MCO OC4 South-West Modification

Flora and Fauna Impact Assessment

Prepared for
Moolarben Coal Operations

17 April 2015

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Executive Summary

Eco Logical Australia (ELA) was engaged by Moolarben Coal Operations Pty Ltd (MCO) to undertake a flora and fauna impact assessment for relocation of the Stage 2 Open Cut 4 (OC4) haul road. This flora and fauna impact assessment will be used to support an Environmental Assessment to facilitate the modification of both the Stage 1 and Stage 2 Moolarben Coal Project Approvals (05_0117 and 08_0135) under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (the Modification).

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 *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Surface disturbance associated with the proposed modification consists of a relocation of the approved OC4 haul road between OC4 and the Stage 1 run-of-mine coal facility.

The proposed modification area (5.1 hectares [ha]) contains two BioMetric vegetation types, of which none are related to any threatened ecological communities listed under the TSC or EPBC Act. No threatened flora or fauna species were recorded within the OC4 haul road relocation area.

Habitat requirements for observed and potential threatened species and communities were compared with the study area's characteristics. One threatened flora species, 33 threatened fauna species and five non-threatened migratory fauna species have the potential or are likely in the area. These 39 species were assessed in accordance with the relevant legislative guidelines.

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 & C) the OC4 haul road modification is unlikely to result in significant impacts to threatened biodiversity.

The impacts associated with this modification (5.1 ha of remnant native vegetation) are well catered for within the established offset for the Stage 2 Project. The current Biodiversity Offsetting Strategy for Stage 2 will result in surplus area under this proposal, as the proposed modification results in less disturbance than the approved haul road (5.1 ha versus 18.5 ha).

Mitigation measures for impacts on vegetation and fauna habitat will be undertaken. Management includes a biodiversity impact mitigation strategy that aims to 'maintain and enhance' ecological values in order to result in a net positive biodiversity benefit in the post developed landscape. Mitigation measures are scheduled to be undertaken prior, during and post mining operations.

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Abbreviations

Abbreviation	Description
BOS	Biodiversity Offset Strategy
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	*Environmental Protection and Biodiversity Conservation Act 1999*
OEH	Office of Environment and Heritage
IA	Ecological Impacts Assessment
KTP	Key Threatening Process
LGA	Local Government Area
LWD	Large Woody Debris (e.g. fallen logs)
MCO	Moolarben Coal Operations
MNES	Matter of National Environmental Significance under EPBC Act
PMST	Protected Matters Search Tool
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 to relocate the Stage 2 Open Cut 4 (OC4) haul road. This flora and fauna impact assessment will be used to support an Environmental Assessment to facilitate the modification of both the Stage 1 and Stage 2 Moolarben Coal Project Approvals (05_0117 and 08_0135) under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (the Modification).

This flora and fauna impact assessment has been undertaken to determine any potential impacts from the proposed activity (haul road realignment) on threatened flora and fauna within and adjacent to the proposed haul road, and is required pursuant to the EP&A Act, NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.2 DESCRIPTION OF PROJECT

MCO has reviewed the mining sequence and associated infrastructure layout requirements at the Moolarben Coal Complex to enable more efficient access to the OC4 resource. As a consequence, the approved Stage 2 Haul Road (to the north-east of OC4) would no longer be required, and would be replaced by a shorter, more direct, haul road route to Stage 1 Open Cut 1 (OC1) (in the south-west).

Removal of the approved Stage 2 Haul Road would result in benefits to the environment, including:

- up to approximately 18.5 hectares (ha) of approved surface disturbance being avoided; and
- improved water management and reduced risk of uncontrolled site discharge to Murragamba and Wilpinjong Creeks, by removing ongoing high maintenance requirements to control sediment along the approved haul road.

The OC4 South-West Modification includes the following key components:

- construction of the OC4 south-west haul road between OC4 and OC1 (and therefore the approved Stage 2 Haul Road would not need to be constructed);
- adjustments to the site water management system to contain surface water runoff from the south-west haul road and diversion of clean water;
- refinements to the early stages of mining and associated infrastructure layout at OC4 (wholly located within the approved surface disturbance footprint); and
- backfilling of the northern OC1 final void to approximately pre-mining elevations.

1.3 SURVEY AREA

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

The footprint of the proposed haul road alignment overlaps the footprint of an approved waste emplacement area, assessed as part of the Stage 2 Project Approval. Therefore this report only assesses the smaller northern portion of the haul road outside of this waste emplacement footprint (**Figure 1**).

The purpose of this study was to undertake a flora and fauna impact assessment for the proposed OC4 haul road realignment for inclusion within an Environmental Assessment under Section 75W of the EP&A Act. The proposed OC4 haul road realignment is shown in **Figure 1**.

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 haul road on threatened flora and fauna species, populations and ecological communities that occur or are likely to occur in the study area through significance assessments in accordance with the TSC Act and the EPBC Act; and
- Propose mitigation and management measures where appropriate to minimise and/or manage impacts.

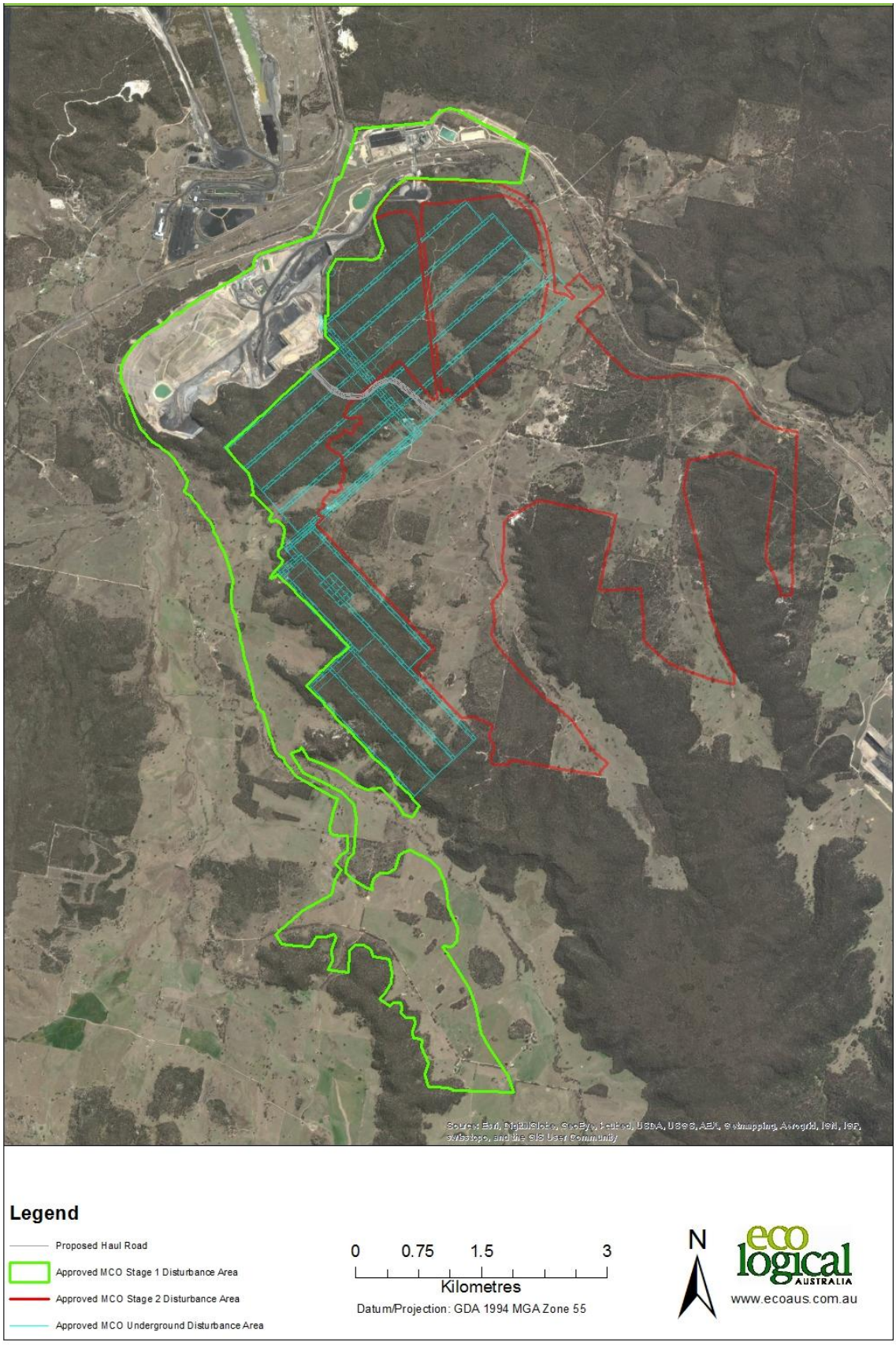

Figure 1: Location of Proposed Haul Road Realignment

1.5 LEGISLATIVE REQUIREMENTS

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

Table 1: Legislation Relevant to the Proposed Works

Name	Relevance to the Modification
Commonwealth	
Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)	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) which is responsible for administering the EPBC Act. MNES have been identified on or near the site and have been considered in this report. Impacts associated with the haul road realignment have been considered not significant; therefore a referral is not required.
State	
Environmental Planning and Assessment Act 1979 (EP&A Act)	The modification is to be assessed under the transitional provisions of Part 3A, Section 75W of the EP&A Act. Assessments of significance for impacts to threatened species and endangered ecological communities have been prepared in accordance with s5A of the Act and the report addresses the relevant requirements of s228 of the *EP&A Regulation 2000*.
Threatened Species Conservation Act 1995 (TSC Act)	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	The *Fisheries Management Act 1995* (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.

Name	Relevance to the Modification
State	
State Environmental Planning Policy No. 44 – Koala Habitat Protection	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 literature review was undertaken to determine the location and extent of previous surveys. The review aims were to identify flora and fauna within the subject site, the potential presence of any threatened species, populations and ecological communities listed under the TSC Act and the 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 and Heritage [OEH] 2014a) covering an area from latitude -32.34 to -32.44 and longitude 150.1 to 150.2 (Datum GDA94).
- EPBC Protected Matters Search Tool (PMST) (DotE 2014a) using a radius of 10 km around coordinates -32.39745 S, 150.1439 E (Datum GDA94).
- Moolarben Coal Project – Stage 1 Optimisation Modification. Ecological Impact Assessment (EMM 2013)
- Moolarben Coal Flora and Fauna Monitoring 2011/2012 Summary (EcoLogical Australia 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 3.3 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 to occur, 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 field survey was undertaken on 10th July 2014 by ELA ecologists David Allworth and Kurtis Lindsay in addition to previous field assessments undertaken in the vicinity for the initial design for the haul road alignment.

An ecological assessment was undertaken within a 100 metre (m) buffer around the centre line of the haul road realignment.

The field assessment consisted of validating BioMetric vegetation types, identifying general floristic structure, targeted threatened flora searches, habitat assessment, Koala habitat assessment and opportunistic fauna sightings. Whilst some threatened species are out of season for survey (e.g. *Pomaderris queenslandica*), potential habitat for these species was targeted during the field survey where present.

Plant species were listed to species level, genera or family level following nomenclature used in the NSW Government's Plant net database (Royal Botanic Gardens Sydney 2014). Where possible an assessment of cover/abundance using a modified Braun-Blanquet system was undertaken for plants.

During the field survey the temperatures were mild to cold, with 0.3 millimetres (mm) of rain recorded (**Table 2**) (temperature records from the nearest BOM weather station, Gulgong, NSW; (BOM 2014).

Table 2: Weather Conditions During the Field Surveys

Date	Min Temp (°C)	Max Temp (°C)	Rainfall (mm)	Max Wind (km/h and direction)	9am Temp (°C)
10th July 2014	No data	8.8	0.3	22 SW	6.3

3 Results

3.1 VEGETATION COMMUNITIES

The data audit revealed nine threatened ecological communities (TEC) 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 subject site. 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		
Grey Box Grassy Woodlands and Derived Native Grassland	-	E	Predominantly occurs on the drier edge of the temperate grassy eucalypt woodland belt. A tree canopy dominated by *Eucalyptus microcarpa* is typically present. A range associated tree species may be present but these do not dominate the ecological community (DotE 2014b). This endangered ecological community (EEC) has not been recorded within or adjacent to the proposed impact area. No habitat exists for Grey Box Grassy Woodlands and Derived Native Grassland within the proposed impact area.	No
Central Hunter Grey Box – Ironbark Woodland	E	-	Typically forms woodland dominated by *Eucalyptus crebra*, *Brachychiton populneus* subsp. *populneus* and *Eucalyptus moluccana* (OEH 2014b).	Unlikely

Threatened Ecological Community	Conservation Significance		Habitat Associations	Likelihood of Occurrence
	TSC Act	EPBC Act		
Hunter Valley Footslopes Slaty Gum Woodland	V	-	Typically forms woodland, or occasionally forest, comprising a sparse to moderately dense tree stratum, occasional low tree stratum, and moderately dense to dense shrub stratum. The tree canopy is typically dominated by *Eucalyptus dawsonii* and/or *Eucalyptus moluccana*. *Acacia salicina* and *Allocasuarina luehmannii* may form a low tree stratum, or may 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.	No
Hunter Valley Vine Thicket	E	-	Typically forms a low forest with a closed canopy dominated by low trees, shrubs and vines. The canopy is dominated by both varieties of *Elaeodendron australe*, *Geijera parviflora*, *Notelaea microcarpa* var. *microcarpa*, and *Alectryon oleifolius* subsp. *elongatus* (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.	No
Hunter Valley Weeping Myall Woodland	E	E	Typically has a dense to open tree canopy up to about 15 m tall, depending on disturbance and regrowth history. The most common tree is *Acacia pendula*, which may occur with *Eucalyptus crebra* and/or *Acacia salicina* (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.	No

Threatened Ecological Community	Conservation Significance		Habitat Associations	Likelihood of Occurrence
	TSC Act	EPBC Act		
Swamp Oak Floodplain Forest	E	-	Has a dense to sparse tree layer in which *Casuarina glauca* is the dominant species northwards from Bermagui. Other trees including *Acmena smithii*, *Glochidion* spp. and *Melaleuca* spp. may be present as subordinate species (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.	No
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland/White Box Yellow Box Blakely's Red Gum Woodland	E	CE	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). This EEC has been recorded within the Stage 1, Stage 2 approval areas. White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland is usually restricted to lower lying and foothill areas and as such it is unlikely that the proposed disturbance will impact upon this EEC/critically endangered ecological community (CEEC).	Unlikely

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

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

The BioMetric vegetation types within the proposed haul road realignment have been mapped and are shown in **Figure 2**. The proposed haul road realignment contains two BioMetric vegetation types. By order of area, the dominant vegetation type is White Box – Narrow-leaved Ironbark Shrubby Open Forest on hills of the central Hunter Valley, Sydney Basin and Grey Gum - Narrow-leaved Stringybark - Ironbark Woodland on ridges of the upper Hunter Valley, Sydney Basin. The BioMetric vegetation types and associated areas are shown in **Table 4**.

These BioMetric vegetation types are not related to any TECs listed under the TSC or EPBC Act.

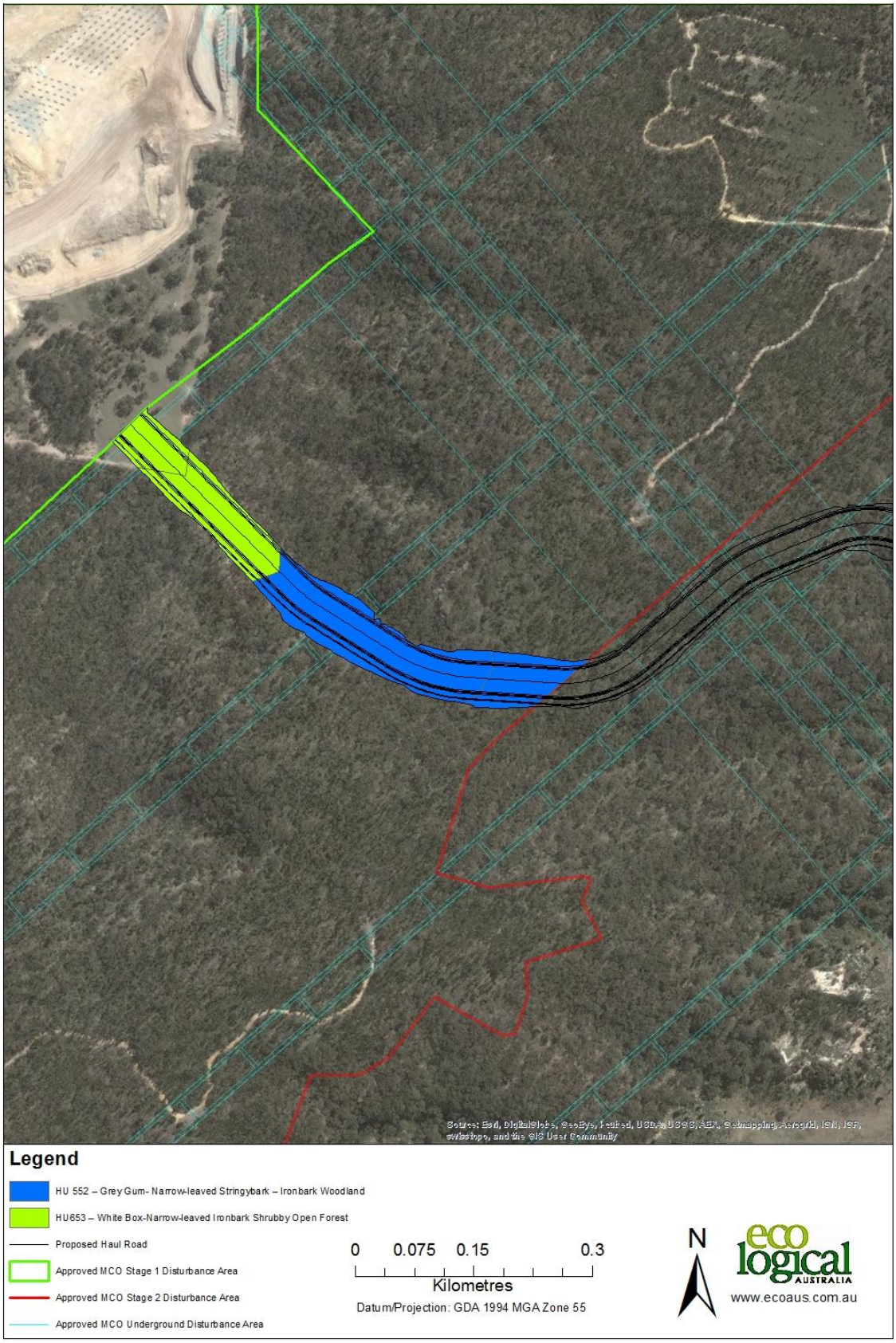

Figure 2: BioMetric Vegetation Types within the Proposed Haul Road Realignment

Table 4: BioMetric Vegetation Types within the Proposed Haul Road Realignment

Biometric Vegetation Types	Area (ha)
Grey Gum - Narrow-leaved Stringybark - Ironbark Woodland on ridges of the upper Hunter Valley, Sydney Basin (HU552)	1.8
White Box – Narrow-leaved Ironbark Shrubby Open Forest on hills of the central Hunter Valley, Sydney Basin (HU653)	3.3

3.1.1 Grey Gum – Narrow-leaved Stringybark – Ironbark Woodland on Ridges

Grey Gum - Narrow-leaved Stringybark - Ironbark Woodland on ridges of the Upper Hunter Valley, Sydney Basin is found on the northern section of the proposed impact 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 fibrosa* (Broad-leaved Ironbark) and *Eucalyptus punctata* (Grey Gum), with *Eucalyptus agglomerata* (Blue-leaved Stringybark) and *Eucalyptus dwyeri* (Dwyer's Red Gum) occurring less frequently (**Plate 1**). 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.

Plate 1: Grey Gum – Narrow-leaved Stringybark – Ironbark Woodland BioMetric Vegetation Type

3.1.2 White Box – Narrow-leaved Ironbark Shrubby Open Forest on Hills

White Box – Narrow-leaved Ironbark Shrubby Open Forest on hills of the central Hunter Valley, Sydney Basin occurs in the southern area 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 *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Eucalyptus blakelyi* (Blakely's Red Gum) occurring less frequently (**Plate 2**). The mid-storey is dominated by *Acrotriche rigida, Cassinia spp.* and *Oxylobium ilicifolium*. The groundcover is sparse with scattered native grasses and herbs.

Plate 2: White Box – Narrow-leaved Ironbark Shrubby Open Forest BioMetric Vegetation Type

3.2 FLORA

No threatened species listed under the TSC or EPBC Acts were identified as occurring within the study area by these surveys or any other surveys conducted at Moolarben during past assessments, including the *Moolarben Coal Project Stage 1 Flora, Fauna and Aquatic Ecology Assessment* (Moolarben Biota 2006), *Moolarben Coal Project Stage 1 Optimisation Modification Ecological Impact Assessment* (EMM 2013) and *Moolarben Coal Project Stage 2 Ecological Impact Assessment* (Ecovision Consulting 2008).

The data audit revealed 12 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 subject site. These threatened flora species are listed in **Table 5** together with an assessment of the 'likelihood of occurrence' of each species.

Pomaderris queenslandica (Scant Pomaderris) was the only threatened flora species listed under the TSC or EPBC Act deemed to have the potential to occur within the proposed haul road realignment (i.e. all species had either a "no" or "unlikely" likelihood rating).

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	-	Associated species include *Eucalyptus albens, E. blakelyi* 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, however the proposed disturbance area does not constitute potential habitat for this species.	Unlikely
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	Grows in swamp-heath on sandy soils, chiefly in coastal districts, south from the Gibraltar Range (OEH 2014b). *Cryptostylis hunteriana* has not been recorded previously during assessments undertaken for Stage 1 or Stage 2. No potential habitat will be removed as a result of the proposed disturbance.	No
Diuris tricolor	Pine Donkey Orchid,	V	-	Grows in sclerophyll forest among grass, often with *Callitris sp.*, found in sandy soils, either on flats or small rises. Soils include gritty orange-brown loam on granite, shallow red loamy sand on stony porphyry (OEH 2014b). *Diuris tricolor* has previously been recorded within the Stage 1 approval area, however the proposed disturbance area does not constitute potential habitat for this species.	Unlikely
Eucalyptus cannonii	Capertee Stringybark	V	-	Grows in Tablelands Grassy Woodland Complex communities and Talus Slope Woodland, usually dominated by *Eucalyptus macrorhyncha* or *E. goniocalyx* (OEH 2014b). *Eucalyptus cannonii* and hybrid specimens of this species have identified locally, however, the proposed disturbance 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	Grows in eucalypt forest with a mixed grass and shrub understorey (OEH 2014b). *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 proposed disturbance.	No
Grevillea obtusiflora		E	E	Grows in sandy soils in dry sclerophyll woodland. Subspecies *obtusiflora* is only known to occur near Rylstone, while subspecies *fecunda* occurs in the Capertee Valley, north-west of Lithgow, and in the Gardens of Stone National Park (OEH 2014b). *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 proposed disturbance.	No
Pelargonium sp. Striatellum (G.W. Carr 10345)		-	E	In NSW, is known from the Southern Tablelands. Otherwise, only known from the shores of Lake Omeo near Benambra in Victoria where it grows in cracking clay soil that is occasionally flooded (OEH 2014b). *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 proposed disturbance.	No

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Philotheca ericifolia		-	V	Grows primarily in dry sclerophyll forest and heath on damp sandy flats and gullies, although it has also been collected from heath, open woodland, dry sandy creek beds, and rocky ridge and cliff tops (OEH 2014b). *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 proposed disturbance.	No
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 disturbance area does constitute potential habitat for this species.	Potential
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). *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 proposed disturbance.	No

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Thesium australe	Austral Toadflax	V	V	Occurs in grassland or grassy woodland. Often found in damp sites in association with *Themeda australis* (OEH 2014b). *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 proposed disturbance.	No
Tylophora linearis		V	E	Occurs in dry scrub and open forest usually on sandy soils. Grows among shrubs and tussocks or around large woody debris (OEH 2014b). *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 proposed disturbance.	No

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

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

EPBC Protected Matters Search Tool (DotE 2014a), -32.39745 S, 150.1439 E (Datum GDA94) and Atlas of NSW Wildlife (OEH 2014a), -32.34 to -32.44 and longitude 150.1 to 150.2 (Datum GDA94), 6th February 2014.

3.3 FAUNA HABITAT

Fauna habitat within the proposed haul road realignment consists of a suite of broad habitat elements. These habitat elements include:

- Hollow-bearing trees;
- Stags;
- *Allocasuarina* stands;
- Ephemeral drainage lines and associated vegetation;
- Woody debris (fallen logs and branches);
- Rocky outcrops; and
- Rocky overhangs (**Plate 3**).

The fauna habitat characteristics available within the proposed haul road alignment potentially provide sheltering, foraging, and roosting habitat for a range of fauna groups, particularly where trees and stags support hollows for arboreal mammals, birds and bats to shelter/roost/breed. The rocky overhangs (**Figure 3**) may provide potential roosting habitat for bats. Canopy, shrub layers and derived grassland provide potential foraging habitat for birds and mammals including bats. Woody debris and rocky outcrops provide potential foraging and sheltering habitat for ground dwelling mammals, frogs and reptiles.

No threatened fauna species listed under the TSC Act and/or the EPBC Act were observed during the field survey, nor have they been recorded in the study area by past surveys.

The threatened species returned by the database search are listed in **Table 6** together with an assessment of the likelihood of occurrence for each species.

A total of 33 species of threatened fauna have been deemed to either occur or potentially occur within the study area (i.e. they have a likelihood rating of “potential’ or higher). Five migratory species listed under the EPBC Act have the potential to occur within the study area (i.e. they have a likelihood rating of “potential’ or higher).

Figure 3: Rocky Outcrops within the Proposed Haul Road Realignment Area

Plate 3: A Rock Overhang, a Potential Form of Roosting Habitat for Threatened Bat Species

Table 6: 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					
Heleioporus australiacus	Giant Burrowing Frog	V	V	Forages in woodlands, wet heath, dry and wet sclerophyll forest (OEH 2014b). Associated with semi-permanent to ephemeral sand or rock based streams where the soil is soft and sandy so that burrows can be constructed (OEH 2014b). This species 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 proposed disturbance.	No
Litoria booroolongensis	Booroolong Frog	E	E	Typically inhabits rocky 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 and Stage 2. No potential habitat will be removed as a result of the proposed disturbance.	No
Mixophyes iteratus	Giant Barred Frog	E	E	Found on forested slopes of the escarpment and adjacent ranges in riparian vegetation, subtropical and dry rainforest, wet sclerophyll forests and swamp sclerophyll forest (OEH 2014b). Lives in flowing streams with high water quality, though habitats may contain weeds (OEH 2014b). This species 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 proposed disturbance.	No

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Reptiles					
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	The nearest confirmed record is from over 40 km to the south-west. Inhabits sloping, open woodland areas with predominantly native grassy groundcover, particularly those dominated by Kangaroo Grass (OEH 2014b). This species 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 proposed disturbance.	No
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Typical sites 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. They utilise rock crevices and exfoliating sheets of weathered sandstone during the cooler months and tree hollows during summer (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. Potential habitat exists in the form of exposed sandstone outcrops.	Potential
Birds					
Anthochaera phrygia	Regent Honeyeater	CE	E	Open woodlands and forests, particularly *Eucalyptus sideroxylon*, *E. albens*, *E. melliodora* and *E. blakelyi* 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 and Stage 2. Potential habitat exists 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		
Apus pacificus	Fork-tailed Swift	-	M	Non-breeding migratory bird. Occurs in Australia between October and late April. 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 and Stage 2. Potential habitat exists in the form of potential foraging habitat as open woodland.	Potential
Ardea modesta	Eastern Great Egret	-	M	Common and widespread in Australia. 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 and Stage 2. No potential habitat will be removed as a result of the proposed disturbance.	No
Ardea ibis	Cattle Egret	-	M	Common and widespread in Australia. Forage 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 been recorded previously during assessments undertaken for Stage 1 and Stage 2, however the proposed disturbance area does not constitute potential habitat for this species.	Unlikely
Epthianura albifrons	White-fronted Chat	V	-	Endemic to Australia, in particular southern regions of Australia. In NSW it occupies temperate to arid habitats from foothills to 1000 m altitude. In NSW the White-fronted Chat occurs in open habitats near the coast in close proximity to waterways including estuaries, saltmarsh or marshy wetlands (OEH 2014b).	Unlikely

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 and Stage 2. No potential habitat will be removed as a result of the proposed disturbance.	
Lophoictinia isura	Square-tailed Kite	V	-	Occurs in woodland and forested areas (OEH 2014b). Forages and breeds along inland timbered watercourses. 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. This species was not recorded from adjacent to the proposed impact area. Potential habitat exists in the form of potential foraging habitat as open woodland.	Potential
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	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. This species was not recorded from adjacent to the proposed impact area. Potential habitat exists in the form of potential foraging habitat as open woodland.	Potential
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Associated with a variety of forest types containing *Allocasuarina* species. Nests in large trees with large hollows (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. Likely 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).	Likely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	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. Likely habitat for this species exists within the proposed impact area in the form of foraging habitat and potential nesting habitat.	Likely
Circus assimilis	Spotted Harrier	V	-	Occurs in grassy open woodland and grasslands (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. Likely habitat for this species exists within the proposed impact area in the form of foraging habitat.	Likely
Daphoenositta chrysoptera	Varied Sittella	V	-	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 the ecological assessment undertaken for Stage 1 and Stage 2. Likely habitat for this species exists within the proposed impact area in the form of foraging habitat.	Likely
Gallinago hardwickii	Latham's Snipe	-	M	A variety of permanent and ephemeral wetlands, preferring open fresh water wetlands with nearby cover. 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 and Stage 2. No potential habitat will be removed as a result of the proposed disturbance.	No

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Burhinus grallarius	Bush Stone-curlew	E	-	Associated with dry open woodland with grassy areas, dune scrubs, in savannah areas, the fringes of mangroves, golf courses and open forest / farmland (Marchant & Higgins 1993). 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. This species 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 proposed disturbance.	Unlikely
Glossopsitta pusilla	Little Lorikeet	V	-	Mostly occur 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. Potential habitat exists in the form of potential foraging and nesting habitat.	Potential
Grantiella picta	Painted Honeyeater	V	-	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. Potential habitat exists in the form of potential foraging and nesting habitat.	Potential
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	M	Forages over large open fresh or saline lakes, rivers and wetlands. This species 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 proposed disturbance.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Hieraaetus morphnoides	Little Eagle	V	-	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 the ecological assessment undertaken for Stage 1 and Stage 2. Likely habitat for this species exists within the proposed impact area in the form of foraging habitat.	Likely
Hirundapus caudacutus	White-throated Needletail	-	M	Forages aerially over a variety of habitats usually over coastal and mountain areas, most likely with a preference for wooded areas. 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. Likely habitat exists in the form of potential foraging habitat as open woodland.	Likely
Lathamus discolor	Swift Parrot	E	E	Occur in areas where eucalypts are flowering profusely, or where there are abundant lerp. Breeds in Tasmania during spring and summer, migrating to south-eastern Australia in the autumn and winter months (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. Potential habitat exists in the form of potential foraging habitat with winter flowering Eucalypt species.	Potential
Neophema pulchella	Turquoise Parrot	V	-	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).	Likely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
				This species has been recorded within close proximity to the proposed impact area during the ecological assessment undertaken for Modifications to Stage 1. Likely habitat for this species exists within the proposed impact area in the form of foraging and nesting habitat.	
Leipoa ocellata	Malleefowl	E	-	Dry inland scrub, mallee with loose sandy soils. Males tend large sand nest-mound (OEH 2014b). Nearest confirmed records are between Dubbo and Mendooran over 50 km away. This species 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 proposed disturbance.	No
Pachycephala inornata	Gilbert's Whistler	V	-	The Gilbert's Whistler is found in shrubby woodland, mallee (Simpson & Day 1996). This species has been recorded previously during assessments undertaken for Stage 1. No potential habitat will be removed as a result of the proposed disturbance.	Unlikely
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Associated with a wide range of eucalypt woodlands and open forests. In temperate woodlands, usually open grassy. 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 the ecological assessment undertaken for Stage 1 and Stage 2. Likely habitat for this species exists within the proposed impact area in the form of foraging and nesting habitat.	Likely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Petroica boodang	Scarlet Robin	V	-	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 the ecological assessment undertaken for Stage 1 and Stage 2. 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	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys, and a grassy ground layer for breeding habitat. Shrub density does not appear to be an important habitat factor. Many birds 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 and Stage 2. Potential habitat exists in the form of potential foraging habitat.	Potential
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	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 modifications of Stage 1. Likely habitat for this species exists within the proposed impact area in the form of foraging habitat.	Likely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Merops ornatus	Rainbow Bee-eater	-	M	Regular breeding migrant to southern Australia, arriving September to October, departing February to March. 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. Likely habitat exists in the form of potential foraging habitat as open woodland.	Likely
Myiagra cyanoleuca	Satin Flycatcher	-	M	Heavily vegetated gullies in forests, and taller woodlands of coastal south-east Australia. 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. Potential habitat exists in the form of potential foraging habitat as open woodland.	Potential
Ninox connivens	Barking Owl	V	-	Associated with a variety of habitats such as savannah woodland, open eucalypt forests, wetland and riverine forest. The habitat is typically dominated by eucalypts. It 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 and Stage 2. Potential habitat exists in the form of potential foraging and roosting habitat.	Potential

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Ninox strenua	Powerful Owl	V	-	Eastern forests, from the coast to the tablelands. Now uncommon and occurring at low densities. 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 and Stage 2. This species was not recorded from adjacent to the proposed impact area. Likely habitat exists in the form of potential foraging and roosting habitat.	Likely
Tyto novaehollandiae	Masked Owl	V	-	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). 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 modifications to Stage 1. Likely habitat for this species exists within the proposed impact area in the form of foraging habitat.	Likely
Polytelis swainsonii	Superb Parrot	V	V	Their core breeding area 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 and Stage 2. It is unlikely that any potential habitat will be removed as a result of the proposed disturbance.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	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. Potential habitat exists in the form of potential foraging and nesting habitat as open woodland.	Potential
Chthonicola sagittata	Speckled Warbler	V	-	Occupies a wide range of eucalypt dominated communities with a grassy understorey, often on rocky ridges or in gullies. Typical habitat 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. Likely habitat exists in the form of potential foraging and nesting habitat.	Likely
Stagonopleura guttata	Diamond Firetail	V	-	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 the ecological assessment undertaken for Stage 1 and Stage 2. Likely habitat for this species exists within the proposed impact area in the form of foraging and nesting habitat.	Likely
Rhipidura rufifrons	Rufous Fantail	-	M	Summer breeding migrant to south eastern Australia. 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).	Likely

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. Likely habitat exists in the form of potential foraging habitat as open woodland.	
Rostratula australis	Australian Painted Snipe	E	E, M	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 and Stage 2. No potential habitat will be removed as a result of the proposed disturbance.	No
Mammals					
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	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. Potential roosting habitat exists 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. Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, Bimbil box. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. Feeds on moths and possibly other flying invertebrates (OEH 2014b).	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. Potential roosting habitat exists in the form of exposed sandstone outcrops and potential foraging habitat exists as open woodland.	
Dasyurus maculatus (listed under EPBC Act as *Dasyurus maculatus maculatus* [*SE mainland population*])	Spotted-tailed Quoll	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline (OEH 2014b). This species 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 proposed disturbance.	Unlikely
Phascolarctos cinereus	Koala	V	V	Associated with both wet and dry eucalypt forest and woodland with acceptable Eucalypt food trees. Some preferred Eucalyptus species are: *Eucalyptus albens*, *E. blakelyi* and *E. punctata* (OEH 2014b). This species has not been recorded previously during assessments undertaken for Stage 1 and Stage 2. Potential habitat exists in the form of feed trees (White Box).	Potential
Petaurus australis	Yellow-bellied Glider	V	-	Restricted to tall mature forests, preferring productive tall open sclerophyll forests with a mosaic of tree species including some that flower in winter (OEH 2014b). Large hollows within mature trees are required for shelter, nesting and breeding (OEH 2014b). This species 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 proposed disturbance.	Unlikely

Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence
		TSC Act	EPBC Act		
Petaurus norfolcensis	Squirrel Glider	V	-	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 (OEH 2014b). This species has been recorded previously during assessments undertaken for Stage 1, however the proposed disturbance area does not constitute potential habitat for this species.	Unlikely
Cercartetus nanus	Eastern Pygmy-possum	V	-	The Eastern Pygmy Possum occurs in wet and dry eucalypt forest, subalpine woodland, coastal banksia woodland and wet heath (Menkhorst & Knight 2004). Pygmy-Possums feed mostly on the pollen and nectar from banksias, eucalypts and understorey plants and will also eat insects, seeds and fruit. Small tree hollows are favoured as day nesting sites, but nests have also been found under bark, in old bird nests and in the branch forks of tea-trees (OEH 2014b). This species 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 proposed disturbance.	No
Nyctophilus corbeni	South-eastern Long-eared Bat (listed as Corben's Long-eared Bat under EPBC)	V	V	This species 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 Stage 2. Potential habitat exists in the form of potential foraging and roosting habitat (hollow-bearing trees).	Potential
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Rocky areas in a variety of habitats, typically north facing sites with numerous ledges, caves and crevices and usually near fresh water (OEH 2014b).	Unlikely

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 and Stage 2. No potential habitat will be removed as a result of the proposed disturbance.	
Pseudomys novaehollandiae	New Holland Mouse	-	V	Inhabits open heathlands, open woodlands with a heathland understorey and vegetated sand dunes. A social animal, living predominantly in burrows shared with other individuals (OEH 2014b). This species 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 proposed disturbance.	Unlikely
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	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 and Stage 2. No potential habitat will be removed as a result of the proposed disturbance.	Unlikely
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Found in almost all habitats, from wet and dry sclerophyll forest, open woodland, open country, mallee, rainforests and heathland. 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 Stage 1. Potential habitat exists 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	-	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 artificial openings such as roads, creeks and small rivers, where it hawks backwards and forwards for prey (OEH 2014b). This species 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 proposed disturbance.	Unlikely
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. 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 and Stage 2. Potential habitat exists in the form of potential foraging and roosting habitat (hollow-bearing trees).	Potential
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Prefers moist habitats with trees taller than 20 m (OEH 2014b). 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 and Stage 2. Potential habitat exists 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 schreibersii oceanensis	Eastern Bentwing-bat	V	-	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. 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 Stage 1 and Stage 2. Potential habitat exists in the form of potential foraging and roosting habitat (hollow-bearing trees).	Potential
Vespadelus troughtoni	Eastern Cave Bat	V	-	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. 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 and Stage 2. Potential roosting habitat exists in the form of exposed sandstone outcrops and potential foraging habitat exists in the form as open woodland.	Potential

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

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

EPBC PMST (DotE 2014a), -32.39745 S, 150.1439 E (Datum GDA94) and Atlas of NSW Wildlife (OEH 2014a), -32.34 to -32.44 and longitude 150.1 to 150.2 (Datum GDA94), 6th February 2014.

4 Impact Assessment

The proposed modification described in this report would result less disturbance than that associated with the approved haul road (the approved haul road is 18.5 ha vs 5.1 ha with this modification). Notwithstanding, the impact assessment presented below and the detailed threatened species/community impact assessments provided in **Appendices B and C** have been undertaken from first principles assuming that the Modification represents an additional disturbance area. The impact assessments presented in this report are therefore considered highly conservative.

4.1 SUMMARY OF IMPACTS

The proposed haul road realignment will require removal of vegetation and potential fauna habitat within the proposed impact area. This impact is 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.

4.1.1 Assessment of Impacts on Threatened Species, Populations and Communities

No threatened flora or fauna species and vegetation communities listed under the TSC Act and/or the EPBC Act were observed within the proposed impact area.

Habitat requirements for potential threatened species / communities were compared with the study area's characteristics. One threatened flora species, 32 threatened fauna, and five non-threatened migratory fauna species were classed as either potential, likely or have been recorded. These 38 species were assessed in accordance with the relevant guidelines.

The results of these assessments are summarised in **Table 7**. Assessments for species listed under the TSC Act are detailed in **Appendix B**. Assessments under the EPBC Act are detailed in **Appendix C**.

No additional species would potentially be impacted by this the proposed haul road alignment than the currently approved haul road alignment being replaced (i.e. this 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 7: Summary of Potential Impacts on Threatened Fauna Species

Scientific Name	Common Name	Conservation Significance		Likelihood of Occurrence	Significance of Impact
		TSC Act	EPBC Act		
Pomaderris queenslandica	Scant Pomaderris	E	-	Potential Habitat	Not Significant
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Potential – Nesting, Sheltering and Foraging habitat	Not Significant
Anthochaera phrygia	Regent Honeyeater	CE	E	Potential - Foraging Habitat	Not Significant
Lophoictinia isura	Square-tailed Kite	V	-	Potential – Foraging Habitat	Not Significant
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	Potential – Foraging Habitat	Not Significant
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Likely – Foraging and Nesting Habitat	Not Significant
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Likely – Nesting and Foraging Habitat	Not Significant
Circus assimilis	Spotted Harrier	V	-	Likely - Foraging Habitat	Not Significant
Daphoenositta chrysoptera	Varied Sittella	V	-	Likely - Foraging Habitat	Not Significant
Glossopsitta pusilla	Little Lorikeet	V	-	Potential – Foraging and Nesting Habitat	Not Significant
Grantiella picta	Painted Honeyeater	V	-	Potential – Foraging and Nesting Habitat	Not Significant
Hieraaetus morphnoides	Little Eagle	V	-	Likely - Foraging and Nesting Habitat	Not Significant
Lathamus discolor	Swift Parrot	E	E	Potential - Foraging Habitat	Not Significant

Scientific Name	Common Name	Conservation Significance		Likelihood of Occurrence	Significance of Impact
		TSC Act	EPBC Act		
Neophema pulchella	Turquoise Parrot	V	-	Likely - Foraging and Nesting Habitat	Not Significant
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Likely – Foraging and Nesting Habitat	Not Significant
Petroica boodang	Scarlet Robin	V	-	Likely - Foraging Habitat	Not Significant
Petroica phoenicea	Flame Robin	V	-	Potential - Foraging Habitat	Not Significant
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	Likely- Foraging Habitat	Not Significant
Ninox connivens	Barking Owl	V	-	Potential - Roosting & Foraging Habitat	Not Significant
Ninox strenua	Powerful Owl	V	-	Likely - Roosting & Foraging Habitat	Not Significant
Tyto novaehollandiae	Masked Owl	V	-	Likely - Roosting & Foraging Habitat	Not Significant
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	Potential - Nesting & Foraging Habitat	Not Significant
Chthonicola sagittata	Speckled Warbler	V	-	Likely – Foraging and Nesting Habitat	Not Significant
Stagonopleura guttata	Diamond Firetail	V	-	Likely - Foraging and Nesting Habitat	Not Significant
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Potential - Roosting & Foraging Habitat	Not Significant

Scientific Name	Common Name	Conservation Significance		Likelihood of Occurrence	Significance of Impact
		TSC Act	EPBC Act		
Chalinolobus picatus	Little Pied Bat	V	-	Potential - Roosting & Foraging Habitat	Not Significant
Phascolarctos cinereus	Koala	V	V	Potential - Koala Feed Trees	Not Significant
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Potential - Roosting & Foraging Habitat	Not Significant
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Potential - Roosting & Foraging Habitat	Not Significant
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Potential - Roosting & Foraging Habitat	Not Significant
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Potential - Roosting & Foraging Habitat	Not Significant
Nyctophilus corbeni	South-eastern Long-eared Bat (Corben's Long-eared Bat)	V	V	Potential - Roosting & Foraging Habitat	Not Significant
Vespadelus troughtoni	Eastern Cave Bat	V	-	Potential - Roosting & Foraging Habitat	Not Significant

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

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

The Eastern Cave Bat, Large-eared Pied Bat and Little Pied Bat are associated with open forest on ridges that potentially include rocky outcrops. These habitat elements have the potential for use as roosting habitat. Roosting habitat in rocky outcrops is considered to be a limiting factor in the locality as it is unique to certain geographic locations and is a finite abiotic resource. Potential foraging habitat (in the form of tall open woodland) for these species will also be removed. In consideration of these factors, impacts to the Eastern Cave Bat, Large-eared Pied Bat and Little Pied Bat will most likely occur, however, given the small area of impact are considered not to be significant.

While some impacts are expected for other threatened fauna species including diurnal birds, forest owls, and microbats from the loss of potential habitat (for a full list see **Table 7**), 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 National Park (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

Five non-threatened, commonwealth-listed migratory species are considered likely to occur in the study area (**Table 8**). Assessments of the significance of potential impacts of the proposed haul road realignment 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 8** below. No significant impact is anticipated for the migratory species.

Table 8: Summary of Potential Impacts Upon Migratory Fauna Species

Scientific Name	Common Name	Conservation Significance		Impact Description	Likely Significance of Impact
		TSC Act	EPBC Act		
Apus pacificus	Fork-tailed Swift	-	M	Potential – Foraging Habitat	Not Significant
Hirundapus caudacutus	White-throated Needletail	-	M	Likely – Foraging Habitat	Not Significant
Merops ornatus	Rainbow Bee-eater	-	M	Likely – Foraging Habitat	Not Significant
Myiagra cyanoleuca	Satin Flycatcher	-	M	Potential - Foraging Habitat	Not Significant
Rhipidura rufifrons	Rufous Fantail	-	M	Likely – Foraging Habitat	Not Significant

***EPBC Act Status**: M - Migratory*

4.2 DIRECT IMPACTS

4.2.1 Vegetation Clearing

Approximately 5.1 ha of native vegetation will be directly impacted by the proposed haul road realignment.

Woodland and forest vegetation to be cleared represents less than 0.01% of the remnant forest and woodland outside of conservation areas in the Central Tablelands Local Land Services area (34,533 ha of woodland and 24,792 ha of forest [Somerville 2009]).

None of the vegetation communities identified within the proposed haul road realignment are TECs listed under either the TSC Act and/or the EPBC Act.

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 includes the clearing of approximately 1,534 ha of native vegetation, including 902 ha of remnant vegetation and 632 ha of grassland (including 123 ha of the *Box-Gum Woodland and Derived Native Grassland (CEEC)*).

The vegetation loss within the Stage 2 approval area has resulted in the provision of ecological offsets totalling 4,822 ha of native vegetation, including 3,689 ha of remnant vegetation, 1,134 ha of grassland (including 1,154 ha of *Box-Gum Woodland and Derived Native Grassland (CEEC)*). These offsets are distributed across eight properties.

The proposed disturbance area represents a smaller area to be cleared than the haul road approved under the Stage 2 Project Approval (08_0135), creating surplus offset areas. The approved haul road within the Stage 2 Project Approval would impact an area of 18.5 ha. This is approximately 13.4 ha more vegetation than the proposed OC4 haul road realignment. The current BOS developed for Stage 2 adequately covers the proposed impacts from the proposed haul road realignment, with surplus area.

4.2.2 Loss of Fauna Habitat

Approximately 5.1 ha of forest and woodland containing potential fauna habitat will be removed from the proposed haul road realignment impact area. The vegetation communities present within the impact area provide resources for a range of common and threatened fauna species with habitat features including structural diversity, hollow bearing trees, rocky outcrops and large woody debris.

Habitat features that will be removed include hollow bearing trees and rocky outcrops. Measures to minimise adverse impacts will be undertaken in accordance with MCP's current Landscape Management Plan (LMP) or its future revision (i.e. the complex wide Biodiversity Management Plan [BMP] that is required by Project Approval 08_0135) and include, where practical, the salvaging and relocation of large hollows identified during pre-clearing surveys.

A proportion of the species listed in **Table 7** and **Table 8** are considered to have the potential to breed within the natural habitat currently present in the proposed haul road realignment area. Collectively, approximately 5.1 ha of potential threatened species breeding habitat will be removed from the proposed haul road realignment.

The proposed disturbance area represents a smaller area to be cleared than the approved haul road under the Stage 2 Project Approval (08_0135). The approved haul road impacts an area of 18.5 ha, which contains habitat similar to the proposed haul road realignment impact area. The current BOS developed for Stage 2 adequately covers the proposed impacts upon fauna habitat from the proposed haul road realignment, with surplus area.

4.3 INDIRECT IMPACTS

4.3.1 Noise

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 haul road realignment is adjacent to an existing mining area. Mine operations already emit noise in the study area, which has the ability to disrupt fauna behaviour. Noise impacts as a result of the proposed haul road realignment are not expected to increase greatly above current levels in the study area.

4.3.2 Dust

The proposed disturbance area represents a shorter overall distance to existing mining operations than the currently approved haul road under the Stage 2 Project Approval (08_0135). Dust impacts on native flora and fauna are likely to be less than those currently approved given the shorter, more direct route to existing mining operations for the proposed haul road realignment impact area.

4.3.3 Fragmentation, Edge Effects & 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 haul road realignment area, connecting it to wooded areas and a large regional corridor containing Goulburn River NP and Munghorn Gap Nature Reserve. The proposed haul road realignment is located within the central areas of this large patch of contiguous forest and woodland.

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 including weeds and increase the ability for feral animals to colonise and utilise remnant vegetation (Olivieira Filho *et al*. 1997).

The north-western and south-eastern edges of the proposed impact area are currently (or approved) to be impacted by edge effects. Any additional edge effects from the proposed impact area will be minimised, where possible, using active management techniques. Weeds will be managed in accordance with the LMP.

The proposed disturbance area represents a smaller area to be cleared than the approved haul road under the Stage 2 Project Approval (08_0135). The approved haul road impacts an area of 18.5 ha, which is approximately 13.4 ha more vegetation/habitat than the proposed haul road realignment.

4.3.4 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 the European Red Fox and Rabbit may also be displaced immediately following clearing of the proposed haul road realignment area. Mitigation measures including feral animal management and control are recommended to be implemented to minimise the likelihood of such impacts taking place.

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.

It is of significant note that the cumulative loss of native vegetation and habitat values in the study area from this proposed haul road realignment is 13.4 ha less than the currently approved haul road.

Ensuring that appropriate impact mitigation and management techniques are implemented will help to reduce overall cumulative impacts.

4.5 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 complex wide BMP that is required by Project Approval 08_0135). A component of the LMP/BMP is a biodiversity impact mitigation strategy that aims to 'maintain and enhance' ecological values in order to result in a net positive biodiversity benefit in the post developed landscape.

Progressive mine disturbance rehabilitation is required to take place across the disturbance area. Disturbed areas will be progressively rehabilitated with native vegetation to provide an environment that could resemble pre-mined vegetation and fauna habitat values.

4.5.1 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.

4.5.2 During Construction

- Implementation of MCO's Ground Disturbance Permit to be approved by the Environment and Community Relations Manager as required prior to the commencement of clearing activities.
- Habitat features important to threatened fauna species are recommended to be collected and stockpiled for reinstatement in rehabilitation areas.
- Management for weeds and pest animals is recommended to occur.
- Implementation of dust minimisation and suppression measures detailed in the Air Quality Management Plan or its future revision.
- Top soil removed during construction works is recommended to be stockpiled and used in rehabilitation areas.

4.5.3 Post Construction

- If rehabilitation is to be performed, avoid the use of exotic or non-local native plant species in revegetation work. Appropriate native flora species characteristic of the original communities are recommended to be used. Local provenance seed stock is recommended to be used where possible. Undertake rehabilitation activities in accordance with the LMP/BMP.
- Management for weeds and pest animals is recommended to occur.

5 Conclusion

The proposed haul road realignment requires the removal of approximately 5.1 ha of native vegetation which is 13.4 ha less than the disturbance footprint associated with the currently approved haul road. No TECs or threatened flora species will be removed as part of the proposed works.

The overall removal of vegetation and fauna habitat is considered to be minor within the regional context, especially considering the impact is less than the disturbance associated with approved haul road. Open forest and woodland to be cleared (and then re-established upon completion) represents less than 0.01% of the remnant forest and woodland outside of conservation areas in the Hunter Central Rivers CMA.

Assessments of significance were applied under Section 5A of the EP&A Act as well as assessments under the EPBC Act to determine the significance of potential impacts to species, populations and communities that were deemed potential or likely to occur in the study area. The proposed haul road realignment is not likely to result in significant impacts to any threatened biodiversity.

Management of potential impacts have been addressed, with mitigation measures that include reducing impacts to fauna during clearing and the use of local provenance seed in rehabilitation.

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.

The current BOS developed for Stage 2 adequately covers the proposed impacts from the proposed haul road realignment, with surplus area.

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Appendix A – Fauna Species List

Scientific Name	Common Name	TSC Act	EPBC Act	Presence
Birds				
Acanthiza lineata	Striated Thornbill	-	-	X
Acanthiza pusilla	Brown Thornbill	-	-	X
Acanthorhynchus tenuirostris	Eastern Spinebill	-	-	X
Cacatua galerita	Sulphur-crested Cockatoo	-	-	
Colluricincla harmonica	Grey Shrike-thrush	-	-	
Corcorax melanorhamphos	White-winged Chough	-		X
Cormobates leucophaea	White-throated Treecreeper	-	-	X
Corvus coronoides	Australian Raven	-	-	X
Cracticus tibicen	Australian Magpie	-	-	X
Dacelo novaeguineae	Laughing Kookaburra	-	-	X
Daphoenositta chrysoptera	Varied Sittella	V	-	X
Eolophus roseicapillus	Galah	-	-	X
Eopsaltria australis	Eastern Yellow Robin	-	-	X
Hylacola pyrrhopygia	Chestnut-rumped Heathwren	-	-	X
Lichenostomus chrysops	Yellow-faced Honeyeater	-	-	X
Lichenostomus fuscus	Fuscous Honeyeater	-	-	X
Lichenostomus leucotis	White-eared Honeyeater	-	-	X
Malurus cyaneus	Superb Fairy-wren	-	-	X
Malurus lamberti	Variegated Fairy-wren	-	-	X
Manorina melanocephala	Noisy Miner	-	-	X
Menura novaehollandiae	Superb Lyrebird	-	-	X
Origma solitaria	Rockwarbler	-	-	X
Pachycephala pectoralis	Golden Whistler	-	-	X

Scientific Name	Common Name	TSC Act	EPBC Act	Presence
Pardalotus punctatus	Spotted Pardalote	-	-	X
Phylidonyris novaehollandiae	New Holland Honeyeater	-		X
Platycercus eximius	Eastern Rosella	-	-	X
Rhipidura albiscapa	Grey Fantail	-	-	X
Sericornis frontalis	White-browed Scrubwren	-		X
Smicrornis brevirostris	Weebill	-	-	X
Strepera graculina	Pied Currawong	-	-	X
Vanellus miles	Masked Lapwing	-	-	X
Zosterops lateralis	Silvereye	-	-	X
Mammals				
Macropus giganteus	Eastern Grey Kangaroo	-	-	X
Wallabia bicolor	Swamp Wallaby	-	-	X
Tachyglossus aculeatus	Short-beaked Echidna	-	-	X
Trichosurus vulpecula	Common Brush-tailed Possum	-	-	X
Vombatus ursinus	Common Wombat	-	-	X
*Oryctolagus cuniculus**	Rabbit*	-	-	
*Vulpes vulpes**	Fox*	-	-	
Reptiles				
Ctenotus taeniolatus	Copper Tailed Skink	-	-	X
Amalosia (*Oedura*) *lesueurii*	Velvet Gecko	-	-	X

Appendix B – EP&A Act Assessment of Significance

As described in Section 4, the Modification described in this report would result in less disturbed than that associated with the approved haul road. Notwithstanding, the assessments presented in this appendix have been undertaken from first principles assuming that the Modification represents an additional disturbance area. The assessments are therefore considered highly conservative.

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 National Park (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 Part 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 haul road realignment will remove potential breeding habitat (hollow-bearing trees) on escarpments, limiting recruitment of the species within the study area, should the species occur. It will also remove some potential foraging and sheltering habitat present in the form of sandstone outcrops.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Approximately 5.1 ha of potential habitat (forest / woodland) will be removed by the proposed haul road realignment. Given that this species was not identified within the study area, it is considered unlikely that this will have an adverse effect on the species. If the species occurs in the study area, the potential habitat being removed would be important to 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 this species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 ha of vegetation and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged hollows and rock to compensate for the loss of these habitat features.
How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect habitat connectivity, as a large connected patch of remnant vegetation occurs adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the width of disturbance should not cause major fragmentation within in this corridor.

Threatened Forest Owls – Barking Owl, Powerful Owl and Masked Owl

The Barking Owl is listed as a vulnerable species under the TSC Act. Potential roosting habitat for the Barking Owl within the study area occurs as canopy species with dense foliage. Within the study area the potential nesting habitat occurs in the form of large tree hollows (OEH, 2014b).

The Powerful Owl is listed as a vulnerable species under the TSC Act. Within the study area the potential roosting habitat for the Barking Owl occurs as canopy species with dense foliage. Potential breeding and foraging habitat for the Powerful Owl is available within the study area in eucalypt woodlands. The Powerful Owl requires large tree hollows for nesting (OEH, 2014b).

The Masked Owl is listed as a vulnerable species under the TSC Act. The Masked Owl roosts in trees, crevices in cliffs or caves (OEH, 2014b). Nesting occurs in trees with hollows of greater than 40 centimetres (cm) in diameter (OEH, 2014b). Breeding is irregular and unpredictable for the Masked Owl, occurring from late summer to spring but mostly March to July (OEH, 2014b). Potential sheltering and foraging habitat is available in the study area within and trees with dense foliage.

An assessment of impact criteria under Part 5a of the EP&A Act has been completed to assess potential impacts to the forest owls.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	Areas of vegetation containing large hollow bearing trees, which are potential breeding resources for these species, will be removed for the proposed haul road realignment. This could limit recruitment of species and displace breeding pairs. Owls may be deterred from breeding in areas immediately adjacent to the study area which will be retained, due to increased noise and light. The study area is considered to represent a small component of these threatened owl's 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 breeding sites and breeding partners 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?	Approximately 5.1 ha of potential habitat (forest / woodland) will be removed by the proposed haul road realignment. Given that this species was not identified within the study area, it is considered unlikely that this will have an adverse effect on the species. If the species does occur in the study area, the potential habitat being removed would be important to 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.
How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 ha and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged hollows to compensate for the loss of some of these habitat features.
How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect overall connectivity, with a large connected patch of remnant vegetation occurring adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the narrow width of disturbance should not cause major fragmentation within in this corridor.

Raptors – Square-tailed Kite, Spotted Harrier and Little Eagle

The Square tailed Kite is listed as a vulnerable species under the TSC Act. It has not been recorded within the study area. Breeding for this species is from July to February, with nest sites generally located along or near watercourses, in a fork or large horizontal limb of a tree (OEH, 2014b). Potential foraging habitat for this species exists within the proposed impact area.

The Spotted Harrier is listed as a vulnerable species under the TSC Act. It has not been recorded within the study area. This species builds a stick nest in a tree (OEH, 2014b). Potential foraging habitat for this species exists within the proposed impact area.

The Little Eagle is listed as a vulnerable species under the TSC Act. It has not been recorded within the study area. This species builds a stick nest in a tree (OEH 2014b). Potential foraging habitat for this species exists within the proposed impact area.

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

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The proposed haul road realignment contains potential foraging and breeding habitat for the threatened raptors. Given that no threatened raptors, or their nests were recorded within the study area, and that similar habitats for these species are available across the locality and the region, the proposed impact is unlikely to affect the life cycles of viable local populations of these species.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Approximately 5.1 ha of potential habitat (Forest / woodland) will be removed by the proposed haul road realignment. These species were not identified within the study area, but may still occur, however, they are wide-ranging, high mobility species that occupy large territories. The small area of land disturbed as a result of the proposed haul road realignment is unlikely to have any impact on habitat resources of these wide-ranging species. It is also noted, that much larger areas of potential habitat exist and remain 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, this proposed haul road realignment is not at the known extent of these species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 ha 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.

How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect overall connectivity, with a large connected patch of remnant vegetation occurring adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the narrow width of disturbance should not cause major fragmentation within in this corridor.

Threatened Nomadic Nectivorous Birds – Swift Parrot, Regent Honeyeater, Painted Honeyeater and Black-chinned Honeyeater

The Regent Honeyeater is listed as a critically endangered species under the TSC Act. It has not been recorded in the study area although the Mudgee Wollar area has been identified as an important area for the species. This species builds small nests within the outer canopy of drooping *Eucalyptus* sp., *Casuarina* sp., *Melaleuca* sp. or Mistletoe branches (OEH, 2014b).

The Painted Honeyeater is listed as a vulnerable species under the TSC Act. It has not been recorded in the study area. Potential foraging and nesting habitat is present for this species in the study area. This species builds small nests within the outer canopy of drooping *Eucalyptus* sp., *Casuarina* sp., *Melaleuca* sp. or Mistletoe branches (OEH, 2014b).

The Black-chinned Honeyeater is listed as a vulnerable species under the TSC Act. It has not been recorded in the study area. This species inhabits woodlands dominated by box and ironbark eucalypts, specifically White Box (OEH, 2014b). This species builds small nests within the outer canopy of drooping *Eucalyptus* sp., *Casuarina* sp., *Melaleuca* sp. or Mistletoe branches (OEH, 2014b).

The Swift Parrot is listed as an endangered species under the TSC Act. White Box, an important winter food resource, occurs in the study area. The Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south eastern Australia from Victoria and the eastern parts of South Australia to south east Queensland (OEH, 2014b).

Potential foraging habitat for threatened nectivores is present within the study area in areas that contain large numbers of mature trees and mistletoes. Key eucalypt feed species including White Box are present in the study area. Rough barked Apple and Mistletoes, and to a lesser extent, Grey Gum and Ironbark, are also present as a foraging resource for these nectivorous species (OEH, 2014b) in the study area.

An assessment of impact criteria under Part 5a of the EP&A Act has been completed to assess potential impacts to the nectivores.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The study area is part of an important area for the Regent Honeyeater. White Box, an important feed species is present within the study area. 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. Potential breeding habitat is present for the Black chinned and Painted Honeyeaters in woodlands of the study area. Given that similar habitats for these 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 5.1 ha of potential habitat (forest / woodland) will be removed by the proposed haul road realignment. 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, this proposed haul road realignment is not at the known extent of these species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 ha and will add to the current disturbance regimes. However, impacts will be managed including measures to restore vegetation and improve connectivity in the surrounding landscape (Offset properties) to compensate for the loss of these habitat features.
How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect overall connectivity, with a large connected patch of remnant vegetation occurring adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the narrow width of disturbance should not cause major fragmentation within in this corridor.

Threatened Hollow-dependent Woodland Birds – Glossy Black-Cockatoo, Brown Treecreeper, Little Lorikeet and Turquoise Parrot

The Glossy Black-Cockatoo is listed as a vulnerable species under the TSC Act. Limited foraging habitat is present for this species within the proposed impact area. Potential nesting habitat occurs in tree hollows of the study area, but as this habitat is not close to an important foraging area, they are unlikely to breed in the study area.

The Brown Treecreeper is listed as a vulnerable species under the TSC Act. Habitat is present for this species within the proposed impact area. Fallen timber is available for foraging habitat. Hollows for nesting are available in standing dead or live trees and tree stumps (OEH, 2014b), particularly in the open forests on hill slopes.

The Little Lorikeet is listed as a vulnerable species under the TSC Act. Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands and on the western slopes have been recorded in remnant woodland patches and roadside vegetation and riparian corridors which are generally favoured. Nest hollows are located at heights of between 2 m and 15 m. Hollow openings are very small, approximately 5 cm in diameter (OEH, 2014b). It has high site fidelity with nesting areas, which are usually in proximity to feeding areas. However, nomadic movements, following food availability are common (OEH, 2014b). Breeding habitat is limited to areas containing suitable hollows in relative close proximity to optimal foraging habitat.

The Turquoise Parrot is listed as a vulnerable species under the TSC Act. Foraging habitat for this species is present throughout the more open woodlands containing some grass in the understory as well as the White box shrubby woodlands and ecotones between woodland and more open areas. Nesting habitat is available in tree hollows, logs and old fence posts. The Turquoise Parrot breeds from August to December (OEH, 2014b).

An assessment of impact criteria under Part 5a of the EP&A Act has been completed to assess potential impacts of the proposed haul road realignment to hollow dependent woodland birds.

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 habitat for the Brown Treecreeper, Little Lorikeet and Turquoise Parrot and foraging habitat for all hollow dependant woodland birds. Given that similar habitats 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?	Approximately 5.1 ha of potential habitat (Forest / woodland) will be removed by the proposed haul road realignment. Habitat fragmentation will occur, however given the proposed haul road is located in an area between current and/or approved mining activities, fragmentation is not considered to be significant and affect the available habitat for these species. 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 proposed haul road realignment is not at the known extent of these species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 ha and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged hollows and undertake restoration effort to compensate for the loss of these habitat features.
How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect overall connectivity, with a large connected patch of remnant vegetation occurring adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the width of disturbance should not cause major fragmentation within in this corridor.

Threatened Nest Building Woodland Birds – Varied Sittella, Grey-crowned Babbler, Speckled Warbler and Diamond Firetail

The Varied Sittella is listed as a vulnerable species under the TSC Act. The Varied Sittella is sedentary and inhabits eucalypt forests and woodlands, especially rough barked species, mature smooth barked gums with dead branches. It builds a cup shaped nest of plant fibres and cobweb in an upright tree fork high in the tree canopy. It often re uses the same fork or tree in successive years. Potential habitat occurs in the study area where smooth barked trees including Grey Gum, and rough barked species including White Box and Rough barked Apple occur.

The Grey-crowned Babbler is listed as a vulnerable species under the TSC Act. Foraging habitat for this species is available in areas of fallen timber or grassy understorey. This highly communal and territorial species builds large dome nests throughout its territory which provide roosting habitat as well as nesting habitat. The species breeds between July and February (OEH 2014b).

The Speckled Warbler is listed as a vulnerable species under the TSC Act. Speckled Warblers inhabit woodlands with a grassy understorey, often on ridges or gullies. The species is sedentary, living in pairs or trios and nests on the ground in grass tussocks, dense litter and fallen branches. They forage on the ground and in the understorey for arthropods and seeds (OEH, 2014b).

The Diamond Firetail is listed as a vulnerable species under the TSC Act. Foraging and breeding habitat is present in the grassy woodlands of the study area. This species is largely sedentary and forms small colonies to breed between August and January (OEH 2014b).

An assessment of impact criteria under Part 5A of the EP&A Act has been completed to assess potential impacts to other woodland birds in the study area.

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 foraging and breeding habitat for threatened nest building woodland birds. Given that similar habitats for these species are available across the locality and the 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?	Approximately 5.1 ha of potential habitat (Forest / woodland) will be removed by the proposed haul road realignment. Habitat fragmentation will occur, however given the proposed haul road is located in an area between current and/or approved mining activities, fragmentation is not considered to be significant and affect the available habitat for these species. 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, this proposed haul road realignment is not at the known extent of these species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 ha and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged hollows and large woody debris as well as undertake active vegetation restoration in accordance with the Biodiversity Offset Strategy. These efforts will aide in compensating for the loss of key habitat features.
How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect overall connectivity, with a large connected patch of remnant vegetation occurring adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the width of disturbance should not cause major fragmentation within in this corridor.

Threatened Robins – Hooded Robin, Scarlet Robin and Flame Robin

The Hooded Robin is listed as a vulnerable species under the TSC Act. Territories range from around 10 ha during the breeding season, to 30 ha in the non-breeding season (OEH 2014b). Potential habitat is present in woodlands of the study area, adjacent to cleared agricultural land.

The Scarlet Robin and Flame Robin are listed as vulnerable species under the TSC Act. These species were not recorded in the study area. Potential winter foraging habitat is available for these species in the proposed impact area. Tree trunks, logs and other coarse woody debris are also available for perching/foraging habitat (OEH 2014b), particularly in open forests on ridges.

An assessment of impact criteria under Part 5a of the EP&A Act has been completed to assess potential impacts of the proposed haul road realignment to robins.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	Scarlet and Flame Robins are unlikely to breed within the study area as they prefer to breed in upland, tall moist forests. Therefore, the proposed haul road realignment will not impact on the lifecycle of these species. If present, it is likely that the Hooded Robin would breed in the study area. Some potential breeding habitat will be removed (open forests on ridges and footslope woodlands). In the areas adjacent to the proposed impact, which will be retained, birds will be subject to an intermittent increase in noise, light and dust. This may cause birds to be deterred from breeding in these areas. Measures to reduce these potential impacts will continue to be implemented as part of the relevant management plans. Given the extent of similar habitats available for these species across the adjacent woodlands and 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?	Approximately 5.1 ha of potential habitat (Forest / woodland) will be removed by the proposed haul road realignment. Habitat fragmentation will occur, however given the proposed haul road is located in an area between current and/or approved mining activities, fragmentation is not considered to be significant and affect the available habitat for these species. It is also noted 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, this proposed haul road realignment is not at the known extent of these species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 ha and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged hollows and large woody debris as well as undertake active vegetation restoration in accordance with the Biodiversity Offset Strategy. These efforts will aide in compensating for the loss of key these habitat features.
How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect overall connectivity, with a large connected patch of remnant vegetation occurring adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the width of disturbance should not cause major fragmentation within in this corridor.

Gang-gang Cockatoo

The Gang-gang Cockatoo is listed as a vulnerable species under the TSC Act. It is likely that the study area provides winter foraging and breeding habitat for this species, due to the presence of box and ironbark eucalypt species, wattles in the understorey of open forests, and suitable tree hollows. Goulburn River NP, directly north of the study area, is the northern limit of this species distribution in the area.

An assessment of impact criteria under Part 5a of the EP&A Act has been completed to assess potential impacts of the proposed haul road realignment to the Gang-gang Cockatoo.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	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 removal of potential wintering habitat in the study area may reduce the availability of foraging and shelter habitat for the species during this part of its life cycle. Surrounding conservation reserves (Goulburn River NP and Munghorn Gap Nature Reserve) provide suitable wintering habitat for this species, minimising the scale of this impact.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Approximately 5.1 ha of potential habitat (forest / woodland) will be removed by the proposed haul road realignment. Habitat fragmentation will occur, however given the proposed haul road is located in an area between current and/or approved mining activities, fragmentation is not considered to be significant and affect the available habitat for these species. It is noted, that much larger areas of potential habitat exist to the east and west of the study are which will continue to provide suitable habitat for the species.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, this proposed haul road realignment is not at the known extent of these species distribution.

How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 ha and will add to the current disturbance regimes. However, impacts will be managed including measures to retain salvaged hollows and large woody debris as well as undertake active vegetation restoration in accordance with the Biodiversity Offset Strategy. These efforts will aide in compensating for the loss of key these habitat features.
How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect overall connectivity, with a large connected patch of remnant vegetation occurring adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the width of disturbance should not cause major fragmentation within in this corridor.

Threatened Cave Roosting Microbats – Large-eared Pied Bat, Little Pied Bat, Eastern Bentwing-bat and Eastern Cave Bat

The Large eared Pied Bat is listed as a vulnerable species under the TSC Act and EPBC Act. Roosting habitat for this species is available in crevices and overhangs in sandstone rocky outcrops. Potential foraging habitat is present in Box Gum Woodlands and creek flats (DECC 2007b), but would also be present in open forest on ridgelines. Males can roost alone or in small groups during torpor in winter. Females form maternity colonies from November to February in the roof domes of sandstone caves. Females show high fidelity to maternity caves (Churchill, 2008).

The Little Pied Bat is listed as a vulnerable species under the TSC Act. Roosting habitat for this species is available in crevices and overhangs in sandstone rocky outcrops. Potential foraging habitat is present in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands (Churchill, 2008).

The Eastern Bent-wing Bat is listed as a vulnerable species under the TSC Act. Habitat (non breeding) is present for this species in eucalypt woodland and open grasslands (Churchill 2008). This species migrates to maternity roosts in limestone caves in October and gives birth from December to January. Females leave maternity sites in March to seek out cold caves for winter hibernation. Eastern Bentwing Bats roost in other caves and road culverts for the remainder of the year. Within the study area, roosting habitat is available in crevices and cracks of rocky outcrops.

The Eastern Cave Bat is listed as a vulnerable species under the TSC Act. Potential roosting habitat is available for the species in crevices and overhangs in rocky outcrops and in boulder piles. Potential foraging habitat is available in open forests, footslope woodlands and riparian woodlands (Churchill, 2008). Little is known of this species' reproductive habits. Pregnant females have been captured in October, and lactating females have been observed in December. Maternity colonies have been found in sandstone caves and also under corrugated iron rooves (Churchill, 2008).

An assessment of impact criteria under Part 5a of the EP& A Act has been completed to assess potential impacts of the proposed haul road realignment to threatened cave roosting bats.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	Potential breeding habitat for the Large-eared Pied Bat, Little Pied Bat and Eastern Cave Bat may be impacted by the proposed haul road realignment. Removal of this area may affect breeding success, limit recruitment and decrease the local population size in the long term as breeding habitat and caves are a limiting factor in the locality. Indirect impacts such as night light may also interrupt these species and affect breeding success in the study area. Habitat feature retention and re use for during rehabilitation will be undertaken. The Eastern Bent-wing Bat breeds in domed limestone caves outside the study area, and as such their breeding cycle will not be affected.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	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. Approximately 5.1 ha of suitable foraging habitat for these species and approximately 200 m of ridgeline containing potential breeding habitat for the Large-eared Pied Bat, Little Pied Bat and Eastern Cave Bat will be removed for the proposed haul road realignment.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, this proposed haul road realignment is not at the known extent of this species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 ha and will add to the current disturbance regimes. However, impacts will be managed including measures to retain bush rock to compensate for the loss of these habitat features.
How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect overall connectivity, with a large connected patch of remnant vegetation occurring adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the width of disturbance should not cause major fragmentation within in this corridor.

Threatened Tree-roosting Microbats –Yellow-bellied Sheathtail-bat, Eastern Freetail-bat and Eastern False Pipistrelle

The Yellow bellied Sheathtail-bat is listed as a vulnerable species under the TSC Act. This species roosts in large tree hollows, in colonies of approximately 30 bats. They hunt above the canopy, and sometimes on the forest edge (Churchill 2008). Foraging opportunities are present for this species within the proposed impact area. Roosting opportunities for the species are available in large tree hollows in eucalypt woodlands.

The East Coast Freetail-bat is listed as a vulnerable species under the TSC Act. This species roosts in tree hollows, and usually in hollow spouts of large mature trees. They hunt on the wing in forest gaps (Churchill 2008). Foraging opportunities are present for this species within the proposed impact area.

The Eastern False Pipistrelle is listed as a vulnerable species under the TSC Act. This species roosts in hollow trunks of eucalypt trees in colonies of three to 80. They hunt in gaps and spaces in the forest and avoid dense regrowth (Churchill 2008). Foraging opportunities are present for this species within the proposed impact area.

An assessment of impact criteria under Part 5a of the EP& A Act has been completed to assess potential impacts of the proposed haul road realignment 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, 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 (with the exception of the Eastern False Pipistrelle, which breeds in upland tall moist forest outside the study area), 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 noise, night light and dust. Measures to reduce these potential impacts will be implemented through the LMP/BMP.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	The proposed haul road realignment will remove 5.1 ha of potential foraging and breeding habitat 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 population' is 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 haul road realignment. The proposed haul road realignment is considered unlikely to fragment habitat for these species.

Does the proposal affect any threatened species that are at the limit of its known distribution?	No, this proposed haul road realignment is not at the known extent of these species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 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.
How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect overall connectivity of the vegetation in the area, with a large connected patch of remnant vegetation occurring adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the width of disturbance should not cause major fragmentation within in this corridor.

Koala

The Koala is listed as a vulnerable species under the TSC Act and EPBC Act. Limited habitat is available in the study area in White Box dominated forests and woodlands within the study area. This species breeds between September and December (OEH 2014b).

It is believed that this species occurs in very low densities in the locality as there is a paucity of records in the study area. Given the limited nature of habitat, it is likely that the study area does not constitute important habitat although this species may be utilising habitat present as part of a larger movement corridor with surrounding conservation reserves.

An assessment of impact criteria under Part 5a of the EP& A Act has been completed to assess potential impacts of the proposed haul road realignment to the Koala.

Factor	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	Koala was not recorded in the study area during the field survey. The species is considered likely to occur, but in low numbers. Potential breeding habitat in the form of woodlands will be removed as a result of the proposed haul road realignment and could impact the Koala due to its large home range size and high dispersal capability. This species is likely to only be present as vagrants or temporary visitors moving through the area between habitat patches, the study area is not likely to constitute important breeding habitat. Therefore its 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 haul road realignment will remove 5.1 ha of potential foraging and breeding habitat for the Koala from the study area. This habitat is not considered important for a local population. The proposed haul road realignment is considered unlikely to fragment habitat for these species.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No, this proposed haul road realignment is not at the known extent of these species distribution.
How is the proposal likely to affect current disturbance regimes?	The proposed haul road realignment will clear approximately 5.1 ha and will add to the current disturbance regimes. However, impacts will be managed including measures to retain feed trees where possible and to undertake revegetation to compensate for the loss of habitat features.
How is the proposal likely to affect habitat connectivity?	The proposed haul road realignment is unlikely to affect overall connectivity, with a large connected patch of remnant vegetation occurring adjacent to the proposed haul road realignment 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 haul road realignment area is located within the central areas of this large patch of contiguous forest and woodland, however the width of disturbance should not cause major fragmentation within in this corridor.

***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.

There were no specimens of Pomaderris spp. seen within the haul road disturbance area. 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 disturbance only, no Scant Pomaderris plants were observed within any of the proposed surface disturbance areas.

Assessment of impact criteria under Part 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 during the field survey; therefore no loss of individuals is expected as a result of clearing works. The Scant Pomaderris is a prolific seeding and suckering plant that benefits from soil disturbance. Clearing 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 5.1 ha of the potential habitat of this species; 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 adjacent 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 Scant Pomaderris.
How is the proposal likely to affect current disturbance regimes?	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 are unlikely. 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 UG1 area.
How is the proposal likely to affect habitat connectivity?	Clearing 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.

Appendix C – EPBC Act Significant Impact Guidelines

As described in Section 4, the Modification described in this report would result in less disturbance than that associated with the approved haul road. Notwithstanding, the assessments presented in this appendix have been undertaken from first principles assuming that the Modification represents an additional disturbance area. The assessments are therefore considered highly conservative.

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

The relevant Significant Impact Criteria have been applied to the endangered woodland birds (Swift Parrot and Regent Honeyeater), vulnerable bats (Large-eared Pied Bat and South-eastern (Corben's) Long-eared Bat), Koala and migratory birds (White-throated Needletail, Fork-tailed Swift, Rainbow Bee-eater, Rufous Fantail and Satin Flycatcher).

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 RAMSAR wetland.
any impact on Commonwealth Listed Critically Endangered or Endangered Species;	**Regent Honeyeater** (*Anthochaera phrygia*) and **Swift Parrot** (*Lathamus discolour*) The Regent Honeyeater is a highly nomadic species considered to have a widespread but patchy distribution throughout NSW, Victoria and Queensland. The species is listed as Endangered under the EPBC Act. The Regent Honeyeater is known to breed in only a few locations with the majority of breeding records coming from the Capertee Valley area of NSW, the Bundarra-Barraba area, and around Chiltern, Victoria. Scattered records of the species breeding in the Australian Capital Territory (ACT) and surrounding area have also been recorded.

Matters to be addressed	Impact (Commonwealth Legislation)
	This species nests in tall eucalypt trees and is found in association with reliable nectar sources such as Yellow Box (*E. melliodora*), White Box and Yellow Gum (*E. leucoxylon*), but also utilises species such as Grey Box (*E. microcarpa*), Red Box (*E. polyanthemos*) and Blakely's Red Gum (*E. blakelyi*) (DotE, 2014b). The Regent Honeyeater migrates depending upon the flowering of particular *Eucalyptus* species as outlined above. The erratic migration behaviours of this species may mean that a site is only visited intermittently but may be of critical importance during its use and as such the irregular use of a site does not reflect the conservation status of that site (DotE, 2014b). The Swift Parrot is listed as an endangered species under the EPBC Act. White Box, an important winter food resource, occurs in the study area. The Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south eastern Australia from Victoria and the eastern parts of South Australia to south east Queensland (OEH, 2014b). No sightings of the Regent Honeyeater or Swift Parrot were recorded in the proposed haul road realignment area, however, the species is known to utilise the region for foraging habitat and as such that there is a likelihood of it occurring. **An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:** **Criterion 1: lead to a long-term decrease in the size of a population** The proposed works will impact vegetation containing White Box, an important feed tree for the Regent Honeyeater and Swift Parrot. It is therefore likely that the study area may represent potential foraging habitat for the Regent Honeyeater and Swift Parrot. Evidence of foraging by Regent Honeyeater and Swift Parrot or breeding by Regent Honeyeater has not been recorded in the study area by detailed ecological surveys over several years and ongoing monitoring of adjacent areas. 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 the species** Regent Honeyeater and Swift Parrot show high site fidelity, returning to sites that have previously been used on a cyclic basis. However, as site use depends on the availability of foraging resources, the species are unlikely to be recorded at the same site every year (DotE 2014b). The proposed works will not reduce the area of occupancy of an important population of the Regent Honeyeater or Swift Parrot. **Criterion 3: fragment an existing 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 impact only on a small area of potential foraging habitat for the Regent Honeyeater and Swift Parrot. Due to the species being highly mobile it is unlikely that the impact to foraging habitat will adversely affect habitat critical to the survival of a species.

Matters to be addressed	Impact (Commonwealth Legislation)
	Criterion 5: disrupt the breeding cycle of a population The proposed works will impact upon a small area of potential foraging habitat for the Regent Honeyeater and Swift Parrot. Due to the species being highly mobile it is unlikely that the impact to foraging habitat will disrupt the breeding cycle of an important population of Regent Honeyeater. The Swift Parrot does not breed on mainland Australia so this Criterion does not apply to the species. **Criterion 6: modify, destroy, remove, 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 a small area of potential foraging habitat for the Regent Honeyeater and Swift Parrot, including a small area of potential winter foraging habitat and is therefore 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**.** Measures to rehabilitate habitats will continue to be implemented in accordance with MCO's LMP/BMP and Biodiversity Offset Strategy. **Criterion 7: result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat** The proposed works will not result in invasive species that are harmful to a endangered species becoming established in the endangered species' habitat. **Criterion 8: introduce disease that may cause the species to decline, or** The Regent Honeyeater is not known to be subject to disease. **Criterion 9: interfere with the recovery of the species.** Recovery actions for the Regent Honeyeater centre upon the maintenance and enhancement of habitat at key sites. MCO's LMP/BMP will minimise impacts on habitat for these species and rehabilitation efforts will replace potential habitat.
any impact on Commonwealth Listed threatened Species;	**Large-eared Pied Bat** (*Chalinolobus dwyeri*) The Large-eared Pied Bat is a medium-sized insectivorous bat measuring a total length of approximately 100 mm and weighing 7–12 grams. It has shiny, black fur on the body with a white stripe on the ventral side of the torso where it adjoins the wings and tail. The ears are large, and lobes of skin adorn the lower lip and between the corner of the mouth and the bottom of the ear. Its relatively short, broad wings suggest it flies slowly and with considerable manoeuvrability. The distribution of the species is poorly known due to its nocturnal and unobtrusive behaviour; and recent advances in targeted survey technology have only been in use since the 1990's. Much of the species' known distribution is within NSW, with the largest concentrations occurring in the sandstone escarpments of the Sydney Basin and the north-west slopes (Coolah Tops, Mt Kaputar, Warrumbungle National Park and Pilliga Nature Reserve). There is insufficient data to estimate the population of the Large-eared Pied Bat; however it has been suggested that the species is not likely to undergo natural fluctuations in population numbers, extent or occurrence. The species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging. It is believed that the Large-eared Pied Bat would utilise, in some part, the sandstone caves/overhangs and woodlands, present within the proposed impact area. These habitats provide the required potential foraging habitat for the species and as such the Large-eared Pied Bat is considered likely to occur in the area.

Matters to be addressed	Impact (Commonwealth Legislation)
	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 impact vegetation comprised of regenerating and mature native vegetation, which is potential foraging habitat. A small area of cliff line roosting habitat will be impacted as a result of the proposed works. Given this, it is possible there may be some long-term decrease in the size of any local populations of the species, although these populations have not been identified as being important. **Criterion 2: reduce the area of occupancy of an important population** The proposed works is not expected to reduce the area of occupancy of a known important population. **Criterion 3: fragment an existing important population into two or more populations** The proposed works will only remove a narrow area of habitat, therefore it is expected they 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 impact only on a small area of potential foraging and roosting habitat for the Large-eared Pied Bat. Due to the species being highly mobile it is unlikely that the impact to foraging habitat will adversely affect habitat critical to the survival of a species. **Criterion 5: disrupt the breeding cycle of an important population** The proposed works will impact upon a small area of potential foraging and roosting habitat for the Large-eared Pied Bat. Due to the species being highly mobile and the existence of a large extent of suitable habitat adjacent to the proposed impact area, and surrounding region it is unlikely that the impact to foraging and small area of roosting habitat will disrupt the breeding cycle of an important population of Large-eared Pied 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 and roosting habitat for the Large-eared Pied Bat, and is therefore 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**.** **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** The proposed works will not introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species.

Matters to be addressed	Impact (Commonwealth Legislation)
	Criterion 9: interfere substantially with the recovery of the species. A relevant objective to the proposed works for the Large-eared Pied Bat is the protection of all known roost sites. Known or potential roost sites for the Large-eared Pied Bat do not occur within the proposed impact area, therefore, the proposed works are consistent with this objective. **South-eastern Long-eared Bat** (Corben's Long-eared Bat) (*Nyctophilus corbeni*) The South-eastern Long-eared Bat, also called the South-eastern Long-eared Bat, has a head and body length of around 50-75 mm and a tail length of 35-50 mm. The weight varies between genders with females (14–21 g) being heavier than males (11–15 g). The South-eastern Long-eared Bat is distinguishable from other long-eared bats by its larger size as well as a broader skull and jaw. As with the Large-eared Pied Bat, the species is quite cryptic due to its nocturnal and unobtrusive behaviour and as a result, little is known about their biology or social structure. The distribution of the South-eastern Long-eared Bat is mostly restricted to the Murray-Darling Basin, however within this range distribution is scattered and the species is rarely recorded. NSW distribution covers most of the state except for the north-west whereby the landscape is dominated by treeless plains. The South-eastern Long-eared Bat occurs in a range of inland woodland vegetation types, including box, ironbark and cypress pine woodlands. The species has primarily been recorded in moister woodland of various eucalypt species lining watercourse and lakes, being most abundant in vegetation with a distinct canopy with a dense cluttered shrub layer. The South-eastern Long-eared Bat is an insectivorous and voracious feeder. Food can be taken in flight, by gleaning vegetation or ground foraging. In flight, it commonly feeds on beetles, bugs, and moths however it has also been recorded feeding on grasshoppers and crickets. **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 impact vegetation comprised of regenerating and mature native woodland, which is potential foraging habitat. Some hollow-bearing trees will be impacted by the proposed works. However, the area of suitable habitat being impacted is small in comparison to the habitat available surrounding area. 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 a known 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)
	Criterion 4: adversely affect habitat critical to the survival of a species The proposed works will impact only on a small area of potential foraging and roosting habitat for the South-eastern Long-eared Bat. Due to the species being highly mobile it is unlikely that the impact to foraging and roosting habitat will adversely affect habitat critical to the survival of a species. **Criterion 5: disrupt the breeding cycle of an important population** The proposed works will impact upon a small area of potential foraging and roosting habitat for the South-eastern Long-eared Bat. Some hollow-bearing trees will be impacted by the proposed works. Due to the species being highly mobile, and the availability of suitable habitat in the surrounding area, the proposed impact it is unlikely to 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 and roosting habitat for the South-eastern Long-eared Bat. Due to the species being highly mobile it is unlikely the proposed impact will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline in the local area or across its distribution. **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** 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 substantially with the recovery of the species.** Recovery actions for the South-eastern Long-eared Bat focus, in part, on gaining a better understanding of the species ecology. The proposed works do not directly interfere with this objective. **Koala** (*Phascolarctos cinereus*) Occurs in eucalypt woodlands and forests. In the Central Tablelands it primarily feeds on *Eucalyptus viminalis* and *E. camaldulensis.* In addition, 18 secondary food tree species have also been identified in this region this includes *Eucalyptus albens* (OEH, 2014b). Koalas spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than 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). White Box is a tree species listed under Schedule 2 of SEPP 44 as a koala feed tree and by OEH as a secondary koala feed tree. White Box trees occurred within proposed haul road realignment area.

Matters to be addressed	Impact (Commonwealth Legislation)
	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 development will disturb a small area of woodland which has some foraging habitat potential (5.1 ha). This is only a very small portion of the suitable foraging habitat in the surrounding area and it 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 development 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 development 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 development 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 impact area, it is unlikely that the proposed development 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 from 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. **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 development will 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 development 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** The proposed development will not introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species. **Criterion 9: interfere substantially with the recovery of the 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".

Matters to be addressed	Impact (Commonwealth Legislation)
	While some potential koala habitat will be removed, effort will be made to retain the potential koala feed trees present in the development envelope (where possible), and restoration efforts will be implemented as per the LMP/BMP. The action proposed is consistent with the objectives of the recovery plan.
any environmental impact on Commonwealth Listed Migratory Species;	**White-throated Needletail** (*Hirundapus caudacutus*), **Fork-tailed Swift** (*Apus pacificus),* **Rainbow Bee-eater** (*Merops ornatus*), **Satin Flycatcher** (*Myiagra cyanoleuca*) and **Rufous Fantail** (*Rhipidura rufifrons*) **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.** These species are all native residents of Australia which undertake latitudinal migrations according to season. The White-throated Needletail and Fork-tailed Swift do not breed in Australian territory, but migrate to Australia to forage during summer. The Rainbow Bee-eater and Rufous Fantail are latitudinal migrants which breed and forage in eastern Australia during the spring and summer. The Satin Flycatcher is an altitudinal and latitudinal migrant which moves between high altitude wet forests in south-eastern Australia where it breeds, to more open areas during the non-breeding season. The study area provides suitable foraging habitat for all of these species and provides suitable breeding habitat for the Rainbow bee-eater only, however, the proposed works are not expected to impact on the availability of foraging area in the vicinity, or surrounding region. Due to the high mobility of these species, the variety of habitat in the area and the small area of proposed 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 these migratory species. **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 these migratory species. **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 these species and the small amount of potential foraging habitat (and breeding habitat for the Rainbow Bee-eater) within the proposed impact area, the lifecycle of these species is not expected to be disrupted as a result of the project in any way.
any critically endangered and endangered ecological communities	No critically endangered and /or endangered ecological communities.
does any part of the Proposal involve a Nuclear Action;	No. The project does not include a Nuclear Action.
any environmental impact on a Commonwealth Marine Area;	No. There are no Commonwealth Marine Areas within the study area.

Matters to be addressed	Impact (Commonwealth Legislation)
In addition, any direct or indirect impact on Commonwealth lands	No. The project does not directly or indirectly affect Commonwealth land.

CONCLUSION OF EPBC ACT ASSESSMENT

It is unlikely that the development will significantly impact on the endangered woodland birds (Swift Parrot and Regent Honeyeater), vulnerable bats (Large-eared Pied Bat and Southern Long-eared Bat), Koala, and migratory birds (White-throated Needletail, Fork-tailed Swift, Rainbow Bee-eater, Rufous Fantail and Satin Flycatcher).

Referral to the Commonwealth under the EPBC Act is not warranted nor recommended.

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