed works will only disturb potential foraging and sheltering habitat. Due to the availability and large expanse of more contiguous and suitable habitat surrounding the surface disturbance area, it is unlikely that the proposed works will affect habitat critical to the survival of a species. **Criterion 5: disrupt the breeding cycle of an important population** No important populations are known in the study area. It is unlikely that disturbance to foraging habitat will disrupt the breeding cycle of an important population of New Holland Mouse. **Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline** The proposed works may impact upon only a small area of potential foraging and breeding habitat for the New Holland Mouse. Due to the species being highly fecund and tolerant of disturbed regrowth areas, it is unlikely the development will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**.** **Criterion 7: result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat** The proposed works will not result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species; (Cont.)	***Pseudomys novaehollandiae* (New Holland Mouse) (Cont.)** **Criterion 8: introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species.** The proposed works will not introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species. **Criterion 9: interfere with the recovery of a vulnerable species.** No recovery objectives have been set for this species.
	***Hoplocephalus bungaroides* (Broad-headed Snake)** **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:** **Criterion 1: lead to a long-term decrease in the size of an important population of a species** The proposed works may disturb a very small area of sandstone rock outcropping and remnant woodland through underground activities, which may serve as potential foraging and sheltering habitat for the Broad-headed Snake. Sandstone outcropping displaying the microhabitat features (e.g. flat exfoliating sandstone on sandstone shelving) required by the Broad-headed Snake is uncommon in the study area and restricted to the underground mining areas. This habitat may be impacted by subsidence, through localised landslip and rock collapse. Chances of such impacts effecting an important population of the Broad-headed Snake (if present) is remote, as impacts would be random and localised. Direct mortality of individual Broad-headed Snakes could occur as a result of subsidence impacts (e.g. rock fall). However, such impacts are expected to be random and localised and the likelihood of their occurrence is low. No impacts are expected to occur to hollow-bearing trees of the type suitable for use by Broad-headed Snake. Given this, it is unlikely the proposed works will lead to a long-term decrease in the size of an important population of a species. **Criterion 2: reduce the area of occupancy of an important population** The proposed works will not reduce the area of occupancy of an important population. **Criterion 3: fragment an existing important population into two or more populations** The proposed works will not fragment an existing important population into two or more populations.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species; (Cont.)	***Hoplocephalus bungaroides* (Broad-headed Snake) (Cont.)** **Criterion 4: adversely affect habitat critical to the survival of a species** The proposed works may disturb a very small area of sandstone rock outcropping and remnant woodland through underground activities, which may serve as potential foraging and sheltering habitat for the Broad-headed Snake. Sandstone outcropping displaying the microhabitat features (e.g. flat exfoliating sandstone on sandstone shelving) required by the Broad-headed Snake is uncommon in the study area and restricted to the underground mining areas. This habitat may be impacted by subsidence, through localised landslip and rock collapse. Chances of such impacts effecting an important population Broad-headed Snake (if present) is remote, as impacts would be random and localised. Direct mortality of individual Broad-headed Snakes could occur as a result of subsidence impacts (e.g. rock fall). However, such impacts are expected to be random and localised and the likelihood of their occurrence is low. No impacts are expected to occur to hollow-bearing trees of the type suitable for use by Broad-headed Snake. All of such trees exist within the underground mining area which is not expected to be impacted by the proposed works. The proposed works are unlikely to adversely affect any habitat critical to the survival of this species. **Criterion 5: disrupt the breeding cycle of an important population** No important populations are known in the study area. No impacts would be expected within the available habitat, even if the species was determined to be present within the study area. **Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline** The proposed works may disturb a very small area of sandstone rock outcropping and remnant woodland through underground activities, which may serve as potential foraging and sheltering habitat for the Broad-headed Snake. Sandstone outcropping displaying the microhabitat features (e.g. flat exfoliating sandstone on sandstone shelving) required by the Broad-headed Snake is uncommon in the study area and restricted to the underground mining areas. This habitat may be impacted by subsidence, through localised landslip and rock collapse. Chances of such impacts effecting an important population Broad-headed Snake (if present) is remote, as impacts would be random and localised. Direct mortality of individual Broad-headed Snakes could occur as a result of subsidence impacts (e.g. rock fall). However, such impacts are expected to be random and localised and the likelihood of their occurrence is low. No impacts are expected to occur to hollow-bearing trees of the type suitable for use by Broad-headed Snake. All of such trees exist within the underground mining area which is not expected to be impacted by the proposed works. The proposed works are unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species; (Cont.)	***Hoplocephalus bungaroides* (Broad-headed Snake) (Cont.)** **Criterion 7: result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat** The proposed works will not result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat. **Criterion 8: introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species.** The proposed works will not introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species. **Criterion 9: interfere with the recovery of an endangered species.** No current recovery plan exists for the Broad-headed Snake.
	***Phascolarctos cinereus* (Koala)** **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:** **Criterion 1: lead to a long-term decrease in the size of an important population of a species** The proposed works will remove some scattered paddock trees within DNG (foraging and sheltering habitat) from within the proposed impact area. Individual specimens of koala food-tree species may be removed during the development, although the numbers of trees will be insignificant compared to the volume of suitable foraging and sheltering habitat which will remain in the surrounding adjacent vegetation. Given this, the proposed works are unlikely to lead to a long-term decrease in the size of an important population of a species. **Criterion 2: reduce the area of occupancy of an important population** The proposed works will not reduce the area of occupancy of an important population. **Criterion 3: fragment an existing important population into two or more populations** The proposed works will not fragment an existing important population into two or more populations. **Criterion 4: adversely affect habitat critical to the survival of a species** The proposed works will only disturb potential foraging habitat for the Koala. Due to the species being highly mobile and the availability of a large expanse of more contiguous and suitable habitat surrounding the proposed works area, it is unlikely that the proposed works will affect habitat critical to the survival of this species. **Criterion 5: disrupt the breeding cycle of an important population** No important populations are known in the study area. Due to the species being highly mobile it is unlikely to that disturbance to foraging habitat will disrupt the breeding cycle of an important population of Koala.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any impact on Commonwealth Listed Critically Endangered or Endangered Species; any impact on Commonwealth Listed threatened Species; (Cont.)	***Phascolarctos cinereus* (Koala) (Cont.)** **Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline** The proposed works may impact upon only a small area of potential foraging habitat for the Koala. Due to the species being highly mobile it is unlikely the development will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**.** **Criterion 7: result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat** The proposed works will not result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat. **Criterion 8: introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species.** The proposed works will not introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species. **Criterion 9: interfere with the recovery of a vulnerable species.** The overall objective of the NSW Koala recovery plan is to "…reverse the decline of the Koala in NSW, to ensure adequate protection, management and restoration of Koala habitat, and to maintain healthy breeding populations of koalas throughout their current range". No potential Koala habitat will be unnecessarily removed, and effort is being made to retain and restore potential Koala feed trees present in the locality through implementation of the Biodiversity Offset Strategy and LMP. As a result, the action proposed is consistent with the objectives of the recovery plan.
any environmental impact on Commonwealth Listed Migratory Species;	Yes **Regent Honeyeater** (addressed above) ***Ardea modesta* (Eastern Great Egret)** **Criterion 1: substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.** The Eastern Great Egret is a resident wetland bird species that is common and wide-spread across eastern Australia, particularly areas that experience sufficient rainfall. The species commonly forages wetlands, but also utilises farm dams and ponds. The study area does provide suitable habitat for this species, but this habitat is made up of dams derived from blocking the natural drainage of creeks and springs. Due to the high mobility of this species, the abundance of suitable habitat in the surrounding locality, and the low area of habitat modification, the proposed works should not impact on the availability of foraging area in the vicinity, or surrounding region.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any environmental impact on Commonwealth Listed Migratory Species; (Cont.)	***Ardea modesta* (Eastern Great Egret) (Cont.)** **Criterion 2: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.** The proposed works will not result in the establishment of any invasive species that are harmful to the Eastern Great Egret. **Criterion 3: seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.** Due to the widespread distribution, nomadic nature and adaptability of this species as well as lack of suitable breeding habitat and the small amount of potential foraging habitat within the proposed impact area, the lifecycle of the Eastern Great Egret should not be disrupted as a result of the modification in any way.
	***Ardea Ibis* (Cattle Egret)** **Criterion 1: substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.** The Cattle Egret is a self-introduced bird species that is common and wide-spread across Australia, particularly areas that experience sufficient rainfall. The species commonly forages among cattle and other livestock in open pastures but will also forage in roadsides, golf courses, wetlands, sporting fields and riparian zones (Morcombe 2004). The study area does provide suitable habitat for this species, but this habitat is grassland derived from clearing. The proposed works should not impact on the availability of foraging area in the vicinity, or surrounding region. Due to the high mobility of this species, the abundance of suitable habitat in the surrounding locality and the low area of habitat modification expected as part of the proposed works, it is not considered that there will be any substantial modification, destruction or isolation or any areas of important habitat for the Cattle Egret. **Criterion 2: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.** The proposed works will not result in the establishment of any invasive species that are harmful to the Cattle Egret. **Criterion 3: seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.** Due to the widespread distribution, nomadic nature and adaptability of this species as well as lack of suitable breeding habitat and the small amount of potential foraging habitat within the proposed impact area, the lifecycle of the Cattle Egret should not be disrupted as a result of the modification in any way.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any environmental impact on Commonwealth Listed Migratory Species; (Cont.)	***Merops ornatus* (Rainbow Bee-eater)** **Criterion 1: substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.** The Rainbow Bee-eater is a common breeding migrant to most of southern Australia, for austral spring/summer. It occurs in open woodlands and riparian environments. It breeds in areas of sandy or loamy soil such as sand-ridges, riverbanks, road-cuttings, and quarries (Morcombe 2004). The study area does provide suitable foraging and nesting habitat for this species. The proposed works should not impact on the availability of foraging area in the vicinity, or surrounding region. Due to the high mobility of this species, the variety of habitat in the area and the low area of habitat modification expected as part of the proposed works, it is not considered that there will be any substantial modification, destruction or isolation or any areas of important habitat for the Rainbow Bee-eater. **Criterion 2: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.** The proposed works will not result in the establishment of any invasive species that are harmful to the Rainbow Bee-eater. **Criterion 3: seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.** Due to the widespread distribution, nomadic nature and adaptability of this species within the proposed impact area, the lifecycle of the Rainbow Bee-eater should not be disrupted as a result of the modification in any way.
	***Rhipidura rufifrons* (Rufous Fantail)** **Criterion 1: substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.** The Rufous Fantail is a common breeding migrant to south-eastern Australia, usually in wet sclerophyll forests, rainforests and sometimes drier woodland areas east of the Great Divide. It breeds in mesic gullies in the austral spring/summer, and migrates to northern Australia and Papua New Guinea for the austral winter (Morcombe 2004). During the non-breeding season, individuals can appear further outside their usual habitats and distribution, including drier areas. The study area does provide suitable foraging habitat for this species. The proposed works should not impact on the availability of foraging habitat in the vicinity, or surrounding region. Due to the high mobility of this species, the variety of habitat in the area and the low area of habitat modification expected as part of the proposed works, it is not considered that there will be any substantial modification, destruction or isolation or any areas of important habitat for the Rufous Fantail. **Criterion 2: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.**

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any environmental impact on Commonwealth Listed Migratory Species; (Cont.)	***Rhipidura rufifrons*** **(Rufous Fantail) (Cont.)** The proposed works will not result in the establishment of any invasive species that are harmful to the Rufous Fantail. **Criterion 3: seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.** The widespread distribution, nomadic nature and adaptability of this species, as well as lack of suitable breeding habitat within the proposed impact area indicates that the lifecycle of the Rufous Fantail should not be disrupted as a result of the modification in any way.
	Myiagra cyanoleuca **(Satin Flycatcher)** **Criterion 1: substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.** The Satin Flycatcher is a common breeding migrant to south-eastern Australia, usually in wet sclerophyll forests, rainforests and sometimes drier woodland areas east of the Great Divide. It breeds in wet gullies and montane regions in far south-eastern Australia in the austral spring/summer, and migrates to northern Australia and Papua New Guinea for the austral winter (Morcombe 2004). During the non-breeding season, individuals can appear further outside their usual habitats and distribution, including drier areas. The study area does provide suitable foraging habitat for this species. The proposed works should not impact on the availability of foraging habitat in the vicinity, or surrounding region. Due to the high mobility of this species, the variety of habitat in the area and the low area of habitat modification expected as part of the proposed works, it is not considered that there will be any substantial modification, destruction or isolation or any areas of important habitat for the Satin Flycatcher. **Criterion 2: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.** The proposed works will not result in the establishment of any invasive species that are harmful to the Satin Flycatcher. **Criterion 3: seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.** The widespread distribution, nomadic nature and adaptability of this species, as well as lack of suitable breeding habitat within the proposed impact area indicates that the lifecycle of the Satin Flycatcher should not be disrupted as a result of the modification in any way.
	Hirundapus caudacutus **(White-throated Needletail)** **Criterion 1: substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.**

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any environmental impact on Commonwealth Listed Migratory Species; (Cont.)	***Hirundapus caudacutus* (White-throated Needletail) (Cont.)** The White-throated Needletail breeds in offshore islands in the Pacific ocean. It migrates to Australia during the austral summer. During this time it remains on the wing, flying over vast areas to forage on aerial insects. As this species does not utilise terrestrial habitats in Australia, it may to occur anywhere and over any habitat. Therefore, there is no possibility of potential impact from habitat modification **Criterion 2: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.** The proposed works will not result in the establishment of any invasive species that are harmful to the White-throated Needletail. **Criterion 3: seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.** Due to the widespread distribution, nomadic nature and adaptability of this species, the lifecycle of the White-throated Needletail should not be disrupted as a result of the modification in any way.
	***Apus pacificus* (Fork-tailed Swift)** **Criterion 1: substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.** The Fork-tailed Swift breeds on offshore islands in Asia. It migrates to Australia during the austral summer. During this time it remains on the wing, flying over vast areas to forage on aerial insects. In the south of its distribution (e.g. NSW) it is most commonly seen in flocks of the more common, White-throated Needletail. As this species does not utilise terrestrial habitats in Australia, it may to occur anywhere and over any habitat. Therefore, there is no possibility of potential impact from habitat modification **Criterion 2: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.** The proposed works will not result in the establishment of any invasive species that are harmful to the Fork-tailed Swift. **Criterion 3: seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.** Due to the widespread distribution, nomadic nature and adaptability of this species, the lifecycle of the Fork-tailed Swift should not be disrupted as a result of the modification in any way.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
any critically endangered and endangered ecological communities	Yes **<u>White Box–Yellow Box–Blakely's Red Gum Woodland and Derived Native Grasslands</u>** **Reduce the extent of an ecological community** The proposal will result in the removal/modification of approximately 0.25 ha of the DNG component of this CEEC. **Fragment or increase fragmentation of an ecological community** The works will not result in the fragmentation of the CEEC. No clearance of woodland will be associated with this modification. The remaining vegetation will be contiguous with other areas of CEEC.
any critically endangered and endangered ecological communities (Cont.)	**Adversely affect habitat critical to the survival of an ecological community** The proposal will not adversely affect habitat critical to the survival of the CEEC, due to the continued existence of CEEC in the surrounding area. **Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction in groundwater levels, or substantial alteration of surface water drainage patterns.** The proposal should not change any abiotic factors necessary for the survival of the CEEC. **Cause substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species.** The proposal will not cause substantial change to the species composition of the remaining CEEC if mitigation measures are implemented to control the spread of weeds. **Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:** • **assisting invasive species, that are harmful to the listed ecological community, to become established, or** • **causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the CEEC, or** The feasible mitigation measures can ensure that impacts from the 'surface disturbance' do not flow out into surrounding CEEC, and the limited extent of the impacts will ensure that there will be no substantial reduction in the quality or integrity of the CEEC. • **interfere with the recovery of an ecological community.** The proposed activity will cause a net loss (0.25 ha) in the extent of the CEEC. In itself the impact of the clearing is very small, but it needs to be part of consideration of its place in the wider works program.

Matters to be addressed	IMPACT (COMMONWEALTH LEGISLATION)
does any part of the Proposal involve a Nuclear Action;	No
any environmental impact on a Commonwealth Marine Area;	No
In addition, any direct or indirect impact on Commonwealth lands	No